

EMC TEST REPORT

Report No. : TS08010064-EME

Model No. : H3C WA2220-AG

Issued Date : Jul. 08, 2008

Applicant: Hangzhou H3C Technologies Co., Ltd.
310 Liuhe Road, Zhijiang Science Park, Hangzhou 310053,
P.R.China

**Test Method/
Standard:** FCC Part 15 Subpart E Section §15.207, §15.209 、 §15.407
and ANSI C63.4/2003.

Test By: Intertek Testing Services Taiwan Ltd.
No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li,
Shiang-Shan District, Hsinchu City, Taiwan

This test report consists of 27 pages in total. It may be duplicated completely for legal use with the allowance of the applicant. It shall not be reproduced except in full, without the written approval of Intertek Laboratory. The test result(s) in this report only applies to the tested sample(s).

Report Engineer

Sammi Liu

Sammi Liu

Project Engineer

Rex Liao

Rex Liao

Reviewed By

Jimmie Liu

Jimmie Liu



Table of Contents

**Summary of Tests****Wireless LAN Access Point
FCC ID: U6IH3CEWT0235A29E**

Test	Reference	Results
Peak output power test	15.407 (a)(1)/(2)/(3) DA 02-2138	Pass
Power Spectrum Density test	15.407 (a)(1)/(2)/(3) DA 02-2138	Pass
Peak excursion to average ratio test	15.407(a)(6) DA 02-2138	Pass
Radiated spurious emission test	15.407(b)(1)/(2)/(3)/(6), 15.209	Pass
Dynamic Frequency Selection (DFS) test	15.407(h), FCC 06-96	No required due to this device was only used UNII band of 5150-5250MHz
Additional provisions	15.215(c)	Pass
AC line conducted emission test	15.407(b)(6) 15.207	Pass

1. General information

1.1 Identification of the EUT

Applicant:	Hangzhou H3C Technologies Co., Ltd.
Product:	Wireless LAN Access Point
Model No.:	H3C WA2220-AG
Operating Frequency:	5180MHz ~ 5240MHz
Channel Number:	4 channels
Frequency of Each Channel:	5180MHz+20k MHz; k=0~3
Type of Modulation:	DSSS, OFDM
Rated Power:	100-240Vac, 50-60Hz with adapter (FSP025-1AD207A)
Power Cord:	3C × 18AWG × 1.8meter unshielded cable
Data Cable:	RJ-45 UTP Cat.5 10meter × 1
Sample Received:	Jan. 17, 2008
Test Date(s):	Jan. 17, 2008 ~ Jun. 30, 2008
Note 1:	This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.
Note 2:	When determining the test conclusion, the Measurement Uncertainty of test has been considered.

1.2 Additional information about the EUT

The EUT is a Wireless LAN Access Point without radar detection, and was defined as information technology equipment.

For more detail features, please refer to User's manual as file name "Installation guide.pdf".



1.3 Antenna description

For 802.11b/g

The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector.

Antenna Gain: 2dBi max
Antenna Type: Dipole antenna
Connector Type: SAM Reverse

For 802.11a

The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector.

Antenna Gain: 3dBi max
Antenna Type: Dipole antenna
Connector Type: SAM Reverse

1.4 Peripherals equipment

Peripherals	Manufacturer	Product No.	Serial No.	FCC ID
Notebook PC	DELL	Latitude D610	5YWZK1S	FCC DoC Approved

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 Subpart E Section § 15.207、§15.209、§15.407、DA 02-2138 and ANSI C63.4/2003.

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

The AC power conducted emissions was invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz. (15.207 paragraph)

Radiated emissions were invested cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading recorded also on the report.

The EUT setup configurations please refer to the photo of test configuration in item.

2.2 Operation mode

The EUT was supplied with 120Vac, 60Hz and it was running in operating mode.

The EUT was transmitted continuously during the test.

With individual verifying, the maximum output power was found at 6Mbps data rate for 802.11a mode. The final tests were executed under these conditions and recorded in this report individually.

11a	CH 40	5500MHz
		PK
6M		23.07
9M		22.89
12M		22.71
18M		22.61
24M		22.49
36M		22.27
48M		22.07
58M		21.88

2.3 Test equipment

Equipment	Brand	Frequency range	Model No.
EMI Test Receiver	Rohde & Schwarz	9kHz~2.75GHz	ESCS 30
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30
Spectrum Analyzer	Rohde & Schwarz	20Hz~40GHz	FSEK 30
Horn Antenna	EMCO	1GHz~18GHz	3115
Horn Antenna	SCHWARZBECK	14GHz~40GHz	BBHA 9170
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9160
Pre-Amplifier	MITEQ	100MHz~26.5GHz	919981
Pre-Amplifier	MITEQ	26GHz~40GHz	828825
Controller	HDGmbH	N/A	HD 100
Antenna Tower	HDGmbH	N/A	MA 240
Turn Table	HDGmbH	N/A	DS 420S
LISN	Rohde & Schwarz	9KHz~30MHz	ESH3-Z5

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

3. Peak Output Power test (FCC 15.407)

3.1 Operating environment

Temperature: 25
 Relative Humidity: 50 %
 Atmospheric Pressure: 1023 hPa

3.2 Test setup & procedure

The power output per FCC §15.407(a) was measured on the EUT using a 50 ohm SMA cable connected to power meter via power sensor. Power was read directly and cable loss correction (2.0dB) was added to the reading to obtain power at the EUT antenna terminals.

3.3 Limit

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

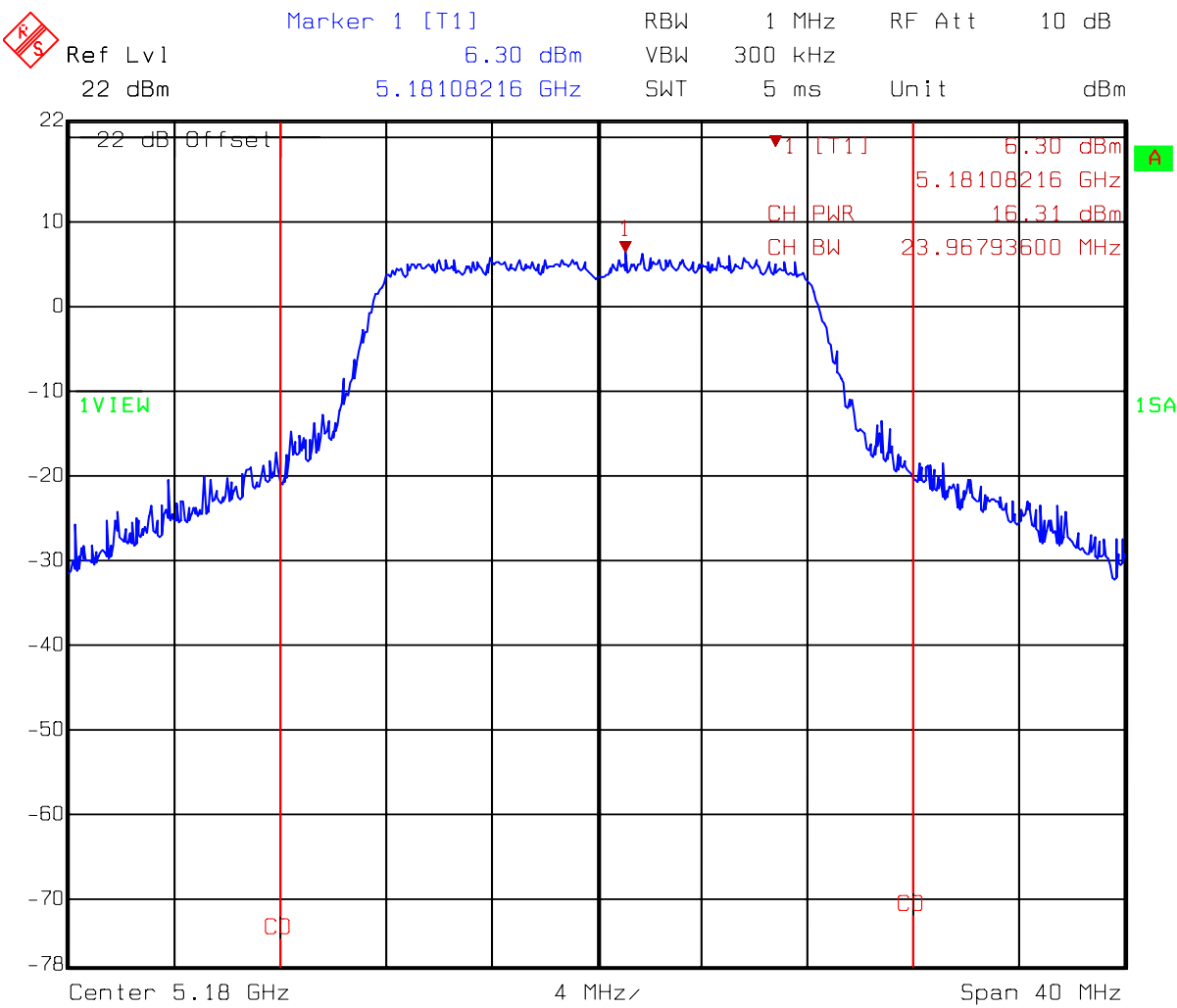
Remark: where B is the -26 dB emission bandwidth in MHz.

