



## FCC CFR47 PART 15 SUBPART E CLASS II PERMISSIVE CHANGE

## **TEST REPORT**

## FOR

## **802.11A CARDBUS RADIO MODULE**

## MODEL NUMBER: AIR-RM21A-A-K9 and AIR-RM22A-A-K9

## FCC ID: LDK102053

## **REPORT NUMBER: 04U2586-1**

## **ISSUE DATE: AUGUST 16, 2004**

Prepared for CISCO SYSTEMS, INC. 170 WEST TASMAN DRIVE SAN JOSE, CA 95134

Prepared by

COMPLIANCE CERTIFICATION SERVICES 561F MONTEREY ROAD, MORGAN HILL, CA 95037, USA TEL: (408) 463-0885 FAX: (408) 463-0888



## TABLE OF CONTENTS

1	•	TES	ST RESULT CERTIFICATION	4
2	•	EU	T DESCRIPTION	5
3	•	TES	ST METHODOLOGY	6
4	•	FA	CILITIES AND ACCREDITATION	6
5	•	CA	LIBRATION AND UNCERTAINTY	7
	5.	1.	MEASURING INSTRUMENT CALIBRATION	7
	5.	2.	MEASUREMENT UNCERTAINTY	7
	5.	3.	TEST AND MEASUREMENT EQUIPMENT	8
6	•	SET	ГUP OF EQUIPMENT UNDER TEST	9
7	•	API	PLICABLE LIMITS AND TEST RESULTS1	1
	7.	1.	EMISSION BANDWIDTH	1
	7.	2.	PEAK POWER	9
	7.	3.	MAXIMUM PERMISSIBLE EXPOSURE	28
	7.	4.	AVERAGE POWER	1
	7.	5.	PEAK POWER SPECTRAL DENSITY	2
	7.	6.	PEAK EXCURSION	
	7.	7.	CONDUCTED SPURIOUS EMISSIONS	
	7.	8.	RADIATED EMISSIONS	;4
		7.8.	1. TRANSMITTER RADIATED SPURIOUS EMISSIONS	
		7.8.	2. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHz FOR 5150 TO 5350 MHz ND WITH 9 dBi INTEGRAL ANTENNA5	7
		БАІ 7.8.		/
		BAI	ND WITH 9.5 dBi EXTERNAL ANTENNA6	6
		7.8.		
		BAI 7.8.	ND WITH 7 dBi EXTERNAL ANTENNA	5
			ND WITH 6 dBi EXTERNAL ANTENNA	4
		7.8.		
			ND WITH 4.5 dBi EXTERNAL ANTENNA	13
		7.8. <sup>°</sup>		12
		БАІ 7.8.	ND WITH 9 dBi INTEGRAL ANTENNA	Z
			ND WITH 9.5 dBi EXTERNAL ANTENNA	1

Page 2 of 177

8.

UP PHOTOS	
POWERLINE CONDUCTED EMISSIONS	
3. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz	
2. CO-LOCATED TRANSMITTER RADIATED EMISSIONS	
JD WITH 4.5 dBi EXTERNAL ANTENNA	
1. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHz FOR 5725	ГО 5825 MHz
ND WITH 6 dBi EXTERNAL ANTENNA	
10. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHz FOR 5725	ГО 5825 MHz
JD WITH 7 dBi EXTERNAL ANTENNA	
P. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHz FOR 5725 T	TO 5825 MHz

Page 3 of 177

### **1. TEST RESULT CERTIFICATION**

STANDA		
	APPLICABLE STANDARDS	
DATE TESTED:	MARCH 29 – AUGUST 25, 2004	
MODEL:	AIR-RM21A-A-K9 and AIR-RM22A-A-K9	
EUT DESCRIPTION:	802.11a CARDBUS RADIO MODULE	
COMPANY NAME:	CISCO SYSTEMS, INC. 170 WEST TASMAN DRIVE SAN JOSE, CA 95134	

 FCC PART 15 SUBPART E
 NO NON-COMPLIANCE NOTED

 Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note**: This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document.

Approved & Released For CCS By:

MH

MIKE HECKROTTE ENGINEERING MANAGER COMPLIANCE CERTIFICATION SERVICES Tested By:

YAN ZHENG EMC ENGINEER COMPLIANCE CERTIFICATION SERVICES

Page 4 of 177

## 2. EUT DESCRIPTION

The EUT is an 802.11a transceiver module.

The transmitter has a maximum peak conducted output power as follows:

5150 to 5250 MHz Authorized Band

Frequency Band (MHz)	Antenna	Output Power (dBm)	Output Power (mW)
5180 - 5250	5 dBi Integral	15.00	31.62
5180 - 5250	All except 5 dBi Integral	11.22	13.24

### 5250 to 5350 MHz Authorized Band

Frequency Band	Antenna	Output Power	Output Power
(MHz)		(dBm)	(mW)
5260 - 5320	All	17.42	55.21

### 5725 to 5825 MHz Authorized Band

Frequency Band	Antenna	Output Power	Output Power
(MHz)		(dBm)	(mW)
5725 - 5825	All	17.72	59.16

The radio was originally certified for use with an integral antenna with a maximum gain of 5 dBi.

The Class II Permissive change is to add one integral antenna and four external antennas, and to add colocation with the 802.11b/g AIR-MP21G-A-K9 radio module, FCC ID: LDK102049, which operates in the 2400 to 2483.5 MHz band.

The new integral antenna has a gain of 9 dBi. The external antennas are a 4.5 dBi Omni, 6 dBi Omni, 7 dBi Patch, and 9.5 dBi Patch.

Models AIR-RM21A-A-K9 and AIR-RM22A-A-K9 are identical radio modules. Model AIR-RM21A-A-K9 is used with integral antennas, and AIR-RM22A-A-K9 is used with external antennas.

Page 5 of 177

## 3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4/2001, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

## 4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <u>http://www.ccsemc.com</u>.



No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government.

Page 6 of 177

# 5. CALIBRATION AND UNCERTAINTY

## 5.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

## 5.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

Page 7 of 177

### 5.3. TEST AND MEASUREMENT EQUIPMENT

TEST EQUIPMENT LIST						
Description	Manufacturer	Model	Serial Number	Cal Due		
Spectrum Analyzer, 26.5 GHz	HP	8593EM	3710A00205	10/1/2004		
Spectrum Analyzer	Agilent	E4446A	MY43360112	1/13/2005		
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	11/21/2004		
<b>RF Filter Section</b>	HP	85420E	3705A00256	11/21/2004		
EMI Test Receiver	R & S	ESHS 20	827129/006	10/22/2005		
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	9001-3245	2/4/2005		
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	2/4/2005		
Antenna, Horn, 18 ~ 26 GHz	ARA	MWH-1826/B	1013	2/4/2005		
Antenna, Horn 1 ~ 18 GHz	EMCO	3117	29301	12/26/2004		
Preamplifier, 1 ~ 26 GHz	Miteq	NSP10023988	646456	4/25/2005		
-	Micronics	HPM13351	1	CNR		
PreAmplifier 26-40 GHz		NSP4000-SP2	924343	6/1/2005		
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	10/13/2004		
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	114	10/13/2004		
Site A Line Stabilizer / Conditioner	Tripplite	LC-1800a	A0051681	CNR		
Power Meter	Agilent	E4416A	GB41291160	11/7/2004		
5.15-5.35 Rejection Filter	Micronics	BRC 13190	1	CNR		
5.47-5.725 Rejection Filter	Micronics	BRC 13191	1	CNR		
5.75-5.875 Rejection Filter	Micronics	BRC 13192	1	CNR		

The following test and measurement equipment was utilized for the tests documented in this report:

Page 8 of 177

## 6. SETUP OF EQUIPMENT UNDER TEST

### SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST							
Description	Manufacturer	Model	Serial Number	FCC ID			
Laptop PC	IBM	T20	78-B3952	DOC			
DC Power Supply	KRM	AEEEG-350	9712154746	None			
DC Power Supply	Kenwood	PA36-3A	7060074	None			
Extender Card	Sycard	PCC Extend 135	C135A-1066	None			
AC Adapter	IBM	02K6750	11S02K67050Z1Z2U	DOC			
			P25G0L				

### I/O CABLES

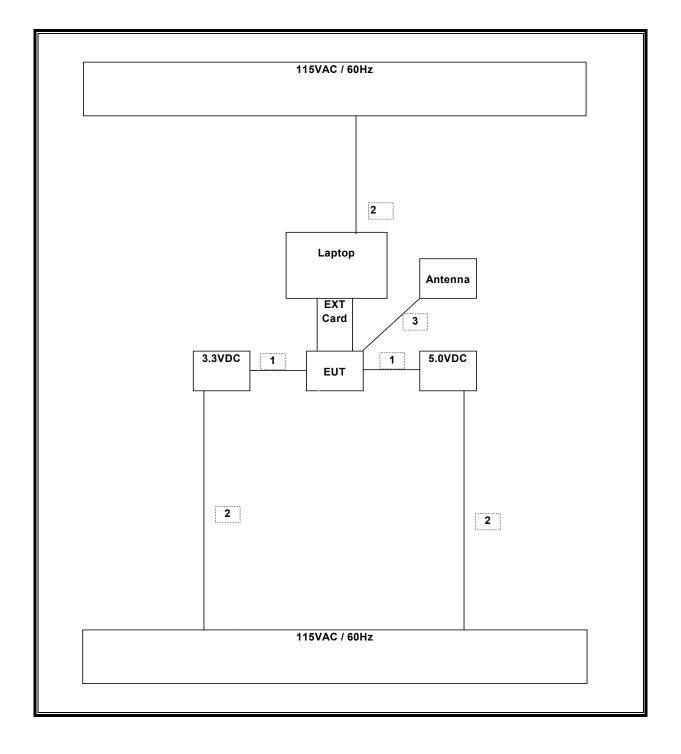
	I/O CABLE LIST								
CablePort# ofComparison		Connector	Cable	Cable	Remarks				
No.		Identical	Туре	Туре	Length				
		Ports							
1	Extender	2	Bananan to clip	DC supply	1m	Connected on Extender Card			
2	AC	3	IEC	AC	1m				
3	Antenna Cable	2				connect the radio to antenna			

### TEST SETUP

The EUT is installed in a host laptop computer via a cardbus-to-miniPCI adapter / extension card during the tests. Test software exercised the radio card.

Page 9 of 177

### SETUP DIAGRAM FOR TESTS



Page 10 of 177

## 7. APPLICABLE LIMITS AND TEST RESULTS

### 7.1. EMISSION BANDWIDTH

### <u>LIMIT</u>

§15.403 (c) <u>Emission bandwidth.</u> For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolutions bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1% to 3% of the 26 dB bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.

Page 11 of 177

### **RESULTS**

No non-compliance noted:

802.11a Mode, 5.2 GHz Band

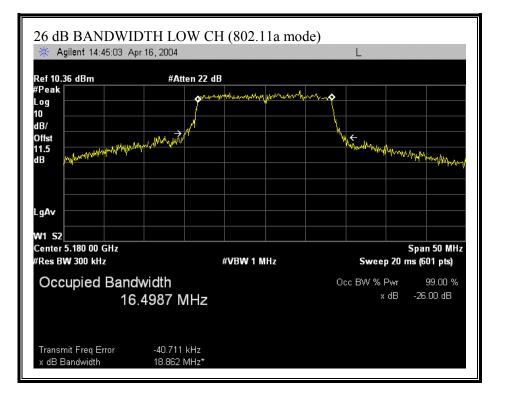
Channel	Frequency	В	10 Log B
	(MHz)	(MHz)	(dB)
Low	5180	16.50	12.17
Middle	5260	16.41	12.15
High	5320	16.40	12.15

802.11a Mode, 5.8GHz Band

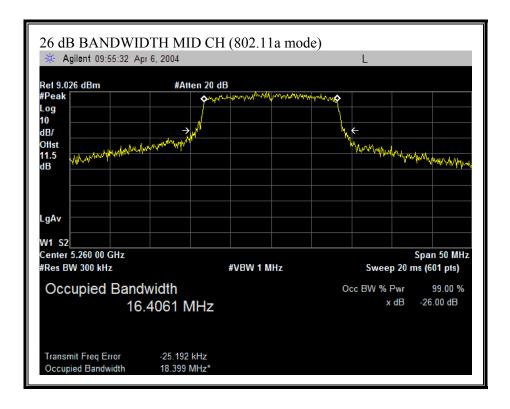
Channel	Frequency	В	10 Log B
	(MHz)	(MHz)	(dB)
Low	5745	16.38	12.14
Middle	5785	16.35	12.14
High	5805	16.34	12.13

Page 12 of 177

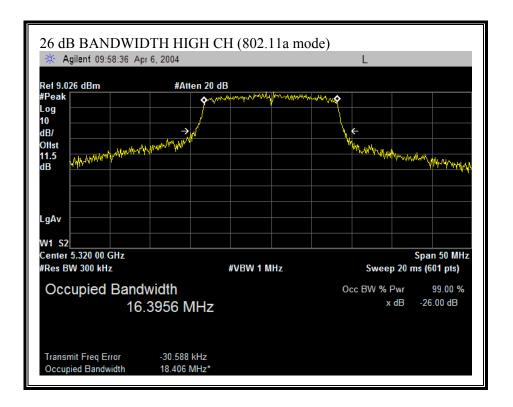
#### 26 dB EMISSION BANDWIDTH (802.11a MODE, 5.2 GHz BAND)



Page 13 of 177

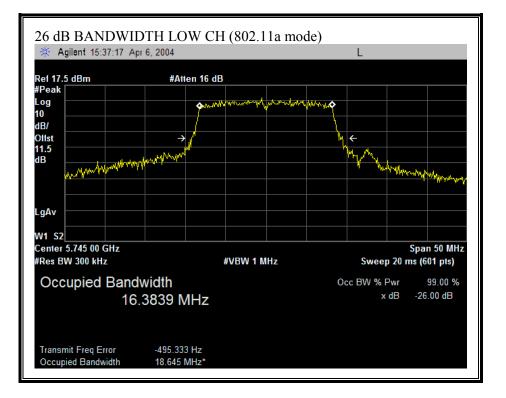


Page 14 of 177

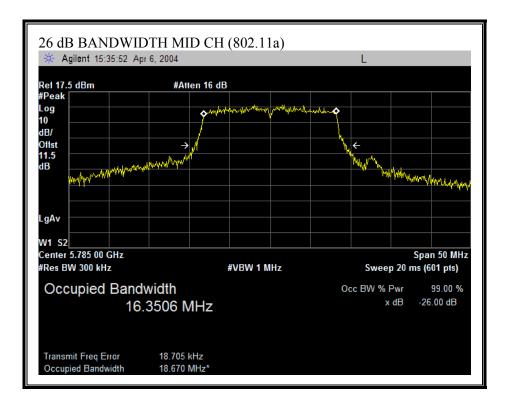


Page 15 of 177

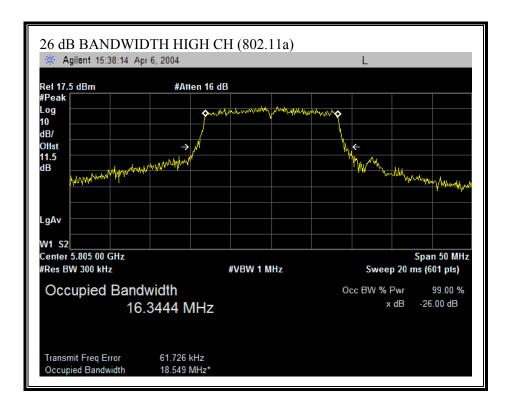
#### 26 dB EMISSION BANDWIDTH (802.11a MODE, 5.8 GHz BAND)



Page 16 of 177



Page 17 of 177



Page 18 of 177

### 7.2. PEAK POWER

### <u>LIMIT</u>

§15.407 (a) (1) For the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50 mW (17 dBm) or 4 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

§15.407 (a) (2) For the band 5.25-5.35 GHz and 5.47-5.725 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

§15.407 (a) (3) For the band 5.725-5.825 GHz, the peak transmit power the peak transmit power over the frequency band of operation shall not exceed the lesser of 1 W or 17 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point to point U-NII devices operating in this band may employ transmitting antennas with directional gain up to 23 dBi without any corresponding reduction in the transmitter peak output power or peak power spectral density. For fixed, point-to-point U-NII transmitters that employ a directional antenna gain greater than 23dBi, a 1 dB reduction in peak transmitter power and peak spectral density for each 1 dB of antenna gain in excess of 23 dBi would be required. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omni directional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that the systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Page 19 of 177

### TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

### LIMITS AND RESULTS

The reduction to the limit is 3.5 dB due to excess antenna gain of the highest gain (9.5 dBi) additional antenna.

No non-compliance noted:

Page 20 of 177

### Limit in 5150 to 5250 MHz Band

Mode	Frequency	Fixed	В	4 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
802.11a	5180	17	16.50	16.17	9.50	12.67

### Limit in 5250 to 5350 MHz Band

Mode	Frequency	Fixed	В	11 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
802.11a	5260	24	16.41	23.15	9.50	19.65
802.11a	5320	24	16.40	23.15	9.50	19.65

### Limit in 5725 to 5825 MHz Band

Mode	Frequency	Fixed	В	17 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
802.11a	5745	30	16.38	29.14	9.50	25.64
802.11a	5785	30	16.35	29.14	9.50	25.64
802.11a	5805	30	16.34	29.13	9.50	25.63

### 802.11a mode Results

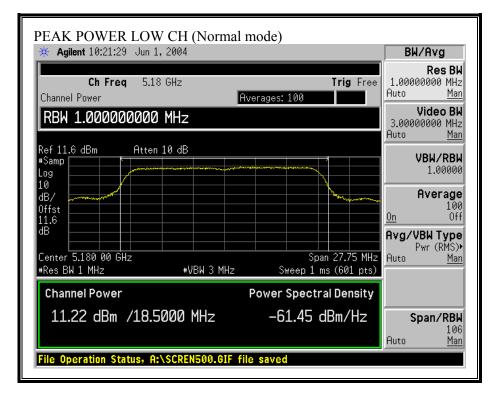
Channel	Frequency	Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5180	11.22	12.67	-1.45
Middle	5260	17.42	19.65	-2.23
High	5320	11.33	19.65	-8.32

### 802.11a mode Results

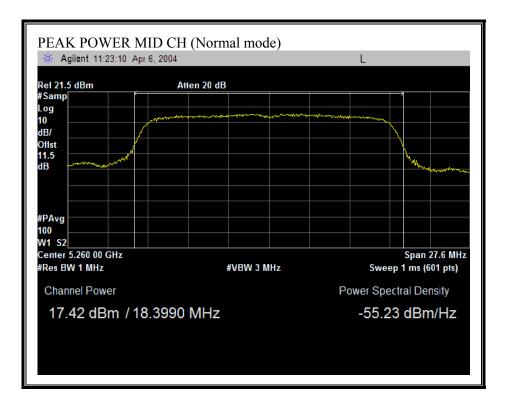
Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5745	17.72	25.64	-7.92
Middle	5785	17.53	25.64	-8.11
High	5805	17.44	25.63	-8.19

Page 21 of 177

### PEAK POWER (NORMAL MODE, 5.2 GHz BAND)



Page 22 of 177

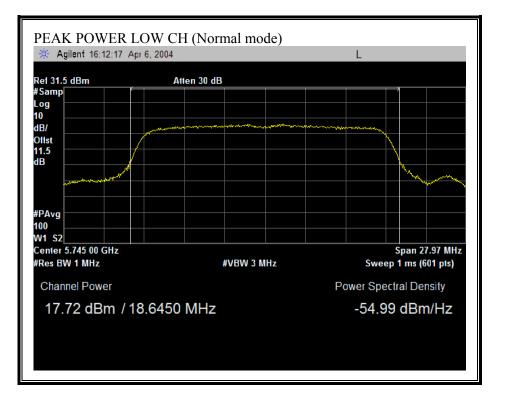


Page 23 of 177

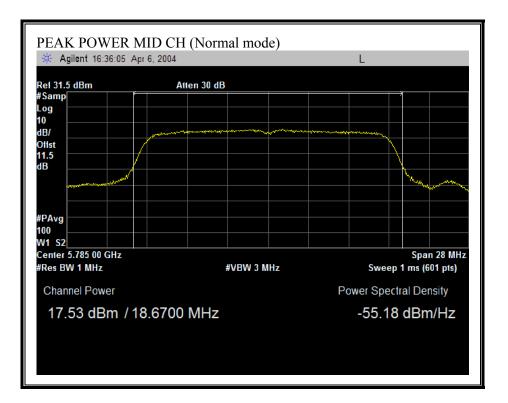
🔆 Agilent			BW/Avg
Ch Freq 5.32 Channel Power	2 GHz Ave	<b>Trig</b> Fr erages: 100	ree 1.00000000 MHz Auto <u>Man</u>
RBW 1.000000000			Video BW 3.00000000 MHz Auto Man
Ref 20 dBm #Atten	20 dB		
#Samp Log 10			VBW/RBW 1.00000
dB/ Offst			Average 100 On Off
dB			Avg/VBW Type Pwr (RMS)>
Center 5.320 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 27.75 M Sweep 1 ms (601 p	
Channel Power	F	ower Spectral Densi	ty
11.33 dBm /18.5	000 MHz	-61.34 dBm/Hz	2 Span/RBW 106 Auto Man

Page 24 of 177

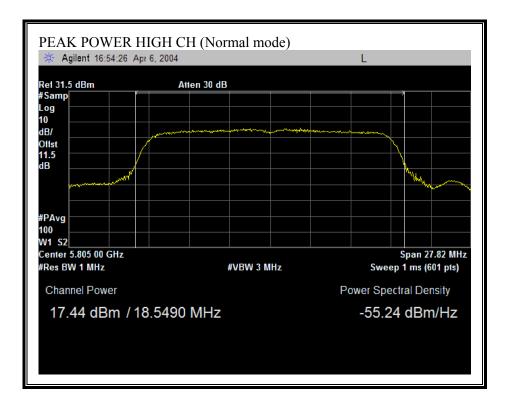
### PEAK POWER (NORMAL MODE, 5.8 GHz BAND)



Page 25 of 177



Page 26 of 177



Page 27 of 177

#### 7.3. MAXIMUM PERMISSIBLE EXPOSURE

### LIMITS

\$1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)
(A) Lim	its for Occupational	/Controlled Exposu	res	
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f²)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits	for General Populati	on/Uncontrolled Exp	posure	
0.3–1.34	614	1.63	*(100)	30
1.34–30	824 <i>/</i> f	2.19/f	*(180/f <sup>2</sup> )	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

#### TABLE 1-LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)-Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)
30–300 300–1500 1500–100,000	27.5	0.073	0.2 f/1500 1.0	30 30 30

f = frequency in MHz

f = frequency in MHz \* = Plane-wave equivalent power density NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occu-pational/controlled limits apply provided he or she is made aware of the potential for exposure. NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be ex-posed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposed are the exposed as a consequence of their employment may not be fully aware of the potential for

exposure or can not exercise control over their exposure.

