

FCC CFR47 PART 15 SUBPART E INDUSTRY CANADA RSS-210 ISSUE 7

CLASS II PERMISSIVE CHANGE TEST REPORT

FOR

DC544D_1 PCIe DAUGHTER CARD FOR 2.4 / 5 GHz CLIENT APPLICATIONS

MODEL NUMBER: 65-VN780-P1

FCC ID: J9C-DC544D1 IC: 2723A-DC544D1

REPORT NUMBER: 09U12687-17

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Prepared for QUALCOMM, INC. 3165 KIFER ROAD SANTA CLARA, CA 95051, U.S.A.

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Page 2 of 255

TABLE OF CONTENTS

1.	ATTESTATION OF TEST RESULTS	6
2.	TEST METHODOLOGY	7
3.	FACILITIES AND ACCREDITATION	7
4.	CALIBRATION AND UNCERTAINTY	7
4	4.1. MEASURING INSTRUMENT CALIBRATION	7
4	4.2. SAMPLE CALCULATION	7
4	4.3. MEASUREMENT UNCERTAINTY	7
5.	EQUIPMENT UNDER TEST	8
5	5.1. DESCRIPTION OF EUT	8
5	5.2. MAXIMUM OUTPUT POWER	8
5	5.3. DESCRIPTION OF AVAILABLE ANTENNAS	8
5	5.4. SOFTWARE AND FIRMWARE	9
5	5.5. WORST-CASE CONFIGURATION AND MODE	9
5	5.6 DESCRIPTION OF CLASS 2 PERMISSIVE CHANGE	9
5	5.7 TEST RESULTS FOR C2PC SAMPLE	. 10
5	5.8 DESCRIPTION OF TEST SETUP	. 11
6.	TEST AND MEASUREMENT EQUIPMENT	12
-		
7.	ANTENNA PORT TEST RESULTS	
7	7.1. 5.2 GHz BAND CHANNEL TESTS FOR 802.11a MODE 7.1.1. 26 dB and 99% BANDWIDTH	
	7.1.2. OUTPUT POWER	.17
	7.1.3. AVERAGE POWER7.1.4. PEAK POWER SPECTRAL DENSITY	
	7.1.4. PEAK POWER SPECTRAL DENSITY7.1.5. PEAK EXCURSION	
	7.1.6. CONDUCTED SPURIOUS EMISSIONS	.28
7	7.2. 5.2 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE	
	 7.2.1. 99% & 26 dB BANDWIDTH 7.2.2. OUTPUT POWER 	
	7.2.3. AVERAGE POWER	
	7.2.4. PEAK POWER SPECTRAL DENSITY	
	7.2.5. PEAK EXCURSION7.2.6. CONDUCTED SPURIOUS EMISSIONS	
7	7.3. 5.2 GHz BAND CHANNEL TESTS FOR 802.11n HT40 MODE	
1	7.3. 5.2 GH2 BAND CHANNEL TESTS FOR 802.1111 H140 MODE 7.3.1. 99% & 26 dB BANDWIDTH	
	7.3.2. OUTPUT POWER	.53
	7.3.3. AVERAGE POWER	
	7.3.4. PEAK POWER SPECTRAL DENSITY7.3.5. PEAK EXCURSION	
	Page 3 of 255	
	MPLIANCE CERTIFICATION SERVICES FORM NO: CCSUP470	
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7.3.6.	CONDUCTED SPURIOUS EMISSIONS	63
7.4. 5.3	3 GHz BAND CHANNEL TESTS FOR 802.11a MODE	65
7.4.1.	26 dB and 99% BANDWIDTH	65
7.4.2.	OUTPUT POWER	68
7.4.3.	AVERAGE POWER	
7.4.4.	PEAK POWER SPECTRAL DENSITY	
7.4.5.	PEAK EXCURSION	76
7.4.6.	CONDUCTED SPURIOUS EMISSIONS	79
7.5. 5.3	3 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE	83
7.5.1.	99% & 26 dB BANDWIDTH	
7.5.2.	OUTPUT POWER	
7.5.3.	AVERAGE POWER	
7.5.4.	PEAK POWER SPECTRAL DENSITY	
7.5.5.		
7.5.6.	CONDUCTED SPURIOUS EMISSIONS	
	3 GHz BAND CHANNEL TESTS FOR 802.11n HT40 MODE	
7.6.1.	99% & 26 dB BANDWIDTH	
7.6.2.	OUTPUT POWER	
7.6.3.	AVERAGE POWER	
7.6.4.	PEAK POWER SPECTRAL DENSITY	
7.6.5.		
7.6.6.	CONDUCTED SPURIOUS EMISSIONS	
7.7. 5.6	6 GHz BAND CHANNEL TESTS FOR 802.11a MODE	
7.7.1.	26 dB and 99% BANDWIDTH	119
7.7.2.	OUTPUT POWER	
7.7.3.	AVERAGE POWER	
7.7.4.	PEAK POWER SPECTRAL DENSITY	
7.7.5.	PEAK EXCURSION	
7.7.6.	CONDUCTED SPURIOUS EMISSIONS	
7.7.7.	CONDUCTED SPURIOUS (-20 dBc)	
7.8. 5.6	6 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE	
7.8.1.	99% & 26 dB BANDWIDTH	
7.8.2.	OUTPUT POWER	
7.8.3.	AVERAGE POWER	
7.8.4.	PEAK POWER SPECTRAL DENSITY	
7.8.5.	PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS	
7.8.6. 7.8.7.	CONDUCTED SPURIOUS EMISSIONS CONDUCTED SPURIOUS (-20 dBc)	
	6 GHz BAND CHANNEL TESTS FOR 802.11n HT40 MODE	
7.9.1.	99% & 26 dB BANDWIDTH	
7.9.2.		
7.9.3.	AVERAGE POWER PEAK POWER SPECTRAL DENSITY	
7.9.4.		
7.9.5. 7.9.6.	PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS	1/4 177
7.9.0. 7.9.7.	CONDUCTED SPURIOUS (-20 dBc)	
	ECEIVER CONDUCTED SPURIOUS EMISSIONS	
8. RADIA	IED TEST RESULTS	185
	Page 4 of 255 E CERTIFICATION SERVICES FORM N IA STREET EDEMONT CA 04538 LISA TEL: (510) 771 1000	
COMPLIANCI	E CERTIFICATION SERVICES FORM N	

8.1.	LIMITS AND PROCEDURE	
8.2 8.2 8.2 8.2 8.2 8.2 8.2 8.2	 802.11a MODE IN 5.2 GHz BAND	
9. AC	C POWER LINE CONDUCTED EMISSIONS	219
10.	DYNAMIC FREQUENCY SELECTION	223
10.1.	OVERVIEW	
10	.1.1. LIMITS	222
-	.1.2. TEST AND MEASUREMENT SYSTEM	
10	.1.2. TEST AND MEASUREMENT SYSTEM	227 230
10 10	.1.2. TEST AND MEASUREMENT SYSTEM	227 230
10 10 10	.1.2. TEST AND MEASUREMENT SYSTEM	227 230 231
10 10 10 10.2.	.1.2.TEST AND MEASUREMENT SYSTEM.1.3.SETUP OF EUT.1.4.DESCRIPTION OF EUT	
10 10 10 <i>10.2.</i> 10	 .1.2. TEST AND MEASUREMENT SYSTEM	
10 10 10 10.2. 10 10	.1.2. TEST AND MEASUREMENT SYSTEM .1.3. SETUP OF EUT .1.4. DESCRIPTION OF EUT .20 MHz BANDWIDTH RESULTS .2.1. TEST CHANNEL	
10 10 10 10.2. 10 10 10	 1.2. TEST AND MEASUREMENT SYSTEM	227 230 231 232 232 232 232 232 234
10 10 10 10.2. 10 10 10 10.3.	 1.2. TEST AND MEASUREMENT SYSTEM	
10 10 10 10.2. 10 10 10 10.3. 10	 1.2. TEST AND MEASUREMENT SYSTEM	
10 10 10.2. 10 10 10 10.3. 10 10	 1.2. TEST AND MEASUREMENT SYSTEM	227 230 231 232 232 232 232 234 234 239 239 239 239 239
10 10 10.2. 10 10 10 10.3. 10 10 10	 1.2. TEST AND MEASUREMENT SYSTEM	227 230 231 232 232 232 232 234 234 239 239 239 239 239
10 10 10.2. 10 10 10 10 10 10 10 10	 1.2. TEST AND MEASUREMENT SYSTEM	227 230 231 232 232 232 232 232 234 239 239 239 239 239 239 241 246

1. ATTESTATION OF TEST RESULTS

DATE TESTED:	JUNE 24 – OCTOBER 15, 2009 JANUARY 28 – APRIL 29, 2010
SERIAL NUMBERS:	Conducted: 7916, Radiated: 7929, DFS: 02324 DFS Version with modified shield: 9021
MODEL:	65-VN780-P1
EUT DESCRIPTION:	DC544D_1 PCIe DAUGHTER CARD FOR 2.4 / 5 GHz CLIENT APPLICATIONS
COMPANY NAME:	QUALCOMM INC. 3165 KIFER RD SANTA CLARA, CA 95051 U.S.A.

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart E	Pass
INDUSTRY CANADA RSS-210 Issue 7 Annex 9	Pass
INDUSTRY CANADA RSS-GEN Issue 2	Pass

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. 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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For CCS By:

FRANK IBRAHIM EMC SUPERVISOR COMPLIANCE CERTIFICATION SERVICES

Tested By:

VIEN TRAN EMC ENGINEER COMPLIANCE CERTIFICATION SERVICES

Page 6 of 255

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, FCC 06-96, RSS-GEN Issue 2, and RSS-210 Issue 7.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

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. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) 36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11a/b/g/n WLAN transceiver module in a PCI form factor, for 2.4 / 5 GHz client applications. It is equipped with four identical transmitter / receiver chains.

The radio module is manufactured by Qualcomm, Inc.

5.2. MAXIMUM OUTPUT POWER

Frequency Range	Mode	Output Power	Output Power
(MHz)		(dBm)	(mW)
5.2 GHz BAND			
5180 - 5240	802.11a	12.18	16.52
5180 - 5240	802.11n HT20	13.23	21.04
5190 - 5230	802.11n HT40	16.67	46.45
5.3 GHz BAND			
5260 - 5320	802.11a	19.15	82.22
5260 - 5320	802.11n HT20	20.65	116.14
5270 - 5310	802.11n HT40	23.24	210.86
5.6 GHz BAND			
5500 - 5700	802.11a	20.77	119.40
5500 - 5700	802.11n HT20	20.24	105.68
5510 - 5670	802.11n HT40	23.65	231.74

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

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a dual band omni monopole (4 identical) antenna, each with a maximum gain of 3 dBi in the 5 GHz bands.

For the 802.11a legacy mode only two chains are transmitting, therefore the effective legacy antenna gain is:

Antenna Gain (dBi)	• • • •	Effective Legacy Gain (dBi)	
3	3.01	6.01	

Page 8 of 255

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Qualcomm, rev. 0.0.500.5.

The test utility software used during emissions testing was PTT Gui, rev. 5.1.

5.5. WORST-CASE CONFIGURATION AND MODE

The EUT was tested as an external module installed in a test jig board connected to a host Laptop PC.

Worst-Case data rates were utilized from preliminary testing of the Chipset, worst-case data rates used during the testing are as follows:

802.11a Mode (20 MHz BW operation): 6 Mbps, OFDM. 802.11n MIMO HT20 Mode: MCS31, 260 Mbps, 4 Spatial Streams. 802.11n MIMO HT40 Mode: MCS31, 540 Mbps, 4 Spatial Streams.

Worst-case mode and channel used for 30-1000 MHz radiated and power line conducted emissions was the mode and channel with the highest output power, that was determined to be 11n HT40, high channel.

For bandwidth measurement preliminary testing showed that there is no significant difference among different chains, so the measurements were performed using Chain 0.

For conducted spurious measurement preliminary testing showed that combiner is worst-case compared to individual chains; therefore final measurements were performed using combiner for all channels and modes.

For PPSD measurement preliminary testing showed that combiner is worst-case compared to individual chains; therefore final measurements were performed using combiner for all channels and modes.

For Radiated Band Edge measurements preliminary testing showed that the worst case was vertical polarization, so final measurements were performed with vertical polarization.

5.6 DESCRIPTION OF CLASS 2 PERMISSIVE CHANGE

A shield was added to the bottom side of the PCB to meet ETSI receiver spurious limits. This shield was subsequently incorporated into all versions of this radio module.

5.7 TEST RESULTS FOR C2PC SAMPLE

As a result of the C2PC, the original data was analyzed to find worst-case modes and margins, then preliminary tests were performed to determine where additional final testing was required. The original data is updated with all new final measurements that show degraded performance compared to the original configuration.

Page 10 of 255

5.8 DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST								
Description	Manufacturer	urer Model Serial Number		FCC ID				
Laptop	IBM	T43 ThinkPad	L3-XDLXW06/02	DoC				
AC Adapter	IBM	08K8204	11S08K8204Z1Z9	DoC				
DC Power Supply	Tektronic	PS2521G	N/A	N/A				
DC Power Supply	HP	336108	KR24104150	N/A				
Extender PCI	ALLION	V1 EC-PEM V1.0	A073	N/A				

I/O CABLES

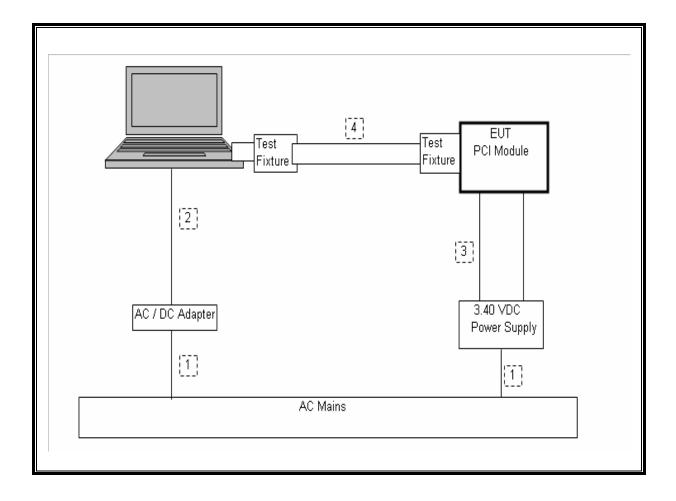
	I/O CABLE LIST								
Cable No.	Port	# of Identical Ports	Connecto Type	Cable Type	Cable Length	Remarks			
1	AC	2	US115	Un-shielded	1.5 m	For laptop			
2	DC	1	DC	Un-shielded	1.5 m	For laptop			
3	DC	1	Cable	Un-shielded	1.0 m	For EUT			
4	Ribbon	1	Ribbon	Un-shielded	.4 m	Test Fixture			

TEST SETUP

The EUT is connected to a host laptop computer via a test fixture during the tests. Test software exercised the radio card.

Page 11 of 255

SETUP DIAGRAM FOR TESTS



Page 12 of 255

6. TEST AND MEASUREMENT EQUIPMENT

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

The following test and measurement equipment was utilized for the additional tests with the

TEST EQUIPMENT LIST								
Description Manufacturer Model Asset Cal Date Cal Due								
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	01/05/09	01/05/10			
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	01/14/09	01/14/10			
Antenna, Horn, 18 GHz	EMCO	3115	C00945	04/22/09	04/22/10			
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	09/29/08	11/28/09			
Antenna, Horn, 40 GHz	ARA	MWH-2640B	C00981	05/21/09	05/21/10			
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	10/11/08	10/11/09			
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	03/31/09	03/31/10			
Preamplifier, 1-26GHz	Agilent / HP	8449B	C01052	08/05/08	08/05/09			
Peak Power Meter	Boonton	4541	C01186	01/19/09	01/19/10			
Peak Power Sensor	Boonton	4541	C01189	01/15/09	01/15/10			
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/29/08	10/29/09			
EMI Test Receiver, 30 MHz	R&S	ESHS 20	N02396	02/06/08	08/06/09			

modified shield:

TEST EQUIPMENT LIST							
Description Manufacturer Model Asset Cal Date Cal Due							
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01159	11/07/08	02/07/11		
Antenna, Horn, 18 GHz	EMCO	3115	C00945	04/22/08	04/22/10		
Preamplifier	Agilent / HP	8449B	C01052	02/04/09	02/04/11		
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	01/14/09	01/14/11		
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	12/16/08	12/16/10		

Page 13 of 255

7. ANTENNA PORT TEST RESULTS

7.1. 5.2 GHz BAND CHANNEL TESTS FOR 802.11a MODE

7.1.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

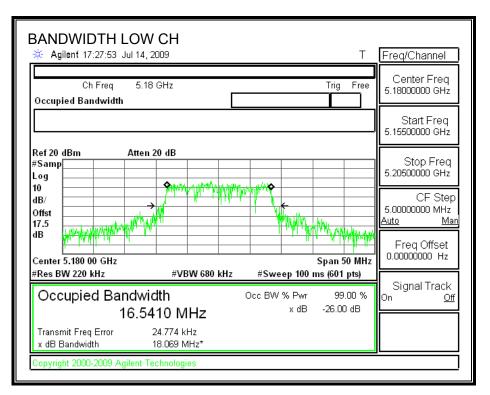
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

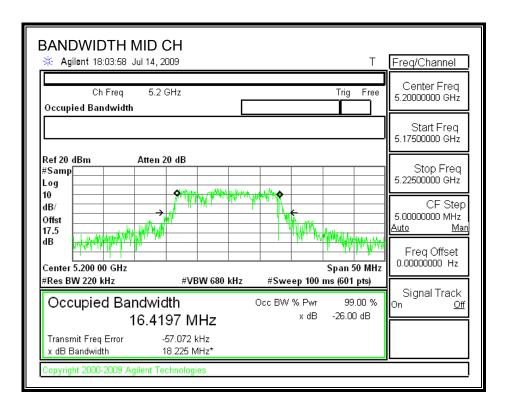
RESULTS

Channel	Frequency	26 dB Bandwidth	99% Bandwidth
	(MHz)	(MHz)	(MHz)
Low	5180	18.0690	16.5410
Middle	5200	18.2250	16.4197
High	5240	19.5230	16.3303

Page 14 of 255

26 dB and 99% BANDWIDTH





Page 15 of 255

BANDWIDTH HIGH	-		Т	Freq/Channel
Ch Freq 5.24 Occupied Bandwidth	GHz		Trig Free	Center Freq 5.24000000 GHz
				Start Freq 5.21500000 GHz
Ref 20 dBm Atten 2 #Samp Log	20 dB			Stop Freq 5.26500000 GHz
10 dB/ → Offst 17.5 dB			The Annual An	CF Step 5.0000000 MHz <u>Auto Man</u>
dB	#VBW 680 kHz	#Sweep 100 n	Span 50 MHz	Freq Offset 0.00000000 Hz
Occupied Bandwid		Occ BW % Pwr	<u> </u>	Signal Track On <u>Off</u>
	26.128 kHz 19.523 MHz*			
Copyright 2000-2009 Agilent Te	chnologies			

Page 16 of 255

7.1.2. OUTPUT POWER

<u>LIMITS</u>

FCC §15.407 (a) (1) IC RSS-210 A9.2 (1)

Antenna gain of Chain 1 =antenna gain of Chain 2.

Antenna Gain (dBi)		Effective Legacy Gain (dBi)
3	3.01	6.01

For the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 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.

<u>RESULTS</u>

Limit

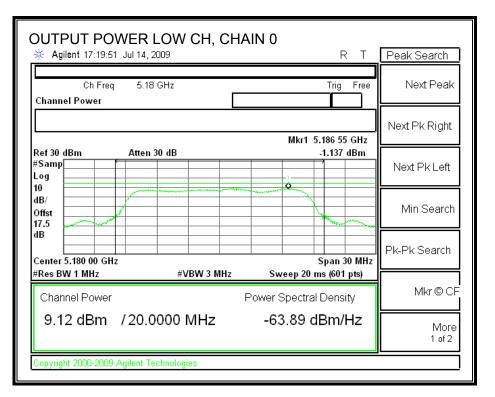
Channel	Freq	Fixed	В	4 + 10 Log B	Effective	Limit
		Limit		Limit	AntennaGain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5180	17	18.069	16.57	6.01	16.56
Mid	5200	17	18.225	16.61	6.01	16.60
High	5240	17	19.523	16.91	6.01	16.90

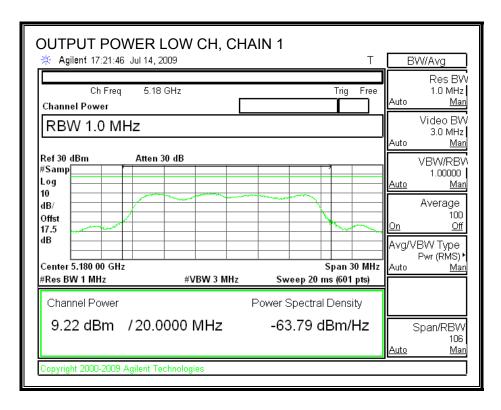
Individual Chain Results

Channel	Freq	Chain 0	Chain 1	Total	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5180	9.12	9.22	12.18	16.56	-4.38
Mid	5200	9.15	8.96	12.07	16.60	-4.53
High	5240	9.18	9.13	12.17	16.90	-4.73

Page 17 of 255

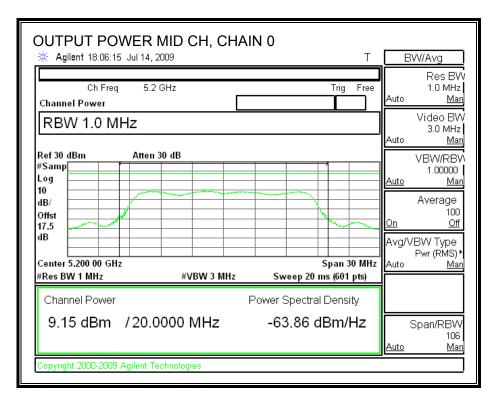
OUTPUT POWER, LOW CHANNEL

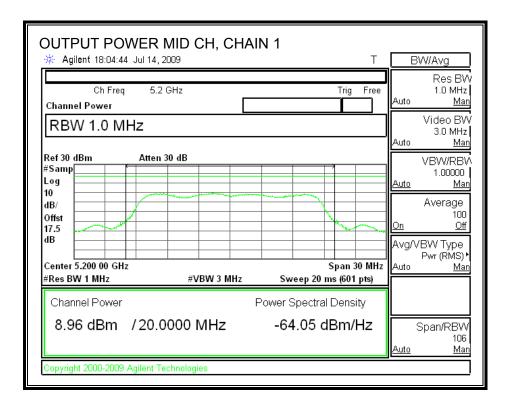




Page 18 of 255

OUTPUT POWER, MID CHANNEL

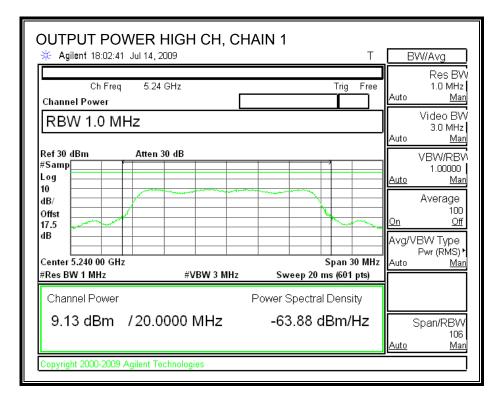




Page 19 of 255

OUTPUT POWER, HIGH CHANNEL

OUTPUT POWER HIGH CH, CHAIN 0	BW/Avg
Ch Freq 5.24 GHz Trig Free	Res BW 1.0 MHz Auto <u>Man</u>
RBW 1.0 MHz	Video BW 3.0 MHz Auto <u>Man</u>
Ref 30 dBm Atten 30 dB #Samp 1 Log 1 10 1 dB/ 1	VBW/RBV 1.00000 <u>Auto Man</u> Average
Offst 17.5 dB Center 5.240 00 GHz Span 30 MHz	100 <u>On Off</u> Avg/VBW Type Pwr (RMS) •
Center 5.240 00 GHz Span 30 MHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (601 pts) Channel Power Power Spectral Density	Auto <u>Man</u>
9.18 dBm /20.0000 MHz -63.83 dBm/Hz	Span/RBW 106 <u>Auto Man</u>
Copyright 2000-2009 Agilent Technologies	



Page 20 of 255

7.1.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Chain 1	Chain 2	Total
		Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)
Low	5180	9.12	9.08	12.11
Middle	5200	9.21	9.05	12.14
High	5240	9.16	8.99	12.09

Page 21 of 255

7.1.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

Use this table if antenna gain for Chain 1 = antenna gain for Chain 2

Antenna Gain (dBi)		Effective Legacy Gain (dBi)	
3	3.01	6.01	

For the 5.15-5.25 GHz band, the peak power spectral density shall not exceed 4 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum effective antenna gain is 6.01 dBi, therefore the limit is 3.99 dBm.

TEST PROCEDURE

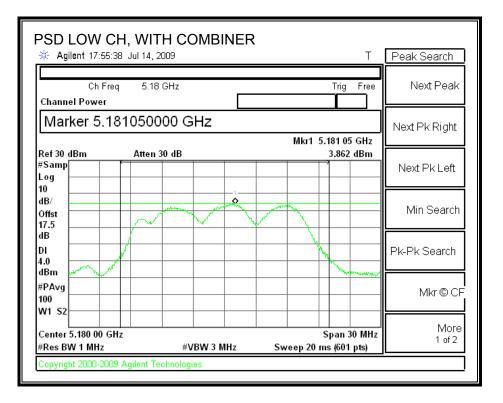
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

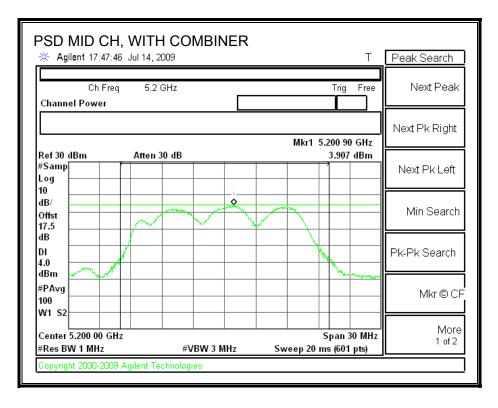
RESULTS

Channel	Frequency	PPSD With Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5180	3.86	3.99	-0.13
Middle	5200	3.91	3.99	-0.08
High	5240	3.82	3.99	-0.18

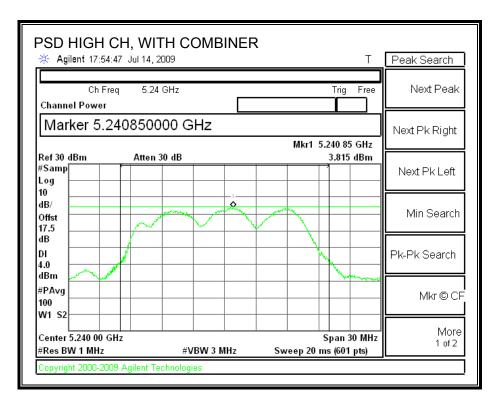
Page 22 of 255

POWER SPECTRAL DENSITY WITH COMBINER





Page 23 of 255



Page 24 of 255

7.1.5. PEAK EXCURSION

LIMITS

FCC §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 transmitter outputs are connected to the spectrum analyzer via a combiner.

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

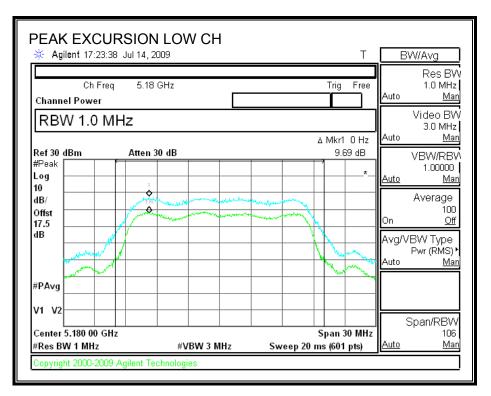
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

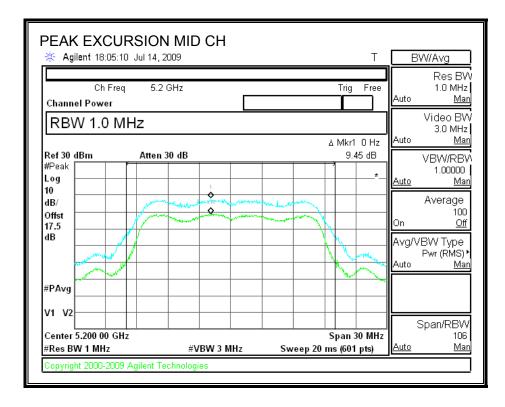
RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5180	9.69	13	-3.31
Middle	5200	9.45	13	-3.55
High	5240	10.20	13	-2.80

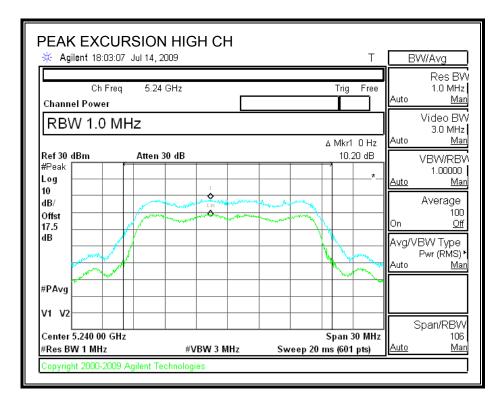
Page 25 of 255

PEAK EXCURSION





Page 26 of 255



Page 27 of 255

7.1.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

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

TEST PROCEDURE

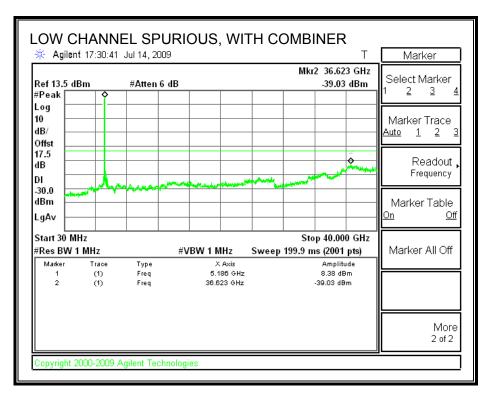
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

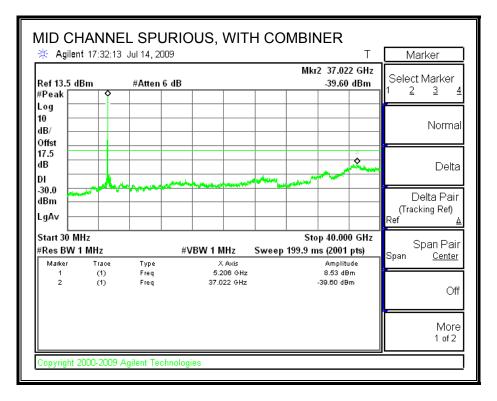
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

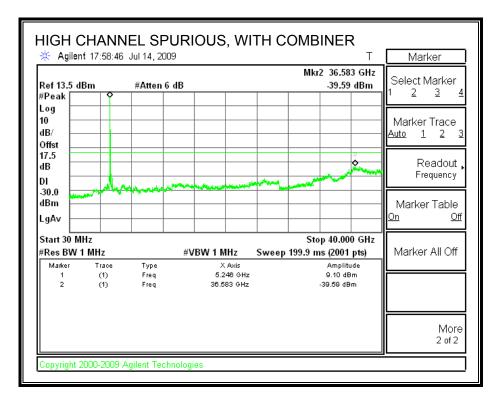
Page 28 of 255

SPURIOUS EMISSIONS WITH COMBINER





Page 29 of 255



Page 30 of 255

7.2. 5.2 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE

7.2.1. 99% & 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

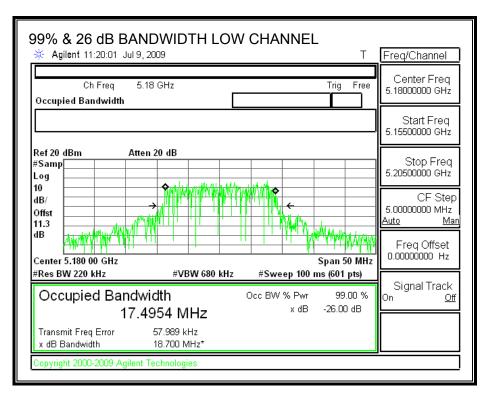
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

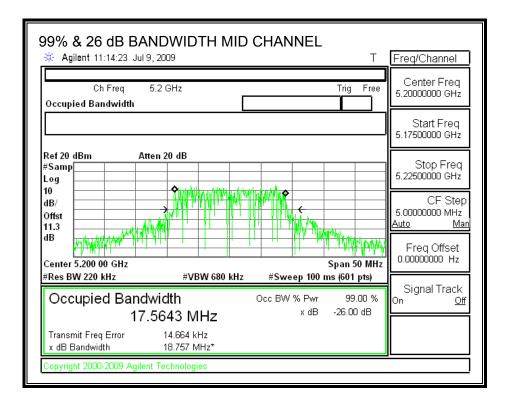
RESULTS

Channel	Frequency	99% OBW	26 dB BW
	(MHz)	(MHz)	(MHz)
Low	5180	17.4954	18.700
Middle	5200	17.5643	18.757
High	5240	17.5132	18.413

Page 31 of 255

99% & 26 dB BANDWIDTH





Page 32 of 255

99% & 26 dB BANDV	/IDTH HIGH	CHANNEL	- T	Freq/Channel
Ch Freq 5.24 GH Occupied Bandwidth	lz		Trig Free	Center Freq 5.24000000 GHz
				Start Freq 5.21500000 GHz
Ref 20 dBm Atten 20 dBm #Samp				Stop Freq 5.26500000 GHz
dB/ Offst 11.3 dB			M. M. Marian Maria	CF Step 5.0000000 MHz <u>Auto Man</u>
Center 5.240 00 GHz #Res BW 220 kHz	#VBW 680 kHz		Span 50 MHz	Freq Offset 0.00000000 Hz
Occupied Bandwidth 17.5132)cc BW % Pwr x dB		Signal Track On <u>Off</u>
	800 kHz 113 MHz*			
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Page 33 of 255

7.2.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2) IC RSS-210 A9.2 (2) For the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 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.

