

FCC CFR47 PART 15 SUBPART E **CLASS II PERMISSIVE CHANGE TEST REPORT** FOR

2.4 & 5 GHZ 802.11 MINICARD

MODEL NUMBER: AR5BXB72-L

FCC ID: PPD-AR5BXB72-L

REPORT NUMBER: 07U11066-1, Revision B1

ISSUE DATE: JUNE 26, 2007

Prepared for **ATHEROS COMMUNICATIONS, INC.** 5480 GREAT AMERICA PARKWAY SANTA CLARA, CA 95054, USA

Prepared by **COMPLIANCE CERTIFICATION SERVICES 47173 BENICIA STREET** FREMONT, CA 94538, USA **TEL: (510) 771-1000** FAX: (510) 661-0888



NVLAP LAB CODE 200065-0

Revision History

	Issue		
Rev.	Date	Revisions	Revised By
	05/15/07	Initial issue based on CCS 06U10382-1C FCC UNII C2PC Report, modified model and FCC ID, added Closing Time close-up plot.	M. Heckrotte
В	06/21/07	Revised Appendix A.	M. Heckrotte
1	06/26/07	Revised Appendix A.	S. Radecki

Page 2 of 2

TABLE OF CONTENTS

1. A'	FTESTATION OF TEST RESULTS	5
2. TI	EST METHODOLOGY	6
3. F A	ACILITIES AND ACCREDITATION	6
4. C	ALIBRATION AND UNCERTAINTY	6
4.1.	MEASURING INSTRUMENT CALIBRATION	6
4.2.	MEASUREMENT UNCERTAINTY	6
5. E(QUIPMENT UNDER TEST	7
5.1.	DESCRIPTION OF EUT	7
5.2.	DESCRIPTION OF MODEL DIFFERENCES	7
5.3.	DESCRIPTION OF CLASS II PERMISSIVE CHANGE	7
5.4.	MAXIMUM OUTPUT POWER	7
5.5.	DESCRIPTION OF AVAILABLE ANTENNAS	8
5.6.	SOFTWARE AND FIRMWARE	8
5.7.	WORST-CASE CONFIGURATION AND MODE	
5.8.	DESCRIPTION OF TEST SETUP	
6. TI	EST AND MEASUREMENT EQUIPMENT	
	MITS AND RESULTS	
7.1.	CHANNEL TESTS FOR THE 5470 TO 5725 MHz BAND	. 12
	1.1. 99% BANDWIDTH AND 26 dB BANDWIDTH	
	1.2. MAXIMUM POWER	
	 1.3. AVERAGE POWER 1.4. PEAK POWER SPECTRAL DENSITY 	
	1.5. PEAK EXCURSION	
7.	1.6. CONDUCTED SPURIOUS EMISSIONS	
7.2.	MAXIMUM PERMISSIBLE EXPOSURE	121
<i>7.3</i> .	RADIATED EMISSIONS	
	3.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS	124
/	3.2. TRANSMITTER ABOVE 1 GHz FOR 5470 TO 5725 MHz BAND WITH PIFA	107
	NTENNAS 3.3.	
	NTENNAS	
7.3	3.4. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz WITH PIFA ANTENNAS3.5. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz WITH MONOPOLE	
Al	NTENNAS	183
7.4.	DYNAMIC FREQUENCY SELECTION	185

Page 3 of 3

7.4.1.	LIMITS	185
7.4.2.	DESCRIPTION OF EUT	188
7.4.3.	TEST AND MEASUREMENT SYSTEM	189
7.4.4.	SETUP OF EUT AND SUPPORT EQUIPMENT	193
7.4.5.	PLOTS OF NOISE, RADAR WAVEFORMS, AND WLAN SIGNALS	195
7.4.6.	TEST CHANNEL AND METHOD	198
7.4.7.	CHANNEL MOVE TIME AND CHANNEL CLOSING TRANSMISSION TIME	198
7.5. PO	WERLINE CONDUCTED EMISSIONS	202
8. SETUP	PHOTOS	206

9. APPENDIX A: MANUFACTURER'S DECLARATION OF MODEL DIFFERENCES 217

Page 4 of 4

1. ATTESTATION OF TEST RESULTS

STANDARD	TEST RESULTS
	APPLICABLE STANDARDS
DATE TESTED:	JUNE 16 - OCTOBER 11, 2006, and JUNE 7, 2007
SERIAL NUMBER TESTED:	XB72-060-L0416
MODEL TESTED:	AR5BXB72
MODEL:	AR5BXB72-L
EUT DESCRIPTION:	2.4 & 5 GHZ 802.11 MINICARD
COMPANY NAME:	ATHEROS COMMUNICATIONS, INC. 5480 GREAT AMERICA PARKWAY SANTA CLARA, CA 95054, USA

FCC PART 15 SUBPART E

NO NON-COMPLIANCE NOTED

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: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. 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. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

Tested By:

MH

MIKE HECKROTTE ENGINEERING MANAGER COMPLIANCE CERTIFICATION SERVICES

and

CAN CHUNG EMC ENGINEER COMPLIANCE CERTIFICATION SERVICES

Page 5 of 5

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15 and FCC 06-96 APPENDIX "COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVCIES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION".

3. 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>.

4. CALIBRATION AND UNCERTAINTY

4.1. 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.

4.2. 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 6 of 6

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The AR5BXB72-L is designed for 802.11a/b/g/n applications using the AR541X/51XX chipset with a PCIExpress Minicard interface. It has three receive chains and two transmit chains (2x3 configuration).

The 2x3 configuration is implemented with two outside chains (Chain 0 and 2) as Tx/Rx and the middle chain (chain 1) as Rx only.

A 2x2 configuration is implemented by depopulating the middle receive chain; in this configuration the transmit chains are identical to the 2x3 configuration. The 2x2 version, when marketed, will have a unique model ID to differentiate it from the fully configured version.

5.2. DESCRIPTION OF MODEL DIFFERENCES

Appendix A contains the applicant's attestation that the hardware and firmware of the EUT is identical to the sample tested.

5.3. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The change filed under this permissive change is addition of DFS compliance in 5250-5350MHz & 5470-5725MHz .

5.4. MAXIMUM OUTPUT POWER

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

Frequency Band (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5260 - 5320	802.11a	18.03	63.53
5260 - 5320	802.11n HT20	20.48	111.69
5260 - 5310	802.11n HT40	21.23	132.74

5250 to 5350 MHz Authorized Band

5470 to 5725 MHz Authorized Band

Frequency Band	Mode	Output Power	Output Power
(MHz)		(dBm)	(mW)
5500 - 5700	802.11a	18.51	70.96
5500 - 5700	802.11n HT20	20.68	116.95
5510 - 5690	802.11n HT40	20.55	113.50

5.5. DESCRIPTION OF AVAILABLE ANTENNAS

The 2x3 configuration utilizes a set of three identical PIFA antennas (maximum gain is 5.56 dBi from 5250 - 5350 MHz and 5.34 dBi from 5470 - 5725 MHz) or a set of three identical Monopole antennas (maximum gain is 6.2 dBi from 5250 - 5350 MHz and is 5.3 dBi from 5470 - 5725 MHz).

Two identical antennas as otherwise described above are used in the 2x2 configuration.

5.6. SOFTWARE AND FIRMWARE

The EUT driver software installed in the host support equipment during testing was AR5002, ANWI Diagnostic Kernel Drive.

The test utility software used during testing was Art Software Revision 0.3 Build #4 Art 11n.

5.7. WORST-CASE CONFIGURATION AND MODE

The 2x3 configuration was used for all testing in this report.

The worst-case data rates are determined to be as follows for each mode, based on the investigations by measuring the avarage power, peak power and PPSD across all the data rates, bandwidths, modulations and spatial stream modes.

Thus all emissions tests were made with following data rates:

- 802.11a mode, 20 MHz Channel Bandwidth, 9 Mb/s, OFDM Modulation, Spatial Stream 1.
- 802.11n HT20 mode, 20 MHz Channel Bandwidth, MCS0, 6.5 Mb/s, OFDM Modulation, Spatial Stream 1.
- 802.11n HT40 mode, 40 MHz Channel Bandwidth, MCS0, 13.5 Mb/s, OFDM Modulation, Spatial Stream 1.

The worst-case configuration for tests below 1 GHz is the mode and channel with the highest power: 802.11b mode, mid channel.

Baseline testing demonstrated that the Power Spectral Density as measured through a combiner with both chains operating simultaneously is less than the sum of the Power Spectral Density of each individual chain when added linearly.

5.8. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST								
Description	Description Manufacturer Model Serial Number FCC ID							
Laptop	IBM	Thindthind R52	L3-GR045	DoC				
AC Adapter	IBM	92P1016	11S92P1016Z1ZAC65C71HZ	DoC				

I/O CABLES

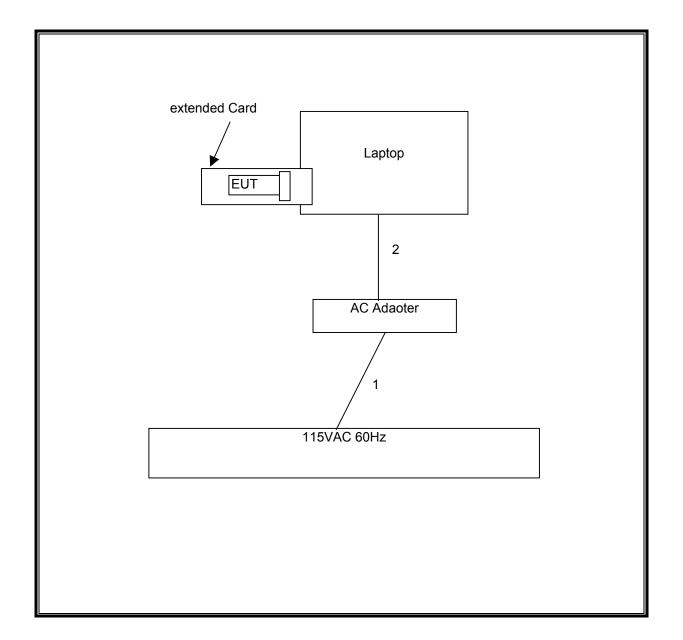
	I/O CABLE LIST								
Cable	Port	Remarks							
No.		Identical	Туре	Туре	Length				
		Ports							
1	AC	1	US 115V	Un-shielded	2m	NA			
2	DC	1	DC	Un-shielded	2m	NA			

TEST SETUP

The EUT is installed in a host laptop computer via a PCIExpress Minicard extender board during the tests. Test software exercised the radio card.

Page 9 of 9

SETUP DIAGRAM FOR TESTS



Page 10 of 10

6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST							
Description	Manufacturer	Model	Serial Number	Cal Due			
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A121003	9/3/2006			
RF Filter Section	Agilent / HP	85420E	3705A00256	2/4/2007			
EMI Receiver, 9 kHz ~ 2.9 GHz	Agilent / HP	8542E	3942A00286	2/4/2007			
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	4/22/2007			
Preamplifier, 1 ~ 26.5 GHz	Agilent / HP	8449B	3008A00369	8/17/2006			
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent / HP	E4446A	MY45300064	12/19/2006			
Peak / Average Power Sensor	Agilent	E9327A	US40440755	12/2/2007			
Peak Power Meter	Agilent / HP	E4416A	GB41291160	12/2/2007			
EMI Test Receiver	R & S	ESHS 20	827129/006	6/3/2007			
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	8/30/2006			
Antenna, Horn 18 ~ 26 GHz	ARA	MWH-1826/B	1049	9/12/06			
Preamplifier, 26 ~ 40 GHz	Miteq	NSP4000-SP2	924343	8/18/06			
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent / HP	E4446A	US42070220	7/29/2006			
Vector Signal Generator 250kHz-20GHz	Agilent / HP	E8267C	US43320336	11/2/2007			

The following test and measurement equipment was utilized for the tests performed on June 7, 2007:

TEST EQUIPMENT LIST							
Description Manufacturer Model Serial Number Cal Due							
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent / HP	E4446A	US42070220	11/26/2007			
Vector Signal Generator 250kHz-							
20GHz	Agilent / HP	E8267C	US43320336	11/2/2007			

Page 11 of 11

7. LIMITS AND RESULTS

7.1. CHANNEL TESTS FOR THE 5470 TO 5725 MHz BAND

7.1.1. 99% BANDWIDTH AND 26 dB BANDWIDTH

<u>LIMIT</u>

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth and 26 dB bandwidth functions are utilized.

RESULTS

No non-compliance noted:

Mode	Frequency	99%	99%	26 dB	26 dB	Worst
Channel		BW	BW	BW	BW	Case
		Chain 0	Chain 2	Chain 0	Chain 2	10 Log B
	(MHz)	(MHz)	(MHz)	(MHz)	(MHz)	(dB)

802.11a Mode

Low	5500	16.44	16.46	18.4	20.81	13.18
Middle	5600	16.46	16.48	19.35	18.97	12.87
High	5700	16.46	16.45	18.5	18.41	12.67

802.11n HT20 Mode

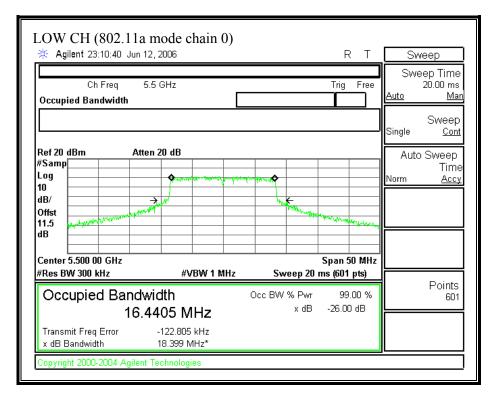
Low	5500	17.69	17.71	19.86	20.83	13.19
Mid	5600	17.65	17.67	19.72	20.59	13.14
High	5700	17.71	17.69	19.84	20.12	13.04

802.11n HT40 Mode

Low	5510	36.19	36.41	38.09	38.42	15.85
Mid	5600	36.29	36.35	39.53	38.76	15.97
High	5690	36.43	36.39	38.57	38.11	15.86

Page 12 of 12

(802.11a MODE CHAIN 0)



Page 13 of 13

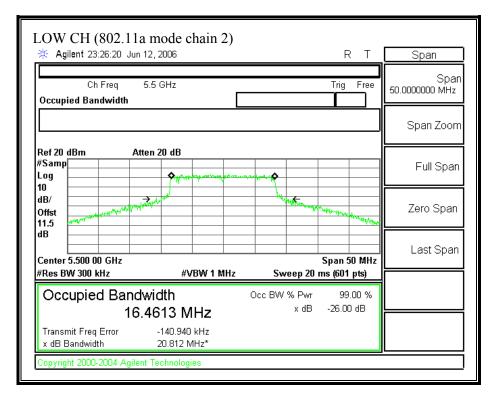
MID CH (802.11a mod	,		RТ	Swee	ip]
Ch Freq 5.6 Gl Occupied Bandwidth	Hz		Trig Free	Sweep 20 <u>Auto</u>) Time .00 ms <u>Man</u>
				S Single	Weep <u>Cont</u>
Ref 20 dBm Atten 20 #Samp	**************************************			Auto S Norm	weep Time <u>Accy</u>
Center 5.600 00 GHz #Res BW 300 kHz	#VBW 1 MHz	sweep 2	Span 50 MHz 0 ms (601 pts)		
Transmit Freq Error -12	0 MHz 28.036 kHz	Occ BW % Pw x dE			Points 601
x dB Bandwidth 19 Copyright 2000-2004 Agilent Tech	.348 MHz* inologies]	

Page 14 of 14

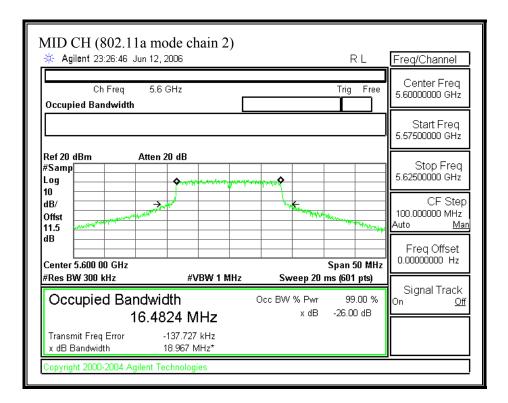
Occupied Bandwidth				5.70000000 GHz
				Start Freq 5.6750000 GHz
Ref 20 dBm Atten 20 dB #Samp	and the second second	hi deneriti de		Stop Freq 5.72500000 GHz
10 dB/ Offst 11.5 whether diverting dependence of the dependen		Wint Windows	Line - where the state of the s	CF Step 100.000000 MHz Auto <u>Ma</u>
Center 5.700 00 GHz	VBW 1 MHz		Span 50 MHz	Freq Offset 0.00000000 Hz
Occupied Bandwidth 16.4575		Sweep 20 n Occ BW % Pwr x dB		Signal Track On <u>Off</u>

Page 15 of 15

(802.11a MODE CHAIN 2)



Page 16 of 16

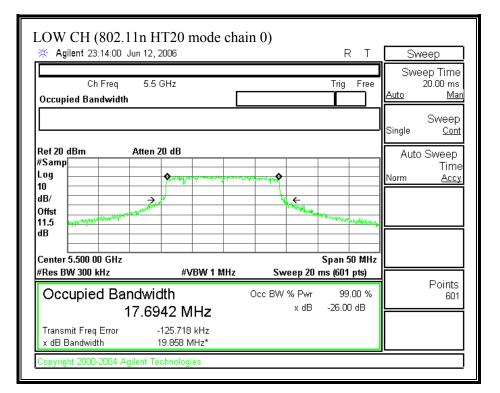


Page 17 of 17

Ch Freq 5.7	GH7		Trig Free	Center Freq
Occupied Bandwidth				5.70000000 GHz
				Start Freq 5.67500000 GHz
Ref 20 dBm Atten 2 #Samp	20 dB	·····		Stop Freq 5.72500000 GHz
10 dB/ → Offst 11.5 → → → → → → → → → → → → →	<i>M</i>		and the state of t	CF Step 100.000000 MHz Auto <u>Ma</u>
dB Center 5.700 00 GHz			Span 50 MHz	Freq Offset 0.00000000 Hz
#Res BW 300 kHz Occupied Bandwid	#VBW 1 MHz	Sweep 20 r	• • •	Signal Track On Off
	98 MHz	x dB	-26.00 dB	<u> </u>

Page 18 of 18

(802.11n HT20 MODE CHAIN 0)



Page 19 of 19

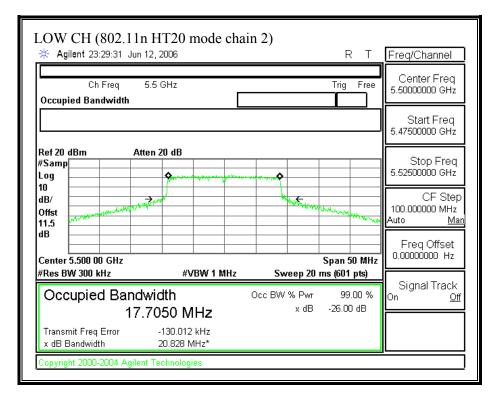
MID CH (802.11n I			RT	Sweep
Ch Freq 5 Occupied Bandwidth	.6 GHz		Trig Free	Sweep Time 20.00 ms <u>Auto Man</u>
				Sweep Single <u>Cont</u>
#Samp Log 10 dB/ Offst 11.5 dB Center 5.600 00 GHz			Span 50 MHz	Auto Sweep Time Norm <u>Accy</u>
#Res BW 300 kHz Occupied Bandw 17 6	/idth 5517 MHz	Occ BW % Pwr x dB	ms (601 pts) 99.00 % -26.00 dB	Points 601
Transmit Freq Error x dB Bandwidth	-104.484 kHz 19.724 MHz*			

Page 20 of 20

	ridth 1091 MHz -134.662 kHz	Occ BW % Pwr x dB	99.00 % -26.00 dB	Signal Track On <u>Of</u>
Center 5.700 00 GHz #Res BW 300 kHz	#VBW 1 MHz	Sweep 20 m	Span 50 MHz ıs (601 pts)	Freq Offset 0.00000000 Hz
10 dB/ 			the state of the s	
#Samp	n 20 dB	·····		Stop Freq 5.72500000 GHz
	L			Start Freq 5.67500000 GHz
Ch Freq 5. Occupied Bandwidth	7 GHz		Trig Free	Center Freq 5.70000000 GHz
🔆 Agilent 23:12:53 Jun 12	2,2006		RT	Freq/Channel

Page 21 of 21

(802.11 HT20 MODE CHAIN 2)



Page 22 of 22

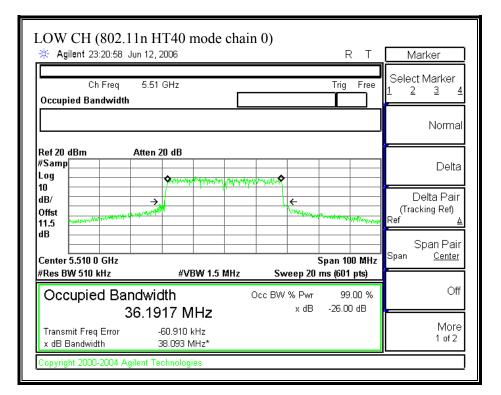
Ch Freq 5.4 Occupied Bandwidth	6 GHz		Trig Free	Center Freq 5.60000000 GHz
	20.10			Start Freq 5.57500000 GHz
Ref 20 dBm Atter #Samp Log 10	1 20 dB			Stop Freq 5.62500000 GHz
dB/ Offst 11.5		har the second s	tother marting and the	CF Step 100.000000 MHz Auto <u>Ma</u>
Center 5.600 00 GHz			Span 50 MHz	Freq Offset 0.00000000 Hz
#Res BW 300 kHz Occupied Bandw 17 6	#VBW 1 MHz idth 653 MHz	Sweep 20 n Occ BW % Pwr x dB	99.00 %	Signal Track ^{On <u>Off</u>}

Page 23 of 23

5.7 GHz	Tr	rig Free	Center Freq 5.70000000 GHz
u			Start Freq 5.67500000 GHz
Atten 20 dB	Work and the second sec		Stop Freq 5.72500000 GHz
	White the second	mungh with the start	CF Step 100.000000 MHz Auto <u>Ma</u>
2	Spa	n 50 MHz	Freq Offset 0.00000000 Hz
andwidth 17.6870 MHz	Occ BW % Pwr	99.00 %	Signal Track On <u>Of</u>
	жини и мини « «vвw 1 мни аndwidth 17.6870 MHz	Atten 20 dB	Atten 20 dB

Page 24 of 24

(802.11 HT40 MODE CHAIN 0)



Page 25 of 25

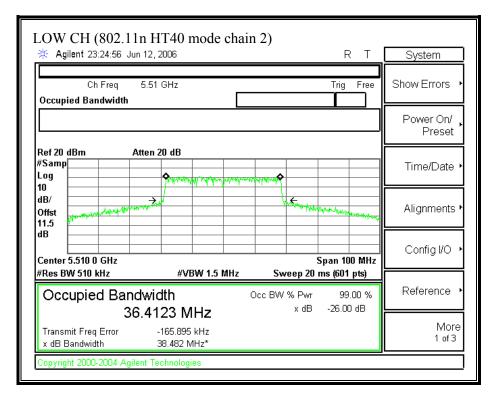
MID CH (802.11r		uin 0)	RT	Freq/Channel
Ch Freq Occupied Bandwidth	5.6 GHz		Trig Free	Center Freq 5.6000000 GHz
				Start Freq 5.5500000 GHz
Ref 20 dBm A #Samp Log	tten 20 dB	hugh man prace		Stop Freq 5.6500000 GHz
dB/ Offst 11.5	→ // / / / / / / / / / / / / / / / / /	With Maryin	th yor have poly and with	CF Step 100.000000 MHz Auto <u>Mar</u>
dB Center 5.600 0 GHz #Res BW 510 kHz	#VBW 1.5 MHz		Span 100 MHz ns (601 pts)	Freq Offset 0.00000000 Hz
Occupied Band 36	dwidth 5.2925 MHz	Occ BW % Pwr x dB	99.00 % -26.00 dB	Signal Track On <u>Off</u>
Transmit Freq Error x dB Bandwidth	-153.625 kHz 39.534 MHz*			

Page 26 of 26

Occupied Bandwidth	Start Freq
	5.64000000 GHz
Ref 20 dBm Atten 20 dB #Samp	Stop Freq 5.7400000 GHz
10 dB/ Offst	CF Step 100.000000 MHz Auto <u>Ma</u>
dB Center 5.690 0 GHz Span 100 MHz	Freq Offset 0.00000000 Hz
#Res BW 510 kHz #VBW 1.5 MHz Sweep 20 ms (601 pts) Occupied Bandwidth Occ BW % Pwr 99.00 % 36.4253 MHz × dB -26.00 dB	Signal Track ^{On <u>Of</u>}

Page 27 of 27

(802.11 HT40 MODE CHAIN 2)



Page 28 of 28

Ch Freq	5.6 GHz	Trig	Free Center Freq 5.60000000 GHz
Occupied Bandwidth			Start Freq 5.55000000 GHz
#Samp	tten 20 dB	un and and a state of the state	Stop Freq 5.65000000 GHz
10 dB/ Offst 11.5		West Stratter March March 19	CF Ste 100.000000 MHz Auto <u>M</u> i
dB Center 5.600 0 GHz		Span 10	Freq Offset 0.00000000 Hz
#Res BW 510 kHz Occupied Band	#VBW 1.5 MHz	Sweep 20 ms (601 Occ BW % Pwr 99	pts) Signal Track
· ·	5.3446 MHz	x dB -26.00	

Page 29 of 29

Center 5.690 0 GHz #Res BW 510 kHz	#VBW 1.5		0 MHz 0.00000 pts)	a Offset 2000 Hz al Track Off
#Samp Log 10 dB/ Offst 11.5 dB		Mineral P	5.74000 100.000 Auto	op Freq 1000 GHz CF Step 1000 MHz <u>Ma</u>
Bef 20 dBm	Atten 20 dB			art Freq 1000 GHz
Ch Free Occupied Bandwi	1	Trig		er Freq 1000 GHz

Page 30 of 30

7.1.2. MAXIMUM POWER

<u>LIMIT</u>

§15.407 (a) (2) For the 5.47–5.725 GHz band, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. 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.