3.4 Measured data of Maximum Output Power test results

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Output Power (dBm)	Limit (dBm)	Result
				CH PWR		
11a	36	5180	6	16.31	17	Pass
	40	5200		16.64	17	Pass
	48	5240		16.62	17	Pass

Please see the plots as next page.

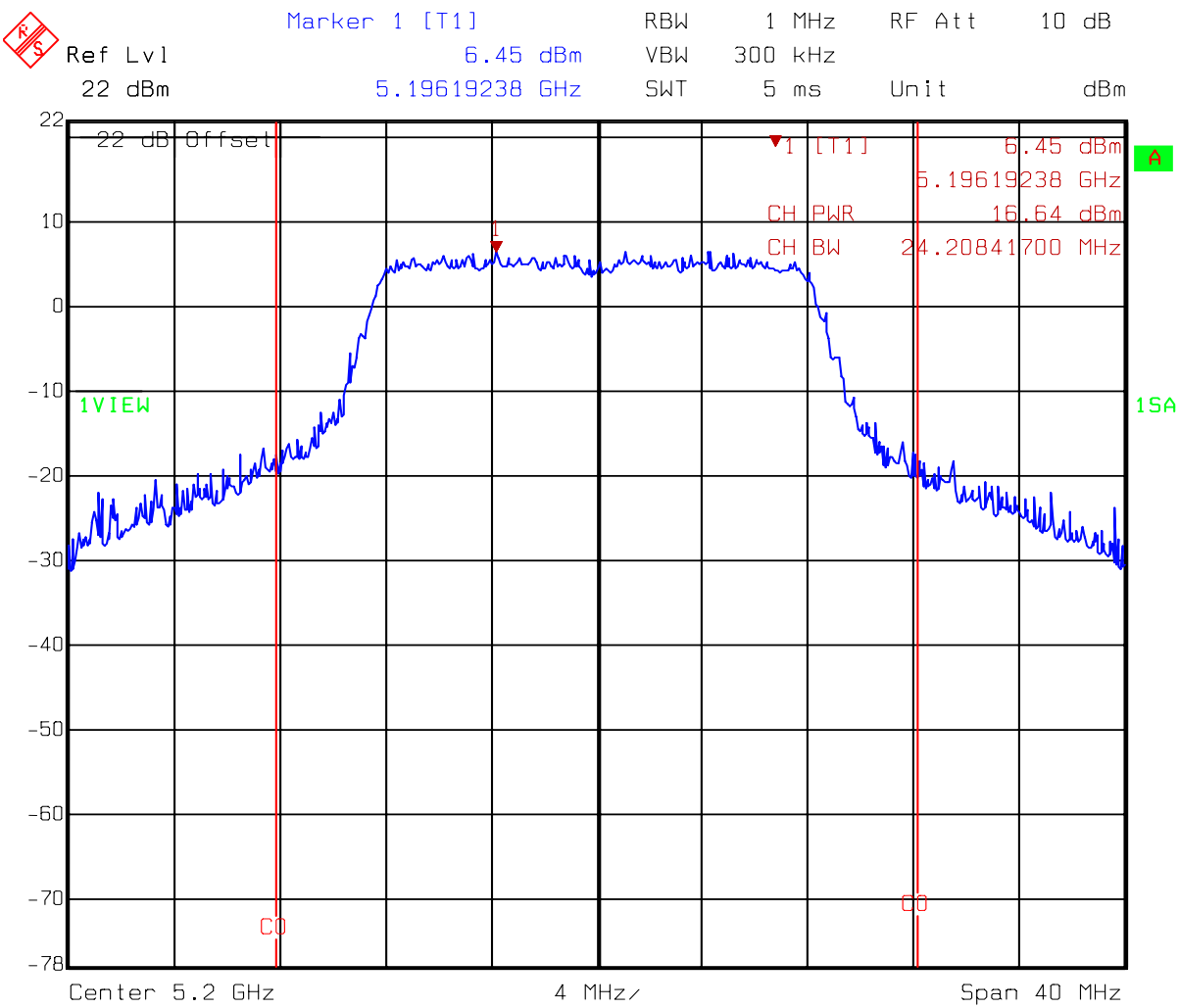
Test Mode: 802.11a CH 36



Title: Output Power
 Comment A: CH 36 at 802.11a mode (Limit 17.000 dBm)
 Date: 15.JAN.2008 11:09:21



