

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

CLASS 2 PERMISSIVE CHANGE CERTIFICATION TEST REPORT

FOR

EA544D_1 ETHERNET ADAPTER CARD FOR 2.4 / 5 GHz CLIENT APPLICATIONS

MODEL NUMBER: 65-VN663-P1

FCC ID: J9C-EA544D1 IC: 2723A-EA544D1

REPORT NUMBER: 09U12689-10

ISSUE DATE: MAY 10, 2010

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

Prepared by COMPLIANCE CERTIFICATION SERVICES 47173 BENICIA STREET FREMONT, CA 94538, U.S.A. TEL: (510) 771-1000 FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	lssue Date	Revisions	Revised By
	05/10/10	Initial Issue	F. Ibrahim

Page 2 of 292

TABLE OF CONTENTS

1.	ATTI	ESTATION OF TEST RESULTS	6
2.	TES	T METHODOLOGY	7
3.	FAC	ILITIES AND ACCREDITATION	7
4.	CAL	IBRATION AND UNCERTAINTY	7
4	.1.	MEASURING INSTRUMENT CALIBRATION	7
4	.2.	SAMPLE CALCULATION	7
4	.3.	MEASUREMENT UNCERTAINTY	7
5.	EQU	IPMENT UNDER TEST	8
5	.1.	DESCRIPTION OF EUT	8
5	.2.	MAXIMUM OUTPUT POWER	8
5	.3.	DESCRIPTION OF AVAILABLE ANTENNAS	8
5	.4.	SOFTWARE AND FIRMWARE	9
5	.5.	WORST-CASE CONFIGURATION AND MODE	9
5	.6	DESCRIPTION OF CLASS 2 PERMISSIVE CHANGE	9
5	.7	TEST RESULTS FOR C2PC SAMPLE	10
5	.6.	DESCRIPTION OF TEST SETUP	
0			
6.	TES	T AND MEASUREMENT EQUIPMENT	
-			12
6. 7.		T AND MEASUREMENT EQUIPMENT ENNA PORT TEST RESULTS 5.2 GHz BAND CHANNEL TESTS FOR 802.11a MODE	12 13
6. 7.	ANT . <i>1.</i> 7.1.1	T AND MEASUREMENT EQUIPMENT ENNA PORT TEST RESULTS 5.2 GHz BAND CHANNEL TESTS FOR 802.11a MODE 26 dB and 99% BANDWIDTH	12 13 <i>13</i> 13
6. 7.	ANT .1.	T AND MEASUREMENT EQUIPMENT ENNA PORT TEST RESULTS 5.2 GHz BAND CHANNEL TESTS FOR 802.11a MODE . 26 dB and 99% BANDWIDTH . OUTPUT POWER	12 13 13 13 16
6. 7.	ANT 7.1.1 7.1.2 7.1.3 7.1.4	T AND MEASUREMENT EQUIPMENT ENNA PORT TEST RESULTS 5.2 GHz BAND CHANNEL TESTS FOR 802.11a MODE 26 dB and 99% BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY	12 13 13 16 20 21
6. 7.	ANT 7.1.1 7.1.2 7.1.3 7.1.4 7.1.5	T AND MEASUREMENT EQUIPMENT ENNA PORT TEST RESULTS 5.2 GHz BAND CHANNEL TESTS FOR 802.11a MODE 26 dB and 99% BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY PEAK EXCURSION	12 13 13 16 20 21 24
6. 7. 7	ANT 7.1.1 7.1.2 7.1.3 7.1.4 7.1.5 7.1.6	T AND MEASUREMENT EQUIPMENT ENNA PORT TEST RESULTS 5.2 GHz BAND CHANNEL TESTS FOR 802.11a MODE 26 dB and 99% BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS	12 13 131620212427
6. 7. 7	ANT 7.1.1 7.1.2 7.1.3 7.1.4 7.1.5	T AND MEASUREMENT EQUIPMENT ENNA PORT TEST RESULTS 5.2 GHz BAND CHANNEL TESTS FOR 802.11a MODE 26 dB and 99% BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS 5.2 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE 99% & 26 dB BANDWIDTH	12 13 13 13 16 20 21 24 27 30 30
6. 7. 7	ANT 7.1.1 7.1.2 7.1.3 7.1.4 7.1.5 7.1.6 .2. 7.2.1 7.2.2	TAND MEASUREMENT EQUIPMENT ENNA PORT TEST RESULTS 5.2 GHz BAND CHANNEL TESTS FOR 802.11a MODE 26 dB and 99% BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS 5.2 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE 99% & 26 dB BANDWIDTH OUTPUT POWER	12 13 13 16 20 21 24 27 30 30 30 33
6. 7. 7	ANT 7.1.1 7.1.2 7.1.3 7.1.4 7.1.5 7.1.6 .2. 7.2.1	T AND MEASUREMENT EQUIPMENT ENNA PORT TEST RESULTS 5.2 GHz BAND CHANNEL TESTS FOR 802.11a MODE 26 dB and 99% BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS 5.2 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE 99% & 26 dB BANDWIDTH OUTPUT POWER AVERAGE POWER	12 13 13 16 20 21 24 27 30 30 33 40
6. 7. 7	ANT 7.1.1 7.1.2 7.1.3 7.1.4 7.1.5 7.1.6 2. 7.2.1 7.2.2 7.2.3 7.2.4 7.2.5	T AND MEASUREMENT EQUIPMENT ENNA PORT TEST RESULTS 5.2 GHz BAND CHANNEL TESTS FOR 802.11a MODE 26 dB and 99% BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS 5.2 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE 99% & 26 dB BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS 5.2 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE 99% & 26 dB BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY PEAK POWER SPECTRAL DENSITY PEAK POWER SPECTRAL DENSITY	12 13 13 16 20 21 24 27 30 30 33 40 41 44
6. 7. 7	ANT 7.1.1 7.1.2 7.1.3 7.1.4 7.1.5 7.1.6 2. 7.2.1 7.2.3 7.2.4 7.2.5 7.2.6	T AND MEASUREMENT EQUIPMENT ENNA PORT TEST RESULTS 5.2 GHz BAND CHANNEL TESTS FOR 802.11a MODE 26 dB and 99% BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS 5.2 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE 99% & 26 dB BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS 5.2 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE 99% & 26 dB BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY PEAK POWER SPECTRAL DENSITY PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS	12 13 13 13 16 20 21 24 27 30 33 40 41 44
6. 7. 7	ANT 7.1.1 7.1.2 7.1.3 7.1.4 7.1.5 7.1.6 2. 7.2.1 7.2.2 7.2.3 7.2.4 7.2.5	TAND MEASUREMENT EQUIPMENT ENNA PORT TEST RESULTS 5.2 GHz BAND CHANNEL TESTS FOR 802.11a MODE 26 dB and 99% BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS 5.2 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE 99% & 26 dB BANDWIDTH OUTPUT POWER AVERAGE POWER 5.2 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE 99% & 26 dB BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY PEAK POWER SPECTRAL DENSITY PEAK POWER SPECTRAL DENSITY PEAK POWER SPECTRAL DENSITY PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS 5.2 GHz BAND CHANNEL TESTS FOR 802.11n HT40 MODE	12 13 13 13 16 20 21 24 24 27 24 27 30 33 40 41 44 47 50
6. 7. 7	ANT 7.1.1 7.1.2 7.1.3 7.1.4 7.1.5 7.1.6 2. 7.2.1 7.2.2 7.2.3 7.2.4 7.2.5 7.2.6 .3. 7.3.1 7.3.2	TAND MEASUREMENT EQUIPMENT ENNA PORT TEST RESULTS 5.2 GHz BAND CHANNEL TESTS FOR 802.11a MODE 26 dB and 99% BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS 5.2 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE 99% & 26 dB BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY DEAK POWER Sold BANDWIDTH OUTPUT POWER AVERAGE POWER Sold BANDWIDTH OUTPUT POWER AVERAGE POWER Sold BANDWIDTH OUTPUT POWER PEAK POWER SPECTRAL DENSITY PEAK POWER SPECTRAL DENSITY PEAK POWER SPECTRAL DENSITY PEAK POWER SPECTRAL DENSITY PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS 5.2 GHz BAND CHANNEL TESTS FOR 802.11n HT40 MODE 99% & 26 dB BANDWIDTH OUTPUT POWER	12 13 13 13 16 20 21 24 27 30 33 40 41 44 47 50 52
6. 7. 7	ANT 7.1.1 7.1.2 7.1.3 7.1.4 7.1.5 7.1.6 .2. 7.2.1 7.2.2 7.2.3 7.2.4 7.2.5 7.2.6 .3. 7.3.1	TAND MEASUREMENT EQUIPMENT ENNA PORT TEST RESULTS 5.2 GHz BAND CHANNEL TESTS FOR 802.11a MODE 26 dB and 99% BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY PEAK POWER SPECTRAL DENSITY PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS 5.2 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE 99% & 26 dB BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY OUTPUT POWER AVERAGE POWER EAK POWER SPECTRAL DENSITY OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY PEAK BAND CHANNEL TESTS FOR 802.11n HT40 MODE 99% & 26 dB BANDWIDTH OUTPUT POWER 426 dB BANDWIDTH OUTPUT POWER AVERAGE POWER	12 13 13 13 16 20 21 24 27 30 33 40 41 41 44 47 50 52 57

Page 3 of 292

8.	RECEIVE	R CONDUCTED SPURIOUS EMISSIONS	182
7.	9. 5.67 7.9.1. 7.9.2. 7.9.3. 7.9.4. 7.9.5. 7.9.6. 7.9.7.	Hz BAND CHANNEL TESTS FOR 802.11HT40 MODE 99% & 26 dB BANDWIDTH. OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY. PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS. CONDUCTED SPURIOUS (-20 dBc).	158 161 168 169 172 175
	8. 5.6 7.8.1. 7.8.2. 7.8.3. 7.8.4. 7.8.5. 7.8.6. 7.8.7.	GHz BAND CHANNEL TESTS FOR 802.11HT20 MODE 99% & 26 dB BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS CONDUCTED SPURIOUS (-20 dBc)	136 139 146 147 150 153
7.	7. 5.60 7.7.1. 7.7.2. 7.7.3. 7.7.4. 7.7.5. 7.7.6. 7.7.7.	GHz BAND CHANNEL TESTS FOR 802.11a MODE 26 dB and 99% BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS CONDUCTED SPURIOUS (-20 dBc)	117 120 124 125 128 131
	7.6.1. 7.6.2. 7.6.3. 7.6.4. 7.6.5. 7.6.6.	GHz BAND CHANNEL TESTS FOR 802.11n HT40 MODE 99% & 26 dB BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS	103 105 110 111 113 115
7.	5. 5.3 7.5.1. 7.5.2. 7.5.3. 7.5.4. 7.5.5. 7.5.6.	GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE 99% & 26 dB BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS	82 85 92 93 96
7.	4. 5.3 7.4.1. 7.4.2. 7.4.3. 7.4.4. 7.4.5. 7.4.6.	GHz BAND CHANNEL TESTS FOR 802.11a MODE 26 dB and 99% BANDWIDTH OUTPUT POWER AVERAGE POWER PEAK POWER SPECTRAL DENSITY PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS	64 67 71 72 75
	7.3.5. 7.3.6.	PEAK EXCURSION CONDUCTED SPURIOUS EMISSIONS	

Page 4 of 292

9.	RADIAT	ED TEST RESULTS	186
9	9.1. LIM	ITS AND PROCEDURE	186
S	9.2. TR/ 9.2.1. 9.2.2. 9.2.3. 9.2.4. 9.2.5. 9.2.6. 9.2.7. 9.2.8. 9.2.9. 9.2.10. 9.2.11. 9.2.12.	ANSMITTER ABOVE 1 GHz 802.11a MODE IN 5.2 GHz BAND TX ABOVE 1 GHz FOR 802.11a DUAL CHAIN MODE IN 5.2 GHz BAND 802.11n HT20 MODE IN 5.2 GHz BAND 802.11n HT40 MODE IN 5.2 GHz BAND 802.11a MODE IN 5.3 GHz BAND TX ABOVE 1 GHz FOR 802.11a DUAL CHAIN MODE IN 5.3 GHz BAND 802.11n HT20 MODE IN 5.3GHz BAND 802.11n HT40 MODE IN 5.3GHz BAND 802.11n HT40 MODE IN 5.3GHz BAND 802.11a MODE IN 5.6 GHz BAND TX ABOVE 1 GHz FOR 802.11a DUAL CHAIN MODE IN 5.6 GHz BAND 802.11n HT40 MODE IN 5.6 GHz BAND X ABOVE 1 GHz FOR 802.11a DUAL CHAIN MODE IN 5.6 GHz BAND 802.11n HT40 MODE 5.6 GHz BAND 802.11n HT40 MODE 5.6 GHz BAND	187 191 196 202 208 212 217 224 232 238 245
9		RST-CASE BELOW 1 GHz	
10.	AC PO	OWER LINE CONDUCTED EMISSIONS	261
11.	DYNA	MIC FREQUENCY SELECTION	265
	11.1. OV	ERVIEW	
	11.1.1.	LIMITS	
	11.1.2.	TEST AND MEASUREMENT SYSTEM	269
	11.1.3.	SETUP OF EUT	272
	11.1.4.	DESCRIPTION OF EUT	273
-		MHz BANDWIDTH RESULTS	
	11.2.1.	TEST CHANNEL	
	11.2.2.	PLOTS OF RADAR WAVEFORM AND WLAN TRAFFIC	
	11.2.3.	MOVE AND CLOSING TIME	276
•	11.3. 40	MHz BANDWIDTH RESULTS	281
	11.3.1.	TEST CHANNEL	281
	11.3.2.	PLOTS OF RADAR WAVEFORM AND WLAN TRAFFIC	-
	11.3.3.	MOVE AND CLOSING TIME	
	11.3.4.	SLAVE NON-OCCUPANCY	288

Page 5 of 292

1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	QUALCOMM, INC. 3165 KIFER RD SANTA CLARA, CA 95051 U.S.A.
EUT DESCRIPTION:	EA544D_1 ETHERNET ADAPTER CARD FOR 2.4 / 5 GHz CLIENT APPLICATIONS

MODEL: 65-VN663-P1

SERIAL NUMBER: 7813, 8286, 9021, 8263, and 9086 FOR ANTENNA PORT, 7908 and 9021 FOR RADIATED EMISSIONS, and 7901 FOR DFS

DATE TESTED: JUNE 24, 2009 – APRIL 28, 2010

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 292

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 for 2.4 / 5 GHz client applications. It is equipped with four identical transmitter / receiver chains and an Ethernet port.

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	12.10	16.22
5180 - 5240	802.11n HT20	13.67	23.28
5190 - 5230	802.11n HT40	16.88	48.75
5.3 GHz BAND			
5260 - 5320	802.11a	18.62	72.78
5260 - 5320	802.11n HT20	20.50	112.20
5270 - 5310	802.11n HT40	23.62	230.14
5.6 GHz BAND			
5500 - 5700	802.11a	18.68	73.79
5500 - 5700	802.11n HT20	20.76	119.12
5510 - 5670	802.11n HT40	23.40	218.78

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 292

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Keyspan, rev. 3.7.0.2.

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

5.5. WORST-CASE CONFIGURATION AND MODE

The EUT was tested as an external module connected to a host Laptop PC via a test fixture.

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 26 dB BW measurement preliminary testing showed that there is no significant difference among different chains, so the measurement was performed using Chain 0.

For conducted spurious measurement preliminary testing showed that combiner is worst-case compared to individual chains; therefore, final measurement was 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 measurement was 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.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST							
Description	Manufacturer	Model	Serial Number	FCC ID			
Laptop	IBM	T43 ThinkPad	L3-F9978 05/06	DoC			
AC Adapter	IBM	08K8208	11S08K8208Z1Z6	DoC			
AC Adapter	Phihong	PSA15R-050P	N/A	N/A			
Serial (DB9)/USB	Keyspan	N/A	N/A	N/A			
Test Fixture	N/A	N/A	N/A	N/A			

I/O CABLES

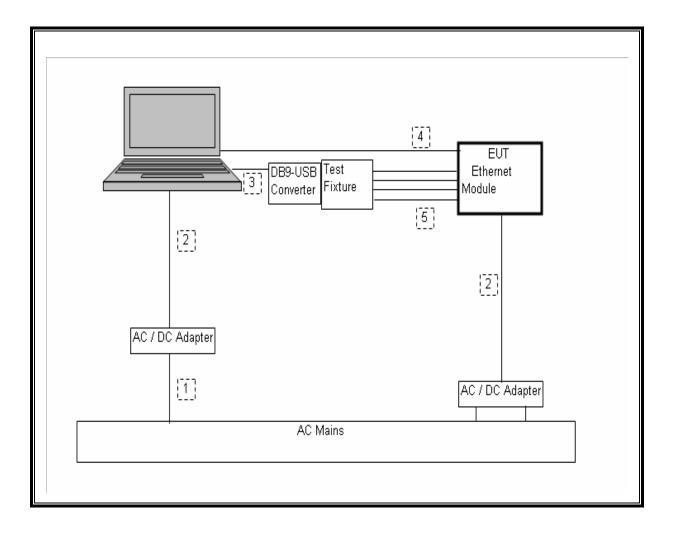
	I/O CABLE LIST							
Cable No.	Port	# of Identical Ports	Connecto Type	Cable Type	Cable Length	Remarks		
1	AC	2	US 115V	Shielded	1m	For laptop & EUT		
2	DC	2	DC	Un-shielded	2m	For laptop & EUT		
3	USB	1	USB	Shielded	.8m	From laptop to USB Converter		
4	Ethernet	1	RJ45	Un-shielded	1 m	From laptop to EUT		
5	Cable	1	Riibon	Un-shielded	.4 m	Test Fixture to EUT		

TEST SETUP

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

Page 10 of 292

SETUP DIAGRAM FOR TESTS



Page 11 of 292

6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST								
Description Manufacturer Model 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			

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

TEST EQUIPMENT LIST									
Description	Manufacturer	Model	Asset	Cal Date	Cal Due				
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	01/05/10	03/05/11				
Antenna, Horn, 18 GHz	EMCO	3115	C00945	04/22/09	04/22/10				
Preamplifier, 1-26GHz	Agilent / HP	8449B	C01052	02/04/09	02/04/10				
Peak Power Meter	Boonton	4541	C01186	01/19/09	01/19/10				
Peak Power Sensor	Boonton	4541	C01189	01/15/09	01/15/10				

Page 12 of 292

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

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

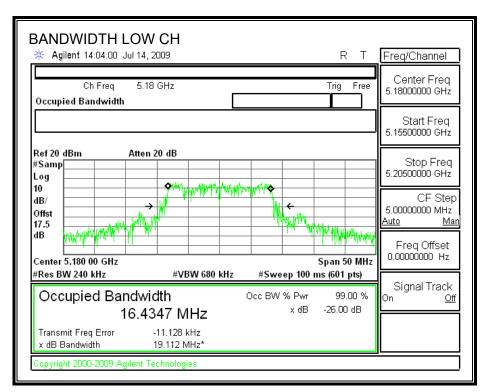
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

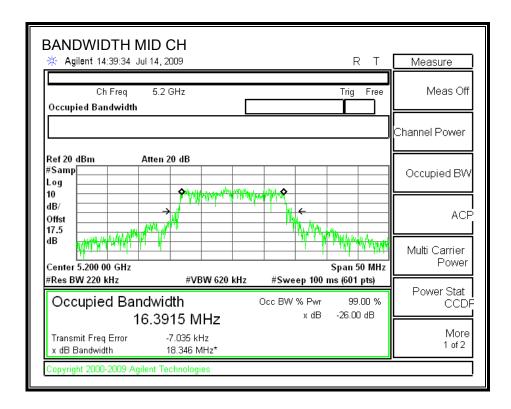
RESULTS

Channel	Frequency	26 dB Bandwidth	99% Bandwidth
	(MHz)	(MHz)	(MHz)
Low	5180	19.1120	16.4340
Middle	5200	18.3460	16.3915
High	5240	18.6980	16.4054

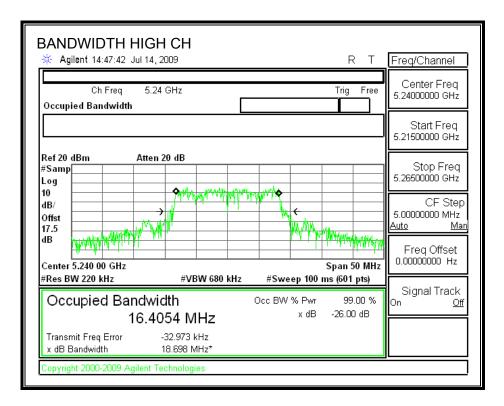
Page 13 of 292

26 dB and 99% BANDWIDTH





Page 14 of 292



Page 15 of 292

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	10 Log (# Tx Chains)	Effective Legacy Gain
(dBi)	(dB)	(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.