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.

Each chain is measured separately and the total power is calculated using:

Total Power = $10 \log (10^{\circ} (Chain 0 Power / 10) + 10^{\circ} (Chain 2 Power / 10))$

Page 31 of 31

No non-compliance noted:

Fixed Limit (dBm)	24
Antenna Gain (dBi)	5.34
10 Log (# Tx Chains)	3.01
Effective Legacy Gain	8.35

Mode	Freq	10LogB	11+10LogB	Limit	Chain	Chain	Total	Margin
Chan			Limit		0	2	Power	
					Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)

802.11a Mode

Low	5500	13.18	24.18	21.65	15.54	15.45	18.51	-3.14
Mid	5600	12.87	23.87	21.52	15.56	14.91	18.26	-3.26
High	5700	12.67	23.67	21.32	15.44	15.07	18.27	-3.05

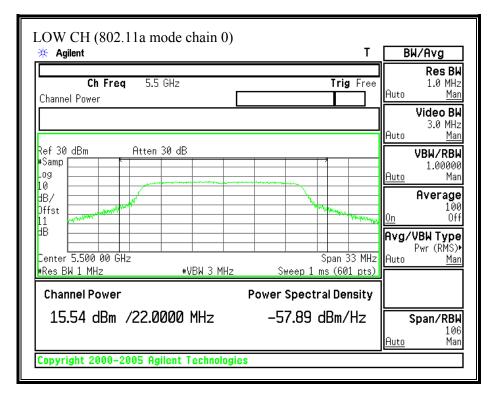
802.11n HT20 Mode

Low	5500	13.19	24.19	24.00	17.64	17.69	20.68	-3.32
Mid	5600	13.14	24.14	24.00	17.76	17.14	20.47	-3.53
High	5700	13.04	24.04	24.00	17.14	17.04	20.10	-3.90

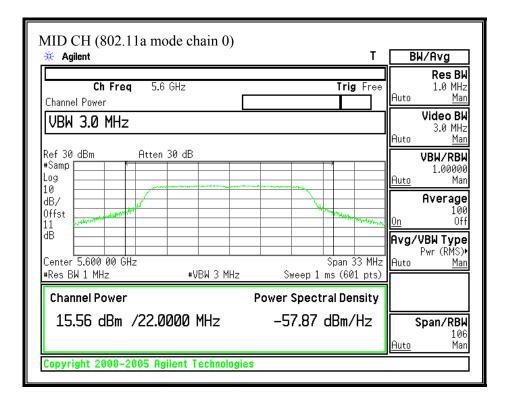
802.11n HT40 Mode

Low	5510	15.85	26.85	24.00	17.52	17.55	20.55	-3.45
Mid	5600	15.97	26.97	24.00	17.73	16.82	20.31	-3.69
High	5690	15.86	26.86	24.00	17.26	17.19	20.24	-3.76

(802.11a MODE CHAIN 0)



Page 33 of 33

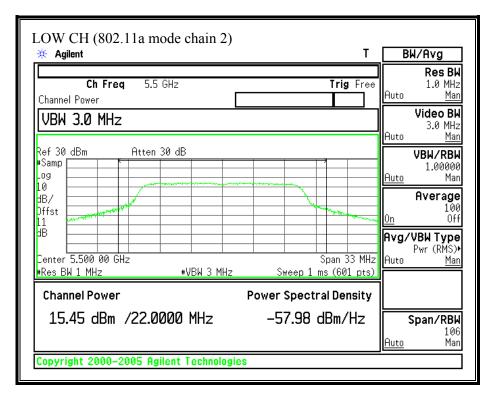


Page 34 of 34

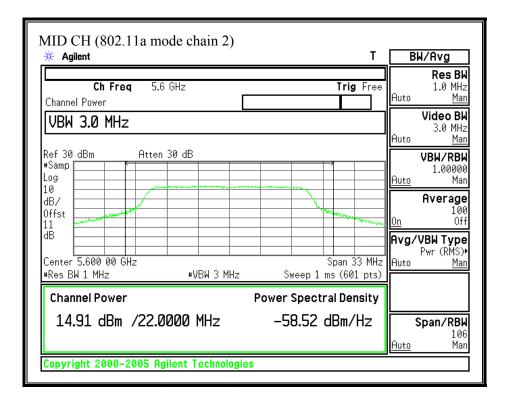
* Agilent				BW/Avg
Ch Freq 5.3 Channel Power	7 GHz	Tri I	g Free A	Res BW 1.0 MHz luto <u>Man</u>
VBW 3.0 MHz				Video BW 3.0 MHz luto <u>Man</u>
Ref 30 dBm Atter +Samp 10 10 10 10 10 11 11 11 11 12 13 14 15 15 16 17 17 17 17 17 17 17 17 17 17	30 dB	Span Sweep 1 ms (6	33 MHz A	vg/VBW Type Pwr (RMS)
Channel Power 15.44 dBm /22.0		rower Spectral De –57.99 dBm	/Hz	Span/RBW 106 Iuto Man

Page 35 of 35

(802.11a MODE CHAIN 2)



Page 36 of 36

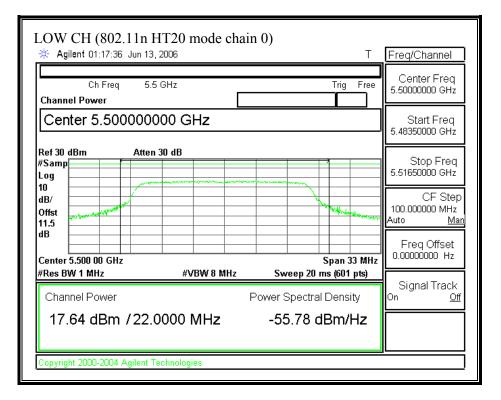


Page 37 of 37

* Agilent			т 🔄	BW/Avg
Ch Freq 5.7 Channel Power	GHz	Trig F	ree Auto	Res Bl 1.0 MH: <u>Ma</u>
				Video Bl 3.0 MH: <u>Ma</u> i
#Samp Log 10 dB/ Offst 11	30 dB		Auto	VBW/RBW 1.00000 Mai Average 100 0f
dB Center 5.700 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 33 Sweep 1 ms (601 p	MHz Auto	/VBW Type Pwr (RMS) <u>Mar</u>
Channel Power	P	ower Spectral Dens	ity	
15.07 dBm /22.0	000 MHz	-58.36 dBm/H	Z Auto	Span/RBI 10 Ma

Page 38 of 38

(802.11n HT20 MODE CHAIN 0)



Page 39 of 39

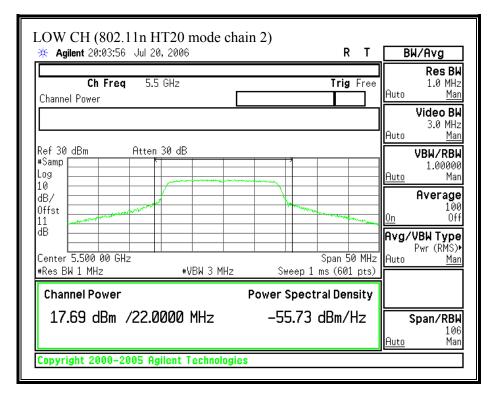
MID CH (802.11n HT		0) R T	Freq/Channel
Ch Freq 5.6 (Channel Power	ƏHz	Trig Free	Center Freq 5.6000000 GHz Start Freq 5.58350000 GHz
Ref 30 dBm Atten 3 #Samp Log 10 dB/ Offst 11.5 dB	0 dB		Stop Freq 5.61650000 GHz CF Step 100.000000 MHz Auto <u>Man</u> Freq Offset
Center 5.600 00 GHz #Res BW 1 MHz Channel Power	#VBW 8 MHz	Span 33 MHz Sweep 20 ms (601 pts) Power Spectral Density	0.000000000 Hz Signal Track On Off
17.76 dBm /22.04 Copyright 2000-2004 Agilent Ted	000 MHz		

Page 40 of 40

HIGH CH (802.11n H		n 0)	T. Freed/Obernel
Ch Freq 5.7 C			T Freq/Channel Center Freq 5.70000000 GHz
Channel Power			Start Freq 5.68350000 GHz
Ref 30 dBm Atten 3 #Samp Log 10 dB/ Offst			5.71650000 GHz CF Ste
11.5 dB Center 5.700 00 GHz		Span 33	Freq Offset
#Res BW 1 MHz Channel Power	#VBW 8 MHz	Sweep 20 ms (601 p Power Spectral Densit	Signal Track
17.14 dBm /22.0	000 MHz	-56.28 dBm/H	Ηz
Copyright 2000-2004 Agilent Teo	hnologies		

Page 41 of 41

(802.11 HT20 MODE CHAIN 2)



Page 42 of 42

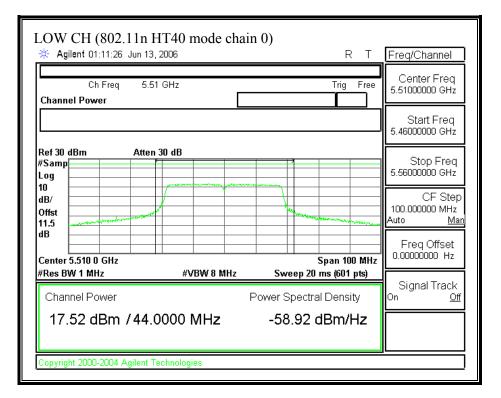
🔆 Agilent 16:13:58 Jul	19,2006		T BW/Avg
Ch Freq 5 Channel Power	.6 GHz	Trig Fr	Res ree 1.0 M Auto <u>M</u>
			Video E 3.0 M Auto M
Ref 30 dBm Attemp .og .og 10	#VBW 3 MHz	Span 33 M Sweep 1 ms (601 p	
Channel Power 17.14 dBm /22		ower Spectral Densit –56.29 dBm/Hz	-

Page 43 of 43

	7 GHz	Trig F	ree Center Freq 5.70000000 GHz
Channel Power Center 5.700000	000 GHz		Start Freq 5.68350000 GHz
Ref 30 dBm Atter #Samp Log 10 dB/ Offst 11.5	1 30 dB		Stop Freq 5.71650000 GHz CF Step 100.000000 MHz Auto <u>Ma</u>
dB Center 5.700 00 GHz #Res BW 1 MHz	#VBW 8 MHz	Span 33 Sweep 20 ms (601 pt	
Channel Power 17.04 dBm /22.		Power Spectral Density	Signal Track On <u>Off</u>

Page 44 of 44

(802.11 HT40 MODE CHAIN 0)



Page 45 of 45

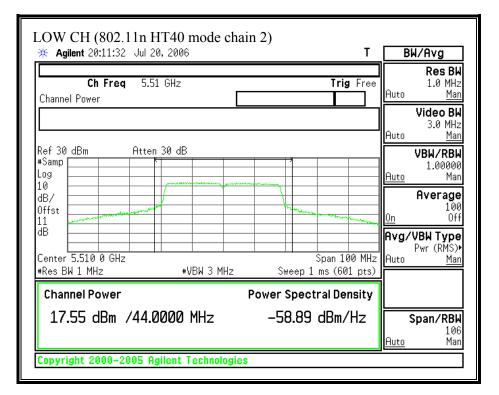
MID CH (802.11n F		- 0)	T Freq/Channel
	6 GHz		Center Freq 5.6000000 GHz
			Start Freq 5.55000000 GHz
Ref 30 dBm Atter #Samp	a 30 dB		Stop Freq 5.6500000 GHz
dB/ Offst 11.5			CF Step 100.000000 MHz Auto <u>Man</u>
dB		Span 100 l	
#Res BW 1 MHz Channel Power	#VBW 8 MHz	Sweep 20 ms (601 pt Power Spectral Density	Signal Track
17.73 dBm /44.	0000 MHz	-58.70 dBm/H	z
Copyright 2000-2004 Agilent	Fechnologies		

Page 46 of 46

HIGH CH (802.11n]		n 0)	RТ	Freq/Channel
Ch Freq 5.68 Channel Power	9 GHz	Tri		Center Freq 5.69000000 GHz Start Freq 5.64000000 GHz
Ref 30 dBm Atten #Samp	30 dB	Suan	100 MHz	Stop Freq 5.74000000 GHz CF Step 100.000000 MHz Auto Freq Offset 0.0000000 Hz
#Res BW 1 MHz Channel Power	#VBW 8 MHz	Span Sweep 20 ms (6 Power Spectral Der	01 pts)	Signal Track On <u>Off</u>
17.26 dBm / 44.(Copyright 2000-2004 Agilent T		-59.17 dBm	n/Hz	

Page 47 of 47

(802.11 HT40 MODE CHAIN 2)



Page 48 of 48

🔆 Agilent 10:30:30 Jul	20, 2006	T	BW/Avg
Ch Freq 5 Channel Power	5.6 GHz	Trig Free	Res Black High Auto Mar
			Video Bk 3.0 MHz Auto <u>Mar</u>
*Samp	en 30 dB		Avg/VBW Type Pwr (RMS)
Center 5.600 0 GHz #Res BW 1 MHz	*VBW 3 MHz	Span 100 MH Sweep 1 ms (601 pts	z Auto <u>Mar</u>
Channel Power	P	ower Spectral Density	
16.82 dBm /44	.0000 MHz	-59.62 dBm/Hz	Span/RBW 106 <u>Auto</u> Mar

Page 49 of 49

Ch Freq 5.6	69 GHz	Trig Fre	Center Freq 5.69000000 GHz
Channel Power Center 5.690000	000 GHz		Start Freq 5.64000000 GHz
Ref 30 dBm Atte #Samp Log 10 dB/ Offst 11.5 dB Center 5.690 0 GHz #Res BW 1 MHz	n 30 dB	Span 100 MI	
Channel Power		Sweep 20 ms (601 pts) Power Spectral Density -59.24 dBm/Hz	Signal Track On <u>Off</u>

Page 50 of 50

7.1.3. AVERAGE POWER

AVERAGE POWER LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

Each chain is measured separately and the total power is calculated using:

Total Power = $10 \log (10^{\circ} (Chain 0 Power / 10) + 10^{\circ} (Chain 2 Power / 10))$

Page 51 of 51

RESULTS

No non-compliance noted:

The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Mode	Frequency	Average Power	Average Power	Average Power
Channel		Chain 0	Chain 2	Total
	(MHz)	(dBm)	(dBm)	(dBm)

802.11a Mode

Low	5500	15.6	15.5	18.6
Middle	5600	15.7	15.1	18.4
High	5700	15.6	15.2	18.4

802.11n HT20 Mode

Low	5500	17.7	17.6	20.7
Middle	5600	17.6	17.3	20.4
High	5700	17.1	17.0	20.1

802.11n HT40 Mode

Low	5510	17.3	17.9	20.6
Middle	5600	17.8	17.0	20.4
High	5690	17.0	17.1	20.1

7.1.4. PEAK POWER SPECTRAL DENSITY

<u>LIMIT</u>

§15.407 (a) (2) For the 5.47–5.725 GHz band, 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.

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.

Each chain is measured separately and the total PPSD is calculated using:

Total PPSD = $10 \log (10^{\circ} (Chain 0 PPSD / 10) + 10^{\circ} (Chain 2 PPSD / 10))$

Page 53 of 53

RESULTS

No non-compliance noted:

Antenna Gain (dBi)	5.34
10 Log (# Tx Chains)	3.01
Effective Legacy Gain	8.35

Mode	Frequency	PPSD	PPSD	PPSD	Limit	Margin
Channel		Chain 0	Chain 2	Total		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)

802.11a Mode

Low	5500	4.40	4.73	7.58	8.65	-1.07
Middle	5600	4.28	4.50	7.40	8.65	-1.25
High	5700	4.69	4.55	7.63	8.65	-1.02

802.11n HT20 Mode

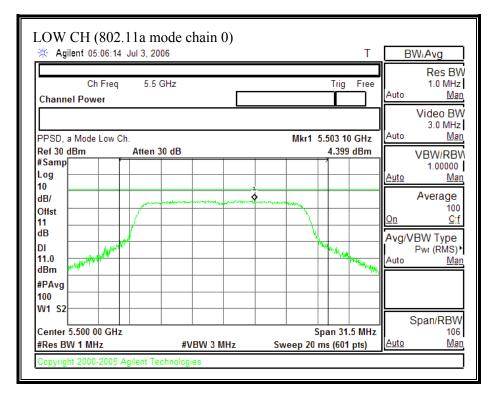
Low	5500	6.20	8.15	10.29	11.00	-0.71
Middle	5600	6.51	6.94	9.74	11.00	-1.26
High	5700	6.05	5.55	8.82	11.00	-2.18

802.11n HT40 Mode

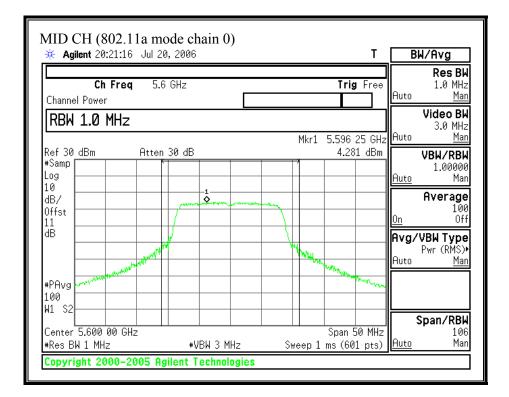
Low	5510	3.05	4.77	7.00	11.00	-4.00
Middle	5600	3.40	4.21	6.83	11.00	-4.17
High	5690	2.68	2.77	5.74	11.00	-5.26

Page 54 of 54

(802.11a MODE CHAIN 0)



Page 55 of 55

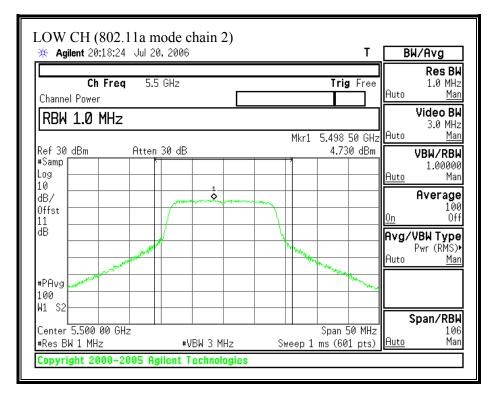


Page 56 of 56

🔆 Agilent 05:20:22 Jul 3	, 2006		L	E	3W/Avg
Ch Freq S	5.7 GHz		Trig Fre	e Auto	Res B\ 1.0 MH; <u>Ma</u>
PPSD, a Mode High Ch.		Mkr1 5	5.701 42 GHz	z Auto	Video B\ 3.0 MH; <u>Ma</u>
Ref 30 dBm Atte #Samp Log 10	en 30 dB		4.690 dBm	1 Auto	VBW/RB 1.00000 <u>Ma</u>
dB/ Offst 11 dB				<u>On</u>	Average 100 <u>Q</u> :
DI 11.0 dBm			North Contract of the Contract	Avg/\ Auto	/BW Type Pwr (RMS) <u>Ma</u>
#PAvg 100 W1 S2					
Center 5.700 00 GHz #Res BW 1 MHz	#VBW 3 MHz		pan 31.5 MF	Iz Auto	Span/RBV 100 Ma

Page 57 of 57

(802.11a MODE CHAIN 2)



Page 58 of 58

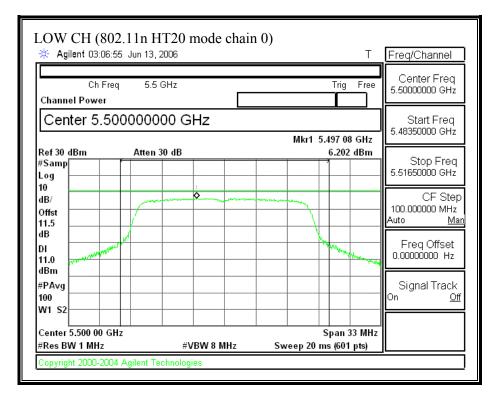
Agilent 05:16:19 Jul 3,	, 2006		Т	Peak Search
Ch Freq 5	5.6 GHz		Trig Free	Next Peak
Marker 5.59864	0000 GHz	MI-4 5 5	98 64 GHz	Next Pk Right
Ref 30 dBm Atte #Samp Log	en 30 dB		4.496 dBm	Next Pk Lett
Offst 11				Min Search
dB DI 11.0			* Herenander	Pk-Pk Search
#PAvg 100 W1 S2				Mkr © CF
Center 5.600 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Spa Sweep 20 ms	in 31.5 MHz (601 pts)	More 1 ct 2

Page 59 of 59

🔆 Agilent 05:22	:54 Jul 3, 20	006							Т	B	W/Avg
Ch Fr Channel Power	eq 5.7	GHz					-	Trig	Free	Auto	Res B ¹ 1.0 MH <u>Ma</u>
PPSD, a Mode Hig	gh Ch.					Mkr1	5.69	98 69	GHz	Auto	Video BV 3.0 MH <u>Ma</u>
Ref 30 dBm #Samp	Atten	30 dB					4	.545	dBm		VBW/RB
Log 10								_		<u>Auto</u>	1.00000 <u>Ma</u>
dB/			\$	- marine and a	varia						Average
Offst						\sum				<u>On</u>	10) <u>C</u> i
dB DI 🖌	www						170 ₀	144.		Avg/\	BW Type Pwr (RMS)
DI 11.0 dBm								1.124	the state of the s	Auto	Ma
#PAvg											
W1 S2											
										:	Span/RBV
Center 5.700 00 (#Res BW 1 MHz	HZ	#\/E	3W 3 M	H-7	Swo	ep 20	•		5 MHz	Auto	100 Ma

Page 60 of 60

(802.11n HT20 MODE CHAIN 0)



Page 61 of 61

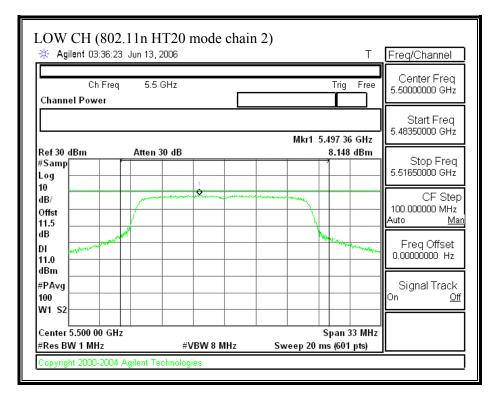
🔆 Agilent 03:06:11 Jun 13	3, 2006	Т	Freq/Channel
Ch Freq 5. Channel Power	6 GHz	Trig Free	Center Freq 5.6000000 GHz
Center 5.600000	000 GHz		Start Freq
Ref 30 dBm Atte #Samp bg	n 30 dB	Mkr1 5.597 03 GHz 6.507 dBm	Stop Freq 5.61650000 GHz
10 dB/ Offst 11.5			CF Step 100.000000 MHz Auto <u>Mar</u>
dB DI Market Ward Di		New Market	Freq Offset 0.00000000 Hz
#PAvg 100 W1 S2			Signal Track On <u>Off</u>
Center 5.600 00 GHz #Res BW 1 MHz	#VBW 8 MHz	Span 33 MHz Sweep 20 ms (601 pts)	