RESULTS

Limit

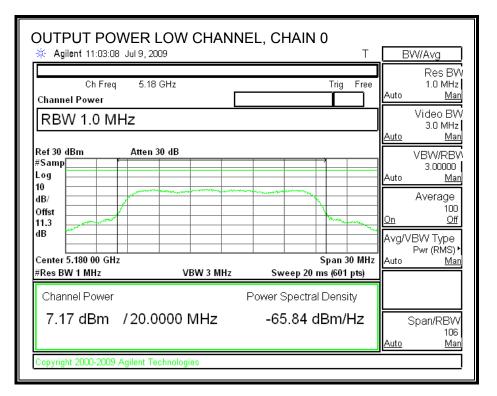
Channel	Freq	Fixed	В	4 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5180	17	18.700	16.72	3	16.72
Mid	5200	17	18.757	16.73	3	16.73
High	5240	17	18.413	16.65	3	16.65

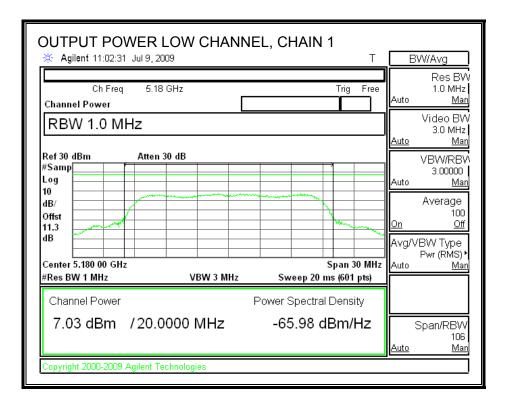
Individual Chain Results

Channel	Freq	Chain 0	Chain 1	Chain 2	Chain 3	Total	Limit	Margin
		Power	Power	Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5180	7.17	7.03	7.07	7.23	13.15	16.72	-3.57
Mid	5200	7.16	7.17	7.22	7.28	13.23	16.73	-3.50
High	5240	7.16	7.14	7.18	7.28	13.21	16.65	-3.44

Page 34 of 255

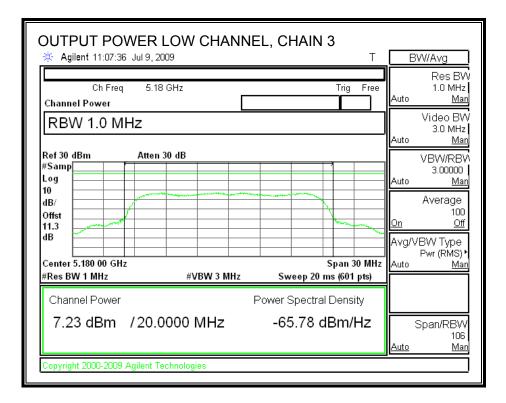
OUTPUT POWER, LOW CHANNEL





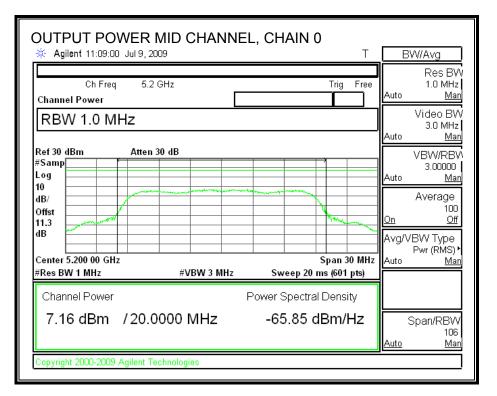
Page 35 of 255

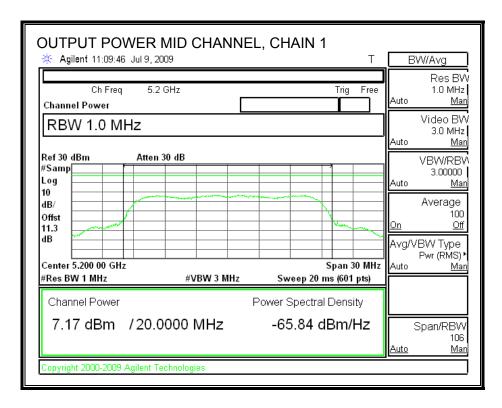
OUTPUT POWER LOW CHANNEL, CHAIN 2 * Agilent 11:01:20 Jul 9, 2009	T BW/Avg				
Ch Freq 5.18 GHz Trig Fre Channel Power	ee Res BW ee 1.0 MHz Auto Man Video BW				
Ref 30 dBm Atten 30 dB #Samp	3.0 MHz <u>Auto Man</u> VBW/RBW 3.00000 Auto Man				
10 dB/ Offst 11.3 dB	Average 100 <u>On Off</u> Avg/VBW Type				
Center 5.180 00 GHz Span 30 M #Res BW 1 MHz VBW 3 MHz Sweep 20 ms (601 pts)					
Channel Power Spectral Density 7.07 dBm / 20.0000 MHz -65.94 dBm/Hz Span/RBW 106 <u>Auto Man</u>					
Copyright 2000-2009 Agilent Technologies					



Page 36 of 255

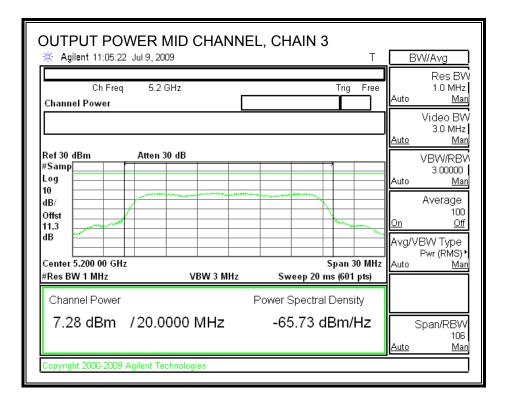
OUTPUT POWER, MID CHANNEL





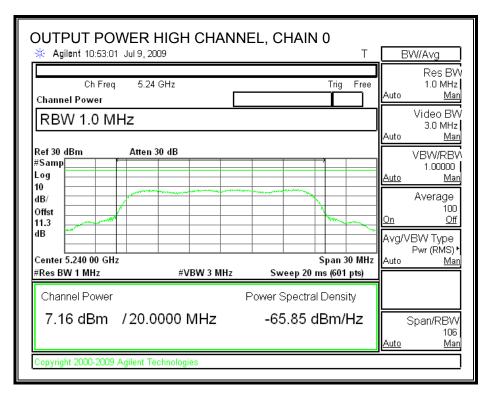
Page 37 of 255

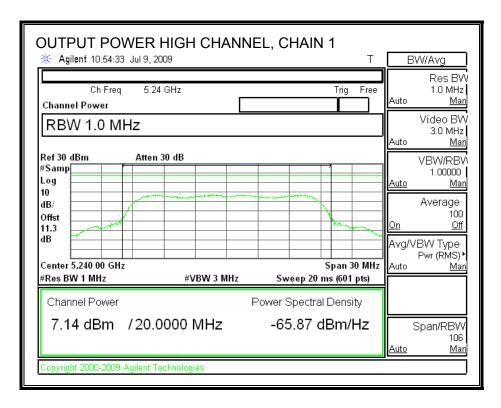
OUTPUT POWER MID CHANNEL, CHAIN 2 * Agilent 11:08:17 Jul 9, 2009	Т	BW/Avg			
Ch Freq 5.2 GHz Trig f	Free	Res BW 1.0 MHz Auto <u>Man</u>			
RBW 1.0 MHz		Video BW 3.0 MHz Auto <u>Man</u>			
Ref 30 dBm Atten 30 dB #Samp		VBW/RBW 3.00000 Auto <u>Man</u>			
dB/ Offst 11.3		Average 100 <u>On Off</u>			
dB Center 5.200 00 GHz Span 30		Avg/VBW Type Pwr (RMS)≛ Auto <u>Man</u>			
#Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (601 pr Channel Power Power Spectral Density	-				
7.22 dBm / 20.0000 MHz -65.79 dBm/Hz Span/RBW 106 Auto Man					
Copyright 2000-2009 Agilent Technologies					



Page 38 of 255

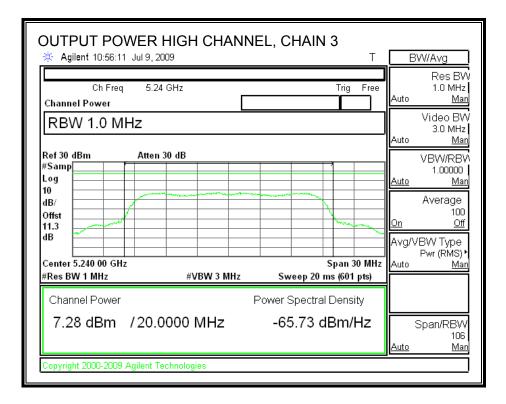
OUTPUT POWER, HIGH CHANNEL





Page 39 of 255

OUTPUT POWER HIGH	CHANN	EL, CHAII	N 2	Т	Б	V/Ava 1
Ch Freq 5.24 GHz			Trig	Free	Auto	Res BW 1.0 MHz <u>Man</u>
RBW 1.0 MHz					Auto	Video BW 3.0 MHz <u>Man</u>
Ref 30 dBm Atten 30 dB #Samp					<u>Auto</u>	VBW/RBV 1.00000 <u>Man</u>
dB/ Offst 11.3					<u>On</u>	Average 100 <u>Off</u>
dB Center 5.240 00 GHz #Res BW 1 MHz #V	BW 3 MHz	Sween 20	Span 30) ms (601 p			BW Type Pwr (RMS) ► <u>Man</u>
Channel Power		Power Spectr	· ·	ŕ		
7.18 dBm /20.0000 N	ИНz	-65.83	dBm/⊦	łz	S <u>Auto</u>	pan/RBW 106 <u>Man</u>
Copyright 2000-2009 Agilent Technologi	es					



Page 40 of 255

7.2.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Frequency	Chain 0	Chain 1	Chain 2	Chain 3
	Power	Power	Power	Power
(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
5180	7.14	7.26	7.10	7.23
5200	7.15	7.21	7.24	7.23
5240	7.35	7.32	7.39	7.28

Page 41 of 255

7.2.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.15-5.25 GHz band, the peak power spectral density shall not exceed 4 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain is less than 6 dBi; therefore the limit is 4 dBm.

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.

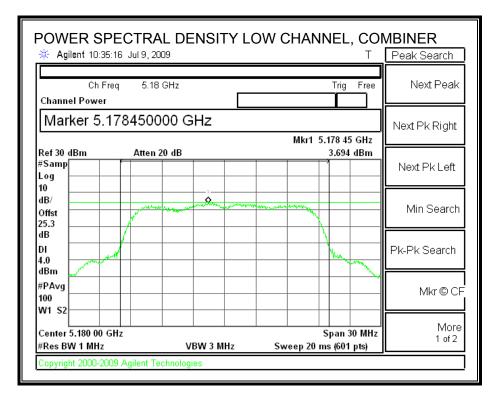
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

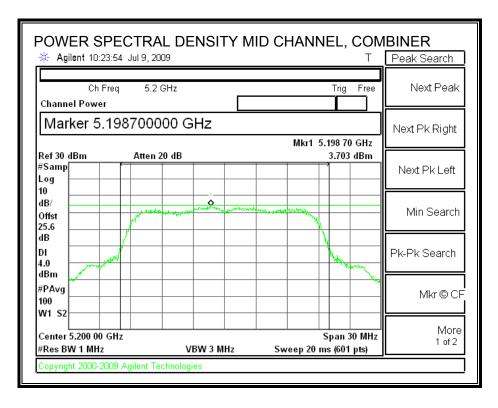
Channel	Frequency	PSD with Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5180	3.69	4	-0.31
Middle	5200	3.70	4	-0.30
High	5240	3.67	4	-0.33

RESULTS

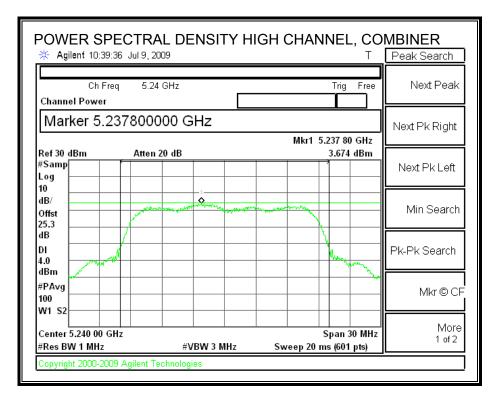
Page 42 of 255

POWER SPECTRAL DENSITY





Page 43 of 255



Page 44 of 255

7.2.5. PEAK EXCURSION

LIMITS

FCC §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 transmitter outputs are connected to the spectrum analyzer via a combiner.

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

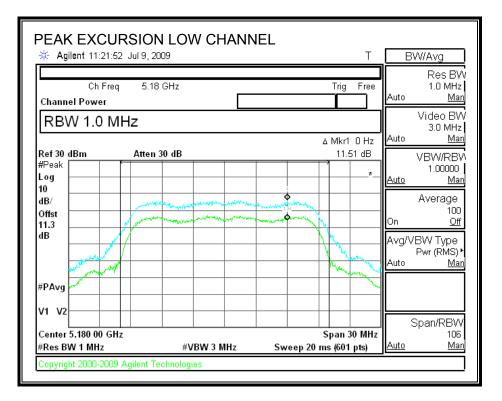
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

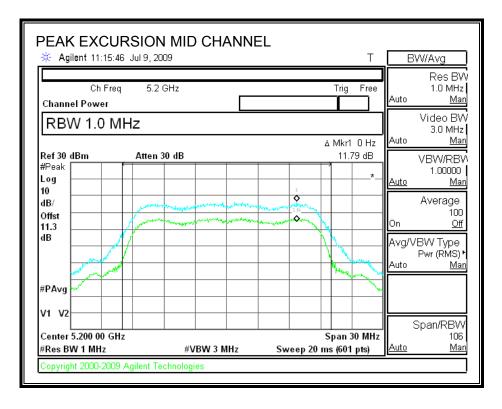
RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5180	11.51	13	-1.49
Middle	5200	11.79	13	-1.21
High	5240	9.82	13	-3.18

Page 45 of 255

PEAK EXCURSION





Page 46 of 255

🔆 Agilent 11:17:40 Jul 9,1	2009		Т	E	3W/Avg
Ch Freq 5.2 Channel Power	4 GHz		Trig Free	Auto	Res BV 1.0 MHz <u>Mar</u>
RBW 1.0 MHz		۵	Mkr1 0 Hz	Auto	Video BV 3.0 MHz <u>Mar</u>
Ref 30 dBm Atter #Peak Log 10	1 30 dB		9.82 dB	<u>Auto</u>	VBW/RB\ 1.00000 <u>Mar</u>
dB/ Offst 11.3		and the second s		On	Average 100 <u>Off</u>
dB			Von a von	A∨g/\ Auto	/BW Type Pwr (RMS) ⁽ <u>Mar</u>
#PAvg					
V1 V2			pan 30 MHz		Span/RBW
#Res BW 1 MHz	#VBW 3 MHz	Sweep 20 m		<u>Auto</u>	Mar

Page 47 of 255

7.2.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (3)

IC RSS-210 A9.3 (3)

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

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.

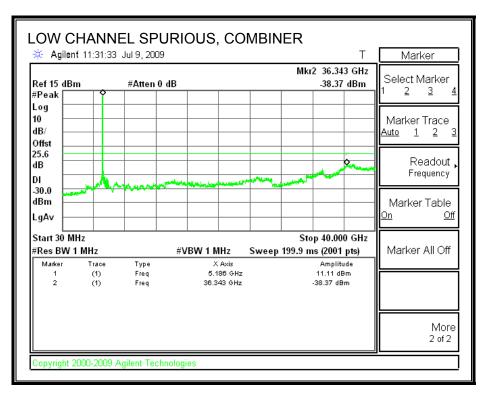
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

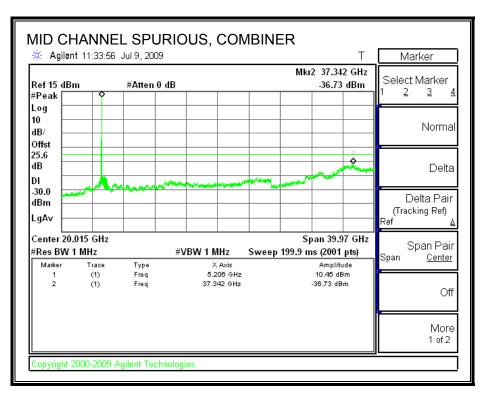
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

Page 48 of 255

LOW CHANNEL SPURIOUS EMISSIONS

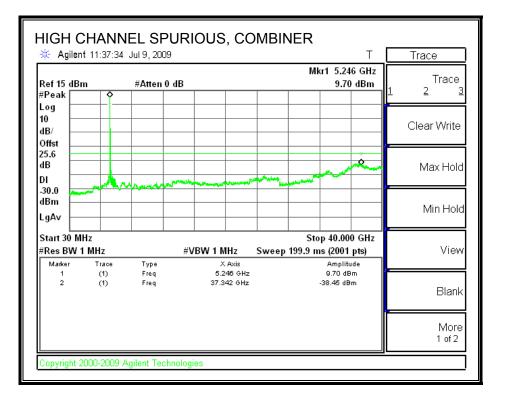


MID CHANNEL SPURIOUS EMISSIONS



Page 49 of 255

HIGH CHANNEL SPURIOUS EMISSIONS



Page 50 of 255

7.3. 5.2 GHz BAND CHANNEL TESTS FOR 802.11n HT40 MODE

7.3.1. 99% & 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

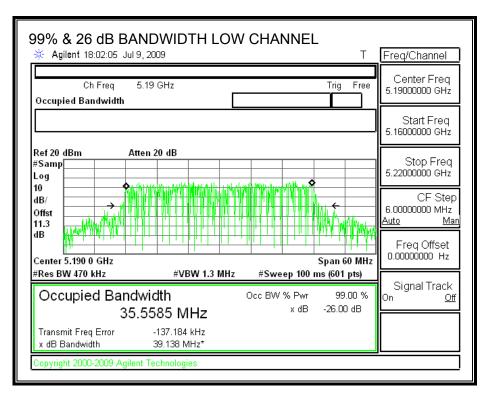
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

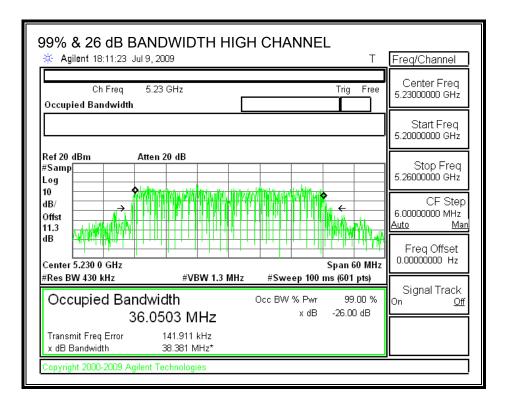
<u>RESULTS</u>

Channel	Frequency	99% OBW	26 dB BW
	(MHz)	(MHz)	(MHz)
Low	5190	35.5585	39.138
High	5230	36.0503	38.381

Page 51 of 255

99% & 26 dB BANDWIDTH





Page 52 of 255

7.3.2. OUTPUT POWER

<u>LIMITS</u>

FCC §15.407 (a) (2) IC RSS-210 A9.2 (2) For the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 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.

<u>RESULTS</u>

Limit

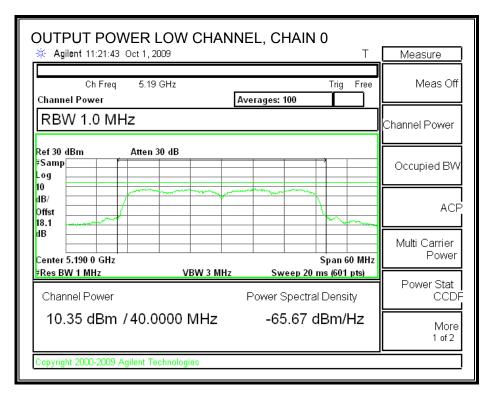
	-					
Channel	Freq	Fixed	В	4 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5190	17	39.138	19.93	3	17.00
High	5230	17	38.381	19.84	3	17.00

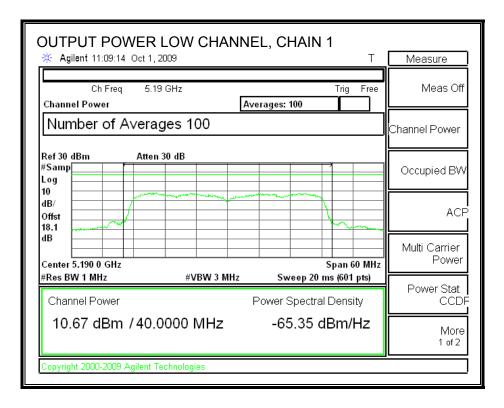
Individual Chain Results

Channel	Freq	Chain 0	Chain 1	Chain 2	Chain 3	Total	Limit	Margin
		Power	Power	Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5190	10.35	10.67	10.63	10.87	16.65	17.00	-0.35
High	5230	10.56	10.79	10.54	10.70	16.67	17.00	-0.33

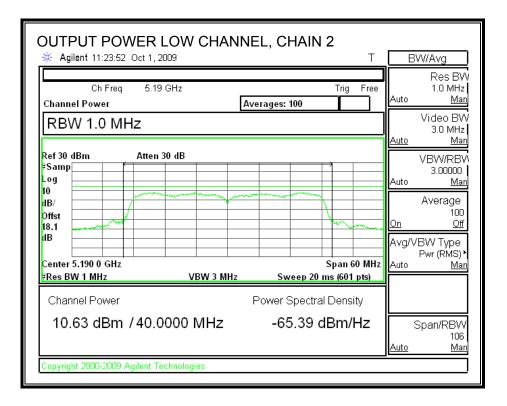
Page 53 of 255

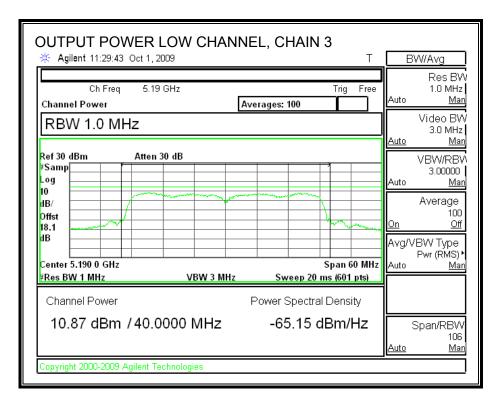
OUTPUT POWER, LOW CHANNEL





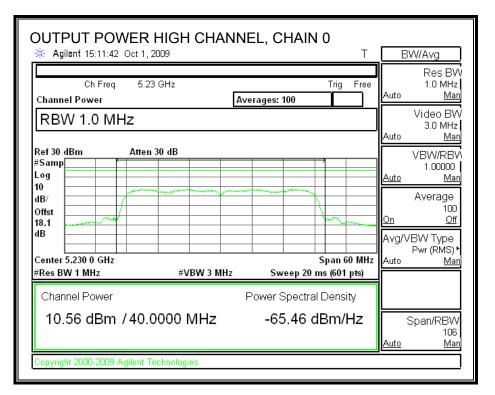
Page 54 of 255

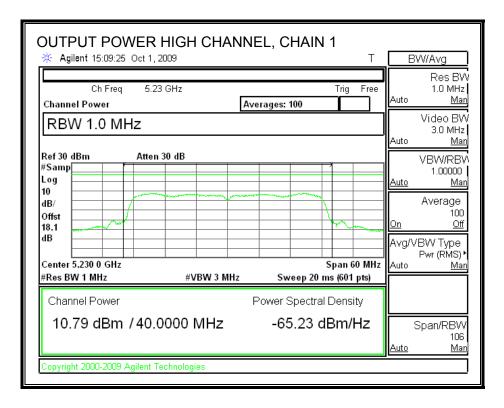




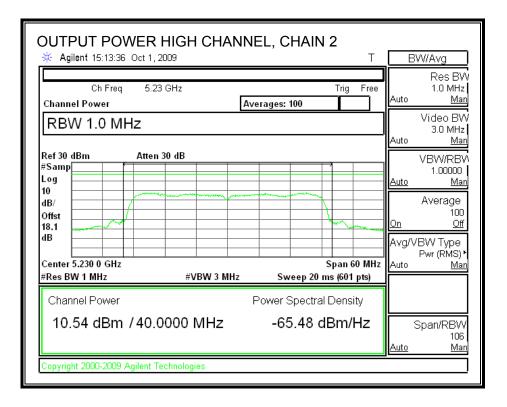
Page 55 of 255

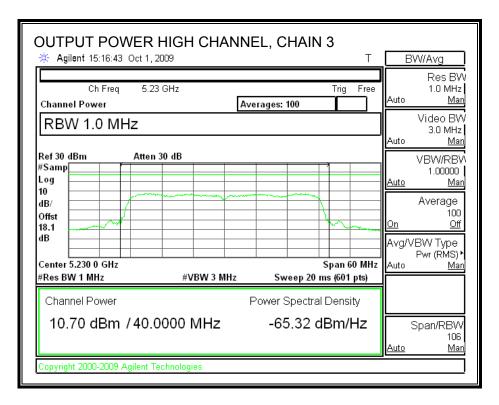
OUTPUT POWER, HIGH CHANNEL





Page 56 of 255





Page 57 of 255

7.3.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Frequency	Chain 0	Chain 1	Chain 2	Chain 3
	Power	Power	Power	Power
(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
5190	10.57	10.98	10.59	10.82
5230	10.47	10.70	10.52	10.66

Page 58 of 255

7.3.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.15-5.25 GHz band, the peak power spectral density shall not exceed 4 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain is less than 6 dBi; therefore the limit is 4 dBm.

TEST PROCEDURE

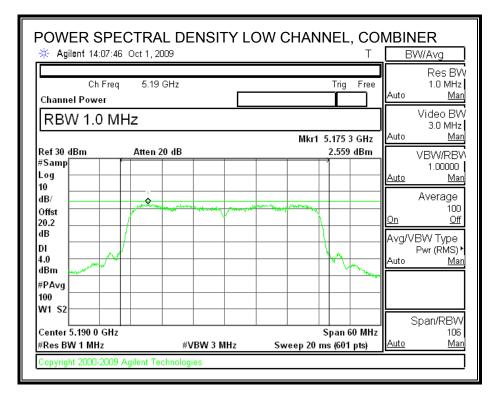
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

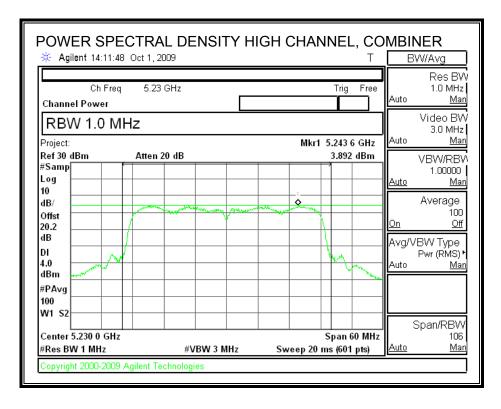
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

Channel	Frequency	PSD with Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5190	2.559	4	-1.44
High	5230	3.892	4	-0.11

<u>RESULTS</u>

POWER SPECTRAL DENSITY





Page 60 of 255

7.3.5. PEAK EXCURSION

<u>LIMITS</u>

FCC §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 transmitter outputs are connected to the spectrum analyzer via a combiner.

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

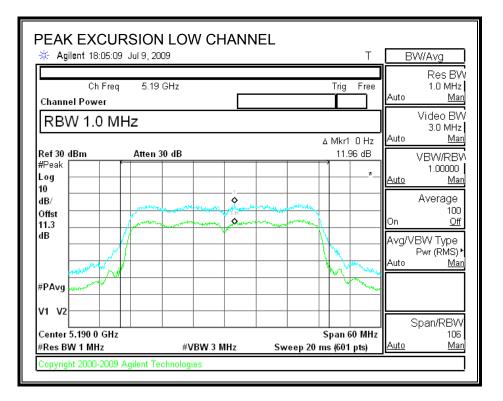
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

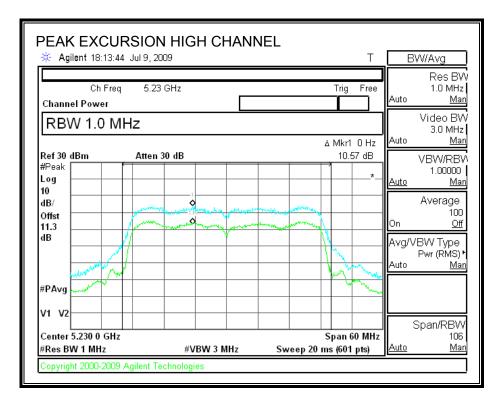
RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5190	11.96	13	-1.04
High	5230	10.57	13	-2.43

Page 61 of 255

PEAK EXCURSION





Page 62 of 255

7.3.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (3)

IC RSS-210 A9.3 (3)

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

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.

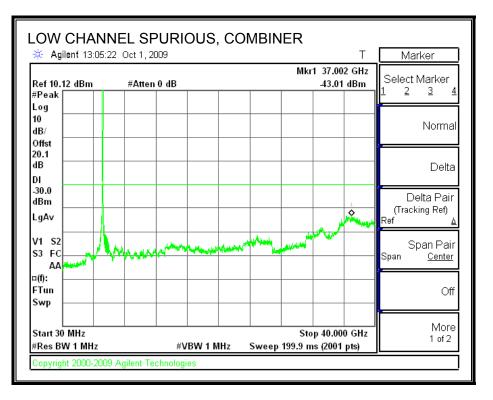
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

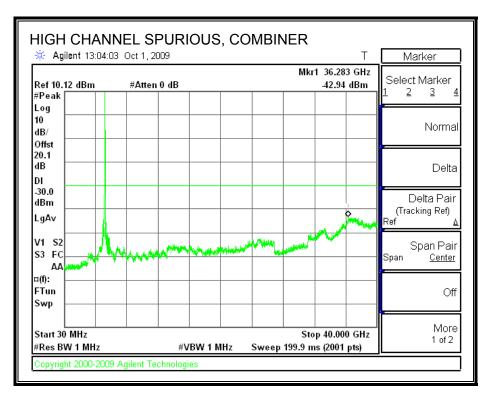
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

Page 63 of 255

LOW CHANNEL SPURIOUS EMISSIONS



HIGH CHANNEL SPURIOUS EMISSIONS



Page 64 of 255

7.4. 5.3 GHz BAND CHANNEL TESTS FOR 802.11a MODE

7.4.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

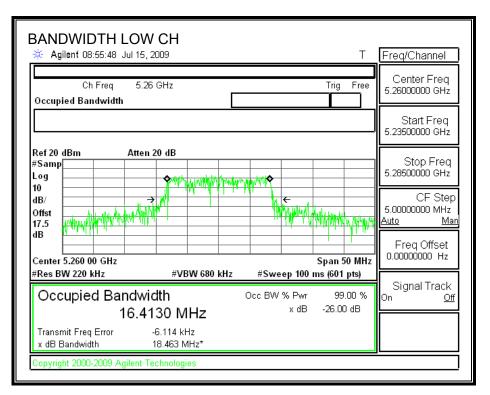
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

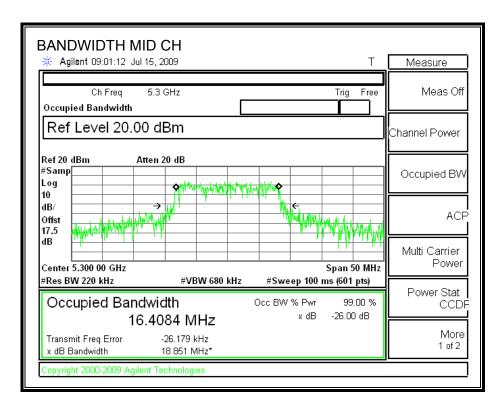
<u>RESULTS</u>

Channel	Frequency	26 dB Bandwidth	99% Bandwidth
	(MHz)	(MHz)	(MHz)
Low	5260	18.4630	16.4130
Middle	5300	18.8510	16.4084
High	5320	18.5600	16.4537

Page 65 of 255

26 dB and 99% BANDWIDTH





Page 66 of 255

BANDWIDTH HIGH CH	Freq/Channel
Ch Freq 5.32 GHz Trig Free Occupied Bandwidth	Center Freq 5.32000000 GHz
	Start Freq 5.29500000 GHz
Ref 20 dBm Atten 20 dB #Samp	Stop Freq 5.34500000 GHz
10 dB/ Offst 17.5 dB	CF Step 5.0000000 MHz <u>Auto Man</u>
Center 5.320 00 GHz Span 50 MHz	Freq Offset 0.00000000 Hz
#Res BW 220 kHz #VBW 680 kHz #Sweep 100 ms (601 pts) Occupied Bandwidth Occ BW % Pwr 99.00 % 10.4527 N4L = x dB -26.00 dB	Signal Track On <u>Off</u>
16.4537 MHz × dB -26.00 dB Transmit Freq Error -79.381 kHz x dB Bandwidth 18.560 MHz*	
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Page 67 of 255

7.4.2. OUTPUT POWER

<u>LIMITS</u>

FCC §15.407 (a) (1) IC RSS-210 A9.2 (1)

Antenna gain of Chain 1 = antenna gain of Chain 2.

Antenna Gain (dBi)		Effective Legacy Gain (dBi)	
3	3.01	6.01	

For the 5.25-5.35 GHz band, the maximum conducted output 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.