Page 28 of 177

### CALCULATIONS

Given

 $E = \sqrt{(30 * P * G)} / d$ 

where

and

E = Field Strength in Volts/meter

P = Power in Watts

 $S = E^{2}/3770$ 

G = Numeric antenna gain

d = Distance in meters

S = Power Density in milliwatts/square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

 $d = \sqrt{((30 * P * G) / (3770 * S))}$ 

Changing to units of Power to mW and Distance to cm, using:

P(mW) = P(W) / 1000 and d(cm) = 100 \* d(m)

yields

 $d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$  $d = 0.282 * \sqrt{(P * G / S)}$ 

where

d = distance in cm P = Power in mW G = Numeric antenna gain S = Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and G (numeric) = 10 ^ (G (dBi) / 10) yields  $d = 0.282 * 10 ^ ((P + G) / 20) / \sqrt{S}$  Equation (1) where d = MPE distance in cm P = Power in dBm G = Antenna Gain in dBi $S = Power Density Limit in mW/cm^2$ 

Equation (1) and the measured peak power is used to calculate the MPE distance.

Page 29 of 177

### LIMITS

From §1.1310 Table 1 (B), S = 1.0 mW/cm^2

### **RESULTS**

No non-compliance noted:

Band	<b>Power Density</b>	Output	Antenna	MPE
	Limit	Power	Gain	Distance
(MHz)	(mW/cm^2)	(dBm)	(dBi)	(cm)
5150-5250 MHz	1.0	11.22	9.50	3.06
5250-5320 MHz	1.0	17.42	9.50	6.26
5725-5825 MHz	1.0	17.72	9.50	6.48

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

Page 30 of 177

### 7.4. AVERAGE POWER

### AVERAGE POWER LIMIT

None; for reporting purposes only.

### TEST PROCEDURE

The transmitter output is connected to a power meter.

### **RESULTS**

No non-compliance noted:

The cable assembly insertion loss of 12 dB (including 10 dB pad and 2 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

ſ	802.11a IVI0			
	Channel	Frequency Antenna		Average Power
		(MHz)		(dBm)
	Low	5180	All except 5 dBi Integral	11.20
ĺ	Middle	5260	All	17.00
	High	5320	All except 5 dBi Integral	11.10

### 802.11a Mode

Channel	Frequency (MHz)	Antenna	Average Power (dBm)
Low	5745	All	17.20
Middle	5785	All	17.10
High	5805	All	17.00

Page 31 of 177

## 7.5. PEAK POWER SPECTRAL DENSITY

### <u>LIMIT</u>

§15.407 (a) (1) For the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50 mW (17 dBm) or 4 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

§15.407 (a) (2) For the band 5.25-5.35 GHz and 5.47-5.725 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

§15.407 (a) (3) For the band 5.725-5.825 GHz, the peak transmit power the peak transmit power over the frequency band of operation shall not exceed the lesser of 1 W or 17 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 17 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point to point U-NII devices operating in this band may employ transmitting antennas with directional gain up to 23 dBi without any corresponding reduction in the transmitter peak output power or peak power spectral density. For fixed, point-to-point U-NII transmitters that employ a directional antenna gain greater than 23dBi, a 1 dB reduction in peak transmitter power and peak spectral density for each 1 dB of antenna gain in excess of 23 dBi would be required. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omni directional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that the systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

### TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

Page 32 of 177

### LIMITS AND RESULTS

The reduction to the limit is 3.5 dB due to excess antenna gain of the highest gain (9.5 dBi) additional antenna.

No non-compliance noted:

802.11a Mode,	5.2	GHz	Band
002.114 11040,	· · -	OIL	Dana

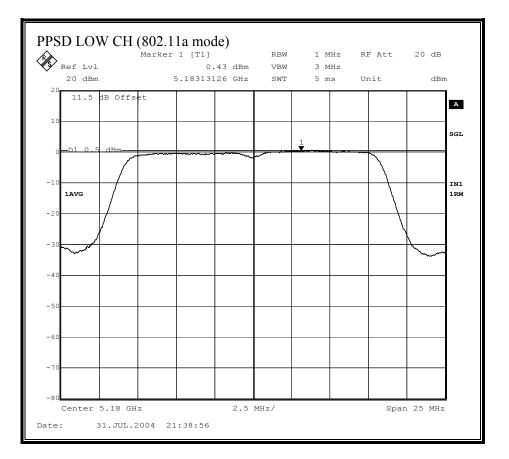
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	0.43	0.50	-0.07
Middle	5260	6.75	7.50	-0.75
High	5320	-0.51	7.50	-8.01

802.11a Mode. 5.8 GHz Band

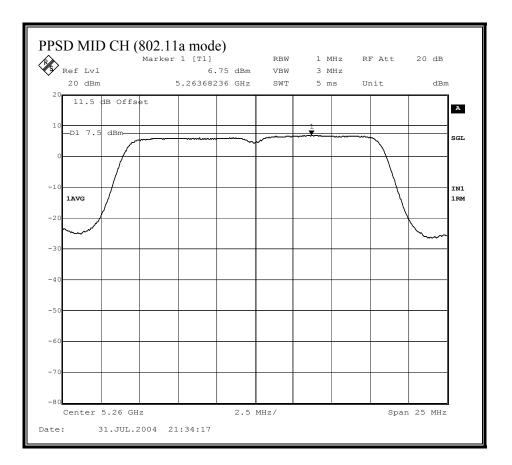
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	7.56	13.50	-5.94
Middle	5785	7.18	13.50	-6.32
High	5805	7.61	13.50	-5.89

Page 33 of 177

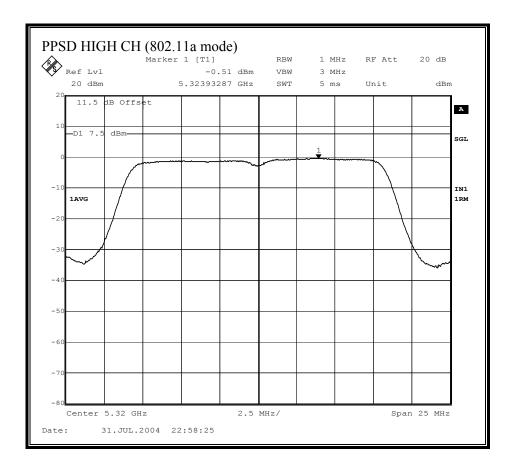
#### PEAK POWER SPECTRAL DENSITY (802.11a MODE, 5.2 GHZ BAND)



Page 34 of 177

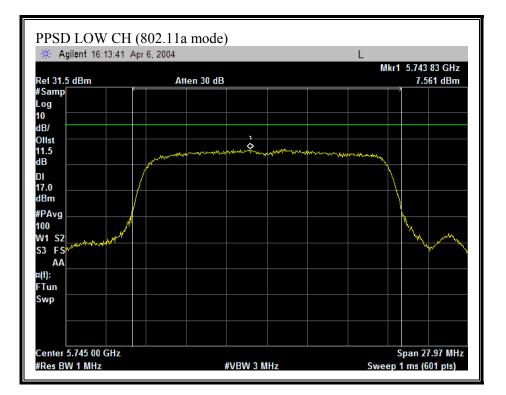


Page 35 of 177

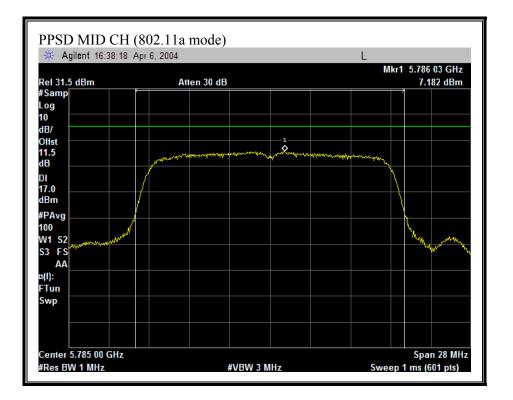


Page 36 of 177

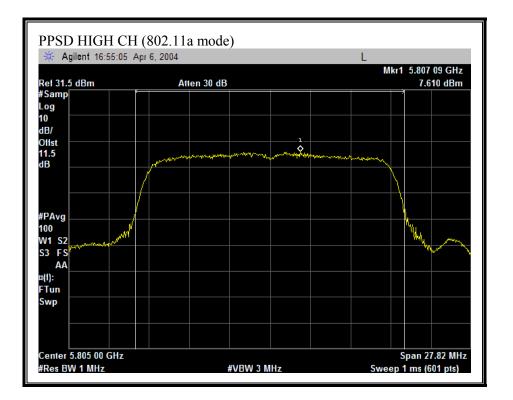
### PEAK POWER SPECTRAL DENSITY (802.11a MODE, 5.8GHZ BAND)



Page 37 of 177



Page 38 of 177



Page 39 of 177

# 7.6. PEAK EXCURSION

# <u>LIMIT</u>

§15.407 (a) (6) The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

## TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

## **RESULTS**

No non-compliance noted:

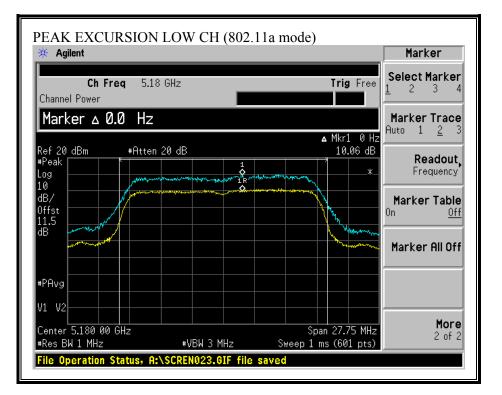
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	10.06	13	-2.94
Middle	5260	10.14	13	-2.86
High	5320	10.62	13	-2.38

802.11a Mode, 5.2 GHz Band

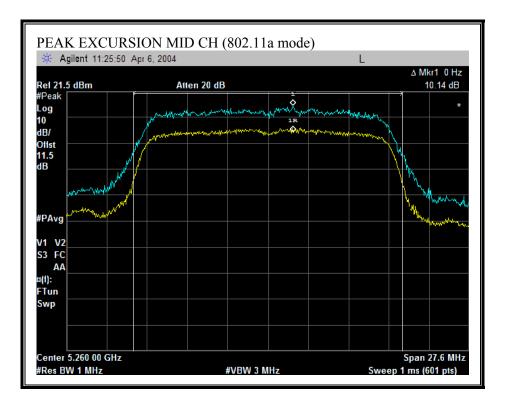
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5745	8.56	13	-4.44
Middle	5785	7.40	13	-5.60
High	5805	9.24	13	-3.76

Page 40 of 177

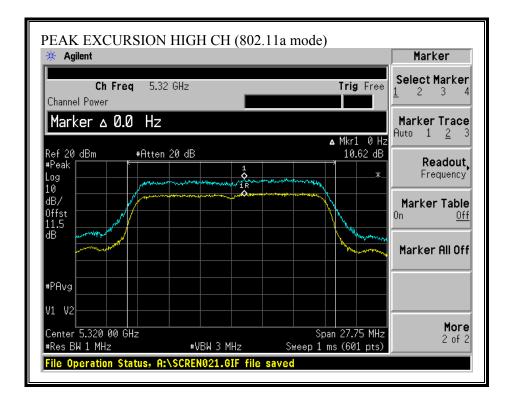
## PEAK EXCURSION (802.11a MODE, 5.2 GHz BAND)



Page 41 of 177

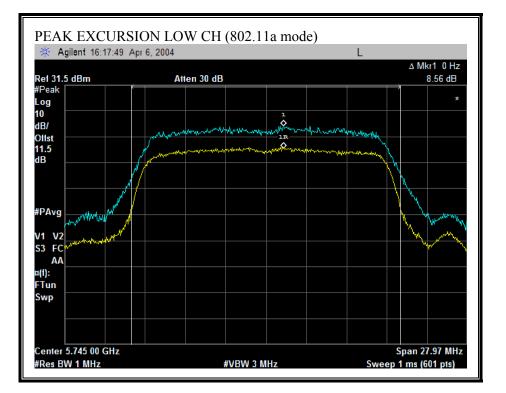


Page 42 of 177

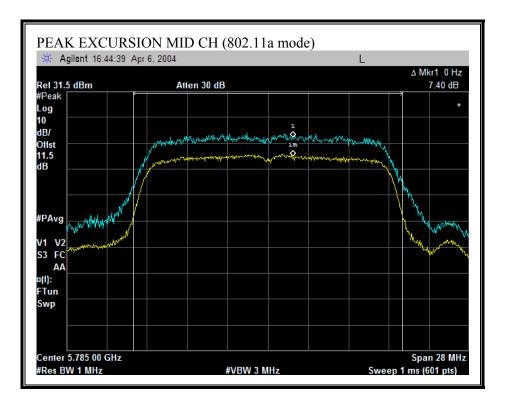


Page 43 of 177

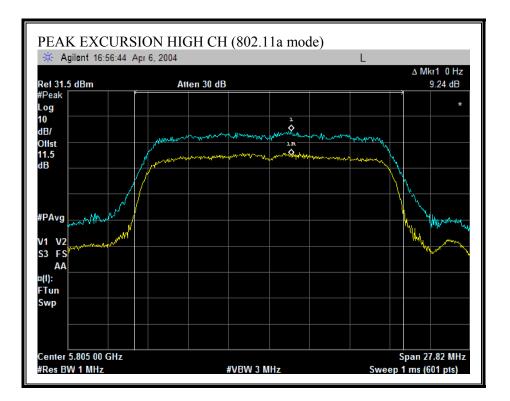
## PEAK EXCURSION (802.11a MODE, 5.8GHz BAND)



Page 44 of 177



Page 45 of 177



Page 46 of 177

# 7.7. CONDUCTED SPURIOUS EMISSIONS

# <u>LIMITS</u>

15.407 (b) (1) For transmitters operating in the 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

§15.407 (b) (2) For transmitters operating in the 5.25–5.35 GHz band: all emissions outside of the 5.15– 5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz. Devices operating in the 5.25–5.35 GHz band that generate emissions in the 5.15–5.25 GHz band must meet all applicable technical requirements for operation in the 5.15–5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of 27 dBm/MHz in the 5.15–5.25 GHz band.

15.407 (b) (3) For transmitters operating in the 5.47–5.725 GHz band: all emissions outside of the 5.47–5.725 GHz band shall not exceed an EIRP of -27 dBm / MHz.

\$15.407 (b) (4) For transmitters operating in the 5.725–5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.

# TEST PROCEDURE

Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

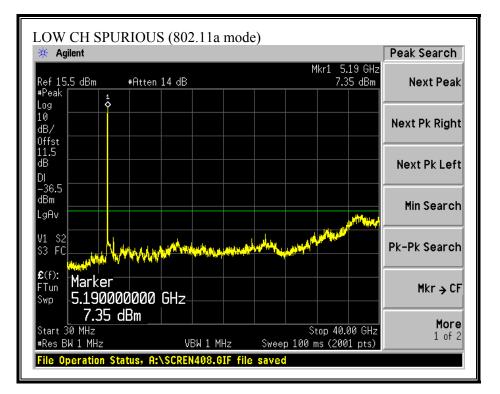
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

## **RESULTS**

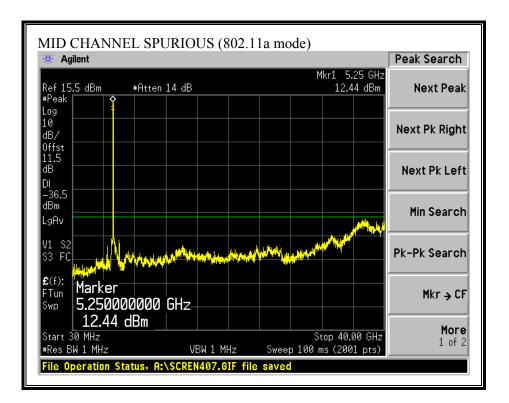
No non-compliance noted:

Page 47 of 177

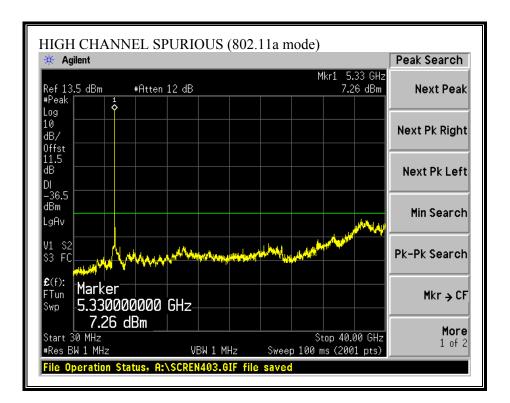
### SPURIOUS EMISSIONS (802.11a MODE, 5.2 GHz BAND)



Page 48 of 177

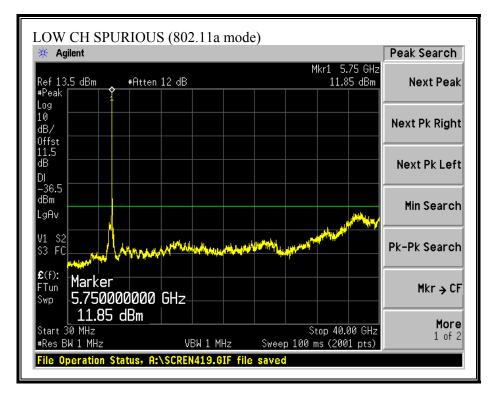


Page 49 of 177

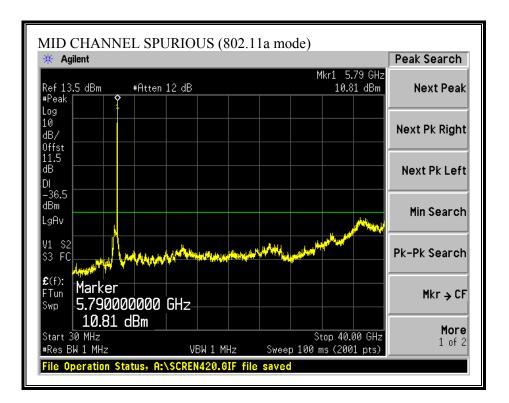


Page 50 of 177

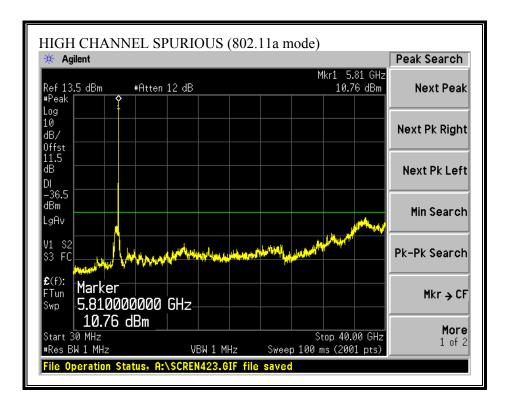
### SPURIOUS EMISSIONS (802.11a MODE, 5.8 GHz BAND)



Page 51 of 177



Page 52 of 177



Page 53 of 177

# 7.8. RADIATED EMISSIONS

# 7.8.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

# LIMITS

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41			

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

Page 54 of 177

\$15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency	Field Strength	Measurement Distance
(MHz)	(microvolts/meter)	(meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

\*\* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

Page 55 of 177

## TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels of each band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

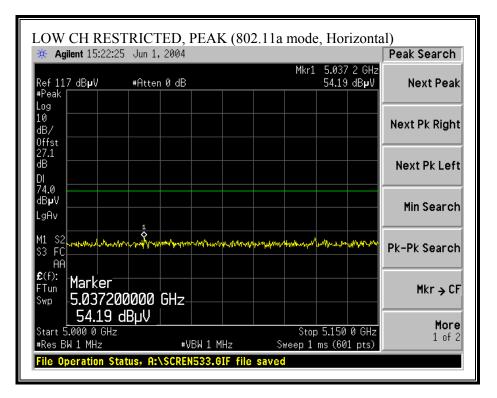
## **RESULTS**

No non-compliance noted:

Page 56 of 177

# 7.8.2. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHz FOR 5150 TO 5350 MHz BAND WITH 9 dBi INTEGRAL ANTENNA

## RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, HORIZONTAL)

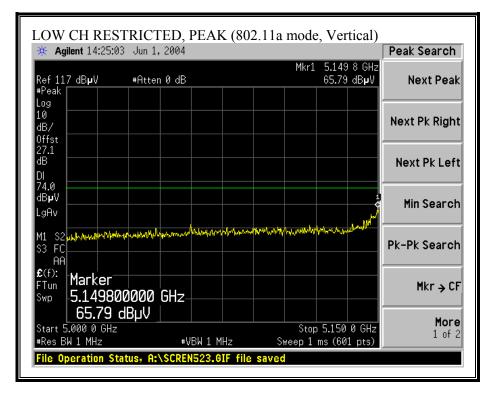


Page 57 of 177

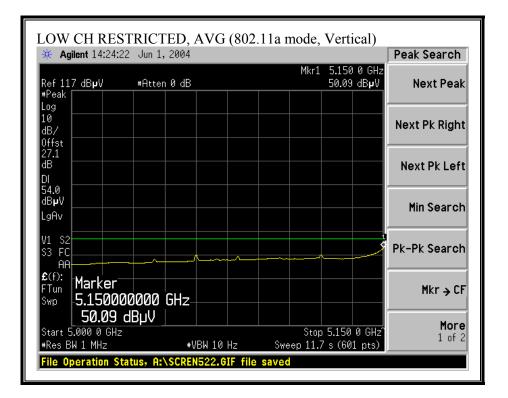
🔆 Agilent 15:23:18 🕔	un 1, 2004		Peak Search
Ref 117 dB <b>µ</b> V # #Peak	Atten 0 dB	Mkr1 5.150 0 GH 42.52 dBµV	
Log 10 dB/ 0ffst			Next Pk Right
27.1 dB DI			Next Pk Left
54.0 dB <b>µ</b> V LgAv			Min Search
M1 S2 S3 FC			Pk-Pk Search
£(f): FTun Swp 5.1500000			Mkr → CF
<b>42.52 dB</b> Start 5.000 0 GHz #Res BW 1 MHz	₩VBW 10 Hz	Stop 5.150 0 GHz Sweep 11.7 s (601 pts)	

Page 58 of 177

#### RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, VERTICAL)

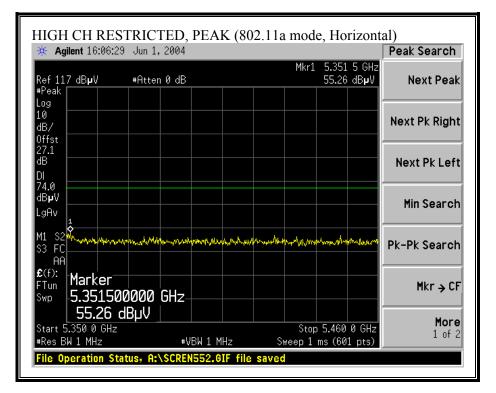


Page 59 of 177



Page 60 of 177

### RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, HORIZONTAL)

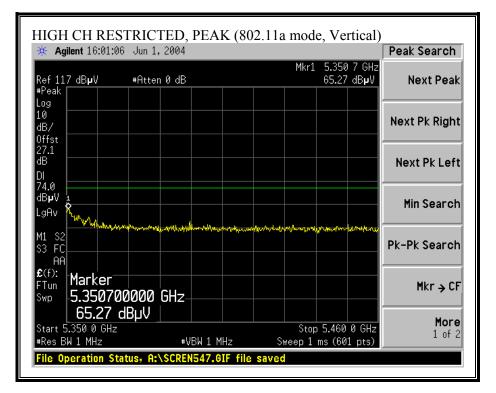


Page 61 of 177

HIGH CH RESTRI <b># Agilent</b> 16:06:02 Jur				,	Peak Search
Ref 117 dB <b>µ</b> V #At #Peak	ten 0 dB		Mkr1	5.350 0 G 43.11 dBµ	
Log 10 dB/ 0ffst					Next Pk Right
27.1 dB DI					Next Pk Left
54.0 dBµV LgAv					Min Search
M1 S2 S3 FC1					Pk-Pk Search
£(f): FTun Swp - <b>5.35000000</b>					Mkr → CF
<b>43.11 dBµ</b> Start 5.350 0 GHz #Res BW 1 MHz		0 Hz		o 5.460 0 GH 7 s (601 pts	