Page 62 of 62

			Т	Freq/Channel
Ch Freq 5.7 Channel Power	GHz		Trig Free	Center Freq 5.70000000 GHz
	L	Mind 5	.698 84 GHz	Start Freq 5.68350000 GHz
Ref 30 dBm Atten	30 dB	МКГТ Э	6.046 dBm 6.046	
#Samp Log 10				Stop Freq 5.71650000 GHz
dB/ Offst	····· • •			CF Step 100.000000 MHz Auto Ma
11.5 dB DI			a stream and a	
DI 11.0				0.00000000 Hz
#PAvg 100 W1 S2				Signal Track On <u>Off</u>
WI 52				

Page 63 of 63

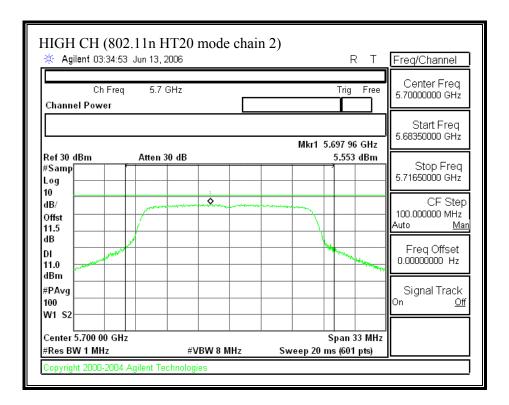
(802.11 HT20 MODE CHAIN 2)



Page 64 of 64

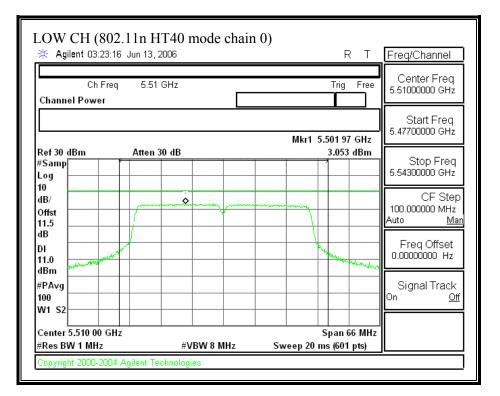
🔆 Agilent 03:35:35 Jun 1	3, 2006	Т	Freq/Channel
Ch Freq 5 Channel Power	5.6 GHz	Trig Free	Center Freq 5.6000000 GHz
		Mkr1 5.597 47 GHz	Start Freq 5.58350000 GHz
#Samp Log	en 30 dB	6.942 dBm	Stop Freq 5.61650000 GHz
10 dB/ Offst 11.5			CF Step 100.000000 MHz Auto <u>Ma</u>
dB			Freq Offset
#PAvg 100 W1 S2			Signal Track On
Center 5.600 00 GHz #Res BW 1 MHz	#VBW 8 MHz	Span 33 MH Sweep 20 ms (601 pts)	z

Page 65 of 65



Page 66 of 66

(802.11 HT40 MODE CHAIN 0)



Page 67 of 67

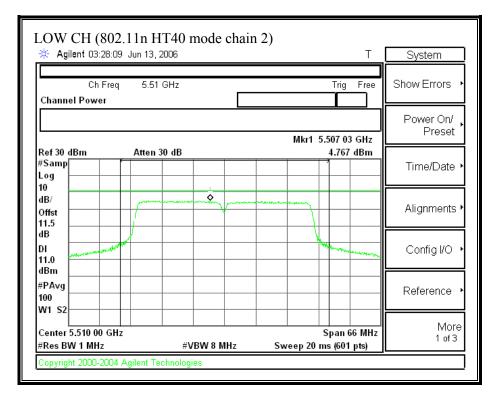
🔆 Agilent 03:24:	19 Jun 13, 2006			RT	Freq/Channel
Ch Fre Channel Power	q 5.6 GHz		-	Trig Free	Center Freq 5.60000000 GHz
			Mkr1 5.59)4 61 GHz	Start Freq 5.56700000 GHz
Ref 30 dBm #Samp Log 10	Atten 30 dB		3	.402 dBm	Stop Freq 5.63300000 GHz
dB/ Offst 11.5		·· &			CF Step 100.000000 MHz Auto <u>Mar</u>
dB Dl 11.0 dBm				un and and	Freq Offset 0.00000000 Hz
#PAvg 100 W1 S2					Signal Track On <u>Off</u>
Center 5.600 00 GI #Res BW 1 MHz		VBW 8 MHz	Sp Sweep 20 ms	an 66 MHz (601 pts)	

Page 68 of 68

🔆 Agilent 03:25:08 Ju	n 13, 2006				Т	Freq/Channel
Ch Freq Channel Power	5.69 GHz			Trig	Free	Center Freq 5.69000000 GHz
			Mind	5.681 64		Start Freq 5.65700000 GHz
#Samp Log	Atten 30 dB			2.679		Stop Freq 5.72300000 GHz
10 dB/ Offst 11.5 dB	×					CF Step 100.000000 MHz Auto <u>Ma</u>
DI 11.0 dBm				Ner market		Freq Offset 0.00000000 Hz
#PAvg 100 W1 S2						Signal Track On <u>Off</u>
Center 5.690 00 GHz #Res BW 1 MHz	#VBV	V 8 MHz	Sweep 20	Span 6 ms <i>(</i> 601		

Page 69 of 69

(802.11 HT40 MODE CHAIN 2)



Page 70 of 70

Agilent 03:29:	03 Jun 13, 20)06					Т	Freq/Channel
Ch Fre	eq 5.6 G	Hz				Trig	Free	Center Freq 5.60000000 GHz
				M	lkr1 5.5	87 46		Start Freq 5.56700000 GHz
Ref 30 dBm #Samp Log	Atten 30) dB				4.206		Stop Freq 5.63300000 GHz
10 dB/ Offst 11.5	\$			·				CF Step 100.000000 MHz Auto <u>Ma</u>
dB DI 11.0 dBm						mandre		Freq Offset 0.00000000 Hz
#PAvg 100 W1 S2								Signal Track On <u>Off</u>
Center 5.600 00 G #Res BW 1 MHz	Hz	#VBW 8	MH7	Swee	S p 20 ms	pan 66 : <i>1</i> 601 i		

Page 71 of 71

🔆 Agilent 03:30:	37 Jun 13, 2006						RT	Freq/Channel
Ch Fre Channel Power	q 5.69 GHz	!				Tri	g Free	Center Freq 5.69000000 GHz
					Mkr1 :	5.682	74 GHz	Start Freq 5.65700000 GHz
Ref 30 dBm #Samp Log 10	Atten 30 d	B				2.7	68 dBm	Stop Freq 5.72300000 GHz
dB/ Offst dB				500g¥-14-1-4-4-4				CF Step 100.000000 MHz Auto <u>Ma</u>
DI 11.0 dBm						W. Martin	and when they are	Freq Offset 0.00000000 Hz
#PAvg 100 W1 S2								Signal Track On <u>Off</u>
Center 5.690 00 G #Res BW 1 MHz	Hz	#VBW 8 M	147	Sw	eep 20		n 66 MHz 01. nts)	

Page 72 of 72

7.1.5. 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.

Page 73 of 73

RESULTS

No non-compliance noted:

Mode	Frequency	Peak	Peak	Limit	Worst
Channel		Excursion	Excursion		Case
		Chain 0	Chain 2		Margin
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)

802.11a Mode

Low	5500	9.76	10.90	13	-2.10
Middle	5600	9.23	10.15	13	-2.85
High	5700	9.93	10.01	13	-2.99

802.11n HT20 Mode

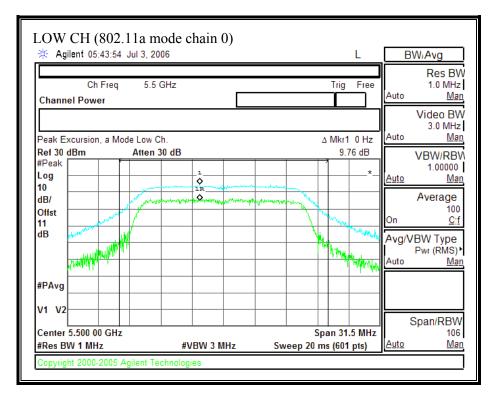
Low	5500	9.88	10.69	13	-2.31
Middle	5600	9.54	8.84	13	-3.46
High	5700	8.94	7.77	13	-4.06

802.11n HT40 Mode

Low	5510	10.37	10.99	13	-2.01
Middle	5600	9.43	10.12	13	-2.88
High	5690	9.39	11.44	13	-1.56

Page 74 of 74

(802.11a MODE CHAIN 0)



Page 75 of 75

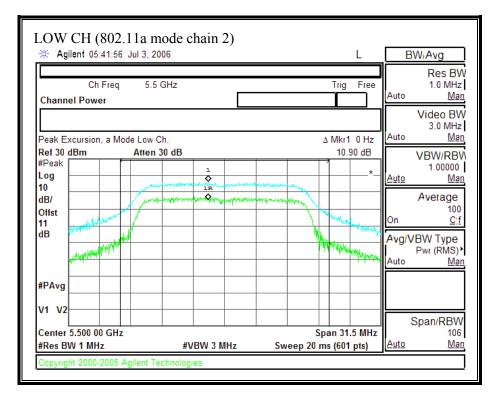
🔆 Agilent 05:46:04 Jul 3, 2	006		L	BW/Avg
Ch Freq 5.6 Channel Power	GHz	Trig	Free Auto	Res BV 1.0 MHz) <u>Ma</u>
Peak Excursion, a Mode Mid	Ch.	∆ Mkr1	0 Hz Auto	Video BV 3.0 MHz Ma
Ref 30 dBm Atten #Peak Log 10	30 dB	9.23	dB *_ <u>Auto</u>	VBW/RB 1.00000 <u>Ma</u>
		Margarian Conception	On	Average 100 <u>O</u> if
dB				/VBW Type Pwr (RMS)
#PAvg				
V1 V2				Span/RBW
Center 5.600 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 31.5 Sweep 20 ms (601 p		. 106

Page 76 of 76

🔆 Agilent 05:47:39 Jul 3, 20	06	L	BW/Avg
Ch Freq 5.7 Channel Power	GHz	Trig Free	Res B 1.0 MH Auto Ma
Peak Excursion, a Mode High (Ch.	∆ Mkr1 0 Hz	Video B 3.0 MH Auto <u>Ma</u>
Ref 30 dBm Atten 3 #Peak Log 10	30 dB	9.93 dB	VBW/RB 1.00000 <u>Auto Ma</u>
dB/	1R Shannan Mar Sandhan ya Sandha Mar Mar Mar Mar Mar Mar Mar Mar Mar Ma	accustor and the second	Average 10 On <u>C</u>
dB		No N	Avg/VBW Type Pwr (RMS) Auto <u>Ma</u>
#PAvg			\
V1 V2			Span/RBV
Center 5.700 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 31.5 MH Sweep 20 ms (601 pts)	

Page 77 of 77

(802.11a MODE CHAIN 2)



Page 78 of 78

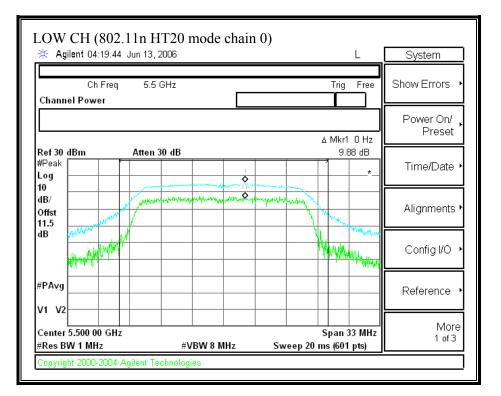
🔆 Agilent 05:40:23 Jul	3, 2006		L	E	3W/Avg
Ch Freq Channel Power	5.6 GHz		Trig Fr	ee Auto	Res BV 1.0 MHz <u>Ma</u>
Peak Excursion, a Mode N	/id Ch.		∆ Mkr1 0 I	Hz Auto	Video BV 3.0 MHz <u>Ma</u>
#Peak	ten 30 dB		10.15 d	B _* <u>Auto</u>	VBW/RB 1.00000 <u>Ma</u>
10 dB/ Offst 11		Name of the second s	winner the second	On	Average 100 <u>Oif</u>
dB			WWWWWWWWWWWW	Huy Avg/	VBW Type Pwr (RMS) <u>Ma</u>
#PAvg					
V1 V2					Span/RBW
Center 5.600 00 GHz #Res BW 1 MHz	#VBW 3 MHz	S Sweep 20 r	pan 31.5 M		106 Ma

Page 79 of 79

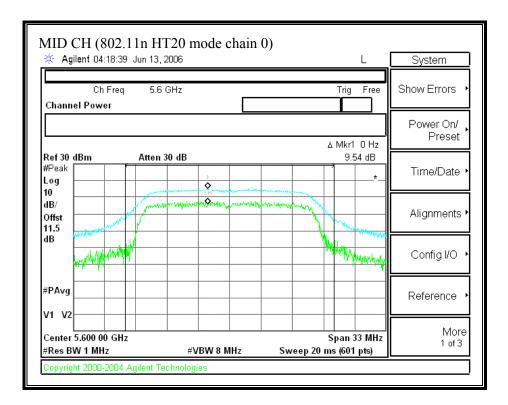
🔆 Agilent 05:34:36 Jul 3,	2006		L	E	3W/Avg
Ch Freq 5. Channel Power	7 GHz		Trig Free	Auto	Res B ¹ 1.0 MH <u>Ma</u>
Peak Excursion, a Mode Hig	h Ch.		∆ Mkr1 0 Hz	Auto	Video B\ 3.0 MH: <u>Ma</u>
Ref 30 dBm Atte #Peak Log 10	n 30 dB		10.01 dB	Auto	VBW/RB 1.00000 <u>Ma</u>
		Norman Marine Contraction		On	Average 100 <u>C</u> r
dB		¥	Marking Walking	Avg/\ Auto	/BW Type Pwr (RMS) Ma
#PAvg					
V1 V2					Span/RBV
Center 5.700 00 GHz #Res BW 1 MHz	#VBW 3 MHz		ipan 31.5 MHz ms (601 pts)	Auto	100 100 <u>Ma</u>

Page 80 of 80

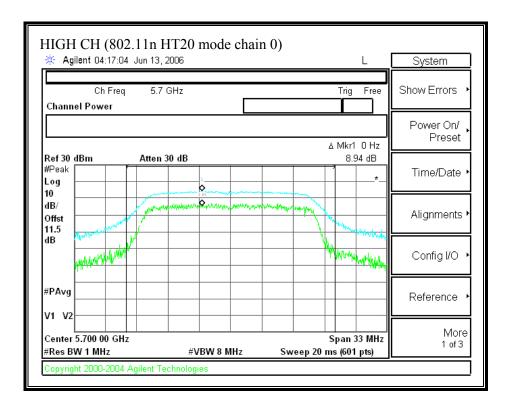
(802.11n HT20 MODE CHAIN 0)



Page 81 of 81

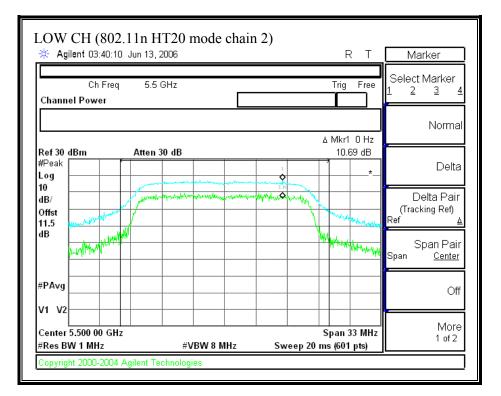


Page 82 of 82



Page 83 of 83

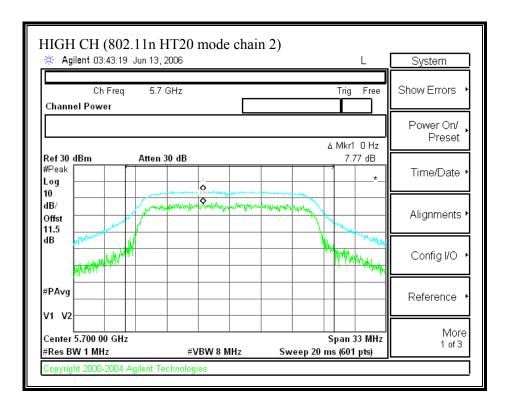
(802.11 HT20 MODE CHAIN 2)



Page 84 of 84

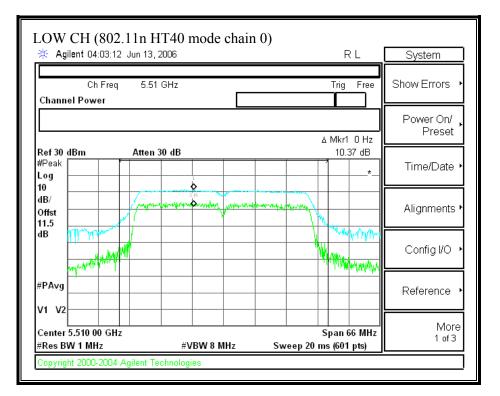
Agilent 03:42:14 Jun 13,	2006	R T	System
Ch Freq 5.6 Channel Power	GHz	Trig Free	Show Errors
		۵ Mkr1 O Hz	Power On/ Preset
Ref 30 dBm Atten #Peak Log 10	30 dB	8.84 dB	Time/Date
dB/ Offst 11.5		Warner warne -	Alignments
dB		Marine	Config I/O
#PAvg			Reference
Center 5.600 00 GHz #Res BW 1 MHz	#VBW 8 MHz	Span 33 MHz Sweep 20 ms (601 pts)	More 1 of 3

Page 85 of 85

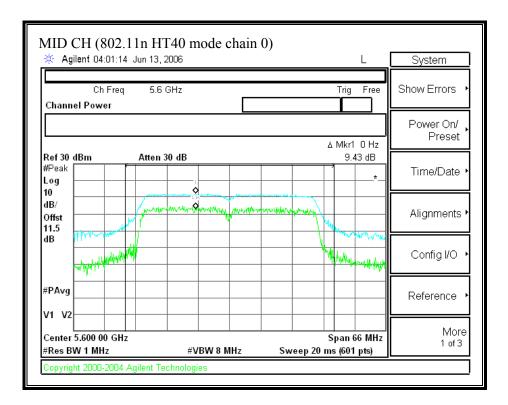


Page 86 of 86

(802.11 HT40 MODE CHAIN 0)



Page 87 of 87

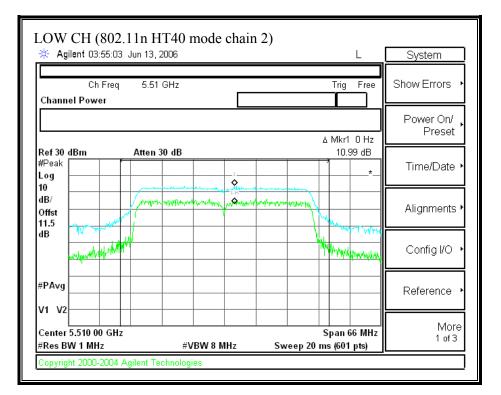


Page 88 of 88

🔆 Agilent 03:59:59 Jur	13,2006	L	System
Ch Freq Channel Power	5.69 GHz	Trig Free	Show Errors
		۵ Mkr1 0 Hz	Power On/ Preset
Ref 30 dBm A #Peak Log 10	tten 30 dB	9.39 dB	Time/Date
dB/ Offst 11.5	aning being a man and a start of the start o	mpunyedurnanyunay	Alignments
dB		- William Manual Company	Config I/O
#PAvg			Reference
V1 V2 Center 5.690 00 GHz #Res BW 1 MHz	#VBW 8 MHz	Span 66 MHz Sweep 20 ms (601 pts)	More 1 of 3

Page 89 of 89

(802.11 HT40 MODE CHAIN 2)



Page 90 of 90

🔆 Agilent 03:56:48 Jun 13	, 2006	R T	System
Ch Freq 5.0 Channel Power	6 GHz	Trig Fre	e Show Errors
	-	۵ Mkr1 O H	Power On/ Preset
Ref 30 dBm Atter	30 dB	10.12 dE	
dB/ Offst	- Anthe Anth		Alignments
dB			Config I/O
#PAvg			Reference
Center 5.600 00 GHz #Res BW 1 MHz	#VBW 8 MHz	Span 66 Mi Sweep 20 ms (601 pts)	Hz More 1 of 3

Page 91 of 91

🔆 Agi	ilent 03:	58:07	Jun 13,	2006						L	System
Chann	Ch I el Powe	Freq r	5.69	9 GHz					Trig	Free	Show Errors
									م Mkr	1 0 Hz	Power On/ Preset
Ref 30 #Peak Log 10	dBm		Atten	30 dB		1				44 dB	Time/Date
dB/ Offst 11.5			front	gar ya	- And	1R	Uningland	- Aller - Co			Alignments
dB	UNIVARIAN	NA ANA ANA							Ny King	Wannya An	Config I/O
#PA∨g V1 V2											Reference
Center	5.690 00 W 1 MHz			#	VBW 8 M	IHz	Sw	/eep 20	•	66 MHz 1 pts)	More 1 of 3

Page 92 of 92

7.1.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

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.

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.