<u>RESULTS</u>

Limit

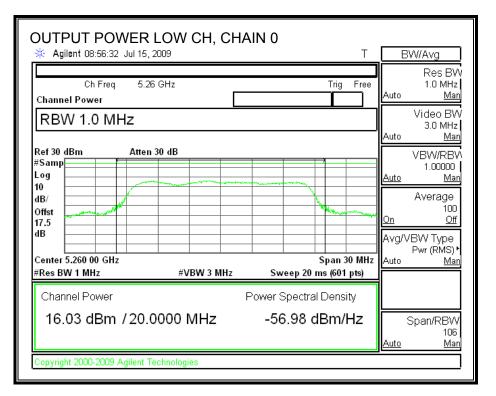
Channel	Frequency	Fixed	В	11 + 10 Log B	Effective	Limit
		Limit		Limit	Ant Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5260	24	18.4630	23.66	6.01	23.65
Mid	5300	24	18.8510	23.75	6.01	23.74
High	5320	24	18.5600	23.69	6.01	23.68

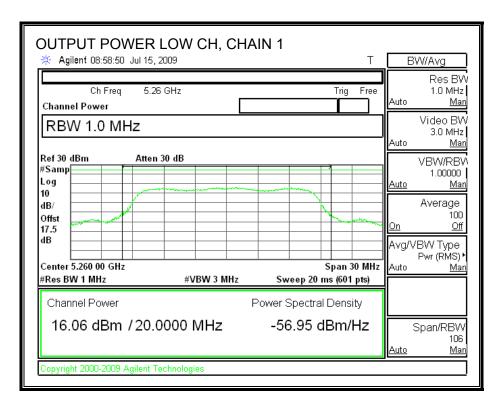
Individual Chain Results

Channel	Frequency	Chain 0	Chain 1	Total	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5260	16.03	16.06	19.06	23.65	-4.60
Mid	5300	16.02	16.25	19.15	23.74	-4.60
High	5320	16.08	16.09	19.10	23.68	-4.58

Page 68 of 255

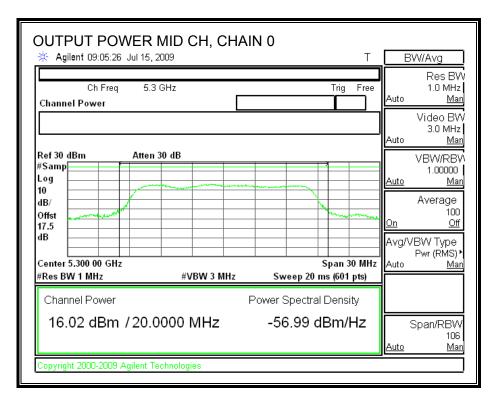
OUTPUT POWER, LOW CHANNEL

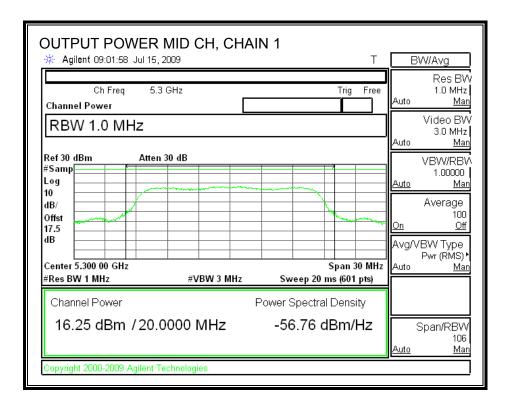




Page 69 of 255

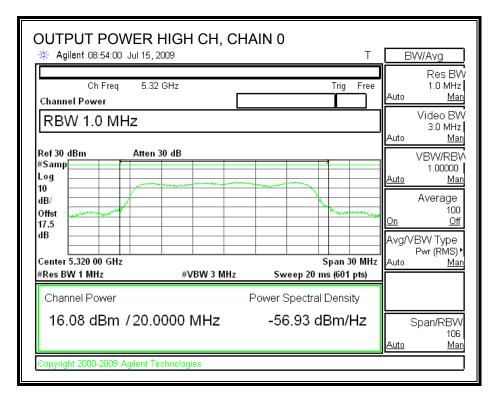
OUTPUT POWER, MID CHANNEL





Page 70 of 255

OUTPUT POWER, HIGH CHANNEL



OUTPUT POWER		AIN 1	Т	BW/Avg
Ch Freq 5.32 Channel Power RBW 1.0 MHz	GHz	Tri	g Free	Res BW 1.0 MHz Auto <u>Man</u> Video BW
Ref 30 dBm Atten 3 #Samp Log 10 dB/ Offst	0 dB			3.0 MHz Auto <u>Man</u> VBW/RBW 1.00000 <u>Auto Man</u> Average 100
Center 5.320 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Spar Sweep 20 ms (6	n 30 MHz 01 pts)	<u>On Off</u> Avg/VBW Type Pwr (RMS) ► Auto <u>Man</u>
Channel Power 16.09 dBm / 20.04	000 MHz	Power Spectral Der -56.92 dBm	, i	Span/RBW 106 <u>Auto Man</u>
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Page 71 of 255

7.4.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Chain 0	Chain 1	Total
		Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)
Low	5260	15.94	16.16	19.06
Middle	5300	16.14	16.32	19.24
High	5320	16.05	16.25	19.16

Page 72 of 255

7.4.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

Use this table if antenna gain for Chain 1 = antenna gain for Chain 2

Antenna Gain (dBi)	. . ,	Effective Legacy Gain (dBi)	
3	3.01	6.01	

For the 5.25–5.35 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.

The maximum effective antenna gain is 6.01 dBi, therefore the limit is 10.99 dBm.

TEST PROCEDURE

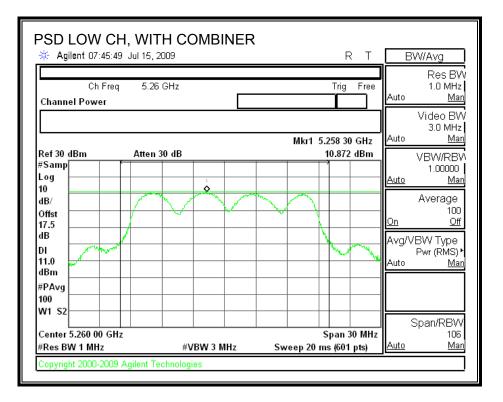
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

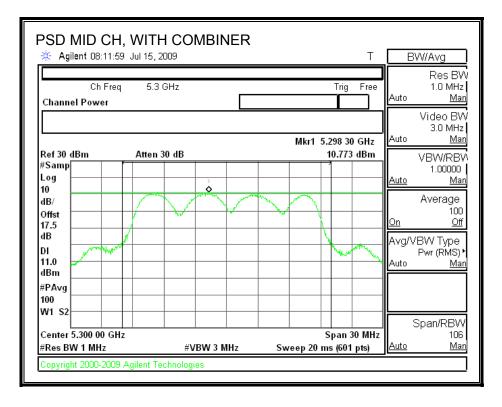
RESULTS

Channel	Frequency	PPSD With Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5260	10.87	10.99	-0.12
Middle	5300	10.77	10.99	-0.22
High	5320	10.52	10.99	-0.47

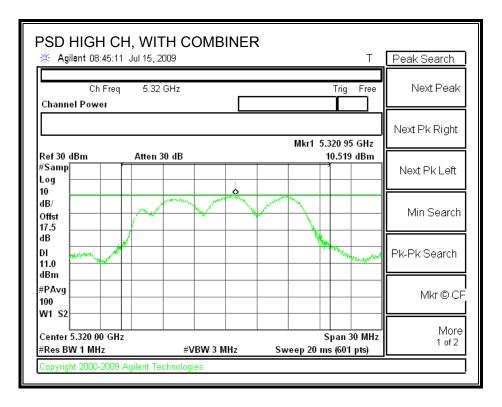
Page 73 of 255

POWER SPECTRAL DENSITY WITH COMBINER





Page 74 of 255



Page 75 of 255

7.4.5. PEAK EXCURSION

LIMITS

FCC §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 transmitter outputs are connected to the spectrum analyzer via a combiner.

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

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

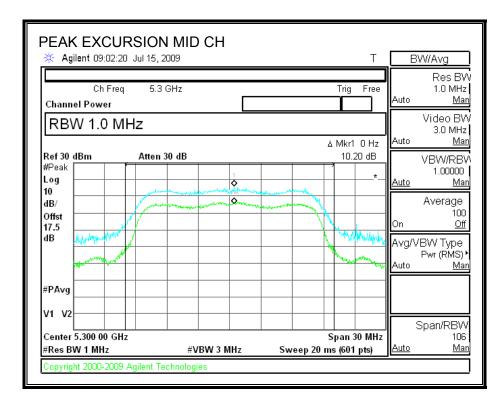
RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5260	10.48	13	-2.52
Middle	5300	10.20	13	-2.80
High	5320	10.08	13	-2.92

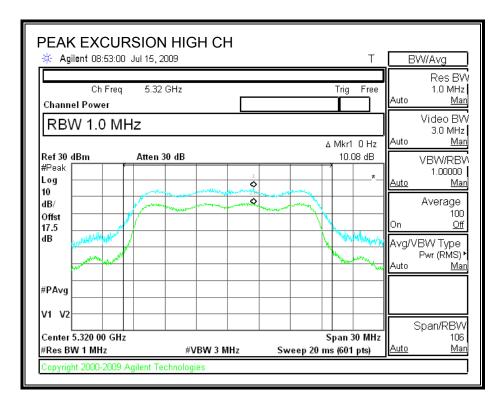
Page 76 of 255

PEAK EXCURSION

PEAK EXCURSION					
🔆 🔆 Agilent 08:57:28 Jul 15, 20	JU9		Т	B	W/Avg
Ch Freq 5.26	GHz		Trig Free	Auto	Res BW 1.0 MHz <u>Man</u>
RBW 1.0 MHz		١٨	Mkr1 0 Hz	Auto	Video BW 3.0 MHz <u>Man</u>
Ref 30 dBm Atten 3 #Peak Log	0 dB		10.48 dB	<u>Auto</u>	VBW/RBW 1.00000 <u>Man</u>
10 dB/ Offst 17.5	······································			On	Average 100 <u>Off</u>
dB Markeland and a second seco			Manual and Winey	Avg/V Auto	BW Type Pwr (RMS) ► <u>Man</u>
#PAvg					
V1 V2				Ś	Span/RBW
Center 5.260 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Sp Sweep 20 ms	an 30 MHz (601 pts)	<u>Auto</u>	106 <u>Man</u>
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Page 77 of 255



Page 78 of 255

7.4.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.25-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

TEST PROCEDURE

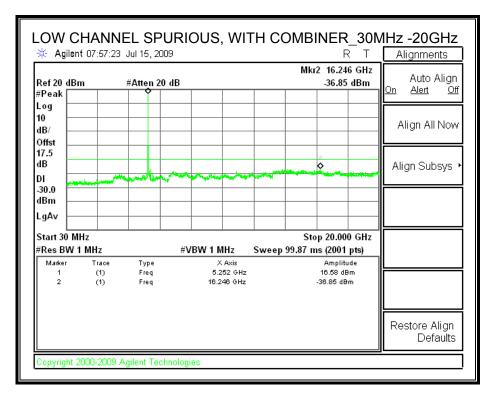
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

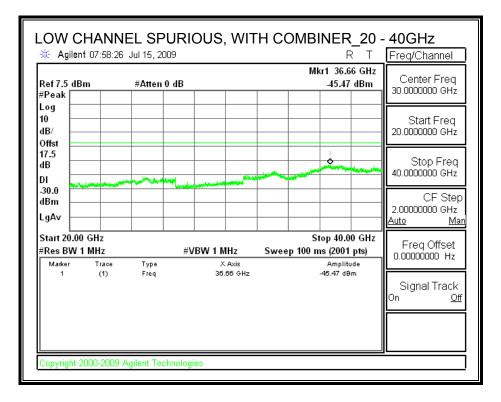
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

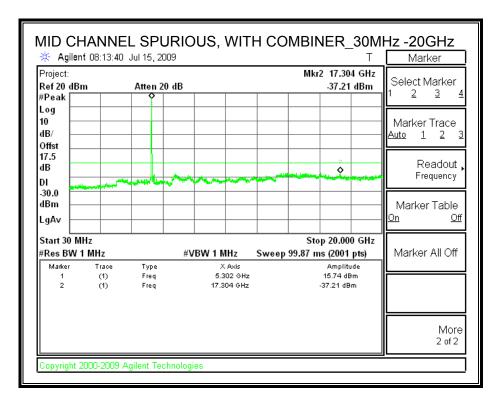
Page 79 of 255

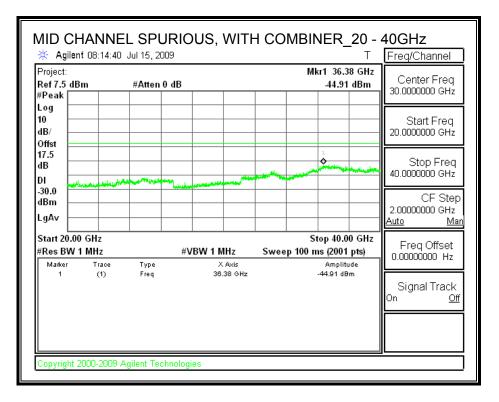
SPURIOUS EMISSIONS WITH COMBINER



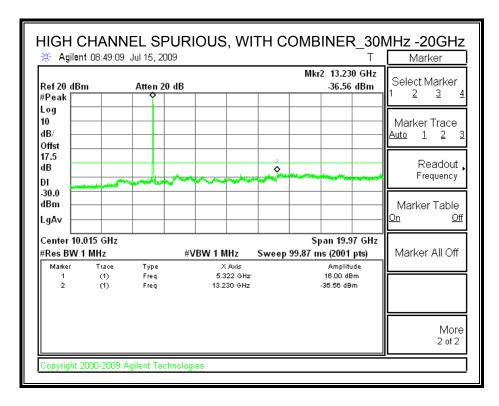


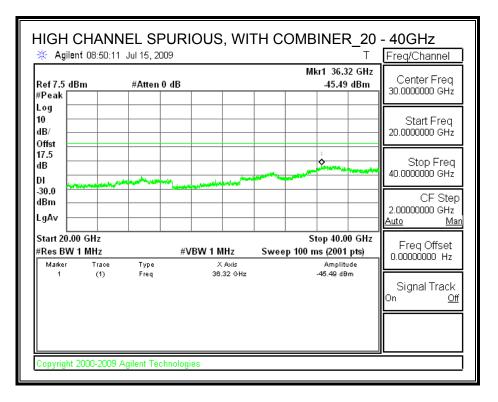
Page 80 of 255





Page 81 of 255





Page 82 of 255

7.5. 5.3 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE

7.5.1. 99% & 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

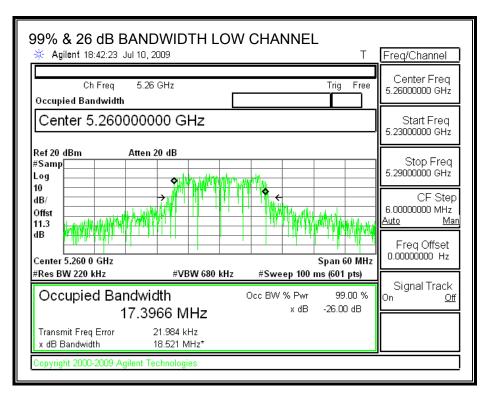
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

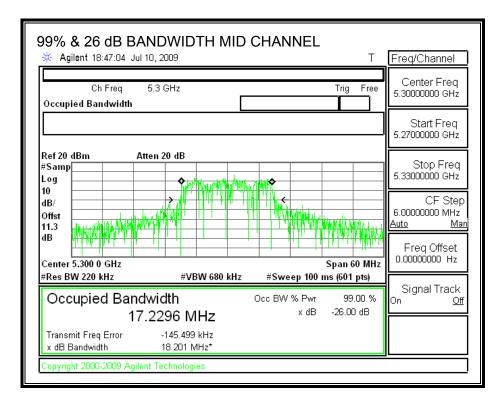
<u>RESULTS</u>

Channel	Frequency	99% OBW	26 dB BW
	(MHz)	(MHz)	(MHz)
Low	5260	17.3966	18.521
Middle	5300	17.2296	18.201
High	5320	17.3380	18.517

Page 83 of 255

99% & 26 dB BANDWIDTH





Page 84 of 255

99% & 26 dB BANE		H CHANNE	L T	Freq/Channel
Ch Freq 5.32 Occupied Bandwidth	GHz		Trig Free	Center Freq 5.32000000 GHz
				Start Freq 5.29000000 GHz
Ref 20 dBm Atten #Samp Log	20 dB			Stop Freq 5.3500000 GHz
10 dB/ Offst 11.3 dB				CF Step 6.0000000 MHz <u>Auto Man</u>
dB Center 5.320 0 GHz #Res BW 220 kHz	#VBW 680 kHz	#Sweep 100	Span 60 MHz	Freq Offset 0.00000000 Hz
Occupied Bandwi		Occ BW % Pwr x dB	· · /	Signal Track On <u>Off</u>
Transmit Freq Error	238.050 kHz 18.517 MHz*			
Copyright 2000-2009 Agilent Te	echnologies			

Page 85 of 255

7.5.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.25-5.35 GHz band, the maximum conducted output 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.

RESULTS

Channe	el Freq	Fixed	В	4 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5260	24	18.520	23.68	3	23.68
Mid	5300	24	18.201	23.60	3	23.60
High	5320	24	18.517	23.68	3	23.68

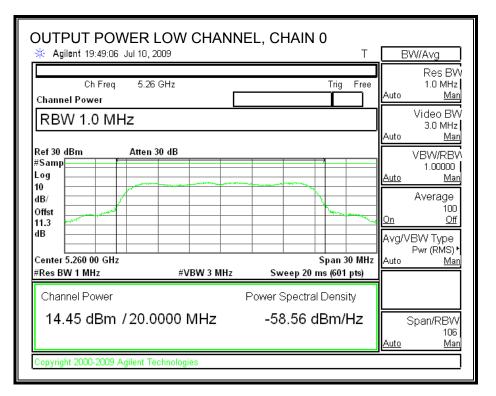
Limit

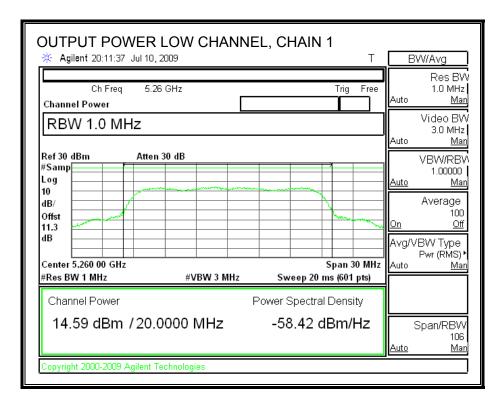
Individual Chain Results

Channel	Freq	Chain 0	Chain 1	Chain 2	Chain 3	Total	Limit	Margin
		Power	Power	Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5260	14.45	14.59	14.46	14.52	20.53	23.68	-3.15
Mid	5300	14.23	14.40	14.49	14.62	20.46	23.60	-3.14
High	5320	14.67	14.59	14.69	14.57	20.65	23.68	-3.02

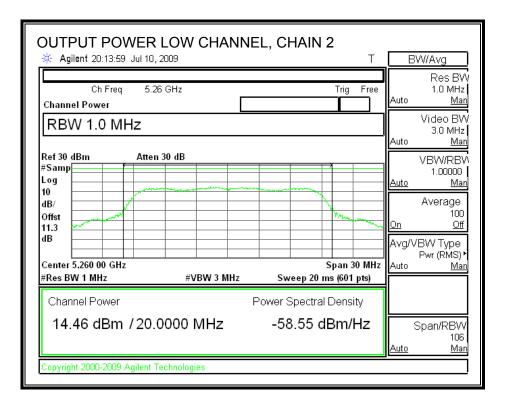
Page 86 of 255

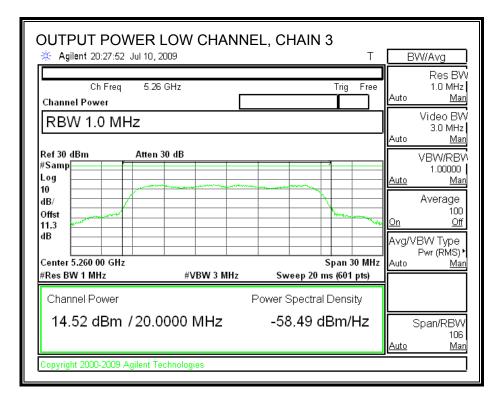
OUTPUT POWER, LOW CHANNEL





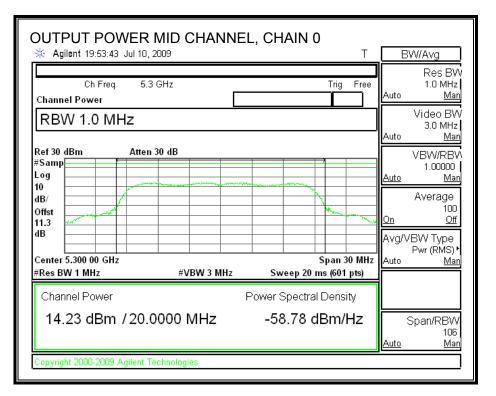
Page 87 of 255

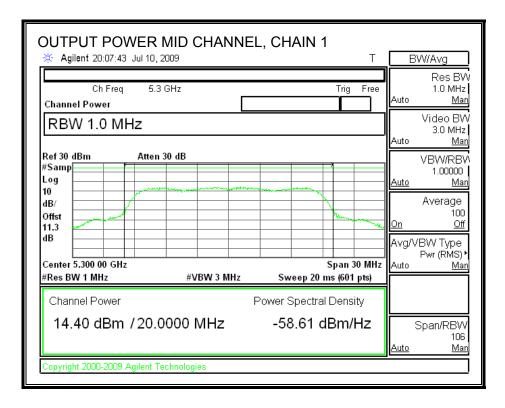




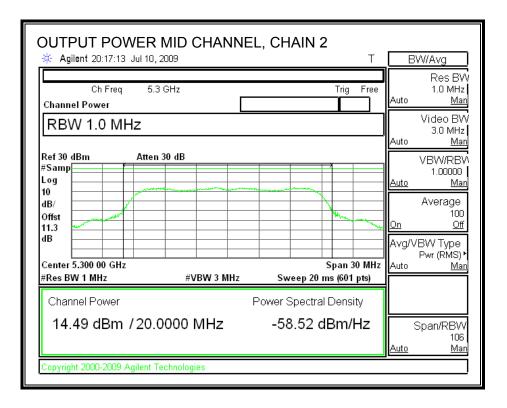
Page 88 of 255

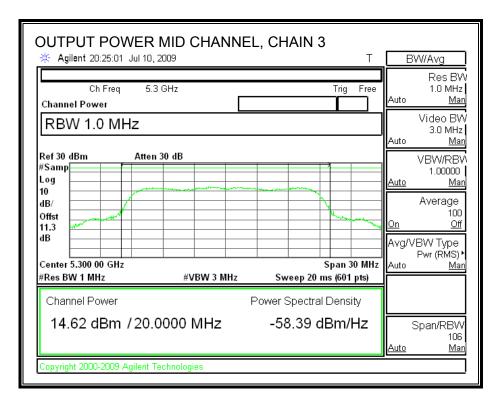
OUTPUT POWER, MID CHANNEL





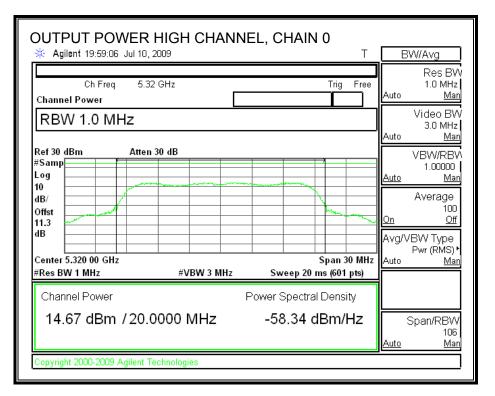
Page 89 of 255

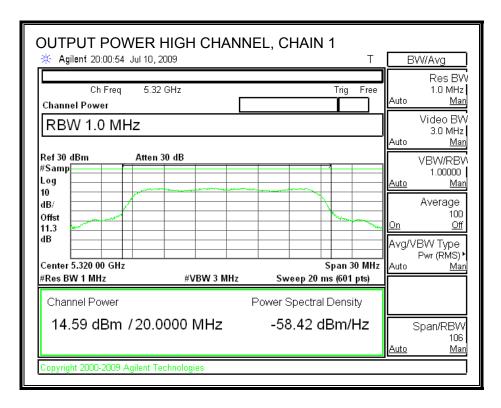




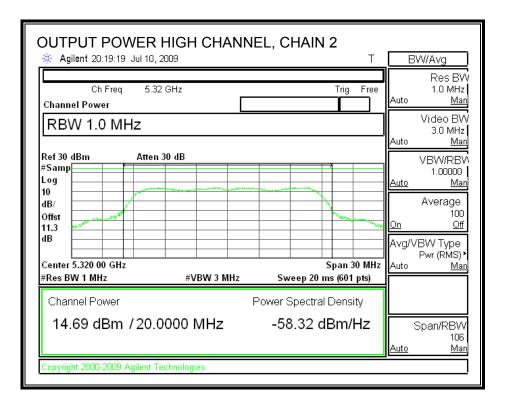
Page 90 of 255

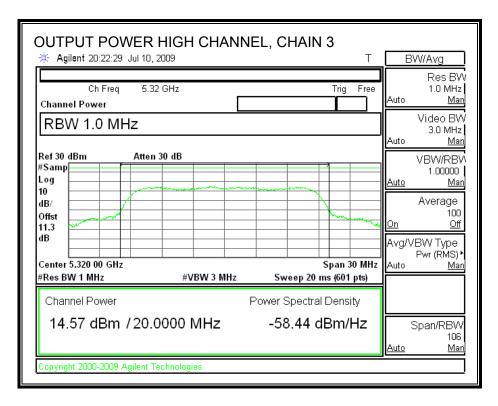
OUTPUT POWER, HIGH CHANNEL





Page 91 of 255





Page 92 of 255

7.5.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Frequency	Chain 0	Chain 1	Chain 2	Chain 3
	Power	Power	Power	Power
(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
5260	14.64	14.56	14.45	14.74
5300	14.44	14.53	14.51	14.64
5320	14.50	14.54	14.65	14.66

Page 93 of 255

7.5.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.25-5.35 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.

The maximum antenna gain is less than 6 dBi; therefore the limit is 11 dBm.

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.

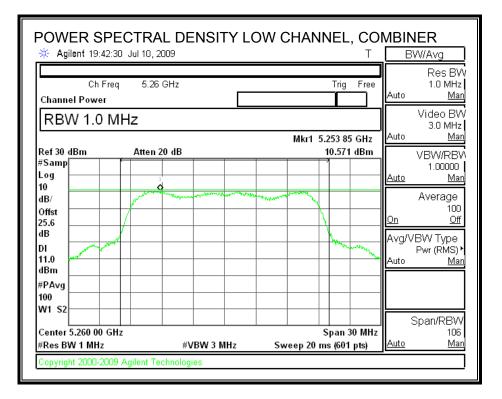
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

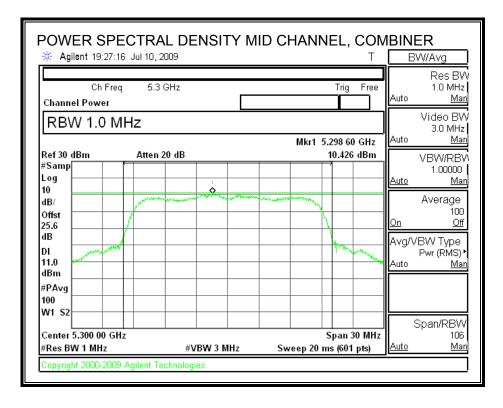
Channel	Frequency	PSD with Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5260	10.57	11	-0.43
Middle	5300	10.43	11	-0.57
High	5320	10.78	11	-0.22

RESULTS

Page 94 of 255

POWER SPECTRAL DENSITY





Page 95 of 255

POWER SPECTRA		IIGH CHANI	NEL, CO		NER
Ch Freq 5.32 (Channel Power	GHz		Trig Free	Auto	Res BVV 1.0 MHz <u>Man</u>
RBW 1.0 MHz	0.4P		313 45 GHz 10.777 dBm	Auto	Video BW 3.0 MHz <u>Man</u>
#Samp Log 10				<u>Auto</u>	VBW/RBV 1.00000 <u>Man</u>
dB/ Offst 25.6 dB				<u>On</u>	Average 100 <u>Off</u>
DI 11.0 dBm			Marine Contraction		BW Type Pwr (RMS)∙ <u>Man</u>
#PAvg 100 W1 S2					
Center 5.320 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Sweep 20 m	Span 30 MHz s (601 pts)	S <u>Auto</u>	Span/RBVV 106 <u>Man</u>
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Page 96 of 255

7.5.5. PEAK EXCURSION

LIMITS

FCC §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 transmitter outputs are connected to the spectrum analyzer via a combiner.

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

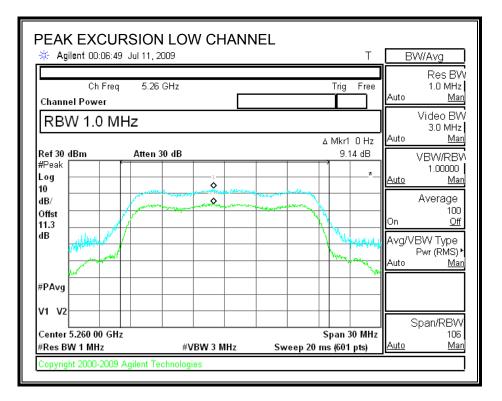
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

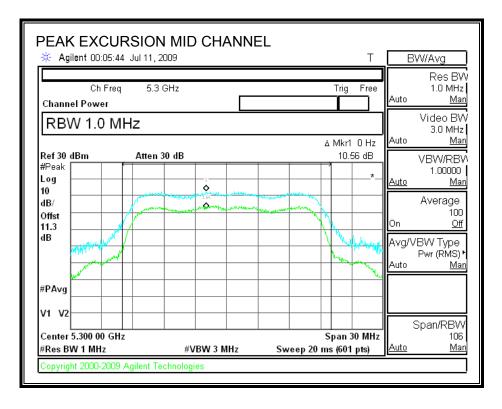
RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5260	9.14	13	-3.86
Middle	5300	10.56	13	-2.44
High	5320	8.87	13	-4.13

Page 97 of 255

PEAK EXCURSION





Page 98 of 255

Ch Freq 5.32 GHz Trig Free Channel Power Channel Power RBW 1.0 MHz Atten 30 dB #Peak Log 10 dB/ Offst 11.3 dB #PAvg V1 V2	* Agilent 00:04:36 Jul 11, 2	I HIGH CHANI		⊤	BW/Avg
Ref 30 dBm Atten 30 dB 8.87 dB #Peak 3.0 MH Log 10 dB/ 4 Offst 1 11.3 4 #PAvg 4 V1 V2 4	1	GHz	Trig F		Res BM 1.0 MHz
#Peak	RBW 1.0 MHz		_ ∆ Mkr1 O	Hz Auto	Video BV 3.0 MHz Man
III IIII IIII IIIII IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	#Peak	1	8.87 c	*	VBW/RBV 1.00000 <u>Man</u>
#PAvg	dB/ Offst	and the second		On	Average 100 <u>Off</u>
V1 V2	HARACLAND .				Pwr (RMS) ►
Center 5.320 00 GHz 10	Center 5.320 00 GHz				Span/RBW 106

Page 99 of 255

7.5.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (3)

IC RSS-210 A9.3 (3)

For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.25-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

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.

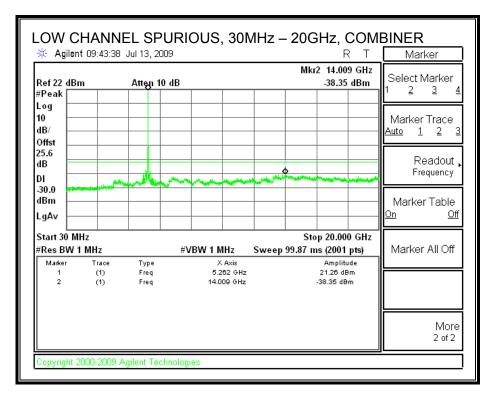
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

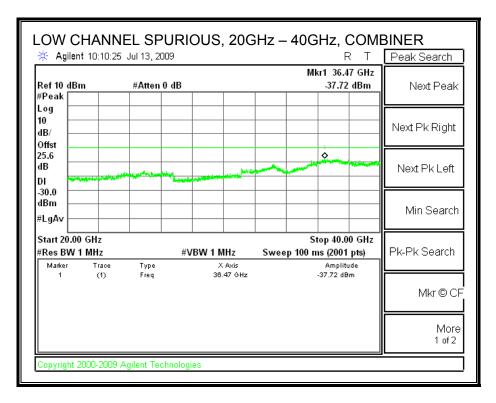
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

Page 100 of 255

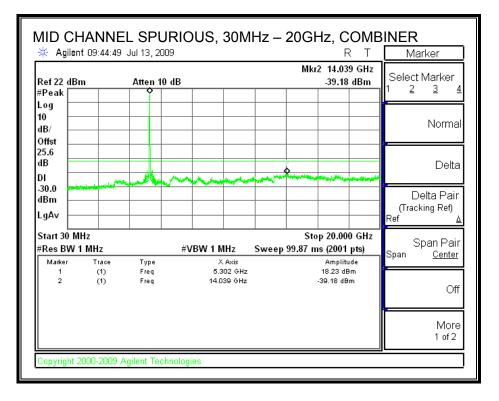
LOW CHANNEL SPURIOUS EMISSIONS

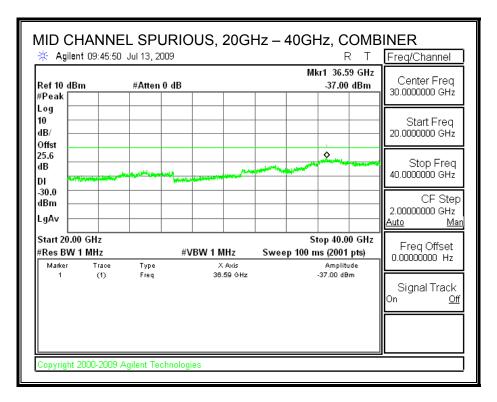




Page 101 of 255

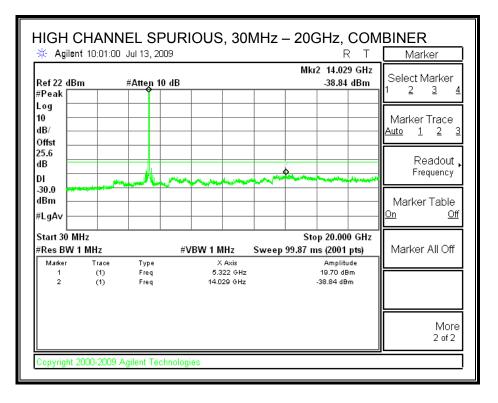
MID CHANNEL SPURIOUS EMISSIONS

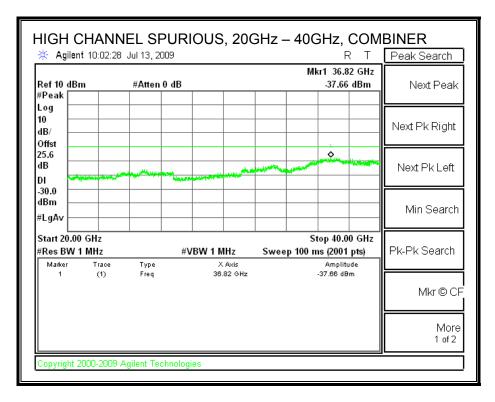




Page 102 of 255

HIGH CHANNEL SPURIOUS EMISSIONS





Page 103 of 255

7.6. 5.3 GHz BAND CHANNEL TESTS FOR 802.11n HT40 MODE

7.6.1. 99% & 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

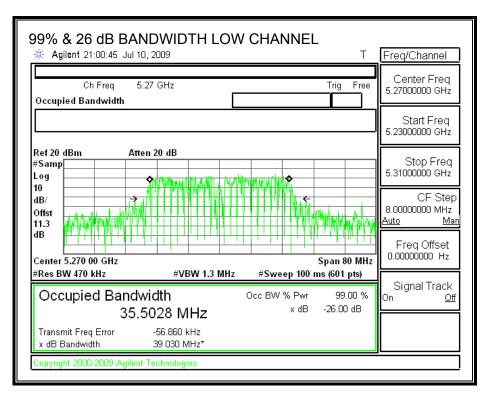
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

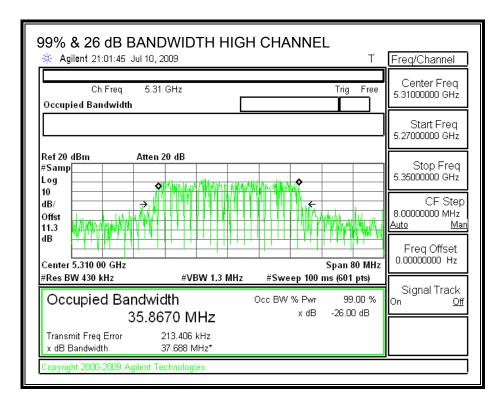
<u>RESULTS</u>

Channel	Frequency	99% OBW	26 dB BW	
	(MHz)	(MHz)	(MHz)	
Low	5270	35.503	39.030	
High	5310	35.867	37.688	

Page 104 of 255

99% & 26 dB BANDWIDTH





Page 105 of 255

7.6.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.25-5.35 GHz band, the maximum conducted output 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.