RESULTS

Channel	Frequency	Fixed	В	4 + 10 Log B	Effective	Limit
		Limit		Limit	Antenna Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5180	17	19.1120	16.81	6.01	16.80
Mid	5200	17	18.3460	16.64	6.01	16.63
High	5240	17	18.6980	16.72	6.01	16.71

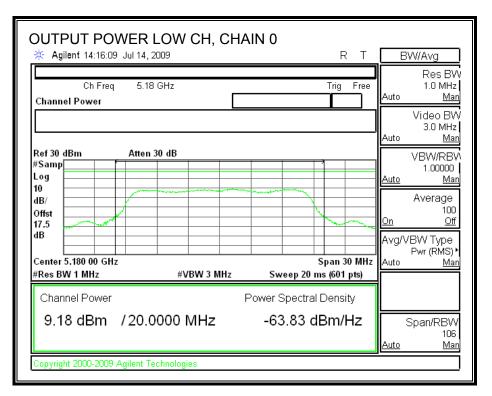
Limit

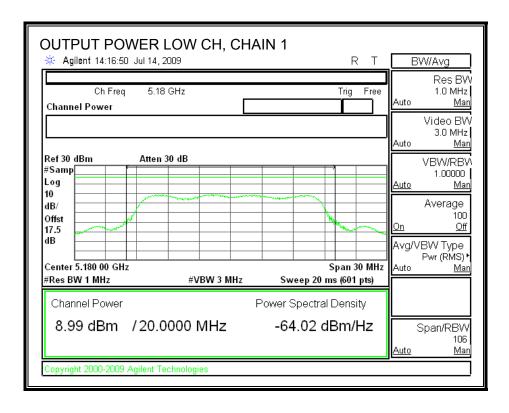
Individual Chain Results

Channel	Frequency	Chain 0	Chain 1	Total	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5180	9.18	8.99	12.10	16.80	-4.71
Mid	5200	9.11	8.99	12.06	16.63	-4.56
High	5240	9.15	8.96	12.07	16.71	-4.64

Page 16 of 292

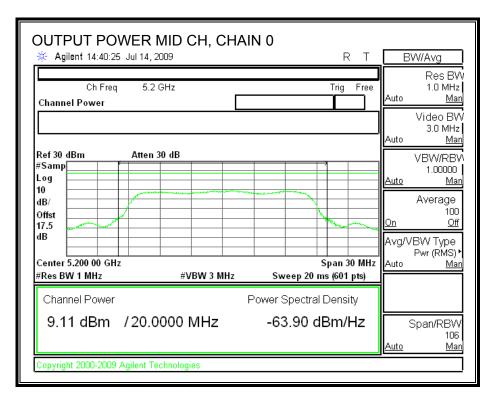
OUTPUT POWER, LOW CHANNEL

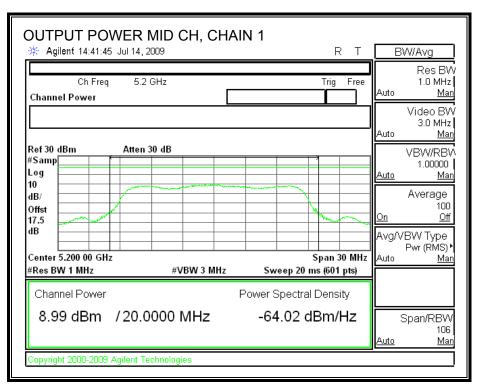




Page 17 of 292

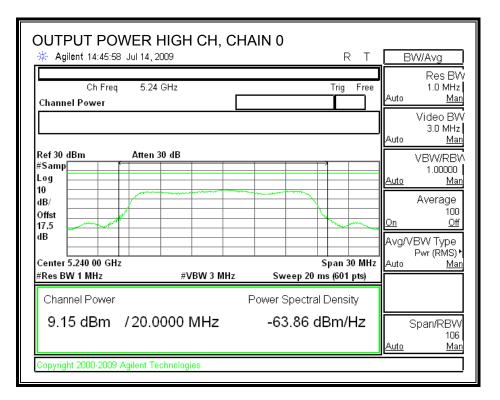
OUTPUT POWER, MID CHANNEL

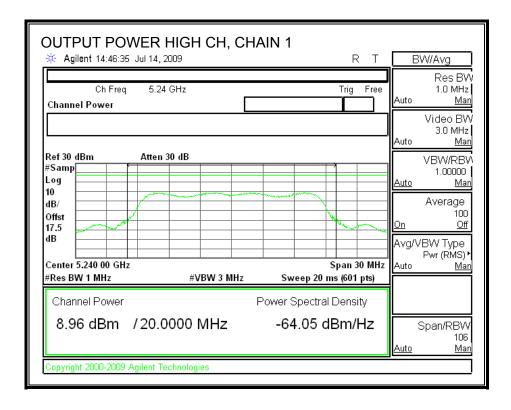




Page 18 of 292

OUTPUT POWER, HIGH CHANNEL





Page 19 of 292

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 0	Chain 1	Total
		Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)
Low	5180	9.15	8.89	12.03
Middle	5200	9.10	8.98	12.05
High	5240	9.09	8.93	12.02

Page 20 of 292

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

		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 less than or equal to 6.01 dBi, therefore the limit is 3.99 dBm.

TEST PROCEDURE

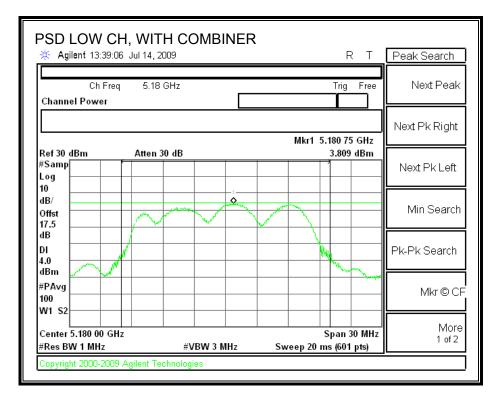
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

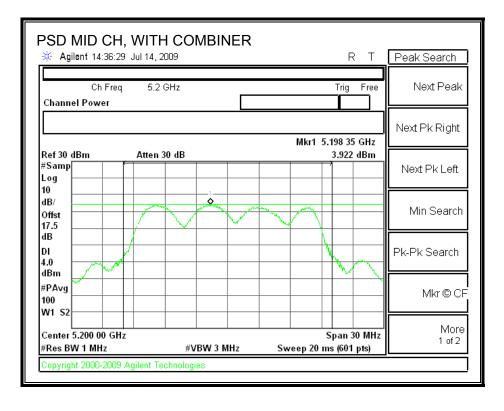
<u>RESULTS</u>

Channel	Frequency	PPSD With Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5180	3.81	3.99	-0.18
Middle	5200	3.92	3.99	-0.07
High	5240	3.86	3.99	-0.13

Page 21 of 292

POWER SPECTRAL DENSITY WITH COMBINER





Page 22 of 292

PSD HIGH CH, W	2009					R	Т	В	W/Avg
Ch Freq 5.2 Channel Power	4 GHz					Trig	Free	Auto	Res BM 1.0 MHz <u>Man</u>
				Mkr1				Auto	Video BW 3.0 MHz <u>Man</u>
#Samp Log	1 30 dB				3	.858	dBm	<u>Auto</u>	VBVV/RBV 1.00000 <u>Mar</u>
10 dB/ Offst 17.5		-1 		\frown				<u>On</u>	Average 100 <u>Off</u>
dB DI 4.0 dBm			 		X	5	~	Avg/∖ Auto	/BW Type Pwr (RMS)► <u>Man</u>
#PAvg 100 W1 S2									
Center 5.240 00 GHz #Res BW 1 MHz	#VB	W 3 MH	 Sw	eep 20			0 MHz pts)	<u>Auto</u>	Span/RBW 106 <u>Mar</u>

Page 23 of 292

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.

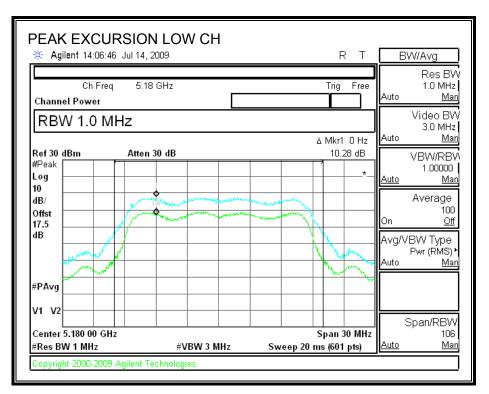
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

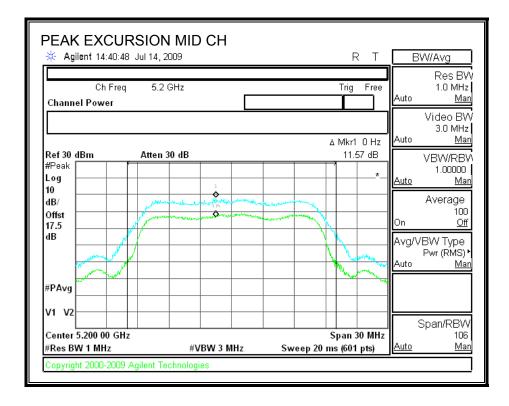
RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5180	10.28	13	-2.72
Middle	5200	11.57	13	-1.43
High	5240	10.22	13	-2.78

Page 24 of 292

PEAK EXCURSION





Page 25 of 292

🔆 Agilent 14:48:51 Jul 14	, 2009			RT		3W/Avg
Ch Freq 5.: Channel Power	24 GHz			Trig Fre	e Auto	Res BV 1.0 MHz <u>Mar</u>
RBW 1.0 MHz				 ∆ Mkr1 O H	z Auto	Video BW 3.0 MHz <u>Man</u>
#Peak	n 30 dB	1		10.22 dE	3 * <u>Auto</u>	VBW/RBV 1.00000 <u>Man</u>
10 dB/ Offst 17.5 dB/ dB/ dB/ dB/ dB/ dB/ dB/ dB/	mar and a second	Martin and	and the second		On	Average 100 <u>Off</u>
dB					Avg/'	VBW Type Pwr (RMS)≛ <u>Man</u>
#PAvg					~	
V1 V2						Span/RBW
Center 5.240 00 GHz #Res BW 1 MHz	#VBW 3	MHz	Sweep 20 i	Span 30 Mi ns (601 pts)	Iz Auto	106 <u>Mar</u>

Page 26 of 292

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

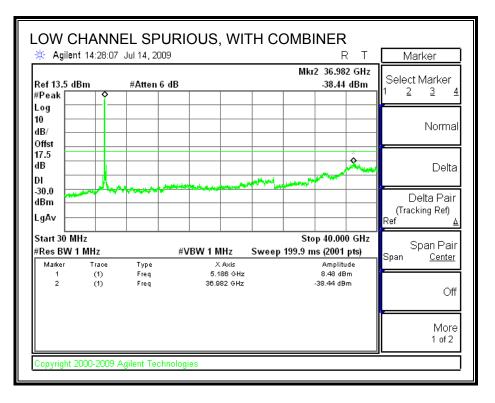
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

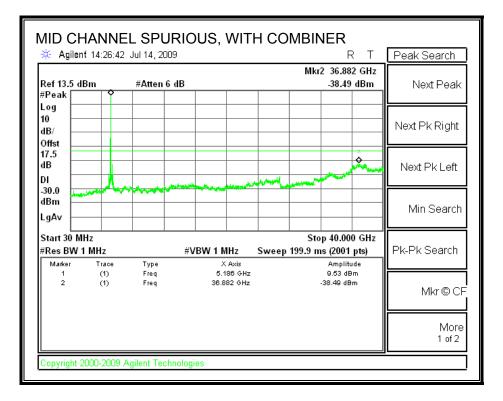
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

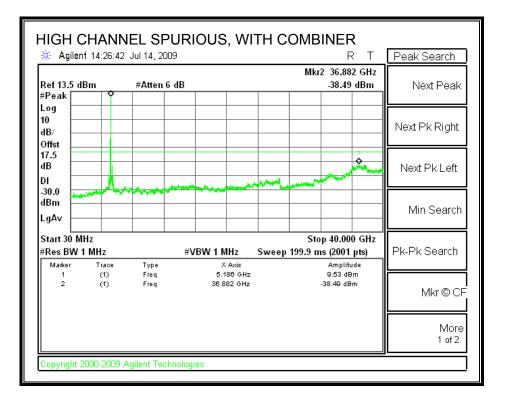
Page 27 of 292

SPURIOUS EMISSIONS WITH COMBINER





Page 28 of 292



Page 29 of 292

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

7.2.1. 99% & 26 dB BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

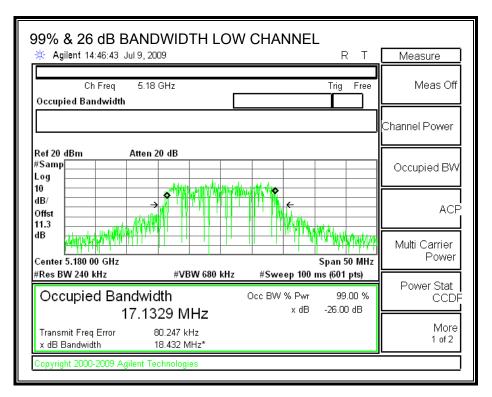
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

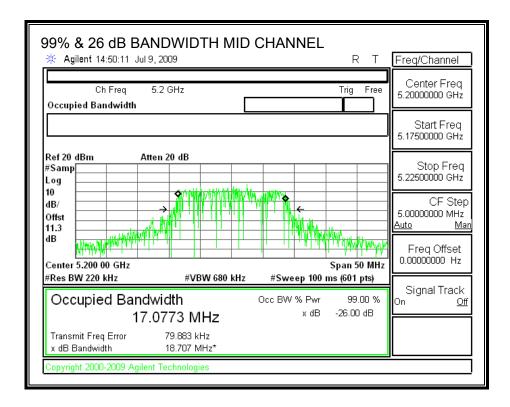
RESULTS

Channel	Frequency	99% OBW	26 dB BW
	(MHz)	(MHz)	(MHz)
Low	5180	17.1329	18.432
Middle	5200	17.0773	18.707
High	5240	17.3831	19.172

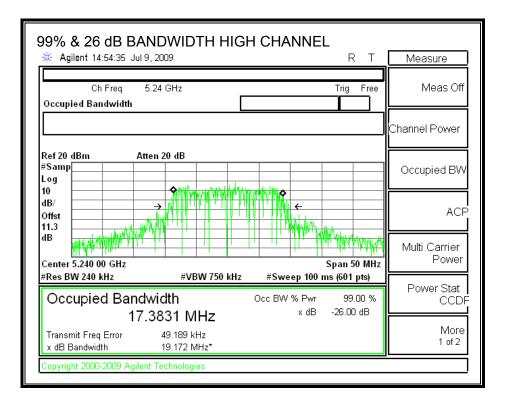
Page 30 of 292

99% & 26 dB BANDWIDTH





Page 31 of 292



Page 32 of 292

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

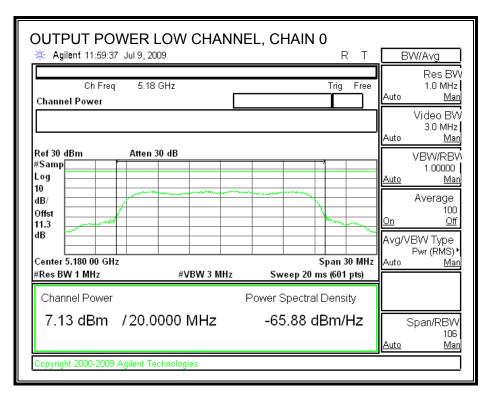
Limit

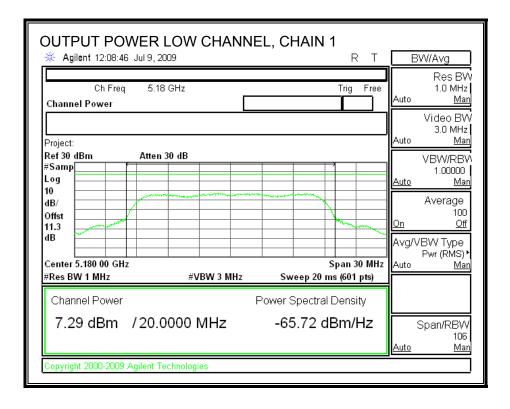
Channel	Freq	Fixed	В	4 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5180	17	18.432	16.66	3	16.66
Mid	5200	17	18.707	16.72	3	16.72
High	5240	17	19.172	16.83	3	16.83

Individual Chain Results

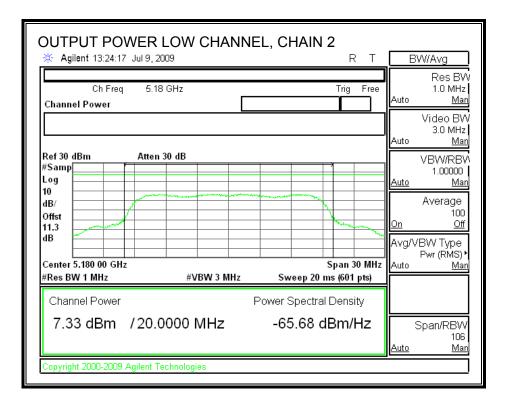
Channel	Freq	Chain 0	Chain 1	Chain 2	Chain 3	Total	Limit	Margin
		Power	Power	Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5180	7.13	7.29	7.33	7.33	13.29	16.66	-3.36
Mid	5200	7.19	7.58	7.47	7.65	13.50	16.72	-3.22
High	5240	7.22	7.86	7.85	7.65	13.67	16.83	-3.15