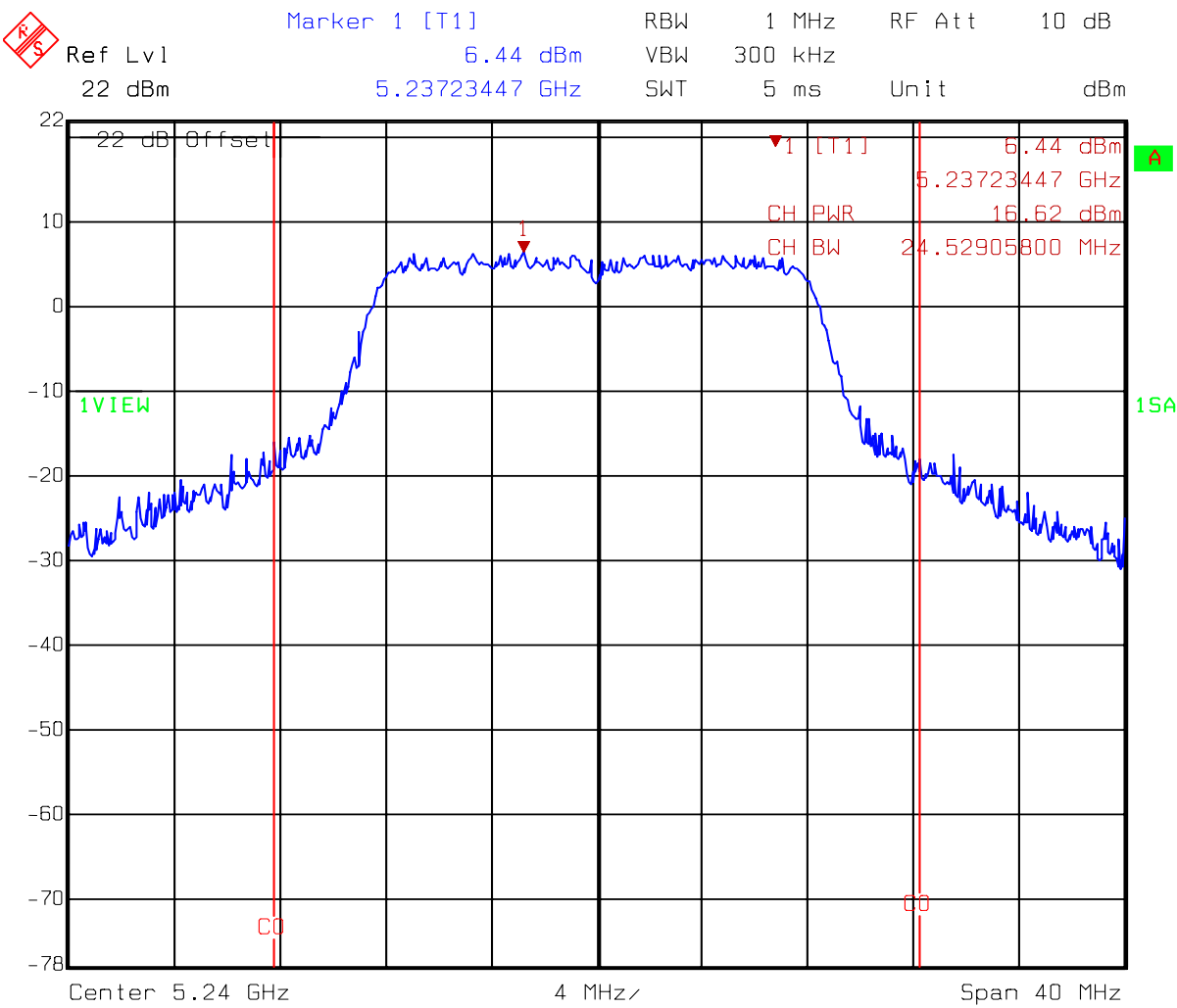
Test Mode: 802.11a CH 40



Title: Output Power
Comment A: CH 40 at 802.11a mode (Limit 17.000 dBm)
Date: 15.JAN.2008 11:14:32



Test Mode: 802.11a CH 48



Title: Output Power
Comment A: CH 48 at 802.11a mode (Limit 17.000 dBm)
Date: 15.JAN.2008 11:17:48

4. Power Spectrum Density test (FCC 15.407)

4.1 Operating environment

Temperature: 25
Relative Humidity: 50 %
Atmospheric Pressure: 1023 hPa

4.2 Test setup & procedure

The power spectrum density per FCC §15.407(a) was measured from the antenna port of the EUT using a 50ohm spectrum analyzer with the resolution bandwidth set at 1MHz, the video bandwidth set at 3MHz. Power spectrum density was read directly and cable loss (2.0dB)/external attenuator (20dB) correction was added to the reading to obtain power at the EUT antenna terminals.

Limit

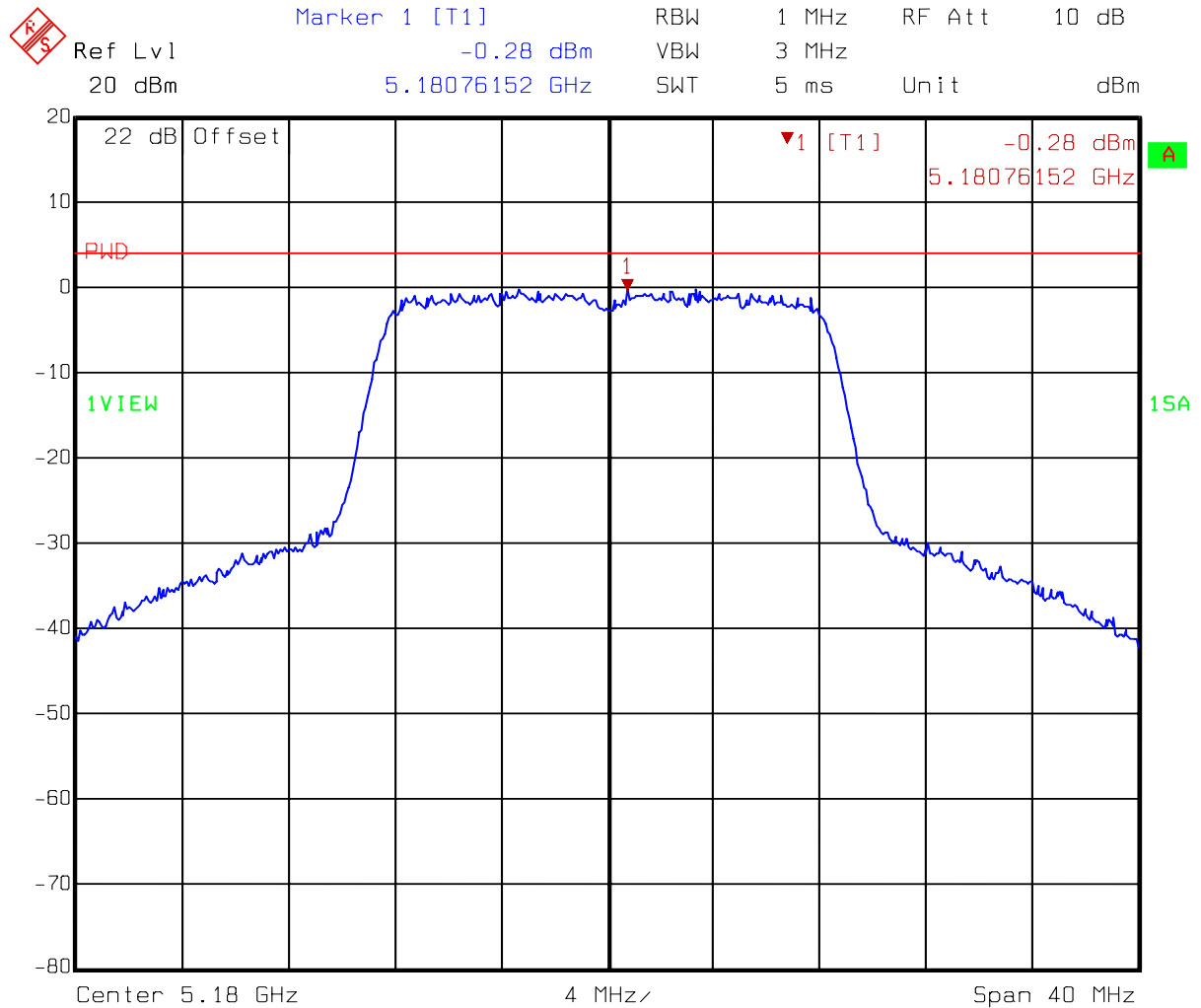
Operating Frequency (MHz)	Power density limit
5150~5250	< 4dBm/MHz
5250~5350, 5470~5725	< 11dBm/MHz
5725~5825	< 17dBm/MHz

4.3 Measured data of Power Spectrum Density test results

Mode	Channel	Frequency (MHz)	Data rate Mbps	PPSD (dBm)	Limit (dBm)	Result
11a	36	5180	6	-0.28	4	Pass
	40	5200		0.16	4	Pass
	48	5240		-0.09	4	Pass