RESULTS

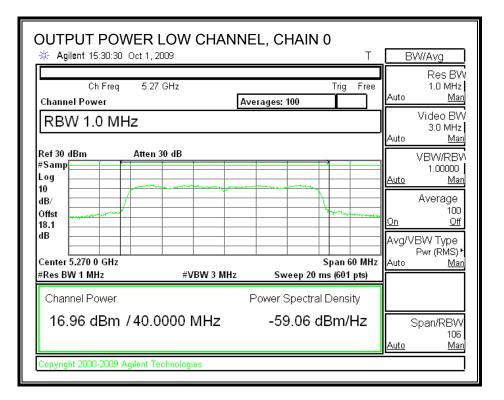
Limit

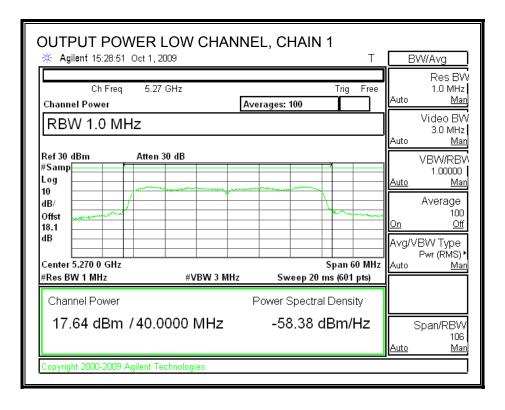
Channel	Freq	Fixed	В	11 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5270	24	39.03	26.91	3	24.00
High	5310	24	37.688	26.76	3	24.00

Individual Chain Results

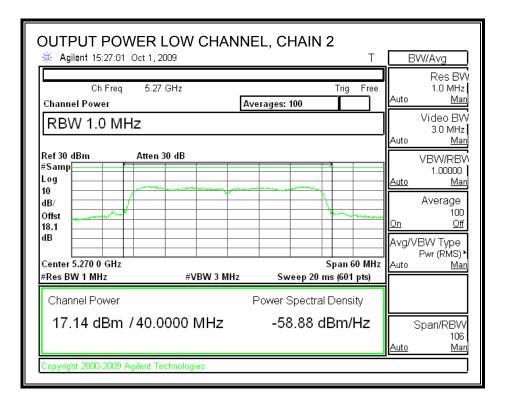
Channel	Freq	Chain 0	Chain 1	Chain 2	Chain 3	Total	Limit	Margin
		Power	Power	Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5270	16.96	17.64	17.14	17.12	23.24	24.00	-0.76
High	5310	12.14	12.46	11.86	12.15	18.18	24.00	-5.82

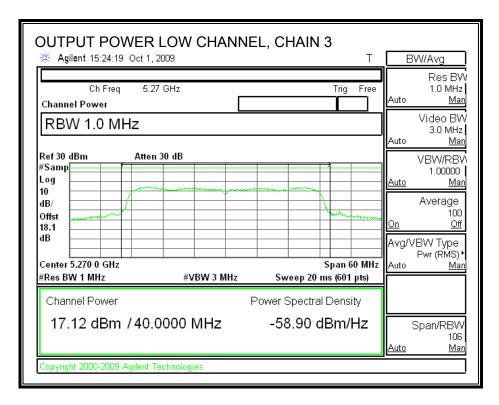
OUTPUT POWER, LOW CHANNEL





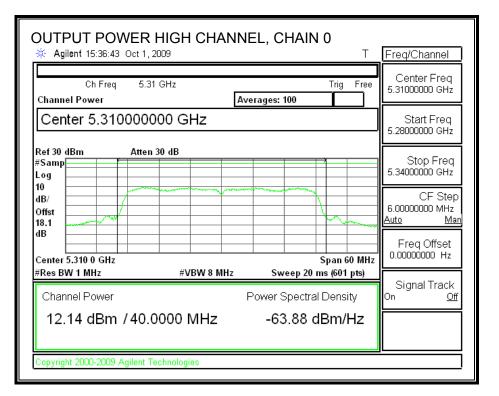
Page 107 of 255

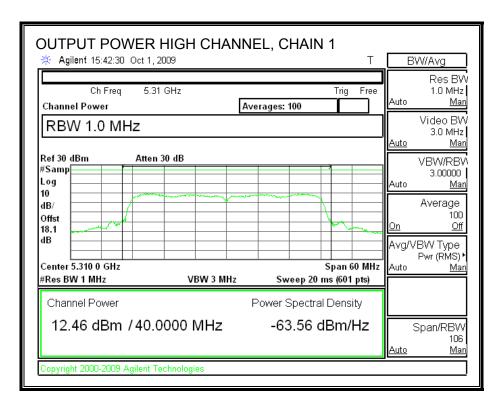




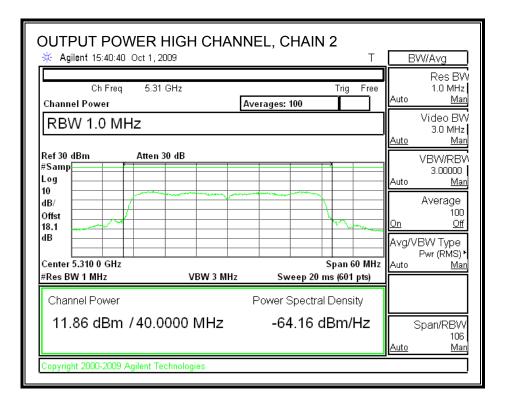
Page 108 of 255

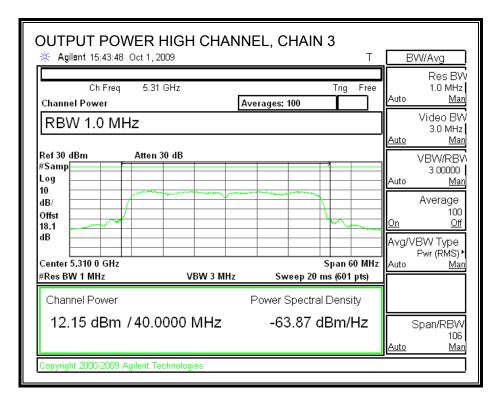
OUTPUT POWER, HIGH CHANNEL





Page 109 of 255





Page 110 of 255

7.6.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency	Chain 0	Chain 1	Chain 2	Chain 3
		Power	Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
Low	5270	16.88	17.59	17.09	17.12
High	5310	12.10	12.38	11.78	12.09

Page 111 of 255

7.6.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.25–5.35 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.

The maximum antenna gain is less than 6 dBi, therefore the limit is 11 dBm.

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.

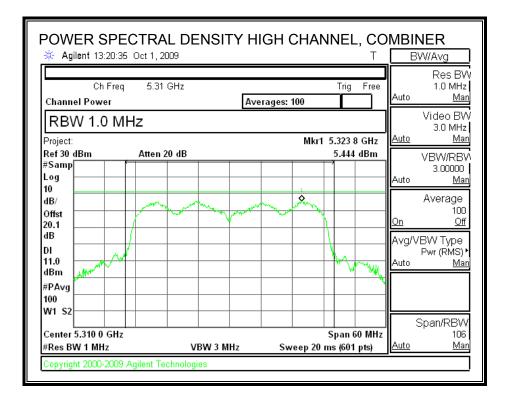
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

Channel	Frequency	PSD with Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5270	8.444	11	-2.56
High	5310	5.444	11	-5.56

<u>RESULTS</u>

POWER SPECTRAL DENSITY

Agilent 14:29:15 Oct 1, 2		OW CHANNEL, CO	
Ch Freq 5.27 Channel Power		Trig Free	Res E
RBW 1.0 MHz		Mkr1 5.254 2 GHz	Video B 3.0 MH Auto M
Ref 30 dBm Atten 2 #Samp Log 10	20 dB	8.444 dBm	VBW/RE 1.0000 <u>Auto M</u>
dB/ Offst 20.2 dB			Average 10 <u>On C</u>
DI			Avg/VBW Type Pwr (RMS Auto <u>M</u>
#PAvg 100 W1 S2			
Center 5.270 0 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 60 MHz Sweep 20 ms (601 pts)	Span/RB ^N z 10 <u>Auto M</u>



Page 113 of 255

7.6.5. PEAK EXCURSION

LIMITS

FCC §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 transmitter outputs are connected to the spectrum analyzer via a combiner.

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

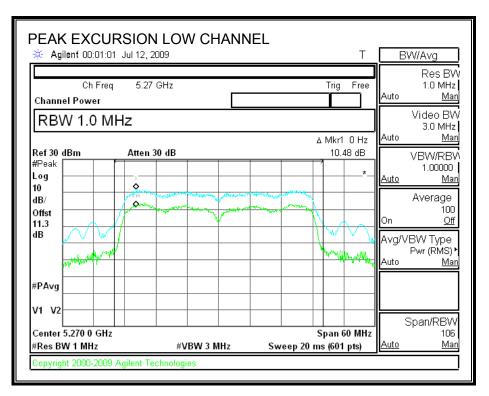
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

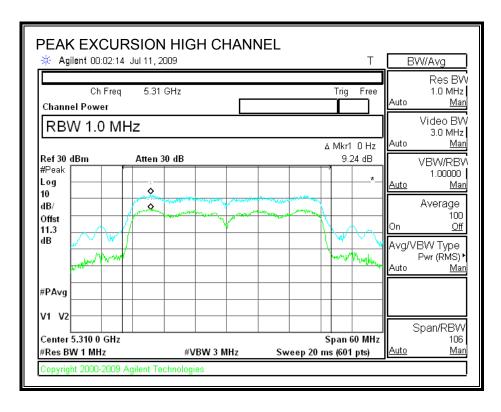
RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5270	10.48	13	-2.52
High	5310	9.24	13	-3.76

Page 114 of 255

PEAK EXCURSION





Page 115 of 255

7.6.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (3)

IC RSS-210 A9.3 (3)

For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.25-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

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.

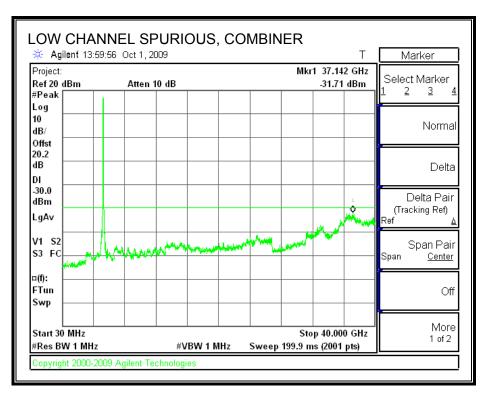
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

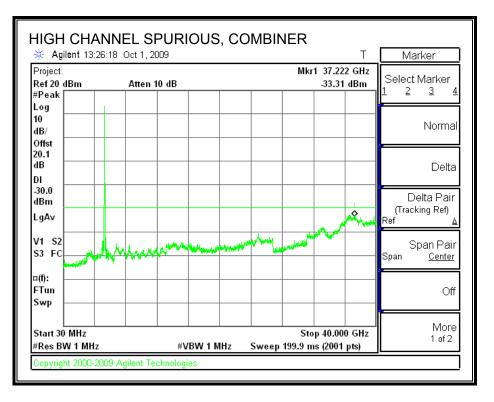
Page 116 of 255

LOW CHANNEL SPURIOUS EMISSIONS



Page 117 of 255

HIGH CHANNEL SPURIOUS EMISSIONS



Page 118 of 255

7.7. 5.6 GHz BAND CHANNEL TESTS FOR 802.11a MODE

7.7.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

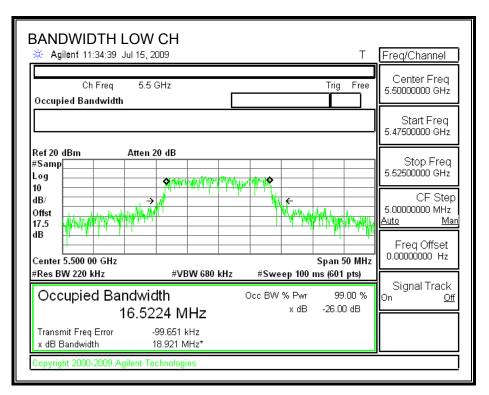
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

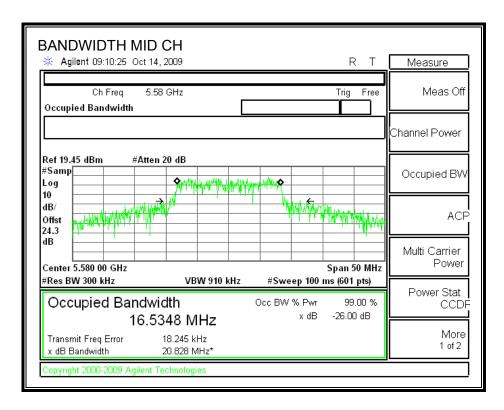
<u>RESULTS</u>

Channel	Frequency	26 dB Bandwidth	99% Bandwidth
	(MHz)	(MHz)	(MHz)
Low	5500	18.9210	16.5224
Mid	5580	20.8280	16.5348
High	5700	19.0480	16.4891

Page 119 of 255

26 dB and 99% BANDWIDTH





Page 120 of 255

BANDWIDTH HIGH CH		Т	Freq/Channel
Ch Freq 5.7 GHz Occupied Bandwidth		Trig Free	Center Freq 5.70000000 GHz
			Start Freq 5.67500000 GHz
Ref 20 dBm Atten 20 dB #Samp Log	NATA ALANTINA		Stop Freq 5.72500000 GHz
10 dB/ Offst 17.5 dB			CF Step 5.0000000 MHz <u>Auto Man</u>
Center 5.700 00 GHz #Res BW 220 kHz #VBW 680		pan 50 MHz (601 pts)	Freq Offset 0.00000000 Hz
Occupied Bandwidth 16.4891 MHz	Occ BW % Pwr x dB -	99.00 % 26.00 dB	Signal Track On <u>Off</u>
Transmit Freq Error-50.367 kHzx dB Bandwidth19.048 MHz*			
Copyright 2000-2009 Agilent Technologies			

Page 121 of 255

7.7.2. OUTPUT POWER

<u>LIMITS</u>

FCC §15.407 (a) (1) IC RSS-210 A9.2 (1)

Antenna gain of Chain 1 =antenna gain of Chain 2.

Antenna Gain (dBi)		Effective Legacy Gain (dBi)	
3	3.01	6.01	

For the 5.47-5.725 GHz band, the maximum conducted output 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.

<u>RESULTS</u>

Limit

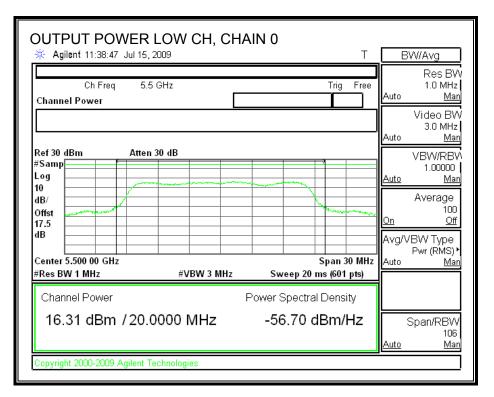
Channel	Frequency	Fixed	В	11 + 10 Log B	Effective	Limit
Chaimor	inequency			•		
		Limit		Limit	Ant Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5500	24	18.9210	23.77	6.01	23.76
Mid	5580	24	18.8560	23.75	6.01	23.74
High	5700	24	19.0480	23.80	6.01	23.79

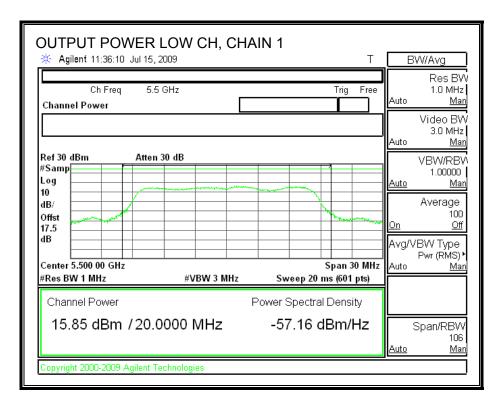
Individual Chain Results

Channel	Frequency	Chain 0	Chain 1	Total	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5500	16.31	18.85	20.77	23.76	-2.99
Mid	5580	15.89	16.37	19.15	23.74	-4.60
High	5700	14.47	13.84	17.18	23.79	-6.61

Page 122 of 255

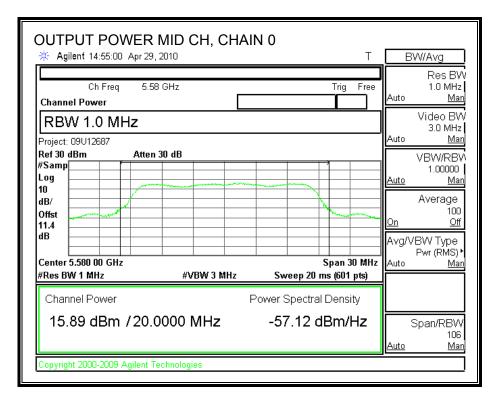
OUTPUT POWER, LOW CHANNEL

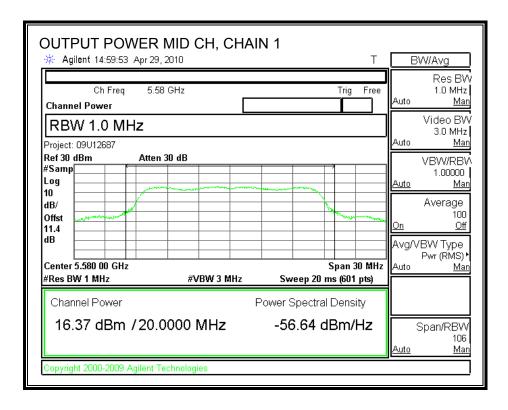




Page 123 of 255

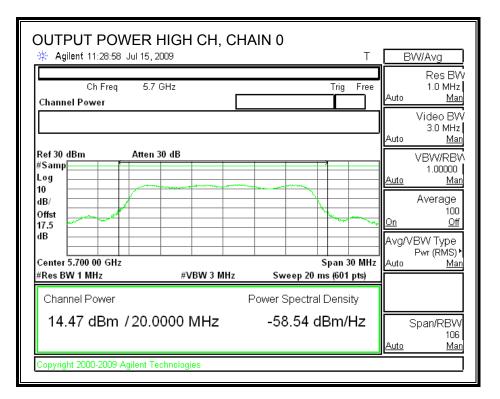
OUTPUT POWER, MID CHANNEL

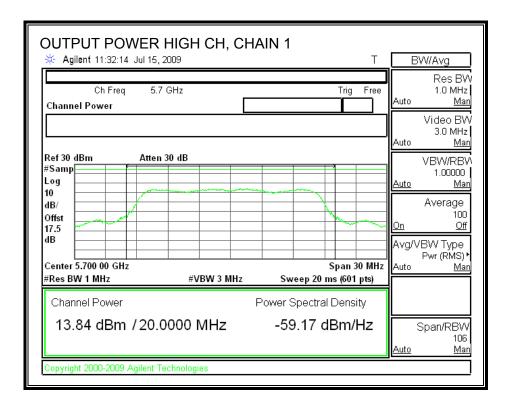




Page 124 of 255

OUTPUT POWER, HIGH CHANNEL





Page 125 of 255

7.7.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Chain 0	Chain 1	Total
		Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)
Low	5500	15.83	16.25	19.06
Middle	5580	16.06	16.30	19.19
High	5700	14.49	13.85	17.19

Page 126 of 255

7.7.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

Use this table if antenna gain for Chain 1 = antenna gain for Chain 2

Antenna Gain (dBi)		Effective Legacy Gain (dBi)
3	3.01	6.01

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.

The maximum effective antenna gain is 6.01 dBi, therefore the limit is 10.99 dBm.

TEST PROCEDURE

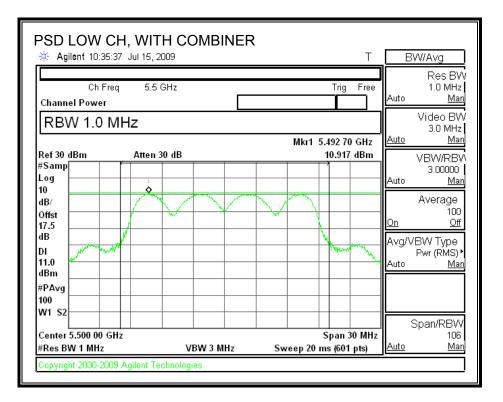
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

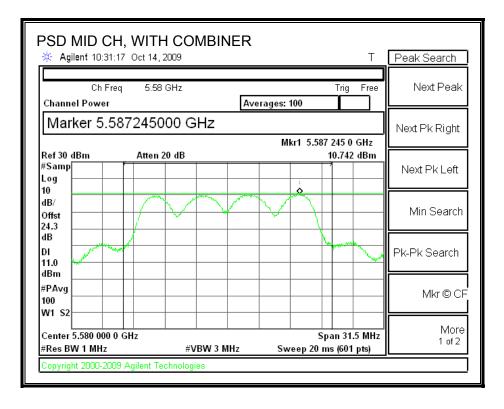
RESULTS

Channel	Frequency	PPSD With Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5500	10.92	10.99	-0.07
Mid	5580	10.74	10.99	-0.25
High	5700	8.00	10.99	-2.99

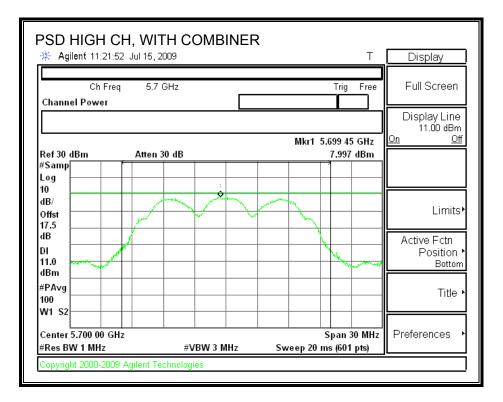
Page 127 of 255

POWER SPECTRAL DENSITY WITH COMBINER





Page 128 of 255



Page 129 of 255

7.7.5. PEAK EXCURSION

LIMITS

FCC §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 transmitter outputs are connected to the spectrum analyzer via a combiner.

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

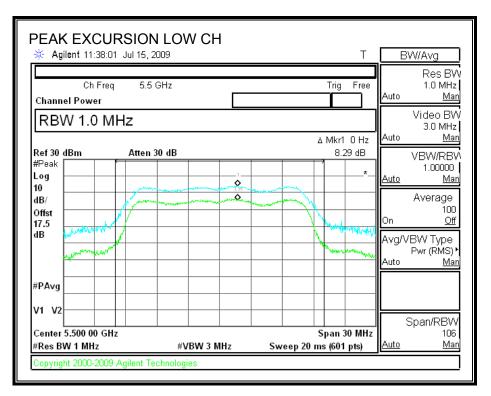
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

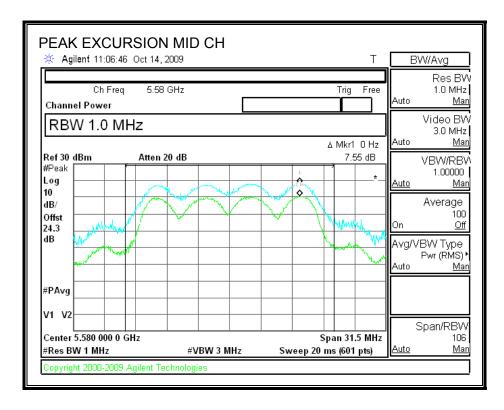
RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5500	8.29	13	-4.71
Mid	5580	7.55	13	-5.45
High	5700	7.97	13	-5.03

Page 130 of 255

PEAK EXCURSION





Page 131 of 255

🔆 Agilent 11:30:32 Jul 15,	2009				Т	B	W/Avg
Ch Freq 5.7 Channel Power	' GHz			Trig	Free	Auto	Res BV 1.0 MHz <u>Mar</u>
RBW 1.0 MHz				 ∆ Mkr1	0 Hz	Auto	Video BV 3.0 MHz <u>Mar</u>
Ref 30 dBm Atten #Peak Log 10	30 dB			7.9	97 dB	<u>Auto</u>	VBW/RBV 1.00000 <u>Mar</u>
0 dB/ Offst 17.5 dB			and the second s			On	Average 100 <u>Off</u>
					the state of the s	Avg/V Auto	'BW Type Pwr (RMS) • <u>Mar</u>
#PAvg							
Center 5.700 00 GHz #Res BW 1 MHz	#VBW 3	MHz	Sweep 20	•	30 MHz pts)	Auto X	Span/RBW 106 <u>Mar</u>

Page 132 of 255

7.7.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

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

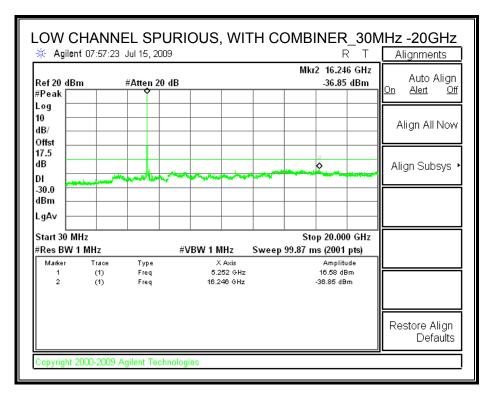
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

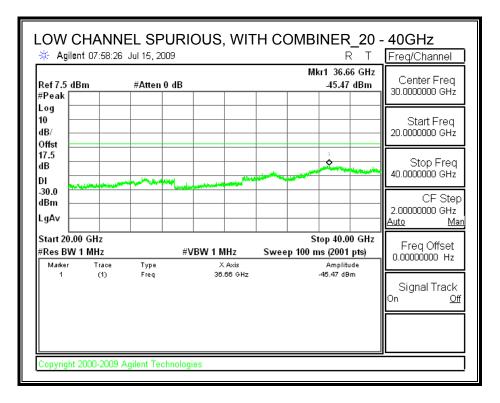
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

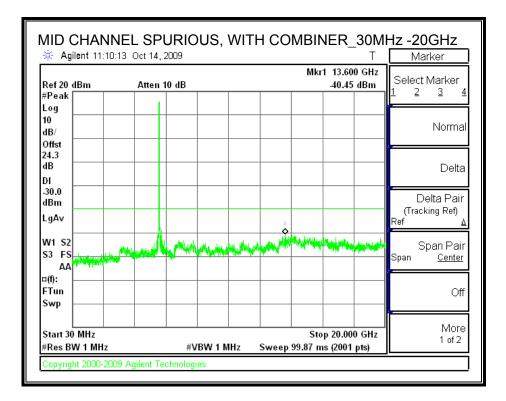
Page 133 of 255

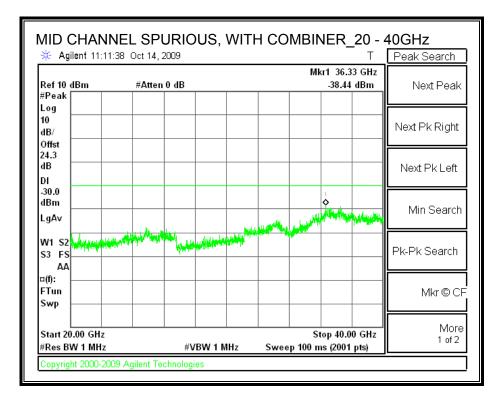
SPURIOUS EMISSIONS WITH COMBINER



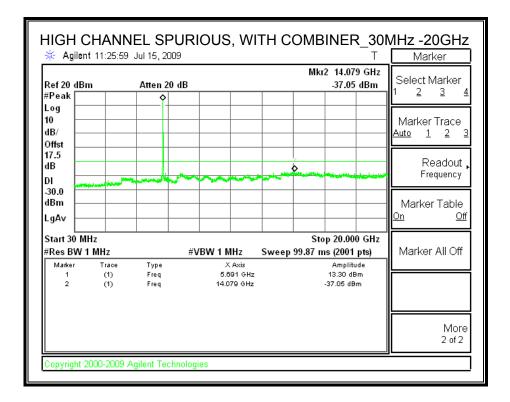


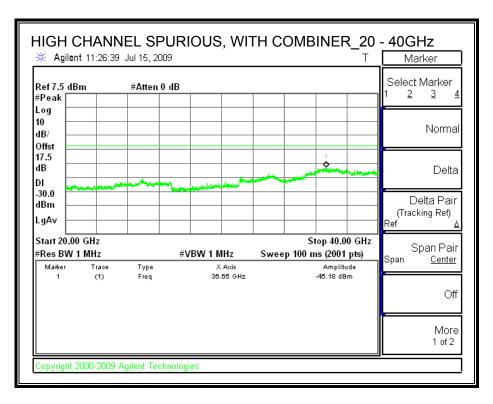
Page 134 of 255





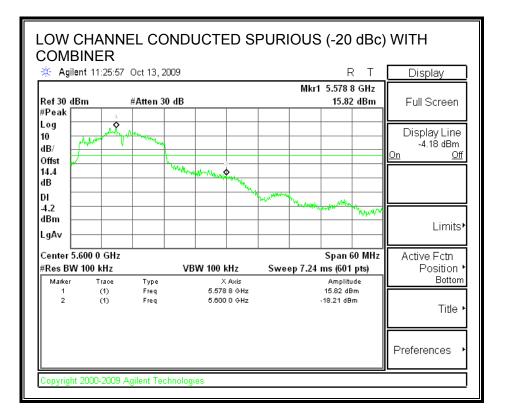
Page 135 of 255

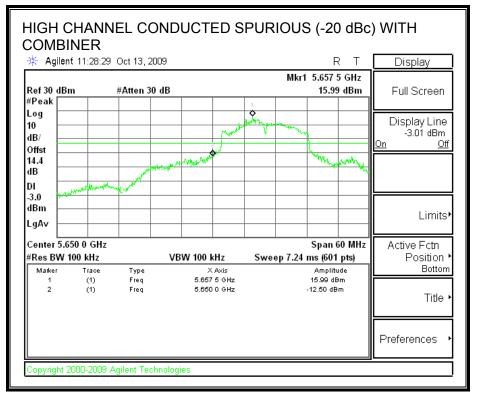




Page 136 of 255

7.7.7. CONDUCTED SPURIOUS (-20 dBc)





Page 137 of 255

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7.8. 5.6 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE

7.8.1. 99% & 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

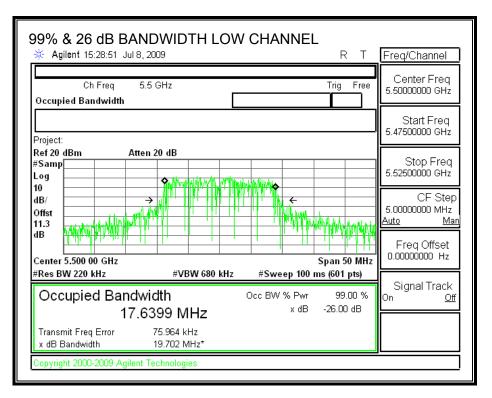
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

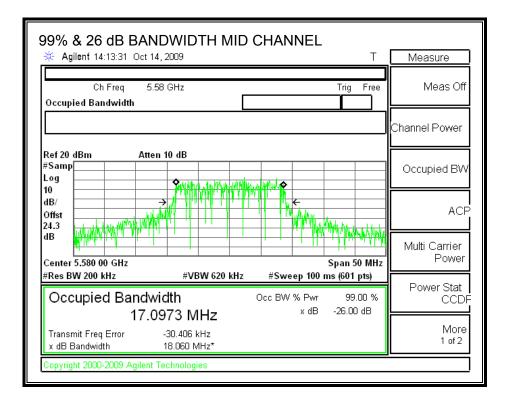
RESULTS

Channel	Frequency	99% OBW	26 dB BW	
	(MHz)	(MHz)	(MHz)	
Low	5500	17.6399	19.702	
Mid	5580	17.0973	18.06	
High	5700	17.5162	18.450	

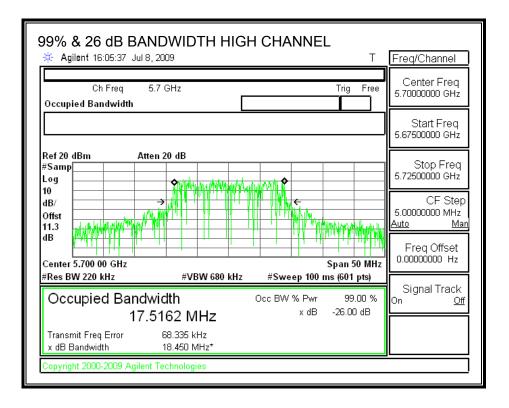
Page 138 of 255

99% & 26 dB BANDWIDTH





Page 139 of 255



Page 140 of 255

7.8.2. OUTPUT POWER

<u>LIMITS</u>

FCC §15.407 (a) (2) IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, the maximum conducted output 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.