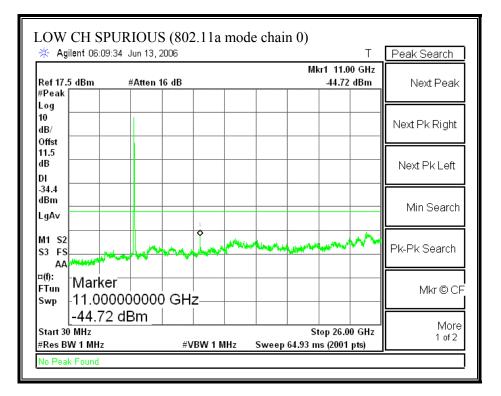
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

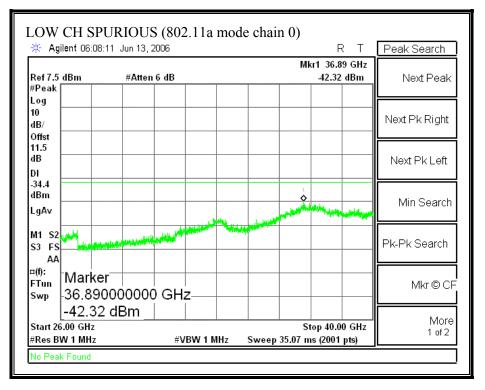
RESULTS

No non-compliance noted:

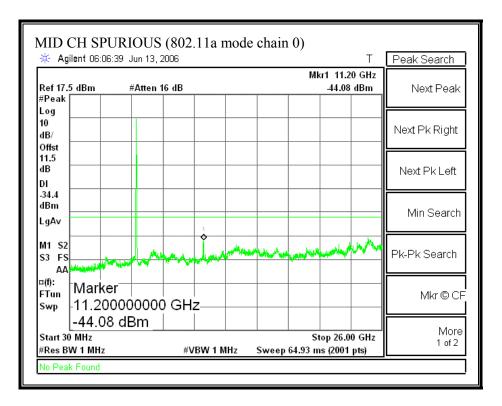
Page 93 of 93

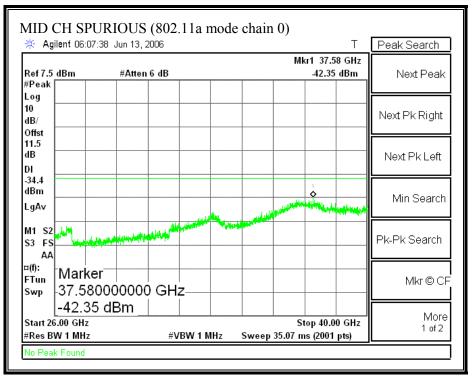
SPURIOUS EMISSIONS (802.11a MODE CHAIN 0)



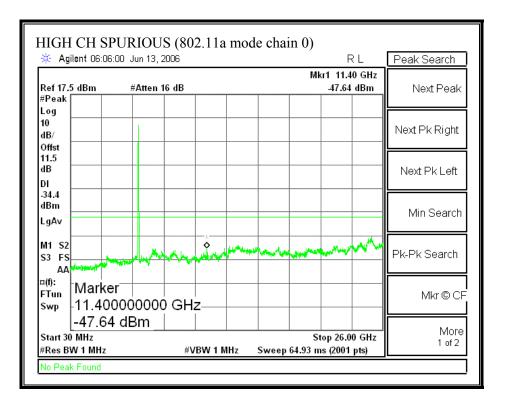


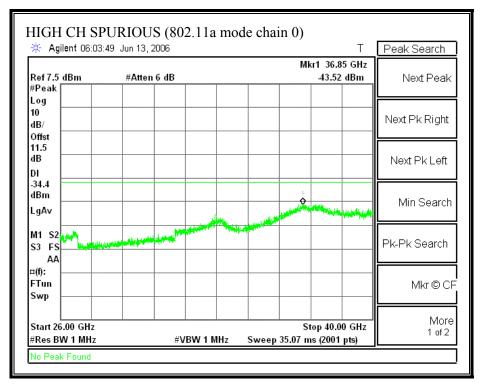
Page 94 of 94





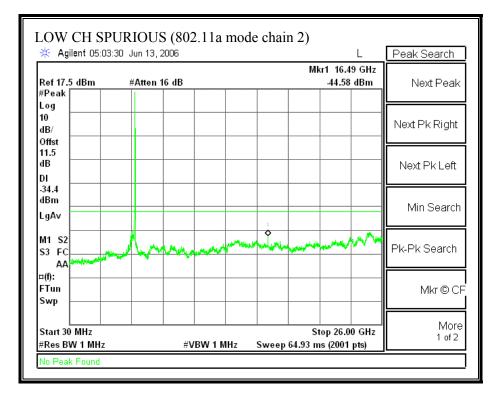
Page 95 of 95

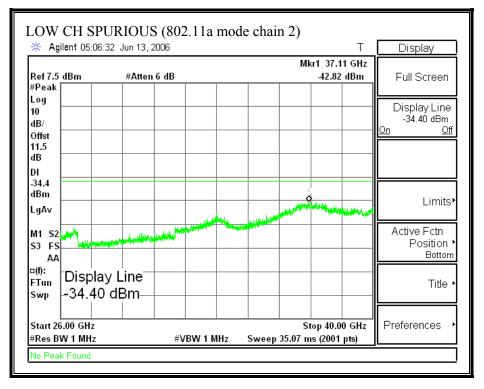




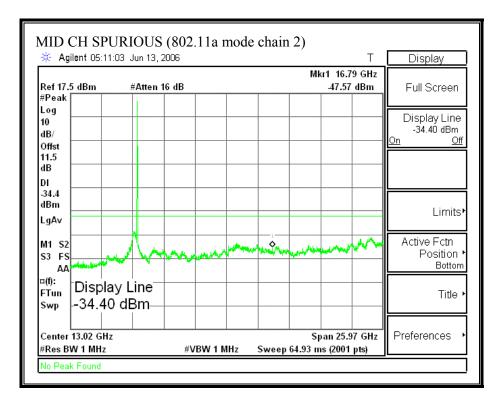
Page 96 of 96

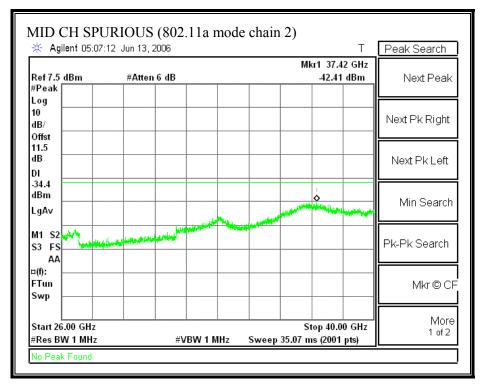
SPURIOUS EMISSIONS (802.11a MODE CHAIN 2)



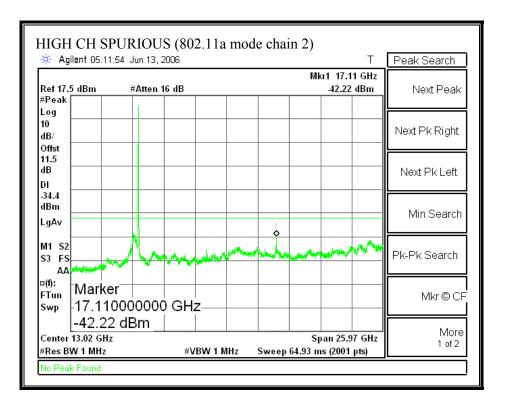


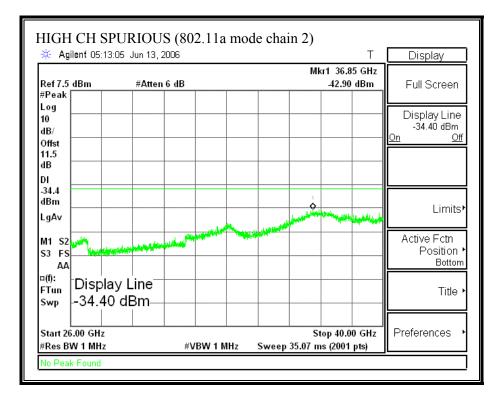
Page 97 of 97





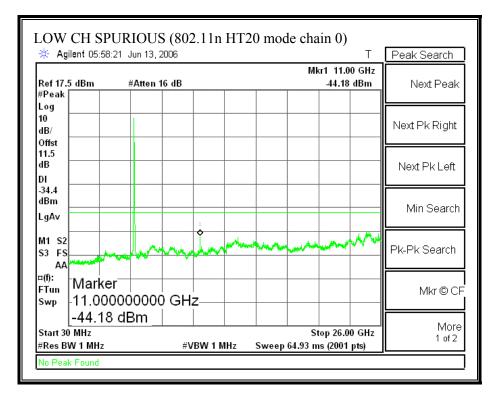
Page 98 of 98

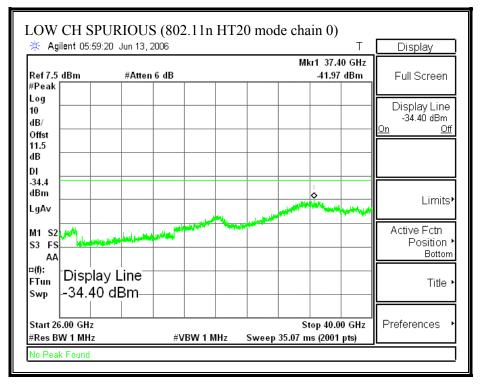




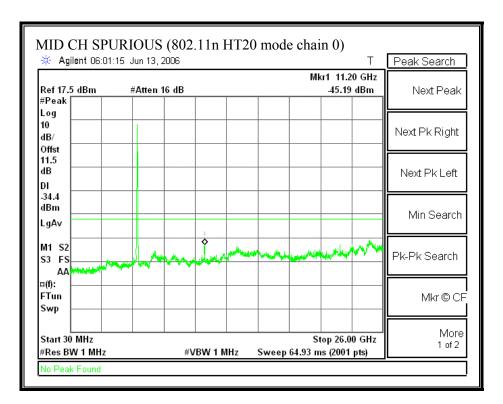
Page 99 of 99

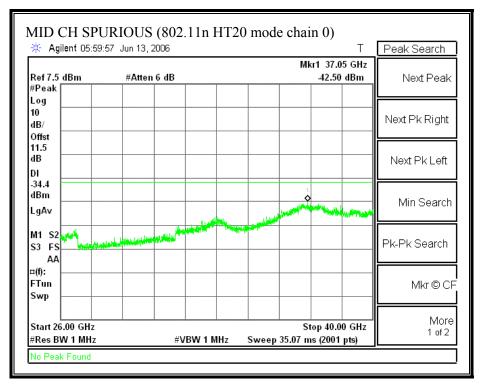
SPURIOUS EMISSIONS (802.11n HT20 MODE CHAIN 0)



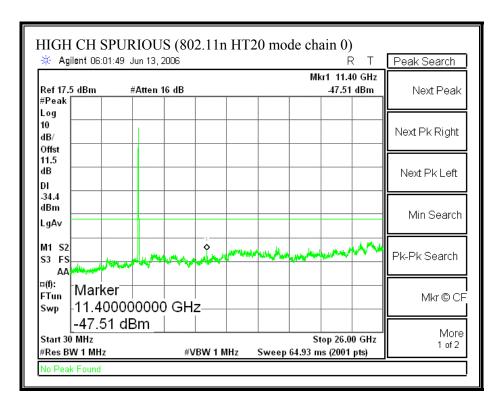


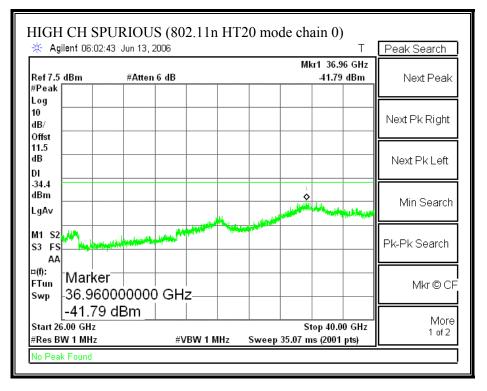
Page 100 of 100





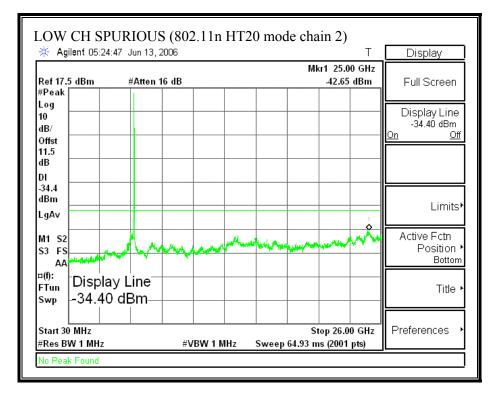
Page 101 of 101

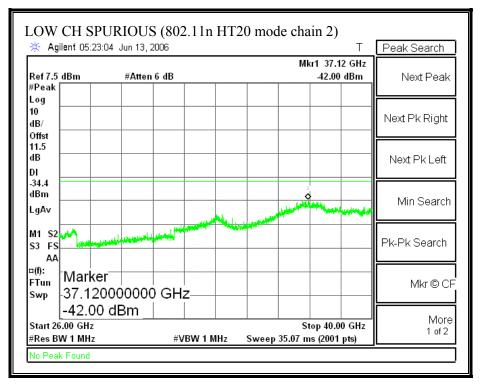




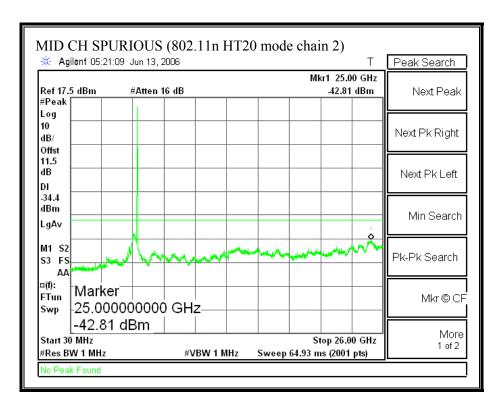
Page 102 of 102

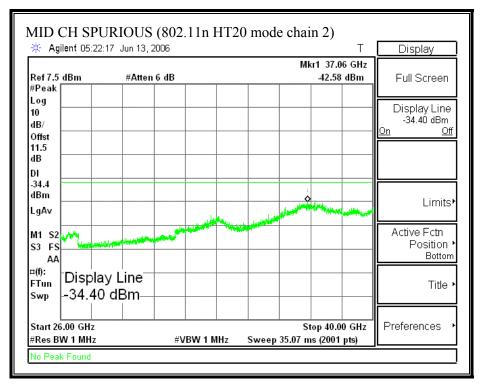
SPURIOUS EMISSIONS (802.11 HT20 MODE CHAIN 2)



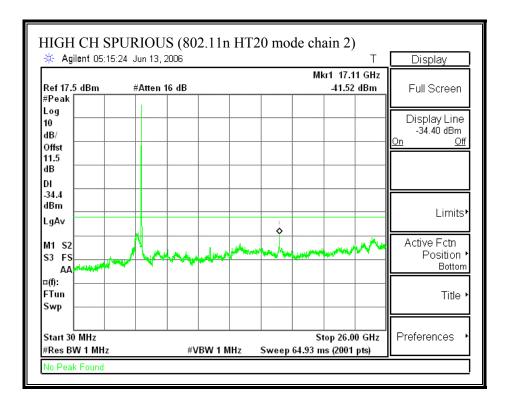


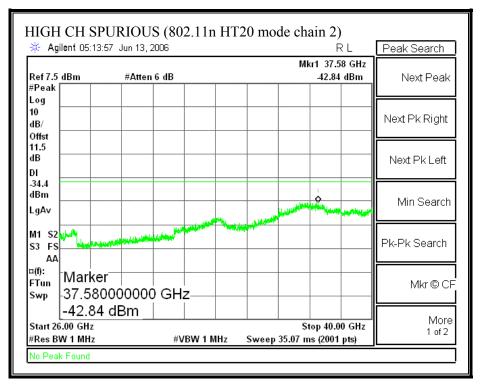
Page 103 of 103





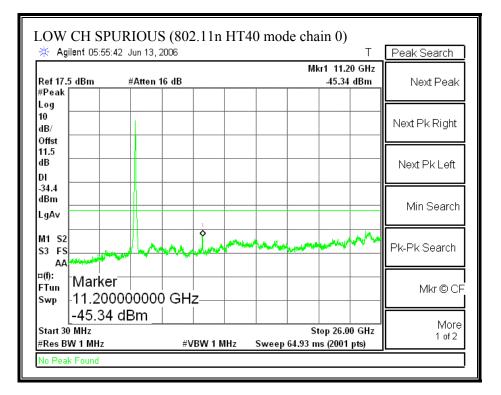
Page 104 of 104

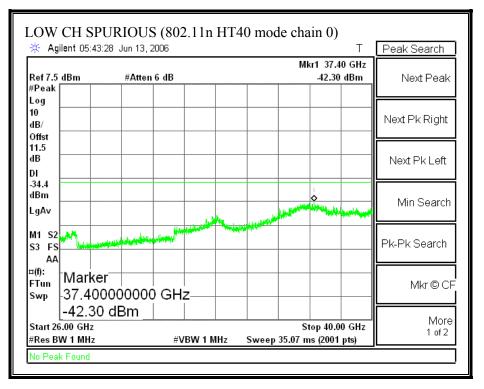




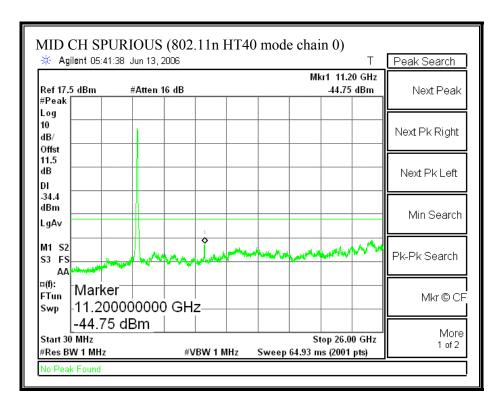
Page 105 of 105

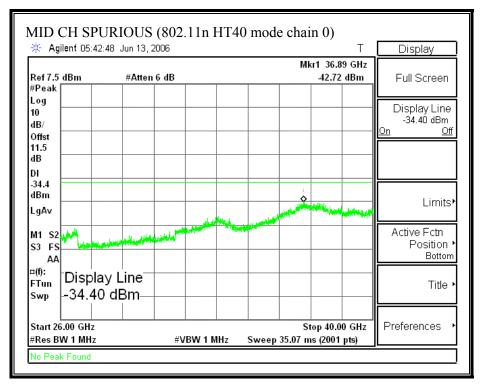
SPURIOUS EMISSIONS (802.11 HT40 MODE CHAIN 0)



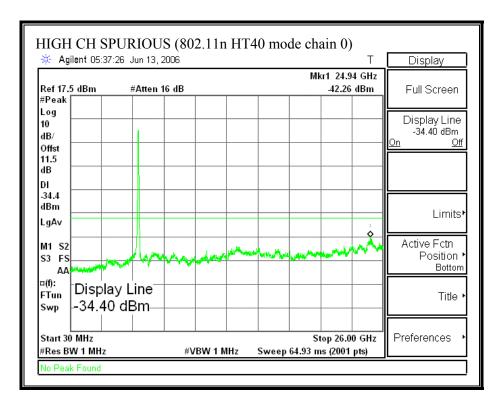


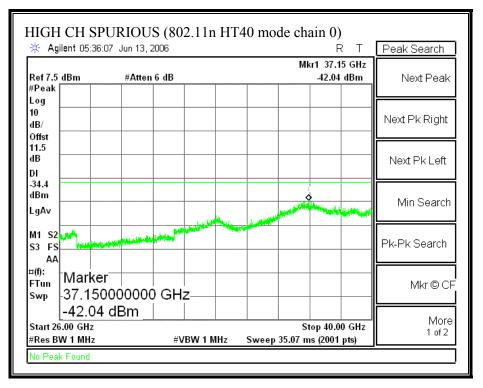
Page 106 of 106





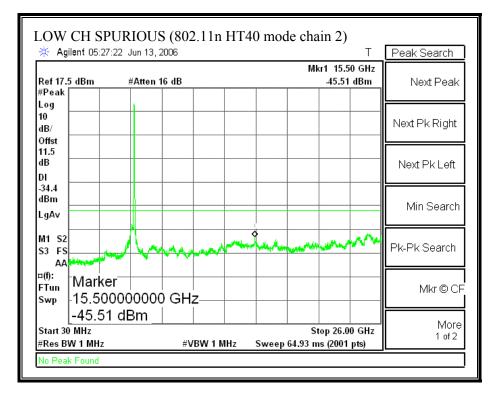
Page 107 of 107

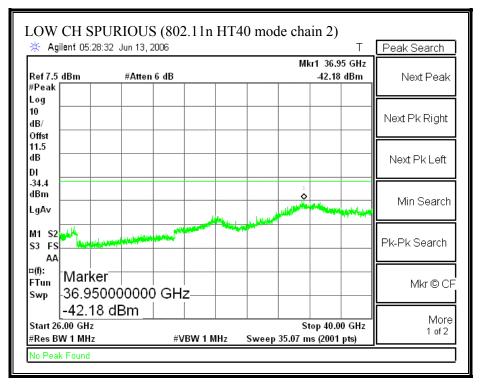




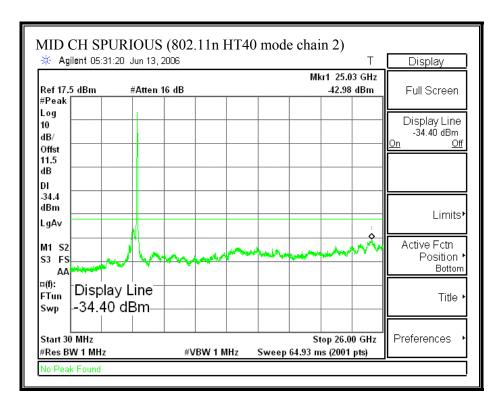
Page 108 of 108

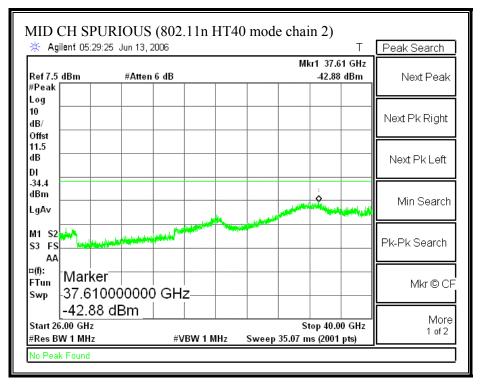
SPURIOUS EMISSIONS (802.11 HT40 MODE CHAIN 2)



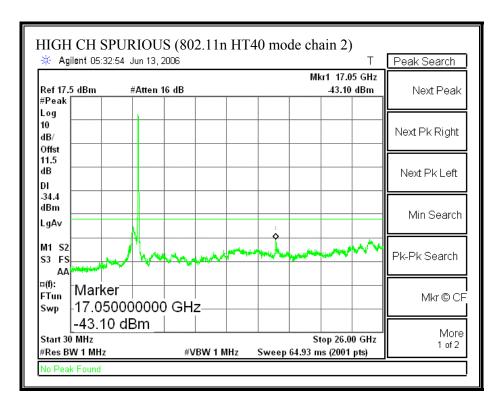


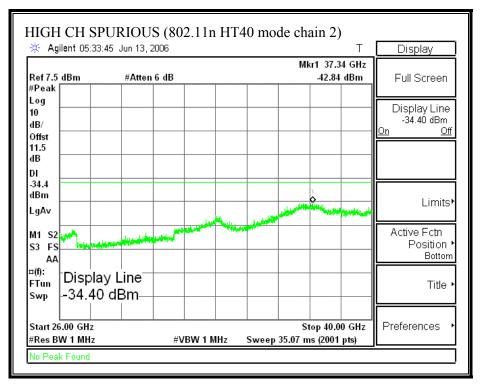
Page 109 of 109





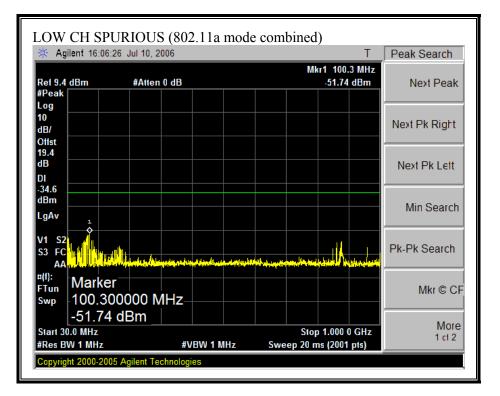
Page 110 of 110

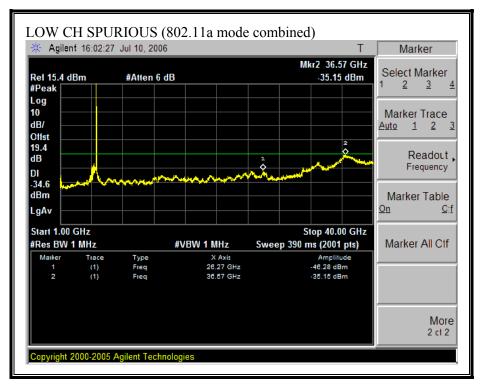




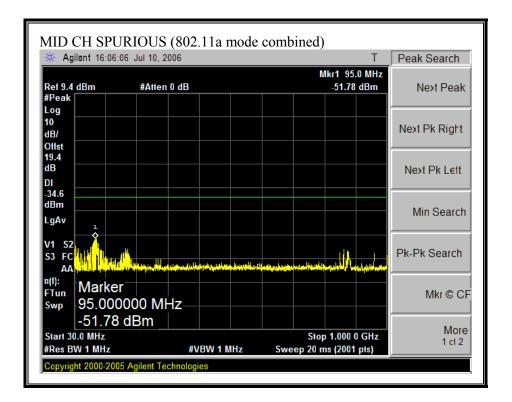
Page 111 of 111

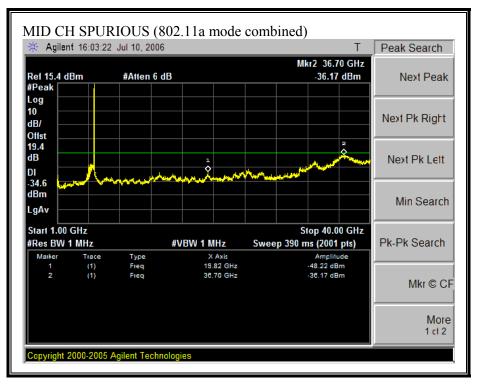
SPURIOUS EMISSIONS (802.11a MODE COMBINED)