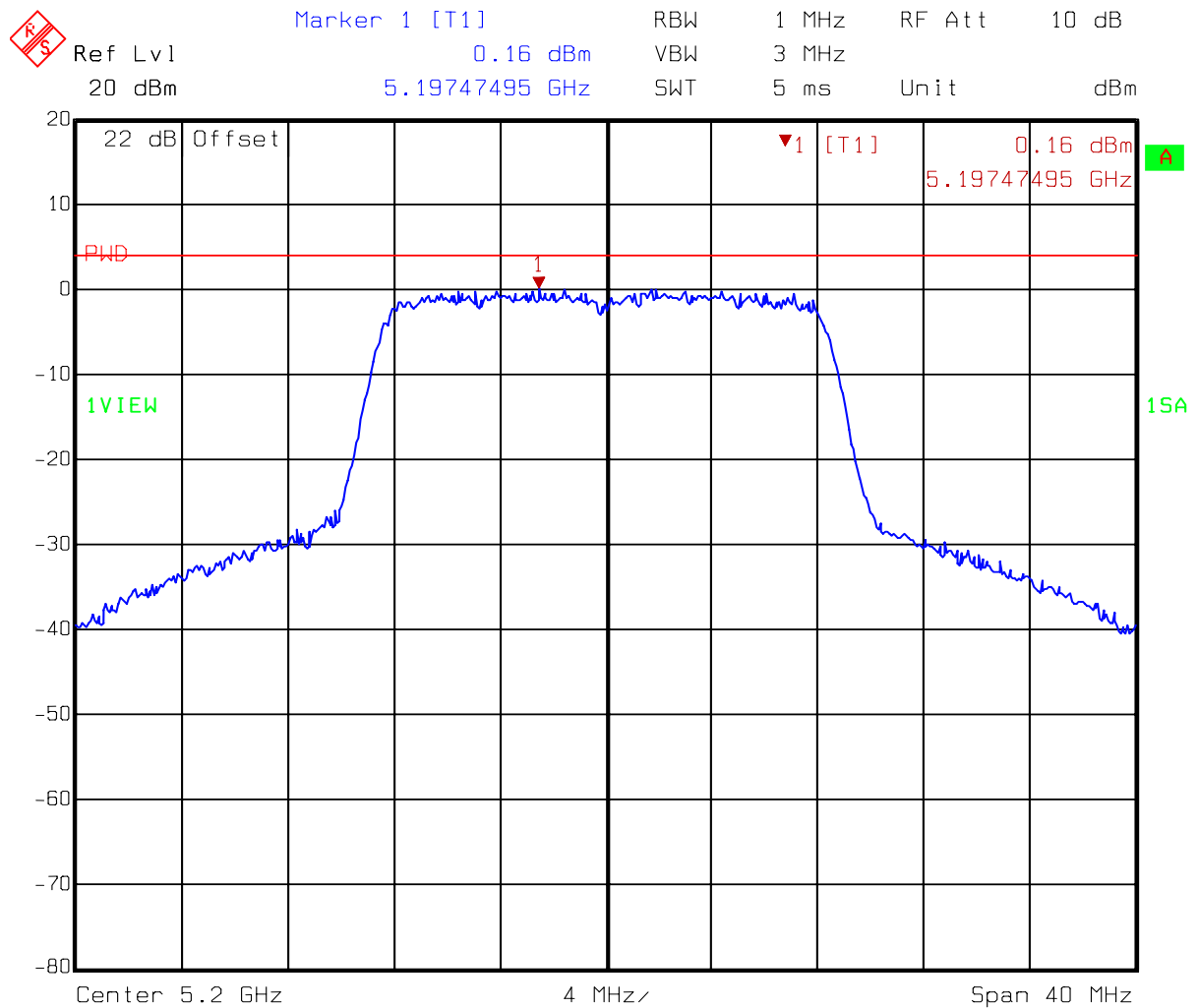
Please see the plot below.

Test Mode: 802.11a CH 36



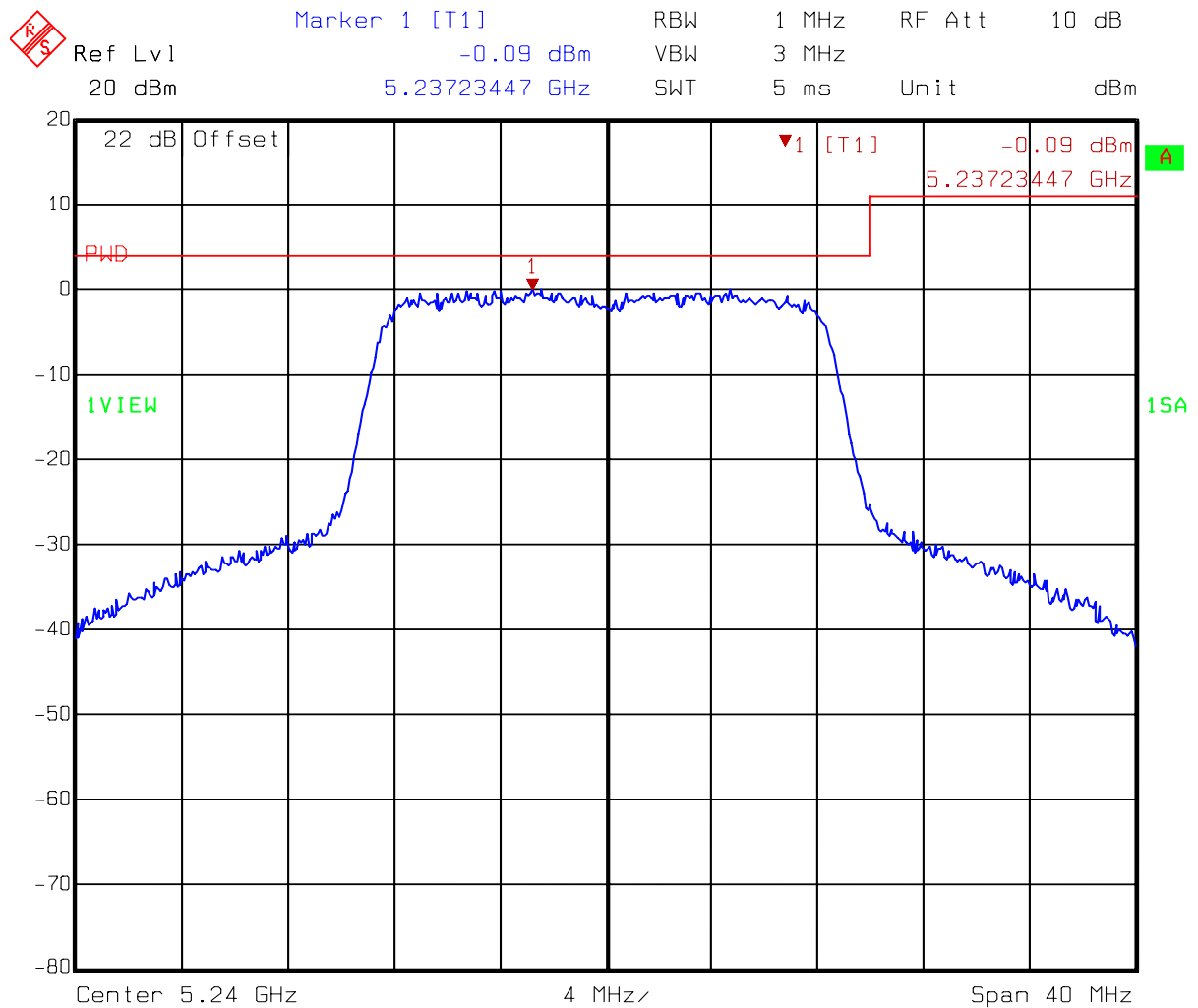
Title: Power Density
 Comment A: CH 36 at 802.11a mode
 Date: 15.JAN.2008 11:11:00

Test Mode: 802.11a CH 40



Title: Power Density
 Comment A: CH 40 at 802.11a mode
 Date: 15.JAN.2008 11:15:53