Page 62 of 177

### RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, VERTICAL)



Page 63 of 177

HIGH CH RESTRIC	ГЕD, AVG (8	02.11a mode	, Vertical)	
🔆 🔆 Agilent 16:01:43 Jun 1,	. 2004			Peak Search
Ref 117 dBµV #Atter #Peak	n 0 dB	Mkr1	5.350 0 GHz 50.78 dBµV	Next Peak
Log 10 dB/ 0ffst				Next Pk Right
27.1 dB DI				Next Pk Left
54.0 dBµV LgAv				Min Search
M1 S2 S3 FC			×	Pk-Pk Search
£(f): FTun Swp 5.350000000	GHz			Mkr → CF
<b>50.78 dBµV</b> Start 5.350 0 GHz^ #Res BW 1 MHz	#VBW 10 Hz		5.460 0 GHz 7 s (601 pts)	More 1 of 2
File Operation Status, A:	SCREN548.GIF f	ile saved		

Page 64 of 177

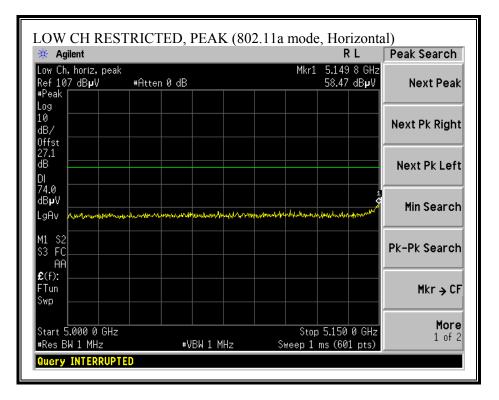
### HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE) WITH 9dBi PATCH ANTENNA

Fest Equ		_	6		-									Horn > ]	1901
	MCO Horn 1-18GHz Spectrum Analyzer 9; S/N: 3245 @3m • Agilent E4446A Analyzer •			er 🗸		Pre-amplifer 1-26GHz Pre-amplifer 26-40GHz T87 Miteq 924342  T88 Miteq 16-40GHz					T87; AR	Horn > 1 A 18-26GHz; S			
Hi Freq	quency Ca ft)		☐ (4 ~ 6 ft)	🔽 (12 ft)	)		FCC 15	Limit	-		1 MHz Reso	isurement Iution Bandv Bandwidth	width		<mark>Ieasurements:</mark> ution Bandwidth andwidth
f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	-	Pk Mar dB	Avg Mar dB	Notes
CH 5180						ĺ									••
5.540 5.540	9.8 9.8	44.1 44.7	32.6 33.1	39.5 39.5	6.1 6.1	-45.5 -45.5	0.0 0.0	1.5 1.5	45.7 46.3	34.2 34.7	74.0 74.0	54.0 54.0	-28.3 -27.7	-19.8 -19.3	V H
CH 5260															
0.520	9.8	57.5	47.2	37.9	4.8	-41.4	0.0	1.5	60.3	50.0	74.0	54.0	-13.7	-4.0	V
15.780 10.520	9.8 9.8	48.3 52.1	35.3 39.6	39.0 37.9	6.2 4.8	-45.6 -41.4	0.0	1.5 1.5	49.3 54.9	36.3 42.4	74.0 74.0	54.0 54.0	-24.7 -19.1	-17.7 -11.6	 Н
15.780	9.8	48.1	36.7	39.0	6.2	-45.6	0.0	1.5	49.1	37.7	74.0	54.0	-19.1	-16.3	H
CH 5320															
.550 .550	9.8 9.8	55.9 54.1	54.0 52.3	32.9 32.9	2.9 2.9	-44.5 -44.5	0.0	1.5 1.5	48.7 46.9	46.8 45.1	74.0 74.0	54.0 54.0	-25.3 -27.1	-7.2 -8.9	V н
0.640	9.8 9.8	54.1	43.5	32.9	4.8	-44.5	0.0	1.5	40.9 57.7	45.1	74.0	54.0 54.0	-27.1	-8.9 -7.5	V
5.960	9.8	47.4	35.6	38.6	6.2	-45.7	0.0	1.5	48.0	36.2	74.0	54.0	-26.0	-17.8	V
0.640	9.8	49.8	37.4	38.0	4.8	-41.3	0.0	1.5	52.8	40.4	74.0	54.0	-21.2	-13.6	H
15.960	9.8	46.2	34.7	38.6	6.2	-45.7	0.0	1.5	46.8	35.3	74.0	54.0	-27.2	-18.7	H
	f Dist Read AF CL	Measurem Distance to Analyzer R Antenna F Cable Los	leading actor	у		Amp D Corr Avg Peak HPF	Average	Correc Field S d Peak	et to 3 mete Strength @ c Field Stre	3 m		Pk Lim Avg Mar	Peak Fiel Margin vs	Field Strength Id Strength Li s. Average Li s. Peak Limit	mit

Page 65 of 177

# 7.8.3. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHz FOR 5150 TO 5350 MHz BAND WITH 9.5 dBi EXTERNAL ANTENNA

## RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, HORIZONTAL)

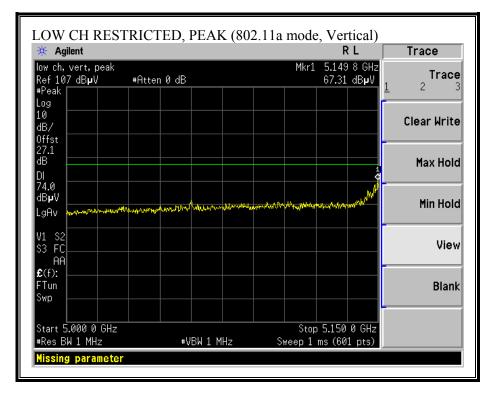


Page 66 of 177

🔆 Agilent			L	Peak Search
Low Ch, horiz, ave Ref 107 dB <b>µ</b> V #Peak		Mkr1	5.150 0 GHz 44.66 dBµV	
Hreak Log 10 dB/ Offst				Next Pk Right
27.1 dB DI				Next Pk Left
54.0 dB <b>µ</b> V LgAv				Min Search
W1 S2 S3 FC AA				Pk-Pk Search
£(f): FTun Swp				Mkr → CF
Start 5.000 0 GH: #Res BW 1 MHz	 3₩ 10 Hz		5.150 0 GHz s (601 pts)	More 1 of 2

Page 67 of 177

### RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, VERTICAL)

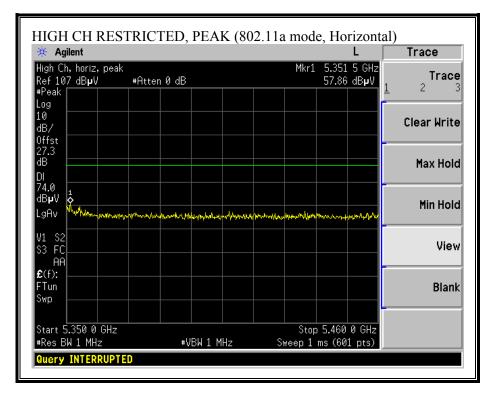


Page 68 of 177

🔆 Agilent			F	₹Т	Peak Search
Low Ch, vert, avera Ref 107 dB <b>µ</b> V			Mkr1 5.150 50.47	0 0 GHz 7 dB <b>µ</b> V	Next Peak
#Peak Log					
10 dB/					Next Pk Right
Offst 27.1 dB					Next Pk Left
54.0 dBµV LgAv					Min Search
V1 S2	^	·			Pk-Pk Search
AA £(f): FTun					Mkr → CF
Swp					More
Start 5.000 0 GHz #Res BW 1 MHz	#URU 1	0 Hz Swee	Stop 5.150 ep 11.7 s (60		1 of 2

Page 69 of 177

### RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, HORIZONTAL)

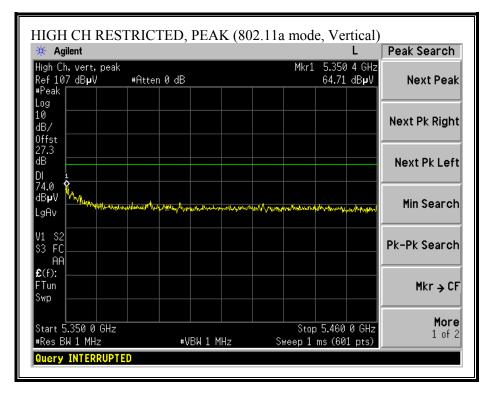


Page 70 of 177

🔆 Agilent				RL	Peak Search
High Ch, horiz, avera Ref 107 dB <b>µ</b> V			Mkr1	5.350 0 GHz 44.57 dB <b>µ</b> V	
#Peak Log 10 dB/					Next Pk Right
0ffst 27.3 dB					Next Pk Left
DI 54.0 dBµV LgAv					Min Search
V1 S2 S3 FC					Pk-Pk Search
AA £(f): FTun					Mkr → CF
Swp Start 5.350 0 GHz			Stop	5.460 0 GHz <sup>°</sup>	More
#Res BW 1 MHz	#VBW :	ЮН <del>∠</del>		's (601 pts)	1 of 2

Page 71 of 177

### RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, VERTICAL)



Page 72 of 177

🔆 Agilent				L	Peak Search
High Ch, vert, averag Ref 107 dBµV				5.350 0 GHz 49.95 dBµV	Next Peak
#Peak Log					
10 dB/					Next Pk Right
0ffst 27.3 dB					Next Pk Left
DI 54.0 dB <b>µ</b> V					Min Search
LgAv 🕯					
V1 S2 S3 FC AA					Pk-Pk Search
£(f): FTun Swp					Mkr → CF
Start 5.350 0 GHz			Stop	5.460 0 GHz^	More
#Res BW 1 MHz	#VBW 1	.0 Hz 🗧	бweep 8.577		1 of 2

Page 73 of 177

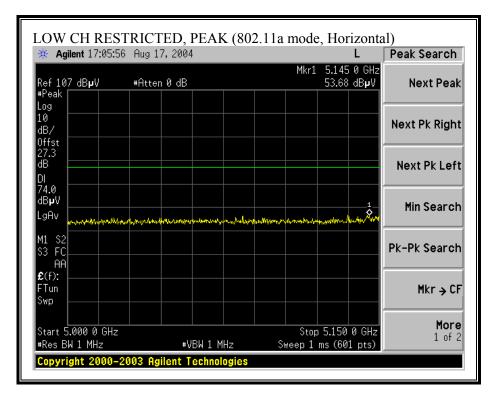
### HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE) WITH 9.5dBi ANTENNA,

2000 22A-K9 2 UNNI -18GHz @3m ↓ wes √ (2~3 ft) Read Pk dBuV	Agilent l	00 Acces etrum Ana E4446A A ▼ (12 ft)	ss Poin alyzer analyzer	t	Pre-amp 187 Mit	lifer 1-2	26GHz	Pre-amj	plifer 26-40G	Hz		Horn > 180	GHz
C UNNI -18GHz @3m ↓ wes √ (2~3 ft) Read Pk dBuV	Spec Agilent I (4~6 ft) Read Avg.	E4446A A ▼ (12 ft)	ılyzer nalyzer		-			Pre-amp	plifer 26-40G	Hz		Horn > 180	-
-18GHz @3m ↓ oles ↓ ✓ (2 ~ 3 ft) Read Pk dBuV	Agilent l	E4446A A	nalyzer	•	-			Pre-am	plifer 26-40G	Hz		Horn >18	-
-18GHz @3m ↓ oles ↓ ✓ (2 ~ 3 ft) Read Pk dBuV	Agilent l	E4446A A	nalyzer	· •	-			Pre-amp	plifer 26-40G	Hz		Horn >18	-
@3m velocity (2~3 ft) Read Pk dBuV	Agilent l	E4446A A	nalyzer	•	-			Pre-amp	plifer 26-40G	Hz		Horn >18	-
les ✓ (2 ~ 3 ft) Read Pk dBuV	(4~6 ft)	<b>▼</b> (12 ft)		· •	-					<u>-</u>			Ŧ
(2~3 ft) Read Pk dBuV	Read Avg.			]		•							
(2~3 ft) Read Pk dBuV	Read Avg.			]									
Read Pk dBuV	Read Avg.			J					Peak Meas		14	Average Mea	
dBuV		AF		•					1 MHz Reso 1MHz Video	lution Bandw Bandwidth	ath	1 MHz Resolut 10Hz Video Ba	tion Bandwidth andwidth
dBuV		AF											
			CL	Amp	D Corr	HPF	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
	dBuV	dB/m	dB	dB	dB		dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	
Hz 63.7	60.3	32.9	2.7	-44.3	0.0	0.0	54.9	51.5	74.0	54.0	-19.1	-2.5	v
45.5	33.0	39.4	5.6	-45.5	0.0	1.0	45.9	33.4	74.0	54.0	-28.1	-20.6	V
60.0 45.2	57.8 32.8	32.9 39.4	2.7	-44.3 -45.5	0.0	0.0	51.2 45.6	49.0 33.2	74.0 74.0	54.0 54.0	-22.8 -28.4	-5.0 -20.8	<u>н</u> Н
		22.0					40.5	45.5	54.0	54.0	215	()	v
													v v
58.0	56.3	32.9	2.8	-44.4	0.0	0.0	49.3	47.6	74.0	54.0	-24.7	-6.4	Н
47.4	35.0	38.7	5.7	-45.6	0.0	1.0	47.2	34.8	74.0	54.0	-26.8	-19.2	Н
lz													
58.4	56.7	33.0	2.8	-44.5	0.0	0.0	49.7	48.0	74.0	54.0	-24.3	-6.0	V
48.5	35.6	38.2	4.6	-41.3	0.0	1.0	51.0	38.1	74.0	54.0			V V
													<u> </u>
47.5	33.5	38.2	4.6	-41.3	0.0	1.0	50.0	36.0	74.0	54.0	-24.0	-18.0	Н
45.8	33.0	38.3	5.7	-45.7	0.0	1.0	45.1	32.3	74.0	54.0	-28.9	-21.7	Н
issions were	detected above	thr syste	m poise	floor.									
	45.2 Hz 58.3 48.0 58.0 47.4 Hz 1z 58.4 46.0 56.5 47.5 45.8	45.2         32.8           Hz	45.2         32.8         39.4           Hz	45.2         32.8         39.4         5.6           Hz	45.2         32.8         39.4         5.6         -45.5           Hz	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				

Page 74 of 177

# 7.8.4. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHz FOR 5150 TO 5350 MHz BAND WITH 7 dBi EXTERNAL ANTENNA

# RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, HORIZONTAL)

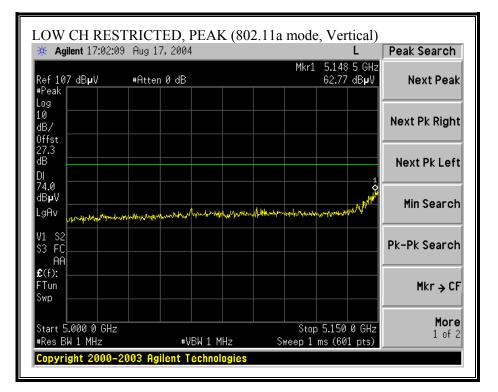


Page 75 of 177

🔆 Agilent 17:07:1-	4 Aug 17, 2004		L	Peak Search
Ref 107 dB <b>µ</b> V	#Atten 0 dB		150 0 GHz .61 dB <b>µ</b> V	Next Peak
#Peak Log				
10 dB/				Next Pk Right
0ffst 27.3 dB				Next Pk Left
DI				Nextra Len
dB <b>µ</b> V LgAv				Min Search
V1 S2			1	
\$3 FC				Pk-Pk Search
£(f):				Mkr → CF
Swp				
Start 5.000 0 GHz #Res BW 1 MHz		 10 Hz	.50 0 GHz <sup>°</sup>	<b>More</b> 1 of 2

Page 76 of 177

# RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, VERTICAL)

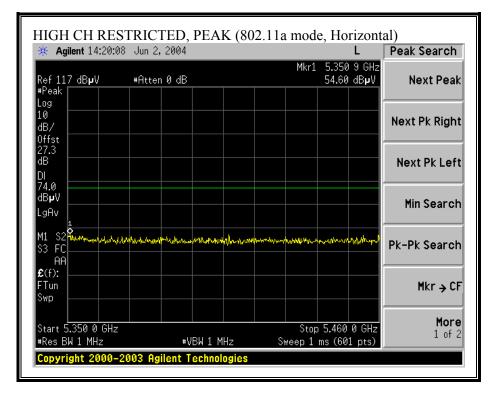


Page 77 of 177

🔆 Agilent 17:02:58		(802.11a mode,	L	Peak Search
Ref 107 dBµV	#Atten 0 dB	Mkr1	5.150 0 GHz 48.02 dBµV	Next Peak
#Peak Log 10				Next Pk Right
dB/ 0ffst 27.3 dB				
DI				Next Pk Left
dBµV LgAv				Min Search
V1 S2 S3 FC	^^			Pk-Pk Search
£(f): FTun Swp				Mkr → CF
Start 5.000 0 GHz		Stor	o 5.150 0 GHzî	More
#Res BW 1 MHz	#VBW 10	Hz Sweep 11.		1 of 2

Page 78 of 177

### RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, HORIZONTAL)

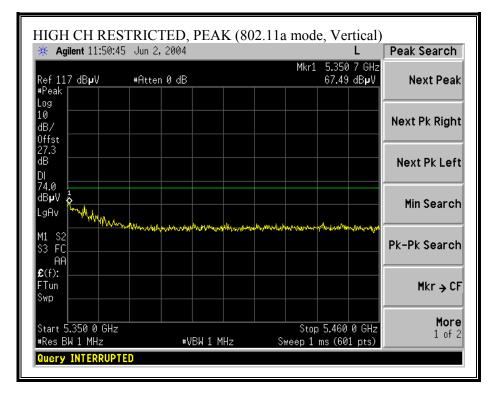


Page 79 of 177

🔆 Agilent 14:19:45	Jun 2, 20	04				L	Peak Search
				1	4kr1 5.3	50 0 GHz	
Ref 117 dB <b>µ</b> V	#Atten 0	зB			43.	15 dB <b>µ</b> V	Next Peak
#Peak Log							
10							
dB/							Next Pk Right
Offst							
27.3 dB							Next Pk Left
							HOATT K LOTT
54.0							
dBµV							Min Search
LgAv							
M1 S2							
\$3 FC1							Pk-Pk Search
AAP	<u> </u>						
£(f):							Mine . CE
Swp							Mkr → CF
Start 5.350 0 GHz					Stop 5 46	50 0 GHz	More
#Res BW 1 MHz		#VBW 10	Hz			601 pts)	1 of 2

Page 80 of 177

### RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, VERTICAL)



Page 81 of 177

HIGH CH RES		AVG (802	2.11a mode	, Vertical)	
🔆 Agilent 11:49:57	Jun 2, 2004			L	Peak Search
Ref 117 dB <b>µ</b> V #Peak	#Atten 0 dB		Mkr1	5.350 0 GHz 53.91 dBµV	Next Peak
Log 10 dB/ 0ffst					Next Pk Right
27.3 dB DI 54.0					Next Pk Left
dB <b>µ</b> V LgAv					Min Search
V1 S2 S3 FC AA				^	Pk-Pk Search
<b>£</b> (f): FTun Swp					Mkr → CF
Start 5.350 0 GHz #Res BW 1 MHz		BW 10 Hz		5.460 0 GHz^ 7 s (601 pts)	More 1 of 2
Query INTERRUPTE	D				

Page 82 of 177

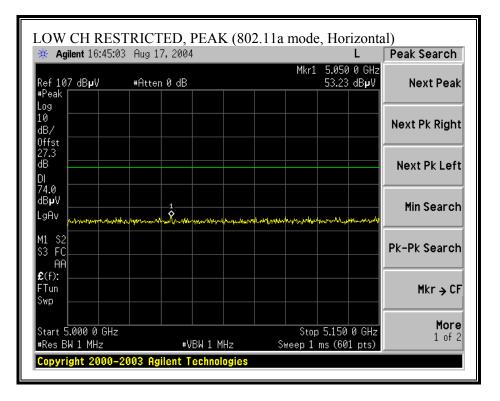
### HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE) WITH 7dBi PATCH ANTENNA

