

CFR 47 FCC Part 15.407

TEST REPORT

Product : **RISC-based Ready-to-Run Wireless
Embedded Computer**

Trade Name : MOXA

Model Number : W311; W311-LX; W321; W321-LX

FCC ID : SLEW321-W311

Prepared for

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Remark :

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

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Statement of Compliance

Applicant: MOXA Inc.
Manufacturer: MOXA Inc.
Product: RISC-based Ready-to-Run Wireless Embedded Computer
Model No.: W311; W311-LX; W321; W321-LX
Tested Power Supply: 120Vac, 60Hz
Date of Final Test: Mar. 11, 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: 2009/03/19

Project Engineer: *Anya Lee*
Anya Lee

Approved: *Jeffry Liu*
Jeffry Liu

1 General Information

1.1 Description of Equipment Under Test

- Product** : RISC-based Ready-to-Run Wireless Embedded Computer
- Model Number** : W311; W311-LX; W321; W321-LX
- 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** : Jan. 19, 2009
- Date of Test** : Feb. 03 ~ Mar. 11, 2009
- Additional Description** : 1. The EUT is “**RISC-based Ready-to-Run Wireless Embedded Computer**”.
2. All model included in this report, the difference please see detail as follows:

Model Number	W311	W311-LX	W321	W321-LX
Embedded Linux Kernel 2.6		✓		✓
Without OS	✓		✓	
Serial Port	1	1	2	2

3. The model **W311** is representative selected in the test and included in this report.
4. For more detail specification about EUT, please refer to the user’s manual.

Product Specifications

Standard Compliance	802.11a/b/g
Radio Frequency Type	DSSS, CCK, OFDM
Media Access Protocol	Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA)
Modulation	802.11a/g: OFDM (64-QAM, 16-QAM, QPSK, BPSK) 802.11b: DSS (DBPSK, DQPSK, CCK)
Transmission Power (Typical)	5.15 to 5.35 GHz: 15 dBm @6 Mbps; 12 dBm @54 Mbps 5.725 to 5.825 GHz: 15 dBm @6 Mbps; 12 dBm @54 Mbps USA: 2.412 to 2.462 GHz (IEEE802.11g): 17 dBm @6 Mbps; EU: 2.412 to 2.472 GHz 15 dBm @54Mbps 2.412 to 2.462 GHz (IEEE802.11b): 18 dBm@ 1 to 11 Mbps
Receiver Sensitivity (Typical)	5.15 to 5.35 GHz: 6 Mbps @ -90 dBm; 54 Mbps @ -72 dBm 5.47 to 5.725 GHz: 6 Mbps @ -90 dBm; 54 Mbps @ -72 dBm 5.725 to 5.825 GHz: 6 Mbps @ -89 dBm; 54 Mbps @ -72 dBm USA: 2.412 to 2.462 GHz (IEEE802.11g): 6 Mbps @ -90 dBm; EU: 2.412 to 2.472 GHz 54 Mbps @ -73 dBm USA: 2.412 to 2.462 GHz (IEEE802.11b): 11 Mbps @ -87 dBm; EU: 2.412 to 2.472 GHz 1 Mbps @ -94 dBm
Transmission Rate	54 Mbps with auto fallback (54, 48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, 1 Mbps) 802.11b supported rates: 1, 2, 5.5, 11 Mbps 802.11a/g supported rates: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
Transmission Distance	100 meters at 11 Mbps (with no obstructions)
Security	WEP 64-bit/128-bit, WPA, WPA2 data encryption
Antenna Connector	Reverse SMA
Antenna	External 2 dBi dipole antenna
WLAN Mode	Infrastructure, Ad-Hoc

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
Registration No. (Conducted Room): C-1094
Registration No. (Conducted Room): T-271
Registration No. (OATS 1): R-1040
Registration No. (OATS 2): R-1041
 - Industry Canada (IC)
Submission: 113543
 - 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
 - TÜV NORD
Certificate No: TNTW0801R
 - Taiwan Accreditation Foundation (TAF)
Accreditation No.: 1113



1.4 Test Equipment

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSP30	100002	2009/12/10
Spectrum Analyzer	Agilent	8564EC	4046A00331	2009/04/11
Preamplifier	Agilent	8449B	3008A01434	2009/03/31
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 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
MULTI UE TESTER	JRC	NJZ-2000	ET00184	2009/12/22

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

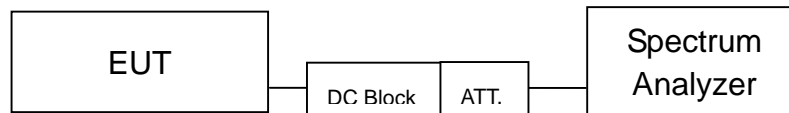
The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of the frequency band were all reach limit requirement, thus we evaluate the EUT pass the specified test.

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

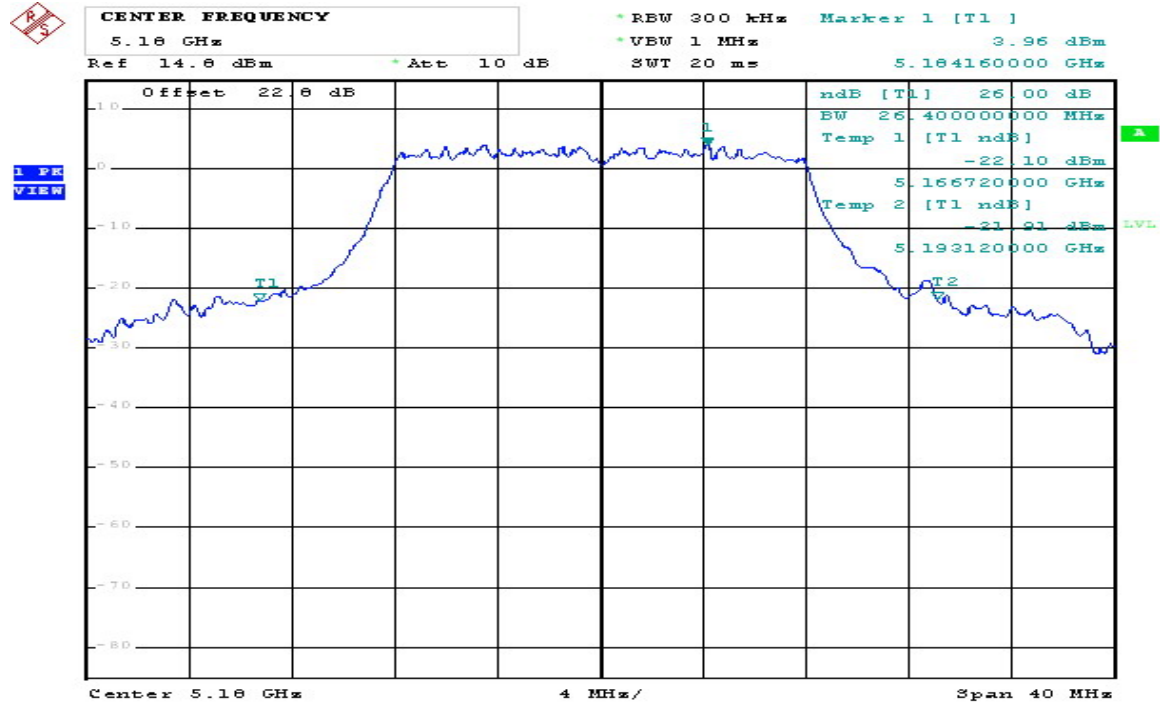
The final test data is shown on as following pages.

26dB Bandwidth

Test Mode : 802.11a		
Test CH		26dB Bandwidth (MHz)
CH No.	Freq. (MHz)	
36	5180	26.40
40	5200	27.44
48	5240	26.56

