REPORT ON

Limited FCC CFR 47: Parts 15 B and C Testing in support of an
Application for Grant of Equipment Authorisation
of a TCM Mobile Ltd. WiFi Sector Communication Unit

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FCC ID VN9BST001

Document 75901050 Report 02 Issue 1 **October 2007**

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REPORT ON Limited FCC CFR 47: Parts 15 B and C Testing in support of an Application for Grant of Equipment Authorisation of a TCM Mobile Ltd. WiFi Sector Communication Unit

Document 75901050 Report 02 Issue 1

October 2007

PREPARED FOR TCM Mobile Ltd.
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48092 Israel

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DATED 1st October 2007

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47: Parts 15 B & C. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineers;

P Harrison S Hartley B Airs A Blagg

UKAS TESTING 0141 Group

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SECTION 1

REPORT SUMMARY

Limited FCC CFR 47: Parts 15 B and C Testing in support of an
Application for Grant of Equipment Authorisation
of a TCM Mobile Ltd. WiFi Sector Communication Unit

Product Service

1.1 STATUS

Equipment Under Test	WiFi Sector Communication Unit
Objective	To undertake measurements to determine the Equipment Under Test's (EUT's) compliance with the specification.
Name and Address of Client	TCM Mobile Ltd. 11 Amal Street – Park Afeq Rosh Ha'ain 48092 Israel
Model Number	802.11 b/g Radio LAN Access Point
Part Number	TCM-BST-001
Serial Number	0003
Hardware Version	Rev-B
Declared Variants	None
Test Specification/Issue/Date	FCC CFR 47: Part 15, Subparts B and C, August 2006
Number of Items Tested	One
Security Classification of EUT	Commercial-In-Confidence
Incoming Release **Date**	Declaration of Build Status 14th August 2007
Disposal **Reference Number** **Date**	Packing Note 75901050 10th August 2007
Order Number **Date**	07/0019 23rd March 2007
Start of Test	25th July 2007
Finish of Test	8th September 2007
Related Documents	ANSI C63.4: 2003 FCC: DA 00-705: 2000

1.2 INTRODUCTION

The information contained within this report is intended to show limited verification of compliance of the TCM Mobile Ltd. WiFi Sector Communication Unit to the requirements of FCC Specification Parts 15 B and C.

Testing was carried out in support of an application for Grant of Equipment Authorisation in the name of TCM Mobile Ltd.

Product Service

1.3 DECLARATION OF BUILD STATUS

MAIN EUT			
MANUFACTURING DESCRIPTION	WiFi sector communication unit		
MANUFACTURER	T.C.M Mobile ltd		
TYPE	WiFi sector communication unit		
PART NUMBER	TCM-BST-001		
SERIAL NUMBER	0003		
HARDWARE VERSION	Rev-B		
SOFTWARE VERSION	N/A		
TRANSMITTER OPERATING RANGE	2412MHz - 2462MHz		
RECEIVER OPERATING RANGE	2412MHz - 2462MHz		
COUNTRY OF ORIGIN	Israel		
INTERMEDIATE FREQUENCIES	N/A		
ITU DESIGNATION OF EMISSION	802.11b – 15M5W7D 802.11g – 16M7W7D		
HIGHEST INTERNALLY GENERATED FREQUENCY	WiFi 802.11b/g		
OUTPUT POWER (W or dBm)	802.11b – +24dBm 802.11g - +22dBm		
TECHNICAL DESCRIPTION (a brief description of the intended use and operation, or provide data sheet)	WiFi sector communication unit for hotspot and WiFi network deployment.		
BATTERY/POWER SUPPLY			
MANUFACTURING DESCRIPTION	Power line		
MANUFACTURER	Sunpower		
TYPE	12V DC Power Supply		
PART NUMBER	SPS-600P-12		
VOLTAGE	12V DC		
COUNTRY OF ORIGIN	Taiwan		
MODULES (if applicable)			
MANUFACTURING DESCRIPTION	Access point	RF Amplifier	Access point
MANUFACTURER	Cisco	T.C.M Mobile	Sparklan
TYPE	Cisco 850	TCM-BST-0032	WX7800
POWER	NA	NA	NA
FCC ID	LDKXSNIAGI3	NA	RYK-7800A
COUNTRY OF ORIGIN	USA	ISRAEL	Taiwan
INDUSTRY CANADA ID	NA	NA	NA
EMISSION DESIGNATOR	NA	NA	NA
DHSS/FHSS/COMBINED OR OTHER	NA	NA	NA
ANCILLARIES (if applicable)			
MANUFACTURING DESCRIPTION	NA		
MANUFACTURER	NA		
TYPE	NA		
PART NUMBER	NA		
SERIAL NUMBER	NA		
COUNTRY OF ORIGIN	NA		

Signature Held on File
Date 14th August 2007
D of B S Serial No 75901050/01

TUV Product Service Limited formally certifies that the manufacturer's declaration as reproduced in this report, is a true and accurate record of the original received from the applicant.

1.3 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out is shown below.

Section	Spec Clause	Test Description	Result
2.1	15.109	Spurious Radiated Emissions	Pass
2.2	15.247(a)(2)	6dB Bandwidth	Pass
2.3	15.247(b)(3)	Maximum Peak Output Power (Conducted)	Pass
2.4	15.247(b)(4)	Maximum Peak Output Power (Radiated)	Pass
2.5	15.247(c)	Spurious Conducted Emissions on Antenna Port	Pass
2.6	15.247(c)	Spurious Radiated Emissions	Pass
2.7	15.205	Measurement at the Band Edge (Marker Delta Method)	Pass
2.8	15.247(d)	Peak Power Spectral Density	Pass

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a TCM Mobile Ltd. WiFi Sector Communication Unit.

1.4.2 Modes of Operation

Modes of operation of the EUT during testing were as follows:

Applicable testing was carried out with the EUT transmitting at maximum power or receiving as detailed in the Section “Test Configuration”.

A program called CPS was run to ensure maximum data rate (approximately 22Mbps was achievable) was used over the link and the EUT was connected via 2 laptops.

1.4.3 Test Configuration

Test Configuration – RLAN Mode

Test Mode 1: RLAN Transmitting on the following channels;
Bottom Channel: 2412MHz
Middle Channel: 2437MHz
Top Channel: 2462MHZ

The Output Power level (controlled by application software) was set to maximum

1.5 TEST CONDITIONS

The EUT was set-up simulating a typical user installation on the Alternative Open Field Test Site under FCC Registration Number: 90987 and tested in accordance with the applicable specification.

For all tests, the TCM Mobile Ltd. WiFi Sector Communication Unit was powered by its own internal battery.

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards were made.

1.7 MODIFICATION RECORD

The table below details modifications made to the EUT during the test programme. The Modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	Original Sample	N/A	N/A
1	1. Replaced the power amplifier to a new one. 2. Insulate all the RF Cables	Avi Shani	08/07/2007

Product Service

SECTION 2

TEST DETAILS

Limited FCC CFR 47: Parts 15 B and C Testing in support of an
Application for Grant of Equipment Authorisation
of a TCM Mobile Ltd. 802.11 b/g Radio LAN Access Point

2.1 SPURIOUS RADIATED EMISSIONS

2.1.1 Specification Reference

FCC CFR 47: Part 15 Subpart B, Section 15.109

2.1.2 Equipment Under Test

WiFi Sector Communication Unit

2.1.3 Date of Test

9th August 2007 – Modification State 1 (Middle Channel)

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT. The list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 30MHz – 1GHz were then formally measured using a CISPR Quasi-Peak detector.

No FCC part 15 B spurious emissions have been investigated above 1 GHz as FCC Part 15C spurious emissions have been investigated to 26 GHz for details refer to section 2.7.

The measurements were performed at a 3m distance unless otherwise stated.

2.1 SPURIOUS RADIATED EMISSIONS

2.1.6 Test Results

Equipment Designation: Unintentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart B, Section 15.109 for Spurious Radiated Emissions (30MHz – 1GHz).

The levels of the six highest emissions measured in accordance with the specification are presented below: -

Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz		cm	degree	dBµV/m	µV/m	dBµV/m	µV/m
45.03	Vertical	100	0	23.9	15.7	40.0	100.0
325.60	Vertical	146	232	36.8	69.2	46.0	200.0
328.40	Vertical	146	232	39.5	63.4	46.0	200.0
328.90	Vertical	146	232	39.9	98.9	46.0	200.0
331.30	Vertical	146	232	33.9	49.5	46.0	200.0
390.40	Vertical	112	169	36.3	65.3	46.0	200.0

2.2 6dB BANDWIDTH

2.2.1 Specification Reference

FCC Part 15.247(a)(2)

2.2.2 Equipment Under Test

WiFi Sector Communication Unit

2.2.3 Date of Test

10th August 2007 – Modification State 1 (Middle Channel)
30th August 2007 – Modification State 1 (Bottom and Top Channels)

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Procedure

Test Performed in accordance with 15.247.

The EUT was transmitted at maximum power via a cable and attenuator to the Spectrum Analyser. The Analyser settings were adjusted to display the resultant trace on screen. The peak point of the trace was measured and the markers positioned to give the –6dBc points of the displayed spectrum.

The measurement plots can be seen on the following pages.