roject # Company		Yan Zheng 04U2586-1 Cisco													
UT Des UT M/	•		2A 802.11 a Ca -K9 IN AIR-A				7dBi Patch	Antenr	ıa						
est Tar Iode O		FCC Class B TX, 5.2 Band													
est Equ	-														
		_			. In									Horn >	1901
		1-18GHz		ctrum Ai	· ·				-26GHz	Pre-am	plifer 26-40	GHz		Horn >	
T59; S/	N: 3245	@3m 🗸	Agilent	E4446A	Analyz	er 🔻	T87 Mi	teq 924	342 🗸			•			•
	uency Ca					]		Limit				isurement			Jeasurements:
<b>(</b> 2	ft)	(2 ~ 3 ft)	□ (4 ~ 6 ft)	✓ (12 ft)	)		FCC 15		•			lution Bandy Bandwidth	width	1 MHz Resol 10Hz Video I	lution Bandwidth Bandwidth
							I	1		1	1	1		:	
f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
H 5180	reet	upuv	ubuv	ab/ill	uD.	ub	ub		aDuv/III	ubu v/III	aDu v/III	uDu v/III	uD	ub	
5.540	9.8	57.0	43.5	39.5	6.1	-45.5	0.0	1.5	58.6	45.1	74.0	54.0	-15.4	- <b>8.9</b>	V
5.540	9.8	56.0	43.0	39.5	6.1	-45.5	0.0	1.5	57.6	44.6	74.0	54.0	-16.4	-9.4	Н
H 5260 0.520	9.8	50.3	40.1	37.9	4.8	-41.4	0.0	1.5	53.1	42.9	74.0	54.0	-20.9	-11.1	V
5.780	9.8	48.5	37.4	39.0	6.2	-45.6	0.0	1.5	49.5	38.4	74.0	54.0 54.0	-20.5	-15.6	v
	9.8	51.2	40.6	37.9	4.8	-41.4	0.0	1.5	54.0	43.4	74.0	54.0	- <b>20.0</b>	-10.6	Н
	0.0	48.1	36.8	39.0	6.2	-45.6	0.0	1.5	49.1	37.8	74.0	54.0	-24.9	-16.2	H
5.780	9.8			32.9	2.9	-44.5	0.0	1.5	52.5	51.2	74.0	54.0	-21.5	-2.8	v
5.780 H 5320		50 7	59 4		4.7	-+4.3		1.5		51.2 44.3	74.0	54.0 54.0	-21.5 -26.8	-2.8 -9.7	v
5.780 H 5320 550	9.8	59.7 54.4	58.4 51.5		2.9	-44.5	0.0		4/.2						Н
5.780 H 5320 .550 .550		59.7 54.4 46.3	58.4 51.5 35.2	32.9 32.9 38.0	2.9 4.8	-44.5 -41.3	0.0 0.0	1.5	47.2 49.3	38.2	74.0	54.0	-24.7	-9.7	H V
5.780 H 5320 .550 .550 0.640 5.960	9.8 9.8 9.8 9.8	54.4 46.3 47.4	51.5 35.2 35.6	32.9 38.0 38.6	4.8 6.2	-41.3 -45.7	0.0 0.0	1.5 1.5	49.3 48.0	38.2 36.2	74.0	54.0	-24.7 -26.0	-15.8 -17.8	V V
5.780 H 5320 550 550 0.640 5.960 0.640	9.8 9.8 9.8 9.8 9.8 9.8	54.4 46.3 47.4 48.0	51.5 35.2 35.6 36.2	32.9 38.0 38.6 38.0	4.8 6.2 4.8	-41.3 -45.7 -41.3	0.0 0.0 0.0	1.5 1.5 1.5	49.3 48.0 51.0	38.2 36.2 39.2	74.0 74.0	54.0 54.0	-24.7 -26.0 -23.0	-15.8 -17.8 -14.8	V V H
5.780 H 5320 550 550 0.640 5.960 0.640	9.8 9.8 9.8 9.8	54.4 46.3 47.4	51.5 35.2 35.6	32.9 38.0 38.6	4.8 6.2	-41.3 -45.7	0.0 0.0	1.5 1.5	49.3 48.0	38.2 36.2	74.0	54.0	-24.7 -26.0	-15.8 -17.8	V V
5.780 H 5320 .550 .550 0.640 5.960 0.640 5.960	9.8 9.8 9.8 9.8 9.8 9.8 9.8	54.4 46.3 47.4 48.0 46.4	51.5 35.2 35.6 36.2 34.9	32.9 38.0 38.6 38.0 38.6	4.8 6.2 4.8	-41.3 -45.7 -41.3 -45.7	0.0 0.0 0.0 0.0	1.5 1.5 1.5 1.5	49.3 48.0 51.0	38.2 36.2 39.2	74.0 74.0	54.0 54.0 54.0	-24.7 -26.0 -23.0 -27.0	-15.8 -17.8 -14.8 -18.5	V V H H
5.780 H 5320 .550 .550 0.640 5.960 0.640 5.960	9.8 9.8 9.8 9.8 9.8 9.8	54.4 46.3 47.4 48.0 46.4 Measurem	51.5 35.2 35.6 36.2 34.9 ent Frequenc	32.9 38.0 38.6 38.0 38.6	4.8 6.2 4.8	-41.3 -45.7 -41.3 -45.7 Amp	0.0 0.0 0.0 0.0 Preamp	1.5 1.5 1.5 1.5	49.3 48.0 51.0 47.0	38.2 36.2 39.2 35.5	74.0 74.0	54.0 54.0 54.0 Avg Lim	-24.7 -26.0 -23.0 -27.0 Average I	-15.8 -17.8 -14.8 -18.5 Field Strengt	V V H H
	9.8 9.8 9.8 9.8 9.8 9.8 9.8 f Dist	54.4 46.3 47.4 48.0 46.4 Measurem Distance to	51.5 35.2 35.6 36.2 34.9 ent Frequence o Antenna	32.9 38.0 38.6 38.0 38.6	4.8 6.2 4.8	-41.3 -45.7 -41.3 -45.7 Amp D Corr	0.0 0.0 0.0 Preamp Distance	1.5 1.5 1.5 1.5 Gain	49.3 48.0 51.0 47.0 ct to 3 mete	38.2 36.2 39.2 35.5	74.0 74.0	54.0 54.0 54.0 Avg Lim Pk Lim	-24.7 -26.0 -23.0 -27.0 Average I Peak Field	-15.8 -17.8 -14.8 -18.5 Field Strengt d Strength L	V V H H
5.780 H 5320 .550 .550 0.640 5.960 0.640 5.960	9.8 9.8 9.8 9.8 9.8 9.8 9.8 f Dist	54.4 46.3 47.4 48.0 46.4 Measurem	51.5 35.2 35.6 36.2 34.9 ent Frequenc o Antenna .eading	32.9 38.0 38.6 38.0 38.6	4.8 6.2 4.8	-41.3 -45.7 -41.3 -45.7 Amp	0.0 0.0 0.0 Preamp Distance Average	1.5 1.5 1.5 1.5 Gain Correc Field S	49.3 48.0 51.0 47.0 ct to 3 mete Strength @	38.2 36.2 39.2 35.5 ers 3 m	74.0 74.0	54.0 54.0 54.0 Avg Lim Pk Lim Avg Mar	-24.7 -26.0 -23.0 -27.0 Average I Peak Field Margin vs	-15.8 -17.8 -14.8 -18.5 Field Strengt d Strength L & Average L	V V H H h Limit imit imit
5.780 H 5320 550 550 0.640 5.960 0.640 5.960	9.8 9.8 9.8 9.8 9.8 9.8 9.8 f Dist Read	54.4 46.3 47.4 48.0 46.4 Measurem Distance to Analyzer R	51.5 35.2 35.6 36.2 34.9 ent Frequenc o Antenna .eading actor	32.9 38.0 38.6 38.0 38.6	4.8 6.2 4.8	-41.3 -45.7 -41.3 -45.7 Amp D Corr Avg	0.0 0.0 0.0 Preamp Distance Average	1.5 1.5 1.5 1.5 Gain Correc Field S ed Peal	49.3 48.0 51.0 47.0 ct to 3 mete Strength @ k Field Stree	38.2 36.2 39.2 35.5 ers 3 m	74.0 74.0	54.0 54.0 54.0 Avg Lim Pk Lim Avg Mar	-24.7 -26.0 -23.0 -27.0 Average I Peak Field Margin vs	-15.8 -17.8 -14.8 -18.5 Field Strengt d Strength L	V V H H h Limit imit imit

Page 83 of 177

# 7.8.5. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHz FOR 5150 TO 5350 MHz BAND WITH 6 dBi EXTERNAL ANTENNA

## RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, HORIZONTAL)

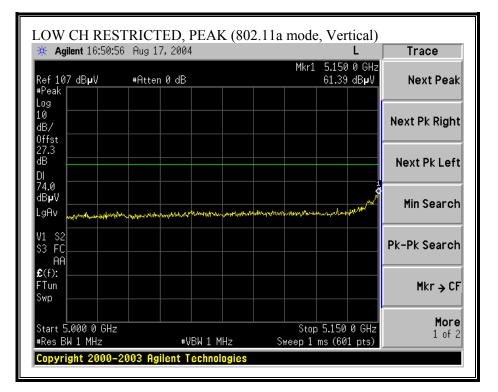


Page 84 of 177

🔆 Agilent 16:46:0	9 Aug 17, 2004		L	Peak Search
Ref 107 dBµV	#Atten 0 dB		.150 0 GHz 0.64 dB <b>µ</b> V	Next Peak
#Peak			0.04 UD <b>P</b> V	Nextreak
Log 10			í	
dB/				Next Pk Right
Offst 27.3			-	
dB				Next Pk Left
DI				
dBµV				Min Search
LgAv				min Search
V1 S2				
\$3 FC				Pk-Pk Search
AA £(f):			-	
FTun				Mkr → CF
Swp				
				More
Start 5.000 0 GHz #Res BW 1 MHz	#URU 10	Stop 5. Hz Sweep 11.7 s	150 0 GHzî (601 pts)	1 of 2

Page 85 of 177

# RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, VERTICAL)

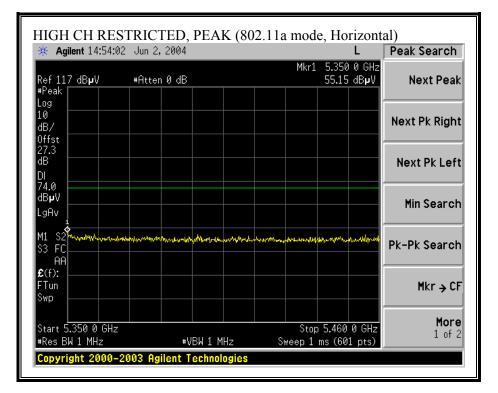


Page 86 of 177

LOW CH REST		5 (002.11 <b>u</b> l	L	Peak Search
	•		Mkr1 5.150 0 G	Hz
Ref 107 dBµV	#Atten 0 dB		46.31 dBµ	V Next Peak
#Peak Log				
10				Next Pk Right
dB/ Offst				- Hext FK Right
27.3				
dB				Next Pk Left
DI				
dBµV				Min Search
LgAv				a
V1 S2				1
\$3 FC		لألأحد فتحدد ا		Pk-Pk Search
AA CO:				
£(f):				Mkr → CF
Swp				
				More
Start 5.000 0 GHz			Stop 5.150 0 G	1Z 1 of 2
#Res BW 1 MHz	#VBW 1	∉Hz Swe	ep 11.7 s (601 pt:	5)

Page 87 of 177

### RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, HORIZONTAL)

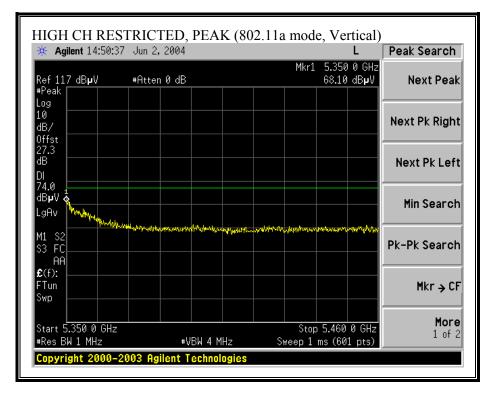


Page 88 of 177

🔆 Agilent 14:54:46	Jun 2, 2004			L	Peak Search
			Mkr1	5.350 0 GH:	
Ref 117 dBµV	#Atten 0 dE	3		42.84 dBµV	Next Peak
#Peak Log					
10					Next Pk Right
dB/					Next FK Right
0ffst 27.3					
dB					Next Pk Left
54.0 dB <b>µ</b> V					
LgAv					Min Search
M1 S2					Pk-Pk Search
\$3 FC1					TK TK Sedi on
<b>£</b> (f):					
FTun					Mkr → CF
Swp					
					More
Start 5.350 0 GHz				5.460 0 GHz	1 of 2
#Res BW 1 MHz		⊧VBW 10 Hz	ъ₩еер ŏ.5/.	7 s (601 pts)	

Page 89 of 177

### RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, VERTICAL)



Page 90 of 177

🔆 Agilent 14:47:25	Jun 2, 200	14			F	8 T	Peak Search
Ref 117 dBµV	#Atten 0 d	IB		Mł	r1 5.350 53.06	) 0 GHz dB <b>µ</b> V	Next Peak
#Peak Log 10							
dB/ 0ffst 27.3							Next Pk Right
dB DI							Next Pk Left
54.0 dBµV LgAv							Min Search
M1 S2							Pk-Pk Search
\$3 FC AA £(f):							
FTun Swp							Mkr → CF
Start 5.350 0 GHz #Res BW 1 MHz		#VBW 10	<u> </u>		top 5.460		More 1 of 2

Page 91 of 177

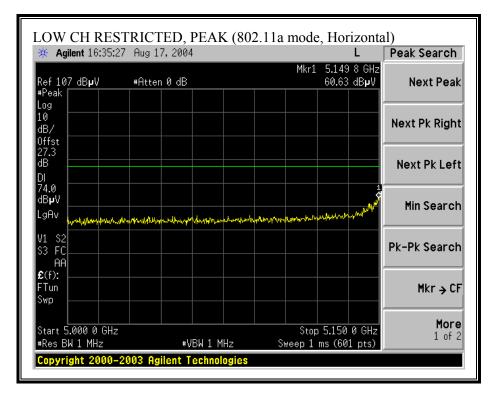
### HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE) WITH 6dBi OMNI ANTENNA

UT Descrip: Kodat RM22A 802.11 a CardBus Rado Module with 6dBi Omni Antenna         UT M/N: AIR-RM22A-K9 IN AIR-AP1200 ACCESS POINT         ENT Tage: FCC Class B         Vode Oper: TX, 5.2 Band         Test Equipment:         Pre-amplifer 1-26GHz         Pre-amplifer 26-40GHz         Joint Colspan="2">Horn > 18GHz         Joint Colspan="2">Pre-amplifer 26-40GHz         Tory S/N: 3245 @3m       Spectrum Analyzer       Pre-amplifer 26-40GHz       Horn > 18GHz         Image Measurements:         Tory S/N: 3245 @3m       Spectrum Analyzer       Pre-amplifer 26-40GHz       Average Measurements:         Tory S/N: 3245 @3m       Spectrum Analyzer       Pre-amplifer 26-40GHz       Average Measurements:         Tory S/N: 3245 @3m       Classing average Measurements:         Tory Cables       Pre-amplifer 26-40GHz       Average Measurements:         1 MHz Resolution Bandwidth         1 MHz Resolution Bandwidth         1 MHz Resolution Bandwidth         1 MHz Resolution Bandwidth         1 Mitz Resolution Bandwidth	Complia	nce Ce	rtification	Services, M	lorgan I	till O <sub>l</sub>	pen Field	d Site								
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $																
UT Descrip: Kodik RND2A 9021 i 6 cm8bis Rado Module with 6d8 Omi Antenna UT M/N: AR.8ND2A.4K3 IN AIR-AP1200 ACCESS POINT est Target: FCC Class B Tode Oper: TX, 52 Band Est Equipment: TMCO Hern 1-18GHz T97; S/N: 3245 @3m Agtlent E446A Analyzer Agtlent E446A Analyzer Agtlent E446A Analyzer Agtlent E446A Analyzer Pre-amplifer 1-26GHz T97; S/N: 3245 @3m Agtlent E446A Analyzer Pre-amplifer 1-26GHz T97; S/N: 3245 @3m Agtlent E446A Analyzer Pre-amplifer 1-26GHz T97; Mireq 924342 T97; Mireq 924342 Pre-amplifer 2-640GHz T97; Mireq 924342 T97; Mireq 924342 Pre-amplifer 2-640GHz T9; Mire Re-alvarements; T0HT; Re-alvarements																
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $				2A 802.11 a Ca	erdBus Ra	dio Mo	dule with	6dBi Omni	Antenn	a						
Mode Op:       T. S. 2. S and         Est Equipment:         ENCO Horn 1-18GHz       Spectrum Analyzer       Pre-amplifer 1-26GHz       Pre-amplifer 26-40GHz       Horn > 18GHz         TS9: SN: 3245 @3m       Pre-amplifer 1-26GHz       Pre-amplifer 26-40GHz       Horn > 18GHz         TS9: SN: 3245 @3m       Pre-amplifer 1-26GHz       Pre-amplifer 26-40GHz       Horn > 18GHz         TS9: SN: 3245 @3m       Pre-amplifer 1-26GHz       Pre-amplifer 26-40GHz       Horn > 18GHz         TS9: SN: 3245 @3m       Pre-amplifer 1-26GHz       Pre-amplifer 26-40GHz       Horn > 18GHz         TS9: SN: 3245 @3m       Pre-amplifer 1-26GHz       Pre-amplifer 26-40GHz       Horn > 18GHz         TS9: SN: 3245 @3m       Pre-amplifer 26-40GHz       Pre-amplifer 26-40GHz       Horn > 245GHz         TS8: SN: 3245 @3m       Pre-amplifer 26-40GHz       Pre-amplifer 26-40GHz       Pre-amplifer 26-40GHz       Horn > 245GHz         TIME: Resolution Bandwidth       Militer X-4464 Mak       Marg Marg Marg Marg Marg Marg Marg Marg		•														
Test Equipment:         INCO Horn 1-18GHz       Spectrum Analyzer       Pre-amplifer 1-26GHz       Pre-amplifer 26-40GHz       Horn > 18GHz         Toy SN: 3245 @3 m       Spectrum Analyzer       Pre-amplifer 1-26GHz       Pre-amplifer 26-40GHz       Horn > 18GHz         Toy SN: 3245 @3 m       Limit       Pre-amplifer 1-26GHz       Pre-amplifer 26-40GHz       Horn > 18GHz         Imite go 24342 w       Pre-amplifer 1-26GHz       Pre-amplifer 26-40GHz       Horn > 18GHz         Imite go 24342 w       Pre-amplifer 1-26GHz       Pre-amplifer 26-40GHz       Marge Measurements:         V       Limit       Pre-amplifer 1-26GHz       Pre-amplifer 26-40GHz       Marge Measurements:         Marge Measurements:       Narge Measurements:         Marge Me		<u> </u>														
EMCO Hern         1.18GHz         Spectrum Analyzer         Pre-amplifer         1.26GHz         Pre-amplifer         2.640GHz         Horn > 18GHz           T59; S/N: 3245 @3m         Agilent E4446A Analyzer         Image: Transmitter         Transmitte	Iode O	per:	TX, 5.2 Bane	1												
Treamplet Frequency Cables         \$\vec{v}\$ (2, ft)       \$\vec{v}\$ (2, a, ft)       \$\vec{v}\$ (12, ft)       \$\vec{v}\$ (13, ft)        \$\vec{v}\$ (13, ft)	lest Equ	uipmen	<u>t:</u>													
Image: Second	EMCO	) Horn	1-18GHz	Spe	ctrum An	alyzer		Pre-am	plifer 1	-26GHz	Pre-am	plifer 26-40	GHz		Horn >	18GHz
Imit       Limit       Limit       Limit       Limit       Average Measurements: IME: Resolution Bandwidth       Average Measurements: IME: Resolution Bandwidth         f       Dist       Read Pk       Read Avg.       AF       CL       Amp       D Corr       HPF       Peak       Average Measurements: IME: Resolution Bandwidth       IME: Resolution Bandwidth         f       Dist       feet       dBuV       dBuV       dB       dB       dB       CHZ       Average Measurements: IME: Resolution Bandwidth       IME: Resolution Bandwidth         1ME: Resolution Bandwidth       MBUV       dBuV       dBuV       dBuV       dBuV/m	T59; S	/N: 3245	@3m 🗸	Agilent	E4446A	Analyzo	er 🗸	T87 Mi	teq 924:	342 🗸			-			-
Imit       Limit       Limit       Limit       Limit       Average Nuessant       Average Nuessant         f       Dist       Read Pk       Read Avg.       AF       CL       Amp       D Corr       HPF       Peak       Avg       Pk Lim       Pk Mar       Avg Mar       Notes         f       Bist       feet       dBuV       dBuV       dB       dB       dB       CHz       Avg       Pk Lim       Avg Mar       Avg Mar       Notes         GHz       feet       dBuV       dBuV       dB       dB       dB       D       Corr       HPF       Peak       Avg       Pk Lim       Avg Lim       Pk Mar       Avg Mar       Avg Mar       Avg Mar       Notes         GHz       feet       dBuV       dBuV       dB       dB       D       Corr       HPF       Peak       Avg       Pk Lim       Avg Lim       Notes       Avg Mar	Hi Free	uency Ca	bles	1			 1	,			1					
f         Dist         Read Pk         Read Avg. Bu V         AF         CL         Amp dB         D Corr dB         HPF dB         Peak dBuV/m         Avg dBuV/m         Avg Lim dBuV/m         Pk Mar dBuV/m         Avg Mar dB         Notes           f         GHz         dBuV         dB/m         dB         dB         D Corr         HPF         Peak dBuV/m         Avg dBuV/m         Avg Lim dBuV/m         Avg Mar dB         Avg Mar         Notes           CH 5180				□ (4 ~ 6 ft)	🔽 (12 ft)				Limit							
GHz         feet         dBuV         dBuV         dBm         dB         dB         dBuV/m         dBuV/m         dBuV/m         dBuV/m         dBuV/m         dB         dB           CH 5180								FCC 15	.209	•		1MHz Video	Bandwidth		10Hz Video I	Bandwidth
CH 5180         CH 6180         CH 6180         CH 6180         CH 6180         CH 6180         CH 6180 <t< th=""><th>f</th><th>Dist</th><th>Read Pk</th><th>Read Avg.</th><th>AF</th><th>CL</th><th>Amp</th><th>D Corr</th><th>HPF</th><th>Peak</th><th>Avg</th><th>Pk Lim</th><th>Avg Lim</th><th>Pk Mar</th><th>Avg Mar</th><th>Notes</th></t<>	f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	HPF	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
15.540       9.8       54.7       41.5       39.5       6.1       -45.5       0.0       1.0       55.8       42.6       74.0       54.0       -18.2       -11.4       V         15.540       9.8       54.9       41.6       39.5       6.1       -45.5       0.0       1.0       56.0       42.7       74.0       54.0       -18.2       -11.4       V         10.520       9.8       55.7       43.6       37.9       4.8       -41.4       0.0       1.5       58.5       46.4       74.0       54.0       -15.5       -7.6       V         10.520       9.8       54.8       43.0       37.9       4.8       -41.4       0.0       1.5       57.6       45.8       74.0       54.0       -16.4       -8.2       H         15.780       9.8       49.0       37.1       39.0       6.2       -45.6       0.0       1.5       49.7       37.6       74.0       54.0       -24.0       -15.9       V         15.780       9.8       48.7       36.6       39.0       6.2       -45.6       0.0       1.5       51.5       50.0       74.0       54.0       -24.3       -16.4       H       H <td></td> <td>feet</td> <td>dBuV</td> <td>dBuV</td> <td>dB/m</td> <td>dB</td> <td>dB</td> <td>dB</td> <td></td> <td>dBuV/m</td> <td>dBuV/m</td> <td>dBuV/m</td> <td>dBuV/m</td> <td>dB</td> <td>dB</td> <td></td>		feet	dBuV	dBuV	dB/m	dB	dB	dB		dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	
15.540       9.8       54.9       41.6       39.5       6.1       -45.5       0.0       1.0       56.0       42.7       74.0       54.0       -18.0       -11.3       H         H 520		9.8	54.7	41.5	39.5	6.1	-45.5	0.0	1.0	55.8	42.6	74.0	54.0	-18.2	-11.4	v
CH 5260         m </td <td>15.540</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>\$</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	15.540									\$						
0.520       9.8       54.8       43.0       37.9       4.8       -41.4       0.0       1.5       57.6       45.8       74.0       54.0       -16.4       -8.2       H         5.780       9.8       49.0       37.1       39.0       6.2       -45.6       0.0       1.5       50.0       38.1       74.0       54.0       -16.4       -8.2       H         5.780       9.8       48.7       36.6       39.0       6.2       -45.6       0.0       1.5       49.7       37.6       74.0       54.0       -24.3       -16.4       H         H       5780       9.8       58.7       57.2       32.9       2.9       -44.5       0.0       1.5       51.5       50.0       74.0       54.0       -21.3       -16.4       H         550       9.8       53.8       51.2       32.9       2.9       44.4       0.0       1.5       46.6       44.0       74.0       54.0       -21.3       -13.5       V         550       9.8       47.4       35.6       38.0       4.8       41.3       0.0       1.5       52.7       40.5       74.0       54.0       -21.3       -13.5       V       -5.560 <td>CH 5260</td> <td></td>	CH 5260															
15.780       9.8       49.0       37.1       39.0       6.2       -45.6       0.0       1.5       50.0       38.1       74.0       54.0       -24.0       -15.9       V         15.780       9.8       48.7       36.6       39.0       6.2       -45.6       0.0       1.5       50.0       38.1       74.0       54.0       -24.0       -15.9       V         15.780       9.8       48.7       36.6       39.0       6.2       -45.6       0.0       1.5       51.5       74.0       54.0       -24.3       -16.4       H         1550       9.8       58.7       57.2       32.9       2.9       44.5       0.0       1.5       51.5       50.0       74.0       54.0       -22.5       -4.0       V         1550       9.8       49.7       37.5       38.0       4.8       -11.3       0.0       1.5       52.7       40.5       74.0       54.0       -21.3       -13.5       V         10.640       9.8       49.7       35.6       38.0       4.8       -41.3       0.0       1.5       51.8       39.5       74.0       54.0       -22.2       -14.5       H         10.640       <											÷					
15.780       9.8       48.7       36.6       39.0       6.2       45.6       0.0       1.5       49.7       37.6       74.0       54.0       -24.3       -16.4       H         H 5320       -																
1.550       9.8       58.7       57.2       32.9       2.9       -44.5       0.0       1.5       51.5       50.0       74.0       54.0       -22.5       -4.0       V         1.550       9.8       53.8       51.2       32.9       2.9       -44.5       0.0       1.5       51.5       50.0       74.0       54.0       -22.5       -4.0       V         10.640       9.8       49.7       37.5       38.0       4.8       -41.3       0.0       1.5       52.7       40.5       74.0       54.0       -21.3       -13.5       V         10.640       9.8       49.7       35.6       38.6       6.2       -45.7       0.0       1.5       48.0       36.2       74.0       54.0       -22.0       -14.5       H         10.640       9.8       48.8       36.5       38.0       4.8       -41.3       0.0       1.5       51.8       39.5       74.0       54.0       -22.2       -14.5       H         15.960       9.8       46.2       34.7       38.6       6.2       -45.7       0.0       1.5       46.8       35.3       74.0       54.0       -22.2       -14.5       H         <	15.780															
1.550       9.8       53.8       51.2       32.9       2.9       44.5       0.0       1.5       46.6       44.0       74.0       54.0       -27.4       -10.0       H         10.640       9.8       49.7       37.5       38.0       4.8       -41.3       0.0       1.5       52.7       40.5       74.0       54.0       -27.4       -10.0       H         15.960       9.8       47.4       35.6       38.6       6.2       -45.7       0.0       1.5       51.8       36.2       74.0       54.0       -21.3       -13.5       V         10.640       9.8       46.2       34.7       38.6       6.2       -45.7       0.0       1.5       51.8       39.5       74.0       54.0       -22.2       -14.5       H         15.960       9.8       46.2       34.7       38.6       6.2       -45.7       0.0       1.5       46.8       35.3       74.0       54.0       -27.2       -18.7       H         15.960       9.8       46.2       34.7       38.6       6.2       -45.7       0.0       1.5       46.8       35.3       74.0       54.0       -27.2       -18.7       H <td>CH 5320</td> <td></td>	CH 5320															
10.640         9.8         49.7         37.5         38.0         4.8         -41.3         0.0         1.5         52.7         40.5         74.0         54.0         -21.3         -13.5         V           15.960         9.8         47.4         35.6         38.6         6.2         -48.7         0.0         1.5         48.0         36.2         74.0         54.0         -21.3         -13.5         V           0.0640         9.8         48.8         36.5         38.0         4.8         -11.3         0.0         1.5         51.8         39.5         74.0         54.0         -22.2         -14.5         H           15.960         9.8         46.2         34.7         38.6         6.2         -45.7         0.0         1.5         46.8         35.3         74.0         54.0         -22.2         -14.5         H           15.960         9.8         46.2         34.7         38.6         6.2         -45.7         0.0         1.5         46.8         35.3         74.0         54.0         -27.2         -18.7         H           15.960         9.8         46.2         34.7         38.6         6.2         -45.7         0.0         1.			å													
15.960         9.8         47.4         35.6         38.6         6.2         -45.7         0.0         1.5         48.0         36.2         74.0         54.0         -26.0         -17.8         V           10.640         9.8         48.8         36.5         38.0         4.8         -41.3         0.0         1.5         51.8         39.5         74.0         54.0         -26.0         -17.8         V           15.960         9.8         46.2         34.7         38.6         6.2         -45.7         0.0         1.5         51.8         39.5         74.0         54.0         -22.2         -14.5         H           15.960         9.8         46.2         34.7         38.6         6.2         -45.7         0.0         1.5         46.8         35.3         74.0         54.0         -27.2         -18.7         H           15.960         9.8         46.2         34.7         38.6         6.2         -45.7         0.0         1.5         46.8         35.3         74.0         54.0         -27.2         -18.7         H           15.9         Distance to Antenna         D Corr         Distance Correct to 3 meters         Pk Lim         Peak Field Strength Limit																
0.640         9.8         48.8         36.5         38.0         4.8         -41.3         0.0         1.5         51.8         39.5         74.0         54.0         -22.2         -14.5         H           15.960         9.8         46.2         34.7         38.6         6.2         -45.7         0.0         1.5         51.8         39.5         74.0         54.0         -22.2         -14.5         H           15.960         9.8         46.2         34.7         38.6         6.2         -45.7         0.0         1.5         46.8         35.3         74.0         54.0         -22.2         -14.5         H           15.960         9.8         46.2         34.7         38.6         6.2         -45.7         0.0         1.5         46.8         35.3         74.0         54.0         -22.2         -14.5         H           16.9         9.8         46.2         34.7         38.6         6.2         -45.7         0.0         1.5         46.8         35.3         74.0         54.0         -22.2         -14.5         H           15.9         Distance to Antenna         D Corr         Distance Correct to 3 metrs         Pk Lim         Peak Field Strength Limit <td>15.960</td> <td></td>	15.960															
f       Measurement Frequency       Amp       Preamp Gain       Avg Lim       Average Field Strength Limit         Dist       Distance to Antenna       D Corr       Distance Correct to 3 meters       Pk Lim       Peak Field Strength Limit         Read       Analyzer Reading       Avg       Average Field Strength @ 3 m       Avg Mar Margin vs. Average Limit         AF       Antenna Factor       Peak       Calculated Peak Field Strength       Pk Mar       Margin vs. Peak Limit	L0.640	9.8	48.8	36.5	38.0	4.8	-41.3	0.0	1.5	51.8	39.5	74.0	54.0	-22.2	-14.5	H
Dist     Distance to Antenna     D Corr     Distance Correct to 3 meters     Pk Lim     Peak Field Strength Limit       Read     Analyzer Reading     Avg     Average Field Strength @ 3 m     Avg Mar     Margin vs. Average Limit       AF     Antenna Factor     Peak     Calculated Peak Field Strength     Pk Mar     Margin vs. Peak Limit	15.960	9.8	46.2	34.7	38.6	6.2	-45.7	0.0	1.5	46.8	35.3	74.0	54.0	-27.2	-18.7	H
Dist     Distance to Antenna     D Corr     Distance Correct to 3 meters     Pk Lim     Peak Field Strength Limit       Read     Analyzer Reading     Avg     Average Field Strength @ 3 m     Avg Mar Margin vs. Average Limit       AF     Antenna Factor     Peak     Calculated Peak Field Strength     Pk Mar     Margin vs. Peak Limit		f	Measurem	ent Frequenc	y		Amp	Preamp	Gain	1		1	Avg Lim	Average 1	Field Strengt	'h Limit
AF Antenna Factor Peak Calculated Peak Field Strength Pk Mar Margin vs. Peak Limit		Dist	Distance to	Antenna			D Corr	Distance	Correc	ct to 3 met	ers					
		Read	Analyzer R	eading			Avg	Average	Field S	Strength @	3 m		Avg Mar	Margin vs	. Average L	imit
CL Cable Loss HPF High Pass Filter			Antenna Fa	actor			Peak	Calculate	d Peal	c Field Stre	ength		Pk Mar	Margin vs	. Peak Limi	t
		AF	~				HPF	High Pas	s Filter							