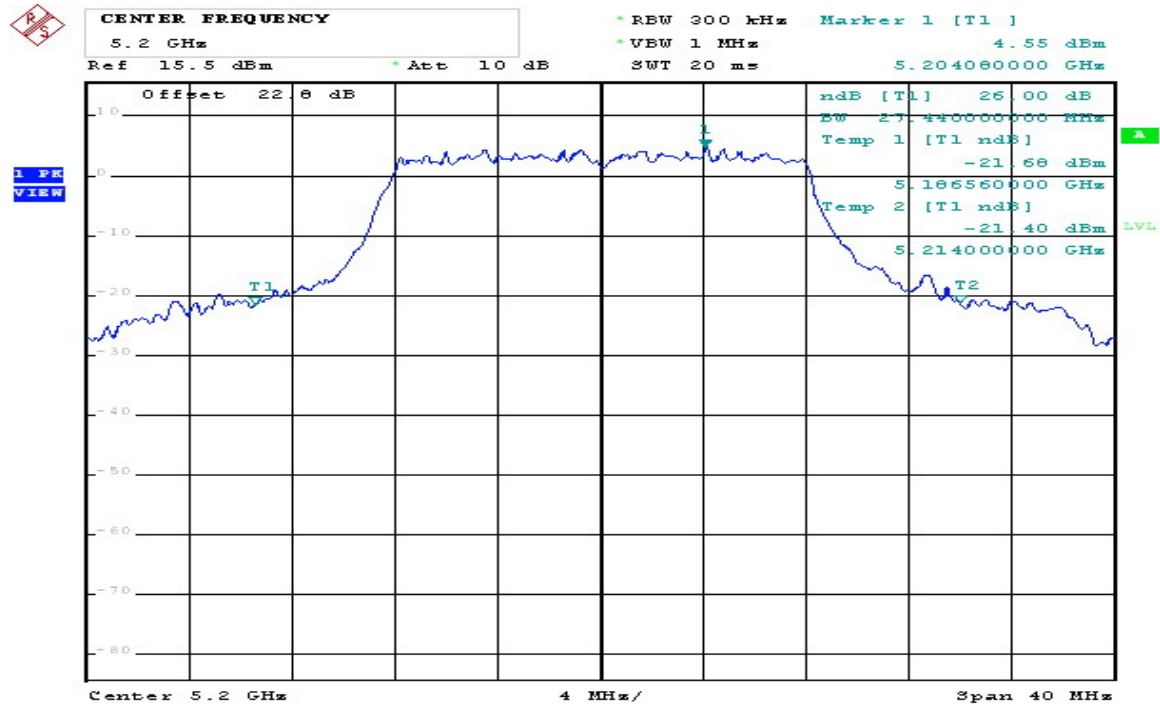
26dB Bandwidth

802.11a CH36 5180MHz



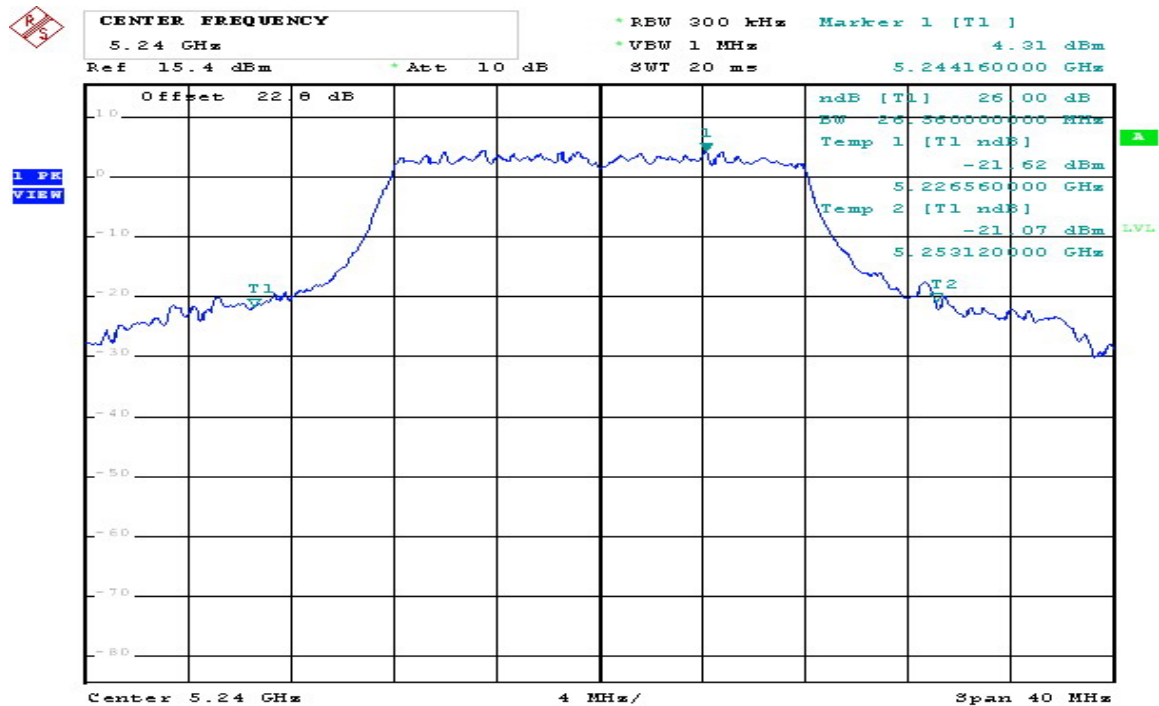
Comment: 802.11a 5180MHz
 Date: 3.FEB.2009 14:54:02

802.11a CH40 5200MHz



Comment: 802.11a 5200MHz
 Date: 3.FEB.2009 14:56:52

802.11a CH48 5240MHz



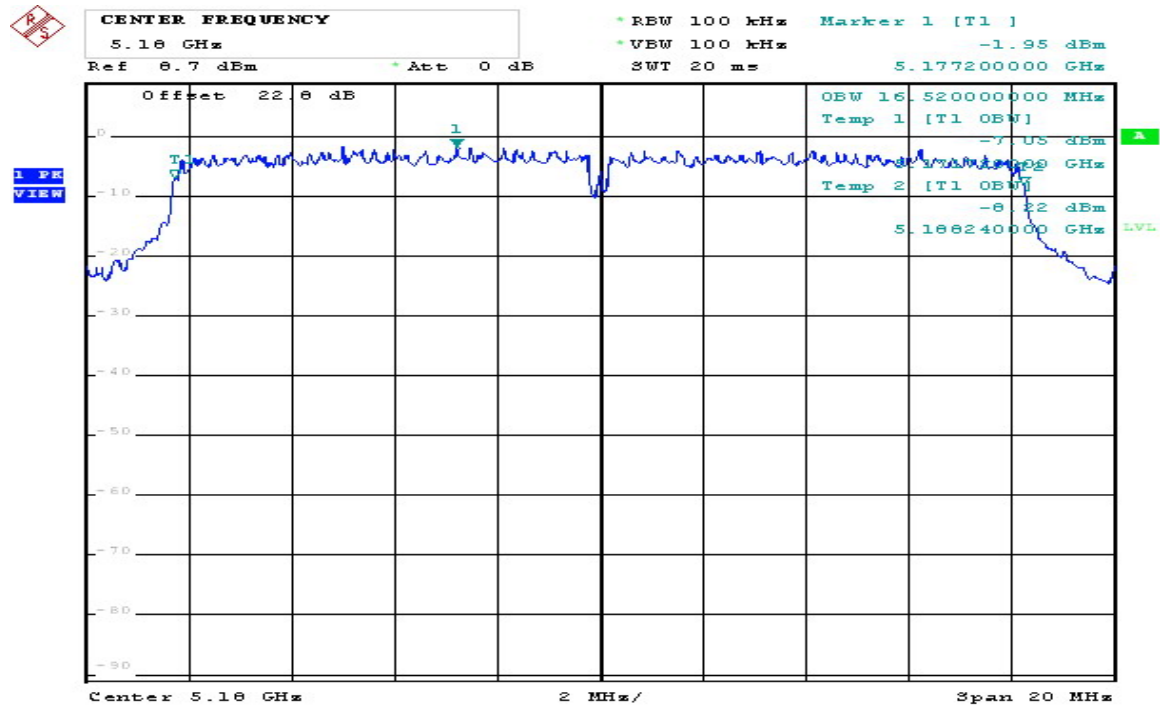
Comment: 802.11a 5240MHz
Date: 3.FEB.2009 15:07:14

99% Occupied bandwidth

Test Mode : 802.11a		
Test CH		Occupied Bandwidth (MHz)
CH No.	Freq. (MHz)	
36	5180	16.52
40	5200	16.52
48	5240	16.56