RESULTS

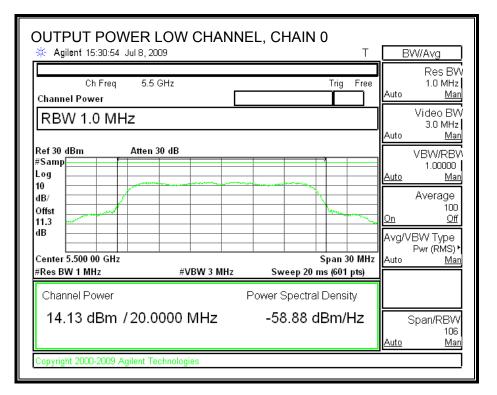
Limit

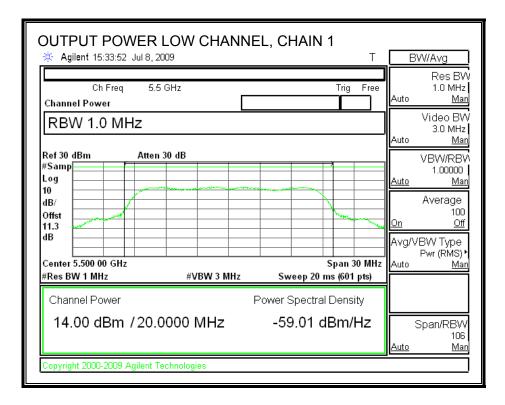
Channel	Freq	Fixed	В	11 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5500	24	19.702	23.95	3	23.95
Mid	5580	24	18.601	23.70	3	23.70
High	5700	24	18.450	23.66	3	23.66

Individual Chain Results

Channel	Freq	Chain 0	Chain 1	Chain 2	Chain 3	Total	Limit	Margin
		Power	Power	Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5500	14.13	14.00	14.21	14.23	20.16	23.95	-3.78
Mid	5580	14.23	14.29	14.46	14.15	20.30	23.70	-3.39
High	5700	14.22	14.24	14.30	14.13	20.24	23.66	-3.42

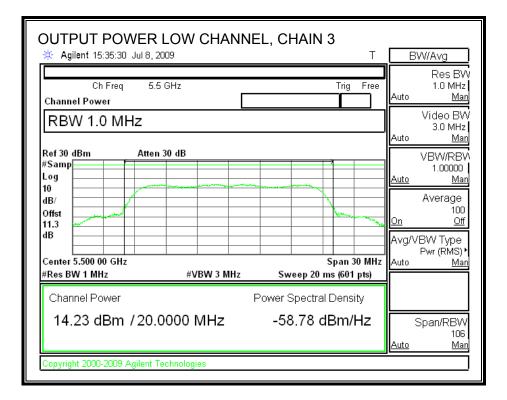
OUTPUT POWER, LOW CHANNEL





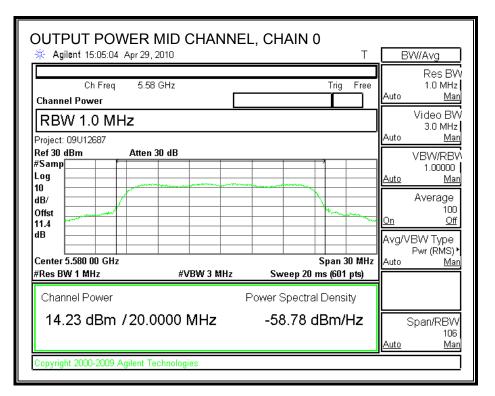
Page 142 of 255

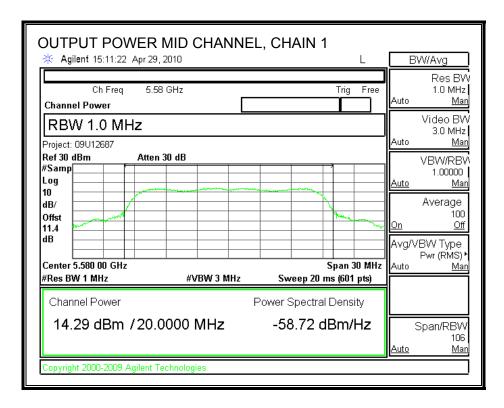
OUTPUT POWER		EL, CHAIN 2	T BW/Avg
	GHz	Trig F	Free Auto Man Video BW 3.0 MHz Auto Man Video BW 3.0 MHz Auto Man VBW/RBV 1.00000 Auto Man Average 100 On Off Avg/VBW Type Pwr (RMS)* Auto Man
Channel Power 14.21 dBm / 20.0 Copyright 2000-2009 Agilent To	0000 MHz	Power Spectral Density -58.80 dBm/H	ý



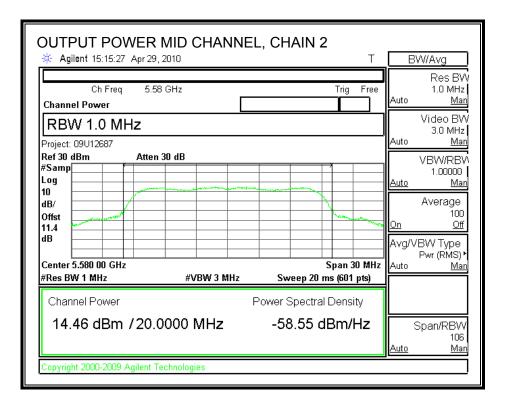
Page 143 of 255

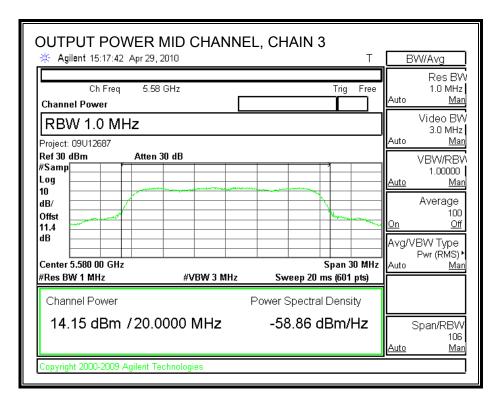
OUTPUT POWER, LOW CHANNEL





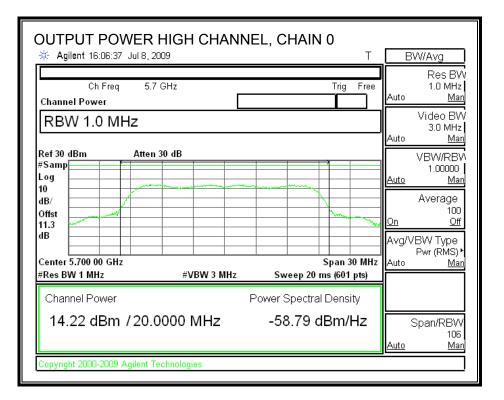
Page 144 of 255

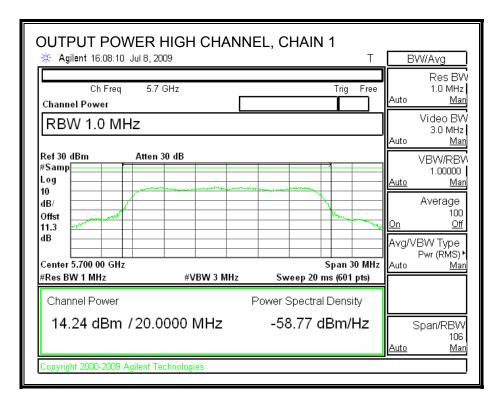




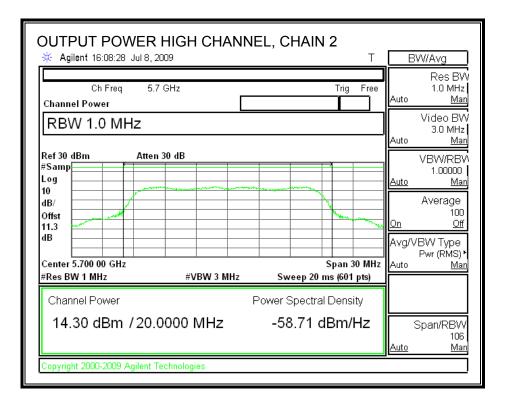
Page 145 of 255

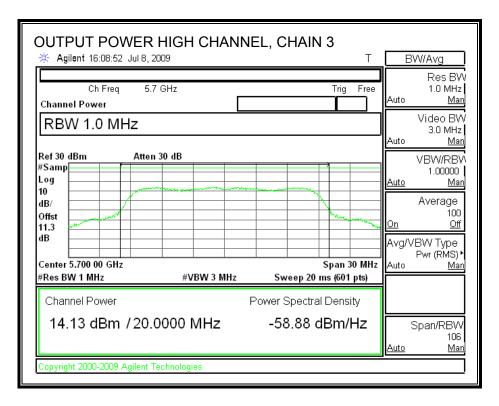
OUTPUT POWER, HIGH CHANNEL





Page 146 of 255





Page 147 of 255

7.8.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency	Chain 0	Chain 1	Chain 2	Chain 3
		Power	Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
Low	5500	14.15	14.11	14.20	14.21
Middle	5580	14.25	14.21	14.30	14.32
High	5700	14.13	14.21	18.18	14.25

Page 148 of 255

7.8.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (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.

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 11 dBm.

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.

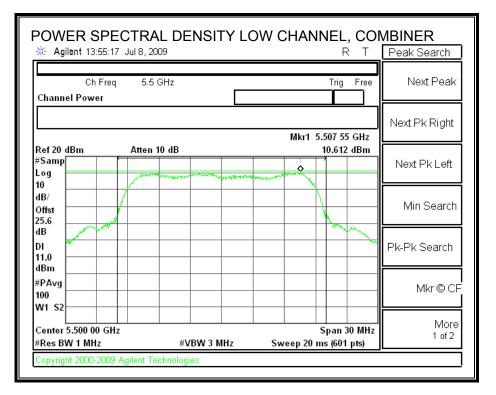
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

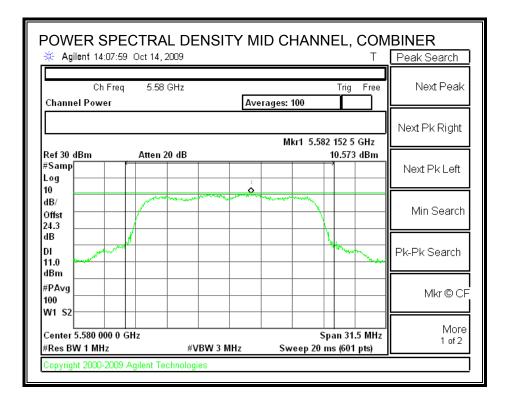
Channel	Frequency	PSD with Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5500	10.61	11	-0.39
Mid	5580	10.57	11	-0.43
High	5700	10.66	11	-0.34

RESULTS

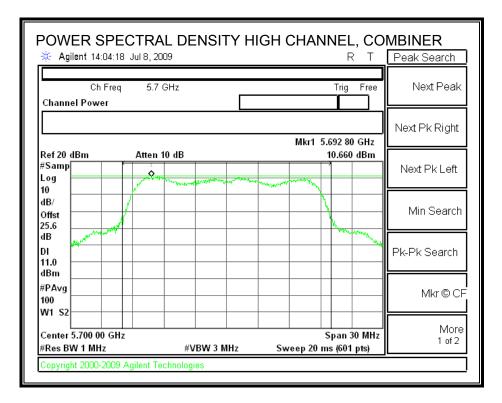
Page 149 of 255

POWER SPECTRAL DENSITY





Page 150 of 255



Page 151 of 255

7.8.5. PEAK EXCURSION

LIMITS

FCC §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 transmitter outputs are connected to the spectrum analyzer via a combiner.

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.

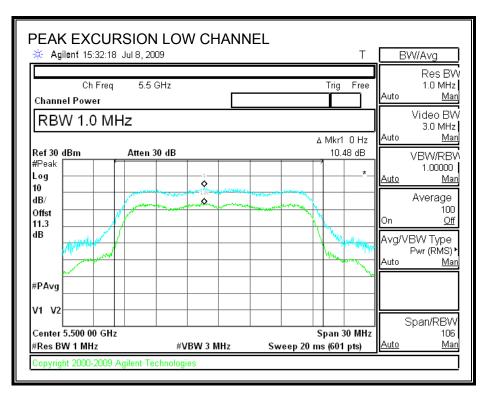
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

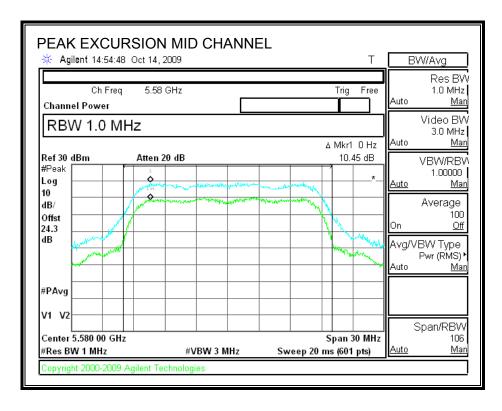
<u>RESULTS</u>

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5500	10.48	13	-2.52
Mid	5580	10.45	13	-2.55
High	5700	9.40	13	-3.60

Page 152 of 255

PEAK EXCURSION





Page 153 of 255

	IIGH CHANN	EL			
Agilent 16:07:05 Jul 8, 2009					W/Avg
Ch Freq 5.7 GH: Channel Power	2	Trig	Free	Auto	Res BW 1.0 MHz <u>Man</u>
RBW 1.0 MHz				Auto	Video BW 3.0 MHz Man
Ref 30 dBm Atten 30 d	IB		10 Hz .40 dB	Auto	
#Peak			*	<u>Auto</u>	VBW/RBV 1.00000 <u>Man</u>
dB/ Offst				0	Average 100
			-	On Avg/V	<u>Off</u> BW Type
and the second s			No.	Auto	Pwr (RMS) ► <u>Man</u>
¥ΡΑνg					
V1 V2					Span/RBW
Center 5.700 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Span Sweep 20 ms (60	30 MHz 1 pts)	<u>Auto</u>	106 <u>Man</u>
Copyright 2000-2009 Agilent Techn	ologies				

Page 154 of 255

7.8.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (3)

IC RSS-210 A9.3 (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.

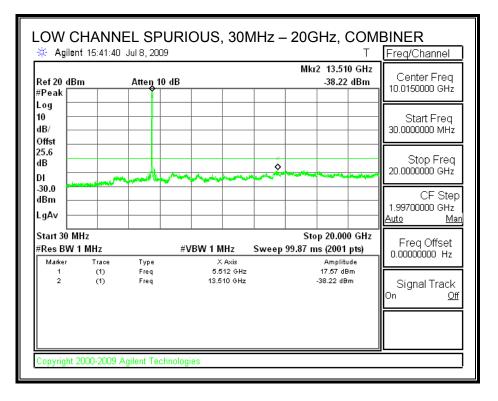
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

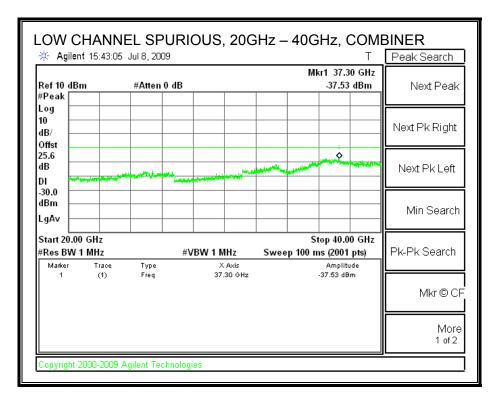
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

Page 155 of 255

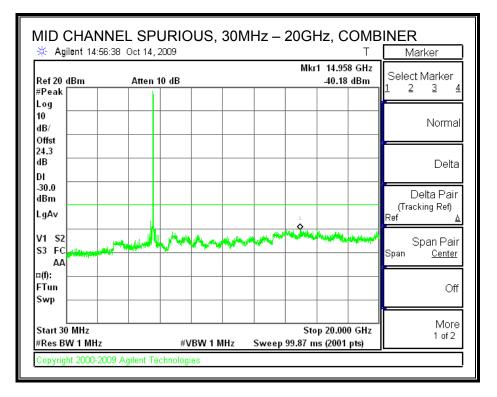
LOW CHANNEL SPURIOUS EMISSIONS

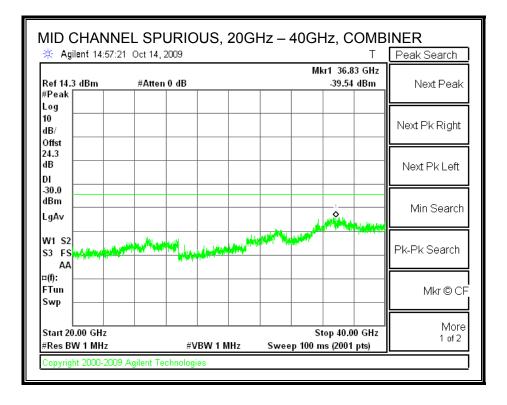




Page 156 of 255

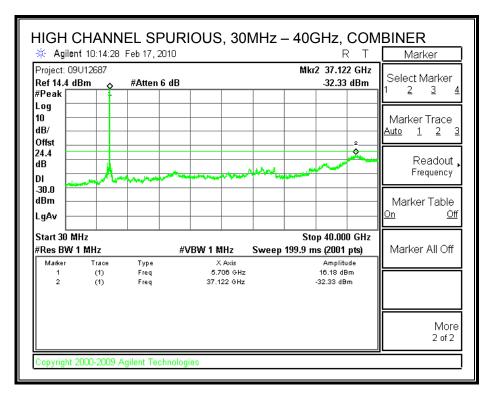
MID CHANNEL SPURIOUS EMISSIONS





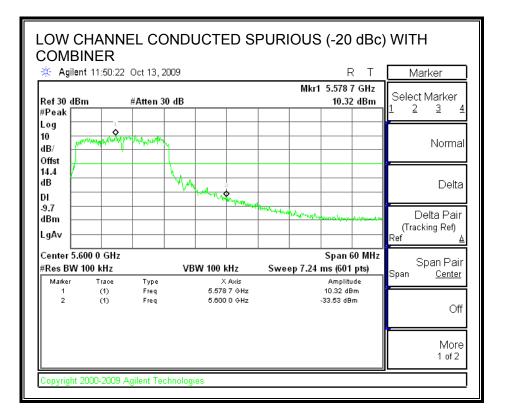
Page 157 of 255

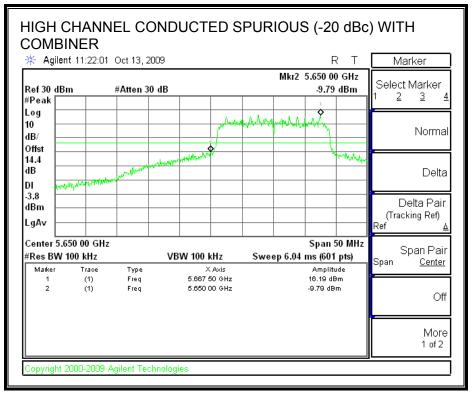
HIGH CHANNEL SPURIOUS EMISSIONS



Page 158 of 255

7.8.7. CONDUCTED SPURIOUS (-20 dBc)





Page 159 of 255

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7.9. 5.6 GHz BAND CHANNEL TESTS FOR 802.11n HT40 MODE

7.9.1. 99% & 26 dB BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

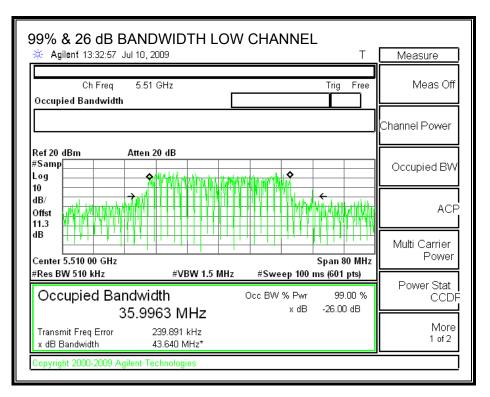
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

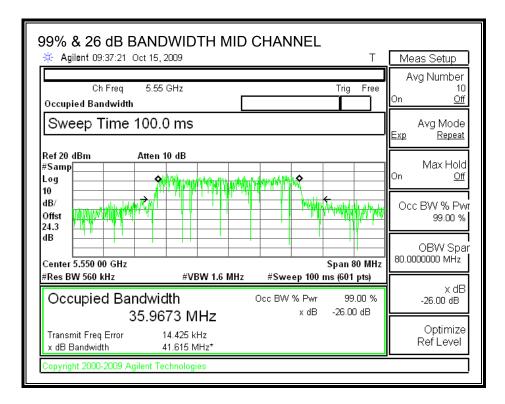
<u>RESULTS</u>

Channel	Frequency	99% OBW	26 dB BW
	(MHz)	(MHz)	(MHz)
Low	5510	35.9963	43.640
Middle	5550	35.9673	41.615
High	5670	35.8572	44.129

Page 160 of 255

99% & 26 dB BANDWIDTH





Page 161 of 255

99% & 26 dB BANDWIDTH HIGH CHANNEL	System
Ch Freq 5.67 GHz Trig Free Occupied Bandwidth	Show Errors
	Power On/ Preset
Ref 20 dBm Atten 20 dB #Samp	Time/Date ▸
Offst 11.3	Alignments •
dB IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	Config I/O 🔸
Occupied Bandwidth Occ BW % Pwr 99.00 % 35.8572 MHz × dB -26.00 dB	Reference 🔸
Transmit Freq Error 124.827 kHz x dB Bandwidth 44.129 MHz*	More 1 of 3
Copyright 2000-2009 Agilent Technologies	

Page 162 of 255

7.9.2. OUTPUT POWER

<u>LIMITS</u>

FCC §15.407 (a) (2) IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, the maximum conducted output 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.

RESULTS

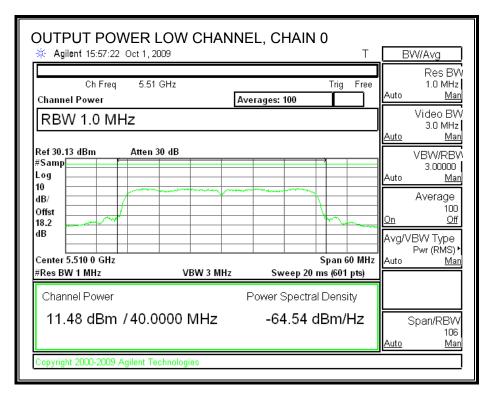
Limit

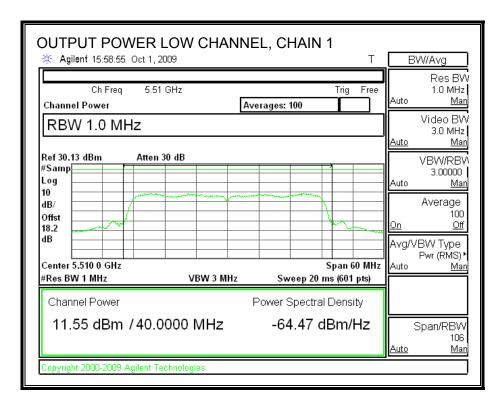
Channel	Freq	Fixed	В	11 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5510	24	43.640	27.40	3	24.00
Mid	5550	24	42.851	27.32	3	24.00
High	5670	24	44.129	27.45	3	24.00

Individual Chain Results

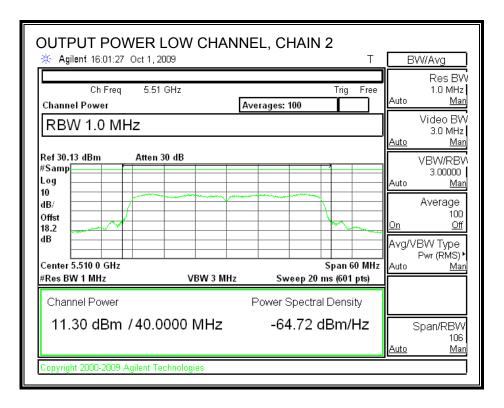
Channel	Freq	Chain 0	Chain 1	Chain 2	Chain 3	Total	Limit	Margin
		Power	Power	Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5510	11.48	11.55	11.30	11.63	17.51	24.00	-6.49
Mid	5550	17.98	17.95	17.44	17.71	23.80	24.00	-0.20
High	5670	14.49	14.29	14.19	13.95	20.25	24.00	-3.75

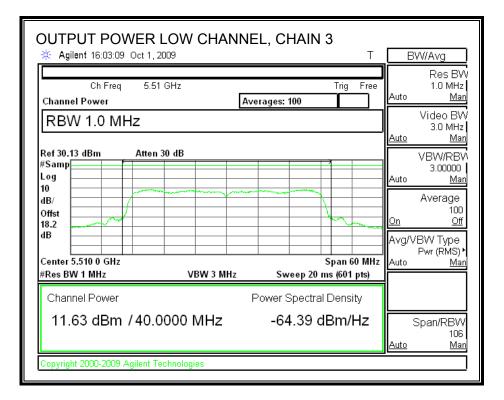
OUTPUT POWER, LOW CHANNEL





Page 164 of 255

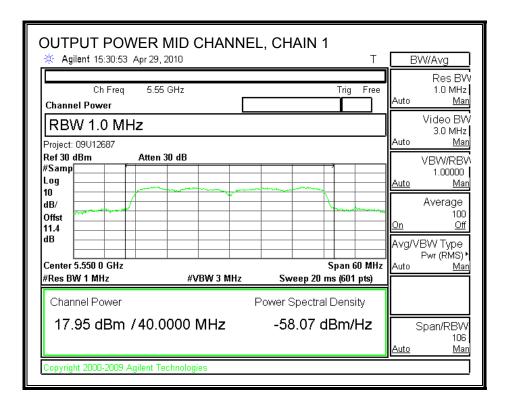




Page 165 of 255

OUTPUT POWER, MID CHANNEL

OUTPUT POWER N		L, CHAIN 0	Т	BW/A	va
Ch Freq 5.55	GHz	Trig	Free	R	es BW .0 MHz <u>Man</u>
RBW 1.0 MHz Project: 09U12687					eo BW .0 MHz <u>Man</u>
Ref 30 dBm Atten 3 #Samp			Mun	Auto Ave <u>On</u> Avg/VBW	
Center 5.550 0 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 6 Sweep 20 ms (601		Pwr Auto	(RMS) ► <u>Man</u>
Channel Power 17.98 dBm /40.00		Power Spectral Densi -58.04 dBm/ł	í	Spar <u>Auto</u>	1/RBW 106 <u>Man</u>
Copyright 2000-2009 Agilent Teo	hnologies				



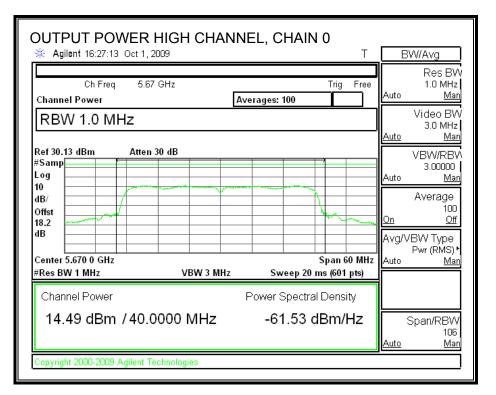
Page 166 of 255

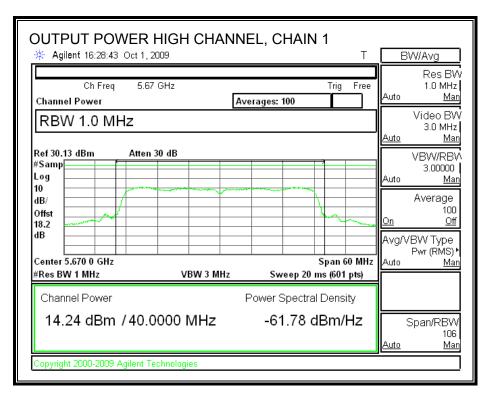
OUTPUT POWER		L, CHAIN 2	BW/Ava
Ch Freq 5.55 Channel Power	GHz	Trig Fr	ee Auto <u>Man</u>
RBW 1.0 MHz Project: 09U12687			Video BW 3.0 MHz Auto <u>Man</u>
Ref 30 dBm Atten 3	30 dB		VBW/RBW 1.00000 Auto Man
dB/ Offst			Average 100 On Off
dB		Span 60 M	Avg/VBW Type Pwr (RMS) • IHz Auto <u>Man</u>
#Res BW 1 MHz Channel Power 17.44 dBm /40.0) Span/RBW		
Copyright 2000-2009 Agilent Te		-58.58 dBm/Hz	Auto Man

OUTPUT POWER MID CHANNEL, CHAIN 3 Agilent 15:23:08 Apr 29, 2010 T	BW/Avg
Ch Freq 5.55 GHz Trig Free Channel Power RBW 1.0 MHz	Res BW 1.0 MHz Auto <u>Man</u> Video BW
Project: 09U12687 Ref 30 dBm Atten 30 dB #Samp Log 10 dB/ Offst 11.4 dB	3.0 MHz Auto <u>Man</u> VBW/RBW 1.00000 <u>Auto Man</u> Average 100 <u>On Off</u>
Center 5.550 0 GHz Span 60 MHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (601 pts) Channel Power Power Spectral Density	
17.71 dBm / 40.0000 MHz -58.31 dBm/Hz Copyright 2000-2009 Agilent Technologies	Span/RBW 106 <u>Auto Man</u>

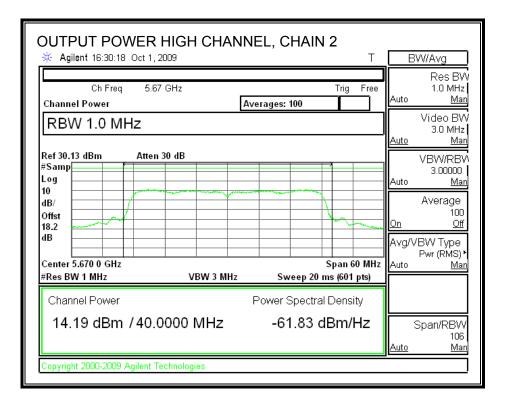
Page 167 of 255

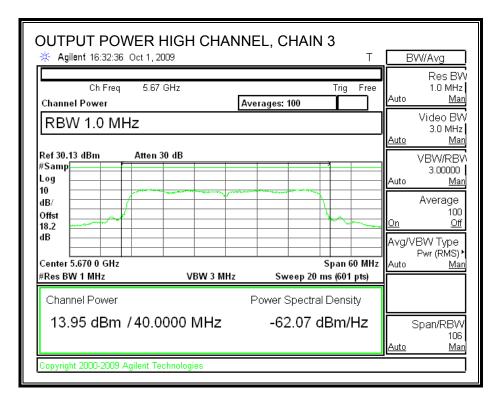
OUTPUT POWER, HIGH CHANNEL





Page 168 of 255





Page 169 of 255

7.9.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency	Chain 0	Chain 1	Chain 2	Chain 3
		Power	Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
Low	5510	11.44	11.53	11.30	11.51
Middle	5550	18.00	18.06	17.45	17.67
High	5670	14.45	14.21	14.15	13.92

Page 170 of 255

7.9.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (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.

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 11 dBm.

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.

Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

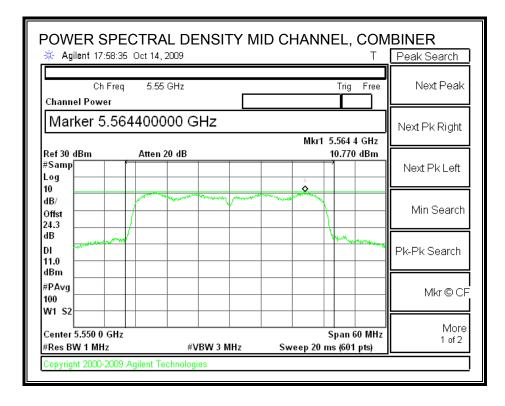
Channel	Frequency	PSD with Combiner Limit		Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5510	10.915	11	-0.09
Middle	5550	10.770	11	-0.23
High	5670	6.028	11	-4.97

RESULTS

Page 171 of 255

POWER SPECTRAL DENSITY

POWER SPECTRAL DENSITY LOW CHANNEL, COMBINER				
🔆 Agilent 10:12:32 Oct 15, 2009		Т	BW/Avg	
Ch Freq 5.51 GHz Channel Power		Trig Free		
RBW 1.0 MHz	Video B 3.0 MH Auto <u>M</u>			
Ref 30 dBm Atten 20 dB #Samp		10.915 dBm		
dB/ Offst 24.3	when the second		Average 10 <u>On C</u>	
dB		And Andrew Constrained	Avg/VBW Type Pwr (RMS Auto <u>M</u>	
#PAvg 100 W1 S2				
Center 5.510 00 GHz #Res BW 1 MHz #VBV	V 3 MHz Sv	Span 66 MHz veep 20 ms (601 pts)		
Copyright 2000-2009 Agilent Technologies				



Page 172 of 255

Agilent 13:45:24 Oct 1,	2009		Т	B	W/Avg
Ch Freq 5.8 Channel Power	7 GHz		Trig Free	Auto	Res B\ 1.0 MH: <u>Ma</u>
RBW 1.0 MHz					Video B\ 3.0 MH:
Project: Ref 30 dBm Atte	n 20 dB		.655 0 GHz 6.028 dBm	Auto	<u>Ma</u>
/Samp _og		· · · · · · · · · · · · · · · · · · ·		<u>Auto</u>	VBW/RB 1.00000 <u>Ma</u>
IB/ Dffst 20.2	mana mana para mana para mana para mana para mana para para para para para para para p			On	Average 100 Of
					BW Type Pwr (RMS)
I1.0 18m			W Low Marine	Auto	Pwr (Rivis) <u>Ma</u>
¢PA∨g 100					
W1 S2					Span/RBV
Center 5.670 0 GHz ∉Res BW 1 MHz	#VBW 3 MHz	Sweep 20 ms	pan 60 MHz s (601 pts)	Auto	108 <u>Ma</u>

Page 173 of 255

7.9.5. PEAK EXCURSION

LIMITS

FCC §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 transmitter outputs are connected to the spectrum analyzer via a combiner.

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.