2.2.6 Test Results

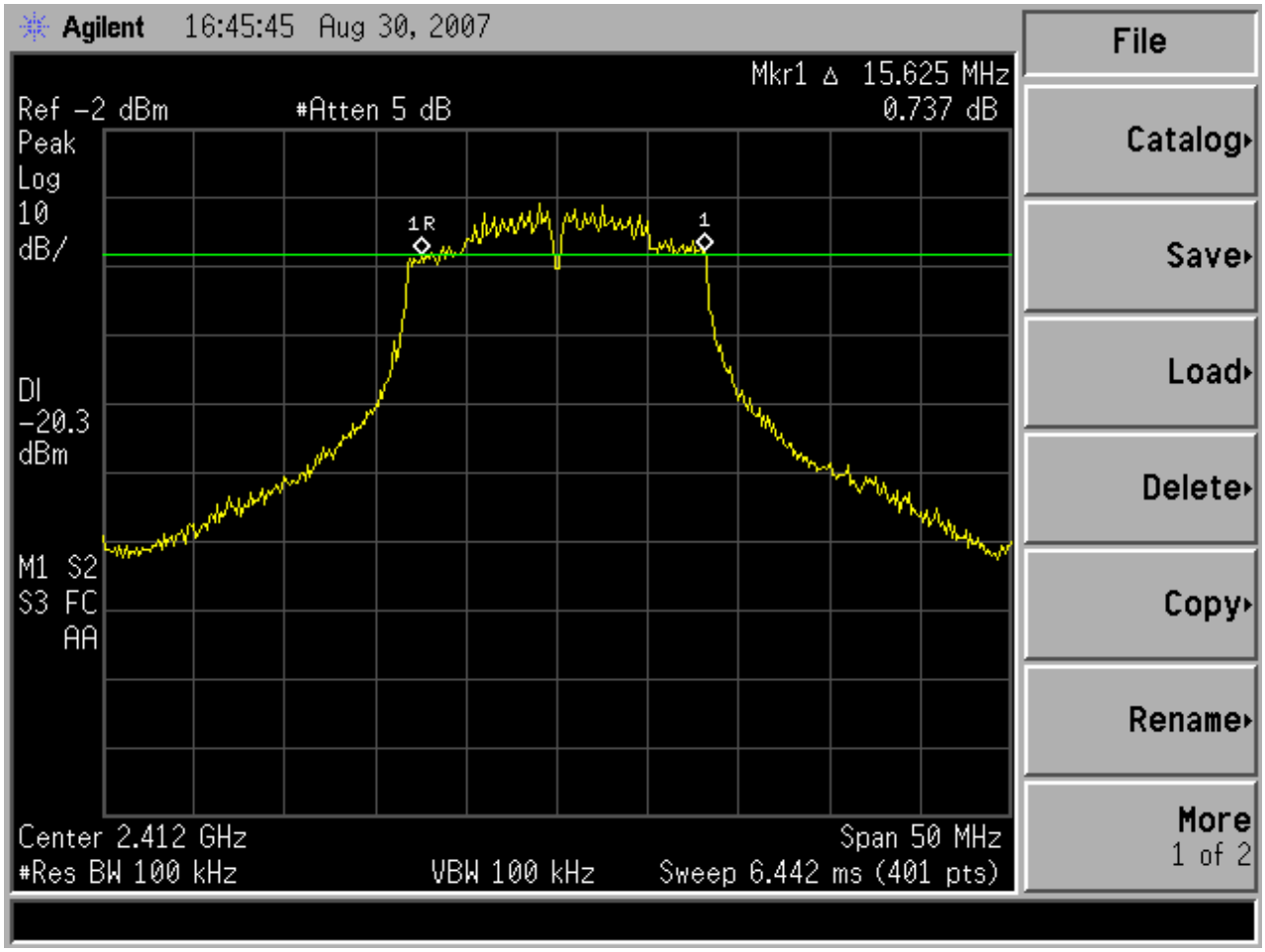
Frequency (MHz)	Data Rate (Mbps)	6dB Bandwidth (MHz)
2412	20	15.625
2437	20	16.625
2462	20	12.000

Limit	≥500kHz

Product Service

2.2 6dB BANDWIDTH

2.2.6 **Test Results** - continued

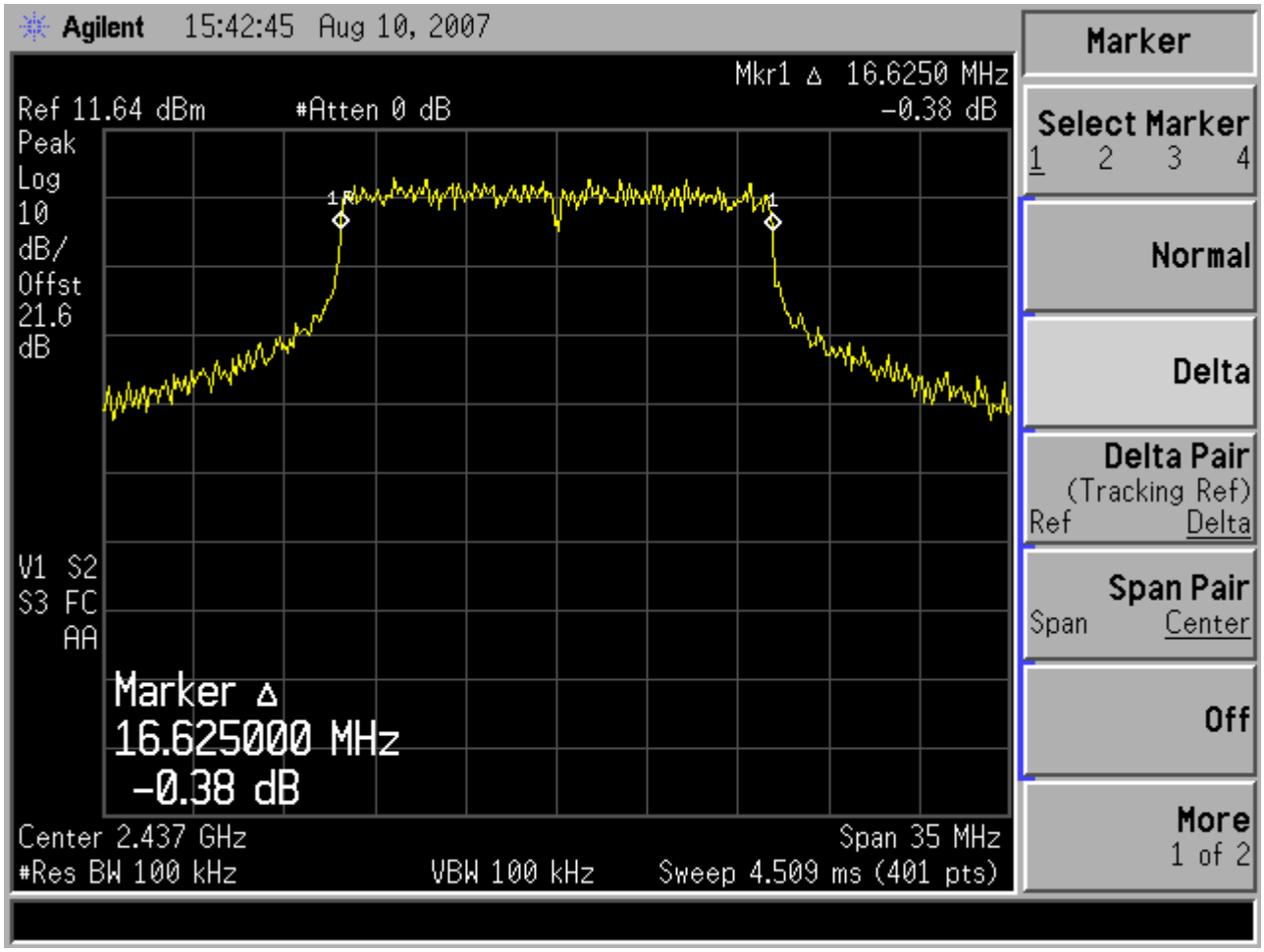


2412.0MHz – Maximum Power 20Mbps

Product Service

2.2 6dB BANDWIDTH

2.2.6 **Test Results** - continued

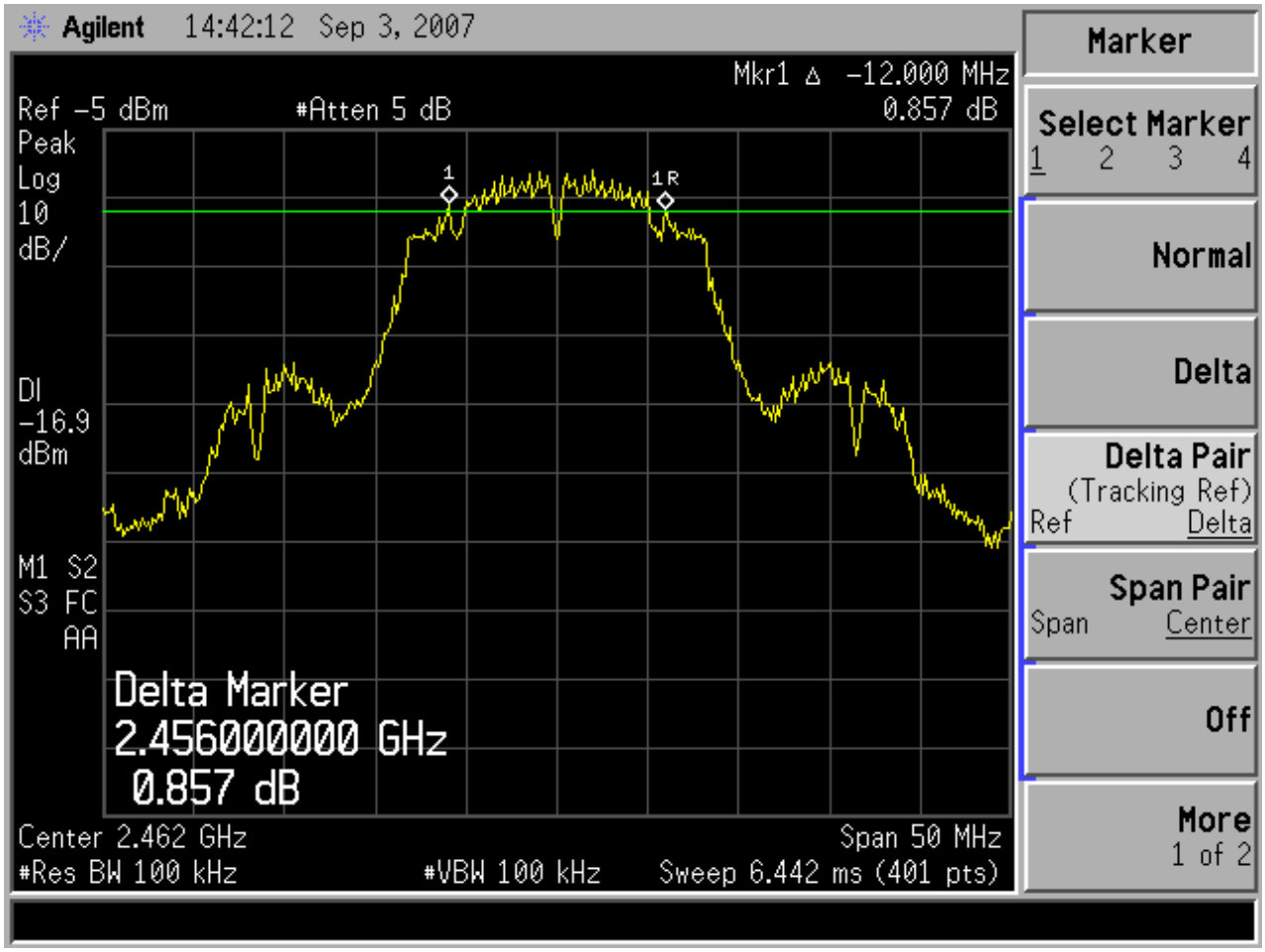


2437.0MHz – Maximum Power 20Mbps

Product Service

2.2 6dB BANDWIDTH

2.2.6 **Test Results** - continued



2462.0MHz – Maximum Power 20Mbps

2.3 MAXIMUM PEAK OUTPUT POWER (CONDUCTED)

2.3.1 Specification Reference

FCC CFR 47: Part 15 Subpart C, Section 15.247(b)(4)

2.3.2 Equipment Under Test

WiFi Sector Communication Unit

2.3.3 Date of Test

10th August 2007 – Modification State 1 (Middle Channel)
31st August 2007 – Modification State 1 (Bottom and Top Channels)

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

The EUT utilises an antenna port and therefore the Maximum Peak Output Power was made using the conducted method.