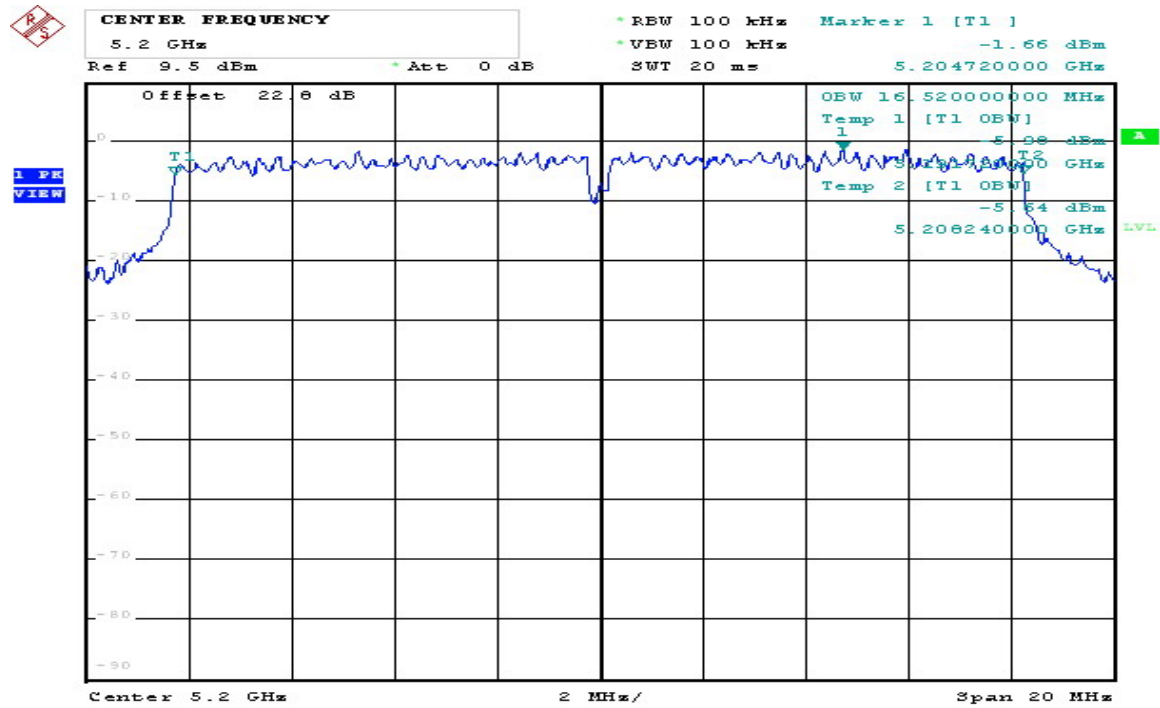
99% Occupied bandwidth

802.11a CH36 5180MHz



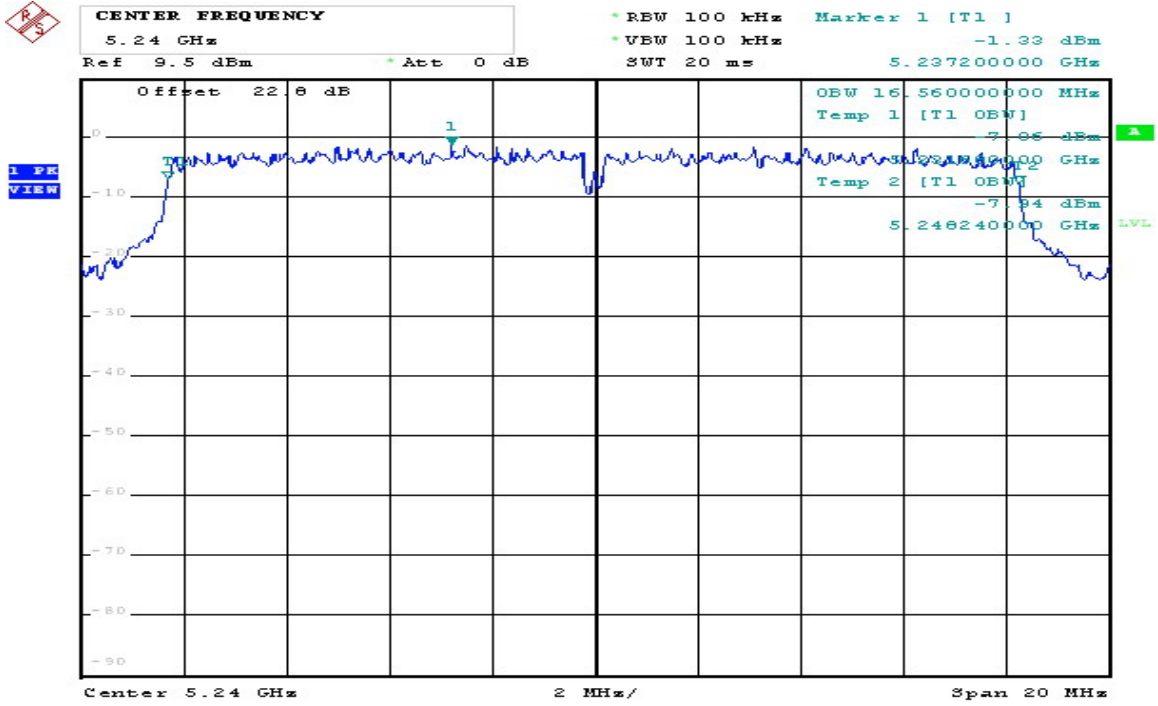
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Date: 3.FEB.2009 15:03:31

802.11a CH40 5200MHz



Comment: 802.11a 5200MHz
Date: 3.FEB.2009 14:02:39

802.11a CH48 5240MHz



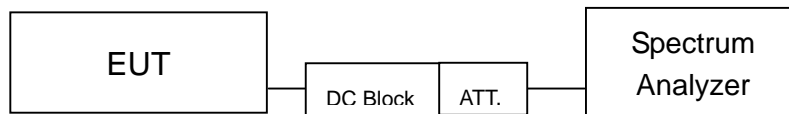
Comment: 802.11a 5240MHz
Date: 3.FEB.2009 15:09:37

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.

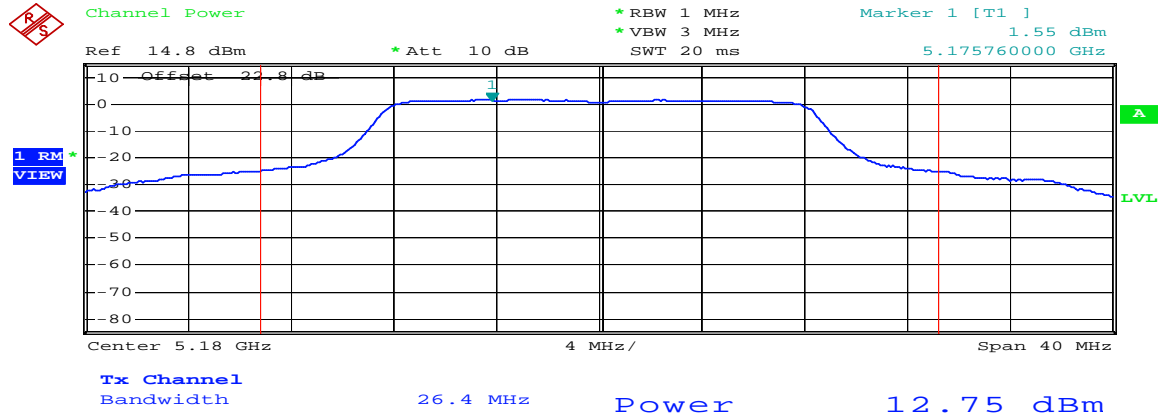
The final test data is shown on as following pages.

Maximum output power

Mode : 802.11 a						
CH	Frq. MHz	Temp. (°C)	Maximum transmit power		Limit (dBm)	Margin (dB)
			(dBm)	(watts)		
36	5180	26	12.75	0.0188	17	-4.25
40	5200	26	13.28	0.0213	17	-3.72
48	5240	26	13.17	0.0207	17	-3.83

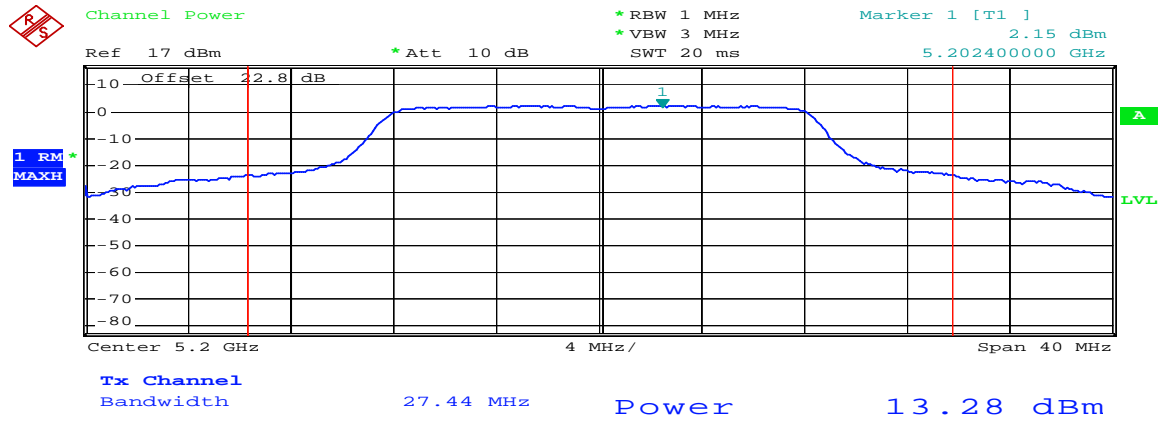
Peak output power test

802.11a CH36 5180MHz



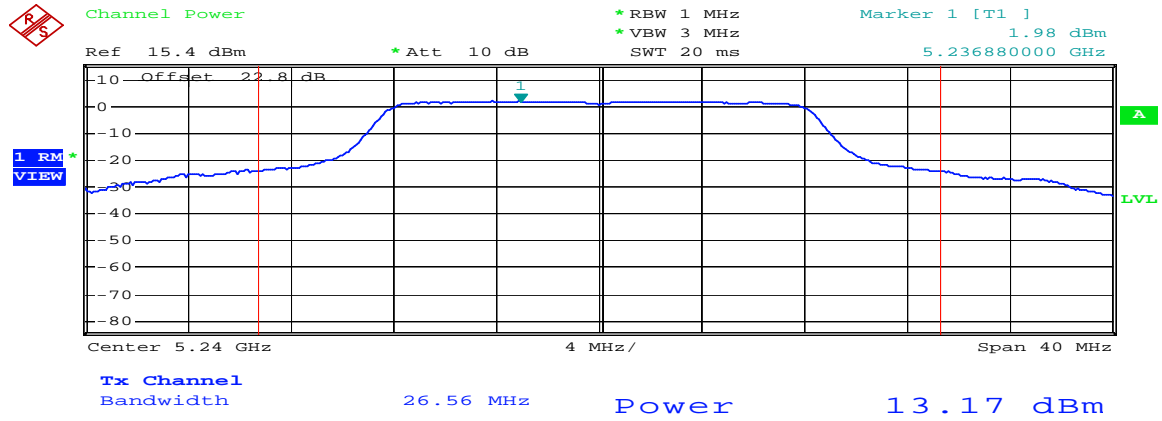
Comment: 802.11a 5180MHz Limit:16.989700
Date: 3.FEB.2009 14:55:10

802.11 a CH40 5200MHz



Comment: 802.11a 5200MHz Limit:16.989700
Date: 3.FEB.2009 15:20:05

802.11 a CH48 5240MHz



Comment: 802.11a 5240MHz Limit:16.989700
Date: 3.FEB.2009 15:08:23

4 Power test of Data Rate

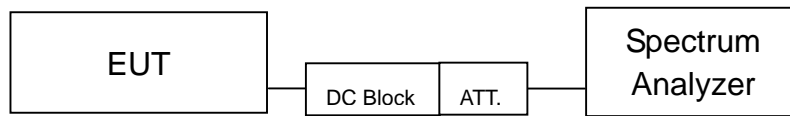
Mode	Bandwidth (MHz)	Channel	Data Rate	Output Power	
				(dBm)	(watts)
802.11b	20	6	1	18.56	0.0718
			5.5	18.64	0.0731
			11	18.68	0.0738
802.11g	20	6	6	19.52	0.0895
			36	19.17	0.0826
			54	18.29	0.0675
802.11a	20	40	6	13.28	0.0213
			36	13.24	0.0211
			54	13.22	0.0210
802.11a	20	157	6	13.63	0.0231
			36	13.36	0.0217
			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.