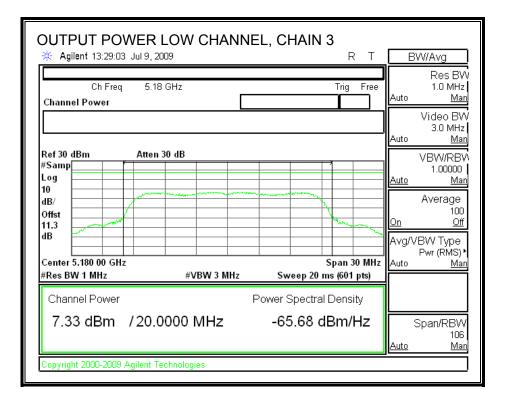
OUTPUT POWER, LOW CHANNEL





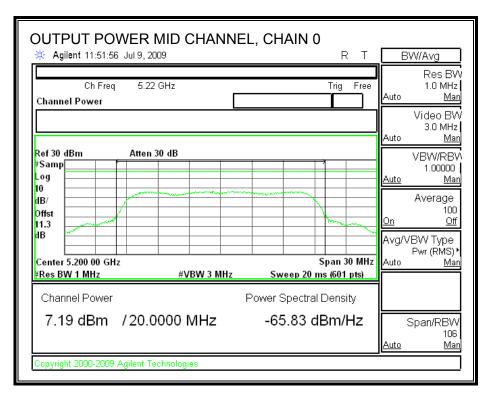
Page 34 of 292

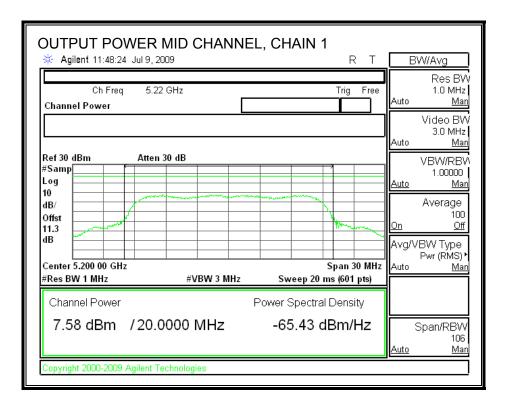




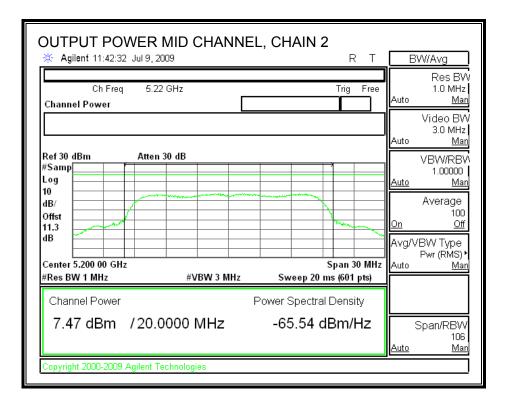
Page 35 of 292

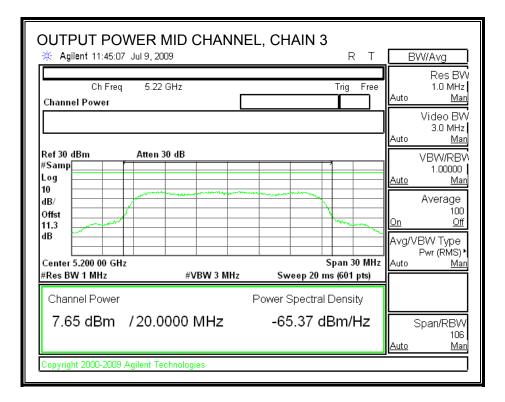
OUTPUT POWER, MID CHANNEL





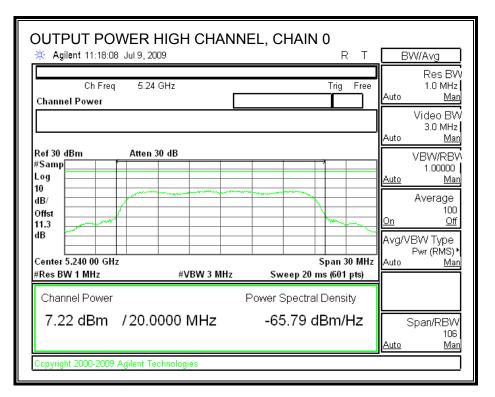
Page 36 of 292

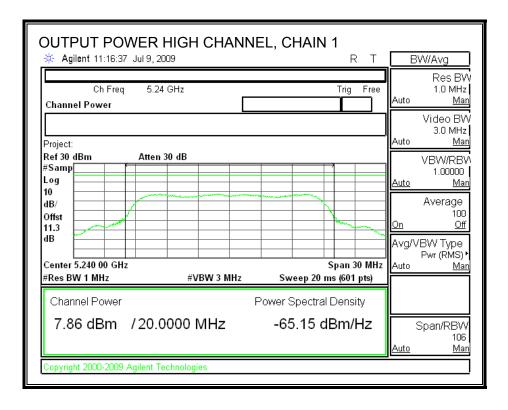




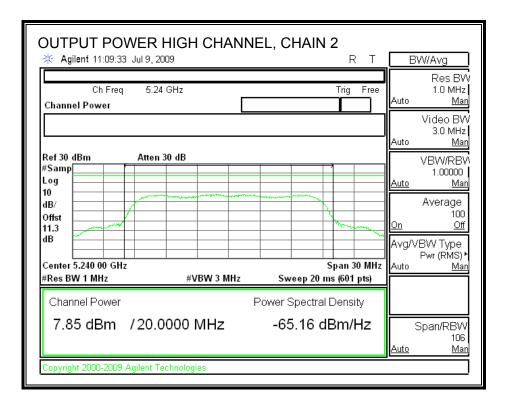
Page 37 of 292

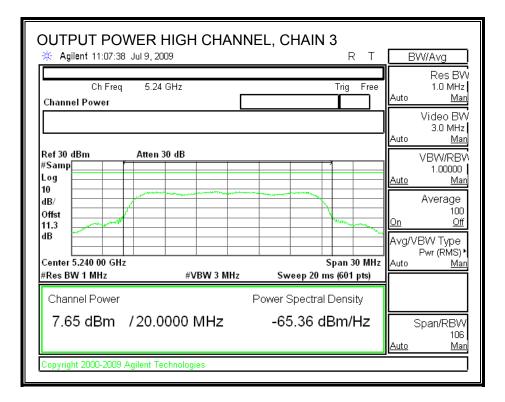
OUTPUT POWER, HIGH CHANNEL





Page 38 of 292





Page 39 of 292

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

Channel	Frequency	Chain 0	Chain 1	Chain 2	Chain 3
		Power	Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
Low	5180	7.41	7.51	7.69	7.89
Middle	5200	7.11	8.23	8.01	8.05
High	5240	7.82	7.85	8.04	8.11

Page 40 of 292

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.

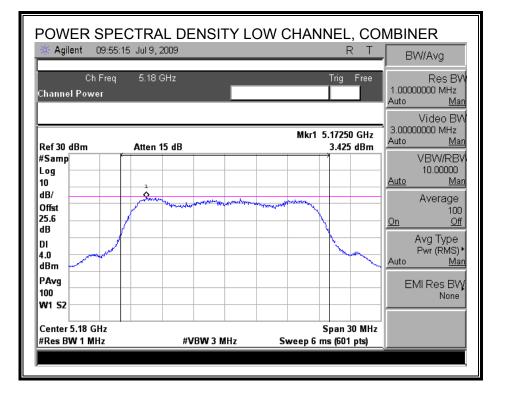
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

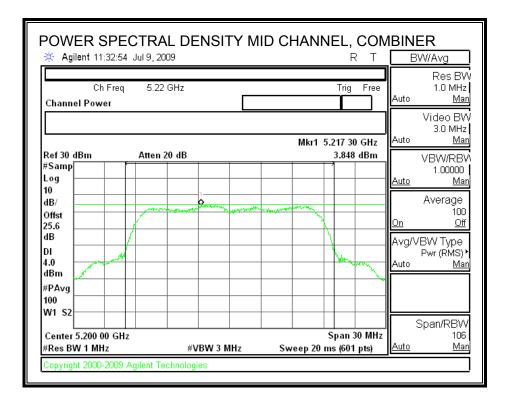
Channel	Frequency	PSD with Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5180	3.43	4	-0.58
Middle	5200	3.85	4	-0.15
High	5240	3.65	4	-0.35

RESULTS

Page 41 of 292

POWER SPECTRAL DENSITY





Page 42 of 292

POWER SPECTRA		IGH CHANNEL,	, CO T	MBINER BW/Avg
Ch Freq 5.24 Channel Power	l GHz	Trig	Free	Res BV 1.0 MHz Auto <u>Mar</u>
		Mkr1 5.242 40		Video BV 3.0 MHz Auto <u>Mar</u>
Ref 30 dBm Atten #Samp Log 10	20 dB	3.652 (VBW/RBV 1.00000 <u>Auto Mar</u>
dB/ Offst 25.6	an Manager and Manager	www.manufull.wy.		Average 100 <u>On Off</u>
dB DI 4.0 dBm		- ha	Anna A	Avg/VBW Type Pwr (RMS) Auto <u>Mar</u>
#PAvg 100 W1 S2				
Center 5.240 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 30 Sweep 20 ms (601 j		Span/RBW 106 <u>Auto Mar</u>
Copyright 2000-2009 Agilent To	echnologies			

Page 43 of 292

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.

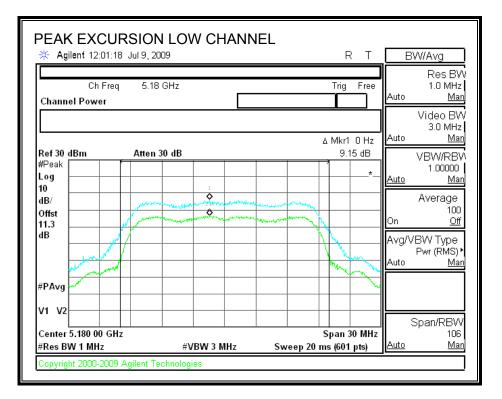
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

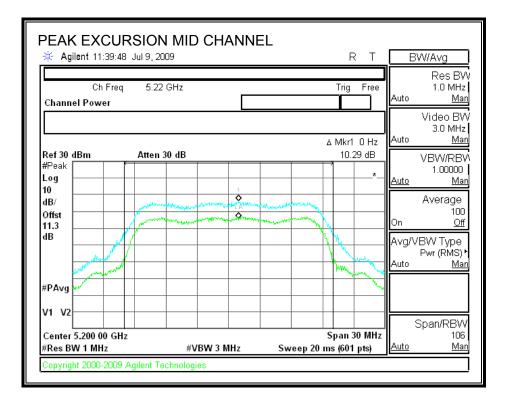
RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5180	9.15	13	-3.85
Middle	5200	10.29	13	-2.71
High	5240	11.12	13	-1.88

Page 44 of 292

PEAK EXCURSION





Page 45 of 292

Ch Freq 5.24 GHz Trig Free Channel Power Channel Power Auto Auto Auto Auto Auto Auto Auto Aut			Ŧ	-			IEL	IAN	H Cł	HIG					
Channel Power Auto Auto Auto Auto Auto Auto Auto Auto	3W/Avg		T	R						19	ui 9, 20	:19 J	1:20	lent 1	🔆 Ag
Ref 30 dBm Atten 30 dB 11.12 dB #Peak 11.12 dB 11.12 dB 10 dB/ 1 1 1 0ffst 1 1 1 1 11.3 dB 1 1 1 1 1 #PAvg 1 1 1 1 1 1	Res BV 1.0 MHz <u>Mar</u>	Auto	Free	Trig						GHz	5.24	eq			Chann
#Peak	Video BV 3.0 MHz <u>Mar</u>	Auto	0 Hz	 Mkr1	۵										
Log 10 10 10 10 10 10 10 10 10 10	VBW/RBV		2 dB	11.1						0 dB	Atten 3			dBm	
dB/ Offst 11.3 dB 0 0 0 0 #PAvg 0	1.00000 <u>Mar</u>	<u>Auto</u>	*						1						og
11.3 dB #PAvg	Average 100					- and the second	the work of the state	have the state of the		Martine proprietor	and the second s				IB/
#PAvg	<u>Off</u> VBW Type			<u>م</u>	~	a second s				and the second second	particular and a second	R			
#PAvg	Pwr (RMS) <u>Ma</u>		may	No.									a de la	Marken and State	
															PA∨g
V1 V2	Span/RBV				$\left \right $							+			/1 V2
Center 5.240 00 GHz Span 30 MHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (601 pts)	106 106			•		eep 20	Sw	IHz	BW 3 N	#V		θHz			

Page 46 of 292

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

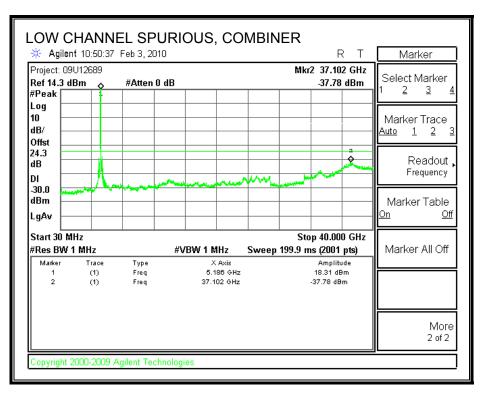
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

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.

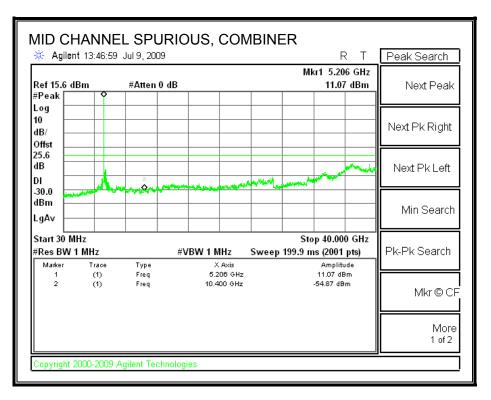
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

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.

LOW CHANNEL SPURIOUS EMISSIONS

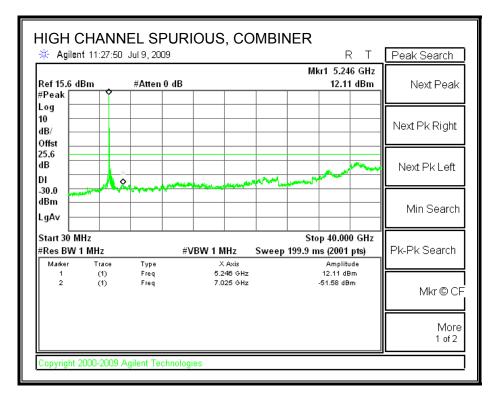


MID CHANNEL SPURIOUS EMISSIONS



Page 48 of 292

HIGH CHANNEL SPURIOUS EMISSIONS



Page 49 of 292

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

7.3.1. 99% & 26 dB BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

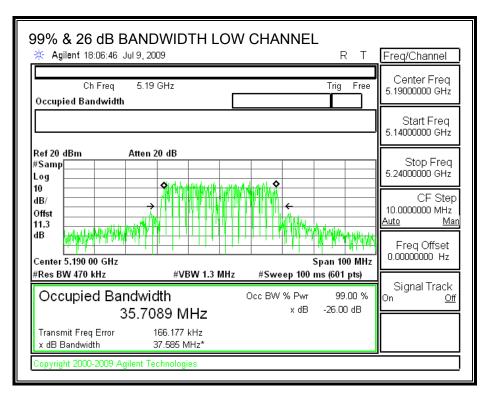
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

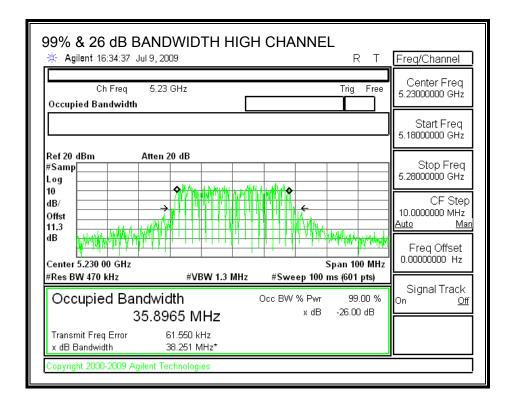
RESULTS

Channel	Frequency	99% OBW	26 dB BW
	(MHz)	(MHz)	(MHz)
Low	5190	35.7089	37.585
High	5230	35.8965	38.251

Page 50 of 292

99% & 26 dB BANDWIDTH





Page 51 of 292

7.3.2. 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.

<u>RESULTS</u>

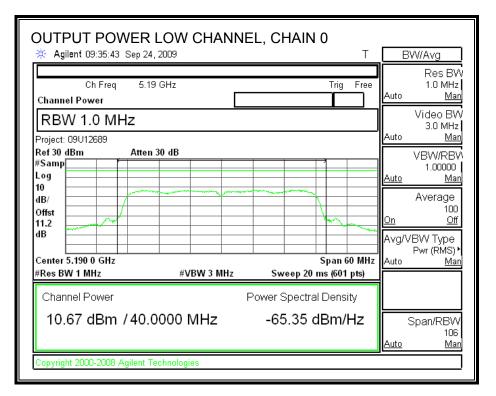
Limit

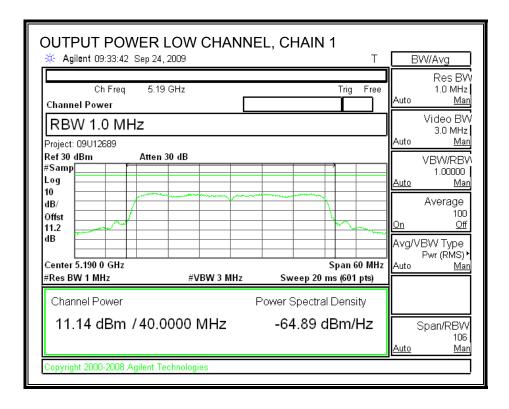
Channel	Freq	Fixed	В	4 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5190	17	37.585	19.75	3	17.00
High	5230	17	38.251	19.83	3	17.00

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	10.67	11.14	10.86	10.75	16.88	17.00	-0.12
High	5230	10.47	10.82	10.71	10.84	16.73	17.00	-0.27

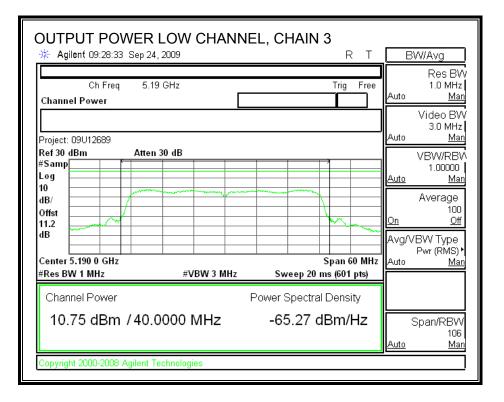
OUTPUT POWER, LOW CHANNEL





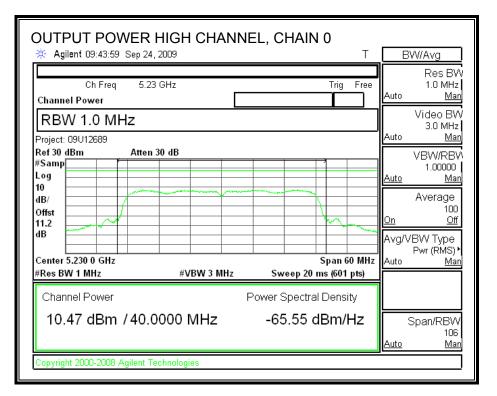
Page 53 of 292

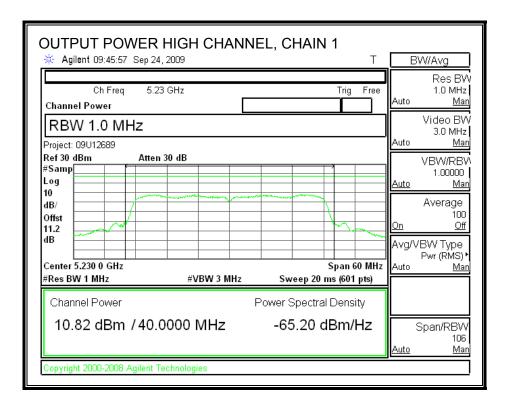
OUTPUT POWER		EL, CHAIN 2	BW/Avg
Ch Freq 5.19 Channel Power RBW 1.0 MHz	GHz	Trig Free	Res BW 1.0 MHz Auto <u>Man</u> Video BW 3.0 MHz
Project: 09U12689 Ref 30 dBm Atten # Samp Log 10 dB/ Offst 11.2 dB	30 dB		Auto <u>Man</u> VBW/RBW 1.00000 <u>Auto Man</u> Average 100 <u>On Off</u> Avg/VBW Type
Center 5.190 0 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 60 MHz Sweep 20 ms (601 pts)	Pwr (RMS) • Auto <u>Man</u>
Channel Power 10.86 dBm /40.0		Power Spectral Density -65.16 dBm/Hz	Span/RBW 106 <u>Auto Man</u>
Copyright 2000-2008 Agilent Te	chnologies		



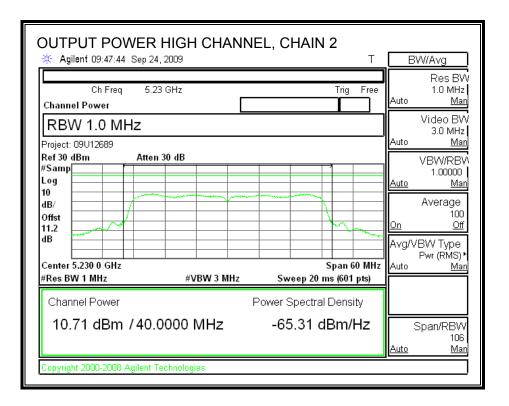
Page 54 of 292

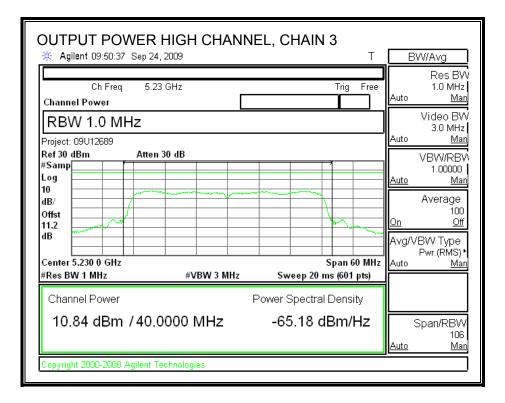
OUTPUT POWER, HIGH CHANNEL





Page 55 of 292





Page 56 of 292

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

Channel	Frequency	Chain 0	Chain 1	Chain 2	Chain 3
		Power	Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
Low	5190	10.48	11.32	11.08	11.40
High	5230	10.98	11.25	11.31	11.40

Page 57 of 292

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.