Page 92 of 177

# 7.8.6. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHz FOR 5150 TO 5350 MHz BAND WITH 4.5 dBi EXTERNAL ANTENNA

# RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, HORIZONTAL)

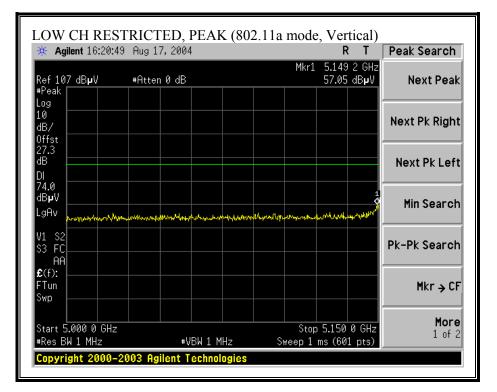


Page 93 of 177

🔆 Agilent 16:37:23 Au	g 17, 2004	L	Peak Search
		Mkr1 5.150 0 GH	z
	tten 0 dB	46.23 dBµV	Next Peak
#Peak			
Log 10			
dB/			Next Pk Right
Offst			
27.3			
dB			Next Pk Left
DI			
dB <b>µ</b> V			
LgAv			Min Search
			4
V1 S2			Pk-Pk Search
\$3 FC			PK-PK Search
AA £(f):			
FTun			Mkr → CF
Swp			
Start 5.000 0 GHz		Stop 5.150 0 GHz	More
#Res BW 1 MHz	₩VBW 10 Hz		1 of 2

Page 94 of 177

### RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, VERTICAL)

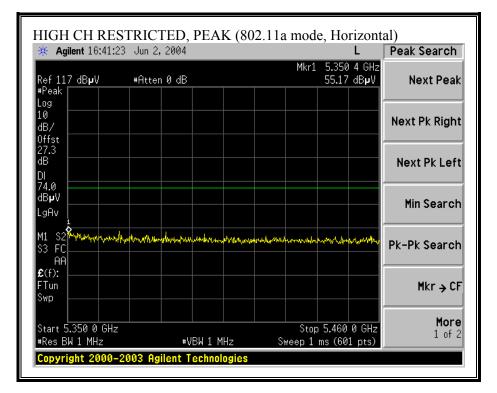


Page 95 of 177

🔆 Agilent 16:28:37	<b>FRICTED, AVC</b> ' Aug 17, 2004	(	L	Peak Search
			Mkr1 5.150 0 GHz	
Ref 107 dB <b>µ</b> V	#Atten 0 dB		42.97 dBµV	Next Peak
#Peak Log				
10				Next Pk Right
dB/				Mext FK Right
Offst 27.3				
dB				Next Pk Left
54.0 dB <b>µ</b> V				
LgAv				Min Search
V1 S2	ļ	<u> </u>		Pk-Pk Search
S3 FC				
£(f):				
FTun				Mkr → CF
Swp				
				More
Start 5.000 0 GHz			Stop 5.150 0 GHz	1 of 2
#Res BW 1 MHz	#VBM 16	Hz Sweep	11.7 s (601 pts)	

Page 96 of 177

#### RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, HORIZONTAL)

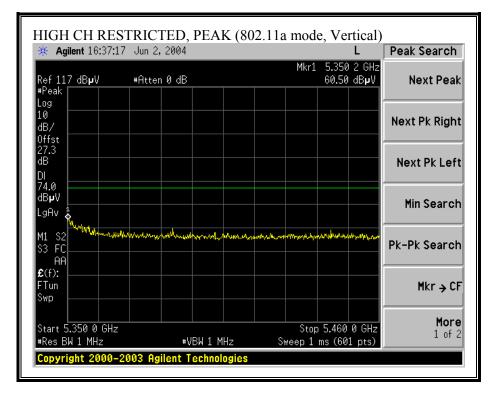


Page 97 of 177

🔆 Agilent 16:42:06	Jun 2, 2	004					L	Peak Search
					Mkr1	5.350	0 GHz	
Ref 117 dB <b>µ</b> V	#Atten 0	dB				44.02	dB₽V	Next Peak
#Peak Log								
10								
dB/								Next Pk Right
Offst 27.3								
dB								Next Pk Left
								MOACH K LOIT
54.0								
dBµV								Min Search
LgAv								
M1 S2								
\$3 FC								Pk-Pk Search
£(f):								Million - CE
Swp								Mkr → CF
Start 5.350 0 GHz					Stop (	5 460	0 GHz	More
#Res BW 1 MHz		#VBW 1	0 Hz	Sween	8.577			1 of 2

Page 98 of 177

### RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, VERTICAL)



Page 99 of 177

🔆 Agilent 16:36:33	2 Jun 2, 2004			Peak Search
Ref 117 dB <b>µ</b> V #Peak	#Atten 0 dB	4	lkr1 5.350 0 GHz 47.08 dBµV	Next Peak
Log 10 dB/				Next Pk Right
0ffst 27.3 dB DI				Next Pk Left
54.0 dB <b>µ</b> V LgAv				Min Search
M1 S2 S3 FC AA		·		Pk-Pk Search
£(f): FTun Swp				Mkr → CF
Start 5.350 0 GHz #Res BW 1 MHz	#VBW 1		Stop^5.460 0 GHz .577 s (601 pts)	<b>More</b> 1 of 2

Page 100 of 177

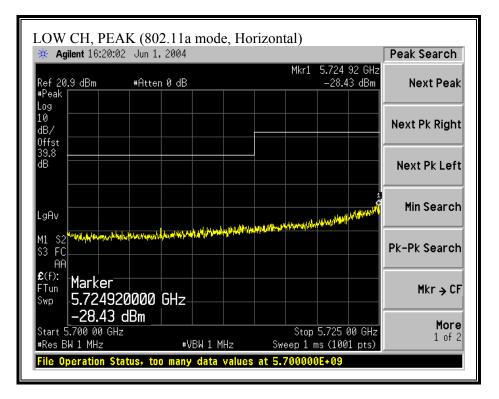
### HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE) WITH 4.5dBi OMNI ANTENNA

EUT M/I Test Tar Mode Oj	; y: scrip.: N: rget: per:	AIR-RM22A FCC Class E TX, 5.2 Ban					4.5dBi Omr	ii Anten	ma						
FMCC		<u>t:</u> 1-18GHz	Spec	ctrum Ar	ıalvzer		Pre am	nlifer l	-26GHz	Pre am	plifer 26-40	CH-		Horn >	18GHz
	N: 3245		Agilent l			er 🗸	T87 Mi	-		Tre-am	piller 20-40	-			•
Hi Freq	uency Ca ft)		└ (4 ~ 6 ft)	ft) 🔽 (12 ft)			Limit FCC 15.209		Peak Measurement 1 MHz Resolution Band 1MHz Video Bandwidth			n Bandwidth 1 MHz Resolution Bandwidth			
f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
CH 5180	Teet	авич	abuv	ad/m	uБ	uь	uь		abuv/m		абиу/т	абиу/т	uь	db	
15.540	9.8	54.5	41.6	39.5	6.1	-45.5	0.0	1.0	55.6	42.7	74.0	54.0	-18.4	-11.3	V
L5.540 CH 5260	9.8	52.0	41.4	39.5	6.1	-45.5	0.0	1.0	53.1	42.5	74.0	54.0	-20.9	-11.5	H
L0.520	9.8	48.2	36.0	37.9	4.8	-41.4	0.0	1.5	51.0	38.8	74.0	54.0	-23.0	-15.2	V
10.520	9.8	47.7	35.5	37.9	4.8	-41.4	0.0	1.5	50.5	38.3	74.0	54.0	-23.5	-15.7	H
15.780	9.8	54.9	42.8	39.0	6.2	-45.6	0.0	1.5	55.9	43.8	74.0	54.0	- <b>18.1</b>	-10.2	V
15.780	9.8	53.3	41.9	39.0	6.2	-45.6	0.0	1.5	54.3	42.9	74.0	54.0	-19.7	-11.1	H
CH 5320 4.550	9.8	57.5	56.5	32.9	2.9	-44.5	0.0	1.5	50.3	49.3	74.0	54.0	-23.7	-4.7	V
4.550	9.8 9.8	57.5	50.5	32.9	2.9	-44.5	0.0	1.5	48.4	49.5	74.0	54.0 54.0	-25.6	-4.7	H
10.640	9.8	48.4	36.2	38.0	4.8	-41.3	0.0	1.5	51.4	39.2	74.0	54.0	-22.6	-14.8	v
15.960	9.8	54.4	42.4	38.6	6.2	-45.7	0.0	1.5	55.0	43.0	74.0	54.0	- <b>19.0</b>	-11.0	V
10.640	9.8	48.0	35.8	38.0	4.8	-41.3	0.0	1.5	51.0	38.8	74.0	54.0	- <b>23.0</b>	-15.2	H
15.960	9.8	52.9	41.5	38.6	6.2	-45.7	0.0	1.5	53.5	42.1	74.0	54.0	-20.5	-11.9	H
	f Dist Read AF CL	Measurem Distance to Analyzer R Antenna F Cable Los	leading actor	y	_	Amp D Corr Avg Peak HPF	Average	Correc Field S d Peak	ct to 3 mete strength @ c Field Stre	3 m		Pk Lim Avg Mar	Peak Fiel Margin vs	Field Strengt d Strength L a. Average L a. Peak Limit	imit imit

Page 101 of 177

# 7.8.7. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHz FOR 5725 TO 5825 MHz BAND WITH 9 dBi INTEGRAL ANTENNA

# BANDEDGE (802.11a MODE, LOW CHANNEL, HORIZONTAL)

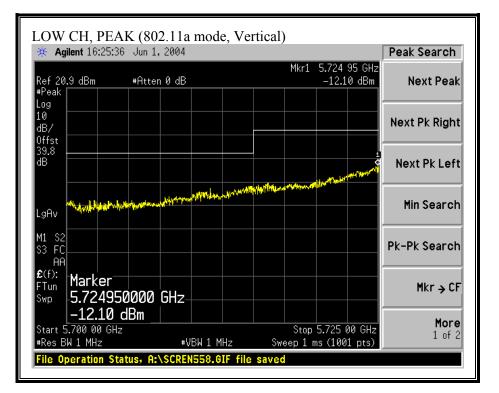


Page 102 of 177

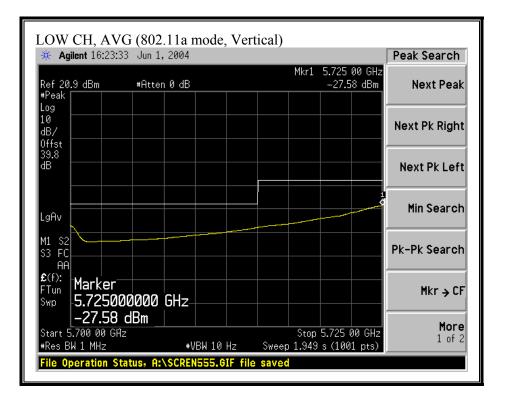
LOW CH, AVG (802		contal)	
🔆 🔆 Agilent 16:20:51 Jun 1,	, 2004		Peak Search
Ref 20.9 dBm #Atter #Peak	n0dB	Mkr1 5.725 00 GHz -42.50 dBm	Next Peak
Log 10 dB/ 0ffst			Next Pk Right
39.8 dB			Next Pk Left
LgAv			Min Search
M1 S2 S3 FC			Pk-Pk Search
£(f): FTun Swp 5.725000000 -42.50 dBm	GHz		Mkr → CF
Start 5.700 00 GHz #Res BW 1 MHz		Stop 5.725 00 GHz Sweep 1.949 s (1001 pts)	More 1 of 2
File Operation Status, A:	SCREN554.GIF file	saved	

Page 103 of 177

# BANDEDGE (802.11a MODE, LOW CHANNEL, VERTICAL)

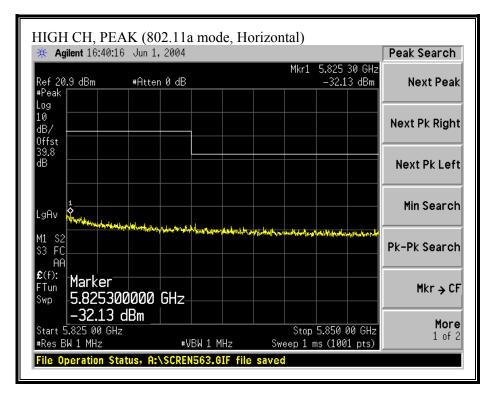


Page 104 of 177

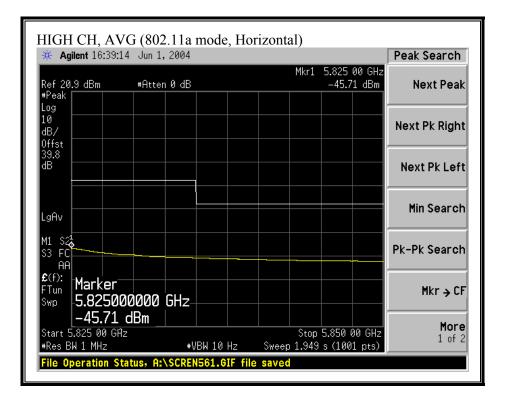


Page 105 of 177

## BANDEDGE (802.11a MODE, HIGH CHANNEL, HORIZONTAL)

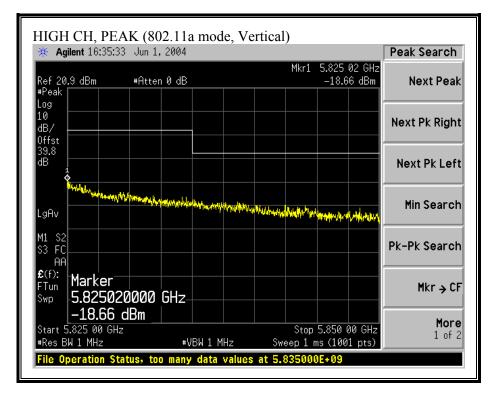


Page 106 of 177

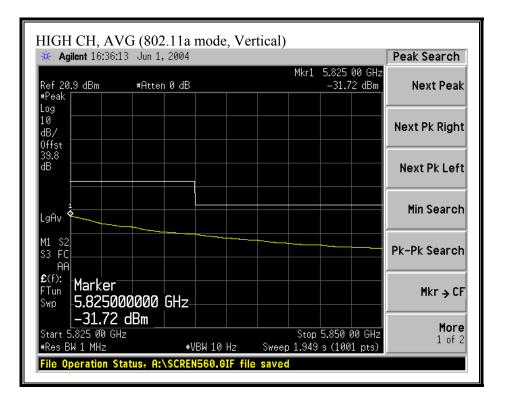


Page 107 of 177

# BANDEDGE (802.11a MODE, HIGH CHANNEL, VERTICAL)



Page 108 of 177



Page 109 of 177

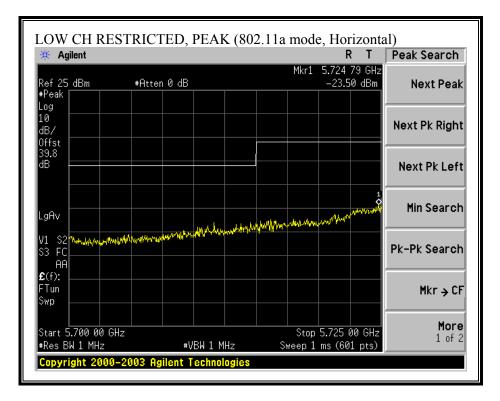
### HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE) WITH 9dBi PATCH ANTENNA

	uipmen	_	6		-1									Horn > 1	DCII.
	O Horn 1 5/N: 3245	1-18GHz 5@3m 🗸		ctrum An E4446A /	· ·	er 🗸		plifer 1- teq 9243	-26GHz 342	Pre-am	plifer 26-40	GHz		Horn >1	8GHz
− Hi Fred	quency Ca ft)		□ (4 ~ 6 ft)	🔽 (12 ft)			FCC 15	Limit	<b>-</b>		1 MHz Reso	<mark>asurements</mark> olution Bandv Bandwidth	width		easurements: tion Bandwidth andwidth
f	Dist		Read Avg.		CL	Amp	D Corr	HPF	Peak	Avg	Pk Lim			Avg Mar	Notes
GHz 1 5745	feet	dBuV	dBuV	dB/m	dB	dB	dB		dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	
43	9.8	59.4	58.4	32.8	2.8	-44.3	0.0	1.5	52.2	51.2	74.0	54.0	-21.8	-2.8	v
43	9.8	57.8	56.8	32.8	2.8	-44.3	0.0	1.5	50.6	49.6	74.0	54.0	-23.4	-4.4	Н
.490	9.8	48.0	36.2	38.7	5.1	-41.5	0.0	1.5	51.8	40.0	74.0	54.0	-22.2	-14.0	V
.490 I 5785	9.8	49.6	36.8	38.7	5.1	-41.5	0.0	1.5	53.4	40.6	74.0	54.0	-20.6	-13.4	H
15785 357	9.8	61.9	61.1	32.8	2.8	-44.3	0.0	1.5	54.7	53.9	74.0	54.0	-19.3	-0.1	v
357	9.8	58.1	56.9	32.8	2.8	-44.3	0.0	1.5	50.9	49.7	74.0	54.0	-23.1	-4.3	Н
.570	9.8	46.6	33.9	38.8	5.1	-41.6	0.0	1.5	50.4	37.7	74.0	54.0	-23.6	-16.3	V
.570 I 5805	9.8	45.8	33.2	38.8	5.1	-41.6	0.0	1.5	49.6	37.0	74.0	54.0	-24.4	-17.0	H
1 5805 383	9.8	58.4	56.9	32.8	2.8	-44.3	0.0	1.5	51.2	49.7	74.0	54.0	-22.8	-4.3	v
83	9.8	58.8	57.2	32.8	2.8	-44.3	0.0	1.5	51.6	50.0	74.0	54.0	- <b>22.4</b>	-4.0	H
.610	9.8	46.2	34.5	38.8	5.2	-41.6	0.0	1.5	50.0	38.3	74.0	54.0	- <b>24.0</b>	-15.7	V
.610	9.8	48.0	36.9	38.8	5.2	-41.6	0.0	1.5	51.8	40.7	74.0	54.0	-22.2	-13.3	Н
	f Measurement Frequency Amp					D Corr Avg Peak	Distance Average Calculate	Distance Correct to 3 meters Pk Lim Average Field Strength @ 3 m Avg Mar					Peak Field Margin vs	Field Strength d Strength Lin 5. Average Lin 5. Peak Limit	nit