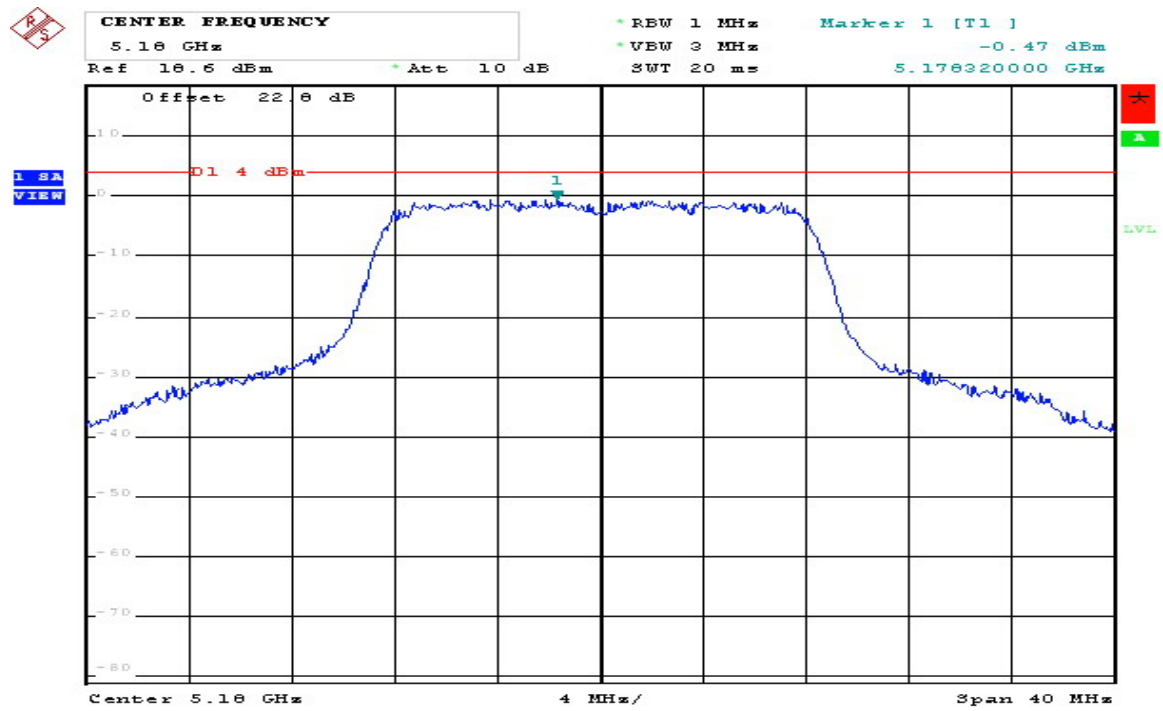
The final test data is shown on as following pages.

Power spectral density

802.11a					
CH	Freq.	Temp. (°C)	Power Spectral Density (dBm)	Limit (dBm)	Margin (dB)
36	5180	26	-0.47	4	-4.47
40	5200	26	0.30	4	-3.70
48	5240	26	0.18	4	-3.82

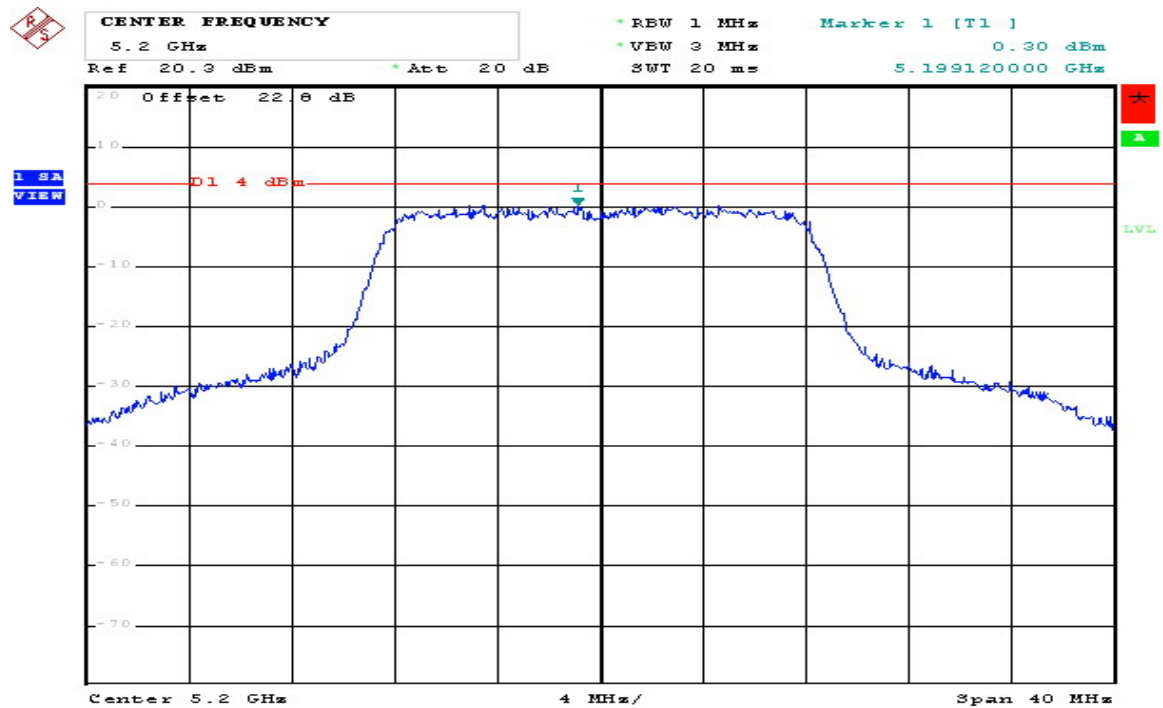
Power spectral density

802.11a CH36 5180MHz



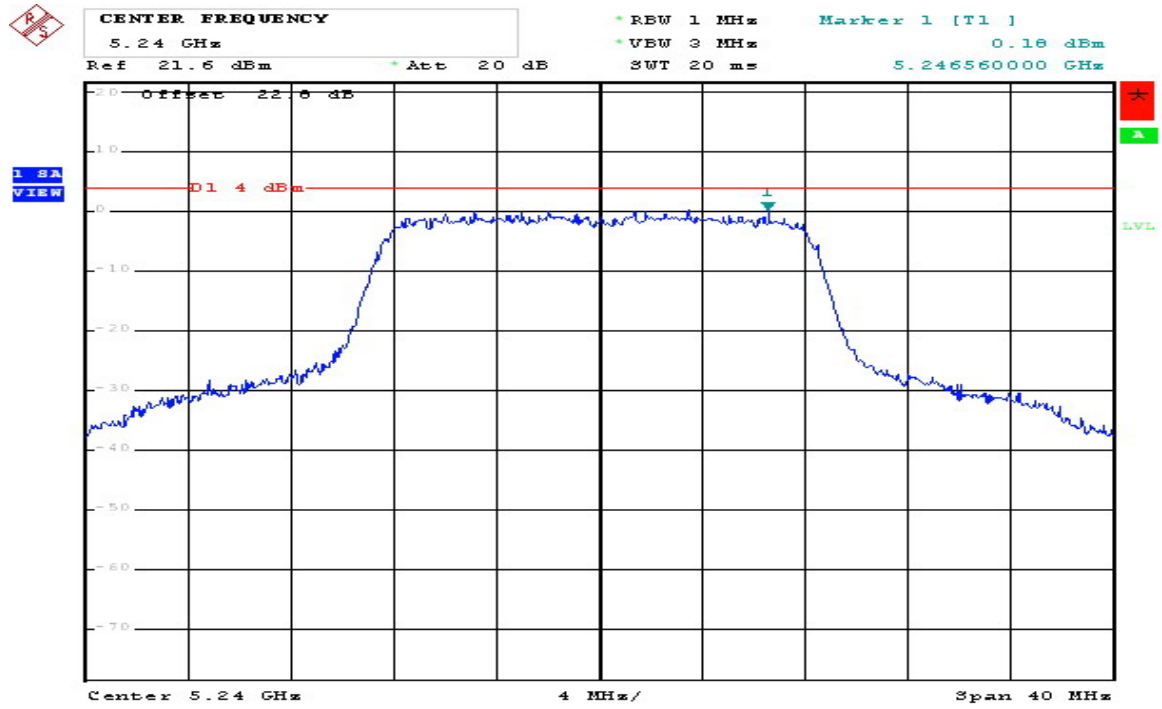
Comment: 802.11a 5180MHz
Date: 3.FEB.2009 14:53:23

802.11a CH40 5200MHz



Comment: 802.11a 5200MHz
Date: 3.FEB.2009 14:58:54

802.11a CH48 5240MHz



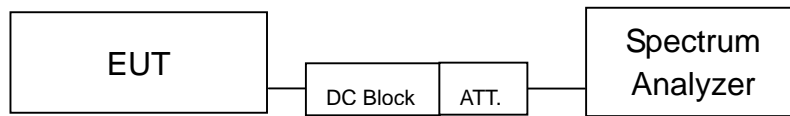
Comment: 802.11a 5240MHz
Date: 3.FEB.2009 15:09:17

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=300kHz for average measurement. Peak excursion to average ratio was read directly.

6.4 Test Result

PASS.

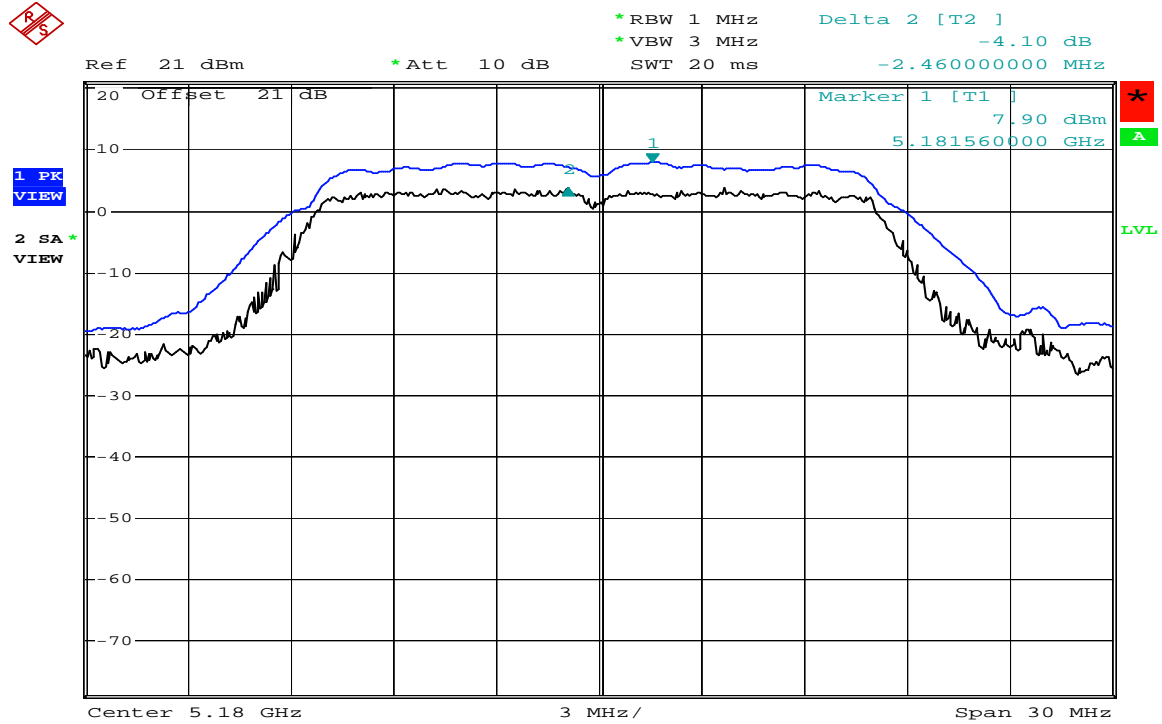
The final test data is shown on as following pages.