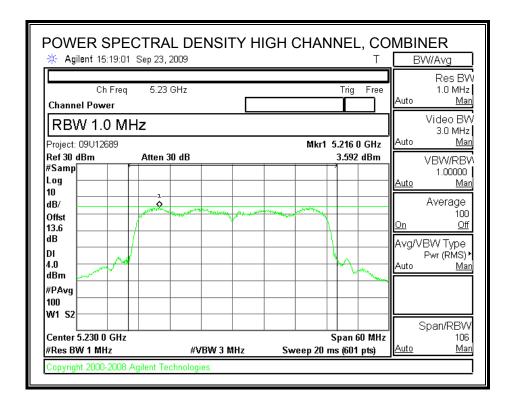
RESULTS

Channel	Frequency	PSD with Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5190	3.56	4	-0.44
High	5230	3.59	4	-0.41

Page 58 of 292

POWER SPECTRAL DENSITY

POWER SPECTRA		W CHANNEL, CO	MBINER BW/Ava
Ch Freq 5.19 (Channel Power		Trig Free	Res BV 1.0 MHz Auto <u>Man</u>
RBW 1.0 MHz Project: 09U12689		Mkr1 5.175 2 GHz	Video BW 3.0 MHz Auto <u>Man</u>
Ref 30 dBm Atten 3 #Samp Log	D dB	3.558 dBm	VBW/RBV 1.00000 <u>Auto Man</u>
10 1 dB/ 0 ffst 13.6	No marked the second second		Average 100 <u>On Off</u>
dB DI 4.0 dBm			Avg/VBW Type Pwr (RMS) ► Auto <u>Man</u>
#PAvg 100 W1 S2			-
Center 5.190 0 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 60 MHz Sweep 20 ms (601 pts)	Span/RBW 106 <u>Auto Man</u>
Copyright 2000-2008 Agilent Tec	hnologies		



Page 59 of 292

7.3.5. 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.

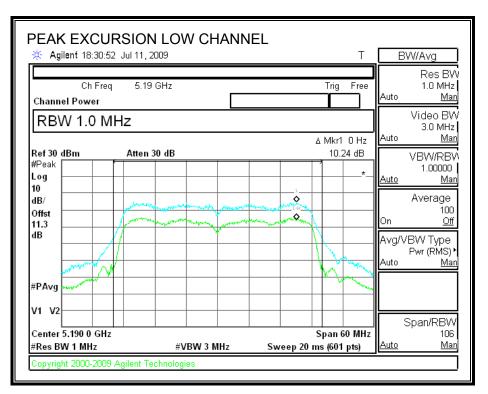
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

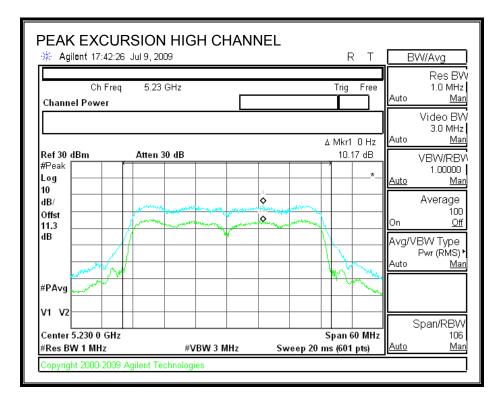
RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5190	10.24	13	-2.76
High	5230	10.17	13	-2.83

Page 60 of 292

PEAK EXCURSION





Page 61 of 292

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.

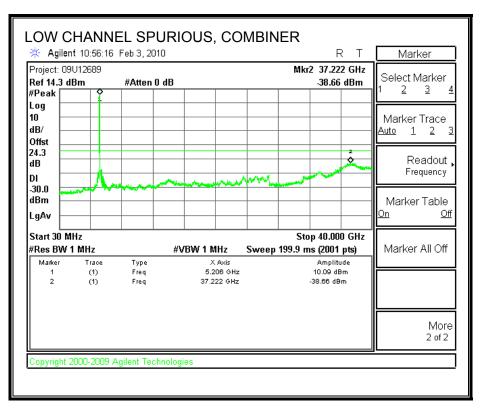
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

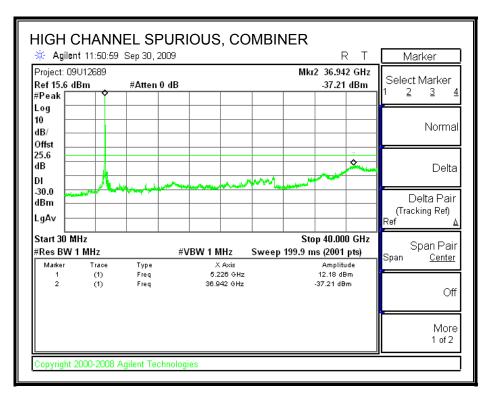
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

Page 62 of 292

LOW CHANNEL SPURIOUS EMISSIONS



HIGH CHANNEL SPURIOUS EMISSIONS



Page 63 of 292

7.4. 5.3 GHz BAND CHANNEL TESTS FOR 802.11a MODE

7.4.1. 26 dB and 99% BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

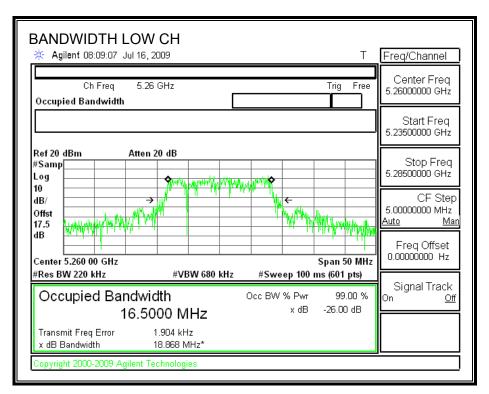
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

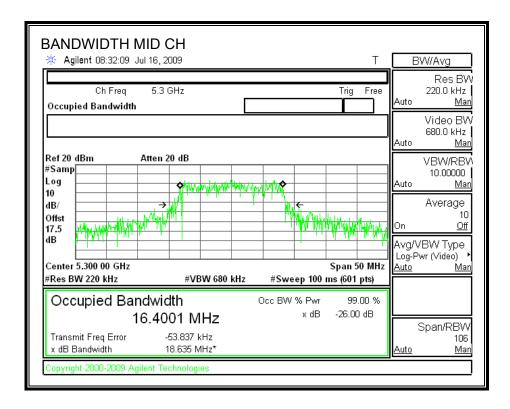
RESULTS

Channel	Frequency	26 dB Bandwidth	99% Bandwidth
	(MHz)	(MHz)	(MHz)
Low	5260	18.8680	16.5000
Middle	5300	18.6350	16.4001
High	5320	18.5070	16.4536

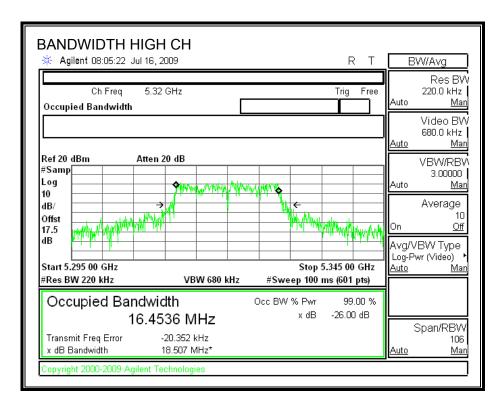
Page 64 of 292

26 dB and 99% BANDWIDTH





Page 65 of 292



Page 66 of 292

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.

RESULTS

Limit

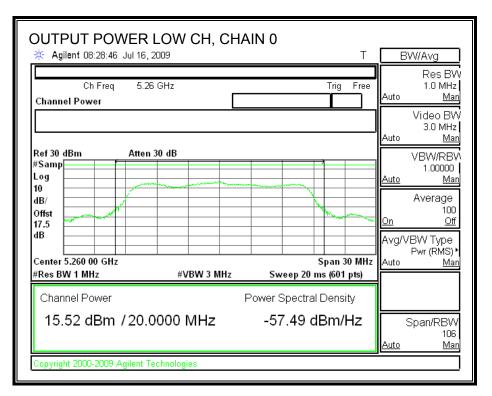
Channel	Frequency	Fixed	В	11 + 10 Log B	Effective	Limit
		Limit		Limit	Ant Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5260	24	18.8680	23.76	6.01	23.75
Mid	5300	24	18.6350	23.70	6.01	23.69
High	5320	24	18.5070	23.67	6.01	23.66

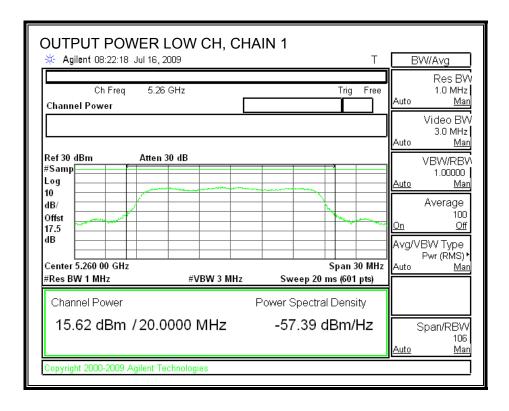
Individual Chain Results

Channel	Frequency	Chain 0	Chain 1	Total	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5260	15.52	15.62	18.58	23.75	-5.17
Mid	5300	15.53	15.58	18.57	23.69	-5.13
High	5320	15.55	15.66	18.62	23.66	-5.05

Page 67 of 292

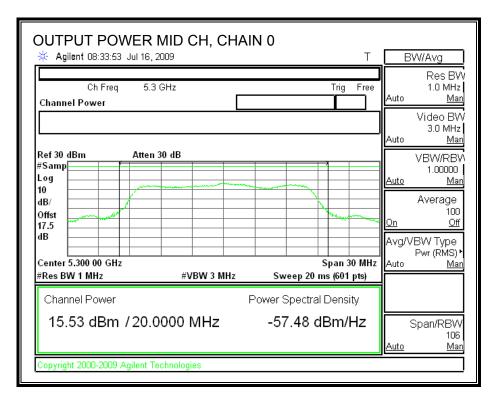
OUTPUT POWER, LOW CHANNEL

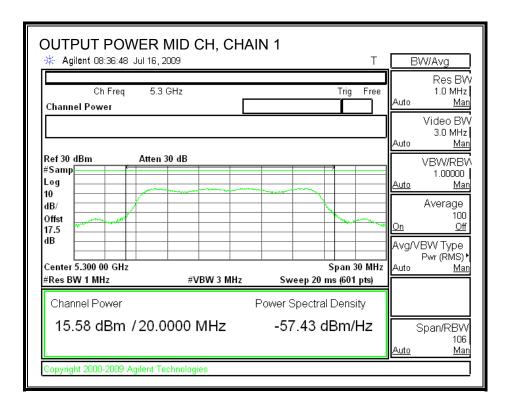




Page 68 of 292

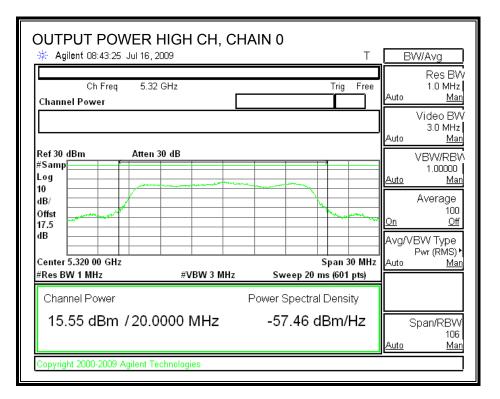
OUTPUT POWER, MID CHANNEL

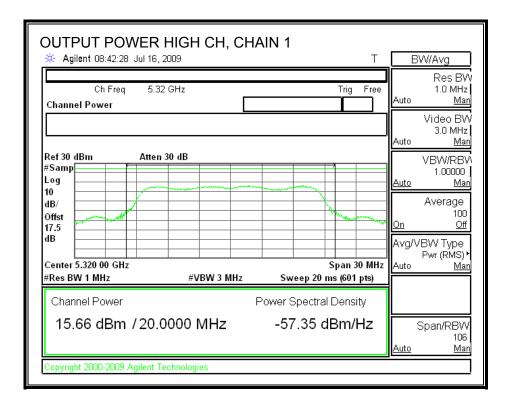




Page 69 of 292

OUTPUT POWER, HIGH CHANNEL





Page 70 of 292

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	15.33	15.55	18.45
Middle	5300	15.57	15.55	18.57
High	5320	15.61	15.52	18.58

Page 71 of 292

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

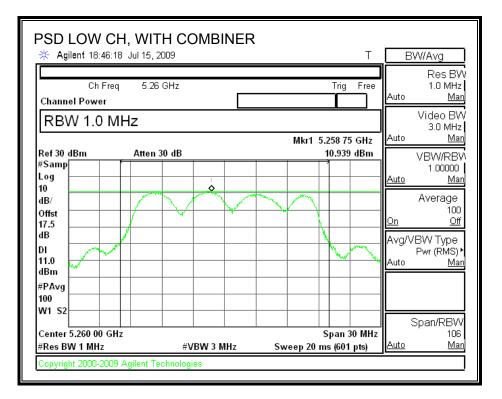
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

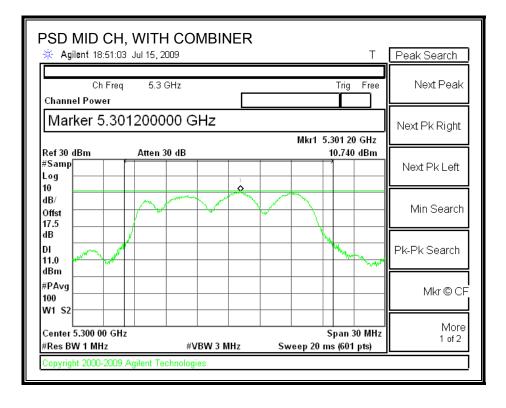
RESULTS

Channel	Frequency	PPSD With Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5260	10.94	10.99	-0.05
Middle	5300	10.74	10.99	-0.25
High	5320	10.85	10.99	-0.14

Page 72 of 292

POWER SPECTRAL DENSITY WITH COMBINER





Page 73 of 292

PSD HIGH CH, WIT		T	В	W/Avg
Ch Freq 5.32 G Channel Power	Hz	Trig Free	e Auto	Res BV 1.0 MHz <u>Man</u>
RBW 1.0 MHz		Mkr1 5.326 25 GHz	Auto	Video BW 3.0 MHz <u>Man</u>
Ref 30 dBm Atten 30 #Samp Log 10	dB	10.851 dBm	Auto	VBW/RBV 1.00000 <u>Man</u>
10 dB/ Offst 17.5			<u>On</u>	Average 100 <u>Off</u>
dB DI 11.0 dBm			Avg/\ 4uto	/BW Type Pwr (RMS) ► <u>Man</u>
#PAvg 100 W1 S2				
Center 5.320 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 30 MH Sweep 20 ms (601 pts)		Span/RBW 106 <u>Man</u>

Page 74 of 292

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.

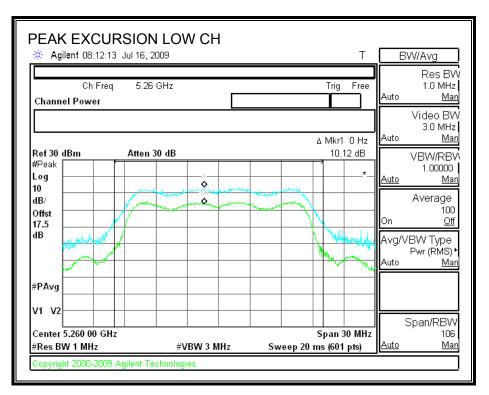
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

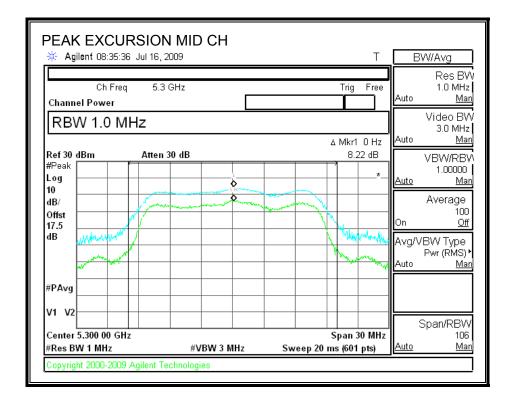
RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5260	10.12	13	-2.88
Middle	5300	8.22	13	-4.78
High	5320	9.77	13	-3.23

Page 75 of 292

PEAK EXCURSION





Page 76 of 292

🔆 Agilent 08:06:24 Jul 16,	2009	Т	BW/Avg
Ch Freq 5.3: Channel Power	2 GHz	Trig Free	Res BV e 1.0 MHz Auto <u>Ma</u>
RBW 1.0 MHz		۵ Mkr1 O Hz	Video BV 3.0 MHz Auto <u>Ma</u>
Ref 30 dBm Atten #Peak Log 10	30 dB	9.77 dB	VBW/RB\ 1.00000 <u>Auto Ma</u>
dB/ Offst 17.5			Average 100 On <u>Off</u>
dB			Avg/VBW Type Pwr (RMS) Auto <u>Ma</u>
#PAvg			_
V1 V2			Span/RBV
Center 5.320 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 30 MH Sweep 20 ms (601 pts)	

Page 77 of 292

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

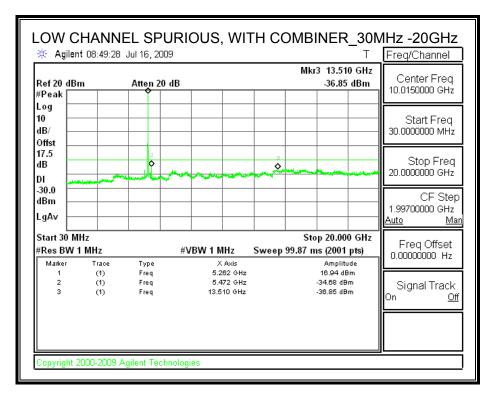
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

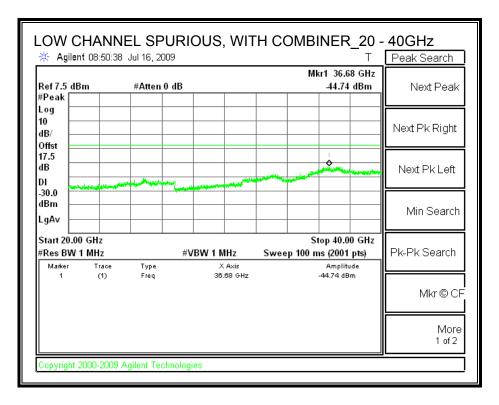
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

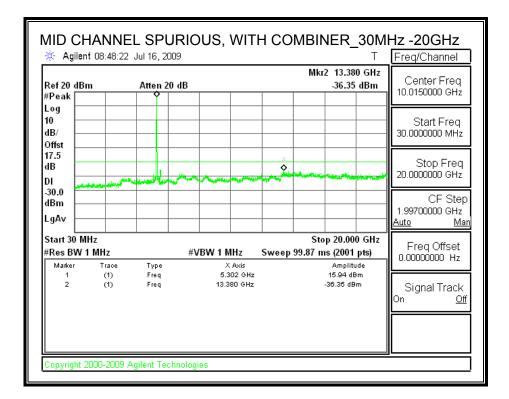
Page 78 of 292

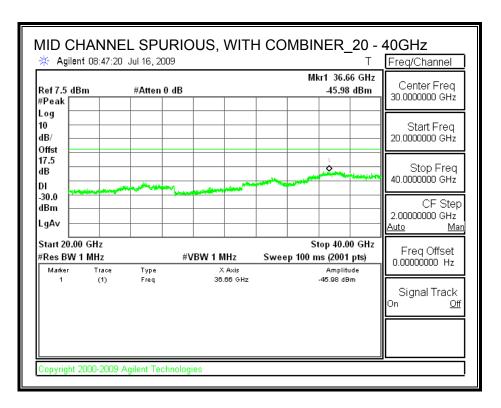
SPURIOUS EMISSIONS WITH COMBINER



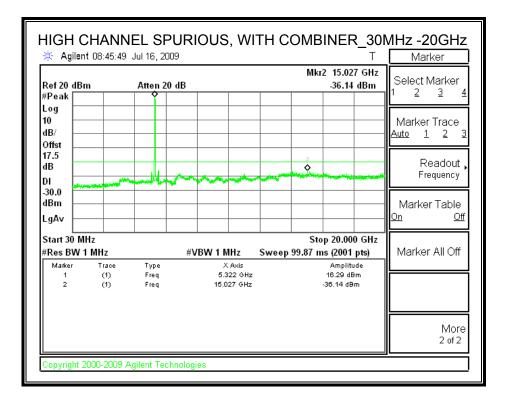


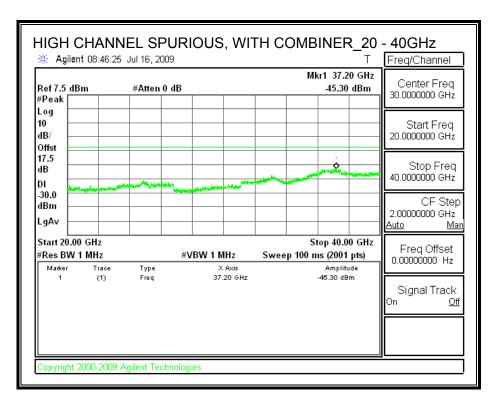
Page 79 of 292





Page 80 of 292





Page 81 of 292

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

7.5.1. 99% & 26 dB BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

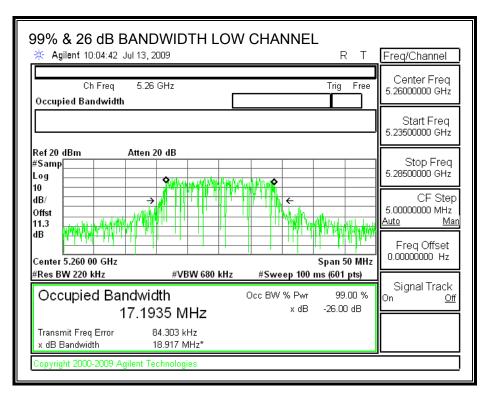
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