Test Mode: 802.11a CH 48



Title: Power Density
Comment A: CH 48 at 802.11a mode
Date: 15.JAN.2008 11:19:16

5. Additional provisions test (FCC 15.215)

5.1 Operating environment

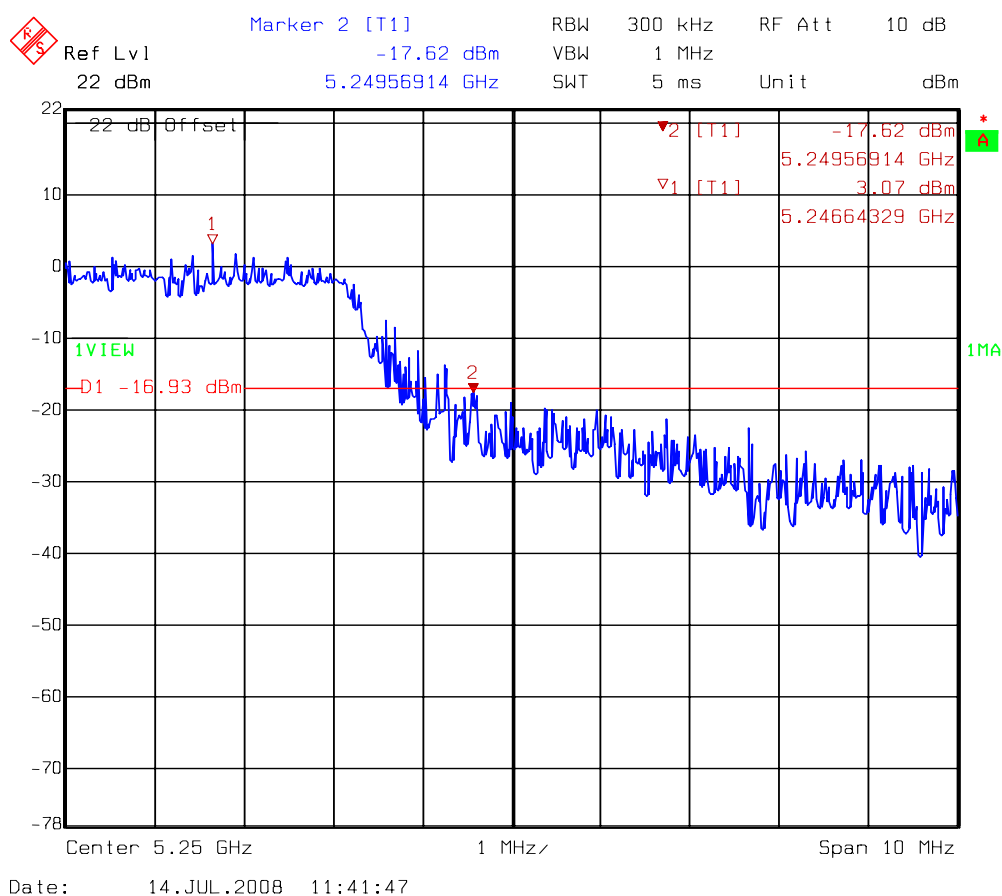
Temperature: 25
 Relative Humidity: 50 %
 Atmospheric Pressure: 1023 hPa

5.2 Procedure of test setup & limitation

The additional provisions mean the device must be designed to ensure that the 20dB bandwidth of the emission or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

This requirement per FCC §15.215 (c) was measured from the antenna port of the EUT using a 50ohm spectrum analyzer with the resolution bandwidth set at 300kHz (approximately 1% of the emission bandwidth), the video bandwidth set at 1MHz (VBW > RBW).

5.3 Measured data of Power Spectrum Density test results



6. Peak excursion to average ratio test (FCC 15.407)

6.1 Operating environment

Temperature: 25
 Relative Humidity: 50 %
 Atmospheric Pressure: 1023 hPa

6.2 Test setup & procedure

The power spectrum density per FCC §15.407(a)(6) was measured from the antenna port of the EUT. Using a 50ohm spectrum analyzer with the RBW=1MHz, VBW=3MHz for peak measurement and RBW=1MHz, VBW=10kHz for average measurement. Peak excursion to average ratio was read directly.

Limit

Operating Frequency (MHz)	Peak excursion to average ratio limit
5150~5250	<13dB
5250~5350, 5470~5725	<13dB
5725~5825	<13dB

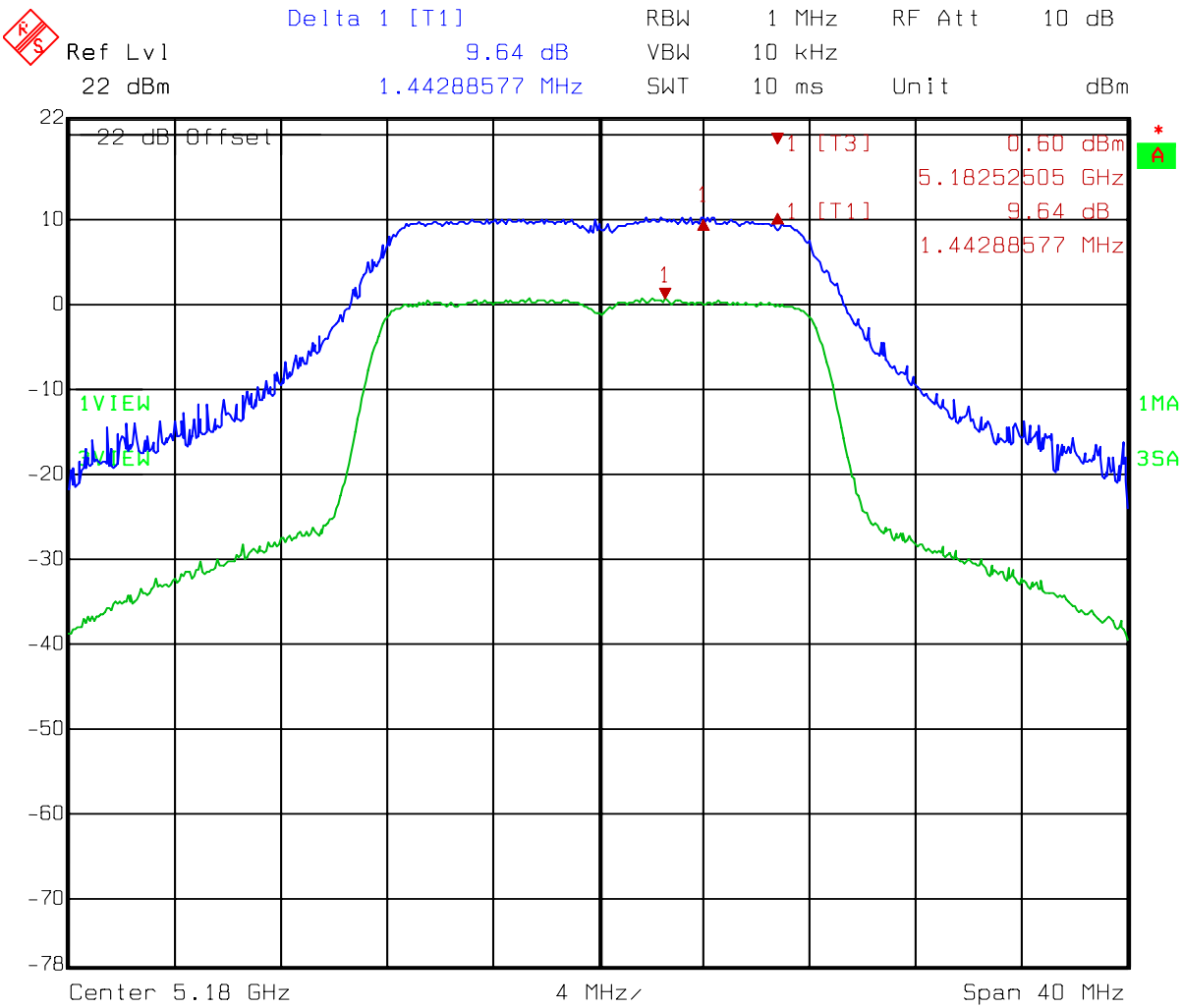
6.3 Measured data of Peak excursion to average ratio test results

Mode	Channel	Frequency (MHz)	Data rate Mbps	PEAR (dBm)	Limit (dBm)
11a	36	5180	6	9.64	13
	40	5200		9.72	13
	48	5240		9.63	13

Please see the plot below.