Peak excursion to Average ratio

Test Mode : 802.11a			
Test CH		PK excursion to Avg. ratio (dB)	Limit (dB)
CH No.	Freq. (MHz)		
36	5180	4.10	13
40	5200	3.95	13
48	5240	3.96	13

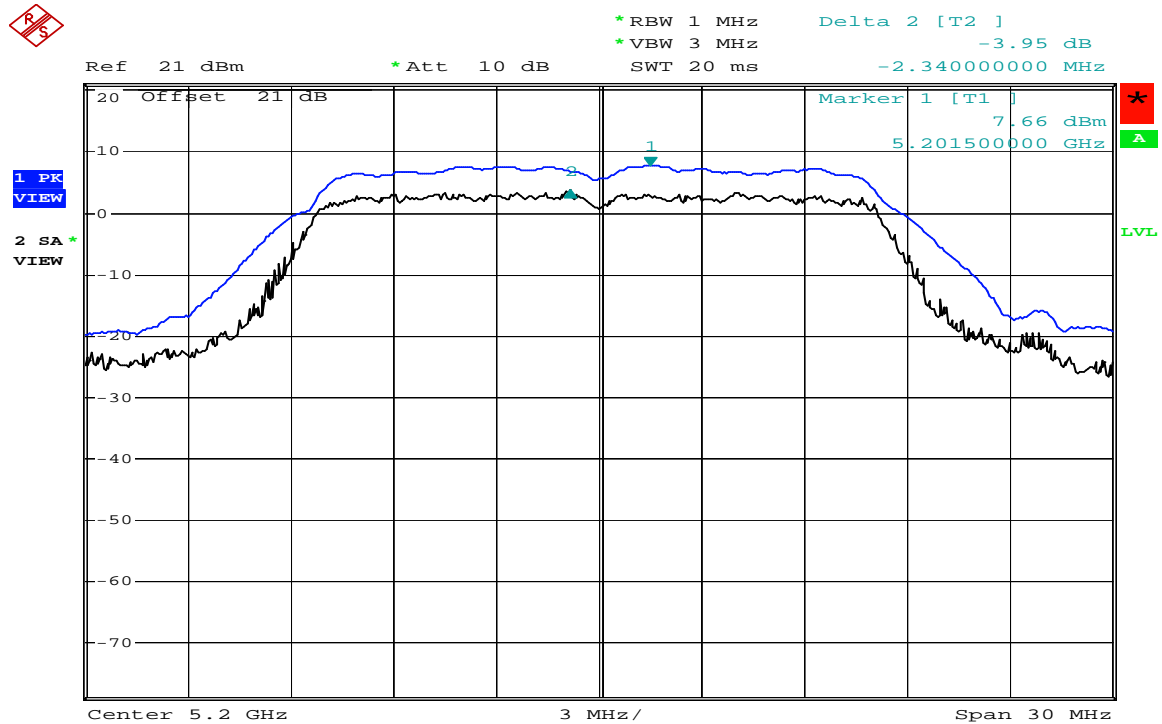
Peak excursion to Average ratio

802.11a CH36 5180MHz PK to AV Ratio



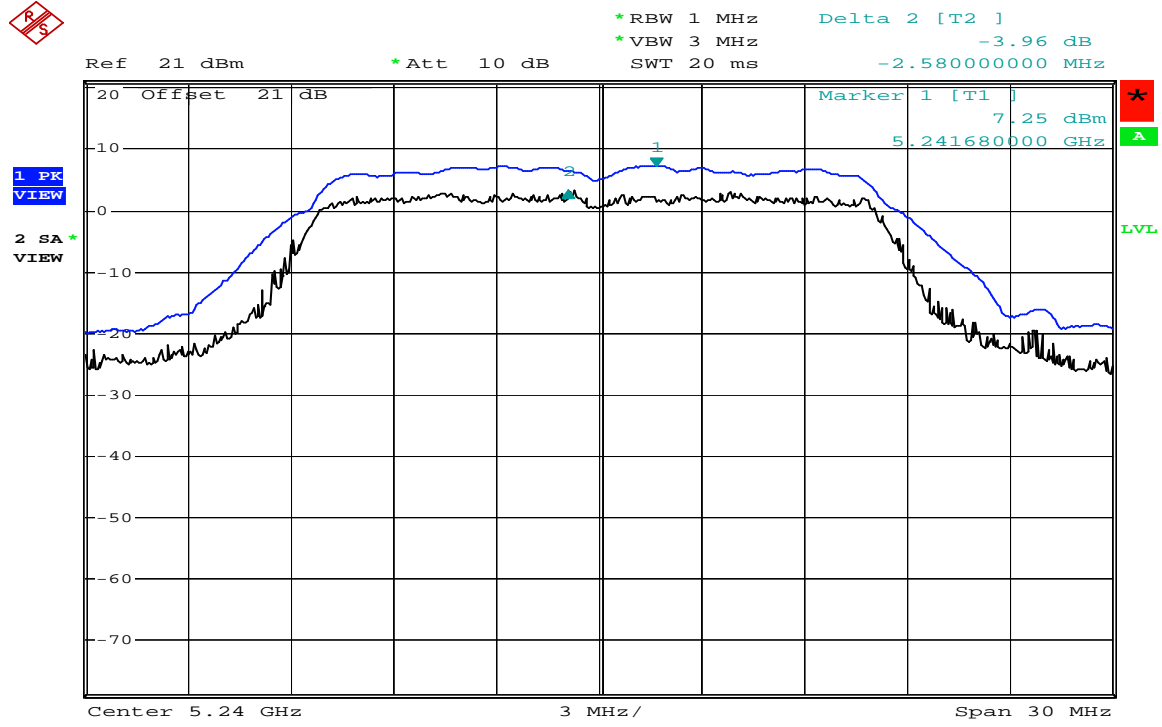
Date: 12.FEB.2009 08:47:58

802.11a CH40 5200MHz PK to AV Ratio



Date: 12.FEB.2009 08:49:40

802.11a CH48 5240MHz PK to AV Ratio



Date: 12.FEB.2009 08:51:03

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.

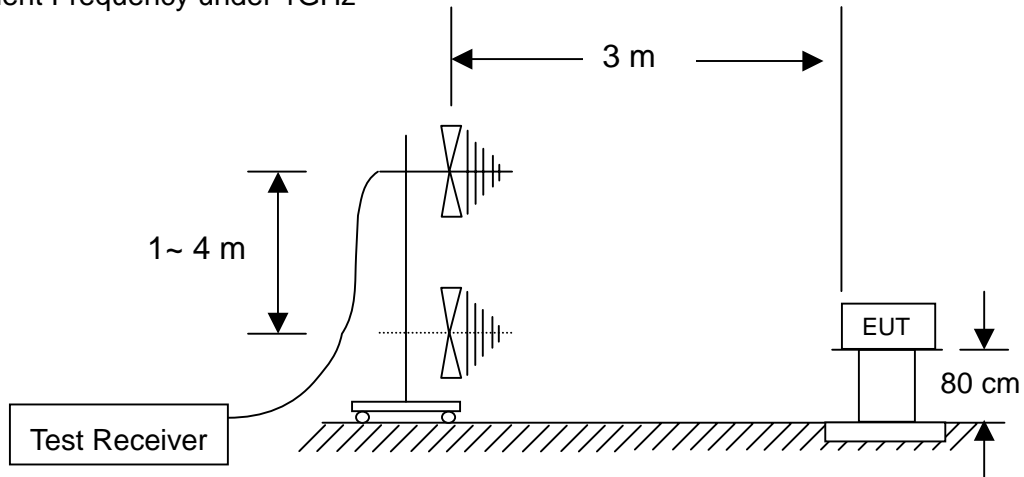
Operating Frequency (MHz)	Limit of Spurious Emissions	
	dBm / MHz EIRP	dB(μ V/m) @3m
5150~5250	-27	68.3
5250~5350	-27	68.3
5725~5825	-27	68.3
	-17 (on \pm 10MHz range of Subscriber transmit channel block)	78.3

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

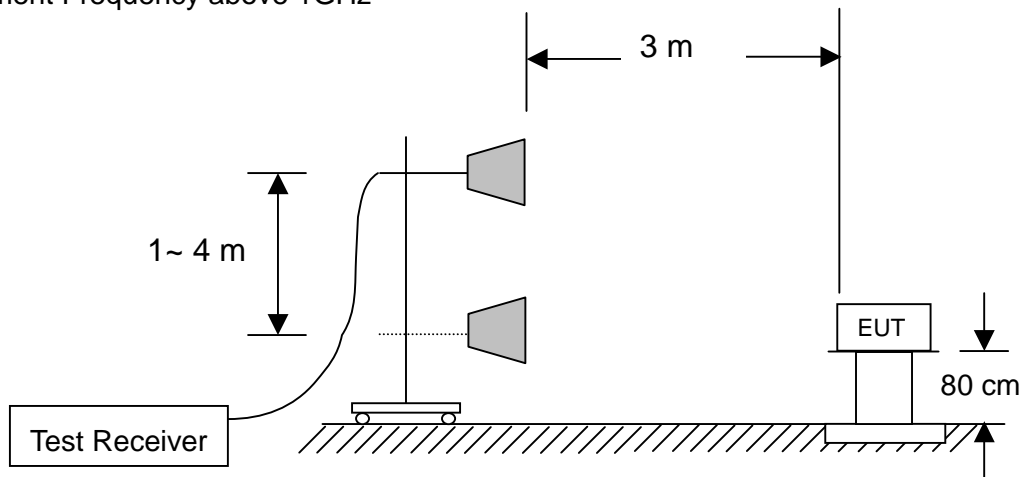
Frequency (MHz)	Field strength dB(μ V/m)	Measurement distance (meters)
1.705~30.0	29.5	30
30 ~ 88	40	3
88~216	43.5	3
216~960	46	3
Above 960	54	3

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 : 26.0°C
 Relative humidity : 45%

Radiated Emission below 1GHz

After verifying 802.11a (CH36 / CH40 / CH48), the worse case determine by 802.11a CH36, the data will present on report.