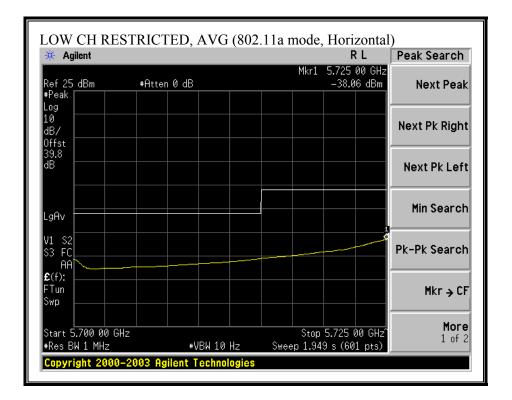
Page 110 of 177

# 7.8.8. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHz FOR 5725 TO 5825 MHz BAND WITH 9.5 dBi EXTERNAL ANTENNA

# RESTRICTED BAND & BANDEDGE (802.11a MODE, LOW CHANNEL, HORIZONTAL)

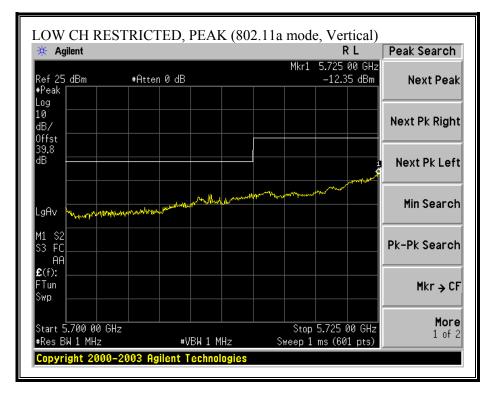


Page 111 of 177

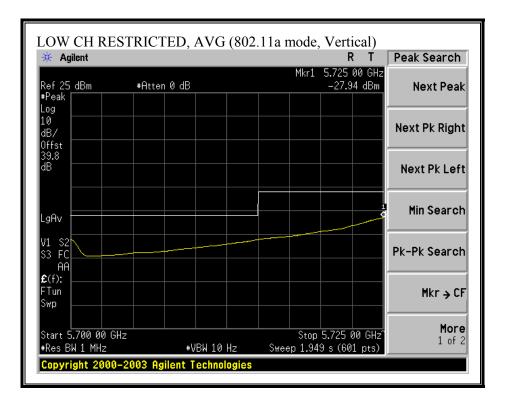


Page 112 of 177

### RESTRICTED BAND & BANDEDGE (802.11a MODE, LOW CHANNEL, VERTICAL)

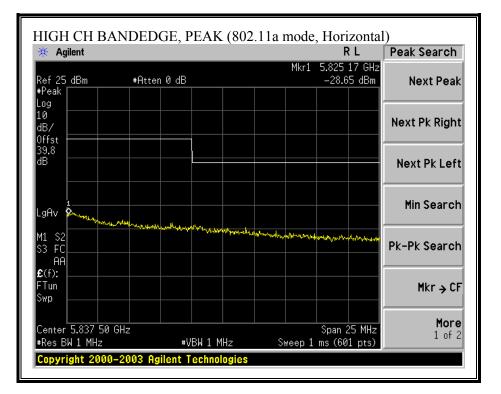


Page 113 of 177

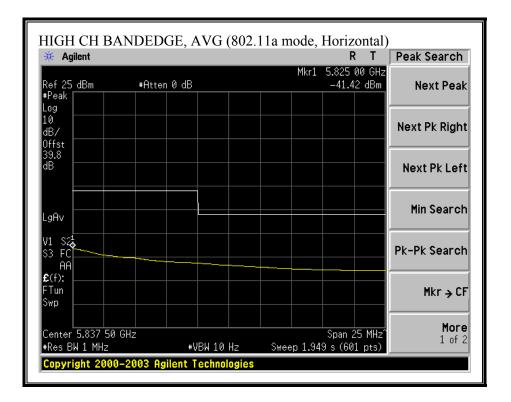


Page 114 of 177

### BANDEDGE (802.11a MODE, HIGH CHANNEL, HORIZONTAL)

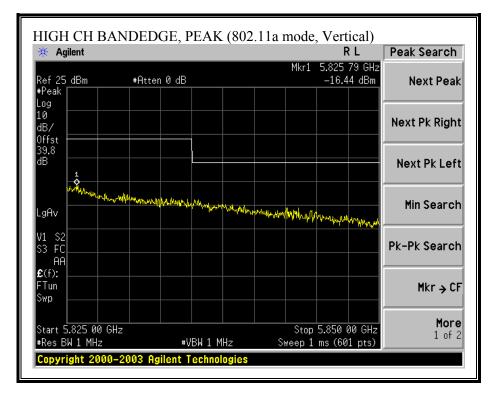


Page 115 of 177

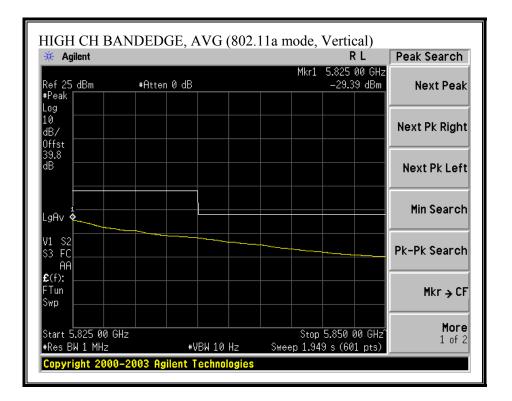


Page 116 of 177

## BANDEDGE (802.11a MODE, HIGH CHANNEL, VERTICAL)



Page 117 of 177



Page 118 of 177

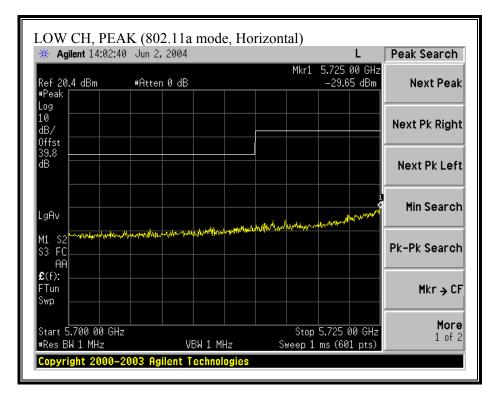
### HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE) WITH 9.5dBi EXTERNAL ANTENNA

Fest Eng Project # Compan EUT Des EUT M/I	gr:Chin   #:04u258 y:Cisco scrip.:Ko	Pang 86 odiak RM22 RM22A-K9	Services, Mo 2AQ 802.11a ( in AP1200 Ac	Cardbus	radio			i anten	na						
Mode Oj	per:Tx														
l'est Equ	ipment:	<u>.</u>										_			
EMCO	O Horn 1	-18GHz	Spec	trum Ana	lyzer		Pre-amp	difer 1-2	eGHz	Pre-amp	plifer 26-400	fer 26-40GHz Horn > 18GHz			Hz
T60; S	/N: 2238	@3m 🖕	Agilent F	24446A A	nalyzer	-	T87 Mit	eq 9243	42 🗸			-			-
I			I				I			1		_ '			
	quency Cab					1					Peak Meas			Average Mea	
<b>(</b> 2	ft)	✓ (2 ~ 3 ft)	$\Box (4 \sim 6 \text{ ft})$	✓ (12 ft)							1 MHz Reso 1MHz Video	lution Bandw Bandwidth	idth	1 MHz Resoluti 10Hz Video Ba	
5.8GHz ba	and					,									
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	HPF	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz	feet	dBuV	dBuV	dB/m	dB	dB	dB		dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	
	5745MI			22.0					(5.2		510	54.0	26.0		
4.343 11.490	9.8 9.8	56.0 46.8	53.5 34.7	32.8 38.7	2.7 4.9	-44.3 -41.5	0.0	0.0	47.2 49.8	44.7 37.7	74.0 74.0	54.0 54.0	-26.8 -24.2	-9.3 -16.3	V V
4.343	9.8	56.3	54.0	32.8	2.7	-44.3	0.0	0.0	47.5	45.2	74.0	54.0	-26.5	-8.8	Н
11.490	9.8	46.5	33.2	38.7	4.9	-41.5	0.0	1.0	49.5	36.2	74.0	54.0	-24.5	-17.8	Н
mid oh	5765M	U.a.													
4.357	9.8	56.5	55.4	32.8	2.7	-44.3	0.0	0.0	47.7	46.6	74.0	54.0	-26.3	-7.4	v
11.530	9.8	45.7	33.1	38.7	4.9	-41.5	0.0	1.0	48.7	36.1	74.0	54.0	-25.3	-17.9	v
1.357	9.8	58.4	56.4	32.8	2.7	-44.3	0.0	0.0	49.6	47.6	74.0	54.0	-24.4	-6.4	Н
1.530	9.8	46.5	34.0	38.7	4.9	-41.5	0.0	1.0	49.5	37.0	74.0	54.0	-24.5	-17.0	Н
high ch.	, 5805M	Hz													
4.383	9.8	55.7	53.2	32.9	2.7	-44.3	0.0	0.0	46.9	44.4	74.0	54.0	-27.1	-9.6	v
1.610	9.8	45.0	33.0	38.8	4.9	-41.6	0.0	1.0	48.0	36.0	74.0	54.0	-26.0	-18.0	v
1.383	9.8	58.0	57.1	32.9	2.7	-44.3	0.0	0.0	49.2	48.3	74.0	54.0	-24.8	-5.7	Н
1.610	9.8	46.1	33.5	38.8	4.9	-41.6	0.0	1.0	49.1	36.5	74.0	54.0	-24.9	-17.5	Н
Note: No	other em	issions were	detected above	thr syste	m noise	floor.									
				.,											
	f Dist Read AF CL	Measurem Distance to Analyzer F Antenna F Cable Loss	Reading actor	у		Amp D Corr Avg Peak HPF	Average	Correc Field S ed Peak	et to 3 mete Strength @ c Field Stre	3 m		Pk Lim Avg Mar	Peak Field Margin vs	Field Strength d Strength Lin s. Average Lin s. Peak Limit	nit

Page 119 of 177

# 7.8.9. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHz FOR 5725 TO 5825 MHz BAND WITH 7 dBi EXTERNAL ANTENNA

# BANDEDGE (802.11a MODE, LOW CHANNEL, HORIZONTAL)

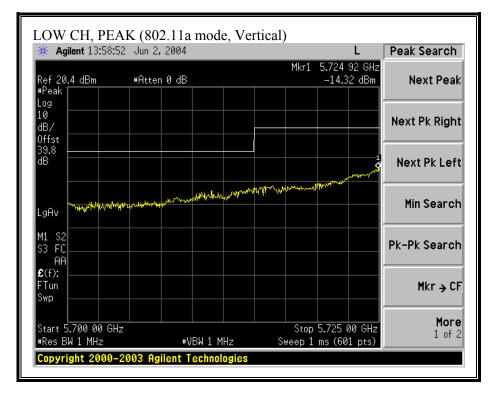


Page 120 of 177

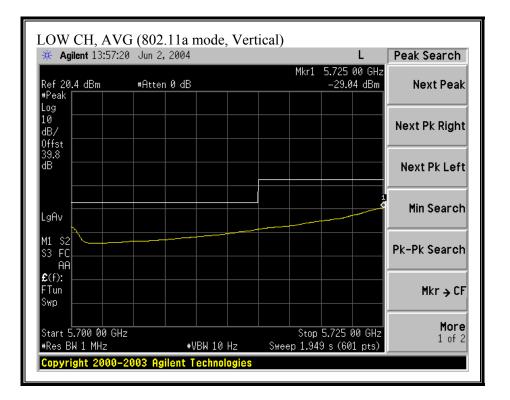
🔆 Agilent 14:03:2	9 Jun 2,2004		L	Peak Search
Ref 20.4 dBm #Peak	#Atten 0 dB	М	kr1 5.725 00 GHz -43.96 dBm	
dB/				Next Pk Right
dB				Next Pk Left
LgAv				Min Search
M1 S2 S3 FC AA				Pk-Pk Search
£(f): FTun Swp				Mkr → CF
Start 5.700 00 GH #Res BW 1 MHz			Gtop 5.725 00 GHz 1.949 s (601 pts)	<b>More</b> 1 of 2

Page 121 of 177

# BANDEDGE (802.11a MODE, LOW CHANNEL, VERTICAL)

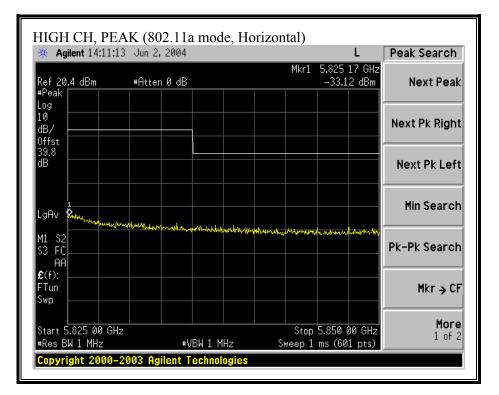


Page 122 of 177



Page 123 of 177

## BANDEDGE (802.11a MODE, HIGH CHANNEL, HORIZONTAL)

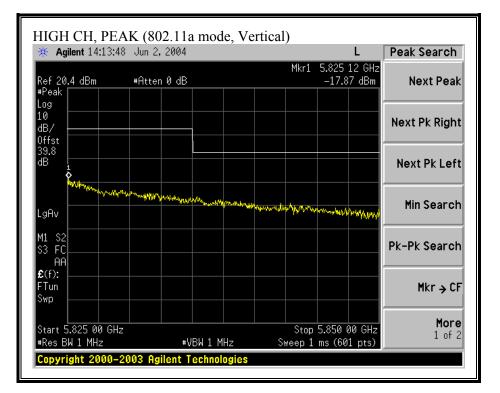


Page 124 of 177

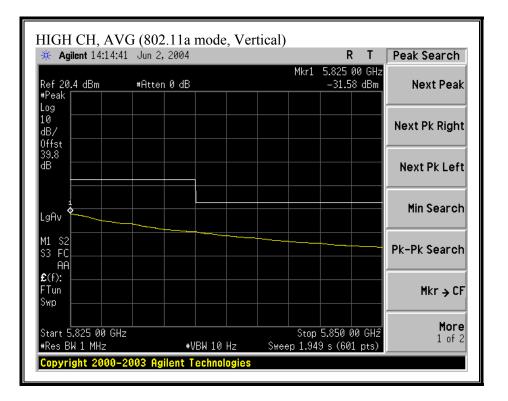
HIGH CH, AV		1110 <b>ue</b> , 110	112011tu1)	R	Т	Peak Search
Ref 20.4 dBm #Peak	#Atten 0 dB		Mkr1	5.825 00 -45.12		Next Peak
Log 10 dB/ 0ffst					,	Next Pk Right
dB						Next Pk Left
LgAv						Min Search
M1 S22 S3 FC AA				-		Pk-Pk Search
£(f): FTun Swp						Mkr → CF
Start 5.825 00 GH #Res BW 1 MHz		BW 10 Hz	Stop Sweep 1.94	5.850 00 9 s (601		<b>More</b> 1 of 2

Page 125 of 177

# BANDEDGE (802.11a MODE, HIGH CHANNEL, VERTICAL)



Page 126 of 177



Page 127 of 177

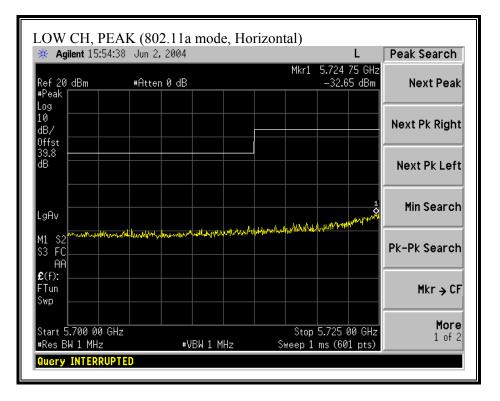
### HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE) WITH 7dBi PATCH ANTENNA