The EUT was connected to an HP 8990 Peak Power Analyser via a 20dB attenuator.
The cable loss was measured (with attenuator) and entered as an offset on the Peak Power Analyser.
The EUT was set to transmit at full power on the Middle Channel at 22Mbps data rate. The peak output power level was measured.

2.3.6 Test Results

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.247(b)(3) for Maximum Peak Output Power(Conducted).

Measurements were made with the EUT in Mode 1.

Frequency (MHz)	Result EIRP (dBm)	Result EIRP (mW)
2412.0	23.22	210.0
2437.0	20.14	103.3
2462.0	22.34	171.4
Limit	<+30dBm or <1W	

2.4 MAXIMUM PEAK OUTPUT POWER (EIRP Method)

2.4.1 Specification Reference

FCC CFR 47: Part 15 Subpart C, Section 15.247(b)(4)

2.4.2 Equipment Under Test

WiFi Sector Communication Unit

2.4.3 Date of Test

9th August 2007 – Modification State 1 (Middle Channel)
5th September 2007 – Modification State 1 (Bottom and Top Channels)

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

The EUT contains an integral antenna and therefore the Maximum Peak Output Power was made using the EIRP method.

The Spectrum Analyser was tuned to the test frequency. The device Output Power setting was controlled as specified in the Product Information, Section 1.5 of this document. The device was then rotated through 360 degrees until the highest power level was observed in both horizontal and vertical polarisation. The device was then replaced with a substitution antenna, who's input signal level into the antenna was adjusted until the received level matched that of the previously detected emission.

2.4.6 Test Results

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.247(b)(4) for Maximum Peak Output Power.

Measurements were made with the EUT in Mode 1.

Frequency (MHz)	Result EIRP (dBm)	Result EIRP (mW)
2412	23.66	232.3
2437	26.72	469.9
2462	23.70	234.4
Limit	<+36dBm or <4W	

2.5 SPURIOUS CONDUCTED EMISSIONS ON ANTENNA PORT

2.5.1 Specification Reference

FCC CFR 47: Part 15 Subpart C, Section 15.247(c)

2.5.2 Equipment Under Test

WiFi Sector Communication Unit

2.5.3 Date of Test

10th August 2007 – Modification State 1 (Middle Channel)
31st August 2007 – Modification State 1 (Bottom and Top Channels)

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.5 Test Procedure

Test Performed in accordance with FCC CFR 47: Part 15 Subpart C, Section 15.247(c).

In accordance with Part 15.247(c), Spurious Conducted Emissions from the antenna terminal were measured within the frequency spectrum investigated from 9kHz to 25 GHz. The transmitter output power was attenuated using a combination of filters and attenuators and. The EUT was set to transmit on full power, at 22Mbps and tested on the Middle channel. The resolution and video bandwidths were set to 100kHz in accordance with Part 15.247. The spectrum analyser detector was set to Max Hold.

For measuring the range 9kHz to 4GHz, a 20dB attenuator was used. From 4 to 18GHz, a 20dB attenuator and a high pass filter were used. From 18 to 25GHz a piece of Waveguide.

The Maximum “fundamental peak” level measured was used to determine the limit line as displayed on the following plots.

The maximum path loss across each measurement band was used as the reference level offset to ensure worst case

2.5.6 Test Results

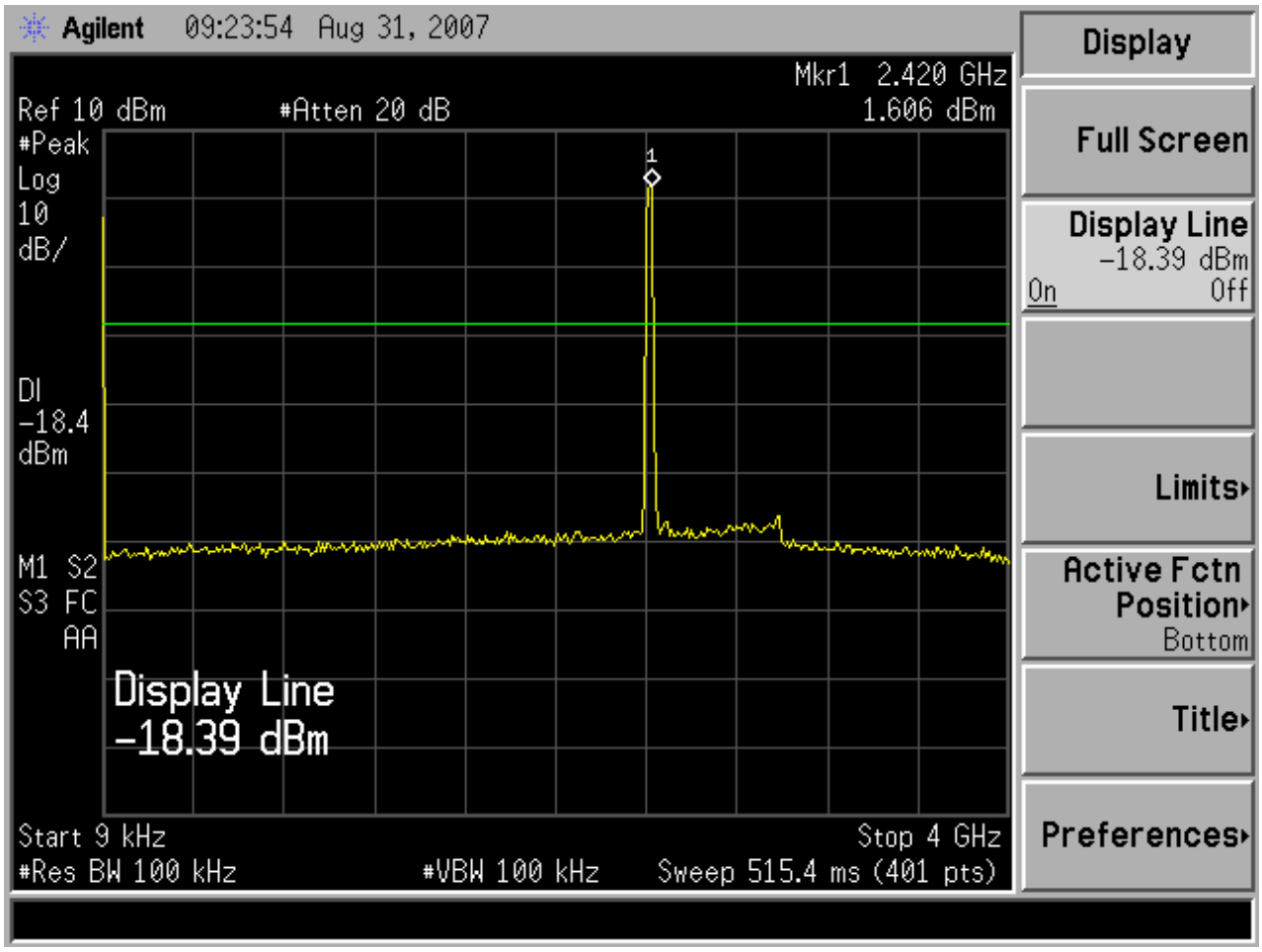
The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.247(b)(1) for Spurious Conducted Emissions on the Antenna Port.

The plots on the following pages show the EUT’s Antenna Ports Spurious Conducted Emissions over the frequency range 9kHz to 25GHz.

Product Service

2.5 SPURIOUS CONDUCTED EMISSIONS ON ANTENNA PORT

2.5.6 **Test Results -** continued



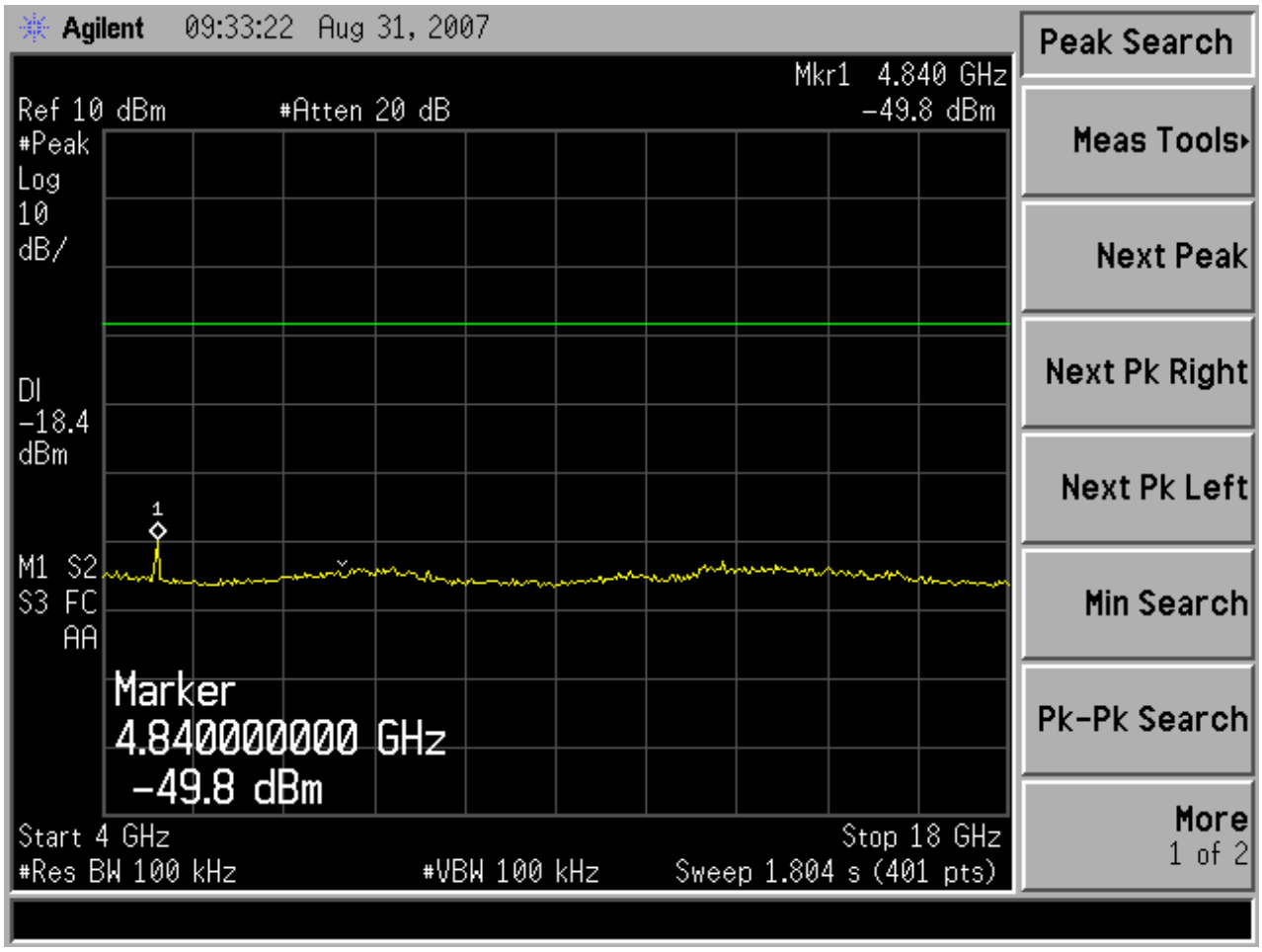
Spurious Conducted Emissions (9kHz – 4GHz)