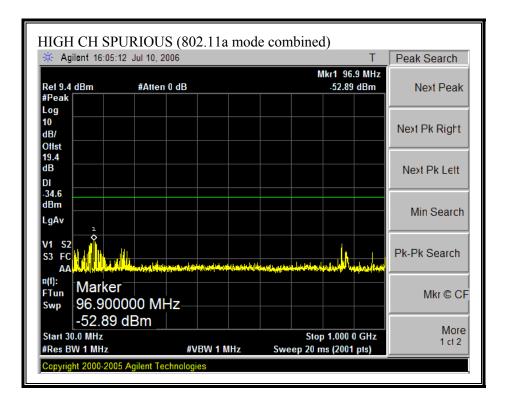


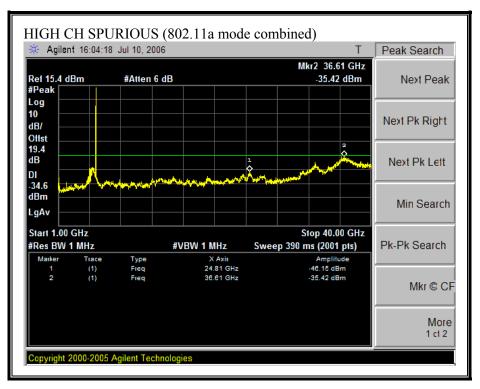
Page 112 of 112





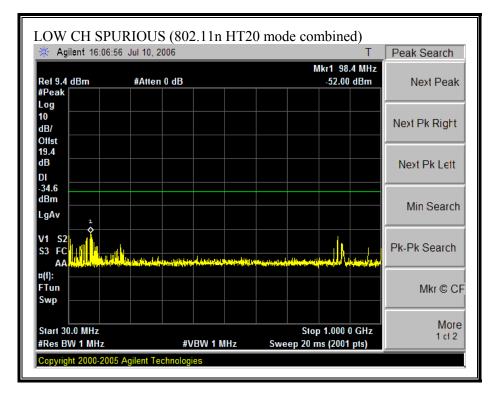
Page 113 of 113

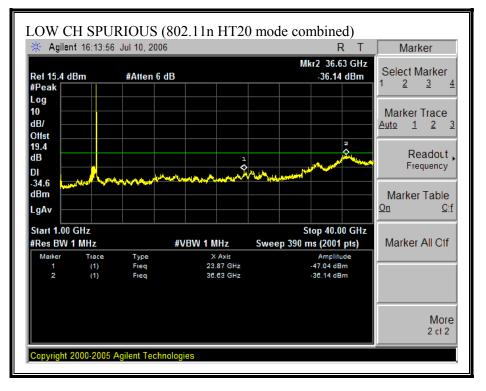




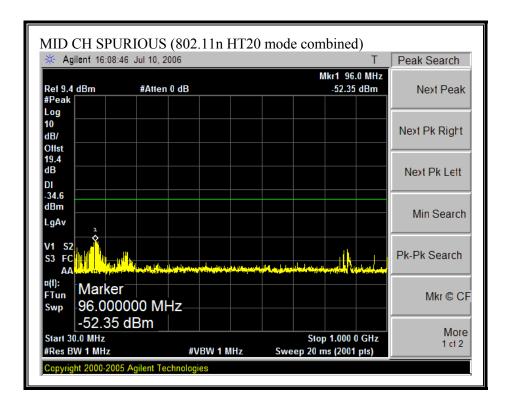
Page 114 of 114

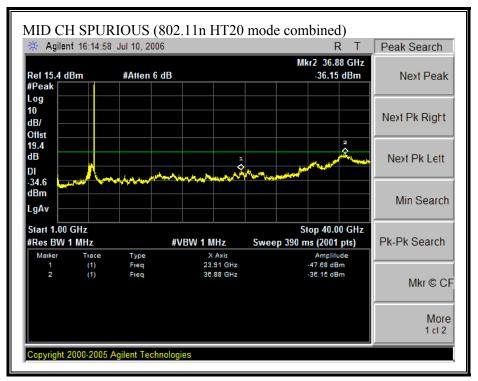
SPURIOUS EMISSIONS (802.11n HT20 MODE COMBINED)



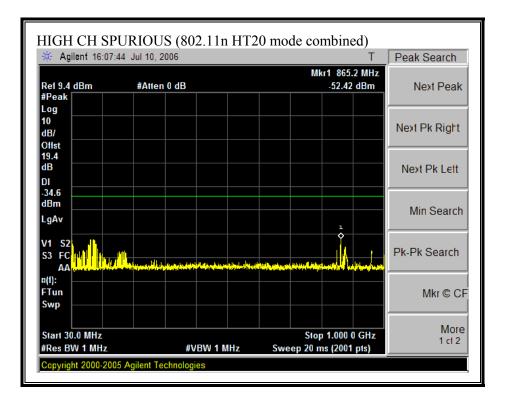


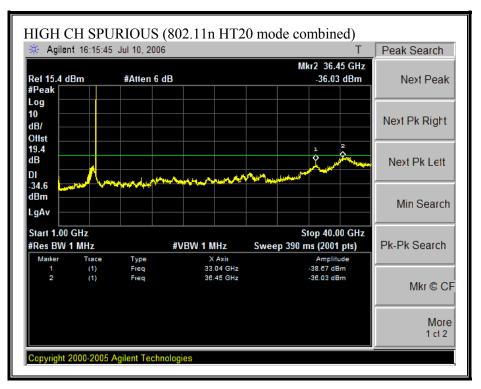
Page 115 of 115





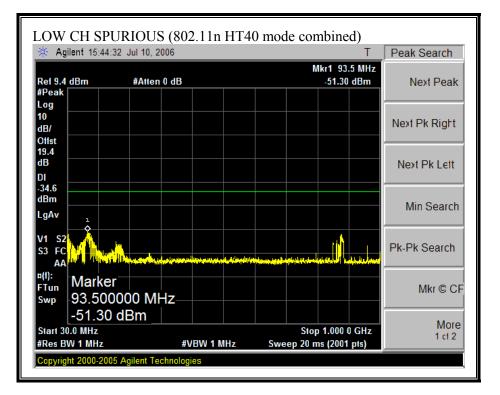
Page 116 of 116

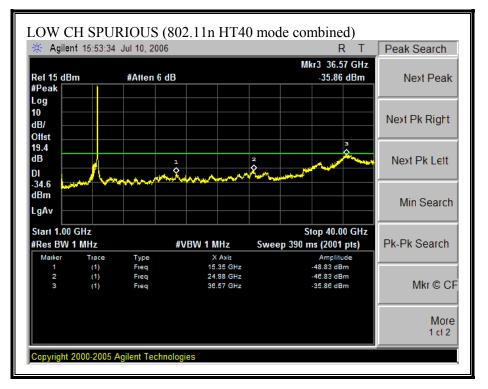




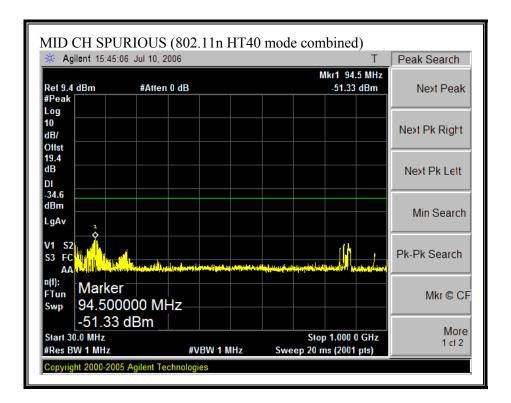
Page 117 of 117

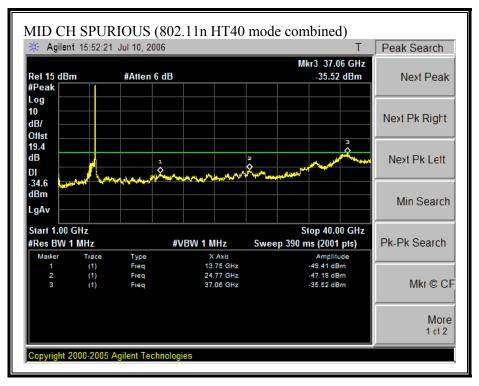
SPURIOUS EMISSIONS (802.11n HT40 MODE COMBINED)



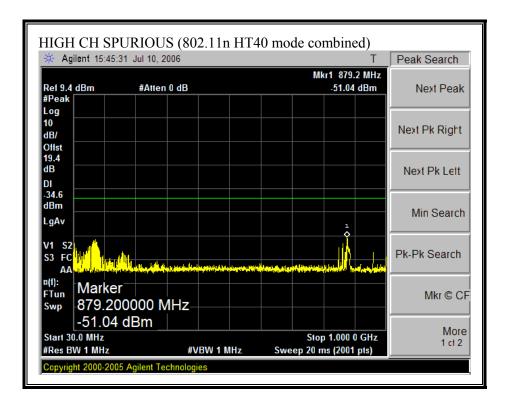


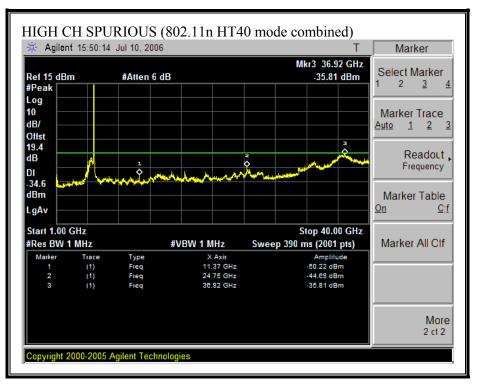
Page 118 of 118





Page 119 of 119





Page 120 of 120

7.2. 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 3.0–30 30–300 300–1500 1500–100,000	614 1842/f 61.4	1.63 4.89/f 0.163	*(100) *(900/f²) 1.0 f/300 5	6 6 6 6 6
(B) Limits	for General Populati	on/Uncontrolled Exp	posure	
0.3–1.34 1.34–30	614 824 <i>/</i> f	1.63 2.19/f	*(100) *(180/f²)	30 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 occupational/controlled limits apply provided the 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 exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure.

exposure or can not exercise control over their exposure.

Page 121 of 121

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 yields: $S = (30 * P * G) / (3770 * (d^2))$

Changing to units of Power to mW and Distance to cm, using: P(W) = P(mW) / 1000 and d(w) = d(w) / 100

d(m) = d(cm) / 100

and substituting the logarithmic form of power and gain using:

 $P(mW) = 10^{(H)} (P(dBm) / 10)$ and $G(numeric) = 10^{(H)} (G(dBi) / 10)$

yields

 $S = 0.0795 * 10^{(P+G)} / 10) / (d^2)$

where

d = MPE distance in cm

P = Power in dBm

G = Antenna Gain in dBi

S = Power Density Limit in mW/cm^2

Page 122 of 122

LIMITS

From \$1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm²

RESULTS

No non-compliance noted: (MPE distance equals 20 cm)

5250 to 5350 MHz Band

Mode	MPE	Total	Antenna	Power
	Distance	Power	Gain	Density
	(cm)	(dBm)	(dBi)	(mW/cm^2)
802.11a *	20.0	17.77	9.21	0.10
802.11n HT20	20.0	20.48	6.20	0.09
802.11n HT40	20.0	19.83	6.20	0.08

5470 to 5725 MHxz Band

Mode	MPE	Total	Antenna	Power
	Distance	Power	Gain	Density
	(cm)	(dBm)	(dBi)	(mW/cm^2)
802.11a *	20.0	18.51	8.35	0.10
802.11n HT20	20.0	20.68	5.34	0.08
802.11n HT40	20.0	20.55	5.34	0.08

* Note: The antenna gain for this mode is the effective legacy gain.

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 123 of 123

7.3. RADIATED EMISSIONS

7.3.1. 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
¹ 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	$(^{2})$
13.36 - 13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² 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 124 of 124

\$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 (MHz)	Field Strength (microvolts/meter)	Measurement Distance (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 125 of 125

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 in 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.

REPORTING NOTES

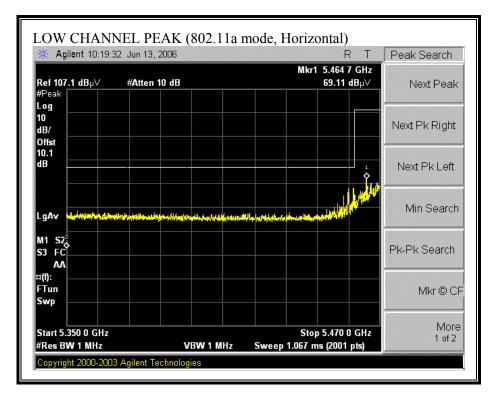
The nearby restricted band stops 10 MHz below the authorized band. A single plot is taken to show both restricted band emission levels and out-of-band radiated spurious emission levels at and near the lower authorized bandedge. The out-of-band spurious limits of -7 dBm Peak EIRP and -27 dBm Average EIRP are converted to the equivalent 3 meter field strengths of 88.2 dBuV/m Peak and 68.2 dBuV/m Average, respectively, for reporting purposes.

The out-of- band radiated spurious emission levels at and near the upper authorized bandedge are reported as EIRP values.

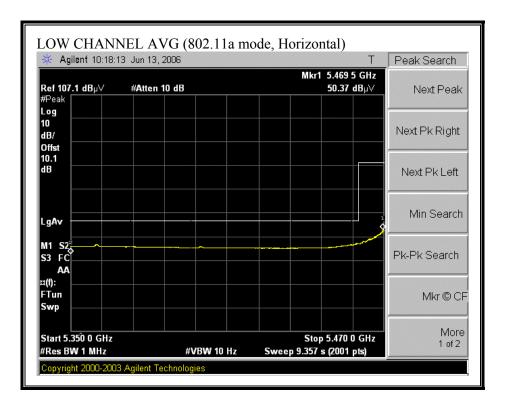
Page 126 of 126

7.3.2. TRANSMITTER ABOVE 1 GHz FOR 5470 TO 5725 MHz BAND WITH PIFA ANTENNAS

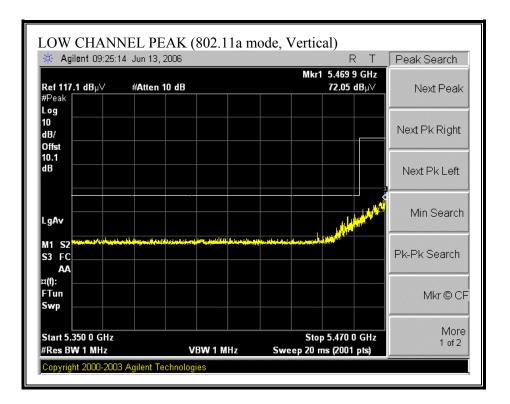
RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL)



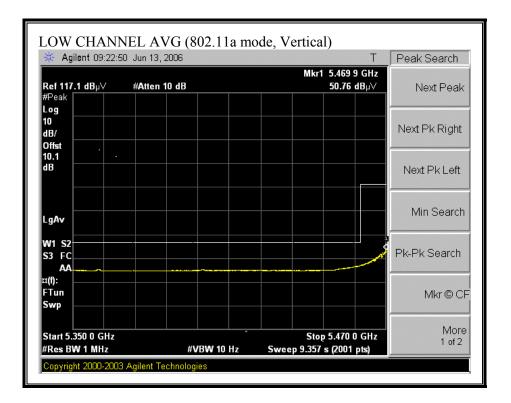
Page 127 of 127



Page 128 of 128

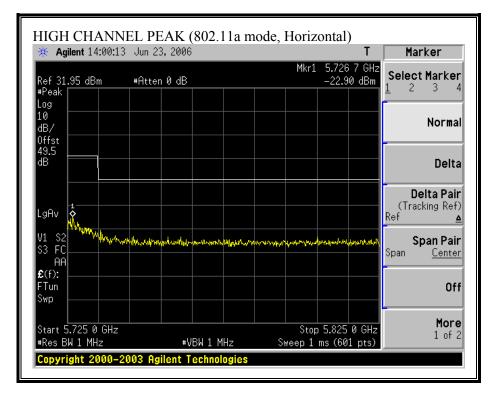


Page 129 of 129



Page 130 of 130

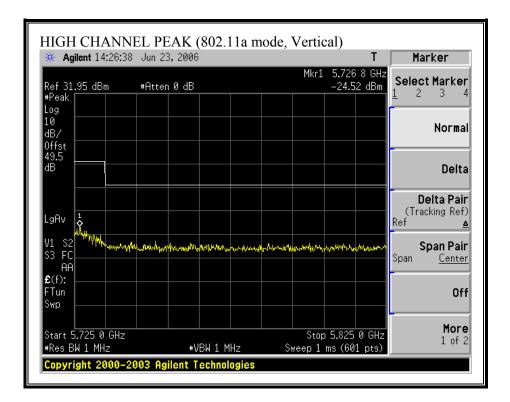
BANDEDGE (802.11a MODE, HIGH CHANNEL)



Page 131 of 131

🔆 Agilent 14:26:38	Jun 23, 2006		Т	Marker
Ref 31.95 dBm	ŧAtten 0 dB		5.726 8 GHz -24.52 dBm	Select Marker
#Peak Log 10 dB/ 0ffst				Normal
dB				Delta
LgAv 1				Delta Pair (Tracking Ref) Ref ▲
AA	nudgenframativetration	ur fan wither Marina Marina Araba Printer Printer	MAN WWWW	Span Pair Span <u>Center</u>
€(f): FTun Swp				Off
Start 5.725 0 GHz #Res BW 1 MHz	#VBW 1 MH		5.825 0 GHz s (601 pts)	More 1 of 2

Page 132 of 132

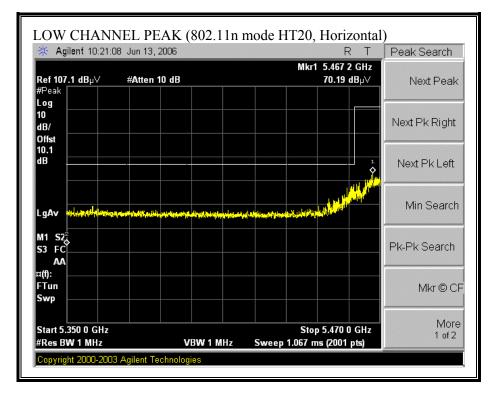


Page 133 of 133

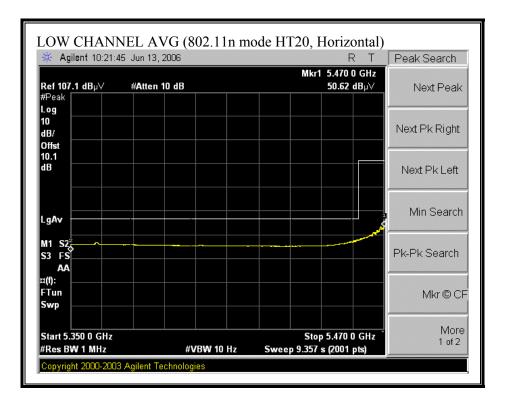
🔆 Agilent 14:25:13	9 Jun 23, 2006	Т	Peak Search
Ref 31.95 dBm	#Atten 0 dB	Mkr1 5.725 0 GH: -40.01 dBm	
#Peak Log 10			
dB/ Offst			Next Pk Right
dB			Next Pk Left
LgAv			Min Search
V1 S2 S3 FC 1 AA			Pk-Pk Search
€(f): FTun Swp			Mkr → CF
Start 5.725 0 GHz #Res BW 1 MHz	#VBW 10 Hz	Stop 5.825 0 GHz z Sweep 7.797 s (601 pts)	

Page 134 of 134

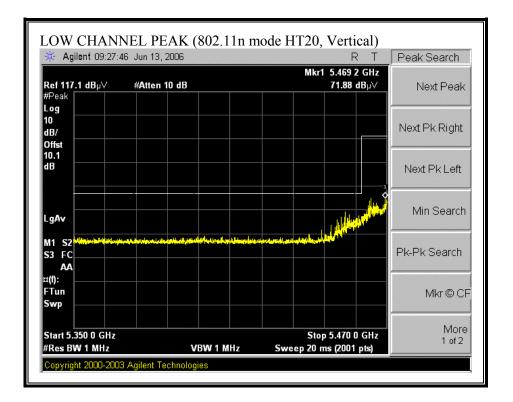
RESTRICTED BANDEDGE (802.11n MODE HT20, LOW CHANNEL)



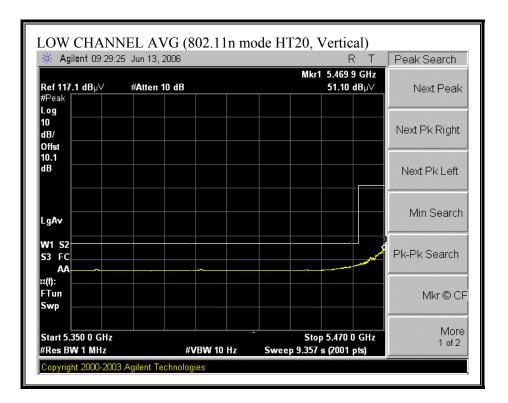
Page 135 of 135



Page 136 of 136

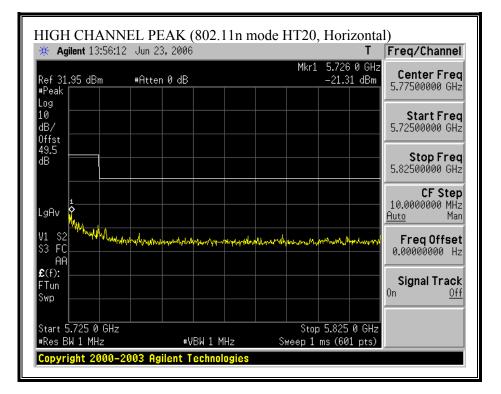


Page 137 of 137



Page 138 of 138

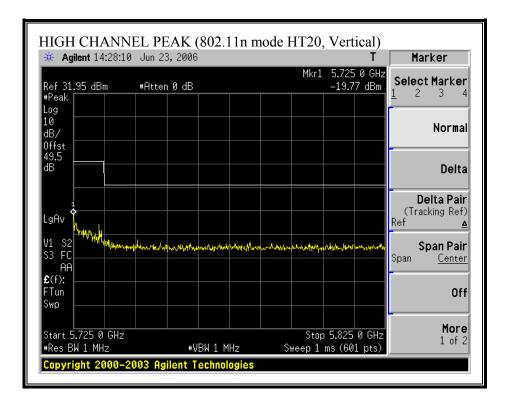
BANDEDGE (802.11n MODE HT20, HIGH CHANNEL)



Page 139 of 139

🔆 Agilent 13:57:	13 Jun 23, 2006	T Marker
Ref 31.95 dBm	#Atten 0 dB	5.725 0 GHz -38.09 dBm 1 2 3
#Peak Log		-
10 dB/		Norma
0ffst 49.5 dB		- Delta
LgAv		Delta Pai (Tracking Ref
V1 S2 S3 FC AA		Span Pail Span <u>Cente</u>
£(f): FTun Swp		Of
Start 5.725 0 GH: #Res BW 1 MHz	z #VBW 10 H	.825 0 GHz [°] More s (601 pts)

Page 140 of 140

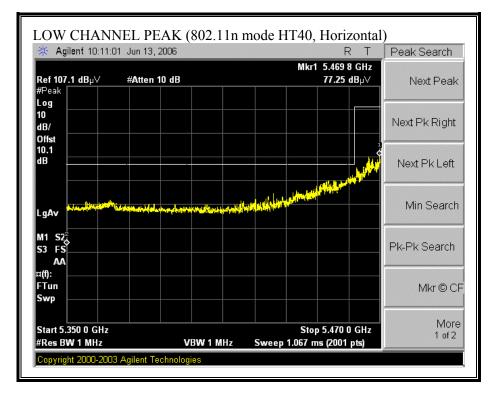


Page 141 of 141

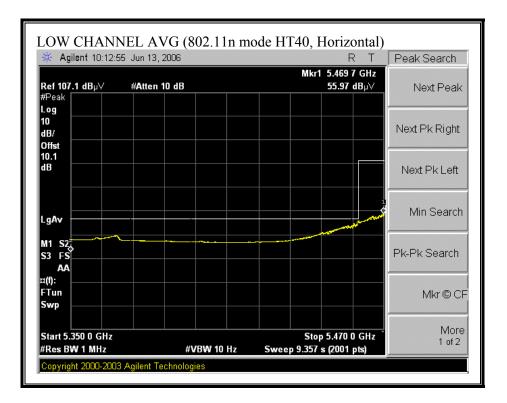
🔆 Agilent 14:29:	08 Jun 23, 2006			R	Τ	Marker
Ref 31.95 dBm	#Atten 0 dB		Mkr1	L 5.725 (-38.44		Select Marker
#Peak Log						± = • ·
10 dB/						Normal
0ffst 49.5 dB						Delta
LgAv						Delta Pair (Tracking Ref) Ref <u>≜</u>
V1 S2 S3 FC						Span Pair Span <u>Center</u>
£ (f): FTun Swp						Off
Start 5.725 0 GH #Res BW 1 MHz		 3W 10 Hz		p 5.825 0 7 s (601		More 1 of 2