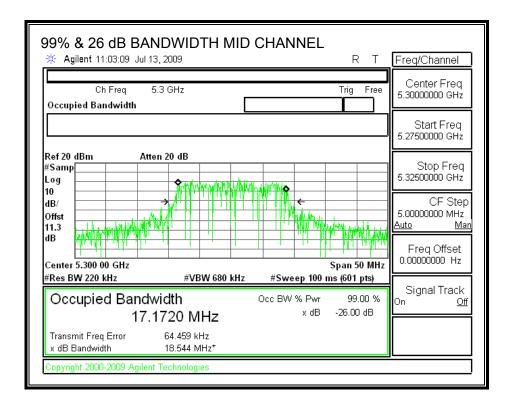
RESULTS

Channel	Frequency	99% OBW	26 dB BW
	(MHz)	(MHz)	(MHz)
Low	5260	17.1935	18.917
Middle	5300	17.172	18.544
High	5320	17.44	19.006

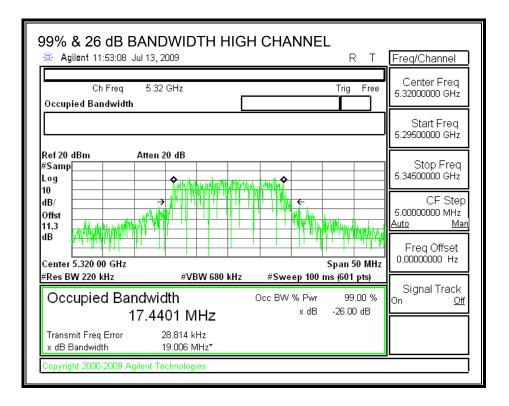
Page 82 of 292

99% & 26 dB BANDWIDTH





Page 83 of 292



Page 84 of 292

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

Limit

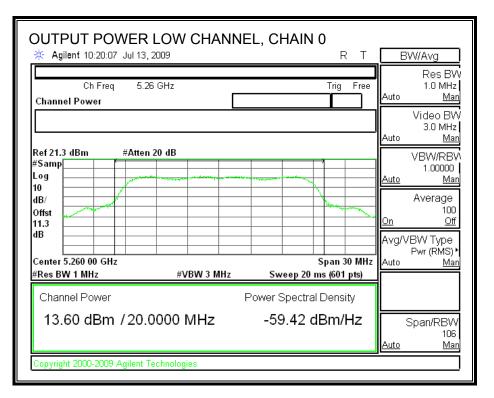
Channel	Freq	Fixed	В	11 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5260	24	18.917	23.77	3	23.77
Mid	5300	24	18.544	23.68	3	23.68
High	5320	24	19.006	23.79	3	23.79

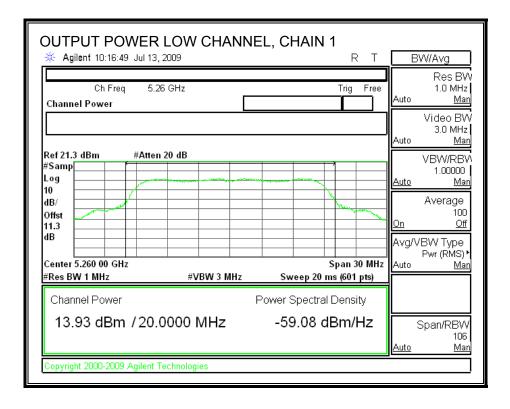
Individual Chain Results

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	13.60	13.93	14.04	13.85	19.88	23.77	-3.89
Mid	5300	14.18	14.15	14.58	14.54	20.39	23.68	-3.29
High	5320	14.36	14.57	14.42	14.58	20.50	23.79	-3.28

Page 85 of 292

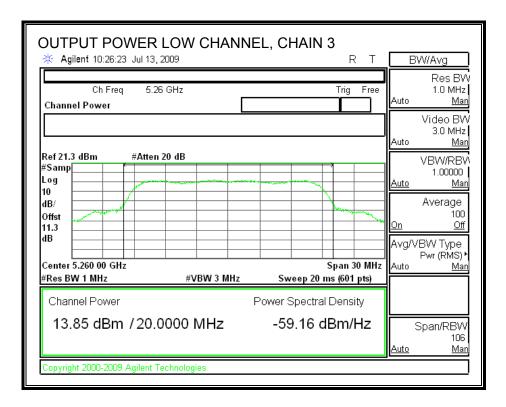
OUTPUT POWER, LOW CHANNEL





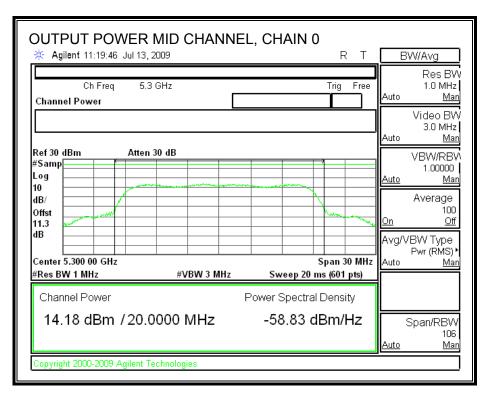
Page 86 of 292

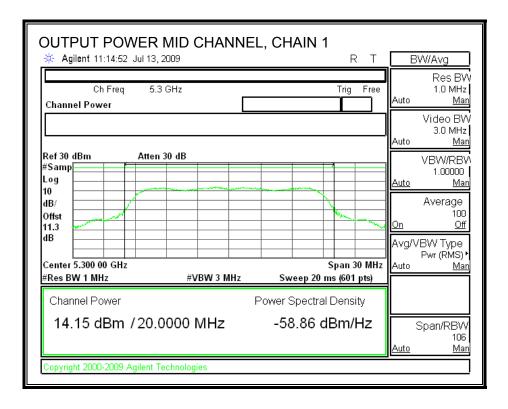
🔆 Agilent 10:21:38 Jul 13, 2	2009	RT	BW/Avg
Ch Freq 5.26 Channel Power	i GHz	Trig Fre	Auto <u>Ma</u>
			Video B\ 3.0 MH: Auto <u>Ma</u>
Ref 21.3 dBm #Atten #Samp			VBW/RB 1.00000 <u>Auto Ma</u>
dB/ Dffst			Average 100 On Of
1B		Span 30 Mł	Avg/VBW Type Pwr (RMS) Iz Auto Ma
≠Res BW 1 MHz	#VBW 3 MHz	Sweep 20 ms (601 pts)	
Channel Power	ł	Power Spectral Density	
14.04 dBm /20.0	0000 MHz	-58.97 dBm/Hz	Span/RBV 100 Auto Ma



Page 87 of 292

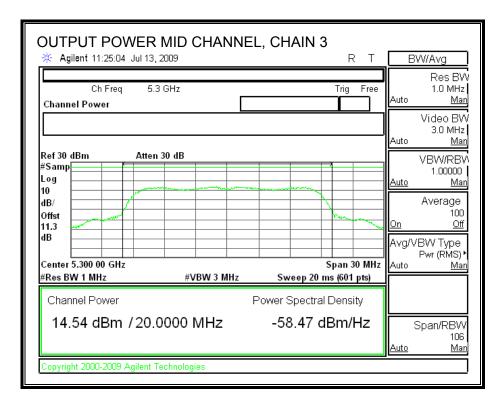
OUTPUT POWER, MID CHANNEL





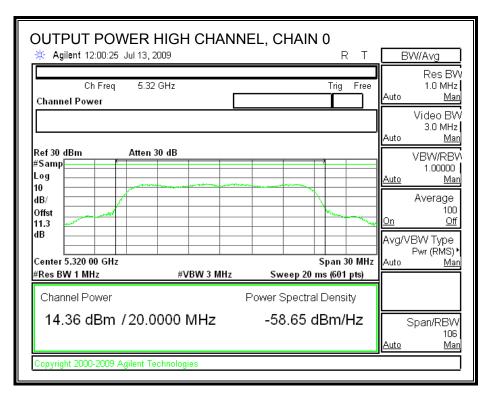
Page 88 of 292

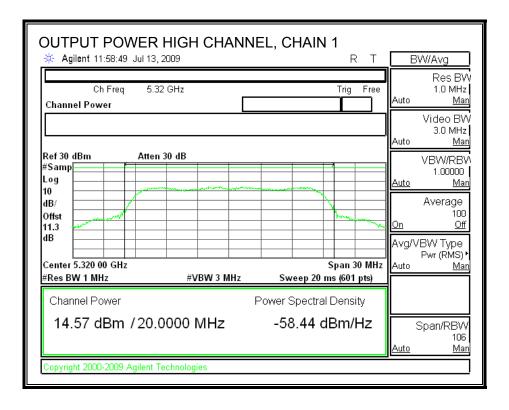
🔆 Agilent 11:22:50 Jul 13,1	2009	RT	BW/Avg
Ch Freq 5.3 Channel Power	GHz	Trig Free	Res B\ 1.0 MH: Auto <u>Ma</u>
			Video B\ 3.0 MH: Auto <u>Ma</u>
Ref 30 dBm Atten #Samp Defined and the second secon	30 dB		VBW/RB 1.00000 <u>Auto Ma</u>
IB/ Dffst			Average 100 <u>On Of</u>
HB Center 5.300 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 30 MHz Sweep 20 ms (601 pts)	Avg/VBW Type Pwr (RMS) Auto <u>Ma</u>
Channel Power		Power Spectral Density	
14.58 dBm /20.0	0000 MHz	-58.43 dBm/Hz	Span/RBV 100 Auto Ma



Page 89 of 292

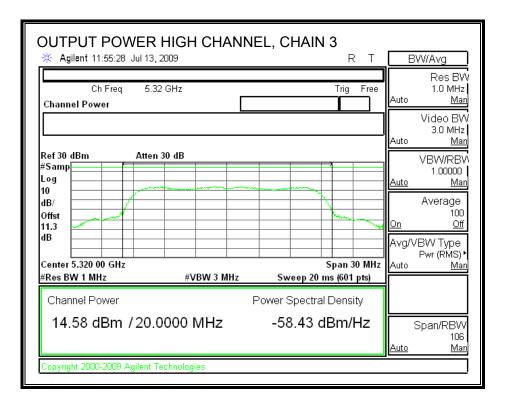
OUTPUT POWER, HIGH CHANNEL





Page 90 of 292

OUTPUT POWER		,	
- 🔆 Agilent 11:56:51 Jul 13, 2	009	R T	BW/Avg
Ch Freq 5.32 Channel Power	GHz	Trig Free	Res BW 1.0 MHz Auto <u>Man</u>
			Video BW 3.0 MHz Auto <u>Man</u>
Ref 30 dBm Atten 3 #Samp	80 dB		VBW/RBV 1.00000 <u>Auto Man</u> Average 100 <u>On Off</u>
Center 5.320 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 30 MHz Sweep 20 ms (601 pts)	Avg/VBW Type Pwr (RMS) • Auto <u>Man</u>
Channel Power 14.42 dBm / 20.0		Power Spectral Density -58.59 dBm/Hz	Span/RBW 106 Auto Man
Copyright 2000-2009 Agilent Te	chnologies		



Page 91 of 292

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

Channel	Frequency	Chain 0	Chain 1	Chain 2	Chain 3
		Power	Power	Power	Power
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
Low	5260	14.08	14.42	14.24	14.19
Middle	5300	14.21	14.50	14.75	14.60
High	5320	14.12	14.41	14.42	14.26

Page 92 of 292

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.

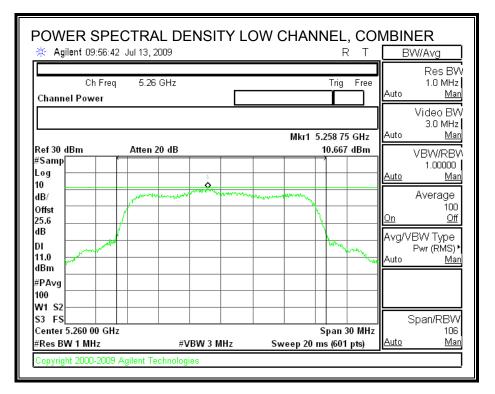
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

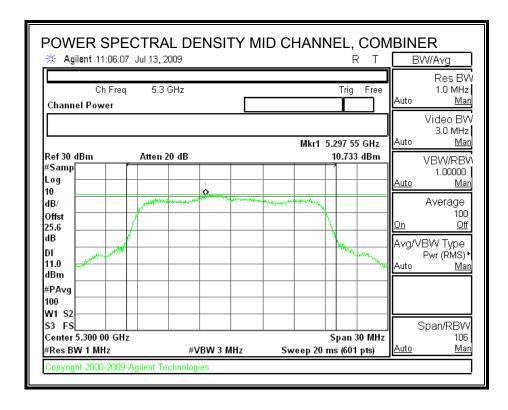
Channel	Frequency	PSD with Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5260	10.67	11.00	-0.33
Middle	5300	10.73	11.00	-0.27
High	5320	10.52	11.00	-0.48

RESULTS

Page 93 of 292

POWER SPECTRAL DENSITY





Page 94 of 292

	009	RT	DMBINER BW/Avg
Ch Freq 5.32 Channel Power	GHz	Trig Free	Res BV 1.0 MHz Auto <u>Ma</u>
Ref 30 dBm Atten 2	0 dB	Mkr1 5.318 05 GHz 10.520 dBm	Video BV 3.0 MHz Auto <u>Ma</u>
#Samp Log 10			VBW/RB 1.00000 <u>Auto Ma</u>
dB/ Offst 25.6 dB			Average 100 <u>On Off</u>
DI 11.0 dBm		http://www.com/www.	Avg/VBW Type Pwr (RMS) Auto <u>Ma</u>
#PAvg 100 W1 S2			-
S3 FS Center 5.320 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 30 MHz Sweep 20 ms (601 pts)	Span/RBV 106 <u>Auto Ma</u>

Page 95 of 292

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.

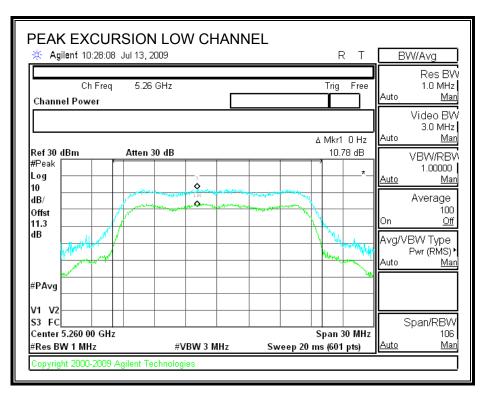
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

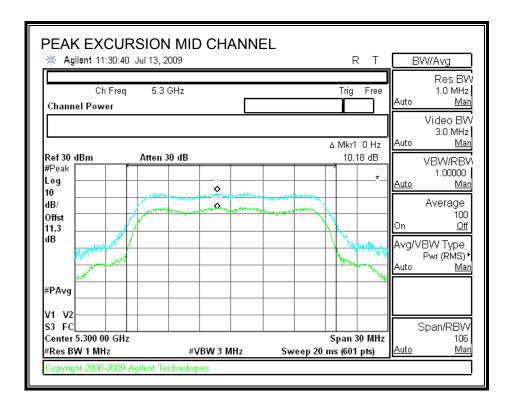
<u>RESULTS</u>

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5260	10.78	13	-2.22
Middle	5300	10.18	13	-2.82
High	5320	9.33	13	-3.67

Page 96 of 292

PEAK EXCURSION





Page 97 of 292

🔆 Agilent 12:12:53 Jul 13,	2009				R	Υ	E	W/Avg
Ch Freq 5.3 Channel Power	2 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 Atten #Peak Log 10	30 dB				9.3	3 dB	<u>Auto</u>	VBW/RBV 1.00000 <u>Mar</u>
dB/ Offst 11.3			alan and a	and the second	u,		On	Average 100 <u>Off</u>
dB					No and a second		A∨g/\ Auto	/BW Type Pwr (RMS) • <u>Mar</u>
#PAvg								
V1 V2 S3 FC								Span/RBW
Center 5.320 00 GHz #Res BW 1 MHz	#VBW 3	MHz	Swe	S ep 20 ms	•	0 MHz pts)	<u>Auto</u>	106 <u>Mar</u>

Page 98 of 292

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.

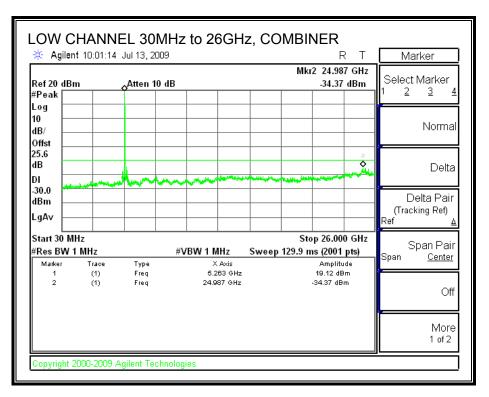
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

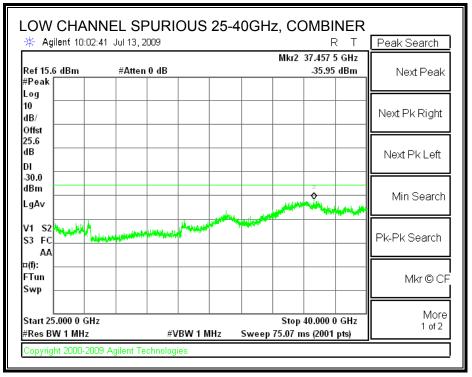
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

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 99 of 292

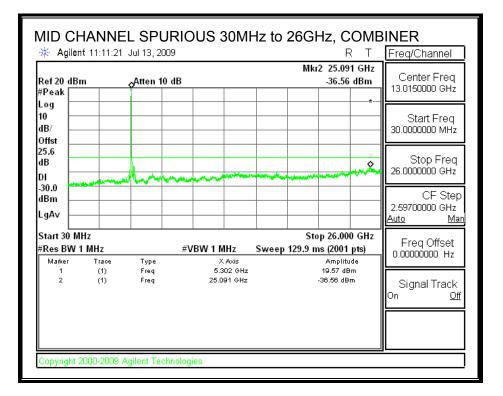
LOW CHANNEL SPURIOUS EMISSIONS

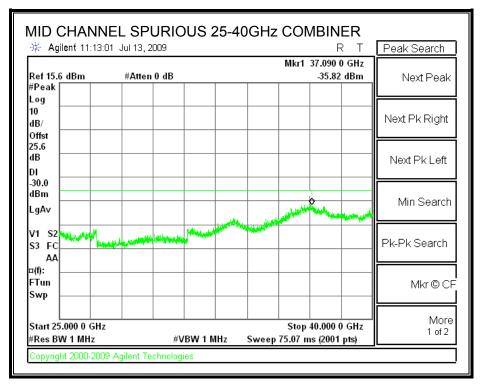




Page 100 of 292

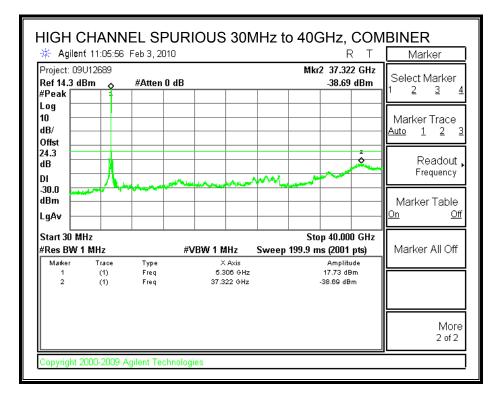
MID CHANNEL SPURIOUS EMISSIONS





Page 101 of 292

HIGH CHANNEL SPURIOUS EMISSIONS



Page 102 of 292

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

7.6.1. 99% & 26 dB BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

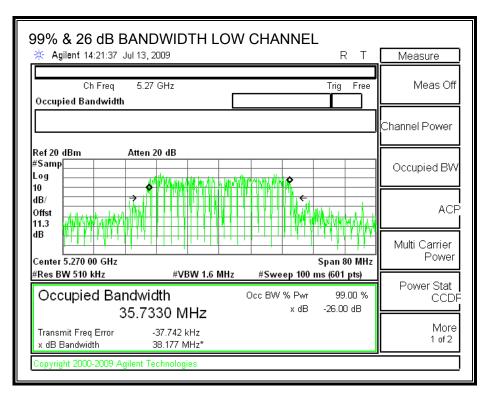
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