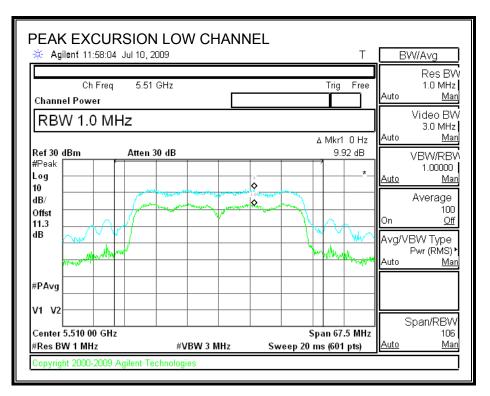
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

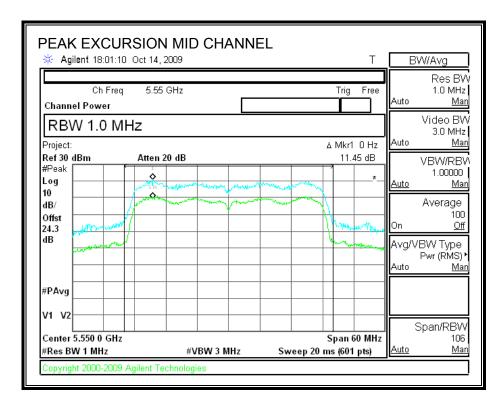
<u>RESULTS</u>

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5510	9.92	13	-3.08
Middle	5550	11.45	13	-1.55
High	5670	9.78	13	-3.22

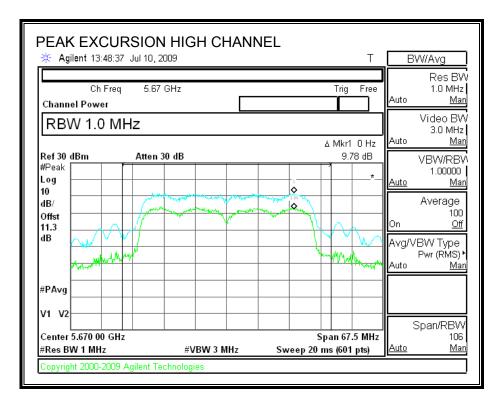
Page 174 of 255

PEAK EXCURSION





Page 175 of 255



Page 176 of 255

7.9.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (3)

IC RSS-210 A9.3 (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.

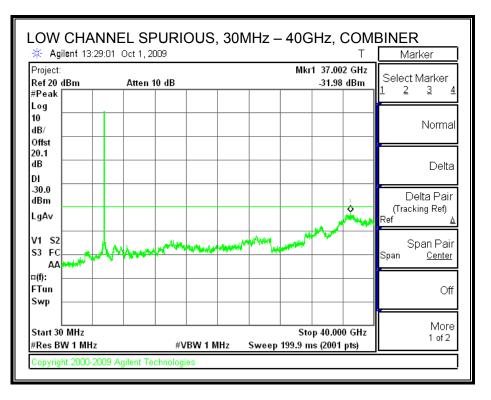
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

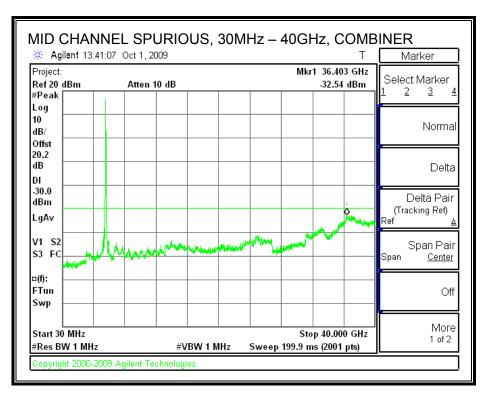
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

Page 177 of 255

LOW CHANNEL SPURIOUS EMISSIONS

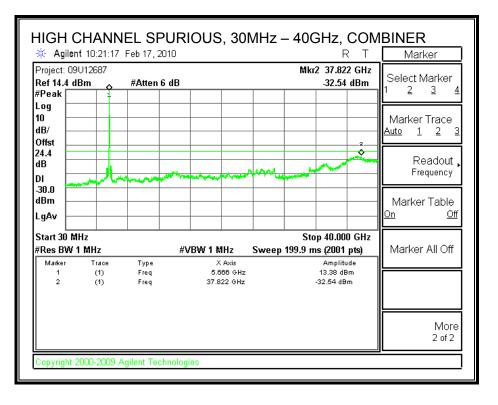


MID CHANNEL SPURIOUS EMISSIONS



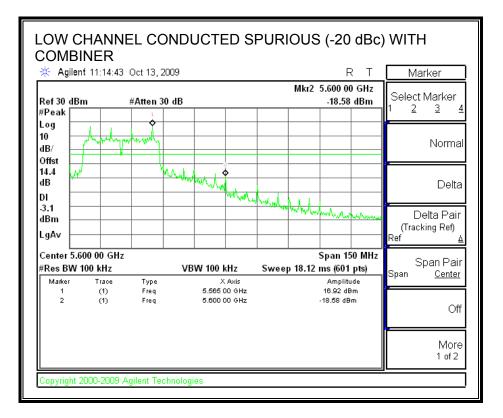
Page 178 of 255

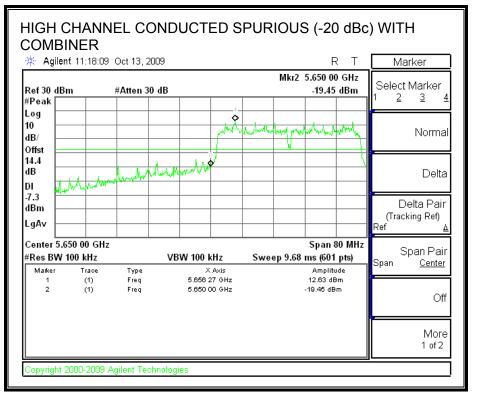
HIGH CHANNEL SPURIOUS EMISSIONS



Page 179 of 255

7.9.7. CONDUCTED SPURIOUS (-20 dBc)





Page 180 of 255

COMPLIANCE CERTIFICATION SERVICESFORM NO: CCSUP4701C47173 BENICIA STREET, FREMONT, CA 94538, USATEL: (510) 771-1000FAX: (510) 661-0888This report shall not be reproduced except in full, without the written approval of CCS.

7.10. RECEIVER CONDUCTED SPURIOUS EMISSIONS

LIMITS

IC RSS-GEN 7.2.3.1

Antenna Conducted Measurement: Receiver spurious emissions at any discrete frequency shall not exceed 2 nanowatts (-57 dBm) in the band 30-1000 MHz, or 5 nanowatts (-53 dBm) above 1 GHz.

TEST PROCEDURE

IC RSS-GEN 4.10, Conducted Method

The receiver antenna port is connected to a spectrum analyzer.

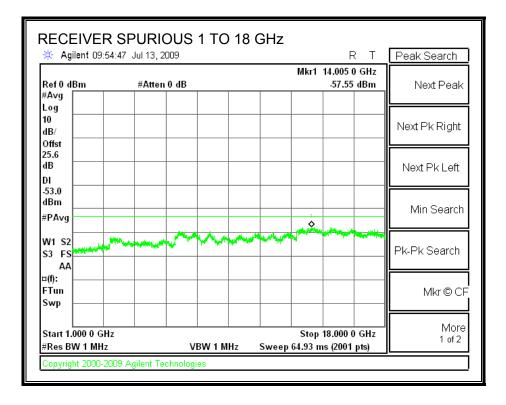
The spectrum from 30 MHz to 18 GHz is investigated with the receiver set to the middle channel of each 5 GHz band.

Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

Page 181 of 255

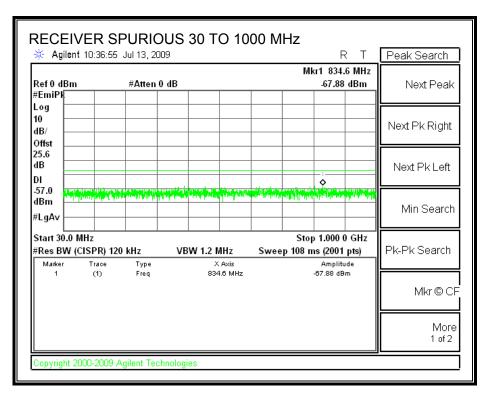
RECEIVER SPURIOUS EMISSIONS IN THE 5.2 GHz BAND

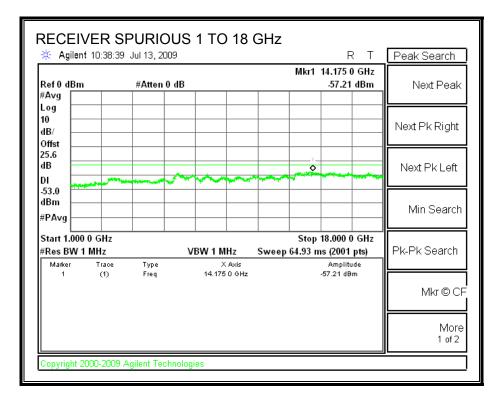
			30 T(0 10	00 M	Hz		чт	De als Calarah
🔆 Agilent C	19:51:22 Jul	13,2009					R		Peak Search
Ref0dBm #EmiPk	##	Atten 0 dB				Mk	r1 791. -68.07		Next Peak
Log 10 dB/ Offst									Next Pk Right
25.6 dB DI									Next Pk Left
-57.0 dBm LgAv									Min Search
W1 S2 S3 FS AA									Pk-Pk Search
¤(f): FTun Swp	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	endkorte n		t. othu					Mkr © CF
Start 30.0 MH #Res BW (CI		z VE	3W 1.2 M	IHz	Swee	Stop p108 m	1.000 0 s (2001		More 1 of 2
Copyright 200	0-2009 Agile	nt Technolog	ies						



Page 182 of 255

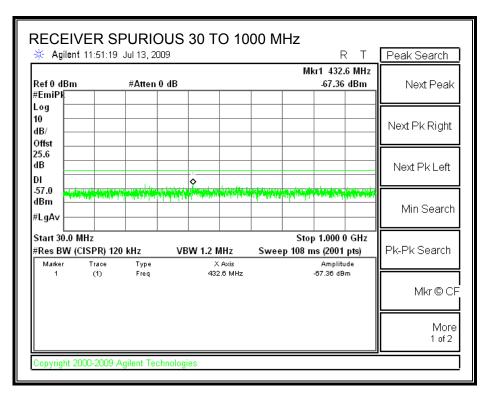
RECEIVER SPURIOUS EMISSIONS IN THE 5.3 GHz BAND

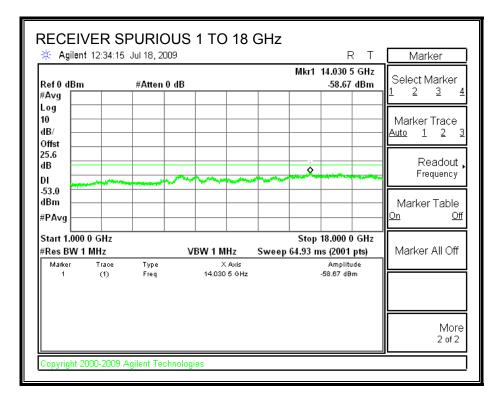




Page 183 of 255

RECEIVER SPURIOUS EMISSIONS IN THE 5.5 GHz BAND





Page 184 of 255

8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

<u>LIMITS</u>

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

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.

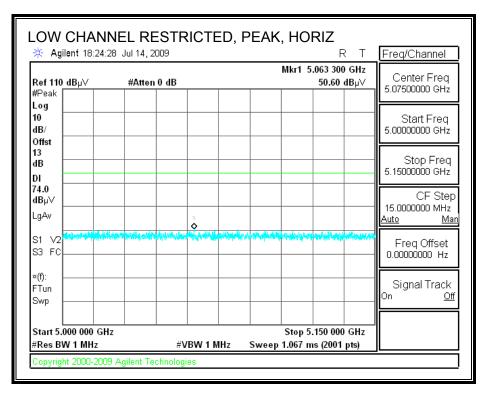
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

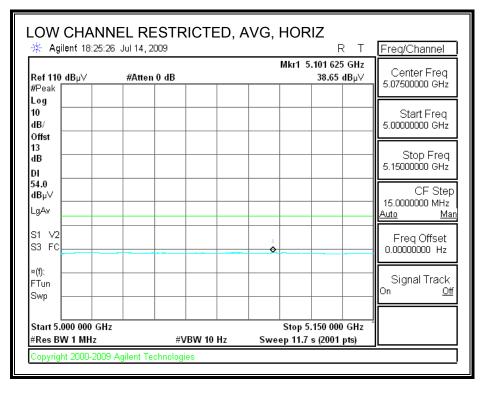
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. 802.11a MODE IN 5.2 GHz BAND

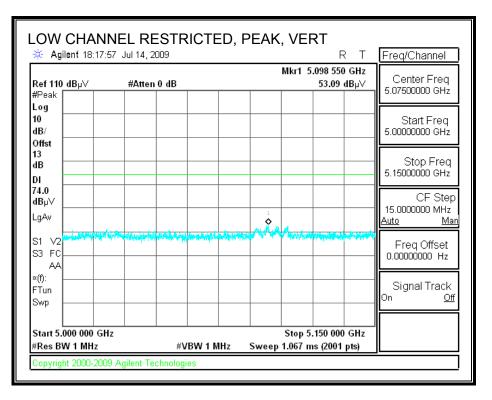
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

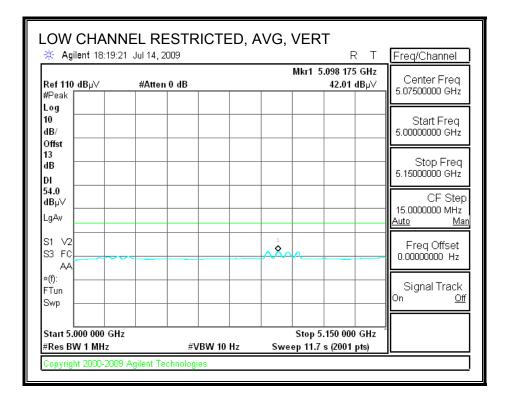




Page 186 of 255

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





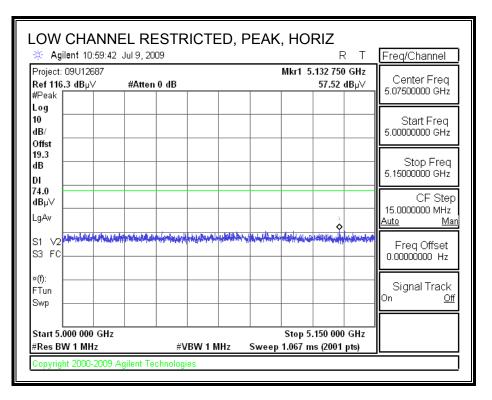
Page 187 of 255

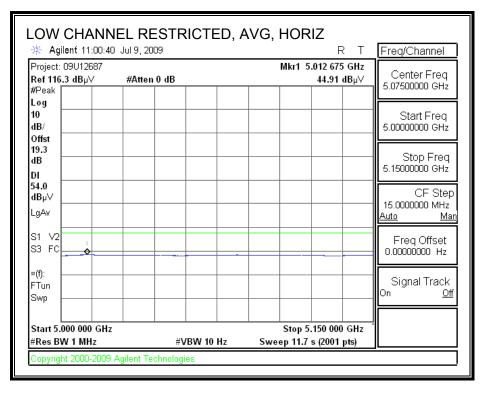
Test Engr Date: Project # Company EUT Desc EUT M/N: Test Targ	+: .y: cription: [:	:	Thanh Ng 07/14/09 09U12652 QualCon 5000 Seri 65-VN780 FCC 15.2	2 mm ries PC :0-P2	CI Card										
Mode Op	f Dist Read AF CL	Distance		ıa	Avg		e Correc Field St ed Peak	Strength @ k Field Stre	93 m	Peak Fiel Margin v	: Field Stren; eld Strength vs. Average vs. Peak Lir	h Limit e Limit			
f	Dist			CL							Ant. Pol.			1 Table Angle	Notes
GHz	(m)		dB/m	dB	dB	dB	dB	dBuV/m	n dBuV/m	∖ dB	V/H	P/A/QP	cm	Degree	
Low Ch 5 15.540	5180MHz 3.0	1z 36.0	38.9	11.3	-34.8	0.0	10.0	61.4	74.0	-12.6	v	Р	145.0	233.3	
15.540	3.0	23.7	38.9	11.3			10.0		54.0	-4.9	v	A	145.0	233.3	
Mid Ch 5						· · · · · · · · · · · · · · · · · · ·		••••		······	·		• • · · ·		
15.600	3.0	37.2	38.7	11.4	-34.8	0.0	10.0	62.5	74.0	-11.5	v	Р	199.8	319.8	
15.600	3.0	24.3	38.7	11.4	-34.8	0.0	10.0	49.6	54.0	-4.4	V	A	199.8	319.8	
High Ch										, j	()				
15.720	3.0	36.9	38.4	11.4			10.0		74.0	-12.0	v	P	200.0	75.6	
15.720	3.0	24.2	38.4	11.4			10.0		54.0	-4.7	V	A	200.0	75.6	,
10.480 10.480	3.0 3.0	36.1 23.8	37.5	9.0 9.0			10.0 10.0		74.0 54.0	-18.2 -10.5	H H	P A	121.7 121.7	358.7 358.7	
Rev. 4.1.2 Note: No		missions	s were deter	cted a	bove the	system 1	noise 1	floor.							

Page 188 of 255

8.2.2. 802.11n HT20 MODE IN 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

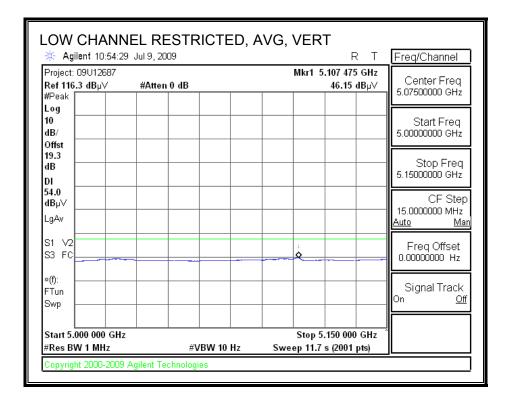




Page 189 of 255

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

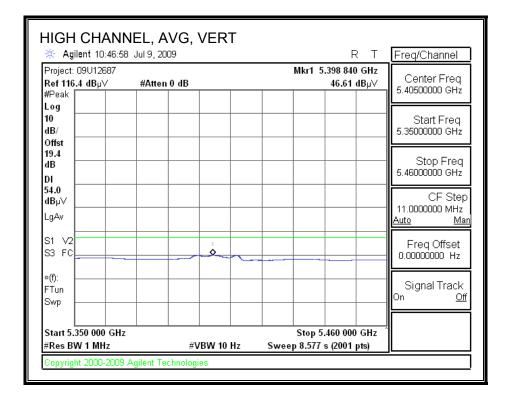
LOW CHANNEL RI	ESTRICTED, I	PEAK, VERT		
🔆 Agilent 10:53:29 Jul 9, 20	009		RТ	Freq/Channel
Project:09∪12687 Ref 116.3 dB µ∨ #Atten #Peak	n0 dB	Mkr1 5.097 6 58.3	50 GHz I dBµ∨	Center Freq 5.07500000 GHz
Log 10 dB/ Offst				Start Freq 5.0000000 GHz
dB DI				Stop Freq 5.1500000 GHz
74.0 dBµ∨ LgAw				CF Step 15.000000 MHz <u>Auto Man</u>
S1 ∨2	naturna an a	en fan de staar de st Staar de staar de staa		Freq Offset 0.00000000 Hz
×(f): FTun Swp				Signal Track On <u>Off</u>
Start 5.000 000 GHz #Res BW 1 MHz	#VBW 1 MHz	Stop 5.150 00 Sweep 1.067 ms (200		
Copyright 2000-2009 Agilent Te	echnologies			



Page 190 of 255

AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)

roject: 09U12687			Mkr1 5.39	4.605 GHz	Freq/Channel
ef 116.4 dBµ∨	#Atten 0 dB			4 005 GH2 7.98 dBµ∨	Center Freq
Peak					5.40500000 GHz
og					
					Start Freq
B/					5.35000000 GHz
nst					
3			+		Stop Freq
					5.46000000 GHz
.0					
Вµ∨					CF Stej 11.0000000 MHz
JAV	1				Auto Ma
and a link of the later of the	Line and Line with the Party	And the standard Berneld	والمراجع والمراجع	م قباد الم فقاميات	
	and an interest of the second second	Alterative and	A STATE OF A STATE OF A STATE OF A		Freq Offset
3 FC					0.00000000 Hz
n:					
run					Signal Track
vp					On <u>Of</u>
tart 5.350 000 GHz			Stop 5 46	0 000 GHz	
Res BW 1 MHz	#\/P	W1MHz Swee	p 1.067 ms (



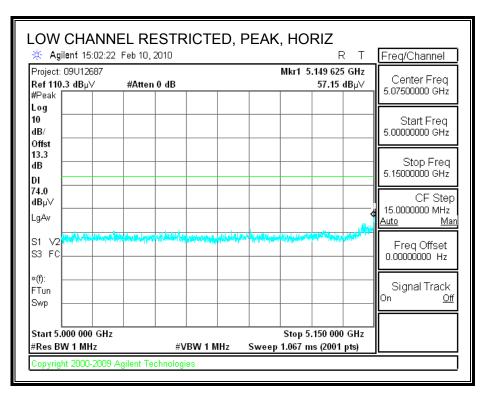
Page 191 of 255

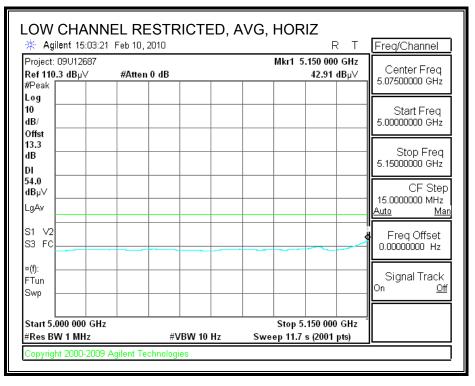
omplia			y Measurem Services, Fr		5m Ch	amber									
ompan	y: Qual	lcomm													
	#: 09U	12687													
	7/09/09 gineer:	Doug And	erson												
nfigu	~	EUT w/Sup	port Notebo	ok PC											
	uipmen														
		_	Desta		4.00		Destar		26-40GH			orn > 180			Limit
		18GHz	Pre-ar	·			Pre-am	piirer	20-40GH	z	- H	om > 180	σΠΖ		FCC 15.205
	5/N: 671	•	▼ 1144 N	liteq 30	08A003	⁹³¹				▼				•	FCC 13.203
	uency Ca	22807700	12' c	able 2	28076	500	20' ca	ble 22	807500		HPF	Re	ject Filte		Measurements
	able 22		421	11 220	07000		20' cab	10 229/	7500		F_7.6GHz		,	RB'	W=VBW=1MHz ge Measurements
5 6		507700	▼ 12 ca	ble 228	07600	•	20 Cab	16 2200	▼		r_7.00Hz	•			<u>ge Wieasurements</u> 1MHz ; VBW=10Hz
f	Dist	1	Read Avg.		CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim	-		Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
w Ch. 5	<u>180</u>														
.540	3.0	44.5	29.6	38.7	113	-34.8	0.0	0.7	60.4	45.5	74	54	-13.6	-8.5	H (Neise Fleer)
.540	3.0	44.5	29.6	38.7	11.3	-34.8	0.0	0.7	60.4	45.5	74	54	-13.6	-8.5	V (Noise Floor)
id Ch. 5	200														
5.600	3.0	43.6	29.8	38.5	11.4	-34.8	0.0	0.7	59.4	45.7	74	54	-14.6	-8.3	H (Noise Floor)
5.600	3.0	43.4	29.9	38.5	11.4	-34.8	0.0	0.7	59.2	45.7	74	54	-14.8	-8.3	H (Noise Floor)
gh Ch.	<u>5240</u>														
.720	3.0	43.7	29.6	38.2	11.4	-34.7	0.0	0.7	59.3	45.3	74	54	-14.7	-8.7	H (Noise Floor)
.720	3.0	43.6	29.7	38.2	11.4	-34.7	۵O	0.7	59 <i>.</i> 3	45 <i>3</i>	74	54	-14.7	-8.7	H (Neise Fleer)
v. 11.10				L	L	1		L	1		1				
v. 11.10	1.08														
	f	Measurem	ent Frequency	7		Amp	Preamp	Gain				Avg Lim	Average I	ield Strengt	n Limit
	Dist	Distance to							ct to 3 mete					l Strength Li	
	Read AF	Analyzer F Antenna F	0			Avg Peak			Strength @ c Field Stre			<u> </u>	<u> </u>	. Average Li . Peak Limit	
	AF CL	Cable Los				Peak HPF	High Pas			ngui		T K TATSL	tviaigiti VS	. Peak Limit	
			-				uv								

Page 192 of 255

8.2.3. 802.11n HT40 MODE IN 5.2 GHz BAND

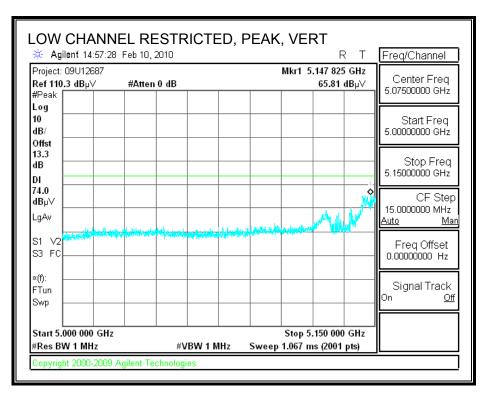
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

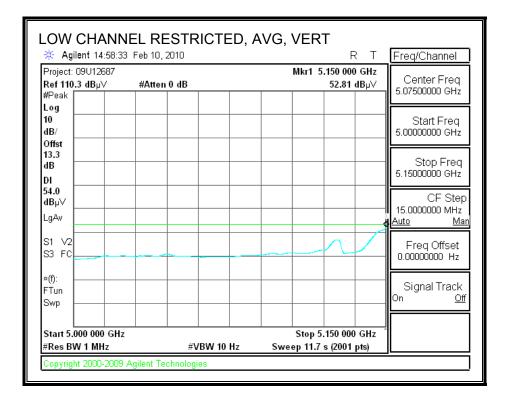




Page 193 of 255

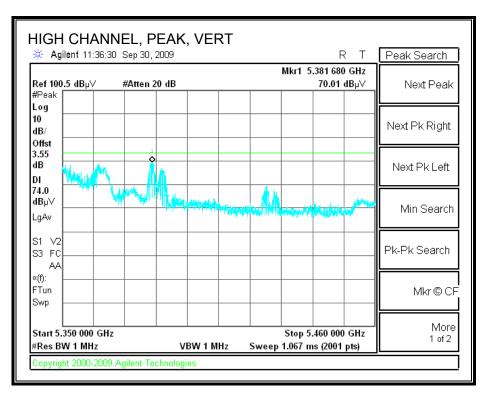
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

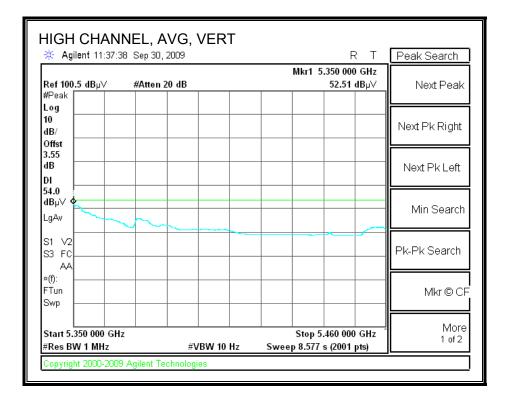




Page 194 of 255

AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





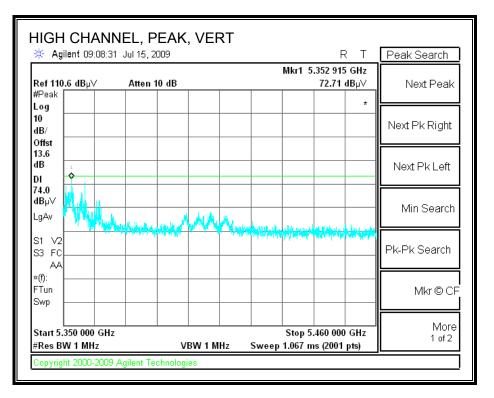
Page 195 of 255

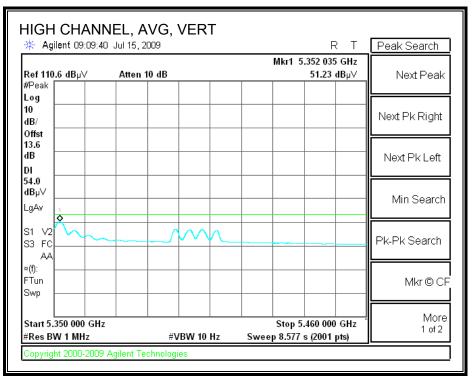
Compai	IV:	Onal	comm												
roject			12687												
ate:		09/	30/09												
	igineer:		unh Nguyen												
onfigu lode:	ration:		w/Support N HT 40, MC		ok PC										
oue.		1 3	111 4 0, MC	0 31											
est Ec	uipmen	<u>t:</u>													
н	lorn 1-	18GHz	Pre-ar	nplifer	1-260	SHz	Pre-am	plifer	26-40GH	z	н	orn > 180	GHz		Limit
T73; S	S/N: 671	7 @3m	- T144 M	Aliteq 30	08A009	31 🖵				-				-	FCC 15.205 📮
- Hi Fre	quency Ca	bles								 					
3'	cable 2	2807700	12' c	able 2	28076	00	20' ca	ble 22	807500		HPF	Re	ject Filte	r <u>Peak</u>	. Measurements
													,	RB ¹	W=VBW=1MHz
3' c	able 22	307700	- 12' ca	nble 228	07600	-	20' cab	le 2280	7500 -	HP	F_7.6GHz	-			ge Measurements 1MHz : VBW=10Hz
I							1			I /				KBW-	100112, VD00-10012
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
w Ch. :	<u>5190</u>														
5.570	3.0	36.4	23.4	38.6	11.4	-34.8	0.0	0.7	52.3	39 <i>.</i> 3	74	54	-21.7	-14.7	V (Noise Floor)
5.570	3.0	34.8	23.4	38.6	11.4	-34.8	0.0	0.7	50.6	39 <i>.</i> 3	74	54	-23.4	-14.7	H (Noise Floor)
igh Ch.	<u>5230</u>	•													
5.690	3.0	37.5	23.8	38.3	11.4	-34.7	0.0	0.7	53.1	39.5	74	54	-20.9	-14.5	H (Neise Fleer)
5.690	3.0	38.4	23.8	38.3	11.4	-34.7	0.0	0.7	54.1	39.5	74	54	-19.9	-14.5	V (Noise Floor)
								l		L		ļ	L	L	
ev. 11.1	D.08														
	f	Measurem	ent Frequenc [,]			Amp	Preamp (Jain				Aug Tim	Average F	ield Strength	a Timait
	Dist	Distance to		,		•			ct to 3 mete	ers		-	-	i Strength Li	
	Read	Analyzer R	eading			Avg			Strength @					. Average Li	
	AF	Antenna F	-			Peak			c Field Stre					. Peak Limit	
	CL	Cable Los	s			HPF	High Pas	s Filter					-		
	~~														

Page 196 of 255

8.2.4. 802.11a MODE IN 5.3 GHz BAND

AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





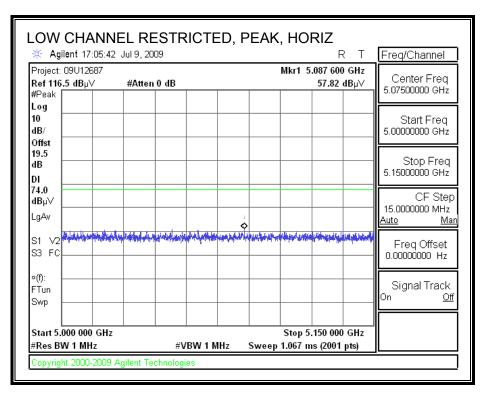
Page 197 of 255

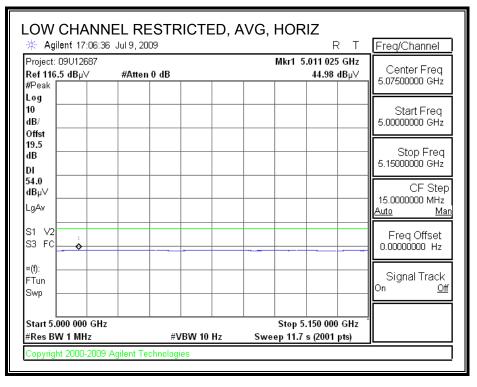
Project #: Company: EUT Description: 1	07/15/09 09U12687													
Company: EUT Description: 1		_												
EUT Description:														
-	QualCor													
EUT MUN: (
	65-VN780		07											
•	FCC15.2		0/											
-	Tx a mod Maarina			A	Preamp (2			A	Field Streng	+h T inn-i			
	Measurem Distance t			-	Distance		nt to 3 mo	tors	-	Field Streng ld Strength	-			
	Analyzer l			Avg			trength @			s. Average				
	Antenna F			Peak			: Field Stre			s. Peak Lin				
	Cable Los:			HPF	High Pas			-6						
f Dist	Read	AF	CL	Amp	D Corr	Fltr	Согт.	Limit	Margin	Ant. Pol.	Det.	Ant.High	Table Angle	Notes
GHz (m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m		V/H	P/A/QP	cm –	Degree	
Low ch 5260MHz														
15.780 3.0	40.1	38.0	11.5	-34.6	0.0	0.7	55.6	74.0	-18.4	V	Р	135.5	322.5	
	27.9	38.0	11.5	-34.6	0.0	0.7	43.4	54.0	-10.6	V	<u>A</u>	135.5	322.5	
15.780 3.0 15.780 3.0	37.0	38.0	11.5	-34.6	0.0	0.7	52.6	74.0	-21.4	H	P	129.2	298.4	
15.780 3.0 Mid ch 5300MHz	25.0	38.0	11.5	-34.6	0.0	0.7	40.6	54.0	-13.4	H	A	129.2	298.4	
10.600 3.0	37.6	37.7	9.0	-36.6	0.0	0.8	48.5	74.0	-25.5	v	Р	100.0	200.0	
10.600 3.0	26.5	37.7	9.0	-36.6	0.0	0.8	37.4	54.0	-16.6	v	Ā	100.0	200.0	
15.900 3.0	39.7	37.7	11.5	-34.6	0.0	0.7	55.1	74.0	-18.9	v	P	101.8	225.7	
15.900 3.0	27.3	37.7	11.5	-34.6	0.0	0.7	42.6	54.0	-11.4	V	A	101.8	225.7	
10.600 3.0	37.8	37.7	9.0	-36.6	0.0	0.8	48.8	74.0	-25.2	H	Р	149.4	297.9	
	25.5	37.7	9.0	-36.6	0.0	0.8	36.5	54.0	-17.5	H	A	149.4	297.9	
15.900 3.0 15.900 3.0	38.8 26.0	37.7 37.7	11.5 11.5	-34.6 -34.6	0.0 0.0	0.7 0.7	54.2 41.3	74.0 54.0	-19.8 -12.7	H H	P	149.4 149.4	297.9 297.9	
High ch 5320MHz		31.1	11.2	-J460	0.0	0.7	41.J	24.V	-16.7		A	147.4	\$7(.7	
10.640 3.0	46.5	37.7	9.1	-36.6	0.0	0.8	57.4	74.0	-16.6	v	Р	134.2	291.0	
10.640 3.0	35.0	37.7	9.1	-36.6	0.0	0.8	46.0	54.0	-8.0	v	Ā	134.2	291.0	
15.960 3.0	44.5	37.5	11.5	-34.5	0.0	0.7	59.8	74.0	-14.2	V	Р	131.1	318.8	
15.960 3.0	31.8	37.5	11.5	-34.5	0.0	0.7	47.0	54.0	- 7.0	v	<u>A</u>	131.1	318.8	
	37.8	37.7	9.1	-36.6	0.0	0.8	48.8	74.0	-25.2	H	P	147.1	295.3	
10.640 3.0 15.960 3.0	28.4	37.7	9.1 11.5	-36.6 -34.5	0.0	0.8	39.4	54.0 74.0	-14.6	H H	A P	147.1 145.9	295.3 266.9	
15.960 3.0 15.960 3.0	40.3 27.6	37.5 37.5	11.5	-34.5	0.0 0.0	0.7 0.7	55.6 42.9	74.0 54.0	-18.4 -11.1	н Н	A	145.9	266.9	
	A 1.0	J rad	11.2	-3-62	0.0		76.7	276U	-11.1		а	140.3	£00,7	
Rev. 4.1.2.7														