UT M/	scrip.:	Cisco													
UT M/	-		22A 802.11 a Ca	rdBue P	idio M	dula mist-	7dRi Patat-	Anten	18						
Loot T-		AIR-RM22A	-K9 IN AIR-AH				ratch ، س	- ment							
	rget:	FCC Class B													
Iode O	per:	TX, 5.8 Band	u												
est Equ	iipmen	<u>t:</u>													
EMCO	) Horn	1-18GHz	Spec	ctrum An	ıalyzer		Pre-am	plifer 1	l-26GHz	Pre-am	ıplifer 26-40	GHz		Horn > ]	18GHz
T59; S/	/N: 3245	@3m 🗸	Agilent	E4446A .	Analyz	er 🗸	T87 Mit	teq 924	342 🗸			•			-
	uency Ca	bles —				1				,	_	_			
Hi Freq			(4 ~ 6 ft)	✓ (12 P)				Limit				asurement: olution Bandy			deasurements: lution Bandwidth
L (2	••/	_ (∠ ~ 3 R)	,(+ ~ 0 II)	(12 ft,			FCC 15	.205				olution Bandy o Bandwidth		1 MHz Resolt 10Hz Video B	
	_	_		_	_	_							_		
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	HPF	1	Avg	Pk Lim	-	Pk Mar	Avg Mar	Notes
GHz	feet	dBuV	dBuV	dB/m	dB	dB	dB		dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	
H 5745 .343	9.8	59.4	58.1	32.8	2.8	-44.3	0.0	1.5	52.2	50.9	74.0	54.0	-21.8	-3.1	v
.343	9.8	55.7	53.9	32.8	2.8	-44.3	0.0	1.5	48.5	46.7	74.0	54.0	-25.5	-7.3	H
1.490	9.8	47.6	35.7	38.7	5.1	-41.5	0.0	1.5	51.4	39.5	74.0	54.0	-22.6	-14.5	V
	· · ·	47.4	35.1	38.7	5.1	-41.5	0.0	1.5	51.2	38.9	74.0	54.0	-22.8	-15.1	Н
	9.8		1		1	1	<u>.</u>				74.0	I	(		
H 5785			58 F	37 0		.11 2	0.0	1 4	52.4		14.0	54.0	_21.6	_27	v
H 5785 .357	9.8 9.8 9.8	59.6 54.9	58.5 52.6	32.8 32.8	2.8 2.8	-44.3 -44.3	0.0	1.5 1.5	52.4 47.7	51.3 45.4	74.0	54.0 54.0	-21.6 -26.3	-2.7 -8.6	V H
H 5785 .357 .357	9.8	59.6			å							·			
H 5785 .357 .357 1.570 1.570	9.8 9.8	59.6 54.9	52.6	32.8	2.8	-44.3	0.0	1.5	47.7	45.4	74.0	54.0	-26.3	- <mark>8.6</mark>	H
H 5785 .357 .357 1.570 1.570 1.570 H 5805	9.8 9.8 9.8 9.8	59.6 54.9 47.2 46.9	52.6 34.8 34.5	32.8 38.8 38.8	2.8 5.1 5.1	-44.3 -41.6 -41.6	0.0 0.0 0.0	1.5 1.5 1.5	47.7 51.0 50.7	45.4 38.6 38.3	74.0 74.0 74.0	54.0 54.0 54.0	-26.3 -23.0 -23.3	-8.6 -15.4 -15.7	H V H
1.490 2H 5785 .357 .357 1.570 1.570 2H 5805 .383	9.8 9.8 9.8 9.8 9.8	59.6 54.9 47.2 46.9 59.5	52.6 34.8 34.5 58.4	32.8 38.8 38.8 32.8	2.8 5.1 5.1 2.8	-44.3 -41.6 -41.6 -44.3	0.0 0.0 0.0	1.5 1.5 1.5	47.7 51.0 50.7 52.3	45.4 38.6 38.3 51.2	74.0 74.0 74.0 74.0	54.0 54.0 54.0 54.0	-26.3 -23.0 -23.3 -21.7	-8.6 -15.4 -15.7 -2.8	H V H V
H 5785 .357 .357 1.570 1.570 1.570 CH 5805 .383 .383	9.8 9.8 9.8 9.8 9.8 9.8 9.8	59.6 54.9 47.2 46.9 59.5 55.9	52.6 34.8 34.5 58.4 54.2	32.8 38.8 38.8 32.8 32.8	2.8 5.1 5.1 2.8 2.8	-44.3 -41.6 -41.6 -44.3 -44.3	0.0 0.0 0.0 0.0 0.0	1.5 1.5 1.5 1.5 1.5	47.7 51.0 50.7 52.3 48.7	45.4 38.6 38.3 51.2 47.0	74.0 74.0 74.0 74.0 74.0 74.0	54.0 54.0 54.0 54.0 54.0 54.0	-26.3 -23.0 -23.3 -21.7 -25.3	-8.6 -15.4 -15.7 -2.8 -7.0	H V H V H
H 5785 357 357 1.570 1.570 H 5805 383 383 1.610	9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8	59.6 54.9 47.2 46.9 59.5 55.9 47.3	52.6 34.8 34.5 58.4 54.2 35.4	32.8 38.8 38.8 32.8 32.8 32.8 38.8	2.8 5.1 5.1 2.8 2.8 5.2	-44.3 -41.6 -41.6 -44.3 -44.3 -41.6	0.0 0.0 0.0 0.0 0.0 0.0	1.5 1.5 1.5 1.5 1.5 1.5 1.5	47.7 51.0 50.7 52.3 48.7 51.1	45.4 38.6 38.3 51.2 47.0 39.2	74.0 74.0 74.0 74.0 74.0 74.0 74.0	54.0 54.0 54.0 54.0 54.0 54.0 54.0	-26.3 -23.0 -23.3 -21.7 -25.3 -22.9	-8.6 -15.4 -15.7 -2.8 -7.0 -14.8	H V H V H V
H 5785 .357 .357 1.570 1.570 H 5805 .383 .383 1.610	9.8 9.8 9.8 9.8 9.8 9.8 9.8	59.6 54.9 47.2 46.9 59.5 55.9	52.6 34.8 34.5 58.4 54.2	32.8 38.8 38.8 32.8 32.8	2.8 5.1 5.1 2.8 2.8	-44.3 -41.6 -41.6 -44.3 -44.3	0.0 0.0 0.0 0.0 0.0	1.5 1.5 1.5 1.5 1.5	47.7 51.0 50.7 52.3 48.7	45.4 38.6 38.3 51.2 47.0	74.0 74.0 74.0 74.0 74.0 74.0	54.0 54.0 54.0 54.0 54.0 54.0	-26.3 -23.0 -23.3 -21.7 -25.3	-8.6 -15.4 -15.7 -2.8 -7.0	H V H V H
H 5785 357 357 1.570 H 5805 383 383 1.610 1.610	9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8	59.6 54.9 47.2 46.9 59.5 55.9 47.3 47.0	52.6 34.8 34.5 58.4 54.2 35.4 35.2	32.8 38.8 38.8 32.8 32.8 38.8 38.8 38.8	2.8 5.1 5.1 2.8 2.8 5.2	-44.3 -41.6 -41.6 -41.6 -44.3 -44.3 -41.6 -41.6	0.0 0.0 0.0 0.0 0.0 0.0 0.0	1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	47.7 51.0 50.7 52.3 48.7 51.1	45.4 38.6 38.3 51.2 47.0 39.2	74.0 74.0 74.0 74.0 74.0 74.0 74.0	54.0 54.0 54.0 54.0 54.0 54.0 54.0 54.0	-26.3 -23.0 -23.3 -21.7 -25.3 -22.9 -23.2	-8.6 -15.4 -15.7 -2.8 -7.0 -14.8 -15.0	H V H V H V H
H 5785 357 357 1.570 1.570 H 5805 383 383 1.610 1.610	9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8	59.6 54.9 47.2 46.9 59.5 55.9 47.3 47.0 Measureme	52.6 34.8 34.5 58.4 54.2 35.4 35.2 ent Frequency	32.8 38.8 38.8 32.8 32.8 38.8 38.8 38.8	2.8 5.1 5.1 2.8 2.8 5.2	-44.3 -41.6 -41.6 -44.3 -44.3 -41.6 -41.6 -41.6 -41.6	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Preamp (	1.5 1.5 1.5 1.5 1.5 1.5 1.5 Gain	47.7 51.0 50.7 52.3 48.7 51.1 50.8	45.4 38.6 38.3 51.2 47.0 39.2 39.0	74.0 74.0 74.0 74.0 74.0 74.0 74.0	54.0 54.0 54.0 54.0 54.0 54.0 54.0 54.0	-26.3 -23.0 -23.3 -21.7 -25.3 -22.9 -23.2 Average H	-8.6 -15.4 -15.7 -2.8 -7.0 -14.8 -15.0	H V H V H V H
H 5785 .357 .357 1.570 1.570 H 5805 .383 .383 1.610 1.610	9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8	59.6 54.9 47.2 46.9 59.5 55.9 47.3 47.0 Measureme Distance to	52.6 34.8 34.5 58.4 54.2 35.4 35.2 ent Frequency O Antenna	32.8 38.8 38.8 32.8 32.8 38.8 38.8 38.8	2.8 5.1 5.1 2.8 2.8 5.2	-44.3 -41.6 -41.6 -41.3 -44.3 -41.6 -41.6 -41.6 -41.6 D Corr	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Distance	1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 Gain	47.7 51.0 50.7 52.3 48.7 51.1 50.8	45.4 38.6 38.3 51.2 47.0 39.2 39.0 ers	74.0 74.0 74.0 74.0 74.0 74.0 74.0	54.0 54.0 54.0 54.0 54.0 54.0 54.0 54.0	-26.3 -23.0 -23.3 -21.7 -25.3 -22.9 -23.2 Average F Peak Field	-8.6 -15.4 -15.7 -2.8 -7.0 -14.8 -15.0 Field Strength d Strength Li	H V H V H V h Limit imit
H 5785 .357 .357 1.570 1.570 H 5805 .383 .383 1.610 1.610	9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8	59.6 54.9 47.2 46.9 59.5 55.9 47.3 47.0 Measureme Distance to Analyzer R	52.6 34.8 34.5 58.4 54.2 35.4 35.2 ent Frequency o Antenna Leading	32.8 38.8 38.8 32.8 32.8 38.8 38.8 38.8	2.8 5.1 5.1 2.8 2.8 5.2	-44.3 -41.6 -41.6 -41.3 -44.3 -44.3 -41.6 -41.6 -41.6 -41.6 D Corr Avg	0.0 0.0 0.0 0.0 0.0 0.0 0.0 Distance Average	1.5 1.5 1.5 1.5 1.5 1.5 1.5 Gain Correct Field S	47.7 51.0 50.7 52.3 48.7 51.1 50.8 ect to 3 meter Strength @	45.4 38.6 38.3 51.2 47.0 39.2 39.0 ers 3 m	74.0 74.0 74.0 74.0 74.0 74.0 74.0	54.0 54.0 54.0 54.0 54.0 54.0 54.0 54.0	-26.3 -23.0 -23.3 -21.7 -25.3 -22.9 -23.2 Average F Peak Field Margin vs	-8.6 -15.4 -15.7 -2.8 -7.0 -14.8 -15.0 Field Strength Li s. Average Li	H V H V H h Limit imit
H 5785 357 357 1.570 H 5805 383 383 1.610 1.610	9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8	59.6 54.9 47.2 46.9 59.5 55.9 47.3 47.0 Measureme Distance to	52.6 34.8 34.5 58.4 55.4 35.2 ent Frequency Antenna Leading actor	32.8 38.8 38.8 32.8 32.8 38.8 38.8 38.8	2.8 5.1 5.1 2.8 2.8 5.2	-44.3 -41.6 -41.6 -41.3 -44.3 -41.6 -41.6 -41.6 -41.6 D Corr	0.0 0.0 0.0 0.0 0.0 0.0 0.0 Distance Average	1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 Correct Field S	47.7 51.0 50.7 52.3 48.7 51.1 50.8 ect to 3 mete Strength @ k Field Stre	45.4 38.6 38.3 51.2 47.0 39.2 39.0 ers 3 m	74.0 74.0 74.0 74.0 74.0 74.0 74.0	54.0 54.0 54.0 54.0 54.0 54.0 54.0 54.0	-26.3 -23.0 -23.3 -21.7 -25.3 -22.9 -23.2 Average F Peak Field Margin vs	-8.6 -15.4 -15.7 -2.8 -7.0 -14.8 -15.0 Field Strength d Strength Li	H V H V H h Limit imit

Page 128 of 177

# 7.8.10. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHz FOR 5725 TO 5825 MHz BAND WITH 6 dBi EXTERNAL ANTENNA

# BANDEDGE (802.11a MODE, LOW CHANNEL, HORIZONTAL)

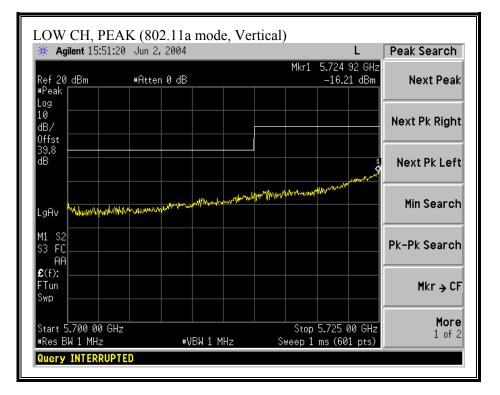


Page 129 of 177

Agilent 15:55	5:43 Jun 2, 2004			L	Peak Search
Ref 20 dBm #Peak	#Atten 0 dB		Mkr1	5.725 00 GHz -46.17 dBm	
Log 10 dB/					Next Pk Right
0ffst 39.8 dB					Next Pk Left
LgAv					Min Search
M1 S2 S3 FC AA				\$	Pk-Pk Search
£(f): FTun Swp					Mkr → CF
Start 5.700 00 0 #Res BW 1 MHz		 BW 10 Hz		5.725 00 GHz 9 s (601 pts)	<b>More</b> 1 of 2

Page 130 of 177

# BANDEDGE (802.11a MODE, LOW CHANNEL, VERTICAL)

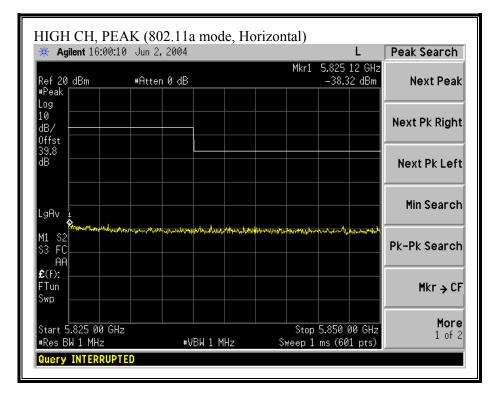


Page 131 of 177

🔆 Agilent 15:50:37	' Jun 2, 2004		L	Peak Search
Ref 20 dBm #Peak	#Atten 0 dB	Mkr1	5.725 00 GHz -31.13 dBm	Next Peak
-rean Log 10 dB/ Offst				Next Pk Right
dB				Next Pk Left
LgAv				Min Search
M1 \$2 \$3 FC AA £(f):				Pk-Pk Search
FTun Swp				Mkr → CF
Start 5.700 00 GHz #Res BW 1 MHz			5.725 00 GHz 9 s (601 pts)	More 1 of 2

Page 132 of 177

## BANDEDGE (802.11a MODE, HIGH CHANNEL, HORIZONTAL)

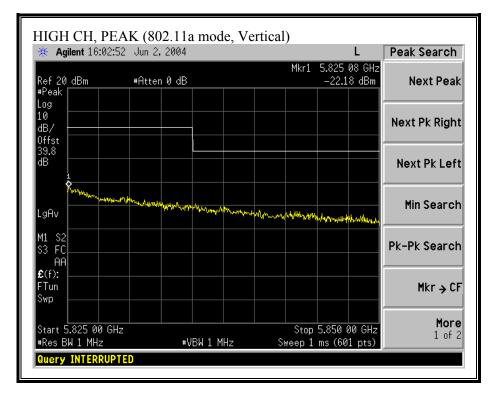


Page 133 of 177

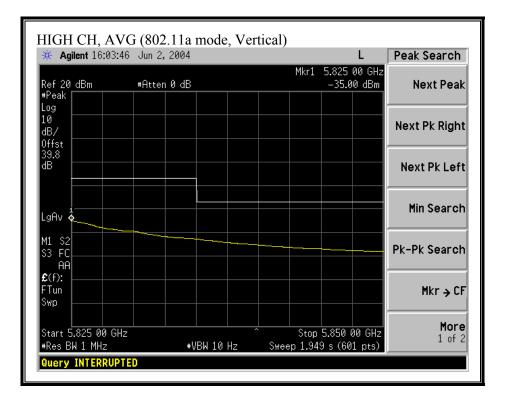
🔆 Agilent 15:59	:09 Jun 2, 2004			L	Peak Search
Ref 20 dBm #Peak	#Atten 0 dB		Mkr1	5.825 12 GHz -49.79 dBm	
HPeak Log 10 dB/					Next Pk Right
0ffst 39.8 dB					Next Pk Left
LgAv					Min Search
M1 S2 S3 FC <b>0</b>					Pk-Pk Search
АА £(f): FTun Swp					Mkr → CF
Start 5.825 00 G #Res BW 1 MHz		3W 10 Hz		5.850 00 GHz 9 s (601 pts)	More 1 of 2

Page 134 of 177

# BANDEDGE (802.11a MODE, HIGH CHANNEL, VERTICAL)



Page 135 of 177



Page 136 of 177

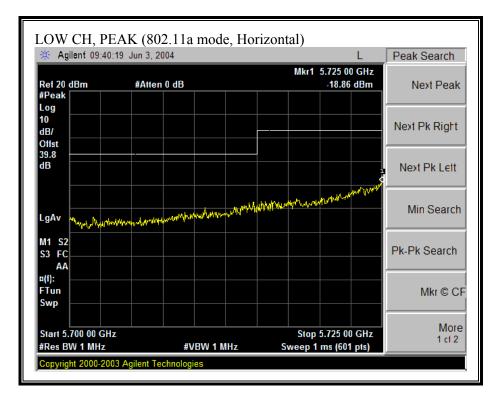
### HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE) WITH 6dBi OMNI ANTENNA

est Eq	uipmen	<u>t:</u>														
	O Horn			ctrum An	-				-26GHz	Pre-am	plifer 26-40	GHz	1	Horn >	18GHz	
	5/N: 3245	-	Agilent	E4446A /	analyzo	er, 🔺	T87 Mi	teq 924.	342 🗸			•			•	
Hi Free	quency Ca ft)		□ (4 ~ 6 ft)	🗹 (12 ft)			FCC 15	Limit	-		1 MHz Reso	asurements olution Bandv Bandwidth	width			
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	HPF	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes	
GHz	feet	dBuV	dBuV	dB/m	dB	dB	dB		dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB		
H 5745 .343	9.8	59.7	58.7	32.8	2.8	-44.3	0.0	1.5	52.5	51.5	74.0	54.0	-21.5	-2.5	v	
.343	9.8	53.2	50.6	32.8	2.8	-44.3	0.0	1.5	46.0	43.4	74.0	54.0	- <b>28.0</b>	-10.6	H	
1.490	9.8	45.3	33.5	38.7	5.1	-41.5	0.0	1.5	49.1	37.3	74.0	54.0	-24.9	-16.7	V	
1.490 H 5785	9.8	47.4	35.0	38.7	5.1	-41.5	0.0	1.5	51.2	38.8	74.0	54.0	-22.8	-15.2	H	
.357	9.8	59.7	58.6	32.8	2.8	-44.3	0.0	1.5	52.5	51.4	74.0	54.0	-21.5	-2.6	v	
.357	9.8	53.4	50.5	32.8	2.8	-44.3	0.0	1.5	46.2	43.3	74.0	54.0	-27.8	-10.7	H	
1.570	9.8	46.8	34.3	38.8	5.1	-41.6	0.0	1.5	50.6	38.1	74.0	54.0	-23.4	-15.9	<u>V</u>	
1.570 H 5805	9.8	47.2	34.5	38.8	5.1	-41.6	0.0	1.5	51.0	38.3	74.0	54.0	-23.0	-15.7	H	
.383	9.8	59.1	57.7	32.8	2.8	-44.3	0.0	1.5	51.9	50.5	74.0	54.0	-22.1	-3.5	v	
.383	9.8	55.8	53.9	32.8	2.8	-44.3	0.0	1.5	48.6	46.7	74.0	54.0	-25.4	-7.3	H	
1.610	9.8	48.0	35.2	38.8	5.2	-41.6	0.0	1.5	51.8	39.0	74.0	54.0	-22.2	-15.0	V	
1.610	9.8	47.5	34.7	38.8	5.2	-41.6	0.0	1.5	51.3	38.5	74.0	54.0	-22.7	-15.5	H	
	f Measurement Frequency Amp Dist Distance to Antenna D Corr Read Analyzer Reading Avg AF Antenna Factor Peak CL Cable Loss HPF						Distance Average Calculate	reamp Gain Avg Lim Average Fie istance Correct to 3 meters Pk Lim Peak Field verage Field Strength @ 3 m Avg Mar Margin vs. A alculated Peak Field Strength Pk Mar Margin vs. F iah Pass Filter					d Strength L . Average L	imit imit		

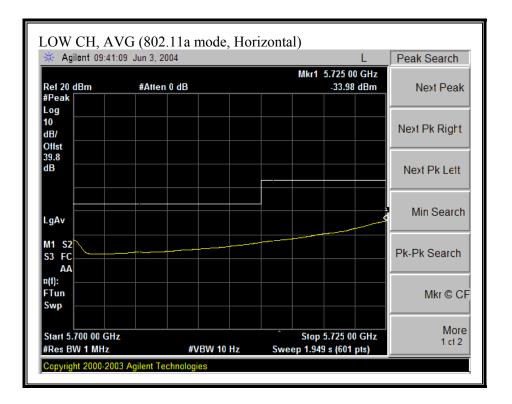
Page 137 of 177

# 7.8.11. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHz FOR 5725 TO 5825 MHz BAND WITH 4.5 dBi EXTERNAL ANTENNA

# BANDEDGE (802.11a MODE, LOW CHANNEL, HORIZONTAL)

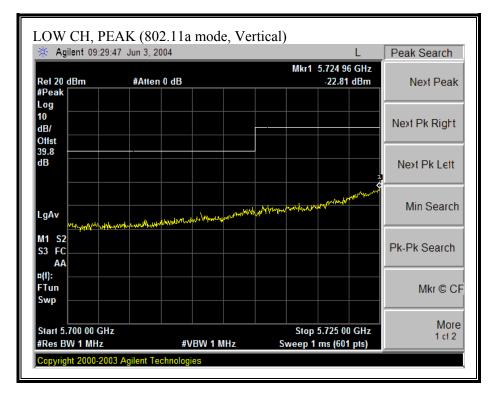


Page 138 of 177



Page 139 of 177

# BANDEDGE (802.11a MODE, LOW CHANNEL, VERTICAL)

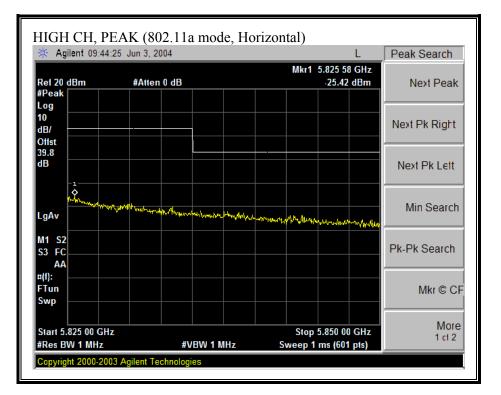


Page 140 of 177

🔆 Agilent 09:28	:20 Jun 3, 2004			L	Peak Search
Ref 20 dBm	#Atten 0 dB		Mkr1 5.725 00 -37.83		Next Peak
#Peak Log					
10 dB/					Next Pk Right
Offst 39.8 dB					Next Pk Lett
LgAv					Min Search
M1 S2 S3 FC					Pk-Pk Search
#(f): FTun Swp					Mkr © CF
Start 5.700 00 GH #Res BW 1 MHz	z #VBW 10	П H-7С.,	Stop 5.725 00 veep 1.949 s (601 p		More 1 ct 2

Page 141 of 177

# BANDEDGE (802.11a MODE, HIGH CHANNEL, HORIZONTAL)

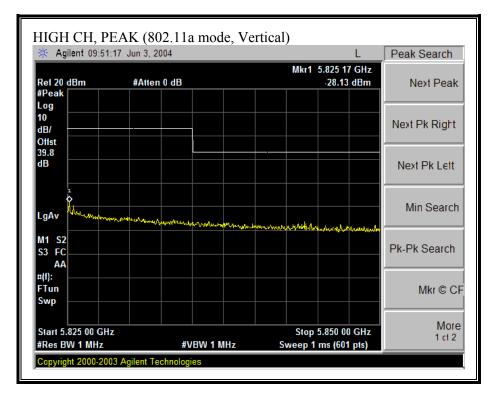


Page 142 of 177

🔆 Agilent 09:45	:33 Jun 3, 2004			L	Peak Search
Ref 20 dBm #Peak	#Atten 0 dB		MI	kr1 5.825 00 GHz -38.43 dBm	Next Peak
Log 10 dB/					Next Pk Right
Ollst 39.8 dB					Next Pk Lett
LgAv 1					Min Search
V1 S2 S3 FC AA					Pk-Pk Search
¤(1): FTun Swp					Mkr © CF
Start 5.825 00 GH #Res BW 1 MHz		/BW 10 Hz		lop 5.850 00 GHz .949 s (601 pts)	More 1 ct 2

Page 143 of 177

# BANDEDGE (802.11a MODE, HIGH CHANNEL, VERTICAL)



Page 144 of 177

🔆 Agilent 09:49:	11 Jun 3, 2004			L	Peak Search
Ref 20 dBm #Peak	#Atten 0 dB		Mkr1	5.825 00 GHz -44.17 dBm	Next Peak
Log					
10 dB/					Next Pk Right
Ollst 39.8 dB					Next Pk Lett
LgAv					Min Search
M1 S2 S3 FC AA					Pk-Pk Search
¤(1): FTun					Mkr © CF
Swp Start 5.825 00 GHz			Stôn	5.850 00 GHz	More
#Res BW 1 MHz		VBW 10 Hz		19 s (601 pts)	1 ct 2

Page 145 of 177

#### HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE) WITH 4.5dBi OMNI ANTENNA

CUT M/ Cest Tai Aode O	rget: )per:	FCC Class B TX, 5.8 Band		. 1200 AU	- 511-30 F	0111									
EMC	O Horn	1-18GHz	Spee	ctrum An	alyzer		Pre-am	plifer l	-26GHz	Pre-am	plifer 26-40	GHz		Horn >1	8GHz
T59; S	5/N: 324	5@3m 🗸	Agilent	E4446A .	Analyze	er 🗸	T87 Mi	teq 924	342 🗸			-			-
Hi Fred	quency Ca ft)		□ (4 ~ 6 ft)	🔽 (12 ft)	)		FCC 15	Limit	-		Peak Mea 1 MHz Reso 1MHz Video		width		leasurements: ition Bandwidth andwidth
f	Dist	1	Read Avg.		CL	Amp	D Corr	HPF	Peak	Avg	Pk Lim	Avg Lim		Avg Mar	Notes
GHz	feet	dBuV	dBuV	dB/m	dB	dB	dB		dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	
H 5745 .343	9.8	58.0	56.7	32.8	2.8	-44.3	0.0	1.5	50.8	49.5	74.0	54.0	-23.2	-4.5	v
.343	9.8	53.8	52.2	32.8	2.8	-44.3	0.0	1.5	46.6	45.0	74.0	54.0	-27.4	-9.0	H
1.490	9.8	47.5	35.1	38.7	5.1	-41.5	0.0	1.5	51.3	38.9	74.0	54.0	-22.7	-15.1	V
1.490	9.8	47.2	34.8	38.7	5.1	-41.5	0.0	1.5	51.0	38.6	74.0	54.0	-23.0	-15.4	H
CH 5785	9.8	58.7	57.1	32.8	2.8	-44.3	0.0	1.5	51.5	49.9	74.0	54.0	-22.5	-4.1	v
.357 .357	9.8 9.8	58.7	57.1	32.8	2.8	-44.3 -44.3	0.0	1.5	51.5 47.1	49.9	74.0	54.0 54.0	-22.5 -26.9	-4.1 -8.6	V H
1.570	9.8	47.9	35.0	38.8	5.1	-44.5	0.0	1.5	51.7	38.8	74.0	54.0	-20.9	-15.2	V
1.570 H 5805	9.8	47.7	34.7	38.8	5.1	-41.6	0.0	1.5	51.5	38.5	74.0	54.0	-22.5	-15.5	H
.383	9.8	58.9	57.8	32.8	2.8	-44.3	0.0	1.5	51.7	50.6	74.0	54.0	-22.3	-3.4	v
.383	9.8	55.1	53.0	32.8	2.8	-44.3	0.0	1.5	47.9	45.8	74.0	54.0	-26.1	-8.2	H
1.610	9.8 9.8	48.2 47.8	35.2 34.5	38.8 38.8	5.2 5.2	-41.6 -41.6	0.0	1.5 1.5	52.0 51.6	39.0 38.3	74.0 74.0	54.0 54.0	-22.0 -22.4	-15.0 -15.7	 Н
	f Dist Read AF CL	Measurem Distance to Analyzer R Antenna Fa Cable Loss	Reading actor	y		Amp D Corr Avg Peak HPF	Average	Corre Field S d Peal	ct to 3 mete Strength @ k Field Stre	3 m		Pk Lim Avg Mar	Peak Fiel Margin vs	Field Strength d Strength Lin Average Lin Peak Limit	mit

Page 146 of 177

## 7.8.12. CO-LOCATED TRANSMITTER RADIATED EMISSIONS

#### SUPPLEMENTAL TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna The dominant transmitter is set to the worst case channel. The spurious emissions performance of the dominant transmitter is investigated as the settings of the non-dominant transmitter are varied. The spectrum is searched for intermodulation products. Worst-case results are reported.