Page 142 of 142

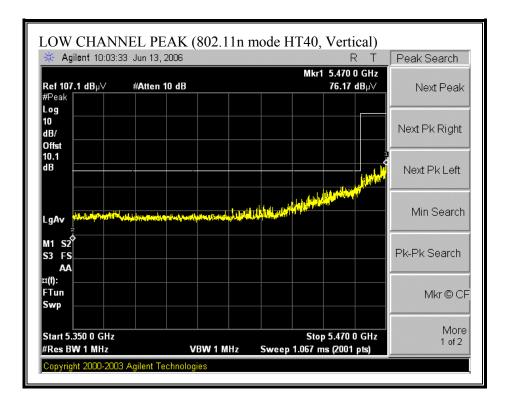
RESTRICTED BANDEDGE (802.11n MODE HT40, LOW CHANNEL)



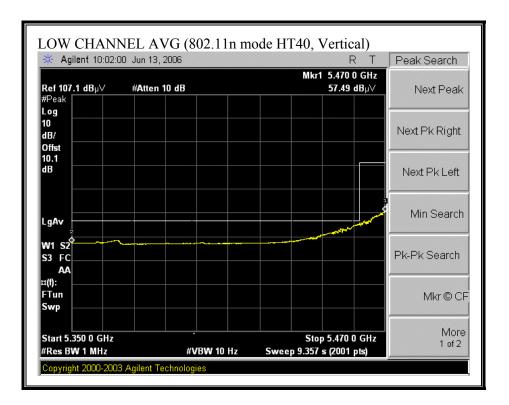
Page 143 of 143



Page 144 of 144

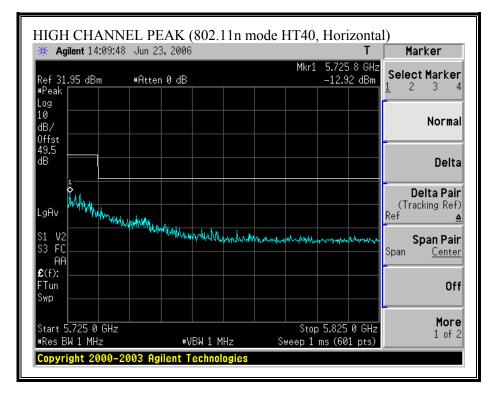


Page 145 of 145

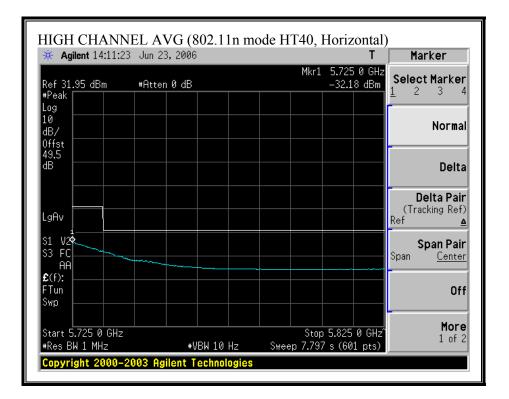


Page 146 of 146

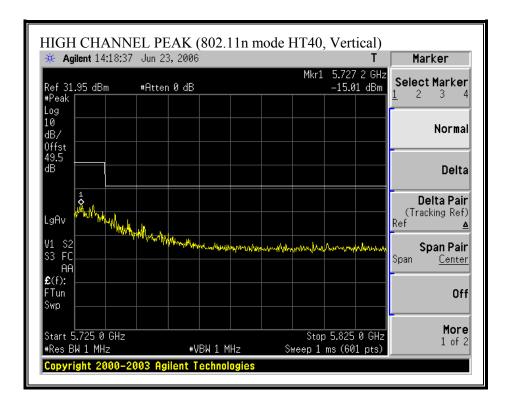
BANDEDGE (802.11n MODE HT40, HIGH CHANNEL)



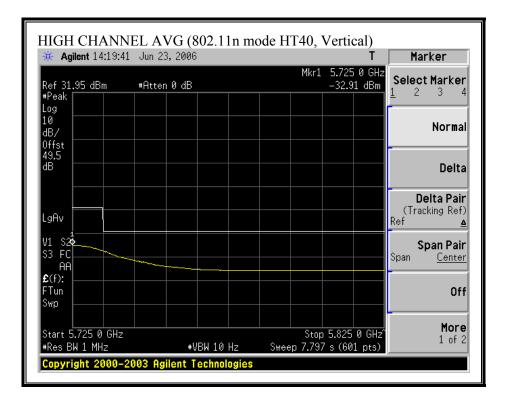
Page 147 of 147



Page 148 of 148



Page 149 of 149



Page 150 of 150

HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

st Eq	uipmen	-													
	orn 1- 5/N: 2238	18GHz		mplifer Miteq 30			Pre-am	plifer	26-40GH		Н	orn > 180	GHz		Limit
	juency Cal	-	• 1144	wited or	00400	931				<u> </u>				•	FCC 15.205
	2 foot		:	3 foot o	able		12	foot o	able		HPF	Re	ject Filte		<u>x Measurements</u> W=VBW=1MHz
			Chin	1975380	101	•	Chin 2	003540	01	HP	F_7.6GHz	•		Avera	ge Measurements 1MHz ; VBW=10Hz
f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBnV/m	Avg dBuV/m	Pk Lim dBuV/m	-	Pk Mar dB	Avg Mar dB	Notes (V/H)
v Ch, 5	500MHz														
00	3.0 3.0	52.0 52.6	37.4 37.6	37.3 37.3	4.3 4.3	-36.3 -36.3	0.0 0.0	0.7 0.7	58.1 58.7	43.5 43.7	74 74	54 54	-15.9 -15.3	-10.5 -10.3	V H
				0110				0.7			/4		-10.0	-10.5	
Ch, 5 200	600MHz 3.0	54.0	40.0	37.3	4.4	-36.1	0.0	0.7	60.3	46.3	74	54	-13.7	-7.7	V
200	3.0	58.2	43.5	37.3	4.4	-36.1	0.0	0.7	64.5	49.8	74	54	-9.5	-4.2	H
h Ch,	5700MH	z													
400	3.0	58.6	43.3	37.4	4.4	-35.9	0.0	0.7	65.2	49.8	74	54	-8.8	-4.2	V
400	3.0	61.0	46.9	37.4	4.4	-35.9	0.0	0.7	67.5	53.4	74	54	-6.5	-0.6	H
7. 5.1.6 (e: No	f Dist Read AF		eading actor		m noise	Amp	Average	Corre Field S d Pea	ct to 3 mete Strength @ k Field Stre	3 m		Pk Lim Avg Mar	Peak Fiel Margin vs	Field Strengtl d Strength Li S. Average Li S. Peak Limit	imit imit

Page 151 of 151

HARMONICS AND SPURIOUS EMISSIONS (802.11n HT20 MODE)

C			Services, M	Jigan	VI	on riel	a one								
	iy:Athei #:06U1														
Date:6/2	21/2006														
		Chin Pang													
		UT/ED4 A Hz Band, I													
	uipmen	18GHz	Pre-ar	molife	1-260		Pre-am	nlifer	26-40GH	-	L	orn > 180	CH-7		Limit
	S/N: 2238			Miteq 30			Tre-am	piner	20-40011	- -			0112	•	FCC 15.205
Hi Frec	quency Cab	oles —				_								_	
	2 foot	cable	3	6 foot o	able		121	foot c	able		HPF	Re	eject Filte		k Measurements W=VBW=1MHz
			Chin	1975380	001	•	Chin 20	035400	•		PF_7.6GHz	•			ige Measurements 1MHz ; VBW=10Hz
f	Dist		Read Avg.	1	CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim		1	Avg Mar	
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
Low Ch, 5 11.000	500MHz 3.0	53.3	37.5	37.3	4.3	-36.3	0.0	0.7	59.4	43.6	74	54	-14.6	-10.4	v
1.000	3.0	54.5	38.0	37.3	4.3	-36.3	0.0	0.7	60.6	44.1	74	54	-13.4	-9.9	H
did Ch. 4	600MHz														
1.200	3.0	56.0	43.0	37.3	4.4	-36.1	0.0	0.7	62.3	49.3	74	54	-11.7	-4.7	v
1.200	3.0	58.0	43.5	37.3	4.4	-36.1	0.0	0.7	64.3	49.8	74	54	- 9.7	-4.2	H
ligh Ch	5700MH	z							<u> </u>						
1.400	3.0	59.6	46.5	37.4	4.4	-35.9	0.0	0.7	66.1	53.0	74	54	-7.9	- 1.0	v
1.400	3.0	60.3	47.2	37.4	4.4	-35.9	0.0	0.7	66.8	53.7	74	54	-7.2	-0.3	H
	-														
Rev. 5.1.6															
		ssions were	detected above	the syste	em noise	floor.									
			ent Frequenc	у		Amp	Preamp (ield Strengt	
		Distance to							ct to 3 mete					d Strength L	
		Analyzer R	-			Avg			Strength @			-	-	. Average L	
	AF	Antenna Fa				Peak HPF	Calculate High Pase		c Field Stre	ngth		PK Mar	iviargin vs	. Peak Limit	L.
	CL	Cable Loss													

Page 152 of 152

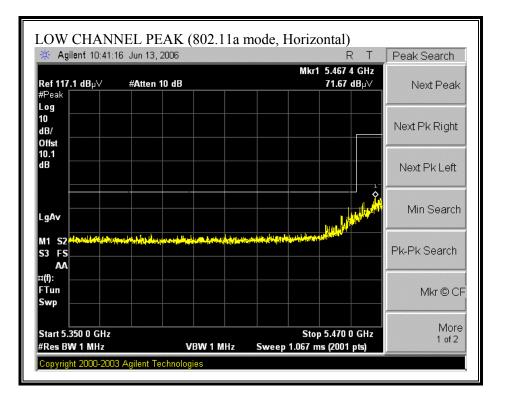
HARMONICS AND SPURIOUS EMISSIONS (802.11n HT40 MODE)

	tion:E ., 5.5G	Chin Pang UT/ED4 A Hz Band, F													
		- I8GHz	Pre-ar	nplifer	1-26	GHz	Pre-am	plifer	26-40GH	z	н	orn > 180	GHz		Limit
T60; S/N				liteq 30						-				-	FCC 15.205
Hi Freque	ency Cab	les —				_									·
2	foot	cable	3	foot	able		12	foot c	able		HPF	Re	ject Filte	F	k Measurements W=VBW=1MHz
			Chin	1975380	01	•	Chin 20	03540	01 🗸	HP	F_7.6GHz	•		Avera	inge Measurements 1MHz ; VBW=10Hz
	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	_	Pk Mar dB	Avg Mar dB	Notes (V/H)
v Ch, 551 020	_		36.0	37.3	4.3	-36.3	0.0	0.7	57.1	42.1	74	54	-16.9	-11.9	V
020	3.0 3.0	51.0 50.0	35.6	37.3 37.3	4.3 4.3	-30.3 -36.3	0.0	0.7	57.1 56.1	42.1 41.7	74 74	54 54	-10.9 -17.9	-11.9 -12.3	H H
l Ch, 560	00MHz														
200 200	3.0 3.0	54.0 55.2	40.0 41.0	37.3 37.3	4.4 4.4	-36.1 -36.1	0.0 0.0	0.7 0.7	60.3 61.5	46.3 47.3	74 74	54 54	-13.7 -12.5	-7.7 -6.7	V H
gh Ch, 57															
.380	3.0	57.0	43.0	37.4	4.4	-35.9	0.0	0.7	63.5	49.5	74	54	-10.5	-4.5	V
380	3.0	58.0	44.0	37.4	4.4	-35.9	0.0	0.7	64.5	50.5	74	54	-9.5	-3.5	H
v. 5.1.6 te: No oth	her emi	ssions were d	letected above t	the syste	m noise	floor.									
f			nt Frequency	у		Amp	Preamp (ield Strengt	
		Distance to Analyzer Ro				D Corr Avg			ct to 3 mete Strength @					l Strength L . Average L	
		Antenna Fa				Peak			c Field Stre					Peak Limi	
C	CL	Cable Loss				HPF	High Pas	s Filter							

Page 153 of 153

7.3.3. TRANSMITTER ABOVE 1 GHz FOR 5470 TO 5725 MHz BAND WITH MONOPOLE ANTENNAS

RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL)



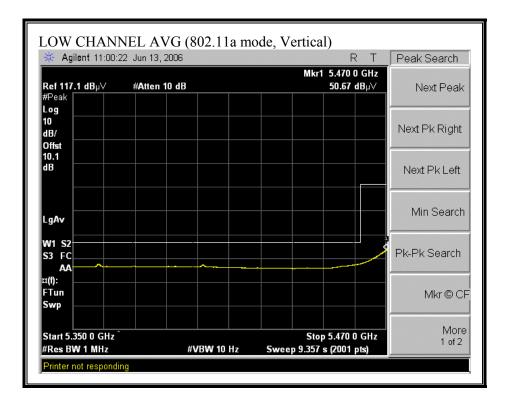
Page 154 of 154

🔆 Agilent 10:42:3	30 Jun 13, 2006			RT	Peak Search
Ref 117.1 dB µ∨ #Peak	#Atten 10 dB		Mkr1	5.470 0 GHz 54.41 dBµ∨	Next Peak
Log 10 dB/ Offst					Next Pk Right
dB					Next Pk Left
LgAv					Min Search
M1 S2 S3 FS AA					Pk-Pk Search
¤(f): FTun Swp					Mkr © Cf
Start 5.350 0 GHz #Res BW 1 MHz		#VBW 10 Hz	Sweep 9.357 s	5.470 0 GHz	More 1 of 2

Page 155 of 155

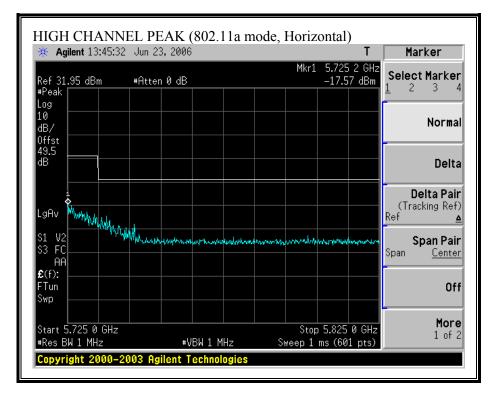
🔆 Agilent 10:59:	43 Jun 13, 2006		RT	Peak Search
Ref 117.1 dB µ∨ #Peak	#Atten 10 dB	Mkr1	5.466 8 GHz 68.25 dBµ∨	Next Peak
Log 10 dB/ Offst				Next Pk Right
dB				Next Pk Left
LgAv				Min Search
M1 S2 S3 FS AA	aydony qalaacantiis, o shikainnintii squadiadd	ya Artai Magi, a Isirika pilanga ang pingkang		Pk-Pk Search
≭(f): FTun Swp				Mkr © CF
Start 5.350 0 GHz #Res BW 1 MHz	VBW 1 I		5.470 0 GHz	More 1 of 2

Page 156 of 156



Page 157 of 157

BANDEDGE (802.11a MODE, HIGH CHANNEL)



Page 158 of 158

🔆 Agilent 13:48:01	Jun 23, 2006				T [Marker
Ref 31.95 dBm	#Atten 0 dB		Mk	r1 5.725 -33.3		Select Marker
#Peak Log						
10 dB/						Normal
Offst 49.5						
dB						Delta
						Delta Pair
LgAv						(Tracking Ref) Ref
S1 V2 S3 FC AA						Span Pair Span <u>Center</u>
£(f):						
FTun Swp						Off
0110						
Start 5.725 0 GHz			St	op 5.825	0 GHzî	More 1 of 2
#Res BW 1 MHz	#VBW :	10 Hz				I UT Z

Page 159 of 159

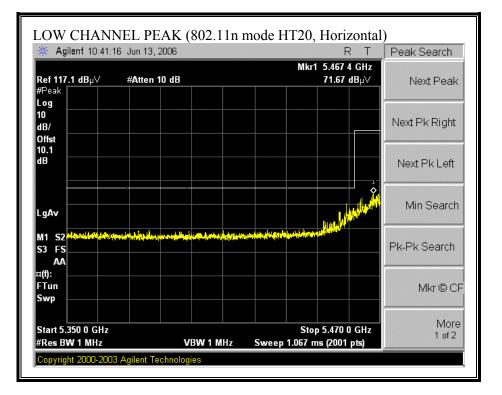
HIGH CHANNEI * Agilent 12:03:53 J		i i a incuc, i cit	T	Peak Search
Ref 31.95 dBm #	Atten ØdB	Mkr	1 5.726 7 GHz -24.87 dBm	
Log 10 dB/ Offst				Next Pk Right
49.5 dB				Next Pk Left
LgAv				Min Search
M1 S2 S3 FC AA	umruryadayaman.	n Untritante North y work of the Part of t	howare and a second the second	Pk-Pk Search
£ (f): FTun Swp				Mkr → CF
Center 5.775 0 GHz #Res BW 1 MHz	#VBW 1 M	1Hz Sweep :	Span 100 MHz 1 ms (601 pts)	More 1 of 2

Page 160 of 160

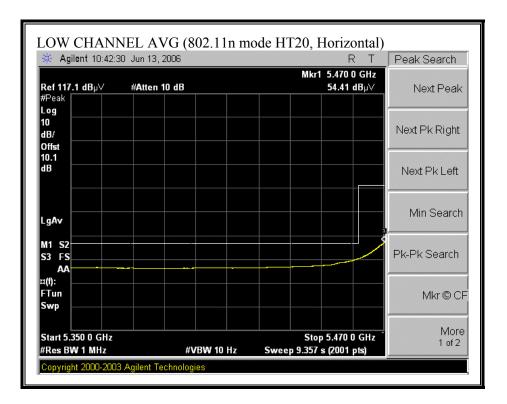
* Agilent 12:05:2	9 Jun 23, 2006	Т	Peak Search
Ref 31.95 dBm	#Atten 0 dB	Mkr1 5.725 0 GHz -40.21 dBm	
#Peak Log 10 dB/			Next Pk Right
0ffst 49.5 dB			Next Pk Left
LgAv			Min Search
M1 S2 S3 FC 2 AA			Pk-Pk Search
£(f): FTun Swp			Mkr → CF
Center 5.775 0 GH #Res BW 1 MHz	z ^ #VBW 10 H;	Span 100 MHz z Sweep 7.797 s (601 pts)	

Page 161 of 161

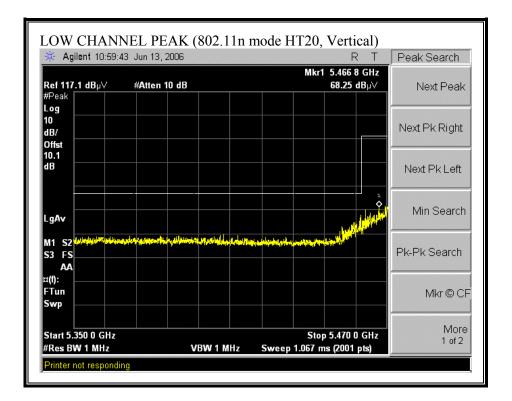
RESTRICTED BANDEDGE (802.11n MODE HT20, LOW CHANNEL)



Page 162 of 162



Page 163 of 163

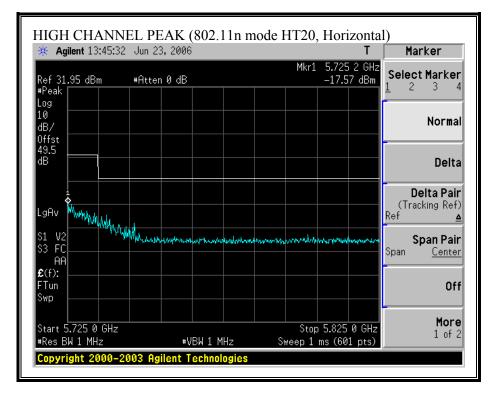


Page 164 of 164

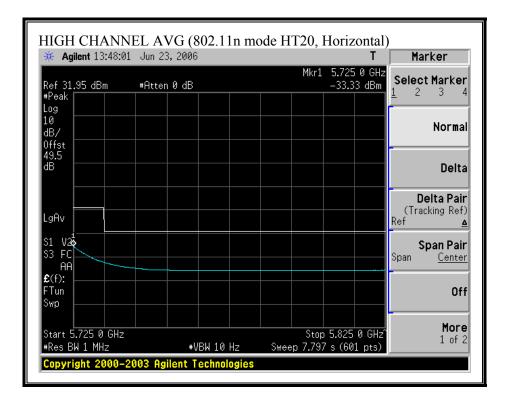
🔆 Agilent 11:00:2	22 Jun 13, 2006		RT	Peak Search
Ref 117.1 dB µ∨ #Peak	#Atten 10 dB		Mkr1 5.470 0 GHz 50.67 dBµ∨	Next Peak
Log 10 dB/ Offst				Next Pk Right
dB				Next Pk Left
LgAv				Min Search
W1 S2 S3 FC AA				Pk-Pk Search
¤(f): FTun Swp				Mkr © CF
Start 5.350 0 GHz Î #Res BW 1 MHz	#VBW 1	IO Hz Sween	Stop 5.470 0 GHz 9.357 s (2001 pts)	More 1 of 2

Page 165 of 165

BANDEDGE (802.11n MODE HT20, HIGH CHANNEL)



Page 166 of 166



Page 167 of 167

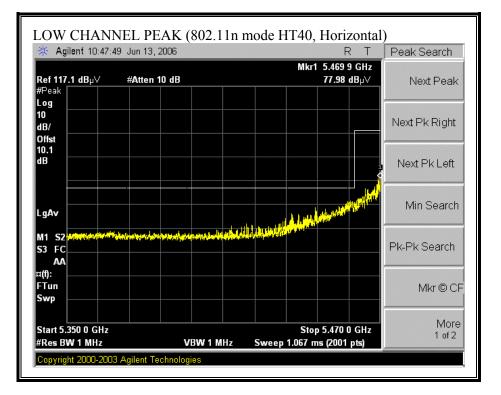
🔆 Agilent 12:03:53 Ju	n 23,2006		Т	Peak Search
Ref 31.95 dBm #F #Peak	tten 0 dB		.726 7 GHz 24.87 dBm	Next Peak
Log 10 dB/ 0ffst				Next Pk Right
49.5 dB				Next Pk Left
LgAv				Min Search
M1 S2 S3 FC AA	an a	mananan ana ang karang kara	www.parentalisest	Pk-Pk Search
£(f): FTun Swp				Mkr → CF
Center 5.775 0 GHz #Res BW 1 MHz	#VBW 1 MHz	Spa Sweep 1 ms	n 100 MHz (601 pts)	More 1 of 2

Page 168 of 168

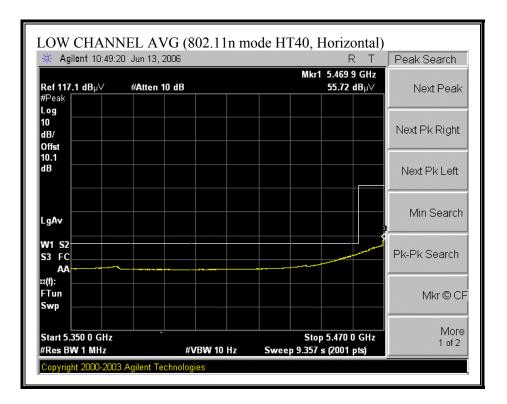
	EL AVG (802.1	1n mode HT2	0, Vertical)	
🔆 🔆 Agilent 12:05:29	Jun 23, 2006		Т	Peak Search
Ref 31.95 dBm #Peak	#Atten 0 dB	٨	1kr1 5.725 0 GHz -40.21 dBm	Next Peak
Log 10 dB/				Next Pk Right
0ffst 49.5 dB				Next Pk Left
LgAv				Min Search
M1 S2 S3 FC AA				Pk-Pk Search
£(f): FTun Swp				Mkr → CF
Center 5.775 0 GHz #Res BW 1 MHz	#VBW 10	Hz Sweep 7	Span 100 MHz '.797 s (601 pts)	More 1 of 2
Copyright 2000-2	003 Agilent Techno	logies		