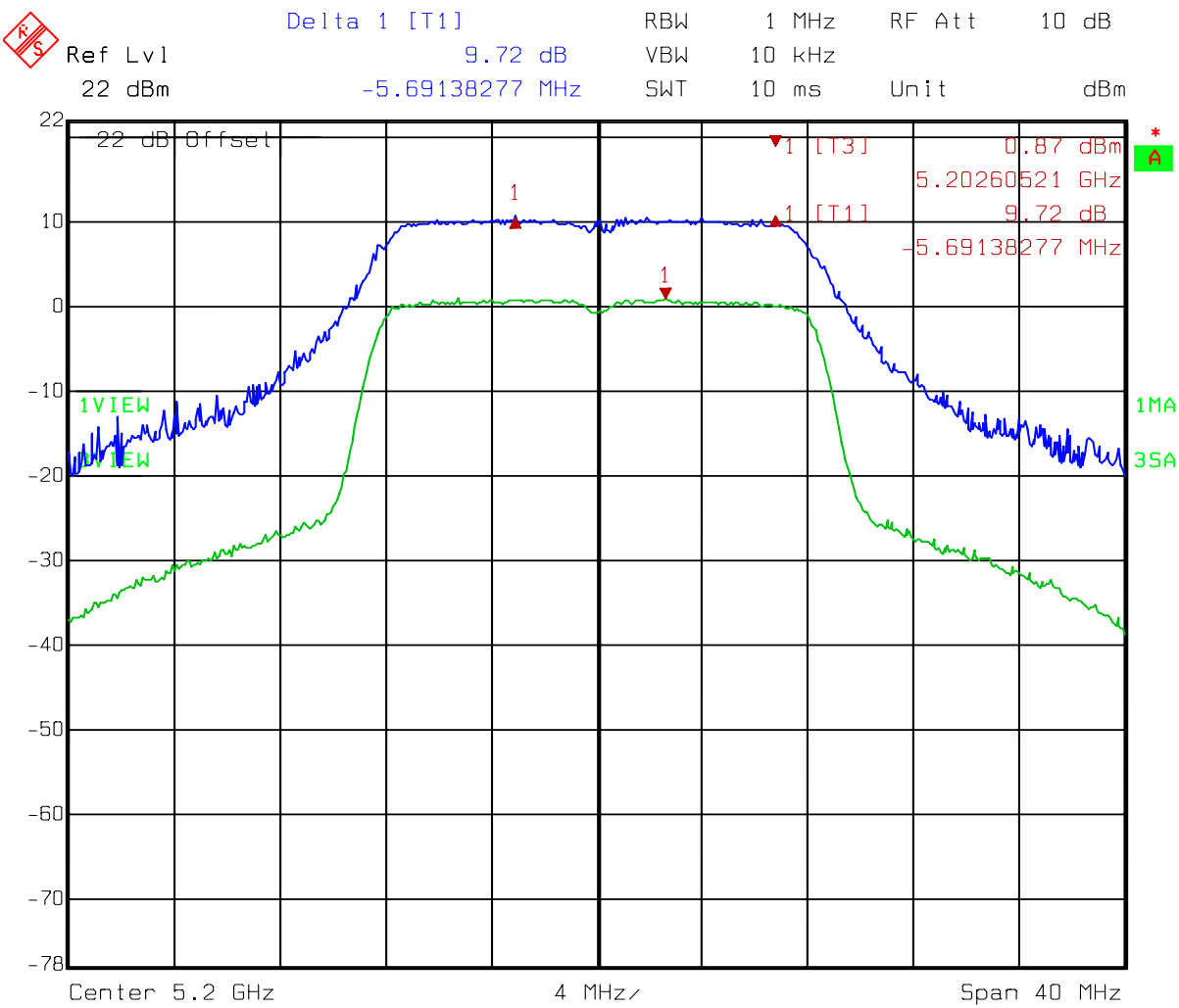
Test Mode: 802.11a CH 36



Title: PK Excursion AV
Comment A: CH 36 at 802.11a mode
Date: 15.JAN.2008 11:10:35

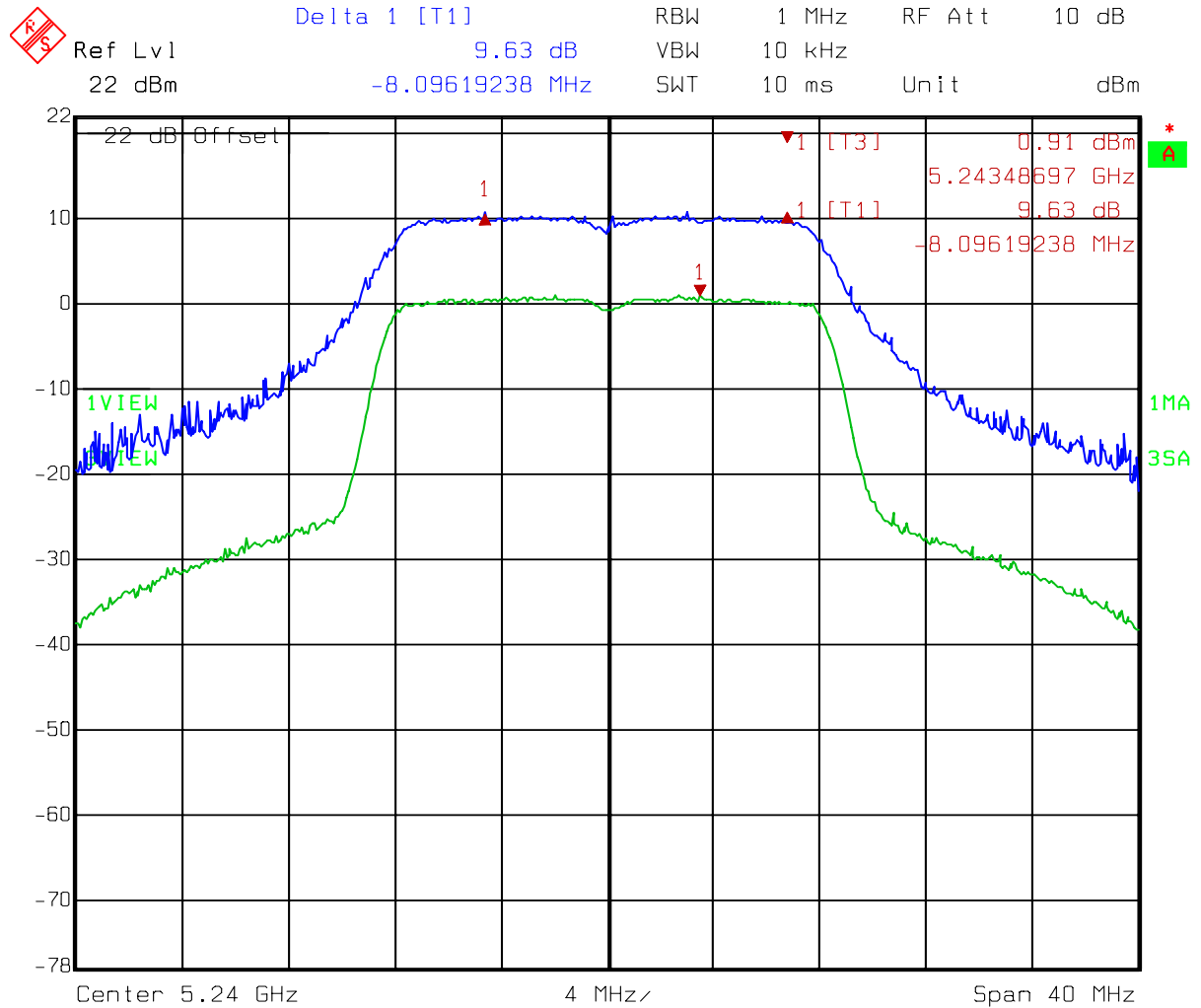


Test Mode: 802.11a CH 40



Title: PK Excursion AV
Comment A: CH 40 at 802.11a mode
Date: 15.JAN.2008 11:15:28