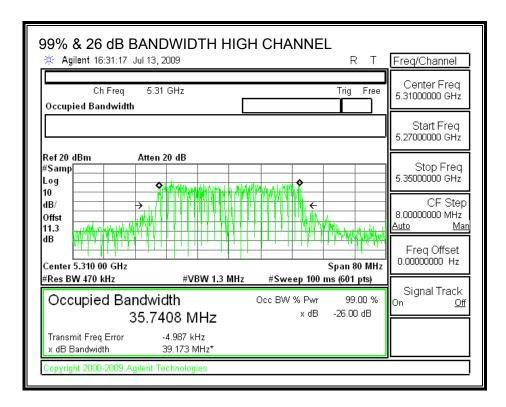
RESULTS

Channel	Frequency	99% OBW	26 dB BW	
	(MHz)	(MHz)	(MHz)	
Low	5270	35.733	38.177	
High	5310	35.7408	39.174	

Page 103 of 292

99% & 26 dB BANDWIDTH





Page 104 of 292

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

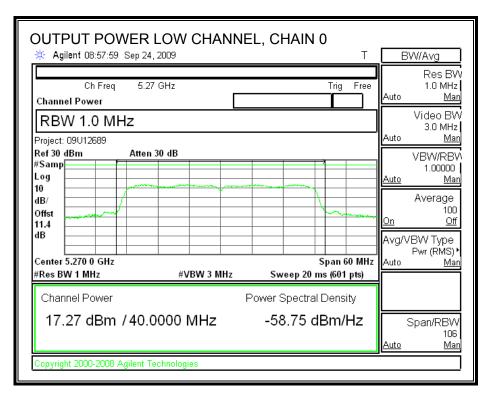
Limit

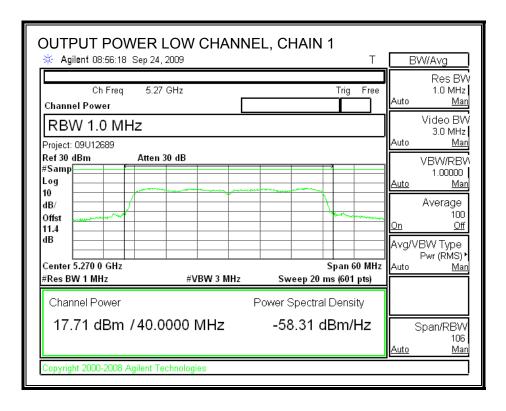
Channel	Freq	Fixed	В	11 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5270	24	38.177	26.82	3	24.00
High	5310	24	39.174	26.93	3	24.00

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	17.27	17.71	17.53	17.88	23.62	24.00	-0.38
High	5310	12.35	12.69	12.30	12.78	18.56	24.00	-5.44

OUTPUT POWER, LOW CHANNEL





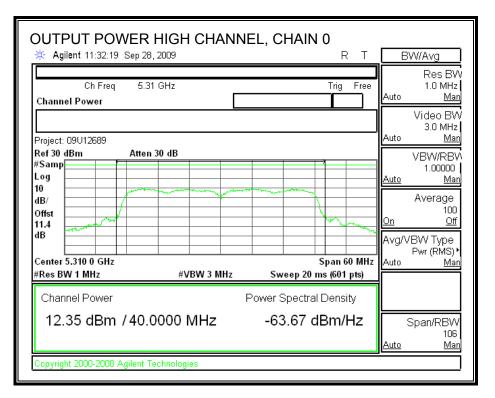
Page 106 of 292

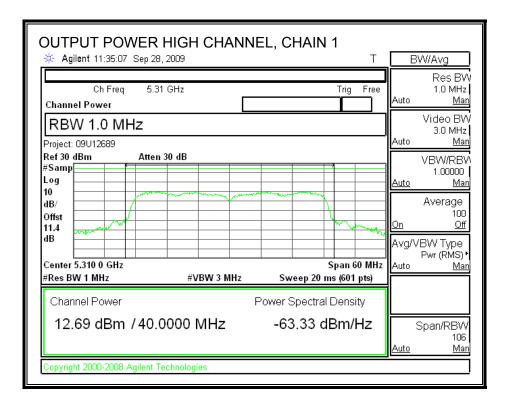
Ch Freq 5.27 GHz Trig Free Channel Power I.0 MHz RBW 1.0 MHz Video BW Project: 09U12689 Ref 30 dBm Atten 30 dB VBW/RBW 1.00000 Log VBW/RBW 10 Auto dB/ Index Offst Index 11.4 Index Auto Man VBW/RBW Index VBW/RBW <th>OUTPUT POWER LOW CHANN Agilent 08:59:34 Sep 24, 2009</th> <th>NEL, CHAIN 2</th> <th>BW/Avg</th>	OUTPUT POWER LOW CHANN Agilent 08:59:34 Sep 24, 2009	NEL, CHAIN 2	BW/Avg
Project: 09U12689 Ref 30 dBm Atten 30 dB VBW/RBV Log 10 dB/ Offst 11.4 dB Center 5.270 0 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (601 pts) Channel Power Power Spectral Density 17.53 dBm / 40.0000 MHz -58.49 dBm/Hz	Channel Power	Trig Free	Res BW 1.0 MHz Auto <u>Man</u> Video BW
Center 5.270 0 GHz Span 60 MHz Auto Pwr (RMS)* #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (601 pts) Man Channel Power Power Spectral Density 17.53 dBm / 40.0000 MHz -58.49 dBm/Hz Span/RBW	Project: 09U12689 Ref 30 dBm Atten 30 dB #Samp 0 Log 0 dB/ 0ffst 0 dB/ 0		Auto <u>Man</u> VBW/RBW 1.00000 <u>Auto Man</u> Average 100 <u>On Off</u>
17.53 dBm / 40.0000 MHz -58.49 dBm/Hz Span/RBW		•	Pwr (RMS) ►
		,	106

OUTPUT POWER LOW CHANNEL, CHAIN 3	
	BW/Avg Res BW 1.0 MHz Auto <u>Man</u> Video BW
Ref 30 dBm Atten 30 dB #Samp	3.0 MHz Auto <u>Man</u> VBW/RBW 1.00000 <u>Auto Man</u> Average 100 <u>On Off</u> Avg/VBW Type
Center 5.270 0 GHz Span 60 MHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (601 pts)	Pwr (RMS) ► Auto <u>Man</u>
Channel Power Power Spectral Density 17.88 dBm / 40.0000 MHz -58.14 dBm/Hz Copyright 2000-2008 Agilent Technologies	Span/RBW 106 <u>Auto Man</u>

Page 107 of 292

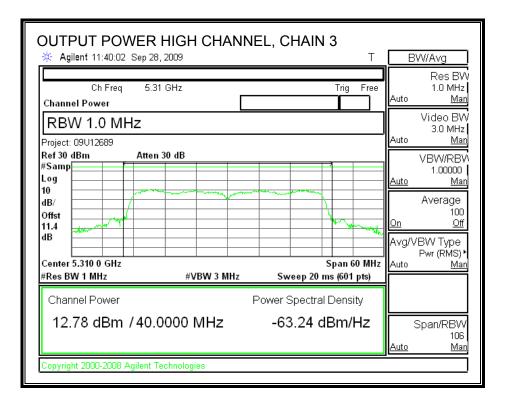
OUTPUT POWER, HIGH CHANNEL





Page 108 of 292

OUTPUT POWER I		EL, CHAIN 2	т	BW/A	va
Ch Freq 5.31 Channel Power		Trig	Free	F Auto	Res BW 1.0 MHz <u>Man</u> deo BW
RBW 1.0 MHz Project: 09U12689 Ref 30 dBm Atten 3 #Samp Log 10 dB/ Offst 11.4	30 dB			Auto VB Auto Avi On	3.0 MHz <u>Man</u> W/RBW .00000 <u>Man</u> erage 100 <u>Off</u>
Center 5.310 0 GHz #Res BW 1 MHz	#VBW 3 MHz	Sweep 20 ms (60	• •	Avg/VBW Pwr Auto	(RMS) ► (<u>Man</u>
Channel Power Power Spectral Density 12.30 dBm / 40.0000 MHz -63.72 dBm/Hz				Spai <u>Auto</u>	n/RBW 106 <u>Man</u>
Copyright 2000-2008 Agilent Te	chnologies				



Page 109 of 292

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	16.69	16.82	17.03	17.57
High	5310	12.65	12.52	12.53	12.72

Page 110 of 292

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.

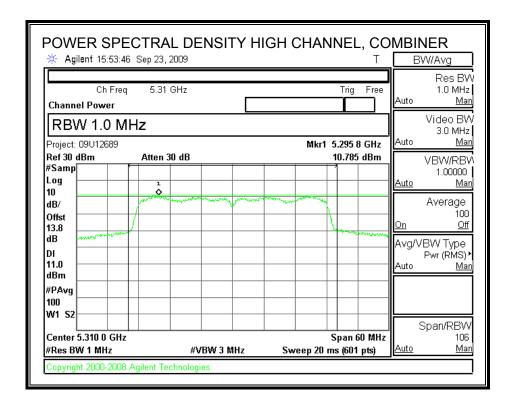
<u>RESULTS</u>

Channel	Frequency	PSD with Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5270	10.69	11.00	-0.31
High	5310	10.79	11.00	-0.21

Page 111 of 292

POWER SPECTRAL DENSITY

POWER SPECTRA		DW CHANNEL, CO	
	7 GHz	Trig Free	Res BW 1.0 MHz Auto <u>Man</u> Video BW
Project: 09U12689 Ref 30 dBm Atten	30 dB	Mkr1 5.254 9 GHz 10.689 dBm	3.0 MHz Auto <u>Man</u> VBW/RBV
#Samp Log 10	nu and a second se		1.00000 <u>Auto Man</u>
dB/ Offst 13.8 dB			Average 100 <u>On Off</u>
DI 11.0 dBm			Avg/VBW Type Pwr (RMS) • Auto <u>Man</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/RBW 106 <u>Auto Man</u>
Copyright 2000-2008 Agilent T	echnologies		



Page 112 of 292

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.

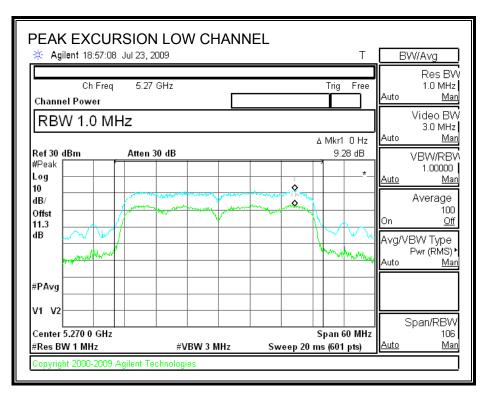
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

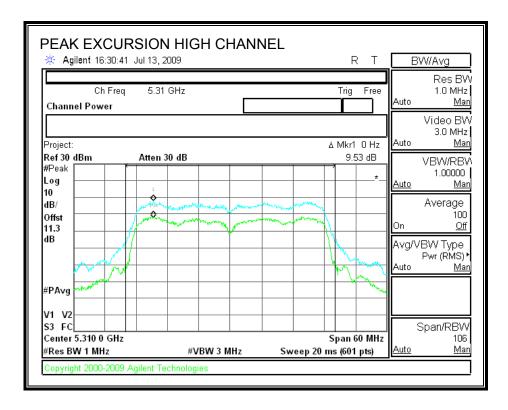
<u>RESULTS</u>

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5270	9.28	13	-3.72
High	5310	9.53	13	-3.47

Page 113 of 292

PEAK EXCURSION





Page 114 of 292

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.

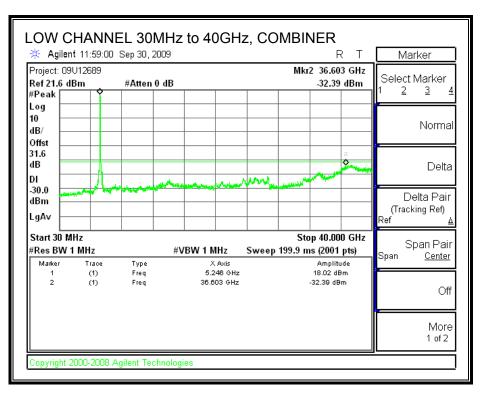
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

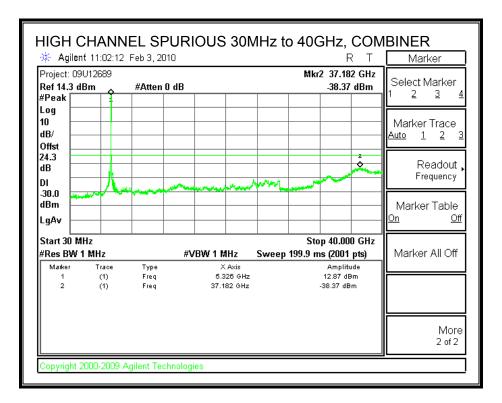
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

Page 115 of 292

LOW CHANNEL SPURIOUS EMISSIONS



HIGH CHANNEL SPURIOUS EMISSIONS



Page 116 of 292

7.7. 5.6GHz BAND CHANNEL TESTS FOR 802.11a MODE

7.7.1. 26 dB and 99% BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

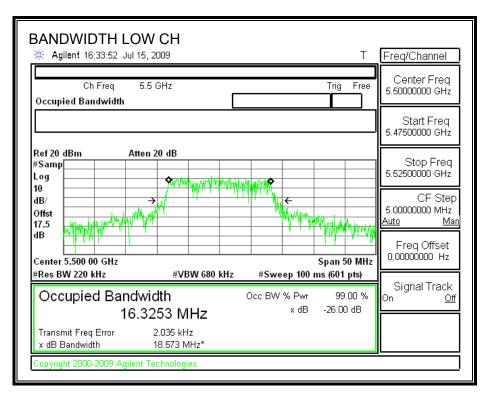
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

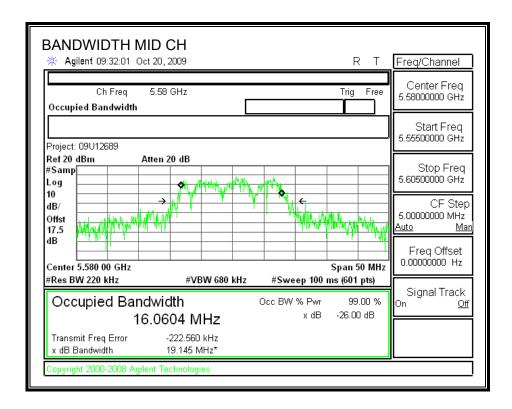
RESULTS

Channel	Frequency	26 dB Bandwidth	99% Bandwidth
	(MHz)	(MHz)	(MHz)
Low	5500	18.573	16.3253
Middle	5580	19.145	16.0604
High	5700	19.048	16.4891

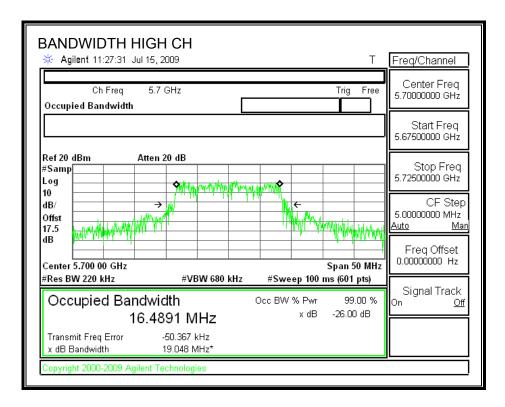
Page 117 of 292

26 dB and 99% BANDWIDTH





Page 118 of 292



Page 119 of 292

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.

RESULTS

Limit

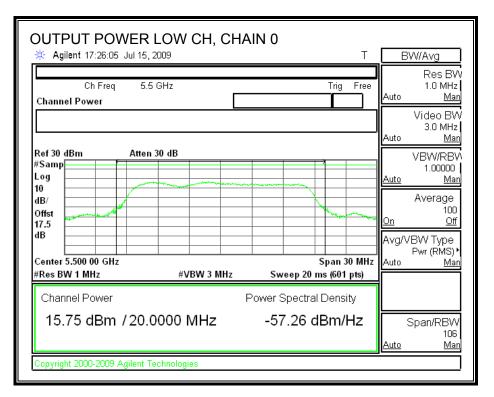
Channel	Frequency	Fixed	В	11 + 10 Log B	Effective	Limit
		Limit		Limit	Ant Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5500	24	18.573	23.69	6.01	23.68
Mid	5580	24	18.279	23.62	6.01	23.61
High	5700	24	19.048	23.80	6.01	23.79

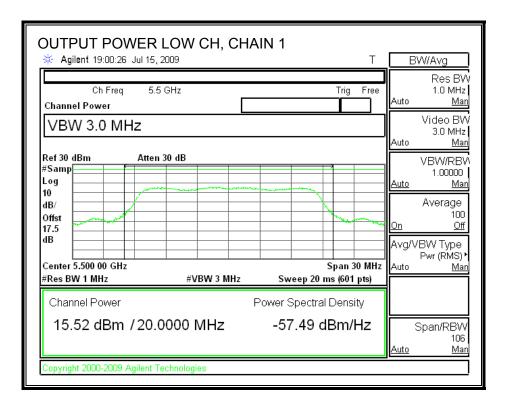
Individual Chain Results

Channel	Frequency	Chain 0	Chain 1	Total	Limit	Margin
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low	5500	15.75	15.52	18.65	23.68	-5.03
Mid	5580	15.74	15.71	18.74	23.61	-4.87
High	5700	15.47	14.89	18.20	23.79	-5.59

Page 120 of 292

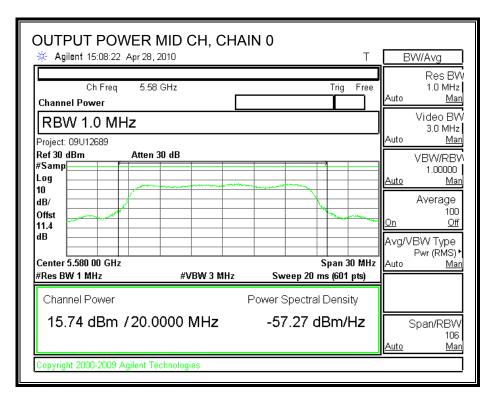
OUTPUT POWER, LOW CHANNEL

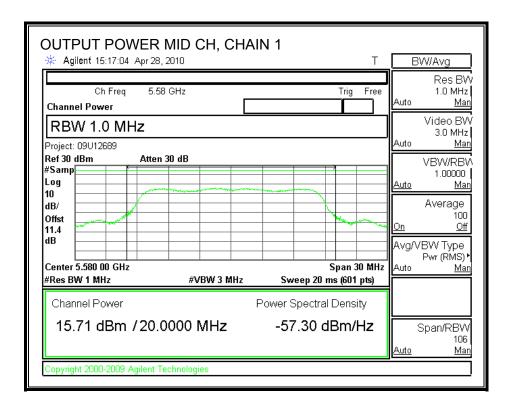




Page 121 of 292

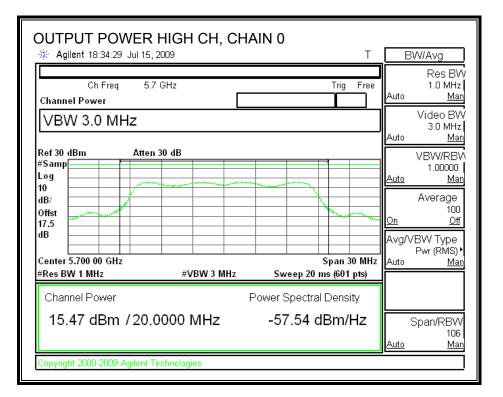
OUTPUT POWER, MID CHANNEL

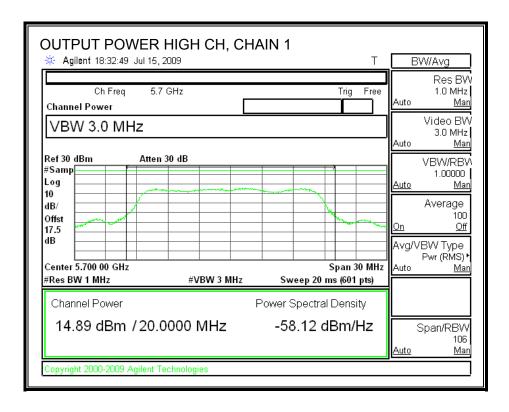




Page 122 of 292

OUTPUT POWER, HIGH CHANNEL





Page 123 of 292

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	15.75	15.52	18.65
Middle	5580	15.72	15.54	18.64
High	5700	15.25	15.92	18.61

Page 124 of 292

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 0 = antenna gain for Chain 1

Antenna Gain 10 Log (# Tx Chains)		Effective Legacy Gain	
(dBi) (dB)		(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

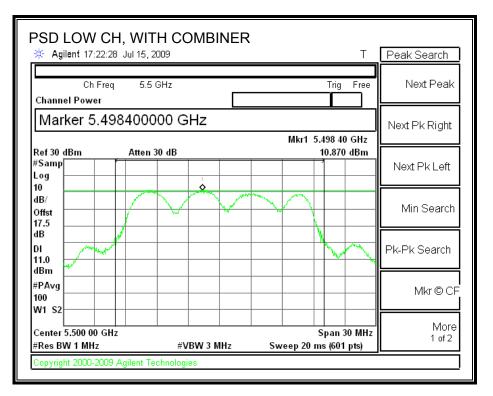
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

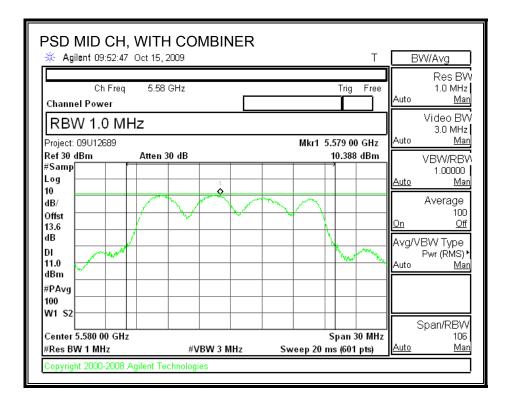
RESULTS

Channel	Frequency	PPSD With Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5500	10.870	10.99	-0.12
Middle	5580	10.388	10.99	-0.60
High	5700	10.215	10.99	-0.78

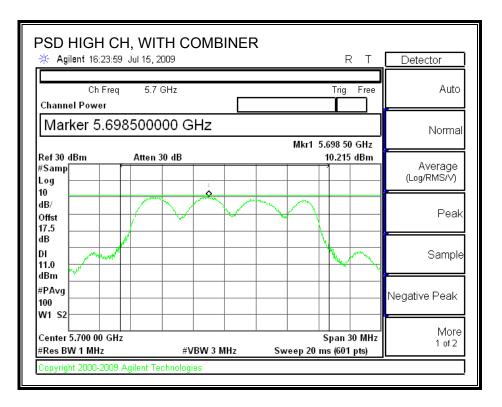
Page 125 of 292

POWER SPECTRAL DENSITY WITH COMBINER





Page 126 of 292



Page 127 of 292

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.