Page 169 of 169

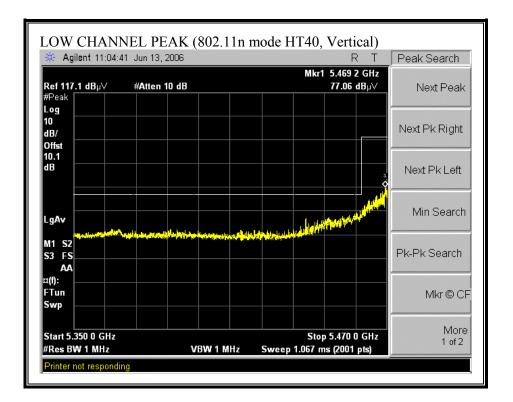
RESTRICTED BANDEDGE (802.11n MODE HT40, LOW CHANNEL)



Page 170 of 170



Page 171 of 171

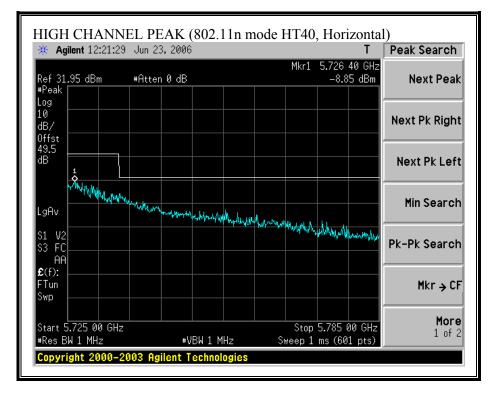


Page 172 of 172

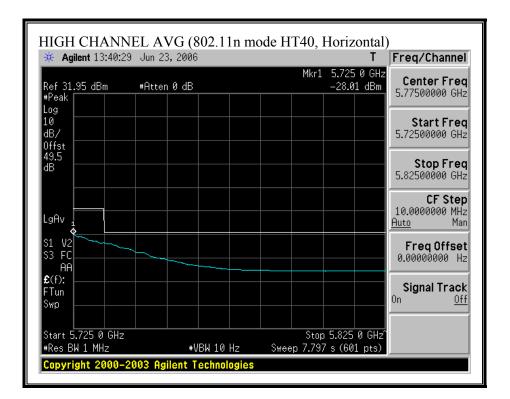
🔆 Agilent 11:02:01	Jun 13, 2006	RT	Peak Search
Ref 117.1 dBµ∨ #Peak	#Atten 10 dB	Mkr1 5.470 0 GHz 55.01 dBμ∨	Next Peak
Log 10 dB/ Offst			Next Pk Right
dB			Next Pk Left
LgAv			Min Search
W1 S2 S3 FC AA			Pk-Pk Search
≭(f): FTun Swp			Mkr © Cl
Start 5.350 0 GHz #Res BW 1 MHz	#VBW 10 H	Stop 5.470 0 GHz z Sweep 9.357 s (2001 pts)	More 1 of 2

Page 173 of 173

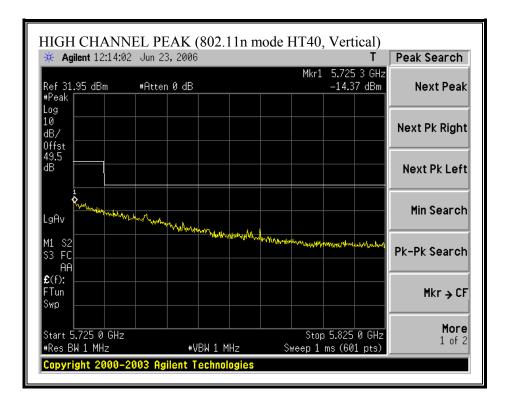
BANDEDGE (802.11n MODE HT40, HIGH CHANNEL)



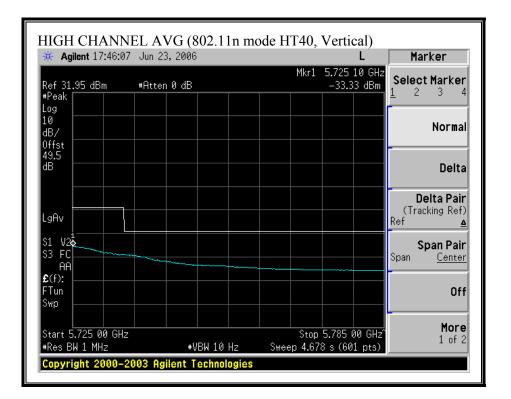
Page 174 of 174



Page 175 of 175



Page 176 of 176



Page 177 of 177

HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

est Eq																
est Equipment: Horn 1-18GHz Pre-amplifer 1-26GHz										1						
н	orn 1-	18GHz	Pre-ar	nplifer	1-260	GHz	Pre-am	plifer	26-40GH	z	H	orn > 180	GHz		Limit	
T60; S	S/N: 2238	@3m	▼ T144 N	liteq 30	08A009	931 🗸								•	FCC 15.205	
- Hi Fred	Hi Frequency Cables				able		12 foot cable Chin 200354001				HPF	Re	Keject Filter		<u>Peak Measurements</u> RBW=VBW=1MHz verage Measurements	
				197538001			Chin 200334001				F_7.6GHz	•			<u>ge Measurements</u> 1MHz ; VBW=10Hz	
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)	
ow Ch, 5	500MHz															
.000 .000	3.0 3.0	50.0 48.5	36.7 35.4	37.3 37.3	4.3 4.3	-36.3 -36.3	0.0 0.0	0.7 0.7	56.1 54.6	42.8 41.5	74 74	54 54	-17.9 -19.4	-11.2 -12.5	V H	
id Ch, 5	600MHz															
1.200 1.200	3.0 3.0	53.5	40.0 36.5	37.3 37.3	4.4	-36.1	0.0 0.0	0.7 0.7	59.8 57.5	46.3 42.8	74 74	54 54	-14.2 -16.5	-7.7 -11.2	V H	
		51.2	30.5	37.3	4.4	-36.1	0.0	0.7	37.3	42.8	/4	24	-10.5	-11.4	H	
igh Ch, 1.400	5700MH	59.8	46.7	37.4	4.4	-35.9	0.0	0.7	66.3	53.2	74	54	-7.7	-0.8	v	
L.400	3.0	59.8 53.0	40.7	37.4	4.4	-35.9	0.0	0.7	59.5	46.5	74 74	54 54	-14.5	-0.8	H	
ev. 5.1.6 ote: No	other emi		letected above		m noise								·			
		Measureme Distance to	ent Frequency	у		Amp Preamp Gain Avg Lim Average Field Streng D Corr Distance Correct to 3 meters Pk Lim Peak Field Streng										
		Analyzer R				Avg			Strength @					Average L		
		Antenna Fa				Peak	Calculate	d Peal	c Field Stre			-	-	i vs. Peak Limit		
	CL	Cable Loss				HPF	High Pas	s Filter								

Page 178 of 178

HARMONICS AND SPURIOUS EMISSIONS (802.11n HT20 MODE)

Н	orn 1-	18GHz	Pre-ar	nplifer	1-260	GHz	Pre-amplifer 26-40GHz				Н		Limit			
	VN: 2238	-	▼ T144 N	liteq 30	08A009	31 🗸				•				•	FCC 15.205	
	2 foot cable			3 foot cable			12 foot cable			HPF		Reject Filter		RB	Peak Measurements RBW=VBW=1MHz	
			Chin	1975380	01	•	Chin 20	03540	•		F_7.6GHz	•			ige Measurements 1MHz ; VBW=10Hz	
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m		Avg Mar dB	Notes (V/H)	
ow Ch, 5 1.000 1.000	500MHz 3.0 3.0	52.0 47.0	38.2 33.7	37.3 37.3	4.3 4.3	-36.3 -36.3	0.0 0.0	0.7 0.7	58.1 53.1	44.3 39.8	74 74	54 54	-15.9 -20.9	-9.7 -14.2	V H	
	600MHz															
1.200 1.200	3.0 3.0	57.0 50.0	42.5 35.0	37.3 37.3	4.4 4.4	-36.1 -36.1	0.0 0.0	0.7 0.7	63.3 56.3	48.8 41.3	74 74	54 54	-10.7 -17.7	-5.2 -12.7	V H	
ligh Ch, 1.400 1.400	5700MH 3.0 3.0	59.5 55.0	45.0 41.0	37.4 37.4	4.4 4.4	-35.9 -35.9	0.0 0.0	0.7 0.7	66.0 61.5	51.5 47.5	74 74	54 54	-8.0 -12.5	-2.5 -6.5	V H	
ev. 5.1.6						_	<u></u>	<u> </u>	<u> </u>	<u></u>		<u>[</u>	<u>[</u>	<u> </u>		
ote: No other emissions were detected above the system nois f Measurement Frequency Dist Distance to Antenna Read Analyzer Reading AF Antenna Factor						Amp	o Preamp Gain orr Distance Correct to 3 meters Average Field Strength @ 3 m						Avg Lim Average Field Strength Limit Pk Lim Peak Field Strength Limit Avg Mar Margin vs. Average Limit Pk Mar Margin vs. Peak Limit			
	CL	Cable Loss				HPF	High Pas			gui		111111			-	

Page 179 of 179

HARMONICS AND SPURIOUS EMISSIONS (802.11n HT40 MODE)

T60; S/N: 2238 @3m T Hi Frequency Cables 2 foot cable	e-amplifer 1: 44 Miteq 3008 3 foot cal hin 197538001	3A00931 - ble		foot c		z •		orn > 180	Hz	Ţ	Limit FCC 15.205	
tode:TX, 5.5GHz Band, HT40 est Equipment: Horn 1-18GHz Pr T60; S/N: 2238 @3m T Hi Frequency Cables T C C f Dist Read Pk Read A GHz (m) dBuV dBu w Ch, 5510MHz 0.00 3.0 51.4 36.5 .020 3.0 47.5 33.0 id Ch, 5600MHz C C C	e-amplifer 1: 44 Miteq 3008 3 foot cal hin 197538001	3A00931 ↓ ble	12	foot c	able			orn > 180	ЭНz	T	FCC 45 205	
Horn 1-18GHz Pr T60; S/N: 2238 @3m T Hi Frequency Cables T Z foot cable C f Dist Read Pk Read A GHz (m) dBuV dBu' 020 3.0 51.4 36.5 .020 3.0 47.5 33.0 d Ch, 5600MHz	44 Miteq 3008 3 foot cal hin 197538001	3A00931 ↓ ble	12	foot c	able			orn > 180	Hz	•	ECC 45 205	
T60; S/N: 2238 @3m T Hi Frequency Cables	44 Miteq 3008 3 foot cal hin 197538001	3A00931 ↓ ble	12	foot c	able			orn > 180	5HZ	•	FCC 45 205	
Hi Frequency Cables 2 foot cable f Dist Read Pk Read A GHz (m) dBuV dBu' v Ch, 5510MHz 020 3.0 51.4 36.5 020 3.0 47.5 33.0 d Ch, 5600MHz	3 foot cal	ble								•		
2 foot cable f Dist Read Pk Read A GHz (m) dBuV dBu' w Ch, 5510MHz 020 3.0 51.4 36.5 020 3.0 47.5 33.0 d Ch, 5600MHz	hin 197538001	1										
f Dist Read Pk Read A GHz (m) dBuV dBu' w Ch, 5510MHz	vg. AF (Chin 2	003540		HPF		Re	ject Filte		<u>Peak Measurements</u> RBW=VBW=1MHz	
GHz (m) dBuV dBu w Ch, 5510MHz	<u> </u>	CT A			⁰¹		F_7.6GHz	•	ļ		age Measurements =1MHz ; VBW=10Hz	
w Ch, 5510MHz .020 3.0 51.4 36.5 .020 3.0 47.5 33.0 id Ch, 5600MHz		CL Amp dB dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)	
020 3.0 47.5 33.0 d Ch, 5600MHz	37.3	4.3 -36.3	0.0	0.7	57.5	42.6	74	54	-16.5	-11.4	v	
		4.3 -36.3		0.7	53.6	42.0 39.1	74	54 54	-10.5 -20.4	-11.4 -14.9	H	
200 3.0 53.4 40.0 200 3.0 48.0 35.0		4.4 -36.1 4.4 -36.1		0.7 0.7	59.7 54.3	46.3 41.3	74 74	54 54	-14.3 -19.7	-7.7 -12.7	V H	
zh Ch, 5690MHz												
.380 3.0 57.0 43.4 .380 3.0 52.0 38.0		4.4 -35.9 4.4 -35.9		0.7 0.7	63.5 58.5	49.9 44.5	74 74	54 54	-10.5 -15.5	-4.1 -9.5	V H	
v. 5.1.6 te: No other emissions were detected a	bove the system	noise floor.			1		I	l				
f Measurement Freq	iency	Amp	Preamp	Gain				Avg Lim	Average F	ield Strengt	th Limit	
Dist Distance to Antenna	1				ct to 3 mete					Strength L		
Read Analyzer Reading AF Antenna Factor		Avg Peak			Strength @ k Field Stre			Avg Mar Pk Mar				
CL Cable Loss		HPF	High Pas			5			0			

Page 180 of 180

7.3.4. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz WITH PIFA ANTENNAS

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

HORIZONTAL DATA Condition: FCC CLASS-B HORIZONTAL Test Operator: : Chin Pang Company: : Atheros Project #: : 06U10365 Model: : AR5BXB72 Configuration: : EUT/Laptop Mode of Operation: TX (b mode Mid Ch with ED4 Antennas) Page: 1 Read Limit Over Freq Level Factor Level Line Limit Remark MHz dBuV dB dBuV/m dBuV/m dB 1 251.160 25.63 13.93 39.56 46.00 -6.44 Peak 373.380 21.29 17.46 38.75 46.00 -7.25 Peak 2 3 456.800 19.55 19.36 38.91 46.00 -7.09 Peak 609.090 22.14 21.66 43.80 46.00 -2.20 Peak 708.030 15.71 23.23 38.94 46.00 -7.06 Peak 807.940 17.99 24.69 42.68 46.00 -3.32 Peak 4 5 6

Page 181 of 181

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

VERTICAL DATA

Condition: FCC CLASS-B VERTICAL Test Operator: : Chin Pang Company: : Athero-company: : O6U10365 PERXB72 : AR5BXB72 Model: Configuration: : EUT/Laptop Mode of Operation: TX (b mode Mid Ch with ED4 Antennas) Page: 1 Read Limit Over Freq Level Factor Level Line Limit Remark MHz dBuV dB dBuV/m dBuV/m dB 1 48.430 28.04 10.29 38.33 40.00 -1.67 Peak 2 177.440 25.04 13.11 38.15 43.50 -5.35 Peak

 371.440
 22.16
 17.44
 39.60
 46.00
 -6.40
 Peak

 407.330
 21.65
 18.21
 39.86
 46.00
 -6.14
 Peak

 567.380
 19.12
 21.12
 40.24
 46.00
 -5.76
 Peak

 806.000
 16.55
 24.64
 41.19
 46.00
 -4.81
 Peak

 з 4 5 6

Page 182 of 182

7.3.5. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz WITH MONOPOLE ANTENNAS

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL

HORIZONTAL DATA

Condition: FCC CLASS-B HORIZONTAL Test Operator: : Chin Pang Company: : Atheros Project #: : 06010365 Model: : AR5BXB72 Configuration: : EUT/Laptop Model: Mode of Operation: TX (b mode Mid Ch with Foxconn Antenna) Page: 1 Read Limit Over Freq Level Factor Level Line Limit Remark MHZ dBuV dB dBuV/m dBuV/m dB 150.280 22.34 14.10 36.44 43.50 -7.06 Peak 1 239.520 29.20 13.47 42.67 46.00 -3.33 QP 2 239.520 31.57 13.47 45.03 46.00 -0.97 Peak 3 303.540 27.70 15.75 43.45 46.00 -2.55 QP 4 303.540 28.71 15.75 44.46 46.00 -1.54 Peak 5 371.440 26.20 17.44 43.64 46.00 -2.36 QP 6 371.440 27.96 17.44 45.40 46.00 -0.60 Peak 405.390 23.83 18.18 42.01 46.00 -3.99 Peak 606.180 18.99 21.63 40.62 46.00 -5.38 Peak 707.060 16.80 23.20 40.00 46.00 -6.00 Peak 7 8 9 10 11 853.530 17.17 25.30 42.47 46.00 -3.53 Peak

Page 183 of 183

REPORT NO: 07U11066-1B1 EUT: 2.4 & 5 GHZ 802.11 MINICARD

VERTICAL DATA Condition: FCC CLASS-B VERTICAL Test Operator: : Chin Pang : Atheros : 06010365 Company: Project #: : AR5BXB72 Model: Configuration: : EUT/Laptop Mode of Operation: TX (b mode Mid Ch with Foxconn Antenna) Page: 1 Read Limit Over Freq Level Factor Level Line Limit Remark MHz dBuV dB dBuV/m dBuV/m dB 1 48.430 26.78 10.29 37.07 40.00 -2.93 Peak 2 305.480 24.68 15.80 40.48 46.00 -5.52 Peak
 373.380
 22.00
 17.46
 39.46
 46.00
 -6.54
 Peak

 403.450
 21.55
 18.12
 39.67
 46.00
 -6.33
 Peak

 606.180
 16.46
 21.63
 38.09
 46.00
 -7.91
 Peak

 706.090
 17.19
 23.17
 40.36
 46.00
 -5.64
 Peak
 з 4 5 6 924.340 14.47 26.20 40.67 46.00 -5.33 Peak 7

Page 184 of 184

7.4. DYNAMIC FREQUENCY SELECTION

7.4.1. LIMITS

§15.407 (h) and FCC 06-96 APPENDIX "COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVCIES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION".

Requirement Operational			
	Master	Client (without radar detection)	Client (with radar detection)
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
Uniform Spreading	Yes	Not required	Not required

Table 1: Applicability of DFS requirements prior to use of a channel

Table 2: Applicability of DFS	requirements during	normal operation
Table 2. Applicability of DrS	requirements during	normal operation

Requirement	Operational Mode				
	Master	Client	Client		
		(without DFS)	(with DFS)		
DFS Detection Threshold	Yes	Not required	Yes		
Channel Closing Transmission Time	Yes	Yes	Yes		
Channel Move Time	Yes	Yes	Yes		

Page 185 of 185

Table 3: Interference Threshold values, Master or Client incorporating In-Service Monitoring

Maximum Transmit Power	Value
	(see note)
\geq 200 milliwatt	-64 dBm
< 200 milliwatt	-62 dBm
Note 1: This is the level at the input of the receiver assuming a Note 2: Throughout these test procedures an additional 1 dB ha the test transmission waveforms to account for variations in me ensure that the test signal is at or above the detection threshold	s been added to the amplitude of asurement equipment. This will

Table 4: DFS Response	requirement values
-----------------------	--------------------

Parameter	Value
Non-occupancy period	30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds
Channel Closing Transmission Time	200 milliseconds + approx. 60 milliseconds over remaining 10 second period

The instant that the *Channel Move Time* and the *Channel Closing Transmission Time* begins is as follows:

- For the Short pulse radar Test Signals this instant is the end of the *Burst*.
- For the Frequency Hopping radar Test Signal, this instant is the end of the last radar burst generated.
- For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission.

The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate channel changes (an aggregate of approximately 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Page 186 of 186

Radar Type	Pulse Width	PRI	Pulses	Minimum	Minimum
	(Microseconds)	(Microseconds)		Percentage of	Trials
				Successful	
				Detection	
1	1	1428	18	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Ra	adar Types 1-4)	80%	120		

Table 5 – Short Pulse Radar Test Waveforms

Table 6 – Long Pulse Radar Test Signal

Radar	Bursts	Pulses	Pulse	Chirp	PRI	Minimum	Minimum
Waveform		per	Width	Width	(µsec)	Percentage of	Trials
		Burst	(µsec)	(MHz)		Successful	
						Detection	
5	8-20	1-3	50-100	5-20	1000-	80%	30
					2000		

Table 7 – Frequency Hopping Radar Test Signal

Radar	Pulse	PRI	Burst	Pulses	Hopping	Minimum	Minimum
Waveform	Width	(µsec)	Length	per	Rate	Percentage of	Trials
	(µsec)		(ms)	Нор	(kHz)	Successful Detection	
6	1	333	300	9	.333	70%	30

Page 187 of 187

7.4.2. DESCRIPTION OF EUT

OVERVIEW OF EUT WITH RESPECT TO §15.407 (h) REQUIREMENTS

The EUT operates over the 5250-5350 MHz and 5470-5725 MHz ranges.

The EUT is a Client Device that does not have radar detection capability.

The EUT is a MIMO device that uses two transmitters and three receivers; each of the three RF ports are connected to identical antennas via three separate coaxial connectors.

The highest gain antenna assembly utilized with the EUT has a gain of 6.2 dBi in the 5250-5350 MHz band and 5.34 dBi in the 5470-5725 MHz band. The highest gain antenna assembly utilized with the EUT has an effective 802.11a legacy mode gain of 9.21 dBi in the 5250-5350 MHz band and 8.35 dBi in the 5470-5725 MHz band. The lowest gain antenna assembly utilized with the EUT has a gain of -2.0 dBi in the 5250-5350 MHz band and -1.2 dBi in the 5470-5725 MHz band.

The highest combined power level within these bands for the 802.11n mode is 26.68 dBm EIRP in the 5250-5350 MHz band and 26.02 dBm EIRP in the 5470-5725 MHz band. The highest combined power level within these bands for the 802.11a legacy mode is 26.98 dBm EIRP in the 5250-5350 MHz band and 26.86 dBm EIRP in the 5470-5725 MHz band.

Both of the 50-ohm Tx/Rx antenna ports are connected to the test system via a power combiner/divider to perform conducted tests.

WLAN traffic is generated by streaming the video file TestFile.mp2 "6 ½ Magic Hours" from the Master to the Slave in full motion video mode using the media player with the V2.61 Codec package.

TPC is not required since the maximum EIRP is less than 500 mW (27 dBm).

The EUT utilizes an 802.11a/n IP based architecture. Two nominal channel bandwidths, 20 MHz and 40 MHz, are implemented.

OVERVIEW OF MASTER DEVICE WITH RESPECT TO §15.407 (h) REQUIREMENTS

The Master Device is an Atheros Access Point, FCC ID: PPD-AR5BAP-00032. The DFS software installed in the Master Device is revision 5.1.0.42.

The rated output power of the Master unit is > 23 dBm (EIRP). Therefore the required interference threshold level is -64 dBm. After correction for antenna gain and procedural adjustments, the required conducted threshold at the antenna port is -64 + 4 + 1 = -59 dBm.

The calibrated conducted DFS Detection Threshold level is set to -64 dBm. The tested level is lower than the required level hence it provides margin to the limit.

Page 188 of 188

7.4.3. TEST AND MEASUREMENT SYSTEM

SYSTEM OVERVIEW

The measurement system is based on a conducted test method.

The short pulse and long pulse signal generating system utilizes the NTIA software and the same manufacturer / model Vector Signal Generator as the NTIA. The hopping signal generating system utilizes the simulated hopping method.

The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution. The short pulse types 2, 3 and 4, and the long pulse type 5 parameters are randomized at run-time. The hopping type 6 pulse parameters are fixed while the hopping sequence is based on the August 2005 NTIA Hopping Frequency List, with the initial starting point randomized at run-time.

The signal monitoring equipment consists of a spectrum analyzer with the capacity to display 8192 bins on the horizontal axis. A time-domain resolution of 2 msec / bin is achievable with a 16 second sweep time, meeting the 10 second short pulse reporting criteria. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection and max hold. A time-domain resolution of 3 msec / bin is achievable with a 24 second sweep time, meeting the 22 second long pulse reporting criteria and allowing a minimum of 10 seconds after the end of the long pulse waveform.

FREQUENCY HOPPING SIGNAL GENERATION

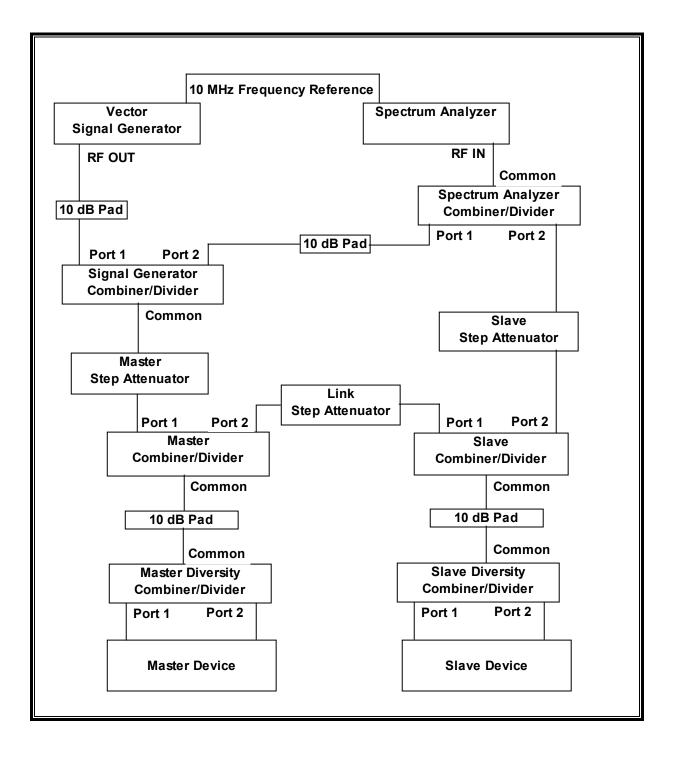
The hopping burst generator is a High Speed Digital I/O card plugged into the control computer. This card utilizes an independent hardware clock reference therefore the output pulse timing is unaffected by host computer operating system latency times.