Page 198 of 255

8.2.5. 802.11n HT20 MODE IN 5.3 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

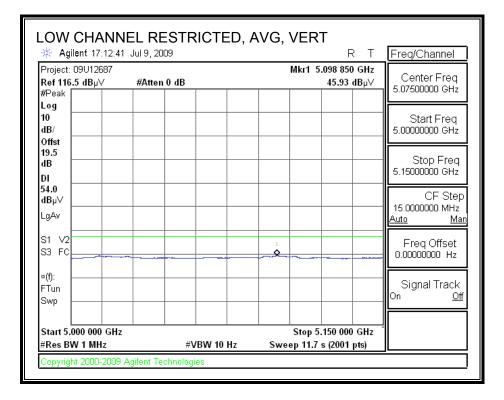




Page 199 of 255

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

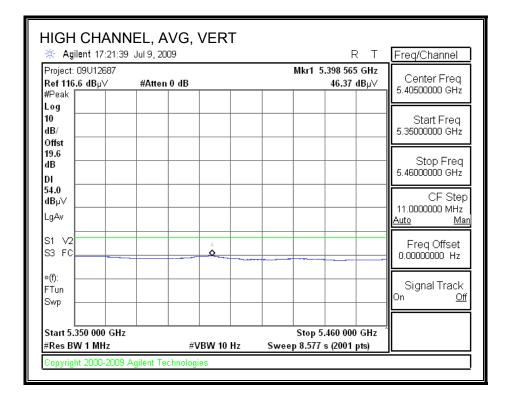
LOW CHANNEL		PEAK, VERT	Freq/Channel
Project: 09U12687 Ref 116.5 dBµ∨ #A #Peak	tten 0 dB	Mkr1 5.052 800 GHz 57.42 dBµ∀	Center Freq 5.07500000 GHz
Log 10 dB/ Offst			Start Freq 5.0000000 GHz
19.5 dB DI			Stop Freq 5.15000000 GHz
74.0 dBµ∨ LgAv	1		CF Step 15.0000000 MHz <u>Auto Man</u>
S1 V2 S3 FC	allaatide Duttering alatticida auge planets	hen gesteller i Andrea i Andre I an	Freq Offset 0.00000000 Hz
×(f): FTun Swp			Signal Track On <u>Off</u>
Start 5.000 000 GHz #Res BW 1 MHz	#VBW 1 MHz	Stop 5.150 000 GHz Sweep 1.067 ms (2001 pts)	
Copyright 2000-2009 Agiler	nt Technologies	· · · ·	



Page 200 of 255

AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CHANNEL		RT	Freq/Channel
Project: 09∪12687 Ref 116.6 dB µ∨ #A #Peak	tten 0 dB	Mkr1 5.430 795 GHz 57.48 dBµ∨	Center Freq 5.40500000 GHz
Log 10 dB/ Offst			Start Freq 5.3500000 GHz
dB			Stop Freq 5.4600000 GHz
74.0 dBµ√ LgAv			CF Step 11.0000000 MHz Auto Man
S1 V2	fið sennafn tið ming hafði skildir í Alladirði síði sveið að stansson hella st	nyaku analasi (nya kuta kuta nya ya kuta nya kuta na ku	Freq Offset 0.00000000 Hz
*(f):			Signal Track On <u>Off</u>
Start 5.350 000 GHz #Res BW 1 MHz	#VBW 1 MHz	Stop 5.460 000 GHz Sweep 1.067 ms (2001 pts)	
Copyright 2000-2009 Agilen	t Technologies]



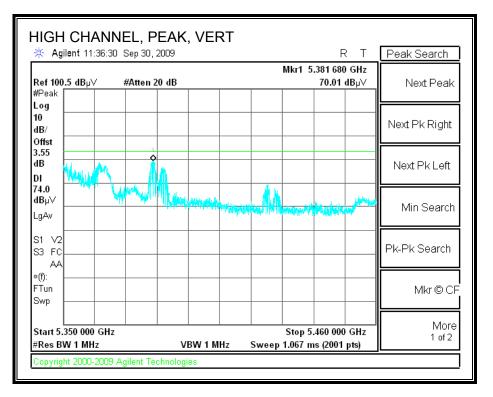
Page 201 of 255

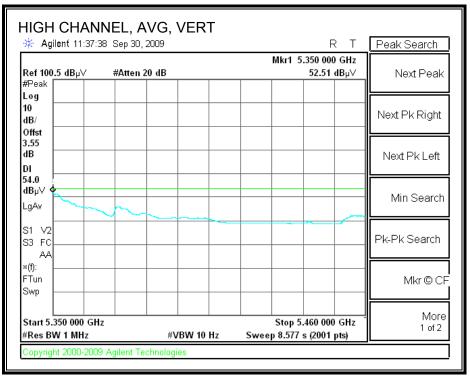
•			Services, Fr	- mont	on of	anoei									
	ıy: Qual #: 09U														
	7/09/09	12007													
		Doug And													
~	ration: Fx / HT	-	port Notebo	ok PC											
	uipmen	_													
н	orn 1-	18GHz	Pre-ar	nplifer	1-260	GHz	Pre-am	plifer	26-40GH	Iz	н	orn > 180	GHz		Limit
T73; S	5/N: 671	7 @3m	▼ T144 N	liteq 30	08A009)31 🖵				•				-	FCC 15.205
	juency Ca														
3' 0	cable 2	2807700	12' c	able 2	28076	600	20' ca	ole 22	2807500		HPF	Re	ject Filte		<u>Measurements</u> V=VBW=1MHz
3' c	able 22	307700	12' ca	ble 228	07600	_	20' cab	le 228	07500 🖕	HF	F_7.6GHz	-		Averag	e Measurements
														RBW=1	MHz ; VBW=10Hz
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
w Ch.5	260 (Por	<u>ver = 11dBm)</u>	 												
5.780	3.0	42.5	29.3	38.0	11.5	-34.6	0.0	0.7	58.1	44.9	74	54	-159	- 9.1	H (Noise Floor)
5.780	3.0	42.4	29.4	38.0	11.5	-34.6	0.0	0.7	57.9	45.0	74	54	- 16.1	-9.0	V (Noise Floor)
id Ch. 5	300 (Por	ver = 11dBm)													
0.600	3.0	43.2	32.5	37.7	9.0	-36.6	0.0	0.8	54.2	43.5	74	54	-19.8	-10.5	н
5.900	3.0	41.8	28.9	37.7	11.5	-34.6	0.0	0.7	57.2	44.3	74	54	- 16.8	-9.7	H (Noise Floor)
0.600	3.0	46.1	38.8	37.7	9.0	-36.6	0.0	0.8	57.1	49.7	74	54	- 16.9	-43	v
5.900	3.0	42.2	29.0	37.7	115	-34.6	0.0	0.7	57.5	44.3	74	54	-16 <i>5</i>	-9.7	V (Noise Floor)
igh Ch.	5320 (Pe	wer = 11dBn	L)												
0.640	3.0	43.2	32.9	37.7	9.1	-36.6	0.0	0.8	54.2	43.8	74	54	-19.8	-10.2	Н
5.960	3.0	41.7	28.9	37.5	11.5	-34.5	0.0	0.7	57.0	44.2	74	54	-17.0	-9.8	H (Noise Floor)
).640	3.0	45.7	38.2	37.7	9.1	-36.6	0.0	0.8	56.7	49.2	74	54	- 17.3	- 4.8	v
5.960	3.0	41.5	28.9	37.5	11.5	-34.5	0.0	0.7	56.8	44.2	74	54	-17.2	-9.8	V (Noise Floor)
ev. 11.10	0.08														
	f		ent Frequency	9		Amp	Preamp (-	-	Field Strength	
		Distance to							ct to 3 mete					d Strength Lir	
		Analyzer R	<u> </u>			Avg			Strength @			-	-	. Average Lir	nit
	AF	Antenna Fa				Peak			c Field Stre	ngth		Pk Mar	Margin vs	. Peak Limit	
	CL	Cable Loss	3			HPF	High Pas	s Filter							

Page 202 of 255

8.2.6. 802.11n HT40 MODE IN 5.3 GHz BAND

AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





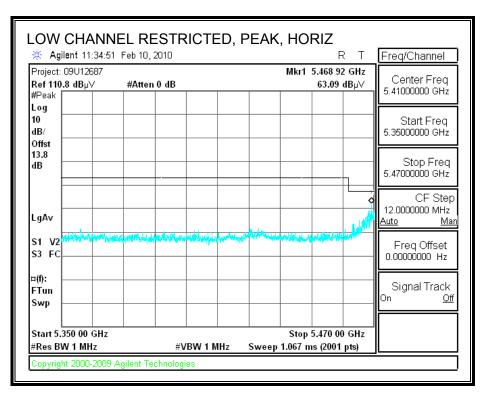
Page 203 of 255

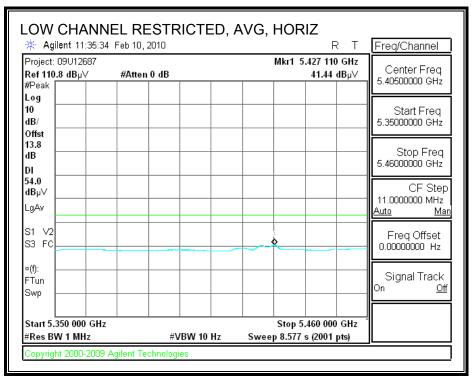
Compai	ıy: Qual	comm													
	#: 09U	12687													
	9/30/09														
		Thanh Ngy													
		EUT w/Sup 40, MCS 3	port Notebo	ok PC											
loae:	IX/HI	40, MCS 3.	1												
est Ec	uipmen	<u>t:</u>													
н	lorn 1-	18GHz	Pre-ar	nplifer	1-260	Hz	Pre-am	plifer	26-40GH	z	н	orn > 180	GHz		Limit
173.	S/N: 671	7 <i>@</i> 3m		Aiteq 30	084009	31								-	FCC 15.205
		(agoin		nicq 50	JUNUU	• •									FCC 15.205
- Hi Fre	quency Ca	bles —	1				_								
3'	cable 2	2807700	12' c	able 2	28076	00	20' ca	ble 22	807500		HPF	Re	ject Filte	r Peak	Measurements
-													Joort into	RB1	W=VBW=1MHz
3' 0	able 22	307700	, 12' ca	nble 228	07600	-	20' cab	le 2280	07500 🖕	HP	F_7.6GHz	-		T	ge Measurements
		_					I		_					RBW=1	MHz; VBW=10Hz
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
ow Ch.	<u>5270</u>		ļ	••••••			· •	†	1	¢	1	· •			
		44.2	33.8	37.0	11.5	-34.6	0.0	07	50 7	40 3	74	54	-14.3	.47	н
5.810	5270 3.0 3.0	44.2 46.3	33.8 37.2	379 379	115 115	-34.6 -34.6	0.0 0.0	0.7 0.7	59.7 61.8	49.3 52.7	74 74	54 54	-14.3 -12.2	-4.7 -1.3	H V
5.810 5.810	3.D 3.D														
5.810 5.810 igh Ch.	3.0 3.0 <u>5310</u>	46.3	37.2	379	115	-34.6	0.0	0.7	61.8	52.7	74	54	-12.2	-1.3	v
5.810 5.810 ligh Ch. 0.620	3.0 3.0 5310 3.0	46.3 43.2	37.2 32.6	37.9 37.7	11 <i>5</i> 9.0	-34.6 -36.6	0.0 0.0	0.7 0.8	61.8 54.2	52.7 43.5	74 74	54 54	-12.2 -19.8	-13 -105	V H
5.810 5.810 igh Ch. 0.620 5.930	3.0 3.0 <u>5310</u>	46.3	37.2	379	115	-34.6	0.0	0.7	61.8	52.7	74	54	-12.2	-1.3	V H H V
5.810 5.810 i <u>gh Ch.</u> 1.620 5.930 1.620	3.0 3.0 5310 3.0 3.0	46.3 43.2 42.6	37.2 32.6 28.9	37.9 37.7 37.6	11 <i>5</i> 9.0 11 <i>5</i>	-34.6 -36.6 -34.5	0.0 0.0 0.0	0.7 0.8 0.7	61.8 54.2 57.9	52.7 43.5 44.2	74 74 74 74	54 54 54 54	-12.2 -19.8 -16.1	-13 -105 -98	V H H
5.810 5.810 i <u>gh Ch.</u> 0.620 5.930 0.620	3.0 3.0 5310 3.0 3.0 3.0 3.0	46.3 43.2 42.6 46.2	37.2 32.6 28.9 39.4	37.9 37.7 37.6 37.7	115 9.0 115 9.0	-34.6 -36.6 -34.5 -36.6	0.0 0.0 0.0 0.0	0.7 0.8 0.7 0.8	61.8 54.2 57.9 57.2	52.7 43.5 44.2 50.4	74 74 74 74	54 54 54 54 54	-12.2 -19.8 -16.1 -16.8	-13 -105 -98 -3.6	V H H V
5.810 5.810 0.620 5.930 0.620 5.930	3.0 3.0 5310 3.0 3.0 3.0 3.0	46.3 43.2 42.6 46.2	37.2 32.6 28.9 39.4	37.9 37.7 37.6 37.7	115 9.0 115 9.0	-34.6 -36.6 -34.5 -36.6	0.0 0.0 0.0 0.0	0.7 0.8 0.7 0.8	61.8 54.2 57.9 57.2	52.7 43.5 44.2 50.4	74 74 74 74	54 54 54 54 54	-12.2 -19.8 -16.1 -16.8	-13 -105 -98 -3.6	V H H V
ow Ch. 5.810 5.810 6.620 5.930 0.620 5.930 6.620	3.0 3.0 5310 3.0 3.0 3.0 3.0	46.3 43.2 42.6 46.2	37.2 32.6 28.9 39.4	37.9 37.7 37.6 37.7	115 9.0 115 9.0	-34.6 -36.6 -34.5 -36.6	0.0 0.0 0.0 0.0	0.7 0.8 0.7 0.8	61.8 54.2 57.9 57.2	52.7 43.5 44.2 50.4	74 74 74 74	54 54 54 54 54	-12.2 -19.8 -16.1 -16.8	-13 -105 -98 -3.6	V H H V
5.810 5.810 0.620 5.930 0.620 5.930	30 30 5310 30 30 30 30 30	46.3 43.2 42.6 46.2 42.9	37.2 32.6 28.9 39.4 29.0	37.9 37.7 37.6 37.7 37.6	9.0 11.5 9.0 11.5 9.0 11.5	-34.6 -36.6 -34.5 -36.6 -34.5	0.0 0.0 0.0 0.0	0.7 0.8 0.7 0.8 0.7	61.8 54.2 57.9 57.2	52.7 43.5 44.2 50.4	74 74 74 74	54 54 54 54 54	-12.2 -19.8 -16.1 -16.8 -15.8	-13 -105 -98 -36 -9.7	V H H V V V
5.810 5.810 0.620 5.930 0.620 5.930	30 30 30 30 30 30 30 30 30 30 30 30 30 3	46.3 43.2 42.6 46.2 42.9 Measureme	37.2 32.6 28.9 39.4 29.0	37.9 37.7 37.6 37.7 37.6	9.0 11.5 9.0 11.5 9.0 11.5	-34.6 -36.6 -34.5 -36.6 -34.5 -34.5 Amp	0.0 0.0 0.0 0.0 0.0 Preamp (0.7 0.8 0.7 0.8 0.7 Gain	61.8 54.2 57.9 57.2 58.2	52.7 43.5 44.2 50.4 44.3	74 74 74 74	54 54 54 54 54 54	-12.2 -19.8 -16.1 -16.8 -15.8 Average I	-13 -105 -98 -36 -9.7 -9.7	V H H V V
5.810 5.810 iigh Ch. 0.620 5.930 0.620 5.930	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	46.3 43.2 42.6 46.2 42.9 Measureme Distance to	37.2 32.6 28.9 39.4 29.0 ent Frequency Antenna	37.9 37.7 37.6 37.7 37.6	9.0 11.5 9.0 11.5 11.5	-34.6 -36.6 -34.5 -36.6 -34.5 -34.5 -34.5 -34.5 D Corr	0.0 0.0 0.0 0.0 Preamp (Distance	0.7 0.8 0.7 0.8 0.7 0.7 Gain	61.8 54.2 57.9 57.2 58.2	52.7 43.5 44.2 50.4 44.3	74 74 74 74	54 54 54 54 54 54 54 54 54 54 54	-12.2 -19.8 -16.1 -16.8 -15.8 Average I Peak Field	-1.3 -10.5 -9.8 -3.6 -9.7 Field Strength d Strength Lin	V H H V V
5.810 5.810 ligh Ch. 0.620 5.930 0.620 5.930	30 30 5310 30 30 30 30 30 30 30 30 30 30 30 30 30	46.3 43.2 42.6 46.2 42.9 Measureme Distance to Analyzer R	37.2 32.6 28.9 39.4 29.0 ent Frequency Antenna eading	37.9 37.7 37.6 37.7 37.6	90 115 90 115	-34.6 -36.6 -34.5 -36.6 -34.5 -34.5 -34.5 D Corr Avg	0.0 0.0 0.0 0.0 0.0 0.0 Distance Average	0.7 0.8 0.7 0.8 0.7 Gain Correc Field S	61.8 54.2 57.9 57.2 58.2 ct to 3 mete Strength @	52.7 43.5 44.2 50.4 44.3 ers 3 m	74 74 74 74	54 54 54 54 54 Pk Lim Avg Lim Avg Mar	-12.2 -19.8 -16.1 -16.8 -15.8 Average F Peak Field	-1.3 -10.5 -9.8 -3.6 -9.7 	V H H V V
5.810 5.810 iigh Ch. 0.620 5.930 0.620 5.930	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	46.3 43.2 42.6 46.2 42.9 Measureme Distance to	37.2 32.6 28.9 39.4 29.0 ent Frequency Antenna eading actor	37.9 37.7 37.6 37.7 37.6	90 115 90 115	-34.6 -36.6 -34.5 -36.6 -34.5 -34.5 -34.5 -34.5 D Corr	0.0 0.0 0.0 0.0 0.0 0.0 Distance Average	0.7 0.8 0.7 0.8 0.7 Gain Correct Field S ed Peal	61.8 54.2 57.9 57.2 58.2 ct to 3 mets Strength @ k Field Stre	52.7 43.5 44.2 50.4 44.3 ers 3 m	74 74 74 74	54 54 54 54 54 Pk Lim Avg Lim Avg Mar	-12.2 -19.8 -16.1 -16.8 -15.8 Average F Peak Field	-1.3 -10.5 -9.8 -3.6 -9.7 Field Strength d Strength Lin	V H H V V

Page 204 of 255

8.2.7. 802.11a MODE IN THE 5.6 GHz BAND

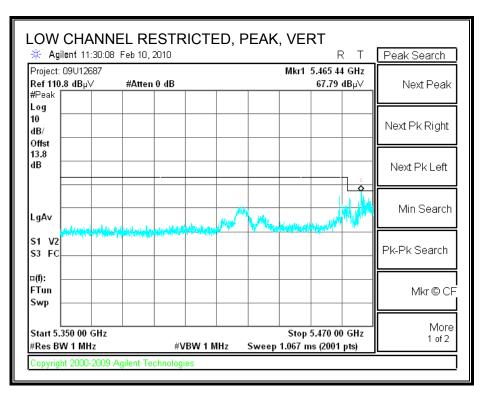
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

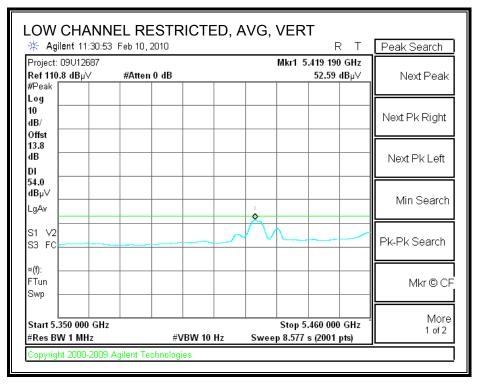




Page 205 of 255

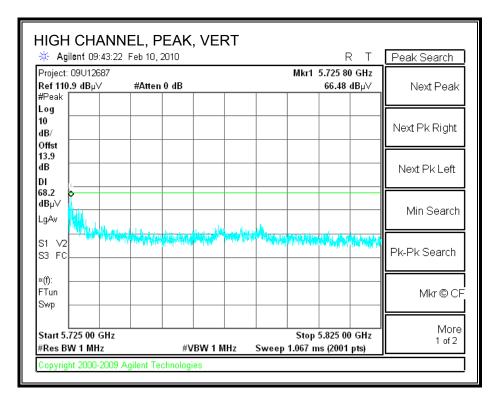
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





Page 206 of 255

AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



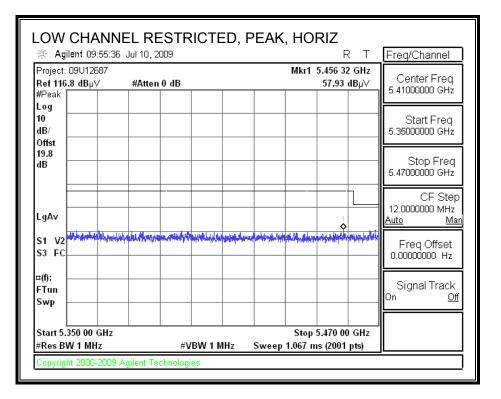
Page 207 of 255

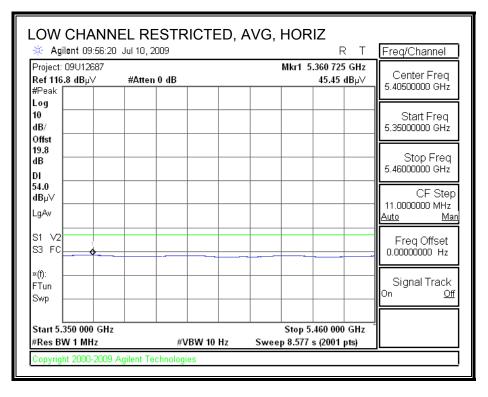
Company Project # Date: Cest Eng Configur Mode:	; gineer:		QualComm 09U12687 10/13/2009 Thanh Nguyen EUT, Support Tx/802.11a												
Cest Equ		_					-								
Horn 1-18GHz Pre-amplifer 1-26GHz						Pre-am	plifer	26-40GH	z	H	orn > 180		Limit		
			- 1144 N	nteq 50	004003	51 <u>-</u>								-	10015.205
H Frequency Cables 3' cable 22807700 12' cable 22807600						20' ca	ble 22	807500		HPF Reject Filte			r Peak Measurements RBW=VBW=1MHz		
3' ca	ble 22	807700	12' ca	07600	•	20' cab	le 2280)7500 🗸	HPF_7.6GHz		•			Average Measurements RBW=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	<u> </u>	шыцу	<u>шың ү</u>	ub/in	ш	ш	<u>ш</u>	ш	ubu v/m	ubu v/m	ubu v/m	ubu v/m	цБ	чD	(1/1)
1.000	3.0	40.6	27.1	37.9	9.2	-36.3	0.0	0.7	52.2	38.7	74	54	-21.8	-153	v
1.000 h. <u>5580</u>	3.0	39.6	27.5	37.9	9.2	-36.3	0.0	0.7	51.2	39.1	74	54	-22.8	-14.9	H
1.160	3.0	38.7	25.5	38.0	9.3	-36.1	0.0	0.7	50.7	37 <i>.</i> 4	74	54	-23.3	-16.6	v
1.160	3.0	36.4	23.4	38.0	9.3	-36.1	0.0	0.7	48.4	35.4	74	54	-25.6	-18.6	H
<u>:h.5660</u>															
1.320	3.0	42.3	34.5	38.2	9.4	-36.0	0.0	0.7	54.6	46.8	74	54	-19.4	-7.2	v
1.320	3.0	41.2	34,4	38.2	9.4	-36.0	0.0	0.7	53.5	46.8	74	54	-20.5	-7.2	H
ligh Ch. f	57 <u>00</u>														
1,400 1,400	3.0 3.0	469 458	40.6 37.7	38.3 38.3	9.4 9.4	-35.9 -35.9	0.0	0.7 0.7	59.4 58.3	53.1 50.2	74 74	54 54	-14.6 -15.7	-0.9 -3.8	V H
lev. 11.10	08			<u></u>											
	f Dist	Distance to		7				Corre	ct to 3 mete			Pk Lim	Peak Field	Field Strengt d Strength Li	mit
	Read Analyzer Reading Avg AF Antenna Factor Peak						Calculate	ed Peal	Strength @ k Field Stre					. Average Li . Peak Limit	
	CL	Cable Loss	3			HPF	High Pas	s Filter							

Page 208 of 255

8.2.8. 802.11n HT20 MODE IN THE 5.6 GHz BAND

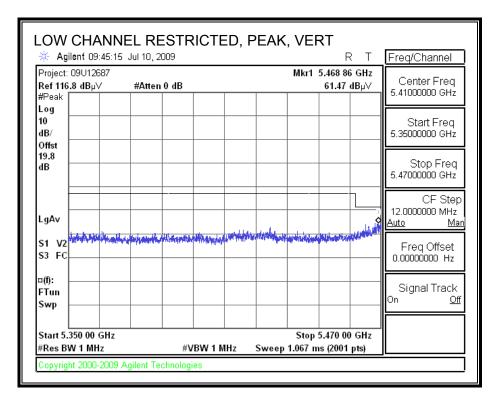
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

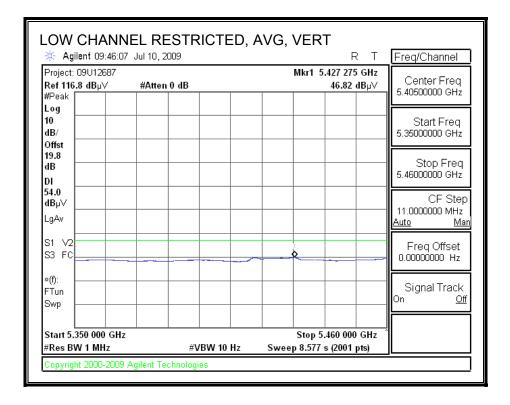




Page 209 of 255

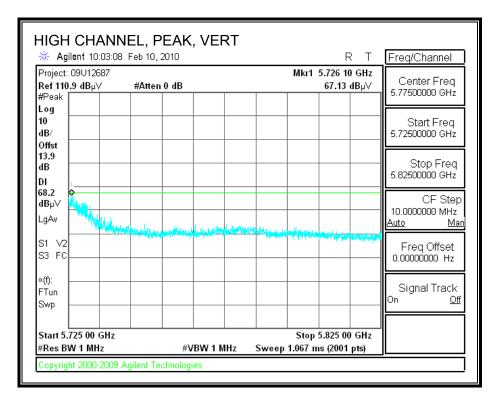
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





Page 210 of 255

AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



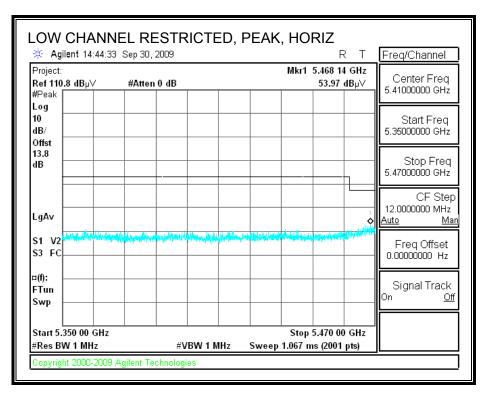
Page 211 of 255

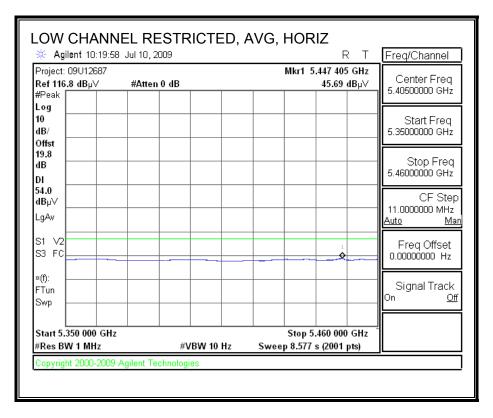
Company Project # Date: Fest Eng Configur Mode:	gineer:		QualComm 09U12687 10/13/2009 Thanh Nguyes EUT, Support Tx / 802.11n J	Laptop											
'est Equ	iipmen	<u>t:</u>													
Horn 1-18GHz Pre-amplifer 1-26GHz					Pre-am	plifer	26-40GH	z	H	orn > 180	SHz		Limit		
173; S	/N: 671)	7@3m	- T144 N	liteq 30	08A009	31 🖵				-				-	FCC 15.205 -
3' c	uency Cal able 2 ible 228	2807700		able 2 ble 228		00	20' cal 20' cab		807500 ⁷⁵⁰⁰ -	HP	HPF F_7.6GHz	Re	ject Filte	RB ¹	<u>x Measurements</u> W=VBW=1MHz ge Measurements 1MHz ; VBW=10Hz
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	0	1	dBuV/m	dB	dB	(V/H)
.ow Ch. 55	5 <u>00</u>														
1.000	3.0	47.1	39.0	37.9	9.2	-36.3	0.0	0.7	58.6	50.5	74	54	-15.4	-3.5	v
1.000	3.0	43.0	33.1	37.9	9.2	-36.3	0.0	0.7	54.6	44.7	74	54	-19.4	-9.3	H
<u> 5580</u>															
1.160	3.0	39.6	27.9	38.0	9.3	-36.1	0.0	0.7	51.5	39.8	74	54	-22.5	-14.2	v
1.160	3.0	36.9	23.6	38.0	93	-36.1	0.0	0.7	48.8	35.5	74	54	-25.2	-18.5	Н
<u>'h. 5660</u>															
1.320	3.0	41.8	30.2	38.2	9.4	-36.0	0.0	0.7	54.1	42.6	74	54	-19.9	-11.4	<u>v</u>
1.320	3.0	38.0	25.8	38.2	9.4	-36.0	0.0	0.7	50.3	38.1	74	54	-23.7	- 15 9	Н
ligh Ch. 5	<u>5700</u>														
1.400	3.0	475	40.9	38.3	9.4	-35.9	0.0	0.7	0.06	53.4	74	54	-14,0	.0. 6	v
1.400	3.0	44.8	34.7	38 <i>.</i> 3	9.4	-35.9	0.0	0.7	57 <i>3</i>	47 <i>3</i>	74	54	-16.7	-6.7	Н
	f Dist	Measurem Distance to Analyzer R Antenna Fa Cable Loss	eading actor	y		Amp D Corr Avg Peak HPF	Average	Corre Field S d Peal	ct to 3 mete Strength @ c Field Stre	3 m		Pk Lim Avg Mar	Peak Fiel Margin vs	Field Strength d Strength Li . Average Li . Peak Limit	mit mit

Page 212 of 255

8.2.9. 802.11n HT40 MODE IN THE 5.6 GHz BAND

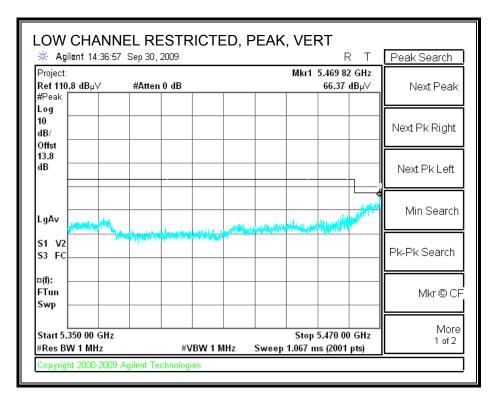
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

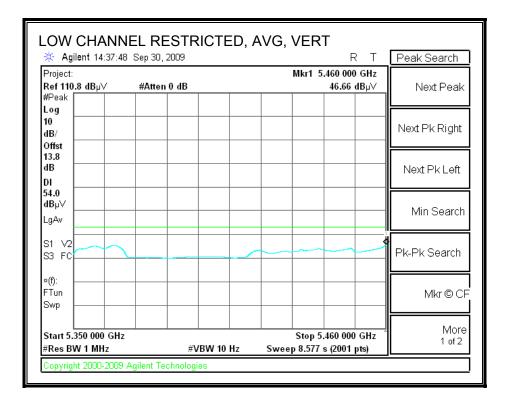




Page 213 of 255

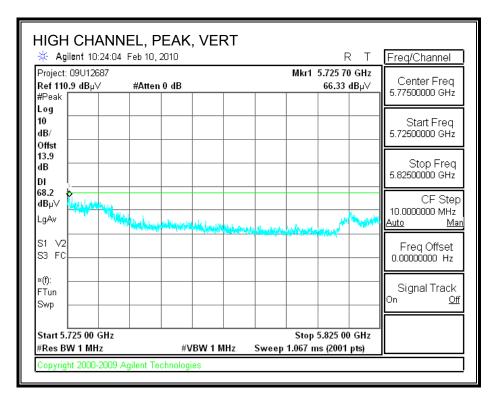
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