EUT Transmitting on Bottom Channel, (2412.0MHz) – Maximum Power 22Mbps

Product Service

2.5 SPURIOUS CONDUCTED EMISSIONS ON ANTENNA PORT

2.5.6 **Test Results -** continued

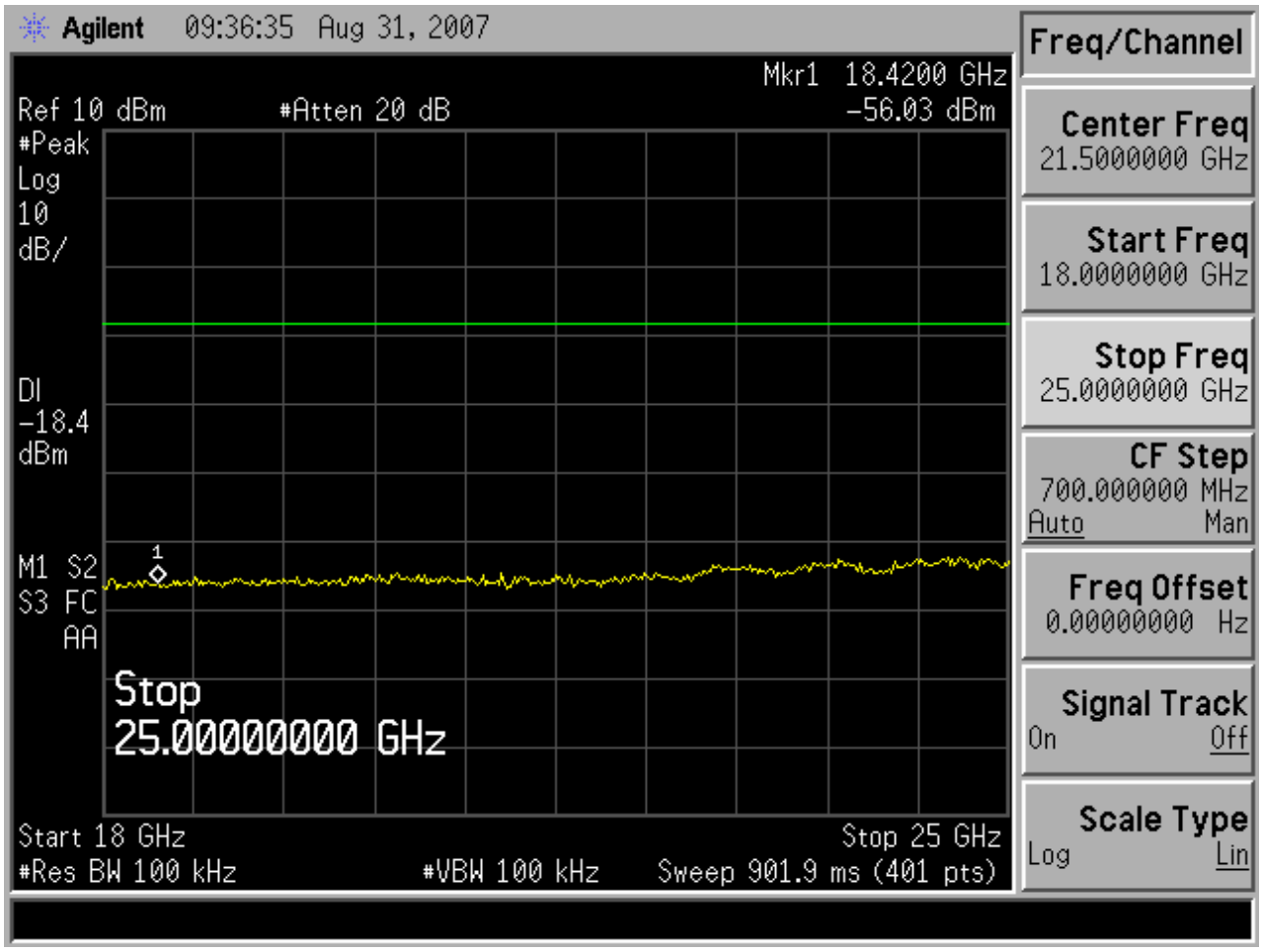


Spurious Conducted Emissions (4GHz – 18GHz)

EUT Transmitting on Bottom Channel, (2412.0MHz) – Maximum Power 22Mbps

2.5 SPURIOUS CONDUCTED EMISSIONS ON ANTENNA PORT

2.5.6 **Test Results -** continued



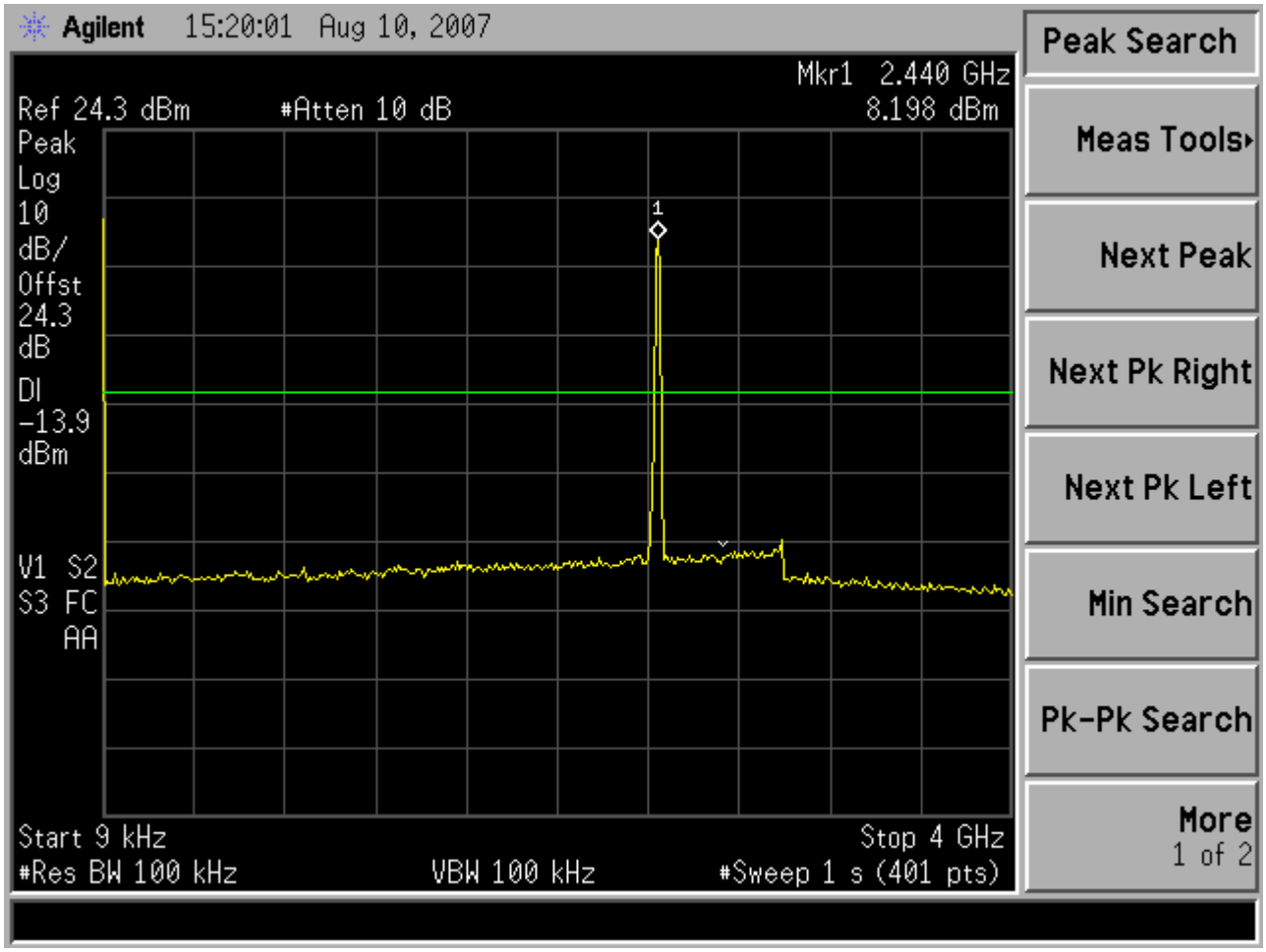
Spurious Conducted Emissions (18GHz – 25GHz)