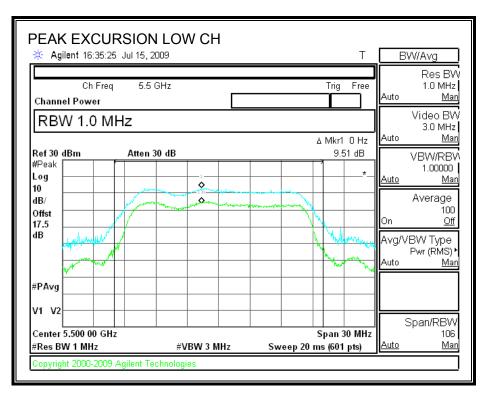
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

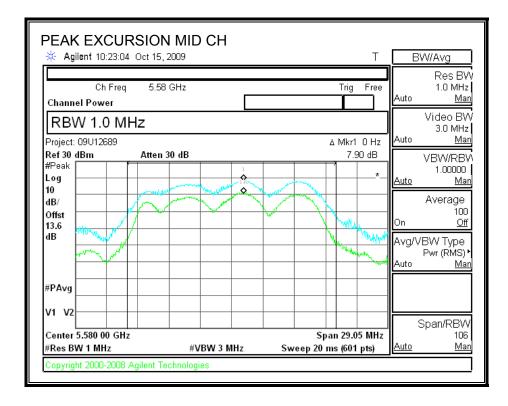
RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5500	9.51	13	-3.49
Middle	5580	7.90	13	-5.10
High	5700	7.97	13	-5.03

Page 128 of 292

PEAK EXCURSION





Page 129 of 292

🔆 Agilent 11:30:32 Jul 15,	2009				Т	В	W/Avg
Ch Freq 5.7 Channel Power	7 GHz			Tri	g Free	Auto	Res BV 1.0 MHz <u>Mar</u>
RBW 1.0 MHz				ے ک Mk	r1 O Hz	Auto	Video BV 3.0 MHz <u>Mar</u>
Ref 30 dBm Atter #Peak Log 10	1 30 dB				7.97 dB	<u>Auto</u>	VBVV/RBV 1.00000 <u>Mar</u>
0 dB/ 0 ffst 17.5			and the second s			On	Average 100 <u>Off</u>
dB						A∨g/∖ Auto	/BW Type Pwr (RMS) • <u>Mar</u>
#PAvg							
V1 V2				Spar	1 30 MHz		Span/RBW 106
#Res BW 1 MHz	#VBW	3 MHz	Sweep 20	•		<u>Auto</u>	Mar

Page 130 of 292

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

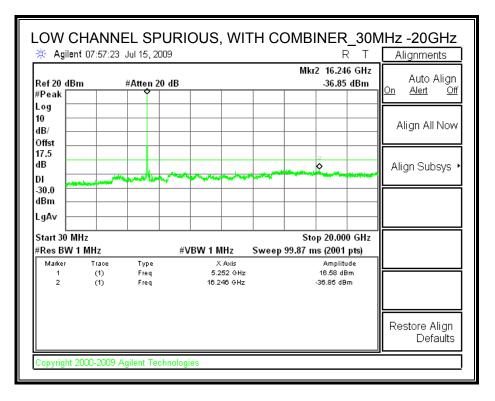
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

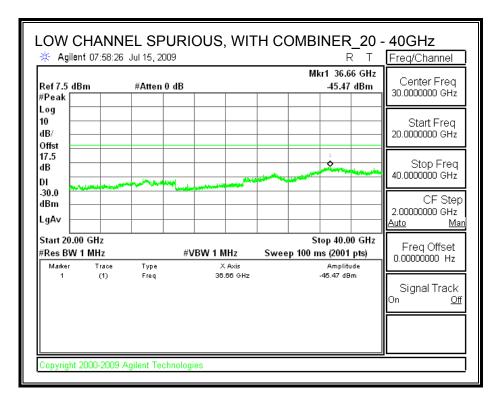
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

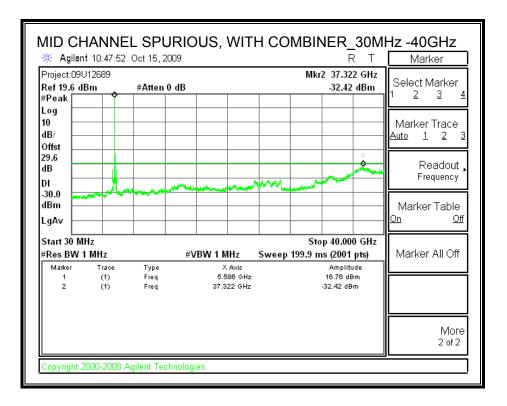
Page 131 of 292

SPURIOUS EMISSIONS WITH COMBINER

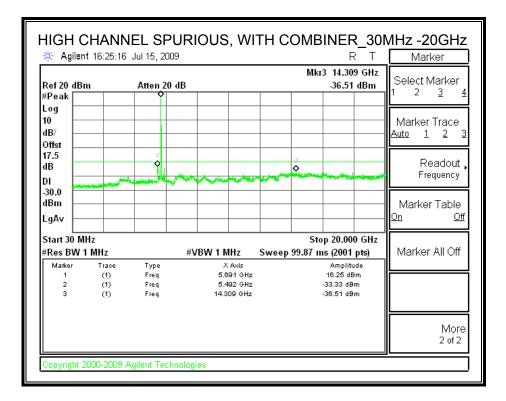


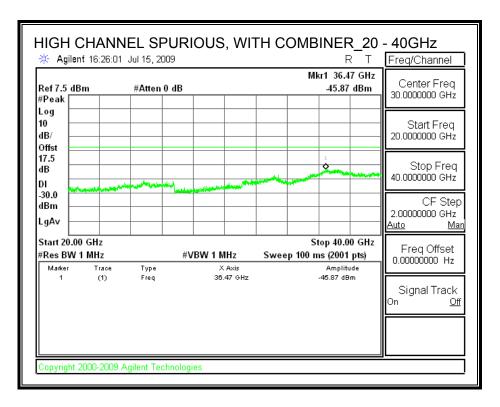


Page 132 of 292



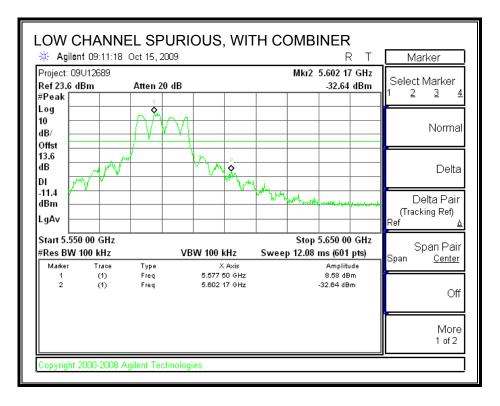
Page 133 of 292

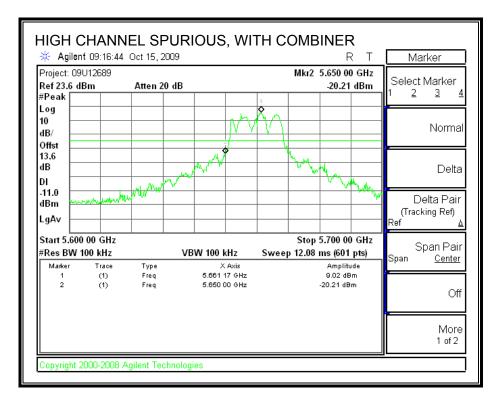




Page 134 of 292

7.7.7. CONDUCTED SPURIOUS (-20 dBc)





Page 135 of 292

7.8. 5.6 GHz BAND CHANNEL TESTS FOR 802.11HT20 MODE

7.8.1. 99% & 26 dB BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

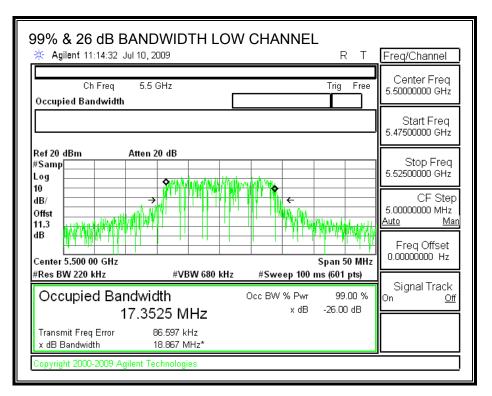
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

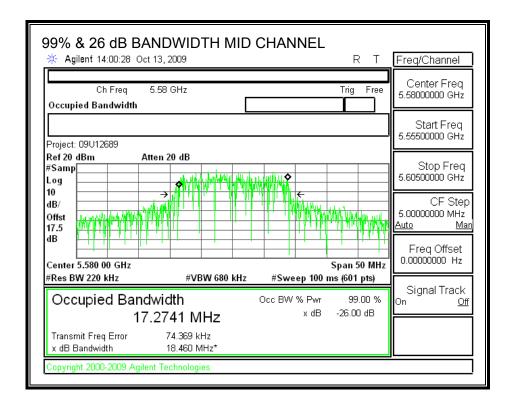
RESULTS

Channel	Frequency	99% OBW	26 dB BW
	(MHz)	(MHz)	(MHz)
Low	5500	17.3525	18.867
Middle	5580	17.2741	18.460
High	5700	17.4728	18.394

Page 136 of 292

99% & 26 dB BANDWIDTH





Page 137 of 292

99% & 26 dB BANDWIDT Agilent 14:13:36 Jul 10, 2009	HIGH CHANNE	i l rt	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 10 Atten 20 dB	a 1100m awak70 water lang		Stop Freq 5.72500000 GHz
dB/ Offst 11.3 det	┢┋╹╫╫╴┼╢┍┦╎╽╫╵╢╎┥		CF Step 5.0000000 MHz <u>Auto Man</u>
Center 5.700 00 GHz	V 680 kHz #Sweep 100	Span 50 MHz	Freq Offset 0.00000000 Hz
Occupied Bandwidth 17.4728 Mł	Occ BW % Pwr	99.00 % -26.00 dB	Signal Track ^{On <u>Off</u>}
Transmit Freq Error 72.384 kH x dB Bandwidth 18.394 MH	z		
Copyright 2000-2009 Agilent Technologie:	3		

Page 138 of 292

7.8.2. OUTPUT POWER

LIMITS

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

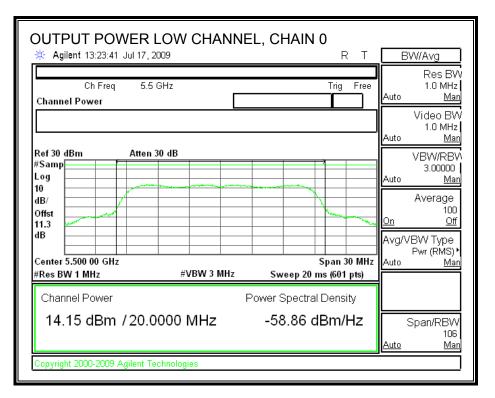
Channel	Freq	Fixed	В	11 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5500	24	18.867	23.76	3	23.76
Mid	5580	24	19.001	23.79	3	23.79
High	5700	24	18.394	23.65	3	23.65

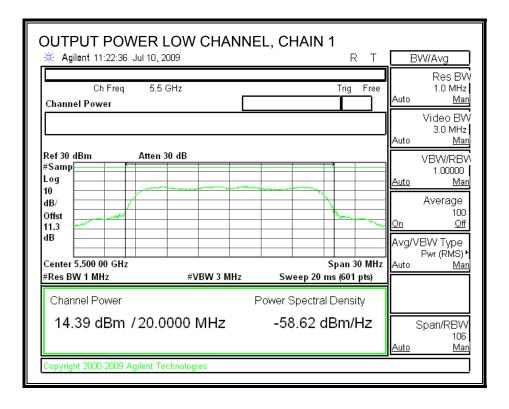
Individual Chain Results

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	5500	14.15	14.39	14.12	14.39	20.28	23.76	-3.47
Mid	5580	14.40	14.43	14.72	14.79	20.61	23.79	-3.18
High	5700	14.78	14.60	14.90	14.66	20.76	23.65	-2.89

Page 139 of 292

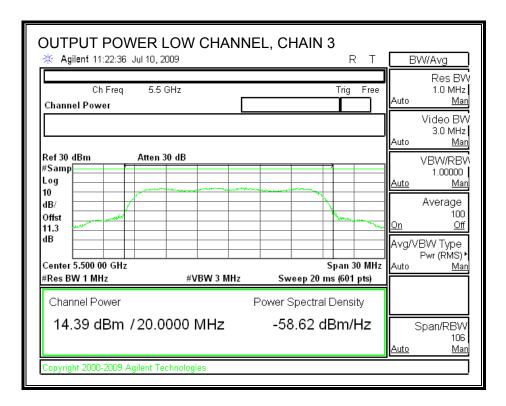
OUTPUT POWER, LOW CHANNEL





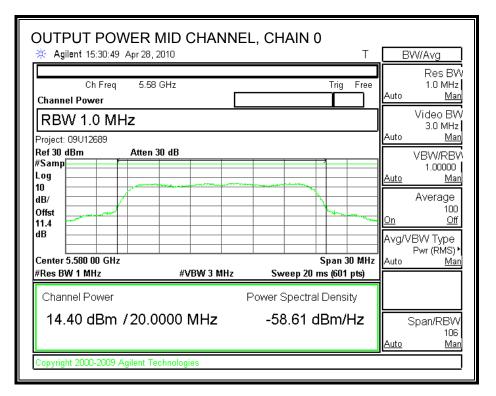
Page 140 of 292

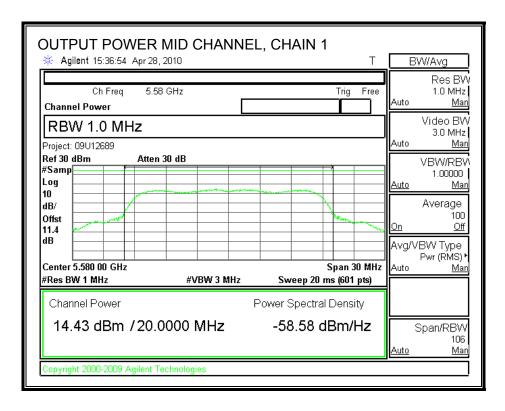
🔆 Agilent 11:20:02 Jul 10	, 2009	R T	BW/Avg
Ch Freq 5 Channel Power	5 GHz	Trig Free	Res BV 1.0 MHz Auto <u>Ma</u> Video BV
Ref 30 dBm Atte	n 30 dB		
#Samp			1.00000 Auto Ma
dB/ Offst 11.3 dB			100 0n 0ff Avg/VBW Type
Center 5.500 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 30 MHz Sweep 20 ms (601 pts)	Pwr (RMS)
Channel Power		Power Spectral Density]
14.12 dBm /20	0000 MHz	-58.89 dBm/Hz	Span/RBV 106 Auto Ma



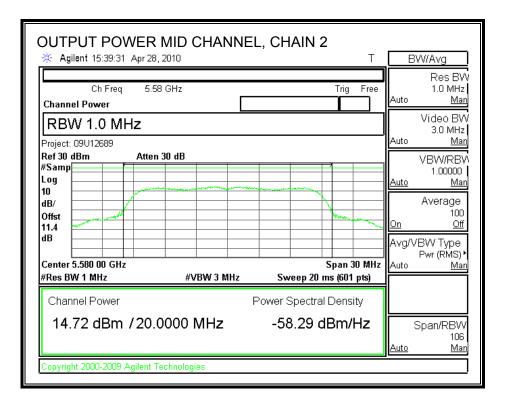
Page 141 of 292

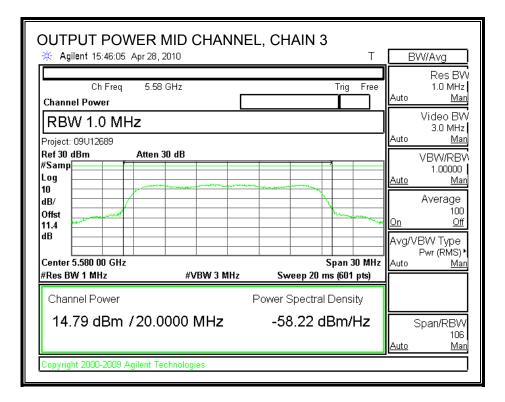
OUTPUT POWER, MID CHANNEL





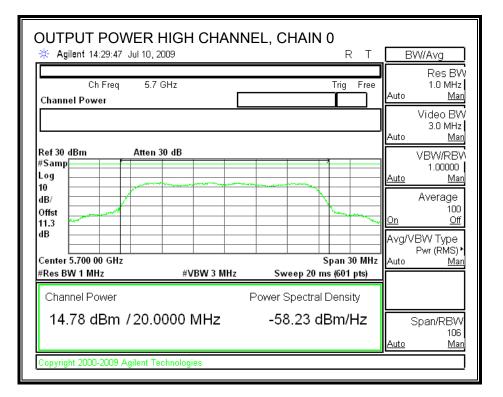
Page 142 of 292

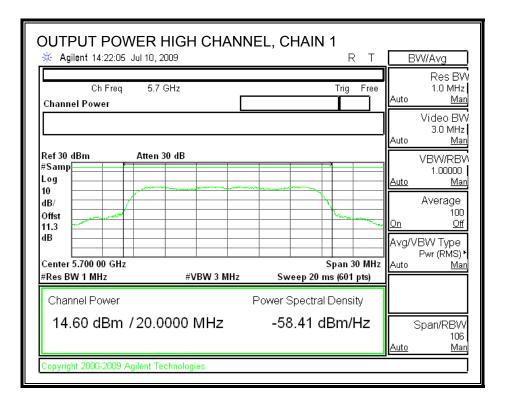




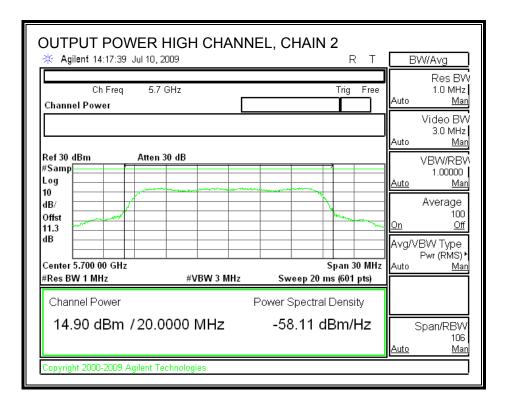
Page 143 of 292

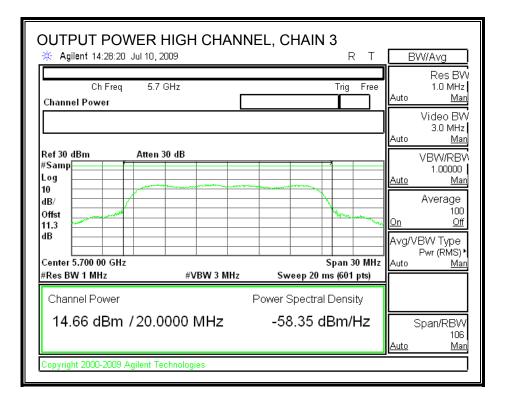
OUTPUT POWER, HIGH CHANNEL





Page 144 of 292





Page 145 of 292

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	14.23	14.22	14.31	14.45
Middle	5580	14.61	14.56	14.29	14.86
High	5700	14.42	14.60	14.59	14.56

Page 146 of 292

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 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.