Page 214 of 255

AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



Page 215 of 255

•		areadon	Services, Fr		- m on											
Company: QualComm Project # 09U12687																
Date: 10/13/2009																
est En			Thanh Nguye:													
'onfiguı Iode:	ration:		EUT, Support Tx/802.11nl													
			17/ 002.1111	1140												
est Eq	uipmer	<u>it:</u>														
Horn 1-18GHz			Pre-ar	nplifer	1-260	SHz	Pre-am	plifer	26-40GH	z	H	orn > 18(GHz		Limit	
T73; S/N: 6717 @3m 🖵 T1			- T144 N	Aliteq 30	08A009	31 🖵							-	FCC 15.205 -		
- Hi Freq	uency Ca	bles												_		
3' cable 22807700			12' c	able 2	28076	00	20' ca	ble 22	807500	HPF R					eak Measurements RBW=VBW=1MHz	
3' ca	able 22	807700	12' cable 22807600				20' cab	le 2280	7500 _	ПР	HPF 7.6GHz				Average Measurements	
						•			·					RBW=	=1MHz ; VBW=10Hz	
f	Dist	1	Read Avg.	AF	CL	Amp	D Corr	Fltr	Peak	Avg		-		Avg Mar	Notes	
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)	
Ch. 5510 1.020	MHz 3.0	43.8	38.0	37.9	9.2	-36.3	0.0	0.7	55.4	49.7	74	54	-18.6	-43	v	
1.020	3.0	41.7	34.1	37 <i>9</i>	9.2	-36.3	0.0	0.7	53.3	45.7	74	54	-20.7	-8.3	Н	
<u>h. 5550</u>																
1.100	3.0	39.2	27.2	38.0	93	-36.2	0.0	0.7	51.0	39.0	74	54	-23.0	-15.0	v	
1.100	3.0	37.4	24.3	38.0	9.3	-36.2	0.0	0.7	49.2	36.1	74	54	- 24.8	-17 .9	H	
. 5670	MHz															
1.340	3.0	45.7	39,4	38.2	9.4	-36.0	0.0	0.7	58.1	51.8	74	54	-15 <i>9</i>	-2.2	v	
1.340	3.0	42.3	34.4	38.2	9.4	-36.0	0.0	0.7	54.7	46.8	74	54	-19.3	-7.2	H	
				•												
		<u>.</u>	L	I			<u> </u>	l	<u> </u>		<u> </u>			[]		
ev. 11.10	.08															
							т.	a :				а т:	. т		4 1 1 1	
1 9				Amp D.Corr	Preamp (Distance		ct to 3 mete	are		-	-	ield Strengt I Strength L				
		Analyzer R		Avg			Strength @					. Average L				
	AF	Antenna Fa				Peak	-		c Field Stre			-	-	. Peak Limit		
	CL	Cable Loss				HPF	High Pas	s Filter								

Page 216 of 255

8.3. WORST-CASE BELOW 1 GHz

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

	-	ency Meas ication Sei			t 5m Ch	amber							
Test Engr: Date:													
Date: 06/25/09 Project #: 09U12652													
Company		QualCon	n Inc.										
EUT Descr	iption:	802.11n 4		N mod	lule								
EUT M/N:		65-VN780											
Test Targe		FCC Clas Tx worst			,								
Mode Ope	r: f	Ix worst Measurem			a Amp	Preamp (2			Margin	Margin vs.	T innit	
	Dist	Distance to	-	-	D Corr	-		to 3 meters		margin	Margin vs.	Linui	
	Read	Analyzer I		-	Filter	Filter Ins		to 5 meters					
	AF		-		Corr.	Calculate		trength					
AF Antenna Factor CL Cable Loss			Limit	Field Stre	ength Lir	nit							
	CL.	Cable Loss											
f	Dist	Read	AF	CL	Amp	D Corr	Filter	Corr.	Limit	Margin	Ant. Pol.	Det	Notes
f MHz			AF dB/m	CL dB	Amp dB	D Corr dB	Filter dB		Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
MHz	Dist	Read											Notes
MHz 90.002	Dist (m)	Read dBuV 52.1 51.0	dB/m 7.6 11.9	dB 0.8 1.3	dB	dB	dB	dBuV/m 32.2 36.0	dBuV/m	dB -11.3 -10.0	V/H H H	P/A/QP EP EP	Notes
MHz 90.002 234.608 299.171	Dist (m) 3.0 3.0 3.0	Read dBuV 52.1 51.0 51.5	dB/m 7.6 11.9 13.4	dB 0.8 1.3 1.5	dB 28.3 28.2 28.1	طB 0.0 0.0 0.0	dB 0.0 0.0 0.0	dBuV/m 32.2 36.0 38.2	dBuV/m 43.5 46.0 46.0	dB -11.3 -10.0 -7.8	V/H H H H	P/A/QP EP EP EP	Notes
_	Dist (m) 3.0 3.0	Read dBuV 52.1 51.0	dB/m 7.6 11.9	dB 0.8 1.3	dB 28.3 28.2	4B 0.0 0.0	dB 0.0 0.0	dBuV/m 32.2 36.0	dBuV/m 43.5 46.0	dB -11.3 -10.0	V/H H H	P/A/QP EP EP	Notes

Page 217 of 255

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

Complian	ce Certif	ication Ser	rvices, Fr	emont	5m Cha	mber									
Test Engr:		Thanh Ng	çuyen												
Date: 06/25/09															
Project #:		09U12652	-												
Company MAT D		QualCon		NT 1											
EUT Descr	ption:	802.11n 4 65-VN780		N modu	ше										
EUT M/N: Test Targe		FCC Clas													
lest large Mode Ope		Tx worst		п1J											
mode Ope					Amp	Drasser (lain			Margin	Mannin	T innit			
	-		-	. ,				np Preamp Gain Margin Margin vs. Limit Corr Distance Correct to 3 meters							
						Connet	to 3 motors								
				a				to 3 meters							
	Read	Analyzer F	Reading	à	Filter	Filter Ins	ert Loss								
			Reading 'actor	à		Filter Ins Calculate	ert Loss d Field St	irength							
	Read AF	Analyzer F Antenna F	Reading 'actor	a	Filter Corr.	Filter Ins	ert Loss d Field St	irength							
f	Read AF	Analyzer F Antenna F	Reading 'actor	CL	Filter Corr.	Filter Ins Calculate	ert Loss d Field St ngth Lin	irength	Limit	Margin	Ant. Pol.	Det.	Notes		
f MHz	Read AF CL	Analyzer F Antenna F Cable Loss	Reading 'actor ;	_	Filter Corr. Limit	Filter Ins Calculate Field Stre	ert Loss d Field St ngth Lin	irength nit	Limit	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes		
MHz	Read AF CL Dist	Analyzer F Antenna F Cable Loss Read	Reading Factor	CL	Filter Corr. Limit Amp	Filter Ins Calculate Field Stre D Corr	ert Loss d Field St ngth Lin Filter	trength nit Corr.	Limit	dB	V/H	P/A/QP	Notes		
MHz 61.441 142.925	Read AF CL Dist (m) 3.0 3.0	Analyzer F Antenna F Cable Loss Read dBuV 53.4 45.9	AF dB/m 7.9 13.1	CL dB 0.7 1.1	Filter Corr. Limit Amp dB 28.4 28.3	Filter Ins Calculate Field Stre D Corr dB 0.0 0.0	ert Loss d Field St ngth Lin Filter dB	Corr. dBuV/m 33.7 31.8	Limit dBuV/m 40.0 43.5	dB -6.3 -11.7	V/H V V	P/A/QP EP EP	Notes		
MHz 61.441 142.925 498.379	Read AF CL Dist (m) 3.0 3.0 3.0 3.0	Analyzer F Antenna F Cable Loss Read dBuV 53.4 45.9 39.0	AF dB/m 7.9 13.1 16.7	CL dB 0.7 1.1 2.0	Filter Corr. Limit Amp dB 28.4 28.3 27.8	Filter Ins Calculate Field Stree D Corr dB 0.0 0.0 0.0	ert Loss d Field St ngth Lin Filter dB 0.0 0.0 0.0	corr. dBuV/m 33.7 31.8 29.9	Limit dBuV/m 40.0 43.5 46.0	dB -6.3 -11.7 -16.1	V/H V V	P/A/QP EP EP EP	Notes		
MHz 61.441 142.925 498.379 599.303	Read AF CL Dist (m) 3.0 3.0 3.0 3.0 3.0	Analyzer F Antenna F Cable Loss Read dBuV 53.4 45.9 39.0 41.0	AF dB/m 7.9 13.1 16.7 18.4	CL dB 0.7 1.1 2.0 2.2	Filter Corr. Limit Amp dB 28.4 28.3 27.8 27.5	Filter Ins Calculate Field Stre D Corr dB 0.0 0.0 0.0 0.0	ert Loss d Field St ngth Lin Filter dB 0.0 0.0 0.0 0.0	corr. dBuV/m 33.7 31.8 29.9 34.1	Limit dBuV/m 40.0 43.5 46.0 46.0	dB -6.3 -11.7 -16.1 -11.9	V/H V V V V	P/A/QP EP EP EP EP	Notes		
-	Read AF CL Dist (m) 3.0 3.0 3.0 3.0	Analyzer F Antenna F Cable Loss Read dBuV 53.4 45.9 39.0	AF dB/m 7.9 13.1 16.7	CL dB 0.7 1.1 2.0	Filter Corr. Limit Amp dB 28.4 28.3 27.8	Filter Ins Calculate Field Stree D Corr dB 0.0 0.0 0.0	ert Loss d Field St ngth Lin Filter dB 0.0 0.0 0.0	corr. dBuV/m 33.7 31.8 29.9	Limit dBuV/m 40.0 43.5 46.0	dB -6.3 -11.7 -16.1	V/H V V V	P/A/QP EP EP EP	Notes		

Page 218 of 255

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (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 receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

Page 219 of 255

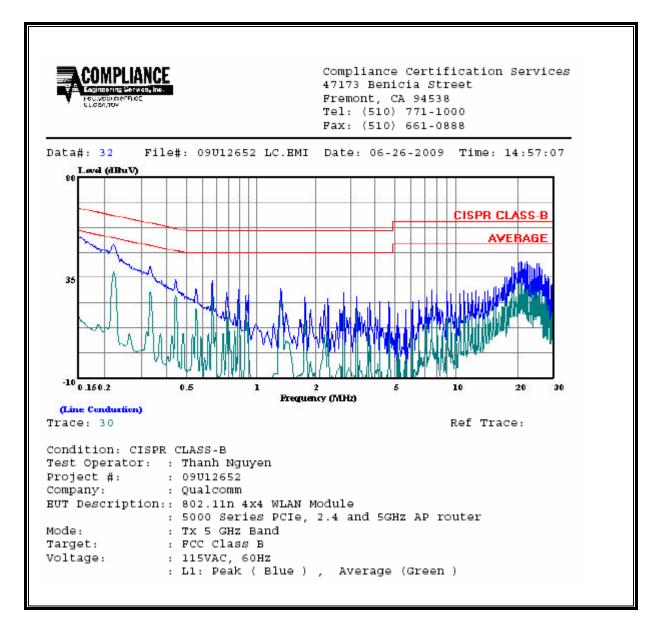
RESULTS

<u>6 WORST EMISSIONS</u>

	CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Marg	çin	Remark	
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV(dB)	L1/L2	
0.22	49.94		36.55	0.00	62.74	52.74	-12.80	-16.19	L1	
0.33	39.76		28.62	0.00	59.35	49.35	-19.59	-20.73	L1	
21.15	41.63		37.25	0.00	60.00	50.00	-18.37	-12.75	L1	
0.22	49.89		36.03	0.00	62.82	52.82	-12.93	-16.79	L2	
0.33	39.80		27.12	0.00	59.35	49.35	-19.55	-22.23	L2	
21.71	38.81		32.20	0.00	60.00	50.00	-21.19	-17.80	L2	
6 Worst I	Data									

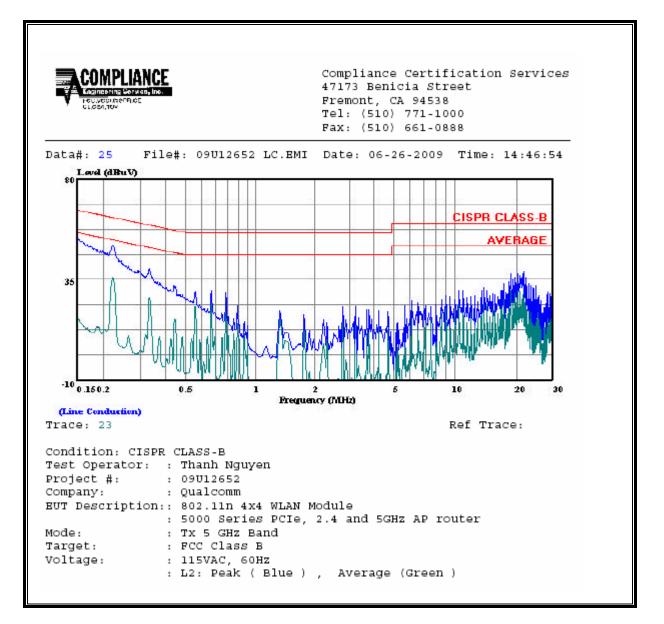
Page 220 of 255

LINE 1 RESULTS



Page 221 of 255

LINE 2 RESULTS



Page 222 of 255

10. DYNAMIC FREQUENCY SELECTION

10.1. OVERVIEW

10.1.1. LIMITS

INDUSTRY CANADA

IC RSS-210 is closely harmonized with FCC Part 15 DFS rules. The deviations are as follows:

RSS-210 Issue 7 A9.4 (b) (ii) Channel Availability Check Time: ...

Additional requirements for the band 5600-5650 MHz: Until further notice, devices subject to this Section shall not be capable of transmitting in the band 5600-5650 MHz, so that Environment Canada weather radars operating in this band are protected.

RSS-210 Issue 7 A9.4 (b) (iv) **Channel closing time:** the maximum channel closing time is 260 ms.

FCC

§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".

Page 223 of 255

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

Requirement	Operational Mode					
	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 2: Applicability of DFS 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 224 of 255

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

Maximum Transmit Power	Value
	(see note)
≥ 200 milliwatt	-64 dBm
< 200 milliwatt	-62 dBm
Note 1: This is the level at the input of the receiver assuming a	0 dBi receive antenna
Note 2: Throughout these test procedures an additional 1 dB has of the test transmission waveforms to account for variations in will ensure that the test signal is at or above the detection three	measurement equipment. This
response.	

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 Ch	annel Closing Transmission Time begins is

Table 4: DFS Response requirement values

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.

Table 5 – Short Pulse Radar Test Waveforms

Radar	Pulse Width	PRI	Pulses	Minimum	Minimum
Туре	(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 (F	Radar Types 1-4)			80%	120

Table 6 – Long Pulse Radar Test Signal

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

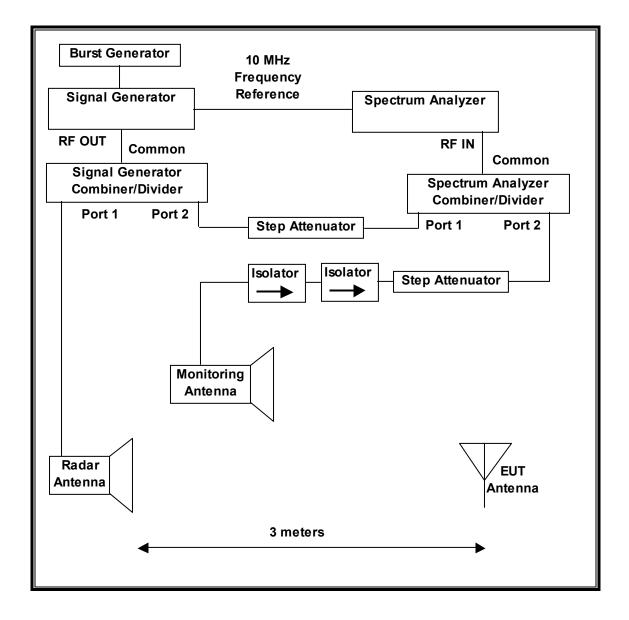
Table 7 – Frequency Hopping Radar Test Signal

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

Page 226 of 255

10.1.2. TEST AND MEASUREMENT SYSTEM

RADIATED METHOD SYSTEM BLOCK DIAGRAM



Page 227 of 255

SYSTEM OVERVIEW

The short pulse and long pulse signal generating system utilizes the NTIA software. The Vector Signal Generator has been validated by the NTIA. The hopping signal generating system utilizes the CCS simulated hopping method and system, which has been validated by the DoD, FCC and NTIA. The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution.

The signal monitoring equipment consists of a spectrum analyzer set to display 8001 bins on the horizontal axis. The time-domain resolution is 2 msec / bin 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.

SYSTEM CALIBRATION

A 50-ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to a horn antenna via a coaxial cable, with the reference level offset set to (horn antenna gain – coaxial cable loss). The signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of –64 dBm as measured on the spectrum analyzer.

Without changing any of the instrument settings, the spectrum analyzer is reconnected to the Common port of the Spectrum Analyzer Combiner/Divider. Measure the amplitude and calculate the difference from –64 dBm. Adjust the Reference Level Offset of the spectrum analyzer to this difference.

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.

Page 228 of 255

ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

Establish a link between the Master and Slave, adjusting the distance between the units as needed to provide a suitable received level at the Master and Slave devices. Stream the video test file to generate WLAN traffic. Confirm that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

TEST AND MEASUREMENT EQUIPMENT

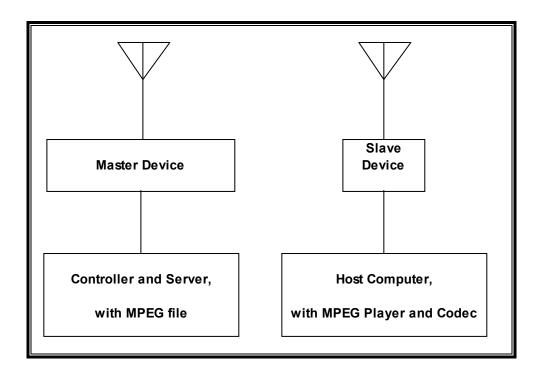
The following test and measurement equipment was utilized for the DFS tests documented in this report:

TEST EQUIPMENT LIST								
Description	Manufacturer	Model	Serial Number	Cal Due				
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4407B	C01098	02/07/10				
Vector signal generator, 20GHz	Agilent / HP	E8267C	C01066	11/16/09				

Page 229 of 255

10.1.3. SETUP OF EUT

RADIATED METHOD EUT TEST SETUP



SUPPORT EQUIPMENT

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

PERIPHERAL SUPPORT EQUIPMENT LIST							
Description	Manufacturer	Model	Serial Number	FCC ID			
Wireless Access Point	Cisco	AIR-AP1252AG-A	FTX120690N2	LDK102061			
(Master Device)		K9					
AC Adapter (AP)	Delta Electronics	EADP-45BB B	DTH112490BD	DoC			
Notebook PC (Host)	Dell	PP18L	10657517255	DoC			
AC Adapter (Host PC)	Lite On	LA65SN0-00	CN-ODF263-	DoC			
	Technology Corp.		71615-687-49E				
Notebook PC (Client)	IBM	Type 2668-46U	L3-XDLW 06/02	DoC			
AC Adapter (Client PC)	IBM	08K8212	11S08K8212Z1Z7	DoC			
			UB4BX0FA				
USB to RS-232 Adapter	Keyspan	USA-19HS	02300	DoC			
AC Adapter (EUT)	PI Electronics	P030WF120A	910000079	DoC			

Page 230 of 255

10.1.4. DESCRIPTION OF EUT

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

The EUT is a Slave Device without radar detection.

The highest power level within these bands is 26.24 dBm EIRP in the 5250-5350 MHz band and 26.65 dBm EIRP in the 5470-5725 MHz band.

The only antenna assembly utilized with the EUT has a gain of 3 dBi; in the 802.11a legacy mode it has an effective transmit antenna gain of 6.01 dBi.

Four identical antennas are utilized to meet the diversity and MIMO operational requirement, except in the 802.11a mode where two identical antennas are active for the transmitter and four identical antennas are active for the receiver.

The EUT uses four transmitter/receiver chains, each connected to an antenna to perform radiated 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 the 802.11a/n architecture. Two nominal channel bandwidths are implemented: 20 MHz and 40 MHz.

The software installed in the EUT is version 5.0.300.23.

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

The Master Device is a Cisco Access Point, FCC ID: LDK102061. The minimum antenna gain for the Master Device is 3.5 dBi.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is -64 dBm. After correction for antenna gain and procedural adjustments, the required radiated threshold is -64 + 1 = -63 dBm.

The calibrated radiated 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 231 of 255

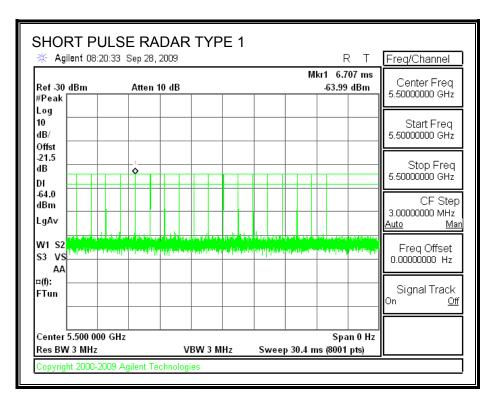
10.2. 20 MHz BANDWIDTH RESULTS

10.2.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5500 MHz.

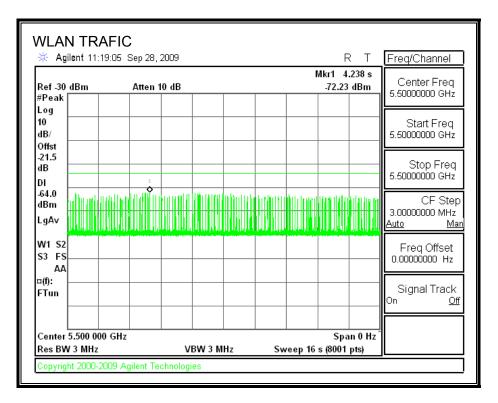
10.2.2. PLOTS OF RADAR WAVEFORM AND WLAN TRAFFIC

PLOTS OF RADAR WAVEFORM



Page 232 of 255

PLOT OF WLAN TRAFFIC



Page 233 of 255

10.2.3. MOVE AND CLOSING TIME

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 FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

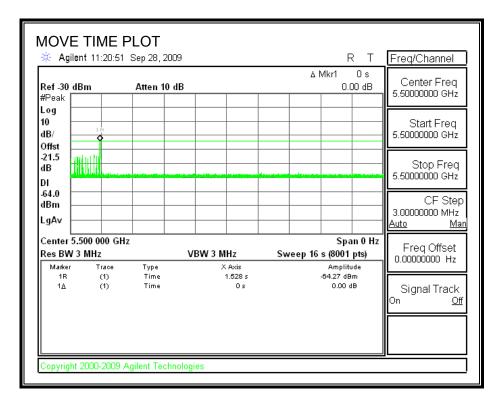
<u>RESULTS</u>

Agency	Channel Move Time	Limit
	(sec)	(sec)
FCC / IC	0.0	10

Agency	Aggregate Channel Closing Transmission Time	Limit
	(msec)	(msec)
FCC	0.0	60
IC	0.0	260

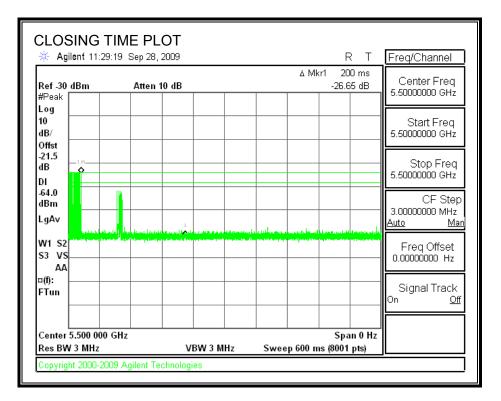
Page 234 of 255

MOVE TIME



Page 235 of 255

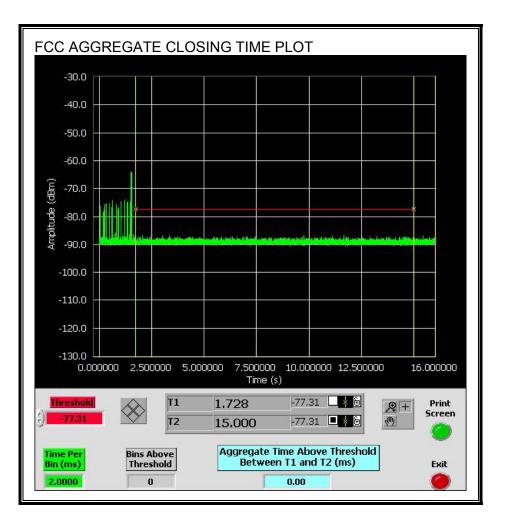
CHANNEL CLOSING TIME



Page 236 of 255

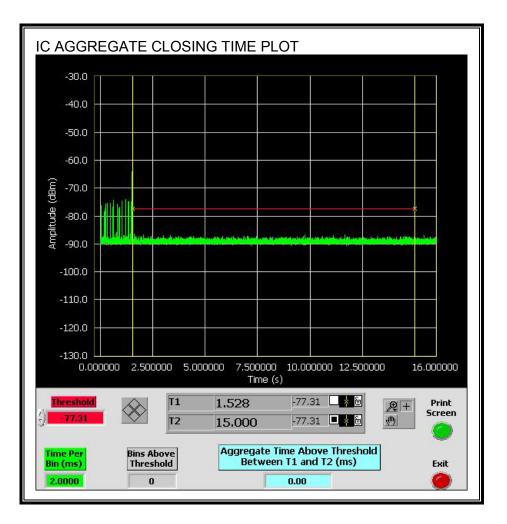
AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the FCC aggregate monitoring period.



Page 237 of 255

No transmissions are observed during the IC aggregate monitoring period.



Page 238 of 255

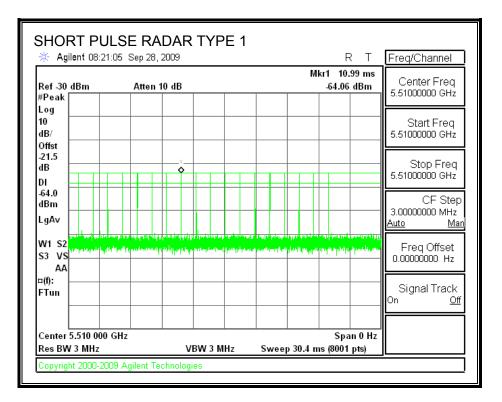
10.3. 40 MHz BANDWIDTH RESULTS

10.3.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5510 MHz.

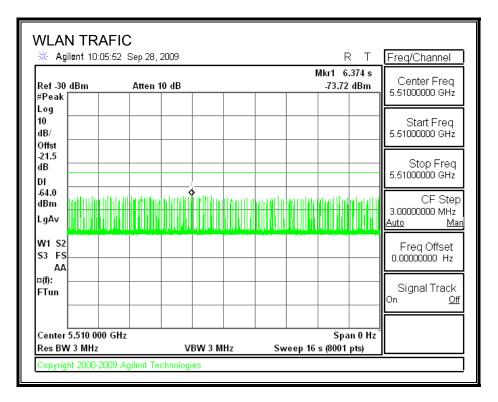
10.3.2. PLOTS OF RADAR WAVEFORM AND WLAN TRAFFIC

PLOTS OF RADAR WAVEFORM



Page 239 of 255

PLOT OF WLAN TRAFFIC



Page 240 of 255

10.3.3. MOVE AND CLOSING TIME

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 FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

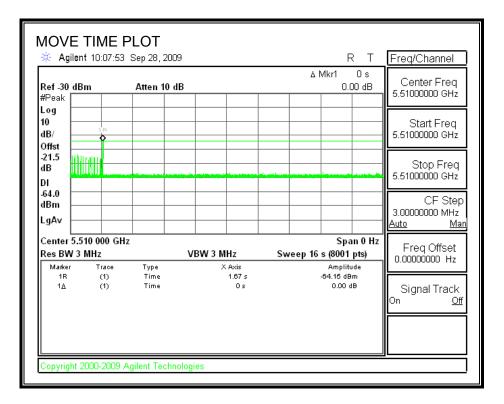
<u>RESULTS</u>

Agency	Channel Move Time	Limit
	(sec)	(sec)
FCC / IC	0.0	10

Agency	Aggregate Channel Closing Transmission Time	Limit
	(msec)	(msec)
FCC	0.0	60
IC	0.0	260

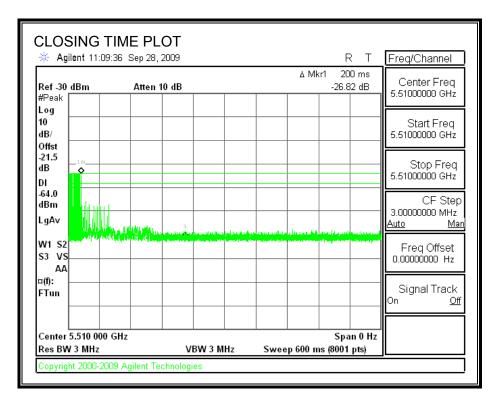
Page 241 of 255

MOVE TIME



Page 242 of 255

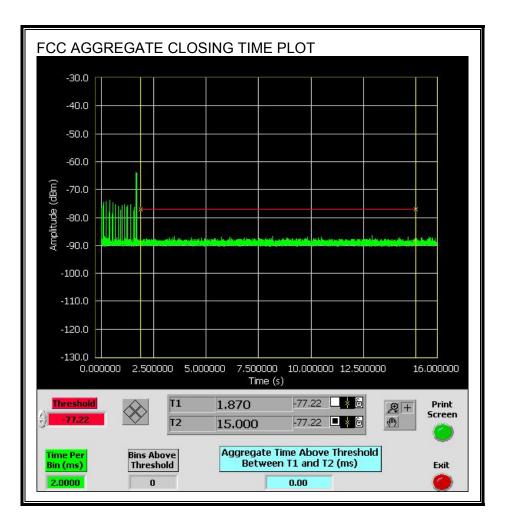
CHANNEL CLOSING TIME



Page 243 of 255

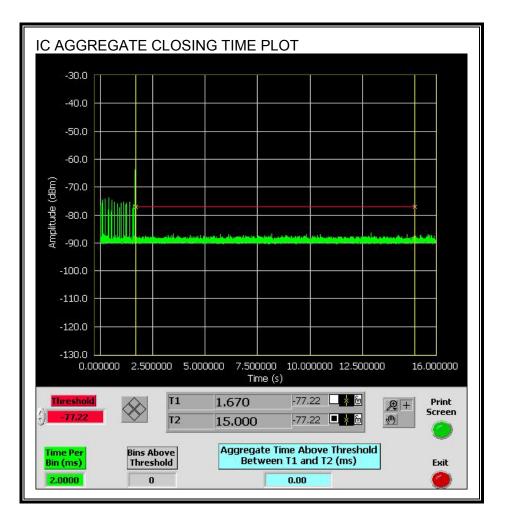
AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the FCC aggregate monitoring period.



Page 244 of 255

No transmissions are observed during the IC aggregate monitoring period.



Page 245 of 255

10.3.4. SLAVE NON-OCCUPANCY

TEST RESULTS

No EUT transmissions were observed on the test channel during the 30-minute observation time.

f -30 dBm	Atten 10 dB	∆ Mkr1 1.8 ks -23.09 dB	Freq/Channel
eak 🛛		-23.05 48	5.51000000 GHz
g			Start Freq 5.51000000 GHz
.5			Stop Freq 5.51000000 GHz
.0			CF Ste 3.00000000 MHz <u>Auto M</u>
S2 FS			Freq Offset 0.00000000 Hz
: un			Signal Track
nter 5.510 000 s BW 3 MHz	GHz VBW 3 MHz	Span 0 Hz Sweep 2 ks (8001 pts)	

Page 246 of 255

11. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§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) Limits for Occupational/Controlled Exposures							
0.3–3.0 30–30 30–30 300–1500 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			
(B) Limits f	for General Populati	on/Uncontrolled Ex	posure				
0.3–1.34 1.34–30	614 824 <i>/</i> f	1.63 2.19/f	*(100) *(180/f ²)	30 30			

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	27.5	0.073	0.2	30
1500-100,000			f/1500 1.0	30 30

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

Page 247 of 255

IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

Table 5

Exposure Limits for Persons Not Classed As RF and Microwave Ex-
posed Workers (Including the General Public)

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	gnetic Field Power ength; rms Density	
0.003–1	280	2.19		6
1–10	280/f	2.19/ <i>f</i>		6
10–30	28	2.19/ <i>f</i>		6
30–300	28	0.073	2*	6
300–1 500	1.585 <i>f</i> ^{0.5}	0.0042f ^{0.5}	f/150	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	616 000 /f ^{1.2}
150 000–300 000	0.158f ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616 000 /f ^{1.2}

* Power density limit is applicable at frequencies greater than 100 MHz.

Notes: 1. Frequency, f, is in MHz.

- 2. A power density of 10 W/m^2 is equivalent to 1 mW/cm^2 .
- A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

Page 248 of 255

EQUATIONS

Power density is given by:

S = EIRP / (4 * Pi * D^2)

where

S = Power density in W/m² EIRP = Equivalent Isotropic Radiated Power in W D = Separation distance in m

Power density in units of W/m² is converted to units of mWc/m² by dividing by 10.

Distance is given by:

D = SQRT (EIRP / (4 * Pi * S))

where

D = Separation distance in m EIRP = Equivalent Isotropic Radiated Power in W S = Power density in W/m²

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

LIMITS

From FCC 1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm² From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m²

Page 249 of 255

RESULTS

(MPE distance equals 20 cm)

Band	Mode	Separation	Output	Antenna	IC Power	FCC Power
		Distance	Power	Gain	Density	Density
		(m)	(dBm)	(dBi)	(W/m^2)	(mW/cm^2)
5.2 GHz	11a (2 Chains)	0.20	12.18	6.01	0.13	0.013
5.2 GHz	11n HT20 (4 Chains)	0.20	13.23	3.0	0.08	0.008
5.2 GHz	11n HT40 (4 Chains)	0.20	16.67	3.0	0.18	0.018
5.3 GHz	11a (2 Chains)	0.20	19.15	6.01	0.65	0.065
5.3 GHz	11n HT20 (4 Chains)	0.20	20.65	3.0	0.46	0.046
5.3 GHz	11n HT40 (4 Chains)	0.20	23.24	3.0	0.84	0.084
5.6 GHz	11a (2 Chains)	0.20	20.77	6.01	0.95	0.095
5.6 GHz	11n HT20 (4 Chains)	0.20	20.24	3.0	0.42	0.042
5.6 GHz	11n HT40 (4 Chains)	0.20	23.65	3.0	0.92	0.092

Page 250 of 255