EUT Transmitting on Bottom Channel, (2412.0MHz) – Maximum Power 22Mbps

Product Service

2.5 SPURIOUS CONDUCTED EMISSIONS ON ANTENNA PORT

2.5.7 **Test Results -** continued



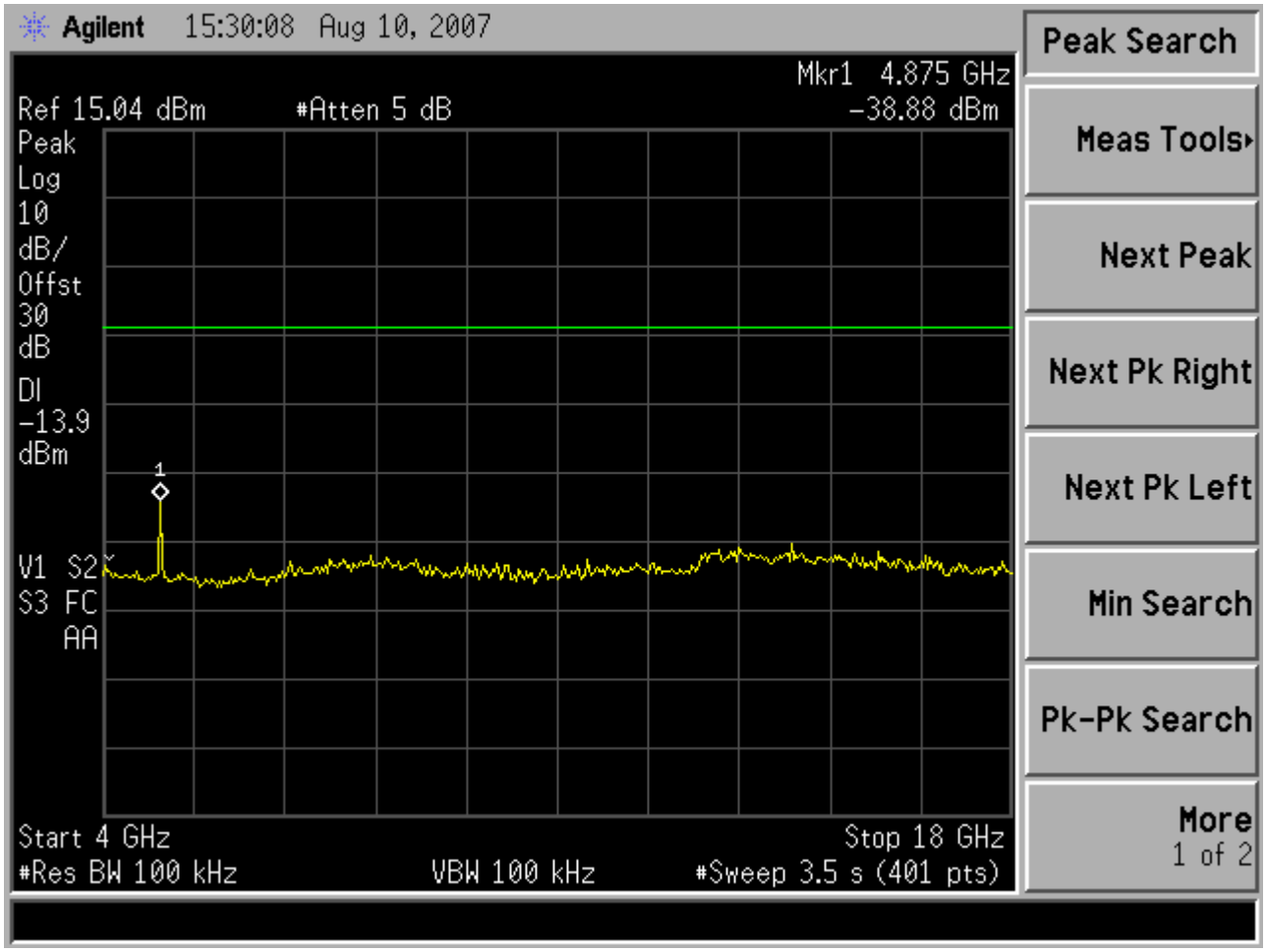
Spurious Conducted Emissions (9kHz – 4GHz)

EUT Transmitting on Middle Channel, (2437.0MHz) – Maximum Power 22Mbps

Product Service

2.5 SPURIOUS CONDUCTED EMISSIONS ON ANTENNA PORT

2.5.7 **Test Results -** continued



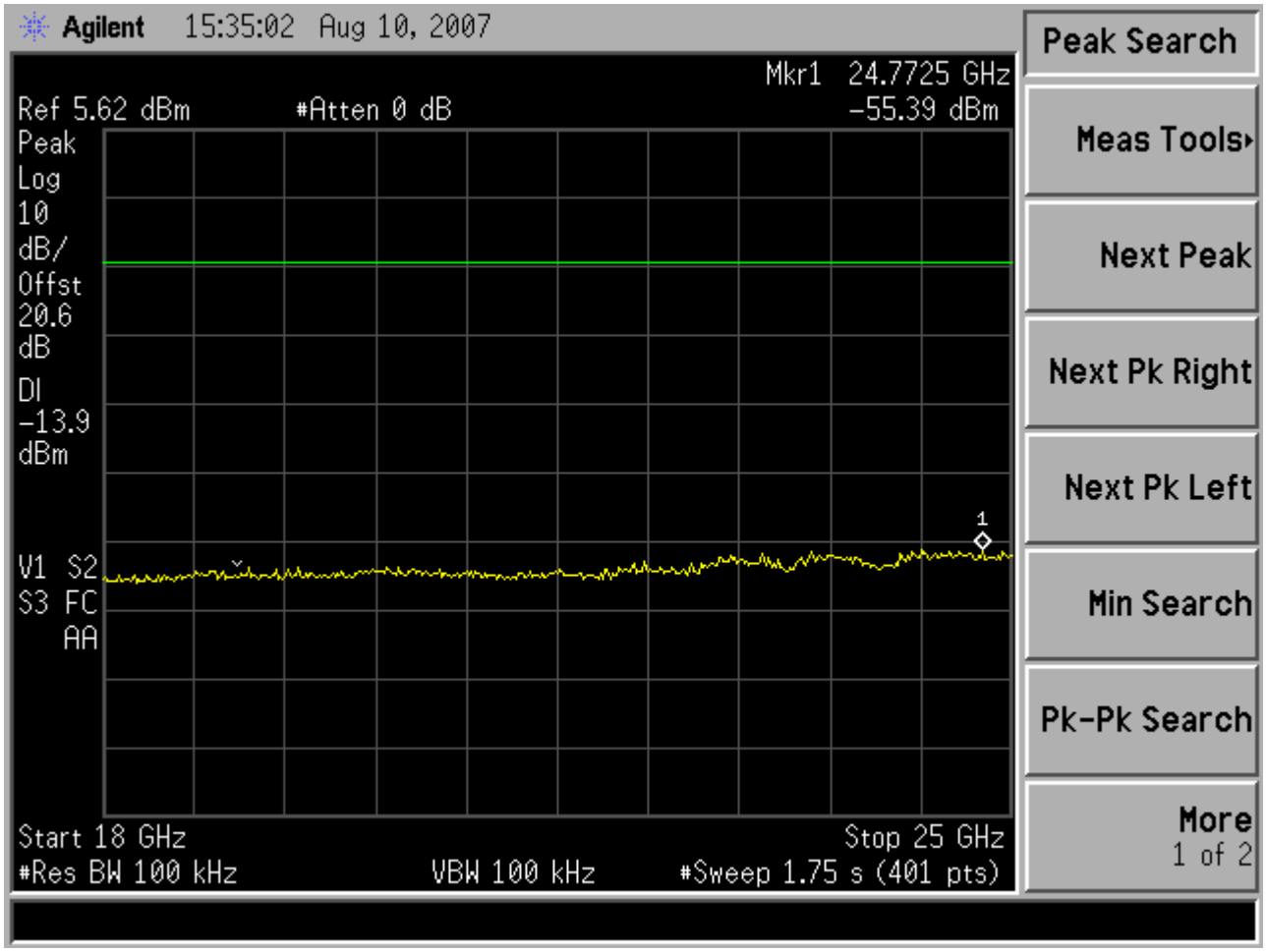
Spurious Conducted Emissions (4GHz – 18GHz)

EUT Transmitting on Middle Channel, (2437.0MHz) – Maximum Power 22Mbps

Product Service

2.5 SPURIOUS CONDUCTED EMISSIONS ON ANTENNA PORT

2.5.7 **Test Results -** continued



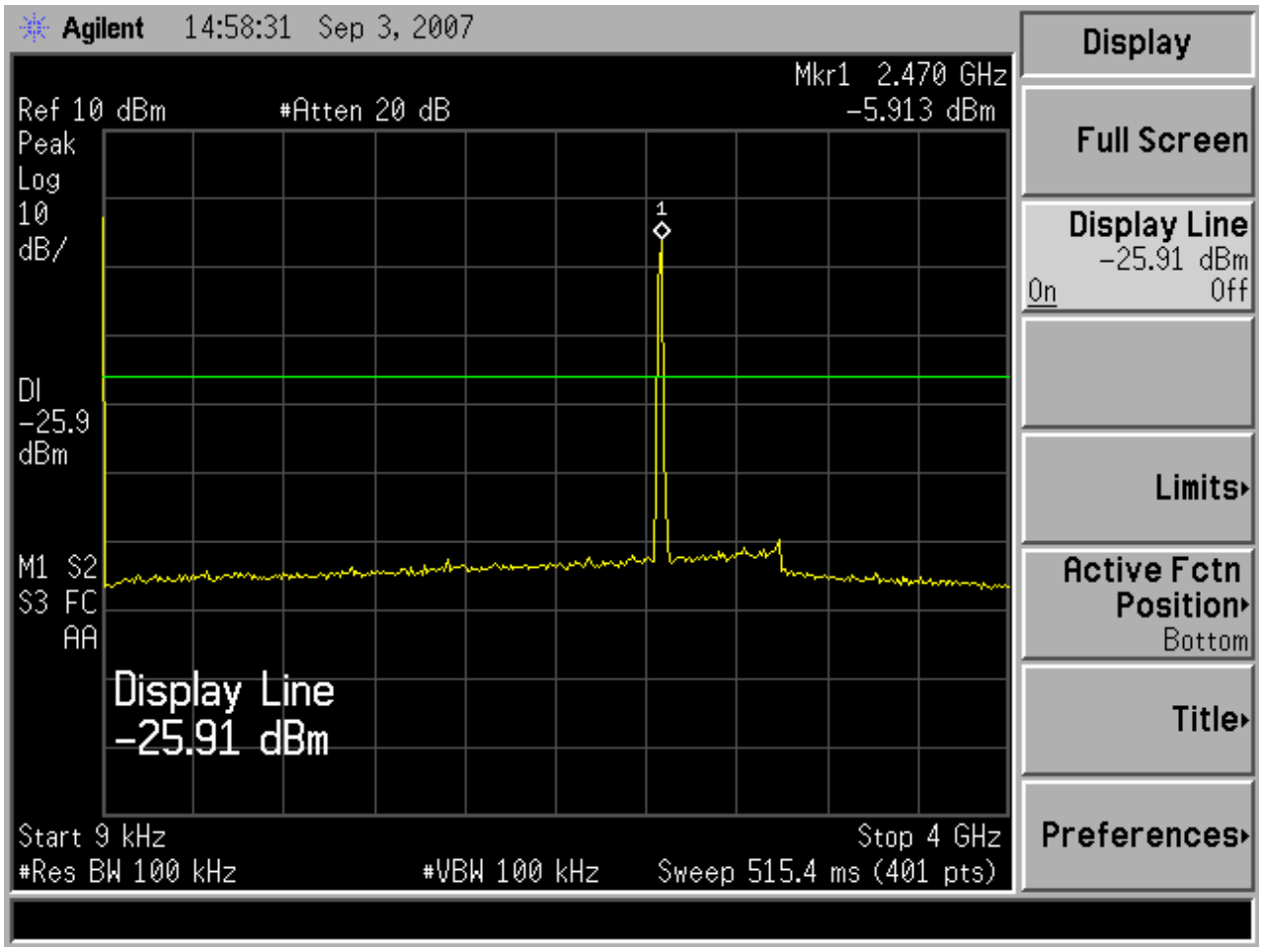
Spurious Conducted Emissions (18GHz – 25GHz)