Test Mode: 802.11a CH 48



Title: PK Excursion AV
 Comment A: CH 48 at 802.11a mode
 Date: 15.JAN.2008 11:18:51

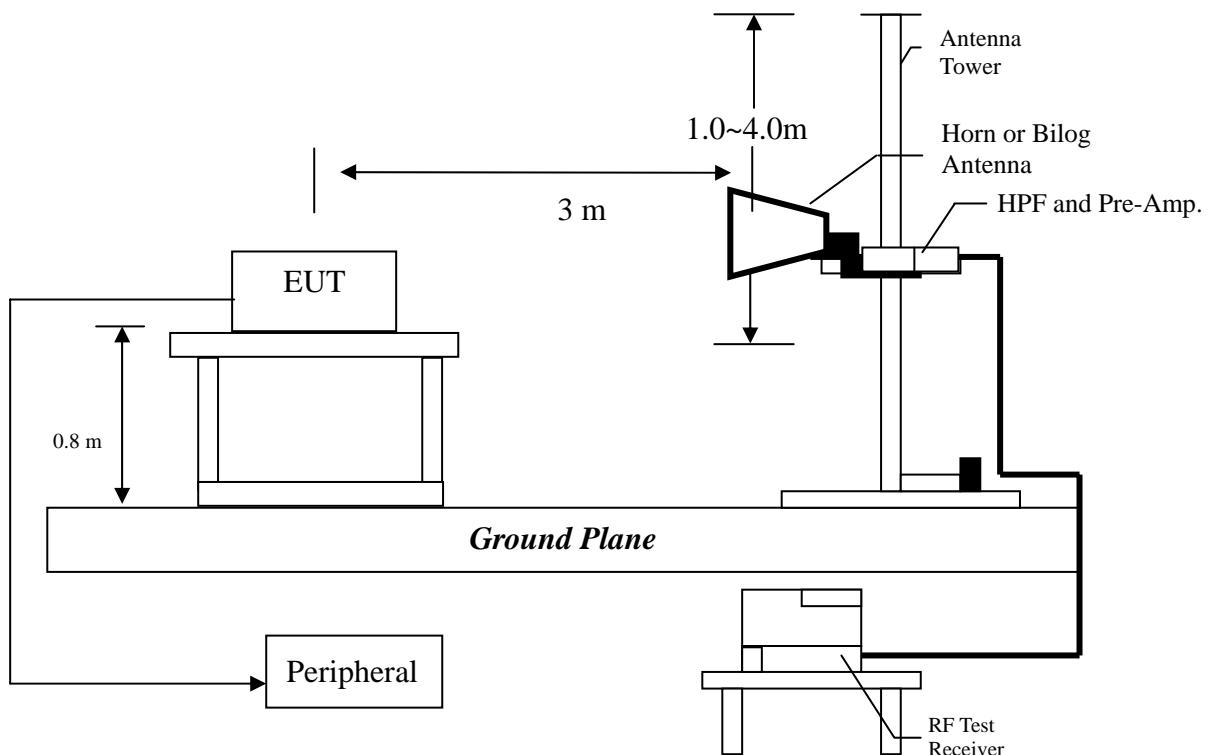
7. Radiated Emission test (FCC 15.205 & 15.209)

7.1 Operating environment

Temperature: 23
Relative Humidity: 58 %
Atmospheric Pressure 1023 hPa

7.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



Radiated emission measurements were performed from 30MHz to tenth harmonic or 40GHz. 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 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

7.3 Emission limits

The spurious Emission shall test through the 10th harmonic. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Frequency (MHz)	Limits (dB μ V/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

Uncertainty was calculated in accordance with NAMAS NIS 81.

Expanded uncertainty (k=2) of radiated emission measurement is ± 3.078 dB.

Expanded uncertainty (k=2) of conducted emission measurement is ± 2.02 dB.

7.4 Radiated spurious emission test data

7.4.1 Measurement results: frequencies equal to or less than 1 GHz

The test was performed on EUT under 802.11a continuously transmitting mode. The worst case occurred at 802.11a Tx channel 36.

EUT : H3C WA2220-AG

Worst Case : 802.11a Tx at channel 36

Antenna Polariz. (V/H)	Freq. (MHz)	Receiver Detector	Corr. Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
V	395.690	QP	16.40	15.74	32.14	46.00	-13.86
V	560.590	QP	19.53	12.49	32.02	46.00	-13.98
V	659.530	QP	21.50	11.84	33.34	46.00	-12.66
V	791.450	QP	23.19	16.70	39.89	46.00	-6.11
V	923.370	QP	24.32	17.94	42.26	46.00	-3.75
V	989.330	QP	25.49	16.00	41.49	54.00	-12.51
H	395.690	QP	16.74	16.75	33.49	46.00	-12.51
H	791.450	QP	23.52	20.13	43.65	46.00	-2.35
H	857.410	QP	24.12	16.22	40.34	46.00	-5.67
H	893.300	QP	24.62	16.37	40.99	46.00	-5.02
H	923.370	QP	24.59	19.67	44.26	46.00	-1.75
H	989.330	QP	25.83	16.74	42.57	54.00	-11.44

Remark:

1. Corr. Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Corr. Factor

7.4.2 Measurement results: frequency above 1GHz

EUT : H3C WA2220-AG
Frequency band : 5180MHz ~ 5240MHz
Test Condition : 802.11a Tx at channel 36

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamplifier (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
10360.00	PK	V	33.72	48.15	55.97	70.40	74	-3.60
10360.00	AV	V	33.72	48.15	38.63	53.06	54	-0.94

Remark:

1. Corrected Level = Reading Level + Correction Factor - Preamp

2. Correction Factor = Antenna Factor + Cable Loss

EUT : H3C WA2220-AG
Frequency band : 5180MHz ~ 5240MHz
Test Condition : 802.11a Tx at channel 40

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamplifier (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
10400.00	PK	V	33.72	48.15	55.04	69.47	74	-4.53
10400.00	AV	V	33.72	48.15	38.64	53.07	54	-0.93

Remark:

1. Corrected Level = Reading Level + Correction Factor - Preamp

2. Correction Factor = Antenna Factor + Cable Loss

EUT : H3C WA2220-AG
Frequency band : 5180MHz ~ 5240MHz
Test Condition : 802.11a Tx at channel 48

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamplifier (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
10480.00	PK	V	33.72	48.15	53.58	68.01	74	-5.99
10480.00	AV	V	33.72	48.15	36.21	50.64	54	-3.36

Remark:

1. Corrected Level = Reading Level + Correction Factor - Preamp

2. Correction Factor = Antenna Factor + Cable Loss

8. Emission on the band edge §FCC 15.205

The measurement was made to the average and peak field strength of the fundamental frequency. And the spurious emission in the restrict band must also comply with the FCC subpart C 15.209.

8.1 Operating environment

Temperature: 22
Relative Humidity: 56 %
Atmospheric Pressure 1023 hPa

8.2 Test setup & procedure

The output of EUT was connected to spectrum analyzer via a 50ohm cable.