Worst case: 802.11a CH36 5180MHz								
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
193.200	H	44.70	29.80	10.47	25.37	43.50	-18.13	QP
249.000	H	44.97	29.60	15.31	30.68	46.00	-15.32	QP
483.740	H	43.99	29.83	20.73	34.89	46.00	-11.11	QP
192.440	V	32.40	29.80	10.48	13.08	43.50	-30.42	QP
249.000	V	45.25	33.40	15.31	27.16	46.00	-18.84	QP
483.770	V	44.41	33.04	20.73	32.10	46.00	-13.90	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

802.11a 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	46.15	36.67	48.20	57.68	74.0	-16.32	PK
10360	H	32.57	36.67	48.20	44.10	54.0	-9.90	AV
*15540	H	52.34	62.20	46.87	37.01	54.0	-16.99	PK
*20720	H	55.64	59.23	43.83	40.24	54.0	-13.76	PK
*25900	H	56.32	51.79	46.44	50.97	54.0	-3.03	PK
*31080	H	27.63	25.64	47.88	49.87	54.0	-4.13	PK
*36260	H	33.31	24.74	49.46	58.03	74.0	-15.97	PK
*36260	H	20.14	24.74	49.46	44.86	54.0	-9.14	AV
10360	V	46.71	36.67	48.20	58.24	74.0	-15.76	PK
10360	V	32.57	36.67	48.20	44.10	54.0	-9.90	AV
15540	V	52.64	62.20	46.87	37.31	54.0	-16.69	PK
*20720	V	58.33	59.23	43.83	42.93	54.0	-11.07	PK
*25900	V	56.62	51.79	46.44	51.27	54.0	-2.73	PK
*31080	V	27.96	25.64	47.88	50.20	54.0	-3.80	PK
*36260	V	33.63	24.74	49.46	58.35	74.0	-15.65	PK
*36260	V	20.63	24.74	49.46	45.35	54.0	-8.65	AV

Remark : Corrected Level = Reading + Correction Factor – Preamp

Correction Factor = Antenna Factor + Cable Loss

* Mark indicated background noise level.

802.11a 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	46.78	36.62	48.19	58.35	74.0	-15.65	PK
10440	H	32.77	36.62	48.19	44.34	54.0	-9.66	AV
*15600	H	53.64	62.19	46.96	38.41	54.0	-15.59	PK
*20800	H	53.24	59.00	44.07	38.31	54.0	-15.69	PK
*26000	H	54.27	51.25	46.38	49.40	54.0	-4.60	PK
*31200	H	31.46	25.54	47.86	53.78	74.0	-20.22	PK
*31200	H	19.13	25.54	47.86	41.45	54.0	-12.55	AV
*36400	H	33.29	24.54	49.66	58.41	74.0	-15.59	PK
*36400	H	20.79	24.54	49.66	45.91	54.0	-8.09	AV
10440	V	47.85	36.62	48.19	59.42	74.0	-14.58	PK
10440	V	32.70	36.62	48.19	44.27	54.0	-9.73	AV
*15600	V	54.51	62.19	46.96	39.28	54.0	-14.72	PK
*20800	V	54.21	59.00	44.07	39.28	54.0	-14.72	PK
*26000	V	54.61	51.25	46.38	49.74	54.0	-4.26	PK
*31200	V	31.87	25.54	47.86	54.19	74.0	-19.81	PK
*31200	V	19.67	25.54	47.86	41.99	54.0	-12.01	AV
*36400	V	33.74	24.54	49.66	58.86	74.0	-15.14	PK
*36400	V	21.01	24.54	49.66	46.13	54.0	-7.87	AV

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

802.11a 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	46.59	36.52	48.16	58.23	74.0	-15.77	PK
10480	H	32.88	36.52	48.16	44.52	54.0	-9.48	AV
*15720	H	53.58	62.15	47.15	38.58	54.0	-15.42	PK
*20960	H	55.21	51.79	46.44	49.86	54.0	-4.14	PK
*26200	H	54.17	51.25	46.36	49.28	54.0	-4.72	PK
*31440	H	30.79	25.35	47.81	53.25	74.0	-20.75	PK
*31440	H	17.96	25.35	47.81	40.42	54.0	-13.58	AV
*36680	H	34.46	24.15	49.62	59.93	74.0	-14.07	PK
*36680	H	21.13	24.15	49.62	46.60	54.0	-7.40	AV
10480	V	46.86	36.52	48.16	58.50	74.0	-15.50	PK
10480	V	33.13	36.52	48.16	44.77	54.0	-9.23	AV
*15720	V	54.14	62.15	47.15	39.14	54.0	-14.86	PK
*20960	V	57.00	51.79	46.44	51.65	54.0	-2.35	PK
*26200	V	55.10	51.25	47.81	51.66	54.0	-2.34	PK
*31440	V	31.21	25.35	47.81	53.67	74.0	-20.33	PK
*31440	V	18.14	25.35	47.81	40.60	54.0	-13.40	AV
*36680	V	35.17	24.15	49.62	60.64	74.0	-13.36	PK
*36680	V	21.68	24.15	49.62	47.15	54.0	-6.85	AV

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

8 Band edge test

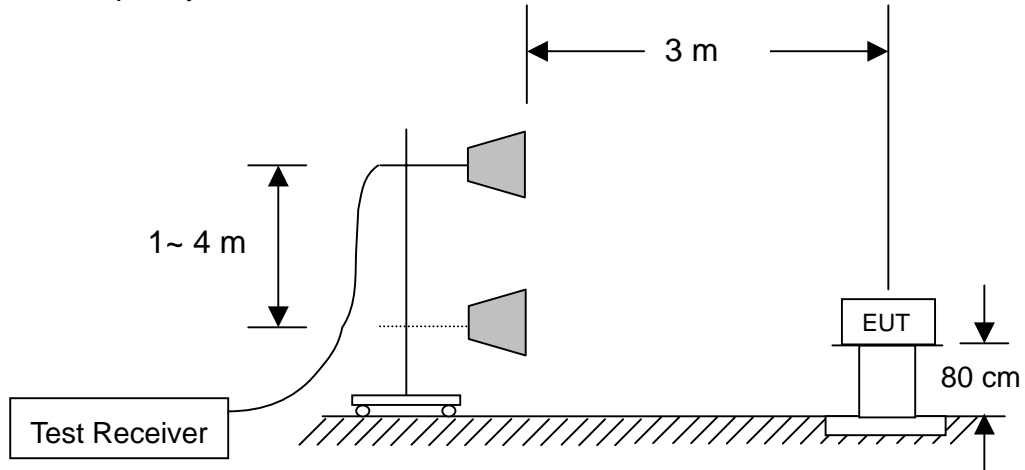
8.1 Limit

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.

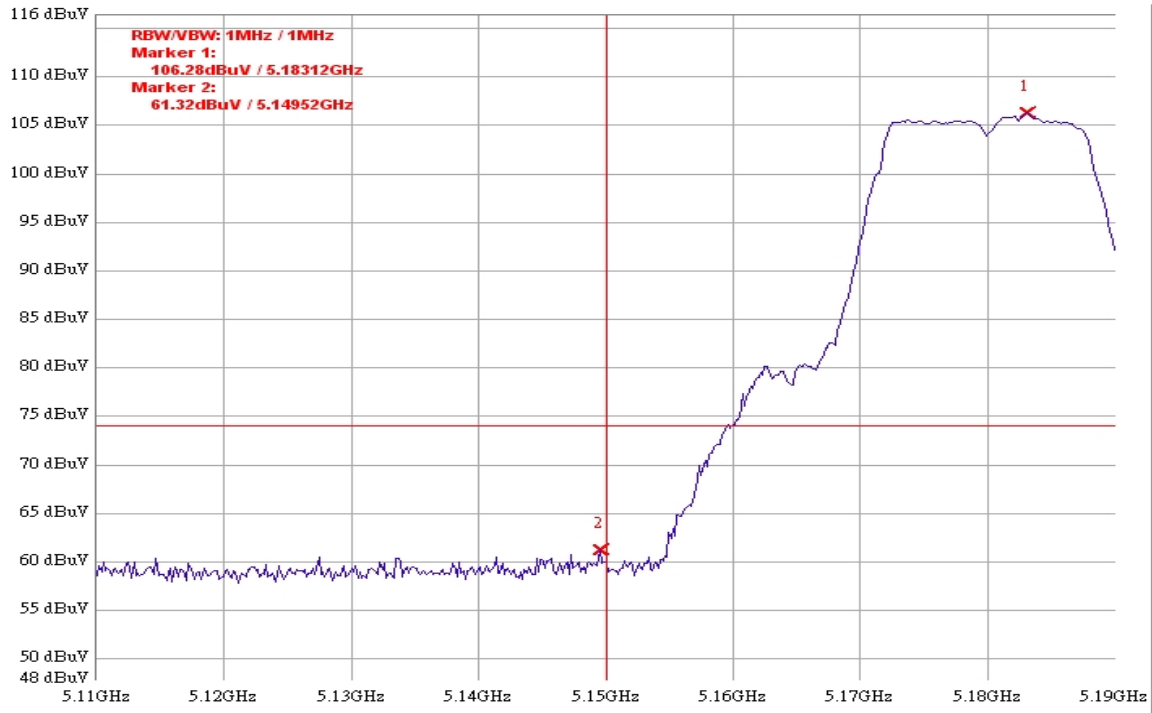
The final test data is shown on as following pages.