EUT Transmitting on Middle Channel, (2437.0MHz) – Maximum Power 22Mbps

Product Service

2.5 SPURIOUS CONDUCTED EMISSIONS ON ANTENNA PORT

2.5.8 **Test Results -** continued

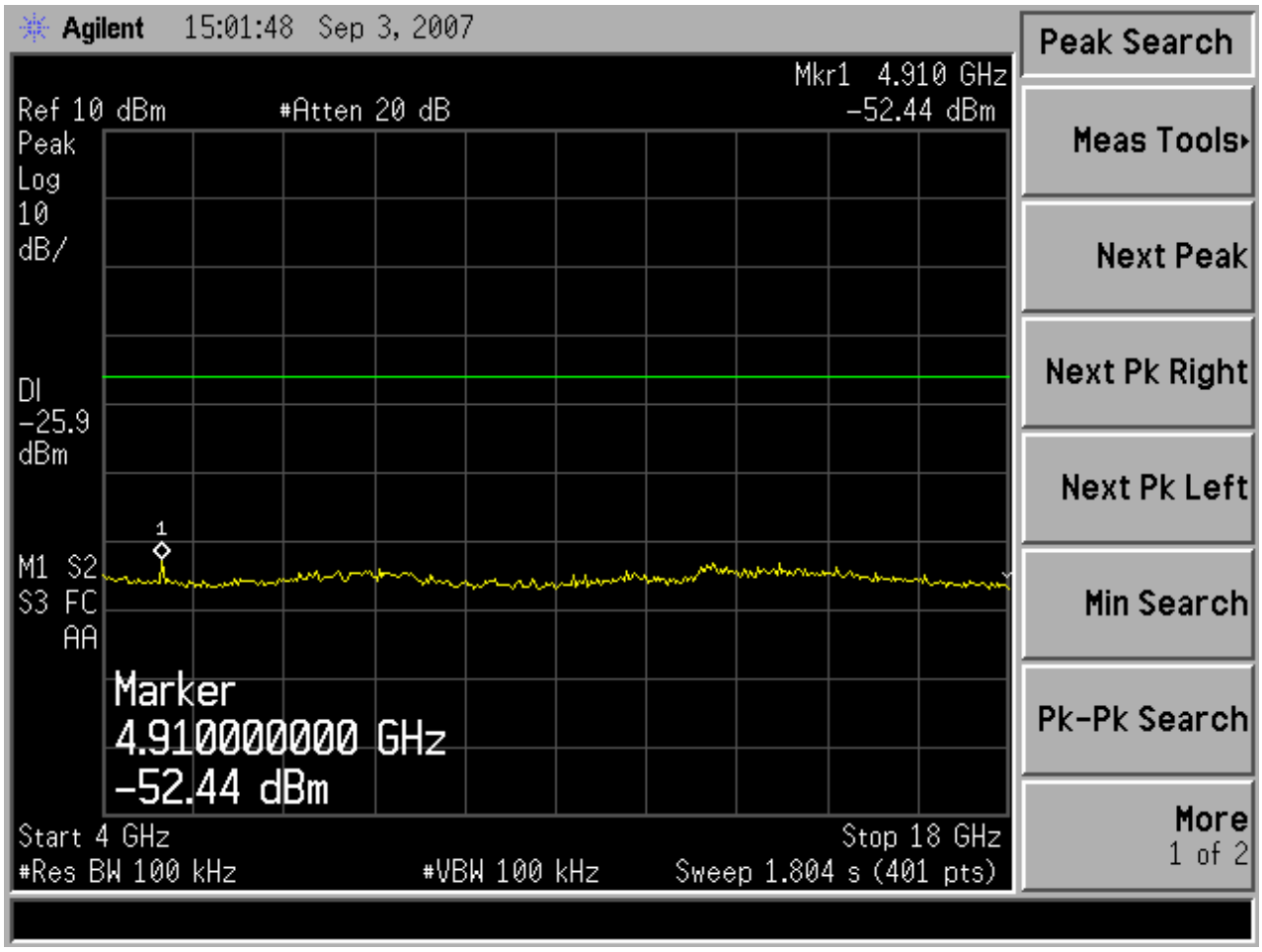


Spurious Conducted Emissions (9kHz – 4GHz)

EUT Transmitting on Top Channel, (2462.0MHz) – Maximum Power 22Mbps

2.5 SPURIOUS CONDUCTED EMISSIONS ON ANTENNA PORT

2.5.8 **Test Results -** continued



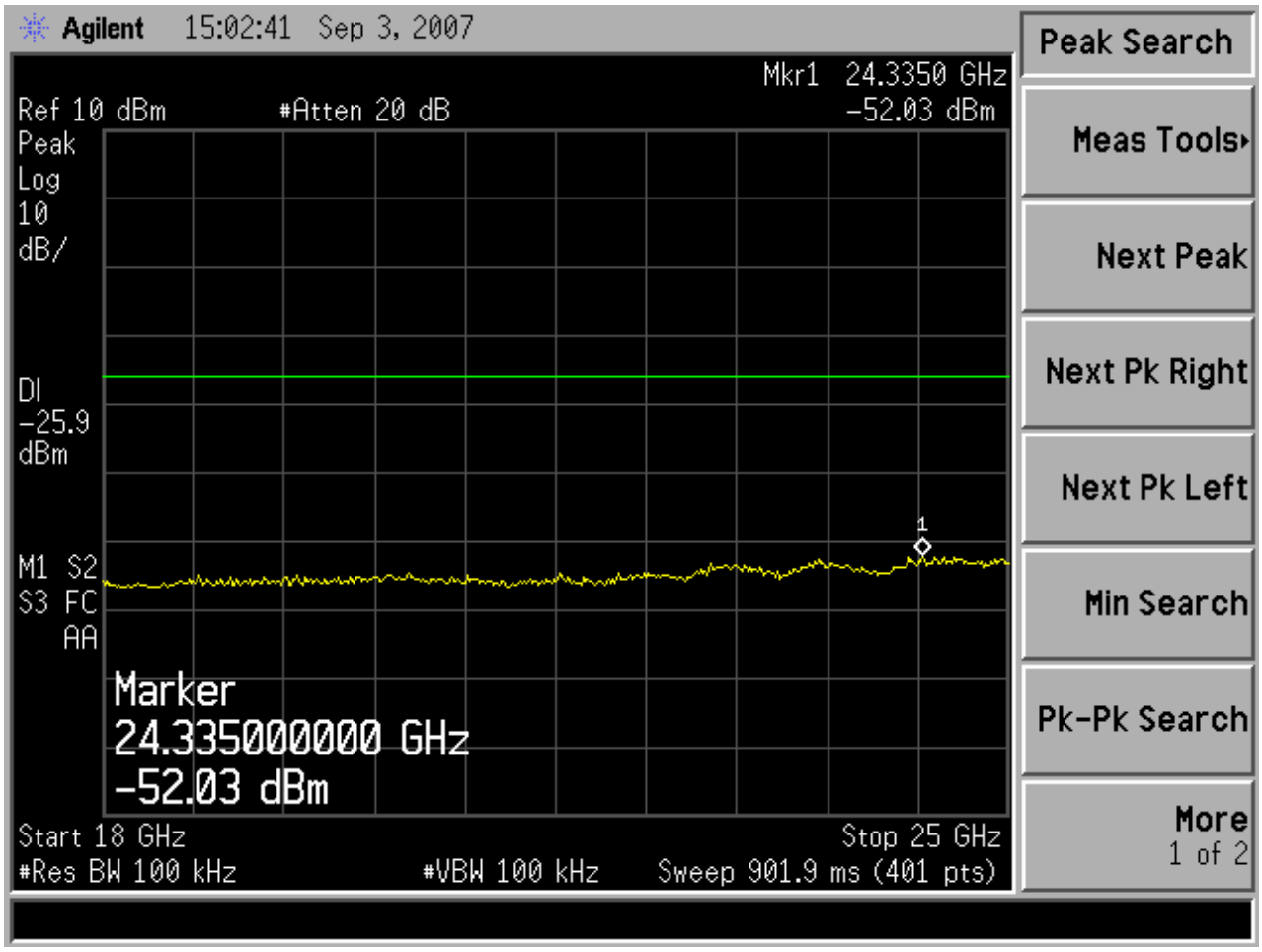
Spurious Conducted Emissions (4GHz – 18GHz)

EUT Transmitting on Top Channel, (2462.0MHz) – Maximum Power 22Mbps

Product Service

2.5 SPURIOUS CONDUCTED EMISSIONS ON ANTENNA PORT

2.5.8 **Test Results -** continued



Spurious Conducted Emissions (18GHz – 25GHz)

EUT Transmitting on Top Channel, (2462.0MHz) – Maximum Power 22Mbps

2.6 SPURIOUS RADIATED EMISSIONS

2.6.1 Specification Reference

FCC CFR 47: Part 15 Subpart C, Section 15.247(c)

2.6.2 Equipment Under Test

WiFi Sector Communication Unit

2.6.4 Date of Test

9th August 2007 – Modification State 1 (Middle Channel)
31st August 2007 – Modification State 1 (Bottom Channel below 1GHz)
4th September 2007 – Modification State 1 (Bottom Channel above 1GHz and Top Channel)

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

FCC CFR 47: Part 15 Subpart C, Section 15.247(c), for Radiated Emissions also requires Sections 15.205 and 15.209 to be applied.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT. The list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 30MHz – 1GHz were then formally measured using a CISPR Quasi-Peak detector.

Emissions identified within the range 1GHz – 26GHz were then formally measured using Peak and Average Detectors, as appropriate.

The measurements were performed at a 3m distance unless otherwise stated.