#### **RESULTS**

No non-compliance noted:

The 802.11 b/g radio is the dominant transmitter, and the 802.11 b mode is the dominant mode.

#### WORST-CASE RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

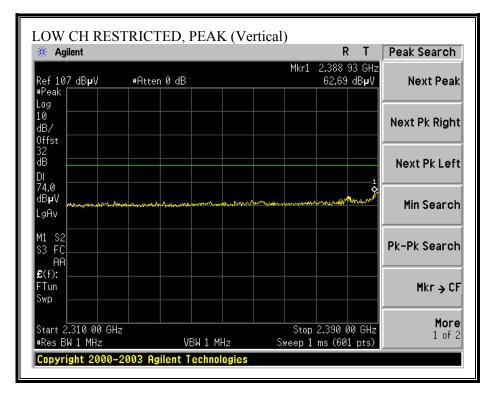
K Agilent	SIKICIED, I	PEAK (Horiz	zontal)	RL	Peak Search
			Mbr 1 - 2	389 33 GHz	I eak Sear off
Ref 107 dB <b>µ</b> V	#Atten 0 dB			509 55 GHZ 52.09 dB <b>µ</b> V	Next Peak
Peak .og					
.0 187					Next Pk Right
)ffst 32 IB					Next Pk Left
DI 74.0 HBµV			horm have a described	1	
.gAv	ever en anne en	~_efrin-aft-fildflaftynniùistadi 19 <sup></sup>		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Min Search
/1 \$2 53 FC AA					Pk-Pk Search
Cf):					
Tun Swp					Mkr → CF
2 21 0 00 C					More
Start 2.310 00 GH Res BW 1 MHz		BW 1 MHz	Stop 2. Sweep 1 ms	390 00 GHz (601 nts)	1 of 2

Page 147 of 177

🔆 Agilent				L	Peak Search
Ref 107 dB <b>µ</b> V #Peak	#Atten 0 dB			360 00 GHz 8.97 dBµV	Next Peak
Log 10 dB/ 0ffst					Next Pk Right
dB DI 54.0					Next Pk Left
dBµV					Min Search
V1 S2 S3 FC AA £(f):					Pk-Pk Search
FTun Swp					Mkr → CF
Start 2.310 00 GH #Res BW 1 MHz		.0 Hz Sw	Stop 2.3 eep 6.238 s	390 00 GHz (601 pts)	More 1 of 2

Page 148 of 177

#### WORST-CASE RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

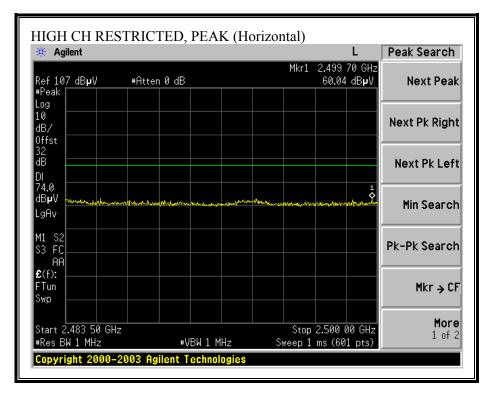


Page 149 of 177

🔆 Agilent				L	Trace
	#Atten 0 dB		Mkr1	2.390 00 47.15 dB	
#Peak Log					-
10 dB/					Clear Write
Offst 32 dB					Hey Hold
DI 54.0					Max Hold
dB <b>µ</b> V					Min Hold
LgAv					4 4
V1 S2 S3 FC AA					View
<b>£</b> (f):					- Dianti
Swp					Blank
Start 2.310 00 GHz			<u> </u>	2.390 00 0	
#Res BW 1 MHz	<b>#</b> I	/BW 10 Hz			

Page 150 of 177

#### WORST-CASE RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

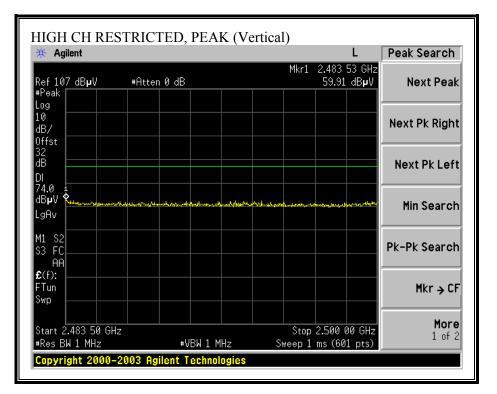


Page 151 of 177

HIGH CH RES	STRICTED, AV	G (Horizontal)		
🔆 Agilent			L	Peak Search
Ref 107 dB <b>µ</b> V #Peak	#Atten 0 dB	Mkr	1 2.493 24 GHz 47.65 dB <b>µ</b> V	Next Peak
Log 10 dB/ Offst				Next Pk Right
32 dB DI				Next Pk Left
54.0 dBµV LgAv				Min Search
V1 S2 S3 FC AA £(f):				Pk-Pk Search
E(T). FTun Swp				Mkr → CF
Start 2.483 50 GH: #Res BW 1 MHz	#VBW 10	)Hz Sweep 1.2	p 2.500 00 GHz^ 287 s (601 pts)	<b>More</b> 1 of 2
Copyright 2000-	2003 Agilent Techno	ligiés		

Page 152 of 177

#### WORST-CASE RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



Page 153 of 177

HIGH CH RES	STRICTED, A	AVG (Ver	tical)		
🔆 Agilent				L	Peak Search
Ref 107 dBµV #Peak	#Atten 0 dB		Mkr1	2.483 50 GHz 47.00 dBµV	
Log 10 dB/ Offst					Next Pk Right
32 dB DI					Next Pk Left
54.0 dBµV LgAv					Min Search
V1 S2 S3 FC AA					Pk-Pk Search
£(f): FTun Swp					Mkr → CF
Start 2.483 50 GHz #Res BW 1 MHz		W 10 Hz	Stop Sweep 1.28	2.500 00 GHz 7 s (601 pts)	More 1 of 2
Copyright 2000-3	2003 Agilent Te	chnologies			

Page 154 of 177

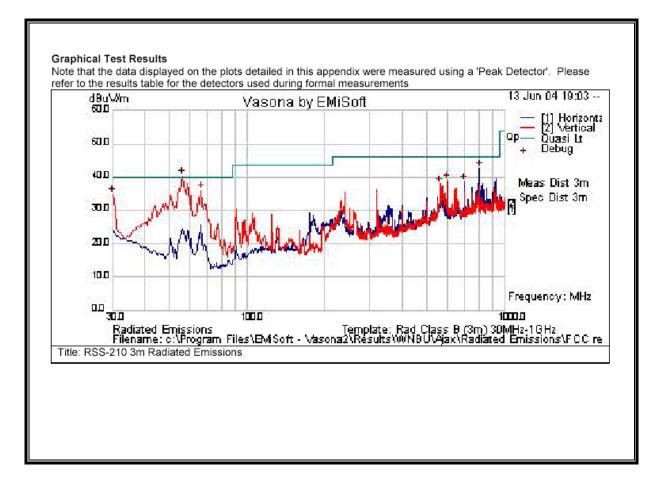
#### WORST-CASE HARMONICS AND SPURIOUS EMISSIONS

Test Eng Project # Company EUT De EUT M/ Test Tan Mode O <u>Test Eq</u> u	#: sscrip.: 'N: rget: per:	AIR-RM22A FCC Class B TX, 11b mod	2A 802.11 a Ca K9 IN AIR-AF le and a WLAN	P1200 AC	CESS F	OINT	4.5dBi Omr	ii Anten	ina						
	O Horn		Snec	ctrum An	alvzer		Pre-am	-1101	accil-	Des est	plifer 26-40	CII-		Horn >	18GHz
	/N: 2238		Agilent l		-	er 🗸	T86 Mi			rre-am	piner 20-40	•			•
□ (2	quency Ca		□ (4 ~ 6 ft)	🔽 (12 ft)	)		FCC 15	Limit	•	I	1 MHz Reso	asurement olution Bandwo Bandwidth			Measurements: lution Bandwidth Bandwidth
Codiak f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	HPF	Peak	Avg	Pk Lim		Pk Mar	Avg Mar	Notes
GHz	feet	dBuV	dBuV	dB/m	dB	dB	dB		dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	
Aid Chan .343	nel 2437 9.8	MHz 57.8	54.7	32.8	2.7	-44.6	0.0	1.5	50.3	47.2	74.0	54.0	-23.7	-6.8	v
.874	9.8	60.9	51.0	33.1	2.9	-45.1	0.0	1.5	53.4	43.5	74.0	54.0	- <b>20.6</b>	-10.5	V
311	9.8	54.0	42.0	36.2	3.7	-45.3	0.0	1.5	50.0	38.0	74.0	54.0	-24.0	-16.0	v
343	9.8	55.0	52.0	32.8	2.7	-44.6	0.0	1.5	47.5	44.5	74.0	54.0	-26.5	-9.5	H
.874 .311	9.8 9.8	56.9 52.3	46.3 41.6	33.1 36.2	2.9 3.7	-45.1 -45.3	0.0	1.5 1.5	49.4 48.3	38.8 37.6	74.0 74.0	54.0 54.0	-24.6 -25.7	-15.2 -16.4	H
	7.0	04.0	41.0	30.4	3./	-43.3	0.0	1.3	40.0	37.0	/4.0	34.0	-40./	-10.4	п
						1									
Note: No o	other emi	ssions were	detected above	the syste	m noise	e floor.									
		Measureme Distance to Analyzer R Antenna Fa Cable Loss	eading actor	y		Amp D Corr Avg Peak HPF	Average	Correc Field S d Peak	et to 3 mete strength @ c Field Stre	3 m	1	Pk Lim Avg Mar	Peak Fiel Margin vs	Field Strengt d Strength L Average L Peak Limit	imit imit

Page 155 of 177

### 7.8.13. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

#### SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)



Page 156 of 177

	dBuV	Loss dB		dBuV/m					dBuV/m			
30	5.3	0.6	18.6	24.6	Qp	V	98	359	40	-15.4	Pass	
56	29.5	0.8	7	37.4	Qp	v	123	204	40	-2.6	Pass	
66.272	24.8	0.9	6.6	32.4	Qp	v	163	86	40	-7.6	Pass	
560	16.5	2.5	19.2	38.2	Qp	v	98	66	46	-7.8	Pass	
600	15.2	2.6	19	36.8	Qp	v	104	96	46	-9.2	Pass	
700	14.4	2.8	19.3	36.4	Qp	Н	307	62	46	-9.6	Pass	
800	16.5	3	20.1	39.6	Qp	Н	198	220	46	-6.4	Pass	

Page 157 of 177

## 7.9. POWERLINE CONDUCTED EMISSIONS

### <u>LIMIT</u>

\$15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted I	.imit (dBuV)
	Quasi-peak	Average
0.15-0.5	66 to 56 °	56 to 46 *
0.5-5	56	46
5-30	60	50

Decreases with the logarithm of the frequency.

#### TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The resolution bandwidth is set to 9 kHz for both peak detection and quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

Line conducted data is recorded for both NEUTRAL and HOT lines.

#### **RESULTS**

No non-compliance noted:

Page 158 of 177

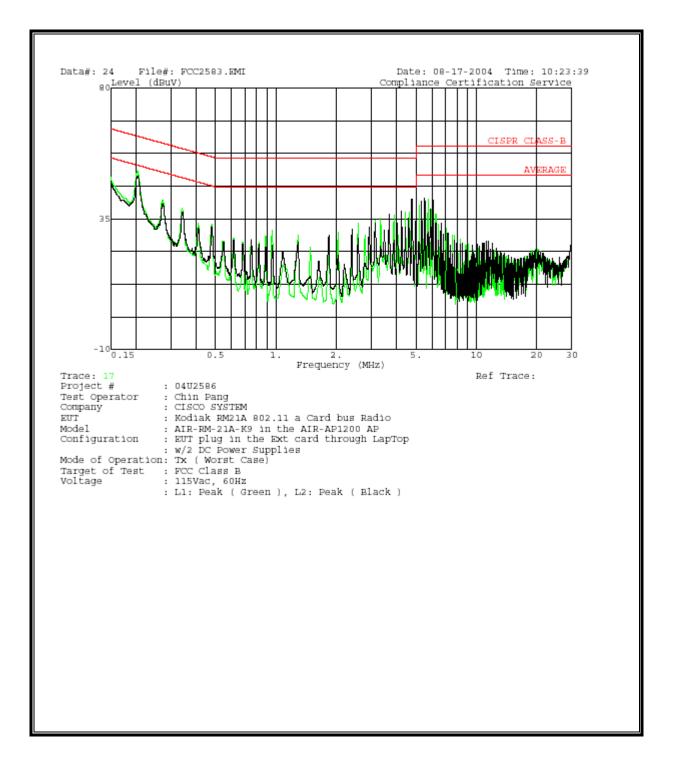
Т

#### 6 WORST EMISSIONS (AC Adapter)

		CONDUC	TED EMISS	IONS D.	ATA (115	VAC 60H	z)		
Freq.		Reading		Closs	Limit	EN_B	Marg	çin	Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1/L2
0.21	51.11			0.00	64.43	54.43	-13.32	-3.32	L1
0.27	41.30			0.00	62.49	52.49	-21.19	-11.19	L1
5.74	41.90			0.00	60.00	50.00	-18.10	-8.10	L1
0.21	49.56			0.00	64.43	54.43	-14.87	-4.87	L2
4.77	41.80			0.00	56.00	46.00	-14.20	-4.20	L2
6.07	41.52			0.00	60.00	50.00	-18.48	-8.48	L2
6 Worst I	Data								

Page 159 of 177

#### LINE 1 AND LINE 2 RESULTS (AC Power)



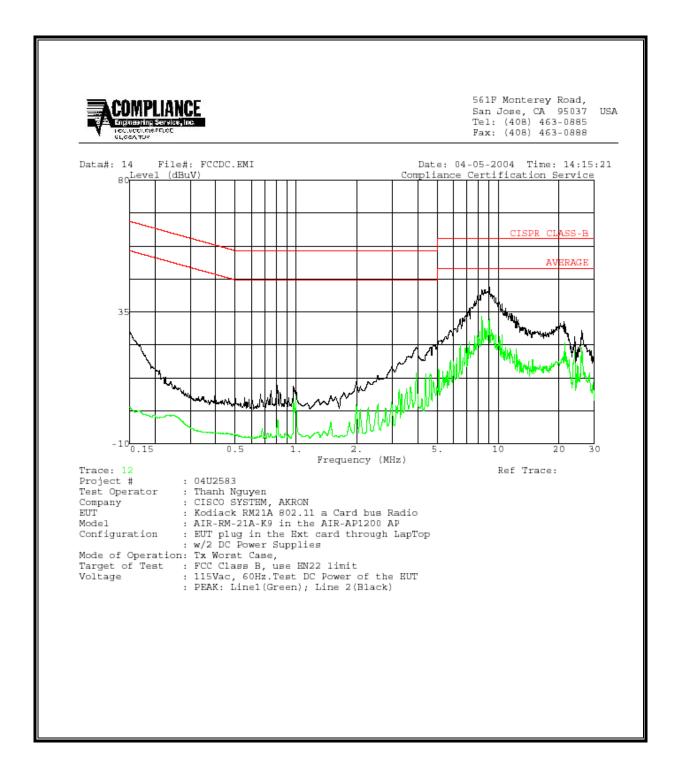
Page 160 of 177

#### 6 WORST EMISSIONS (DC Power)

		CONDUC	TED EMISS	SIONS D	OATA (11:	5VAC 60E	Iz)		
Freq.		Reading		Closs	Limit	FCC_B	Mar	gin	Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
8.73	42.88			0.00	60.00	50.00	-17.12	-7.12	L1
20.06	31.62			0.00	60.00	50.00	-28.38	-18.38	L1
0.15	27.86			0.00	66.00	56.00	-38.14	-28.14	L1
9.06	43.40			0.00	60.00	50.00	-16.60	-6.60	L2
21.15	31.72			0.00	60.00	50.00	-28.28	-18.28	L2
0.15	28.56			0.00	66.00	56.00	-37.44	-27.44	L2
6 Worst I	Data								

Page 161 of 177

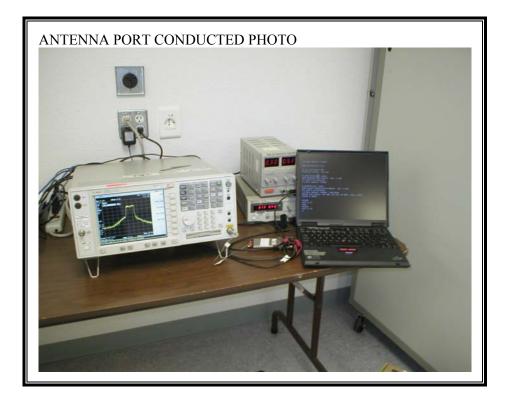
#### LINE 1 AND LINE 2 RESULTS (DC Power)



Page 162 of 177

## 8. SETUP PHOTOS

#### ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

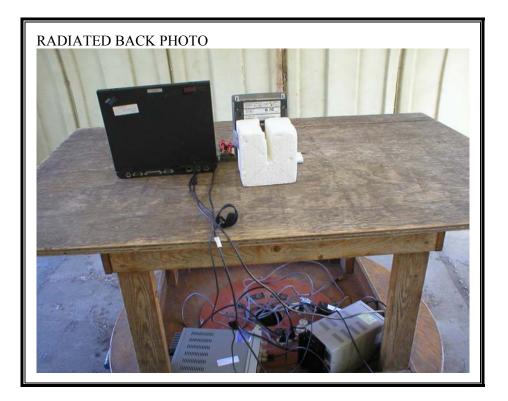


Page 163 of 177

#### RADIATED RF MEASUREMENT SETUP WITH INTERNAL 9 dBi PATCH ANTENNA

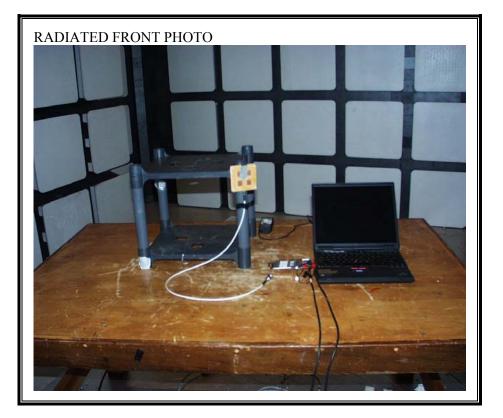


Page 164 of 177



Page 165 of 177

#### RADIATED RF MEASUREMENT SETUP WITH EXTERNAL 9.5 dBi PATCH ANTENNA



Page 166 of 177

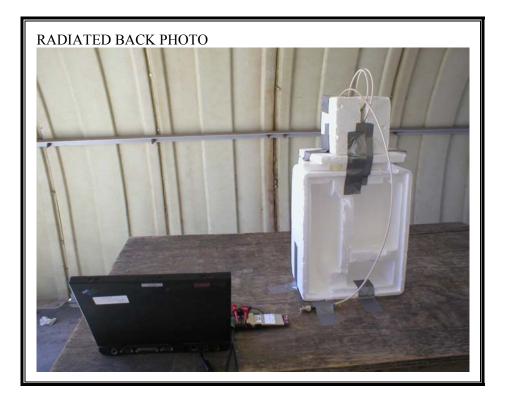


Page 167 of 177

#### RADIATED RF MEASUREMENT SETUP WITH EXTERNAL 7 dBi PATCH ANTENNA



Page 168 of 177

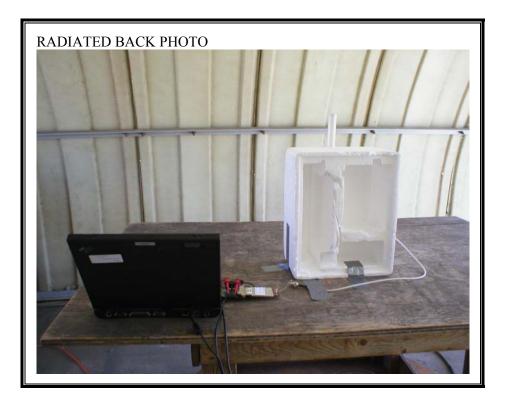


Page 169 of 177

#### RADIATED RF MEASUREMENT SETUP WITH EXTERNAL 6 dBi OMNI ANTENNA



Page 170 of 177



Page 171 of 177

#### RADIATED RF MEASUREMENT SETUP WITH EXTERNAL 4.5 dBi OMNI ANTENNA

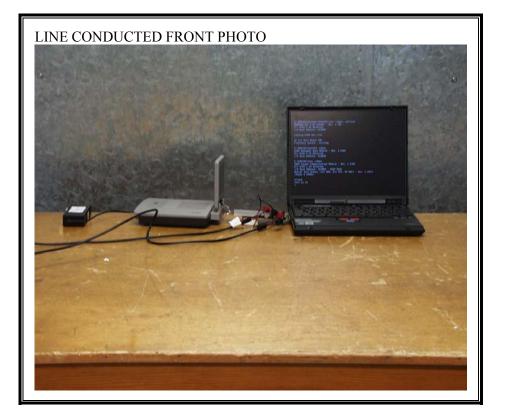


Page 172 of 177



Page 173 of 177

#### POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP WITH AC ADAPTER

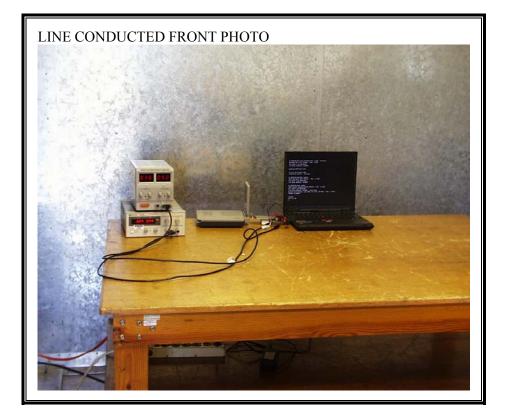


Page 174 of 177



Page 175 of 177

#### POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP WITH DC POWER



Page 176 of 177



# **END OF REPORT**

Page 177 of 177