Band edge test

802.11a					
CH	Restricted Band (MHz)	Maximum Level (dB μ V/m)	Limit (dBm)	Margin (dB)	Detector Mode
36	4500~5150	61.32	74	-12.68	PK
		48.02	54	-5.98	AV

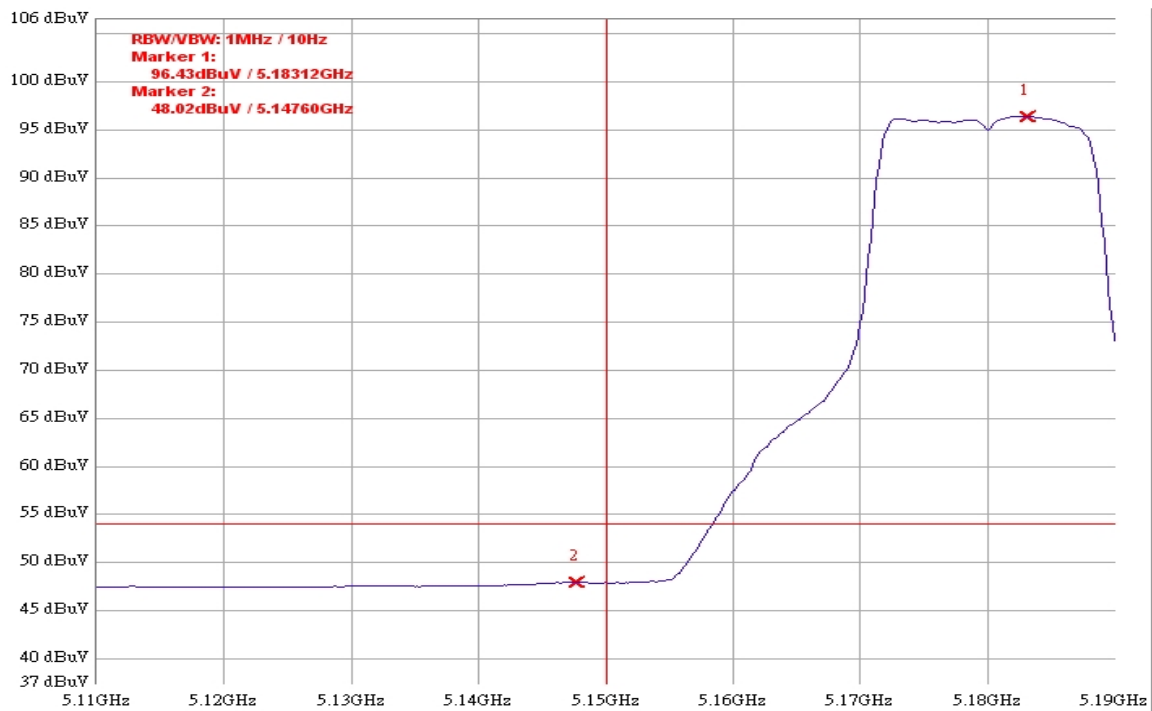
Band edge test

802.11a CH36 5180MHz PK



Band Edge_802.11a_5180MHz_PK

802.11a CH36 5180MHz AV



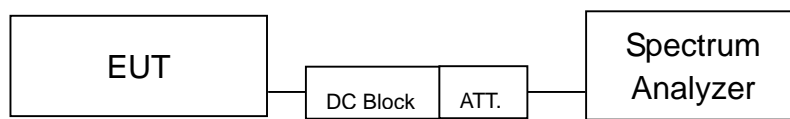
Band Edge_802.11a_5180MHz_AV

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 ± 10 MHz 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.

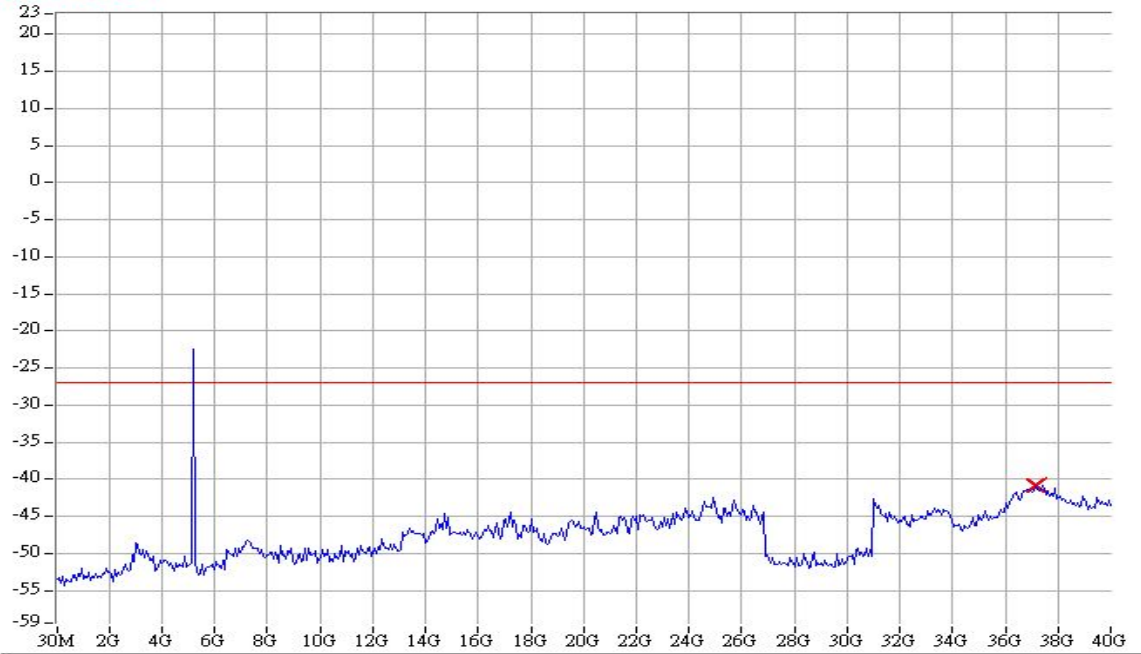
The final test data is shown on as following pages.