Product Service

2.6 SPURIOUS RADIATED EMISSIONS

2.6.5 Test Procedure - continued

The limits for Spurious Emissions Outside the Restricted Bands have been measured and calculated , as shown in the table below:

Test Mode	Carrier Frequency GHz	Carrier Field Strength dBµV/m	Limit for Spurious Outside Restricted Band (Carrier F S –20dB) dBµV/m
Mode 1 (RLAN)	2412	114.00	94.00
	2437	115.42	95.42
	2462	113.02	93.02

30MHz - 1GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.247(c), 15.205 and 15.209 for Radiated Emissions (30MHz – 1GHz).

Transmitting on Bottom Channel (2412MHz)

Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz		cm	degree	dBµV/m	µV/m	dBµV/m	µV/m
30.46	Vertical	100	194	31.8	38.9	40.0	100.0
43.31	Vertical	100	317	23.8	15.5	46.0	200.0
88.51	Vertical	100	112	29.3	29.2	46.0	200.0
325.01	Vertical	100	200	42.5	133.4	46.0	200.0
390.20	Horizontal	100	265	41.7	121.6	46.0	200.0
706.75	Vertical	100	279	32.5	42.2	46.0	200.0

Transmitting on Middle Channel (2437MHz)

Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz		cm	degree	dBµV/m	µV/m	dBµV/m	µV/m
45.03	Vertical	100	0	23.9	15.7	40.0	100.0
325.60	Vertical	146	232	36.8	69.2	46.0	200.0
328.40	Vertical	146	232	39.5	63.4	46.0	200.0
328.90	Vertical	146	232	39.9	98.9	46.0	200.0
331.30	Vertical	146	232	33.9	49.5	46.0	200.0
390.40	Vertical	112	169	36.3	65.3	46.0	200.0

Transmitting on Top Channel (2462MHz)

Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz		cm	degree	dBµV/m	µV/m	dBµV/m	µV/m
45.263	Vertical	100	317	38.4	83.2	40.0	100.0
45.744	Vertical	100	344	38.3	82.2	40.0	100.0
51.053	Vertical	100	349	37.3	73.3	40.0	100.0
106.716	Vertical	102	3	39.6	95.5	43.5	150.0
325.505	Horizontal	100	94	45.1	179.9	46.0	200.0
389.576	Vertical	105	188	40.5	105.9	46.0	200.0

1GHz – 26GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.247(c), 15.205 and 15.209 for Radiated Emissions (1GHz – 26GHz).

Transmitting on Bottom Channel (2412MHz)

Frequency	Polarisation	Height	Azimuth	Field Strength at 3m (Peak)		Specification Limit (Peak)		Field Strength at 3m (Average)		Specification Limit (Average)	
MHz		cm	degree	dBµV/m	µV/m	dBµV/m	µV/m	dBµV/m	µV/m	dBµV/m	µV/m
4.824	Vertical	100	000	69.06	2838	74.0	5011	45.47	187.7	54.0	500

Transmitting on Middle Channel (2437MHz)

Frequency	Polarisation	Height	Azimuth	Field Strength at 3m (Peak)		Specification Limit (Peak)		Field Strength at 3m (Average)		Specification Limit (Average)	
MHz		cm	degree	dBµV/m	µV/m	dBµV/m	µV/m	dBµV/m	µV/m	dBµV/m	µV/m
4.874	Horizontal	108	316	59.63	928	74.0	5011	40.79	110	54.0	500

Transmitting on Top Channel (2462MHz)

Frequency	Polarisation	Height	Azimuth	Field Strength at 3m (Peak)		Specification Limit (Peak)		Field Strength at 3m (Average)		Specification Limit (Average)	
MHz		cm	degree	dBµV/m	µV/m	dBµV/m	µV/m	dBµV/m	µV/m	dBµV/m	µV/m
4.924	Vertical	100	317	57.7	767.4	74.0	5011	38.21	81.4	54.0	500

2.7 MEASUREMENT AT THE BAND EDGE (MARKER DELTA METHOD)

2.7.1 Specification Reference

FCC CFR 47: Part 15 Subpart C, Section 15.205

2.7.2 Equipment Under Test

WiFi Sector Communication Unit

2.7.3 Date of Test

4th September 2007 – Modification State 1 (Top Channel)
5th September 2007 – Modification State 1 (Bottom Channel)

2.7.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.5 Test Procedure

Test Performed in accordance with FCC Public Notice document
(DA 00-705 released 30 March 2000)

2.7 MEASUREMENT AT THE BAND EDGE (MARKER DELTA METHOD)

2.7.6 Test Results

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.205 for Band Edge Measurements.

Measurements were made with the EUT in Mode 1 Bottom Channel (2414MHz).

Step 1

Bottom Channel Fundamental Field Strength Measurement.

Peak measurements performed utilising a Resolution Bandwidth and Video Bandwidth of 1MHz. Average measurements performed utilising a Resolution Bandwidth of 1MHz and Video Bandwidth of 10Hz.

Frequency	Antenna Polarisation	Height	Azimuth	Peak Field Strength	Average Field Strength
MHz		cm	deg	dBµV/m	dBµV/m
2412	Vertical	100	000	115.69	82.52

Step 2

Determine Marker delta amplitude between 2412MHz (the fundamental) and 2390MHz (the Band Edge under investigation).

Using a span of 30MHz with Resolution Bandwidth and Video Bandwidth of 300kHz.

Marker Delta Amplitude = 42.79dB

Step 3

Subtracting the Marker Delta obtained from Step 2 from the 2412MHz Field Strength measurement from Step 1, gives following Result:

Peak of 72.9 dBµV/m (Limit is 74.0 dBµV/m)
Peak of 4415 µV/m (Limit is 5011µV/m)

Average of 39.73 dBµV/m (Limit is 54.0 dBµV/m)
Average of 966 µV/m (Limit is 500 µV/m)

2.7 MEASUREMENT AT THE BAND EDGE (MARKER DELTA METHOD)

2.7.6 **Test Results** - continued

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.205 for Band Edge Measurements.

Measurements were made with the EUT in Mode 1 Top Channel (2462MHz).

Peak measurements performed utilising a Resolution Bandwidth and Video Bandwidth of 1MHz. Average measurements performed utilising a Resolution Bandwidth of 1MHz and Video Bandwidth of 10Hz.

Frequency	Antenna Polarisation	Height	Azimuth	Peak Field Strength	Average Field Strength
MHz		cm	deg	dBµV/m	dBµV/m
2462	Vertical	100	356	113.36	78.4

Step 2

Determine Marker delta amplitude between 2462MHz (the fundamental) and 2483.5MHz (the Band Edge under investigation).

Using a span of 30MHz with Resolution Bandwidth and Video Bandwidth of 300kHz.

Marker Delta Amplitude = 43.75 dB

Step 3

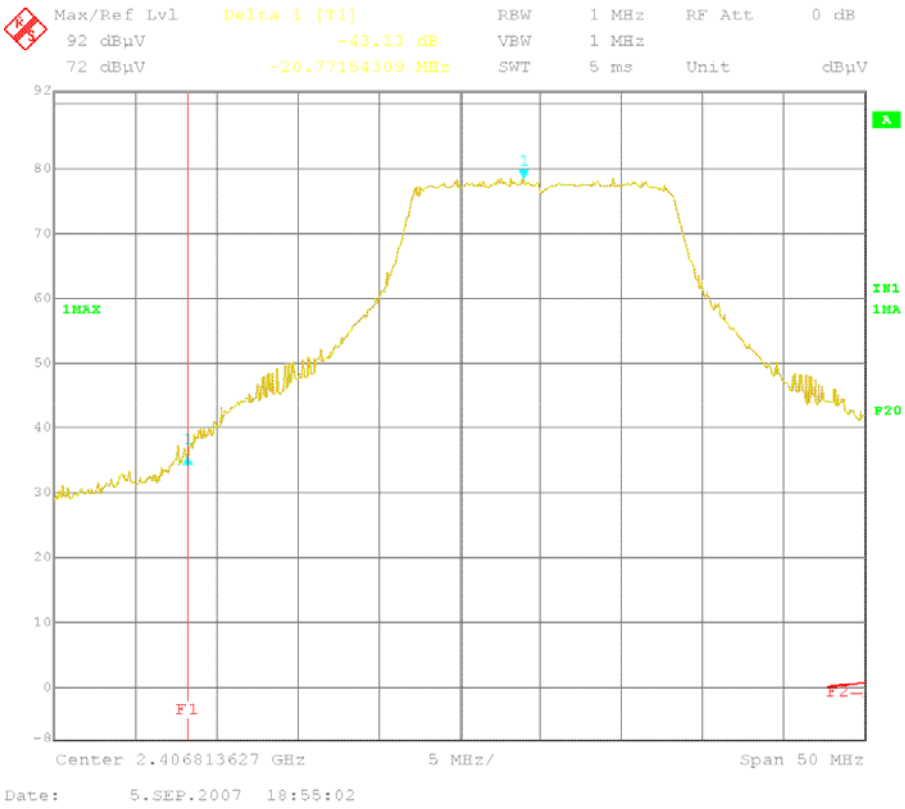
Subtracting the Marker Delta obtained from Step 2 from the 2483.5MHz Field Strength measurement from Step 1, gives following Result

Peak of 69.61 dBµV/m (Limit is 74.0 dBµV/m)
Peak of 3023 µV/m (Limit is 5011µV/m)

Average of 34.65 dBµV/m (Limit is 54.0 dBµV/m)
Average of 54.0 µV/m (Limit is 500 µV/m)