The software selects the hopping sequence as a 100-length segment of the August 2005 NTIA hopping frequency list. This list contains 274 unique pseudorandom sequences. Each such sequence contains 475 frequencies ordered on a random without replacement basis. Each successive trial uses a contiguous 100-length segment from within each successive 475-length sequence in the list. The initial starting point within the list is randomized at run-time such that the first 100-length segment is entirely contained within the first 475-length sequence. The starting point of each successive trial is incremented by 475.

Each frequency in the 100-length segment is compared to the boundaries of the EUT Detection Bandwidth and the software creates a hopping burst pattern in accordance with Section 7.4.1.3 Method #2 Simulated Frequency Hopping Radar Waveform Generating Subsystem of FCC 06-96 APPENDIX. The frequency of the signal generator is incremented in 1 MHz steps from F_L to F_H for each successive trial. This incremental sequence is repeated as required to generate a minimum of 30 total trials and to maintain a uniform frequency distribution over the entire Detection Bandwidth.

Page 189 of 189

CONDUCTED METHOD SYSTEM BLOCK DIAGRAM



Page 190 of 190

MEASUREMENT SYSTEM FREQUENCY REFERENCE

Lock the signal generator and the spectrum analyer to the same reference source as follows: Connect the 10 MHz OUT (SWITCHED) on the spectrum analyer to the 10 MHz IN on the signal generator and set the spectrum analyzer 10 MHz Out to On.

SYSTEM CALIBRATION

Adjust the Master Step Attenuator to 30 dB, the Link Step Attenuator to 70 dB, and the Slave Step Attenuator to 70 dB.

If required, disconnect the spectrum analyzer, Master Device, and Slave Device from the test system. Terminate the Common port of the Spectrum Analyzer Combiner/Divider, Port 2 of the Master Diversity Combiner/Divider, and Ports 1 and 2 of the Slave Diversity Combiner/Divider. Leave, or connect, the appropriate cable to Port 1 of the Master Diversity Combiner/Divider and connect the free end (Master Device end) of this cable to the spectrum analyzer.

Adjust the signal generator and spectrum analyzer to the center frequency of the channel to be measured. Set the signal generator to CW mode. Set the RBW of the spectrum analyzer to 10 kHz and the span to 100 kHz. Adjust the amplitude of the signal generator to yield a measured level of -64 dBm on the spectrum analyzer.

Without changing any of the instrument settings, reconnect the spectrum analyer to the Common port of the Spectrum Analyzer Combiner/Divider, then remove the cable from Port 1 of the Master Diversity Combiner/Divider and replace this cable with a termination. Measure the amplitude and calculate the difference from -64 dBm. Adjust the Reference Level Offset of the spectrum analyzer to this difference. Confirm that the signal is displayed at -64 dBm. Readjust the RBW and VBW to 3 MHz, set the span to 10 MHz, and confirm that the signal is still displayed at -64 dBm.

This Reference Level Offset setting is used for all tests for which the Master Step Attenuator is set to 30 dB. The spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device. The interference detection threshold may be varied from the calibrated value of -64 dBm and the spectrum analyzer will still indicate the level as received by the Master Device.

The Link Step Attenuator and Slave Step Attenuator settings may be changed without affecting the System Calibration. The System Calibration process must be repeated for different settings of the Master Step Attenuator to determine the Reference Level Offset associated with each Master Step Attenuator setting.

Page 191 of 191

INTERFERENCE DETECTION THRESHOLD ADJUSTMENT

Set the signal generator to produce the specified radar waveform, trigger a burst manually and measure the amplitude on the spectrum analyzer. Readjust the amplitude of the signal generator as required so that the peak level of the waveform is at a displayed level equal to the required or desired interference detection threshold.

ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

Establish a link between the Master and Slave, adjusting the Link Step Attenuator as needed to provide an adequate RSS level at the Master and Slave devices. Stream the video test file to generate WLAN traffic. Adjust the Slave Step Attenuator so that the WLAN traffic level from the Slave, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

Confirm that the displayed traffic is from the Slave Device by changing the setting of the Slave Step Attenuator and verifying that the displayed traffic level changes accordingly. Confirm that the displayed traffic does not include Master Device traffic by changing the setting of the Master Step Attenuator and the Link Step Attenuator and verifying that the displayed traffic level does not change. Reset all Step Attenuators to their previous settings.

If the above conditions cannot be met, use a different setting of the Master Step Attenuator, performing a new System Calibration and Interference Detection Threshold Adjustment as required for the new Master Step Attenuator setting.

Page 192 of 192

7.4.4. SETUP OF EUT AND SUPPORT EQUIPMENT

SUPPORT EQUIPMENT

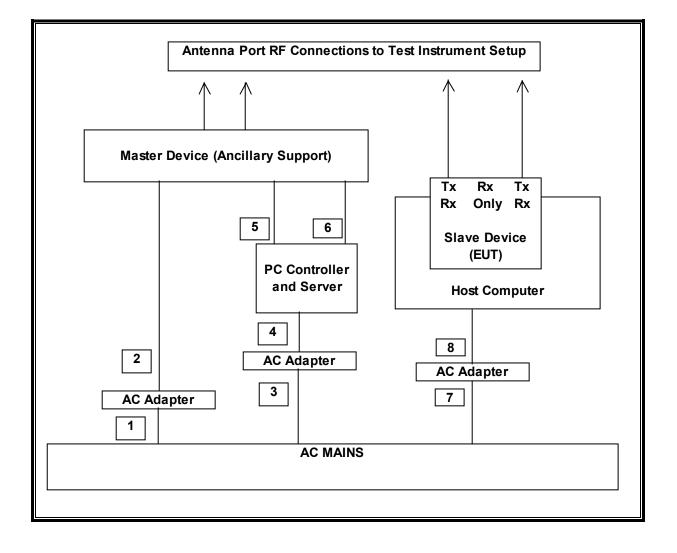
PERIPHERAL SUPPORT EQUIPMENT LIST							
Description	Manufacturer	Model	Serial Number	FCC ID			
AC Adapter	CUI	DSA-0151A	4403	DoC			
Access Point	Atheros	AP 30	AP 30-50-D7323	PPD-AR5BAP-00032			
Laptop	IBM	Thinkpad T42	ZZ-27004	DoC			
AC Adapter	IBM	08K8204	85910TF	DoC			
Laptop	IBM	Thinkpad T42p	ZZ-27259	DoC			
AC Adapter	IBM	02K6746	28106J	DoC			

I/O CABLES

I/O CABLE LIST						
Cable	Port	# of	Connector	Cable	Cable	
No.		Identical Ports	Туре	Туре	Length	
1	10	Ports	110 11 517	D' DI	0	
I	AC	1	US 115V	Direct Plug	0m	
2	DC	1	DC	Un-shielded	2m	
3	AC	1	US 115V	Un-shielded	1m	
4	DC	1	DC	Un-shielded	2m	
5	Ethernet	1	RJ45	Un-shielded	2m	
6	Serial	1	USB to DIN	Shielded	2.5m	
7	AC	1	US 115V	Un-shielded	2m	
8	DC	1	DC	Un-shielded	2m	

Page 193 of 193

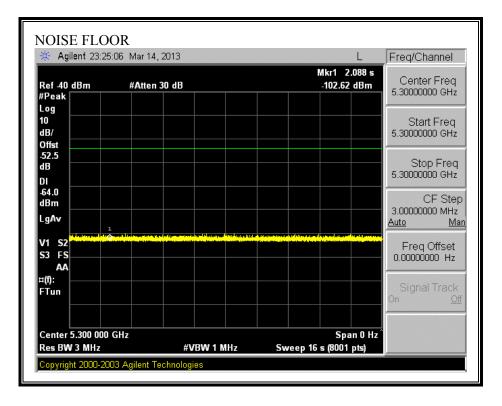
TEST SETUP



Page 194 of 194

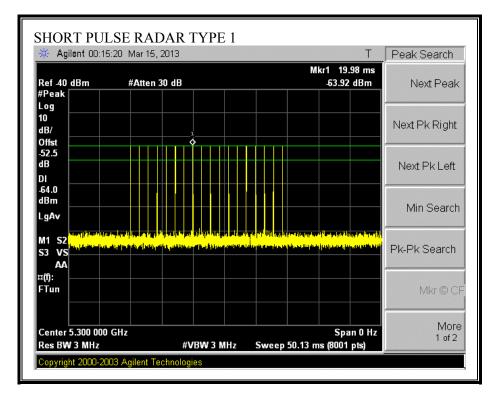
7.4.5. PLOTS OF NOISE, RADAR WAVEFORMS, AND WLAN SIGNALS

PLOT OF SYSTEM NOISE FLOOR



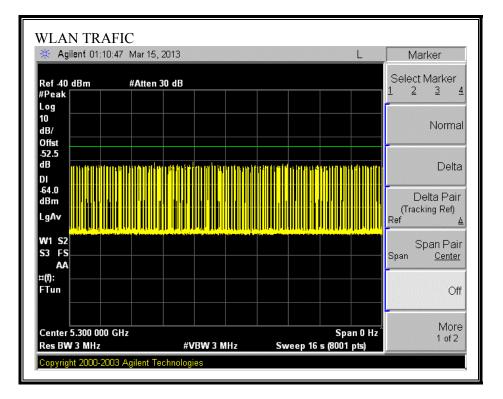
Page 195 of 195

PLOTS OF RADAR WAVEFORM



Page 196 of 196

PLOT OF WLAN TRAFFIC FROM SLAVE



Page 197 of 197

7.4.6. TEST CHANNEL AND METHOD

All tests were performed at a channel center frequency of 5300 MHz utilizing a conducted test method.

7.4.7. CHANNEL MOVE TIME AND CHANNEL CLOSING TRANSMISSION TIME

GENERAL REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time = (Number of analyzer bins showing transmission) * (dwell time per bin)

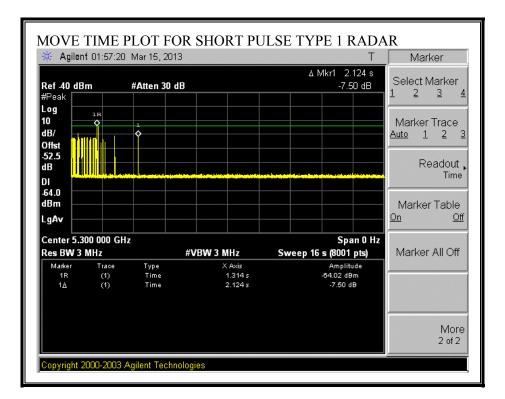
The observation period over which the aggregate time is calculated Begins no later than (Reference Marker + 200 msec) and Ends no earlier than (Reference Marker + 10 sec).

Page 198 of 198

CHANNEL MOVE TIME RESULTS

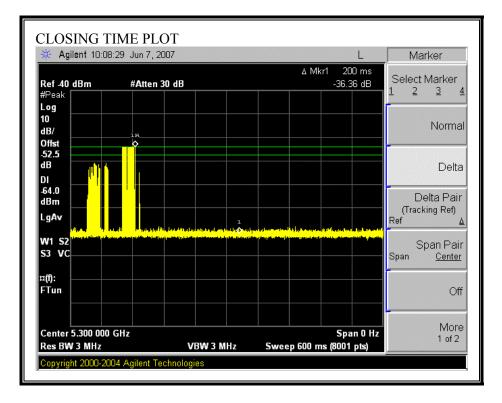
No non-compliance noted:

Channel Move Time	Limit
(s)	(s)
2.124	10



Page 199 of 199

CHANNEL CLOSING TIME RESULTS



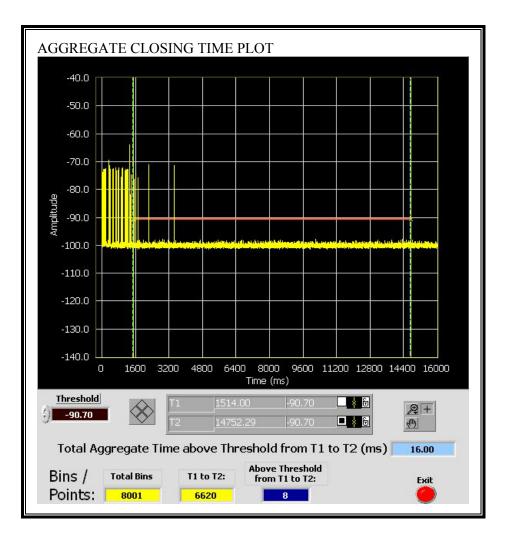
Page 200 of 200

FCC AGGREGATE CHANNEL CLOSING TRANSMISSION TIME RESULTS

No non-compliance noted:

Aggregate Transmission Time	Limit	Margin
(ms)	(ms)	(ms)
16.00	60	44.00

Only intermittent transmissions are observed during the aggregate monitoring period.



Page 201 of 201

7.5. 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 μ 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:

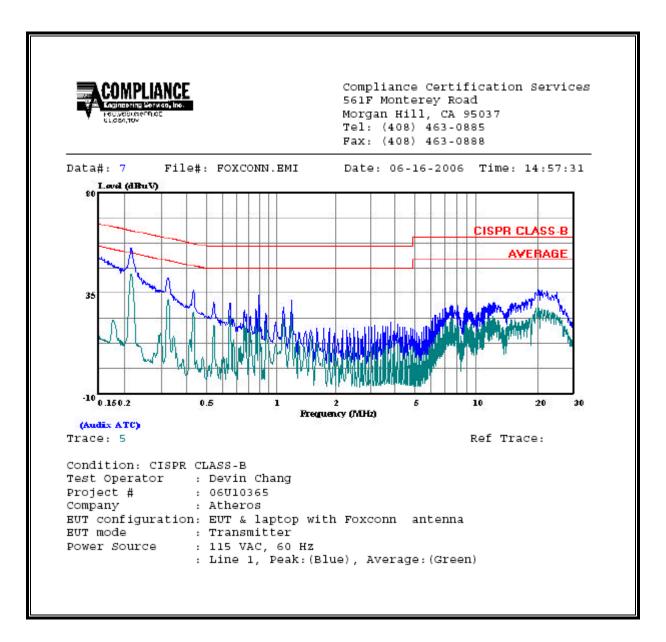
Page 202 of 202

<u>6 WORST EMISSIONS</u>

Freq.		Reading		Closs	Limit	EN_B	Mar	gin	Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.22	54.94		42.83	0.00	62.82	52.82	-7.88	-9.99	L1
0.33	45.00		31.89	0.00	59.45	49.45	-14.45	-17.56	L1
0.89	33.94		33.94	0.00	56.00	46.00	-22.06	-12.06	L1
0.22	50.22		39.72	0.00	62.82	52.82	-12.60	-13.10	L2
0.33	39.44		30.03	0.00	59.45	49.45	-20.01	-19.42	L2
0.89	34.90		33.89	0.00	56.00	46.00	-21.10	-12.11	L2

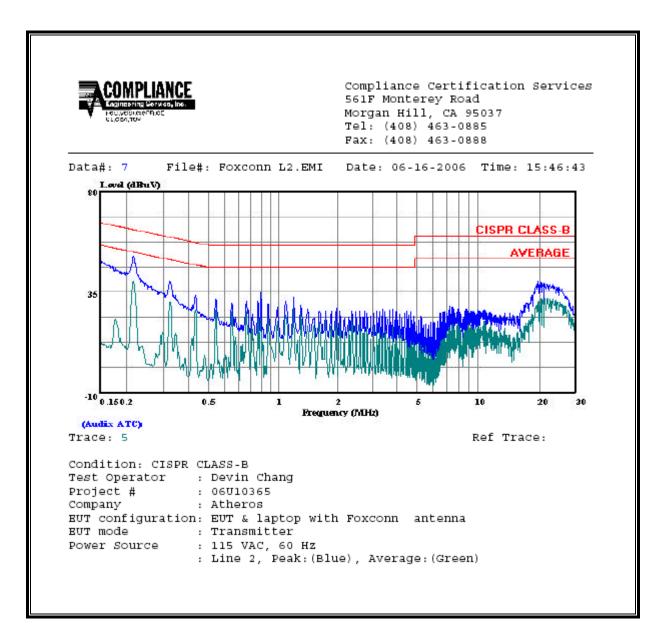
Page 203 of 203

LINE 1 RESULTS



Page 204 of 204

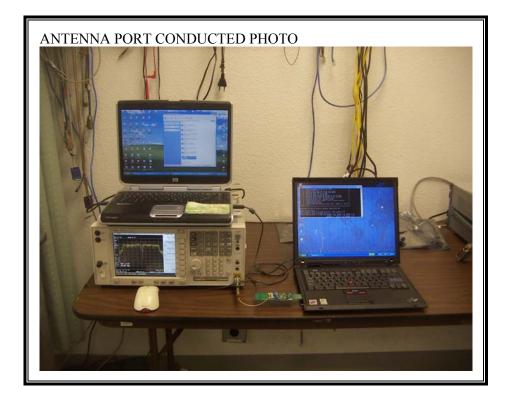
LINE 2 RESULTS



Page 205 of 205

8. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

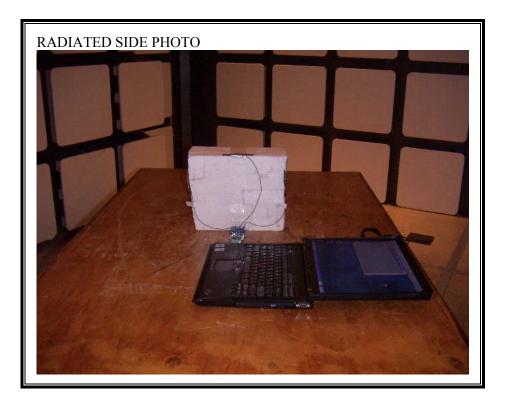


Page 206 of 206

RADIATED RF MEASUREMENT SETUP WITH PIFA ANTENNAS



Page 207 of 207



Page 208 of 208

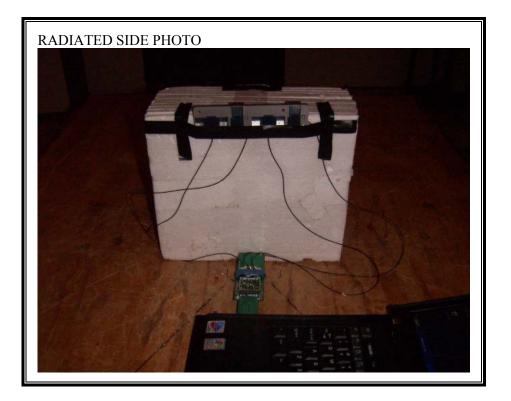


Page 209 of 209

RADIATED RF MEASUREMENT SETUP WITH MONOPOLE ANTENNAS



Page 210 of 210



Page 211 of 211



Page 212 of 212

POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

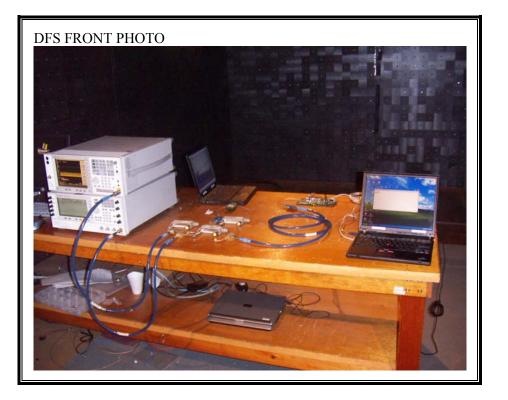


Page 213 of 213

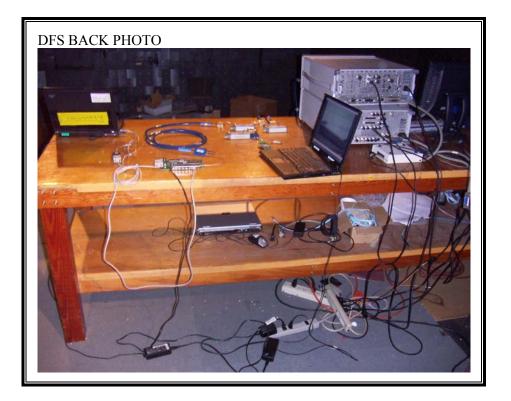


Page 214 of 214

DYNAMIC FREQUENCY SELECTION



Page 215 of 215

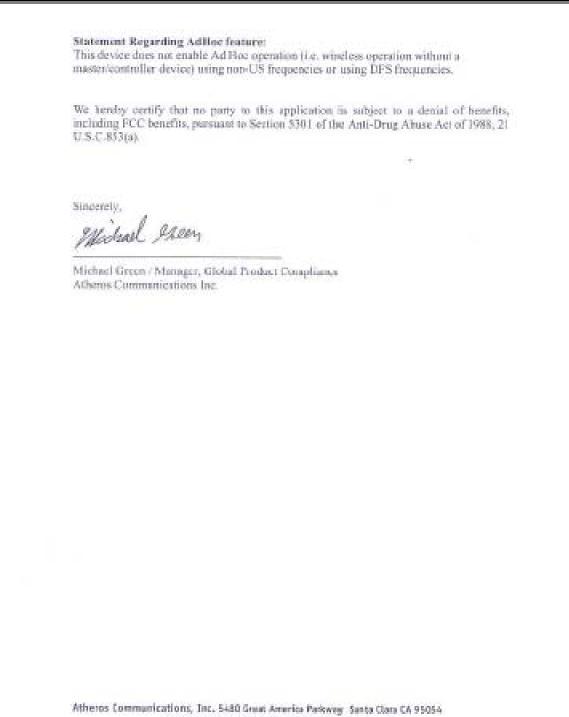


Page 216 of 216

9. APPENDIX A: MANUFACTURER'S DECLARATION OF MODEL DIFFERENCES

	ATHEROS"
	al Communications Commission
	orization & Evaluation Division Oakland Mills Road
	nbia, MD 21046
Attn:	OET Dept.
	OET Dept. FCC Class II Permissive change for FCC ID: PPD-AR5BXB72-L
	Applicant: Atheros Communications, Inc.
Dear	Examiner:
This	s to request a Class II permissive change for FCC ID: PPD-AR5BXB72-L.
There	is no hardware nor electrical modification made to the applying modular nitter itself.
	hange filed under this permissive change is addition of DFS compliance in 5250- MHz & 5470-5725MHz
	mplementation of BIOS Lock feature, antenna specification of the host devices and cation with Bluetooth (FCC ID: MCLJ07H081) remain the same.
The c	riginal DFS test data for PPD-AR5BXB72 certified on October/20/2006 is
	cable for the FCC 15.407 Report for PPD-AR5BXB72-L C2PC Mobile Config.
	riginal Atheros certification for PPD-AR5BXB72 uses identical, highest gain na and type as used for the PPD-AR5BXB72-L FCC certification.
We h	ereby attest that the radio hardware and firmware of PPD-AR5BXB72-L is identical
to the	sample tested for PPD-AR5BXB72.
	470 - 5725 MHz band operation is enabled by firmware controlled by the applicant
durin	g manufacturing (no end-user access).
	40MHz channel operation in the 5.25-5.35 GHz & 5.47-5.725 GHz bands is not
imple	mented. This is also controlled by firmware during manufacturing (no end-user
acces	2).
Ather	os Communications, Inc. 5480 Great America Parkway Santa Clara CA 95054 t 408 773 5200 f 408-773-9940 www.atheros.com

Page 217 of 217



1408 773 5200 1405-773-9940 www.atheros.com

END OF REPORT

Page 218 of 218

COMPLIANCE CERTIFICATION SERVICESDOCUMENT NO: CCSUP4031A47173 BENICIA STREET, FREMONT, CA 94538, USATEL: (510) 771-1000 FAX: (510) 661-0888This report shall not be reproduced except in full, without the written approval of CCS.