Conducted spurious emission

802.11a CH36 5180MHz

RBW / YBW : 100.00k/100.00k
RL OFFSET : 23.00dB SWP : 10s
Limit : -27.00dBm

MKR -40.90dBm
37.135483GHz



802.11a CH40 5200MHz

RBW / YBW : 100.00k/100.00k
RL OFFSET : 23.00dB SWP : 10s
Limit : -27.00dBm

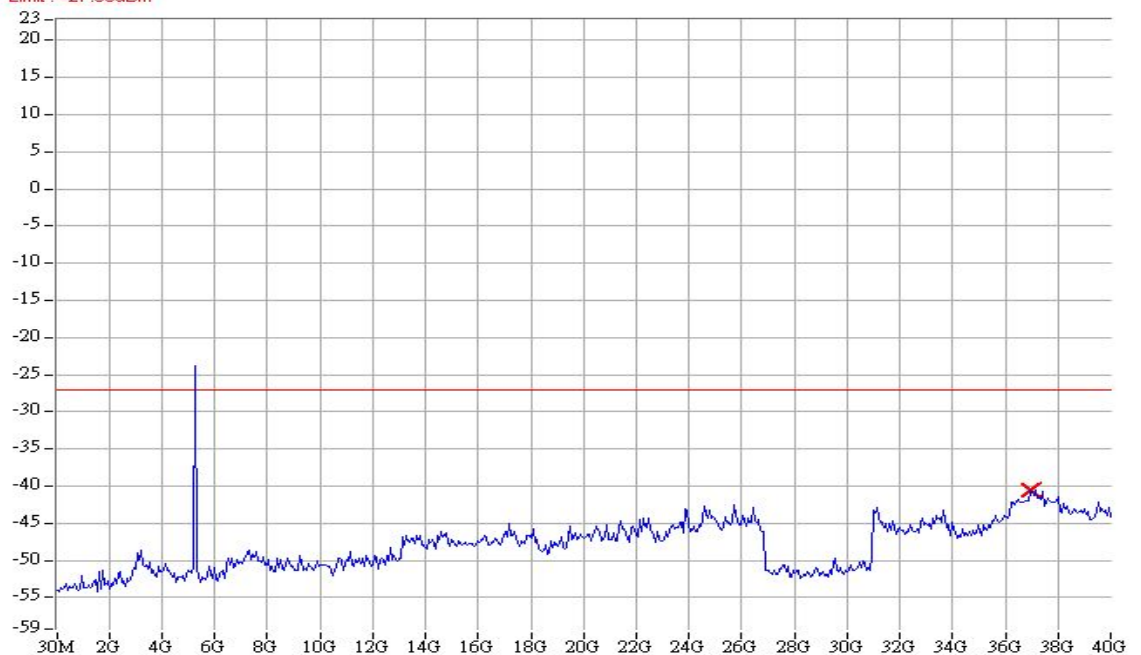
MKR -40.73dBm
37.002250GHz



802.11 a CH48 5240MHz

RBW / YBW : 100.00k/100.00k
RL OFFSET : 23.00dB SWP : 10s
Limit : -27.00dBm

MKR -40.56dBm
36.935633GHz



802.11a Conducted Spurious 5240MHz

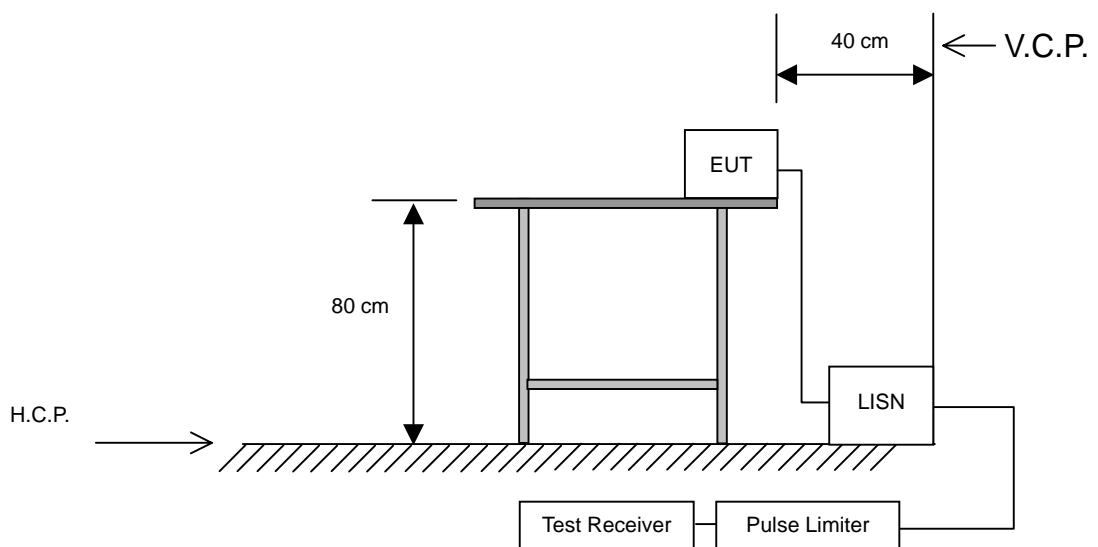
10 AC Power Line Conducted Emission test

10.1 Limits

Frequency (MHz)	Quasi-Peak (dB μ V)	Average (dB μ V)
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.

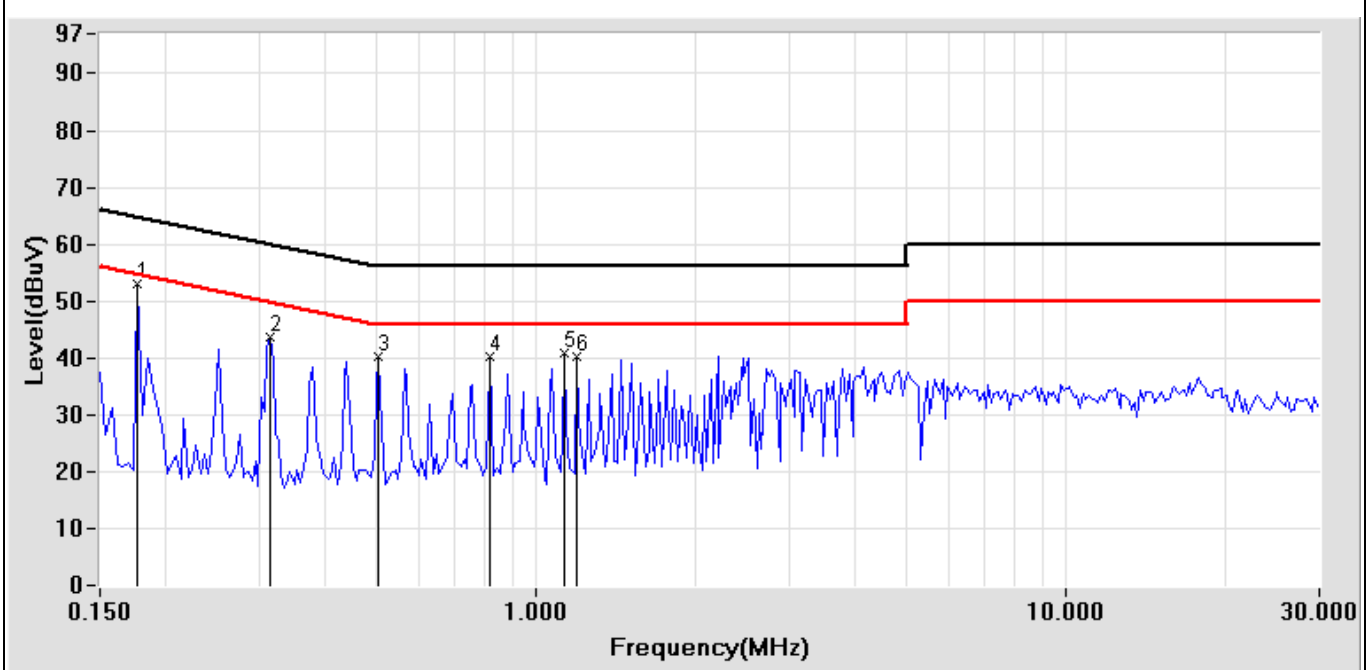
The final test data is shown on as following pages.

Power Line Conducted Test Data

EUT: RISC-based Ready-to-Run Wireless Embedded Computer CLIENT: MOXA MODEL: W311 RATING: 120V/60Hz Temperature: 18.0 °C Humidity: 65 %	POLARITY: Line DISTANCE: Serial No.: FILE/DATA#: MOXA.emi/57 OPERATOR: Terry TEST SITE: Conduction1
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Frequency (MHz)	Factor (dB)	Meter Reading (dB μ V)		Emission Level (dB μ V)		Limits (dB μ V)		Margin (dB)	
		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.177	0.13	46.90	38.90	47.03	39.03	64.63	54.63	-17.60	-15.60
0.314	0.13	43.56	43.50	43.69	43.63	59.86	49.86	-16.17	-6.23
0.502	0.14	40.00	39.60	40.14	39.74	56.00	46.00	-15.86	-6.26
0.818	0.15	39.10	39.00	39.25	39.15	56.00	46.00	-16.75	-6.85
1.130	0.15	39.75	38.93	39.90	39.08	56.00	46.00	-16.10	-6.92
1.193	0.16	39.60	38.20	39.76	38.36	56.00	46.00	-16.24	-7.64

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



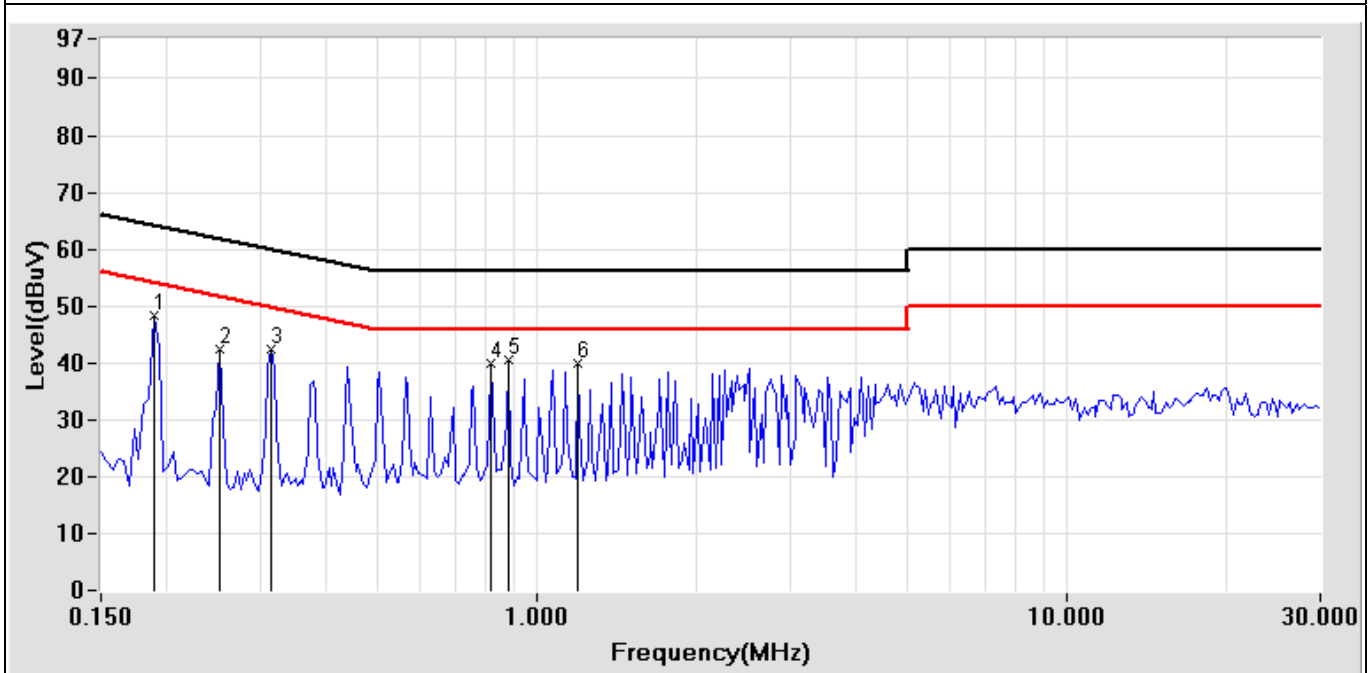
Test Mode: Mode 1: Working Mode

Power Line Conducted Test Data

EUT: RISC-based Ready-to-Run Wireless Embedded Computer CLIENT: MOXA MODEL: W311 RATING: 120V/60Hz Temperature: 18.0 °C Humidity: 65 %	POLARITY: Neutral DISTANCE: Serial No.: FILE/DATA#: MOXA.emi/56 OPERATOR: Terry TEST SITE: Conduction1
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Frequency (MHz)	Factor (dB)	Meter Reading (dBµV)		Emission Level (dBµV)		Limits (dBµV)		Margin (dB)	
		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.189	0.13	46.78	38.26	46.91	38.39	64.08	54.08	-17.17	-15.69
0.252	0.13	40.95	35.12	41.08	35.25	61.69	51.69	-20.61	-16.44
0.314	0.13	42.18	41.92	42.31	42.05	59.86	49.86	-17.55	-7.81
0.818	0.15	38.90	38.90	39.05	39.05	56.00	46.00	-16.95	-6.95
0.880	0.15	39.46	38.80	39.61	38.95	56.00	46.00	-16.39	-7.05
1.193	0.16	40.04	38.80	40.20	38.96	56.00	46.00	-15.80	-7.04

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



Test Mode: Mode 1: Working Mode