2.7 MEASUREMENT AT THE BAND EDGE (MARKER DELTA METHOD)

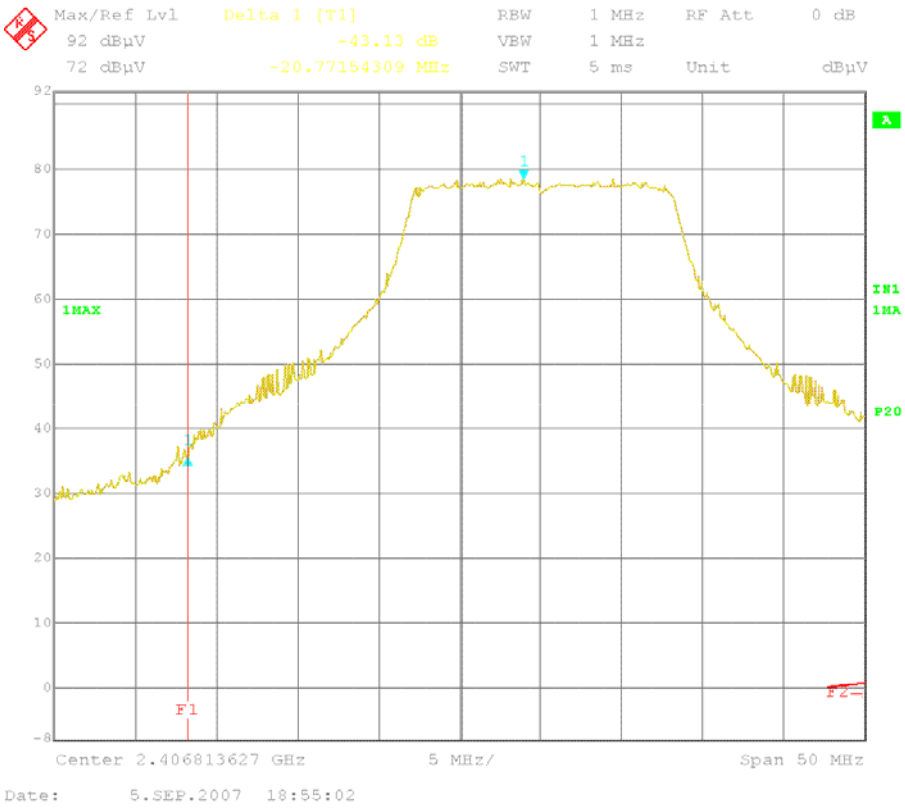
2.7.6 **Test Results** - continued



Bottom Channel 2412 MHz

2.7 MEASUREMENT AT THE BAND EDGE (MARKER DELTA METHOD)

2.7.6 **Test Results** - continued



Top Channel 2462 MHz

2.8 PEAK POWER SPECTRAL DENSITY

2.8.1 Specification Reference

FCC CFR 47: Part 15 Subpart C, Section 15.247(d)

2.8.2 Equipment Under Test

WiFi Sector Communication Unit

2.8.4 Date of Test

10th August 2007 – Modification State 1 (Middle Channel)
30th August 2007 – Modification State 1 (Top and Bottom Channels)

2.8.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.8.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

FCC CFR 47: Part 15 Subpart C, Section 15.247(e), for Peak Power Spectral Density.

2.8.5 Test Results

The EUT met the requirements specified in Clause 15.247(e). The Peak Power Spectral Density was below the +8dBm/3kHz limit.

The results are recorded in the table below.

Frequency (MHz)	Data Rate (Mbps)	Result (dBm)
2412	20	-9.06
2437	20	-8.535
2462	20	-5.98

Limit	≤ +8dBm/3kHz

Remarks

The EUT met the requirements specified in Clause 15.247(e). The Peak Power Spectral Density was below the +8dBm/3kHz limit.

SECTION 3

TEST EQUIPMENT

3.1 TEST EQUIPMENT

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Section 2.4 EMC - Maximum Output Power				
Peak Power Analyser	Hewlett Packard	8990A	107	25-Nov-2007
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	29-Jun-2008
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	29-Jun-2008
Signal Generator	Hewlett Packard	8673B	1351	20-Oct-2007
Screened Room (5)	Rainford	Rainford	1545	1-Mar-2008
Mast Controller	Inn-Co GmbH	CO 1000	1606	TU
Turntable/Mast Controller	EMCO	2090	1607	TU
Signal Generator	Marconi	2031	2015	18-Nov-2007
EMI Test Receiver	Rohde & Schwarz	ESIB26	2028	25-Jun-2008

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Sections 2.1 and 2.6 EMC - Radiated Emissions				
Spectrum Analyser	Hewlett Packard	8542E	18	9-Feb-2008
Peak Power Analyser	Hewlett Packard	8990A	107	25-Nov-2007
Signal Generator	Hewlett Packard	8672A	223	22-Feb-2008
Antenna (Double Ridge Guide)	Link Microtek Ltd	AM180HA-K-TU2	230	22-Jun-2008
Amplifier	Miteq Corp	AMF-3D-001080-18-13P	231	TU
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	29-Jun-2008
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	29-Jun-2008
Amplifier (Low Noise, 18GHz-40GHz)	Narda	NARDA DB02-0447	240	15-Jun-2007
Test Receiver	Rohde & Schwarz	ESIB26	242	29-Dec-2007
Dual Power Supply Unit	Thurlby	PL320	288	TU
Filter (High Pass, 4GHz)	RLC Electronics	F-100-4000-5-R	564	21-May-2008
Filter (High Pass)	Lorch	SHP7-7000-SR	566	31-Oct-2007
Test Receiver	Rohde & Schwarz	ESIB40	1006	21-Apr-2008
Signal Generator	Hewlett Packard	8673B	1351	20-Oct-2007
Pre-Amplifier	Phase One	PS04-0085	1532	TU
Pre-Amplifier	Phase One	PS04-0086	1533	TU
Pre-Amplifier	Phase One	PSO4-0087	1534	TU
Screened Room (5)	Rainford	Rainford	1545	1-Mar-2008
Mast Controller	Inn-Co GmbH	CO 1000	1606	TU
Turntable/Mast Controller	EMCO	2090	1607	TU
Signal Generator	Marconi	2031	2015	18-Nov-2007
EMI Test Receiver	Rohde & Schwarz	ESIB26	2028	25-Jun-2008
Power Sensor	Hewlett Packard	84812A	2743	25-Nov-2007
Amplifier (8GHz-18GHz)	Avantec	AWT-18036	2821	13-Nov-2007
Antenna (Bilog)	Chase	CBL6143	2904	10-Nov-2007

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Section 2.5 Radio (Rx) - Conducted Emissions				
Signal Generator	Hewlett Packard	ESG4000A	38	12-Mar-2008
Power Supply Unit	Thurlby	PL33OQMD	449	TU
Attenuator (10dB, 75W)	Bird	8308-100	469	24-Oct-2007
Crystal Detector	Hewlett Packard	8470B	484	O/P Mon
Spectrum Analyser	Hewlett Packard	E4407B	1154	19-Jul-2008
Hygromer	Rotronic	A1	2138	25-Apr-2008
High Pass Filter (4GHz)	RLC Electronics	F-100-4000-5-R	2773	21-May-2008
Oscilloscope	Lecroy	9370	2832	21-Sep-2007
Attenuator (20dB, 50W)	Aeroflex / Weinschel	47-20-34	3165	29-May-2008
Section 2.5 Radio (Tx) - Conducted Spurious Emissions				
Signal Generator	Hewlett Packard	ESG4000A	38	12-Mar-2008
Dual Power Supply Unit	Hewlett Packard	6253A	271	O/P Mon
Power Supply Unit	Thurlby	PL33OQMD	449	TU
Attenuator (10dB, 75W)	Bird	8308-100	469	24-Oct-2007
Crystal Detector	Hewlett Packard	8470B	484	O/P Mon
Filter (High Pass, 4GHz)	RLC Electronics	F-100-4000-5-R	564	21-May-2008
Multimeter	Fluke	79-3	611	31-May-2008
Signal Generator	Rohde & Schwarz	SMR40	1002	11-Jul-2008
Spectrum Analyser	Hewlett Packard	E4407B	1154	19-Jul-2008
Hygromer	Rotronic	A1	2138	25-Apr-2008
Multimeter	Fluke	70 III	2277	15-Nov-2007
Oscilloscope	Lecroy	9370	2832	21-Sep-2007
Hygrometer	Rotronic	I-1000	2891	6-Jan-2008
Attenuator (20dB, 20W)	Weinschel	1	3032	4-Jul-2008
High Pass Filter (3GHz)	RLC Electronics	F-100-3000-5-R	3349	13-Apr-2008

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Section 2.2 Radio (Tx) - Occupied Bandwidth				
Dual Power Supply Unit	Hewlett Packard	6253A	271	O/P Mon
Power Supply Unit	Thurlby	PL33OQMD	449	TU
Multimeter	Fluke	79-3	611	31-May-2008
Signal Generator	Rohde & Schwarz	SMR40	1002	11-Jul-2008
Spectrum Analyser	Hewlett Packard	E4407B	1154	19-Jul-2008
Hygromer	Rotronic	A1	2138	25-Apr-2008
Hygrometer	Rotronic	I-1000	2891	6-Jan-2008
Attenuator (20dB, 20W)	Weinschel	1	3032	4-Jul-2008
Attenuator (20dB, 50W)	Aeroflex / Weinschel	47-20-34	3165	29-May-2008
Section 2.8 Radio (Tx) - Peak Power Density				
Dual Power Supply Unit	Hewlett Packard	6253A	271	O/P Mon
Power Supply Unit	Thurlby	PL33OQMD	449	TU
Attenuator (10dB, 75W)	Bird	8308-100	469	24-Oct-2007
Multimeter	Fluke	79-3	611	31-May-2008
Signal Generator	Rohde & Schwarz	SMR40	1002	11-Jul-2008
Spectrum Analyser	Hewlett Packard	E4407B	1154	19-Jul-2008
Hygromer	Rotronic	A1	2138	25-Apr-2008
Mains Voltage Monitor	TUV	MVM1	2772	24-Jul-2007
Hygrometer	Rotronic	I-1000	2891	6-Jan-2008
Attenuator (20dB, 20W)	Weinschel	1	3032	4-Jul-2008

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Section 2.3 Radio (Tx) - Power Characteristics				
Signal Generator	Hewlett Packard	ESG4000A	38	12-Mar-2008
Peak Power Analyser	Hewlett Packard	8990A	107	25-Nov-2007
Dual Power Supply Unit	Hewlett Packard	6253A	271	O/P Mon
Power Supply Unit	Thurlby	PL33OQMD	449	TU
Attenuator (10dB, 75W)	Bird	8308-100	469	24-Oct-2007
Crystal Detector	Hewlett Packard	8470B	484	O/P Mon
Multimeter	Fluke	79-3	611	31-May-2008
Signal Generator	Rohde & Schwarz	SMR40	1002	11-Jul-2008
Hygromer	Rotronic	A1	2138	25-Apr-2008
Multimeter	Fluke	70 III	2277	15-Nov-2007
Power Sensor	Hewlett Packard	84812A	2743	25-Nov-2007
Oscilloscope	Lecroy	9370	2832	24-Sep-2008
Hygrometer	Rotronic	I-1000	2891	6-Jan-2008
Attenuator (20dB, 20W)	Weinschel	1	3032	4-Jul-2008

TU Traceability Unscheduled
O/P Mon Output monitored with calibrated equipment

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	Frequency / Parameter	MU
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*
Conducted emissions, LISN	150MHz to 30MHz Amplitude	3.2dB*
Carrier Power	<1GHz	0.45dB
6dB Bandwidth	<1GHz	316Hz
Conducted Spurious Emissions	9kHz to 12.754Hz	2.4dB

Worst case error for both Time and Frequency measurement 12 parts in 10^6.

* In accordance with CISPR 16-4

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).