The setting of spectrum analyzer is:

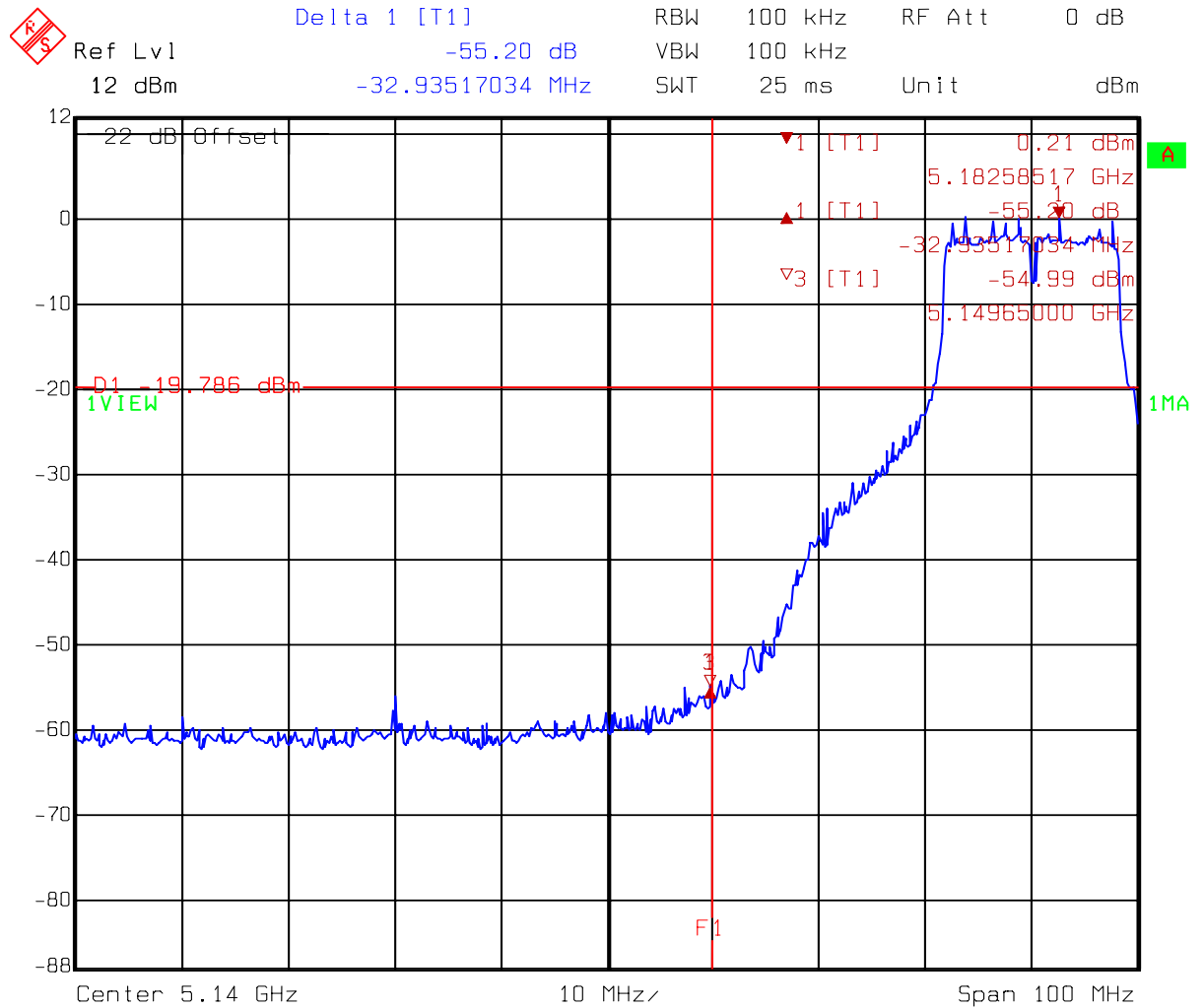
Peak: RBW = 100kHz ; VBW = 100kHz
Average: RBW = 1MHz ; VBW = 10Hz

8.3 Test Result

Channel	Detector	Radiated Method	Conducted Method	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
		Max. Field Strength of Fundamental(dBuV)	Between Carrier Max. Power and Loca Max. Emission in Restrict Band (dBc)			
36	PK	107.40	55.20	55.20	74	-21.80
	AV	96.23	57.90	38.33	54	-15.67

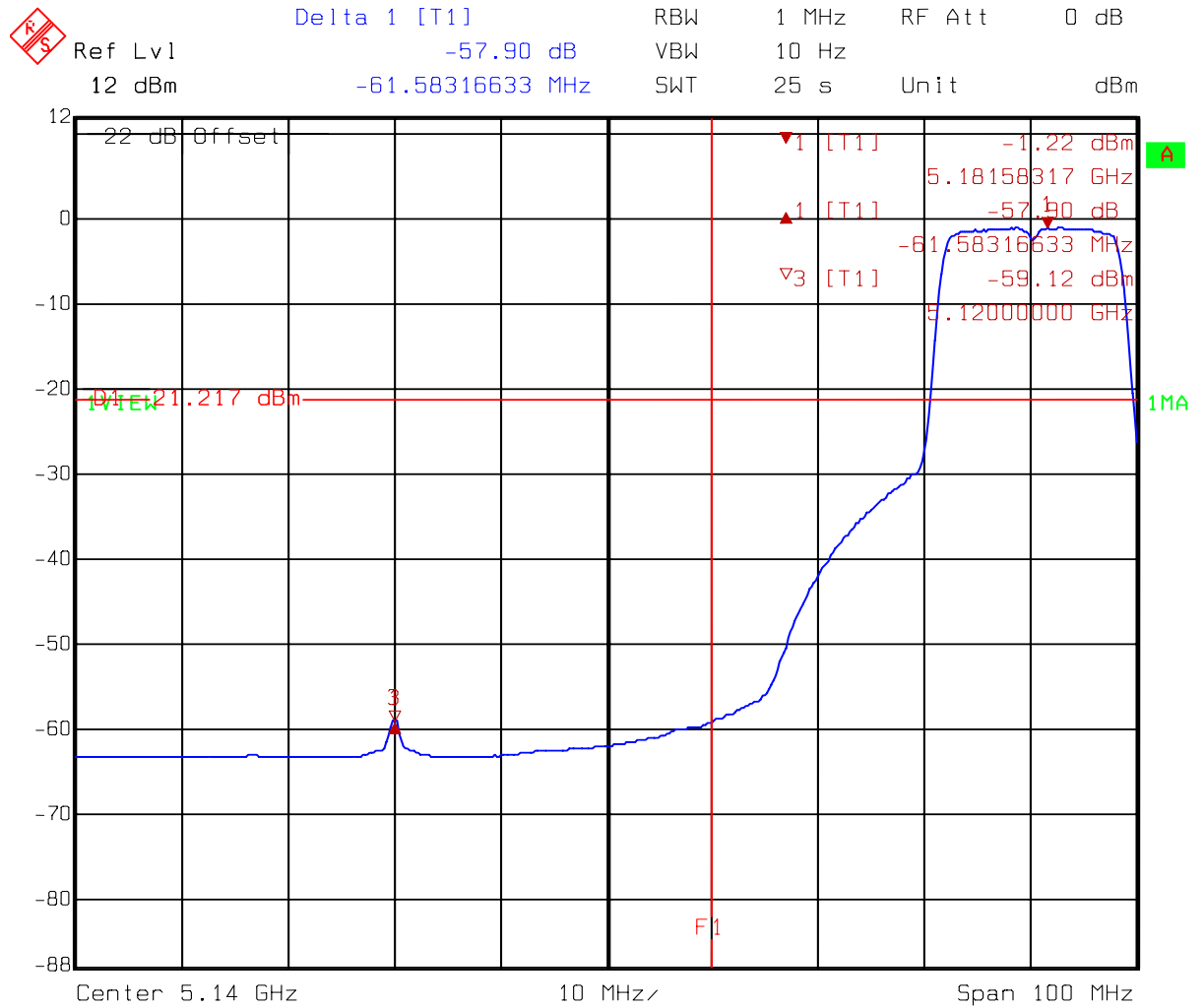
Please see the plots as below pages for conducted method test result.

Test mode: 802.11a CH 36



Title: Band Edge
 Comment A: CH 36 at 802.11a mode
 Date: 15.JAN.2008 11:11:28

Test mode: 802.11a CH 36



Title: Band Edge
 Comment A: CH 36 at 802.11a mode
 Date: 15.JAN.2008 11:12:46