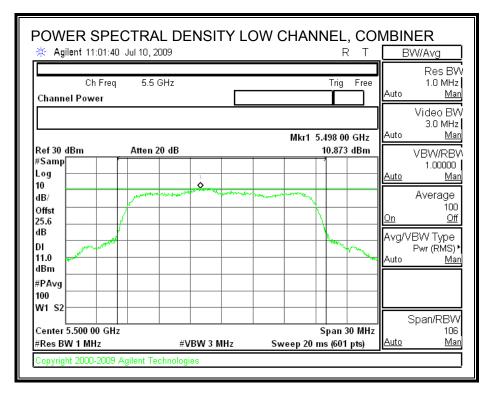
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

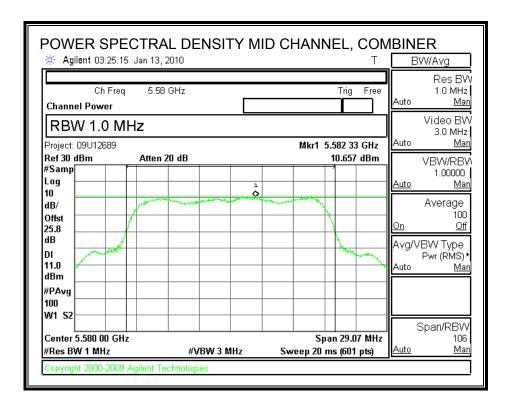
Channel	Frequency	PSD with Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5500	10.873	11.00	-0.13
Middle	5800	10.657	11.00	-0.34
High	5700	10.423	11.00	-0.58

RESULTS

Page 147 of 292

POWER SPECTRAL DENSITY





Page 148 of 292

POWER SPECTR/ # Agilent 14:11:18 Jul 10,				R	, сс Т		W/Avg
Ch Freq 5.7 Channel Power	' GHz			Trig	Free	Auto	Res BV 1.0 MHz <u>Ma</u>
			Mkr1 5.0			Auto	Video BV 3.0 MHz <u>Ma</u>
#Samp Log	20 dB		1	0.423	dBm	<u>Auto</u>	VBW/RB) 1.00000 <u>Ma</u>
10 dB/ Offst		gale and a second second second second	man and a			0.5	Average 100 Off
25.6 // dB DI				man	*~~	<u>On</u> Avg/V	BW Type Pwr (RMS)
11.0 dBm #PAva						Auto	Ma
100 W1 S2							
Center 5.700 00 GHz #Res BW 1 MHz	#VBW 3 M	Hz Sv	S veep 20 m	ipan 3(s (601		<u>Auto</u>	Span/RBV 108 <u>Ma</u>

Page 149 of 292

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.

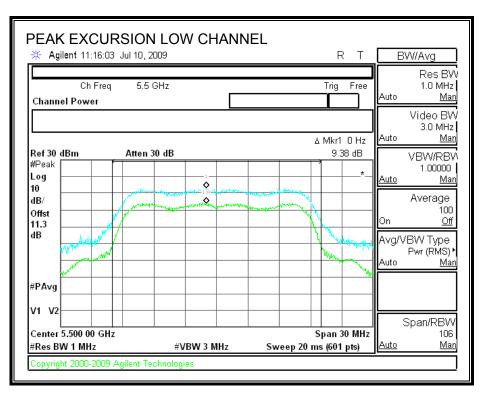
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

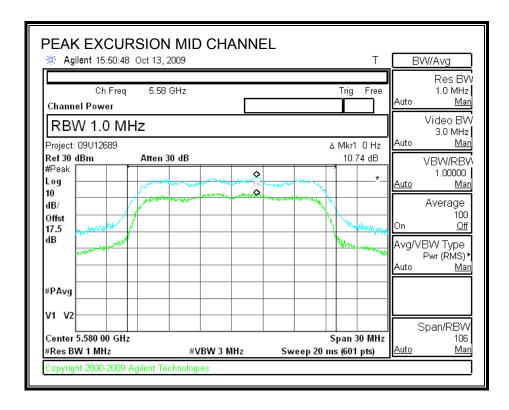
RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5500	9.38	13	-3.62
Middle	5580	10.74	13	-2.26
High	5700	10.70	13	-2.30

Page 150 of 292

PEAK EXCURSION





Page 151 of 292

🔆 Agilent 14:36:25 Ju	10,2009	F	RΤ	B	W/Avg
Ch Freq Channel Power	5.7 GHz	Trig	Free	Auto	Res BV 1.0 MHz <u>Mar</u>
RBW 1.0 MHz		ے ۸ Mkri	0 Hz	Auto	Video BV 3.0 MHz <u>Mar</u>
Ref 30 dBm / / #Peak Log 10	Atten 30 dB	 10.	70 dB	<u>Auto</u>	VBW/RB\ 1.00000 <u>Mar</u>
dB/ Offst 11.3				On	Average 100 <u>Off</u>
dB			and the state of t	Avg/V Auto	BVV Type Pwr (RMS) ^I <u>Mar</u>
#PAvg					
V1 V2			30 MHz		Span/RBV

Page 152 of 292

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.

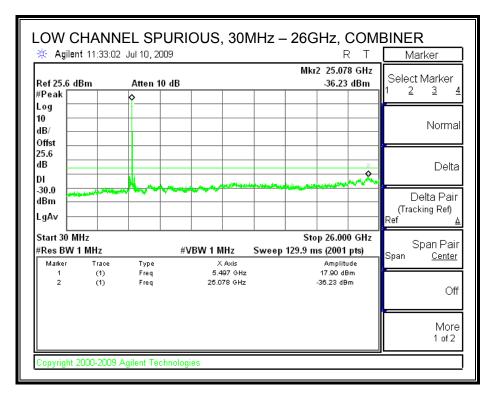
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

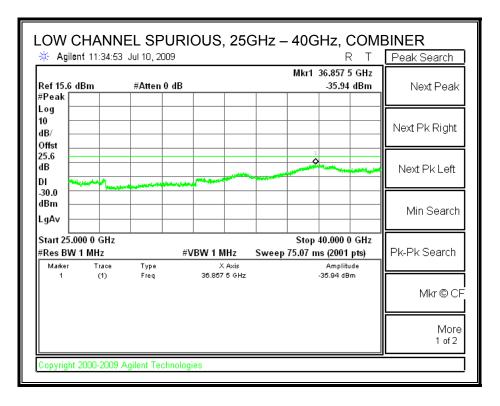
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

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 153 of 292

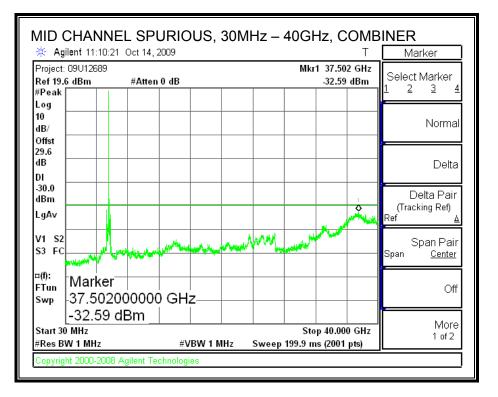
LOW CHANNEL SPURIOUS EMISSIONS





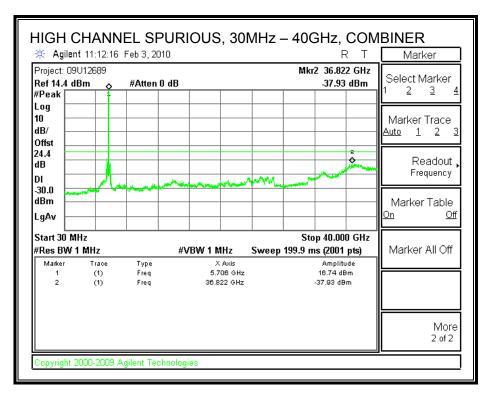
Page 154 of 292

MID CHANNEL SPURIOUS EMISSIONS



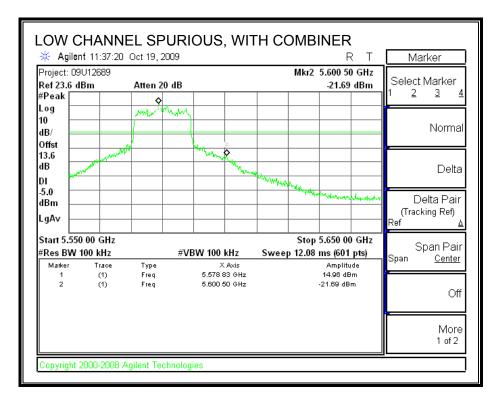
Page 155 of 292

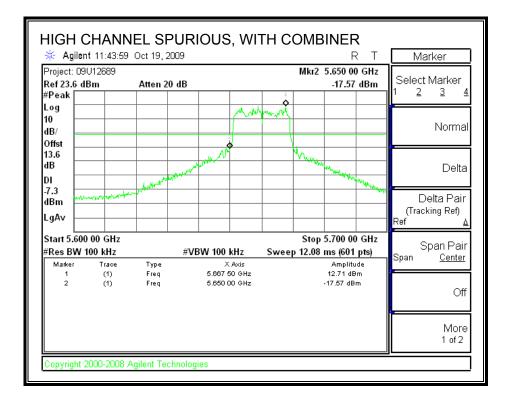
HIGH CHANNEL SPURIOUS EMISSIONS



Page 156 of 292

7.8.7. CONDUCTED SPURIOUS (-20 dBc)





Page 157 of 292

7.9. 5.6 Hz BAND CHANNEL TESTS FOR 802.11HT40 MODE

7.9.1. 99% & 26 dB BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

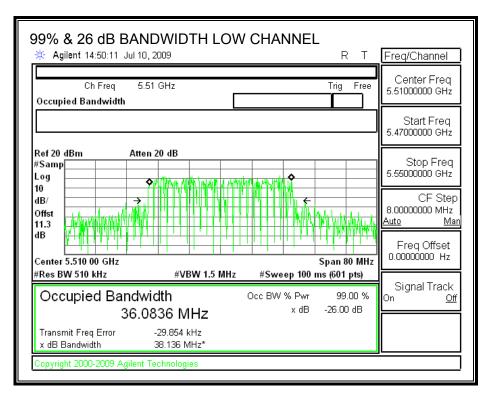
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

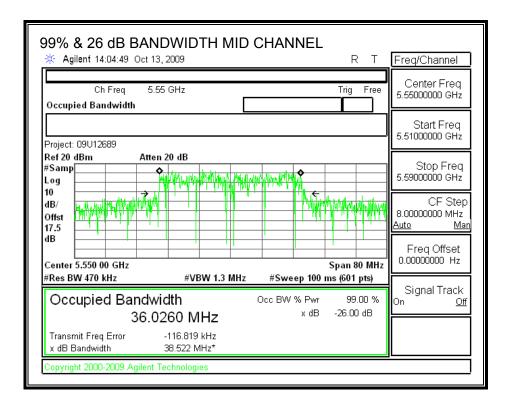
RESULTS

Channel	Frequency	99% OBW	26 dB BW
	(MHz)	(MHz)	(MHz)
Low	5510	36.0836	38.136
Middle	5550	36.0260	38.522
High	5670	35.9928	38.24

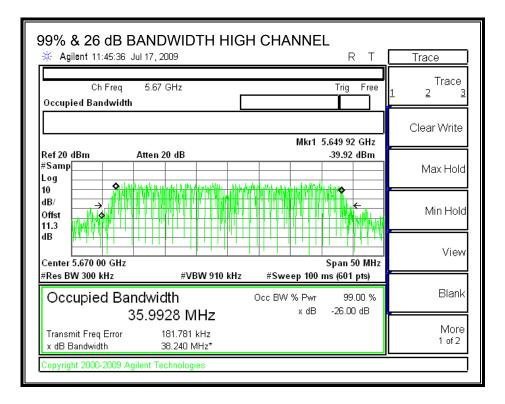
Page 158 of 292

99% & 26 dB BANDWIDTH





Page 159 of 292



Page 160 of 292

7.9.2. OUTPUT POWER

LIMITS

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

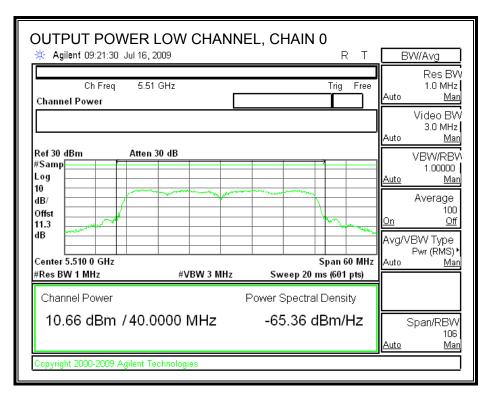
Channel	Freq	Fixed	В	11 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5510	24	38.136	26.81	3	24.00
Mid	5550	24	37.659	26.76	3	24.00
High	5670	24	38.24	26.83	3	24.00

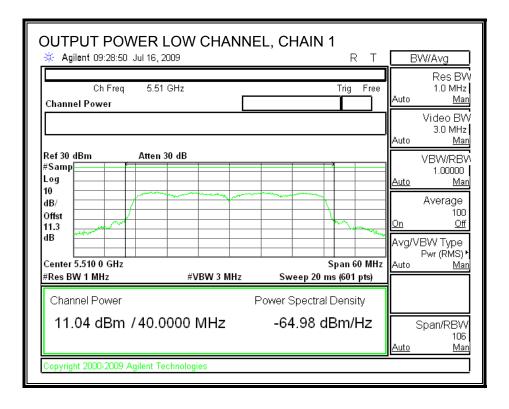
Individual Chain Results

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	10.66	11.04	11.60	11.07	17.13	24.00	-6.87
Mid	5550	17.05	17.66	17.40	17.39	23.40	24.00	-0.60
High	5670	15.03	15.04	15.44	15.01	21.15	24.00	-2.85

Page 161 of 292

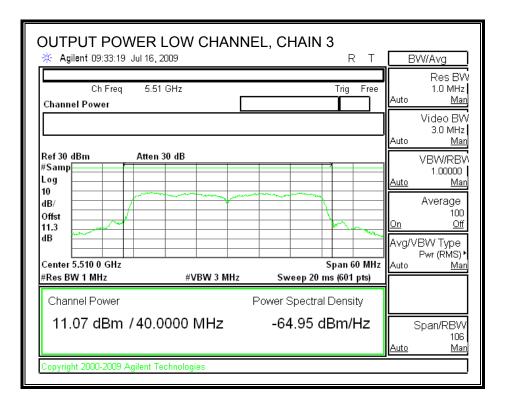
OUTPUT POWER, LOW CHANNEL





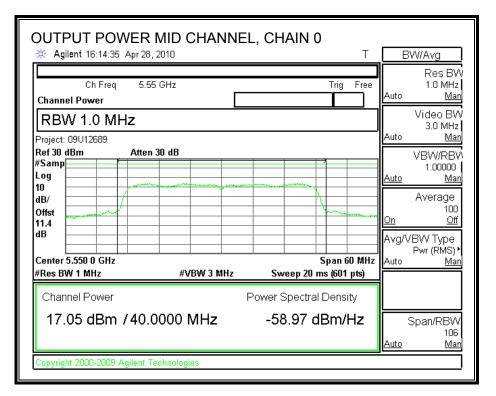
Page 162 of 292

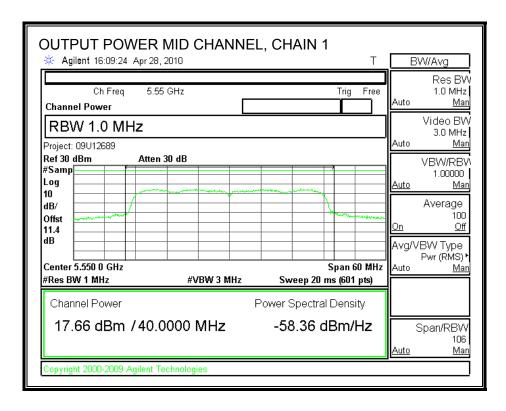
OUTPUT POWER		EL, CHAIN 2	BW/Avg
	GHz	Trig Free	Res BW 1.0 MHz Auto <u>Man</u>
Ref 30 dBm Atten #Samp	30 dB		Video BW 3.0 MHz Auto <u>Man</u> VBW/RBV 1.00000
Log 10 dB/ Offst 11.3 dB			Auto Man Average 100 On Off Avg/VBW Type
Center 5.510 0 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 60 MHz Sweep 20 ms (601 pts)	Pwr (RMS) •
Channel Power 11.60 dBm /40.0		Power Spectral Density -64.42 dBm/Hz	Span/RBW 106 <u>Auto Mar</u>
Copyright 2000-2009 Agilent To	echnologies		



Page 163 of 292

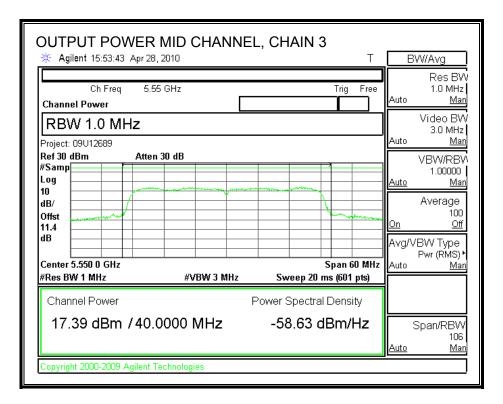
OUTPUT POWER, MID CHANNEL





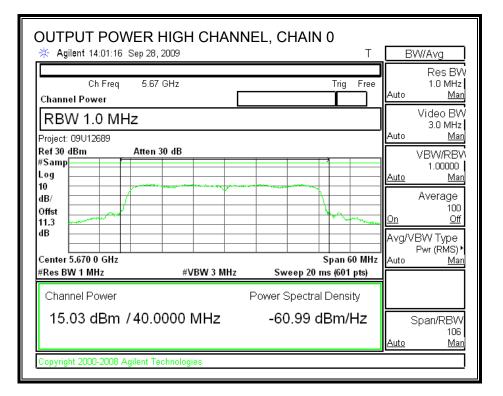
Page 164 of 292

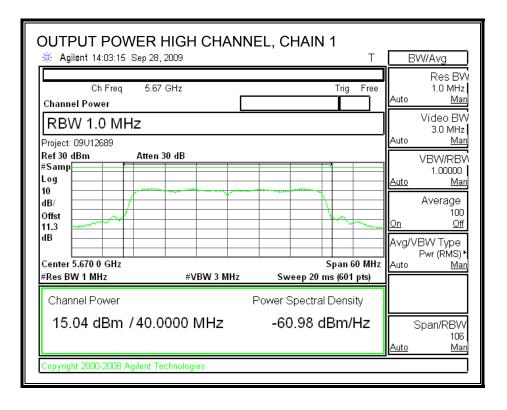
		EL, CHAIN 2	т		A// A
Agilent 16:06:56 Apr 28, 2	2010			E BY	N/Avg
Ch Freq 5.55 Channel Power	GHz		Trig Free	Auto	Res BW 1.0 MHz <u>Man</u>
RBW 1.0 MHz Project: 09U12689				Auto	Video BW 3.0 MHz <u>Man</u>
Ref 30 dBm Atten 3 #Samp Dog 10	0 dB			<u>Auto</u>	VBW/RBW 1.00000 <u>Man</u>
dB/ Offst				<u>On</u>	Average 100 <u>Off</u>
dB Center 5.550 0 GHz #Res BW 1 MHz	#VBW 3 MHz	Sweep 20 ms	oan 60 MHz (601 pts)		BW Type Pwr (RMS) ► <u>Man</u>
Channel Power		Power Spectral D	ensity		
17.40 dBm /40.0	000 MHz	-58.62 dB	m/Hz	S Auto)pan/RBW 106 Man
Copyright 2000-2009 Agilent Te	chnologies				



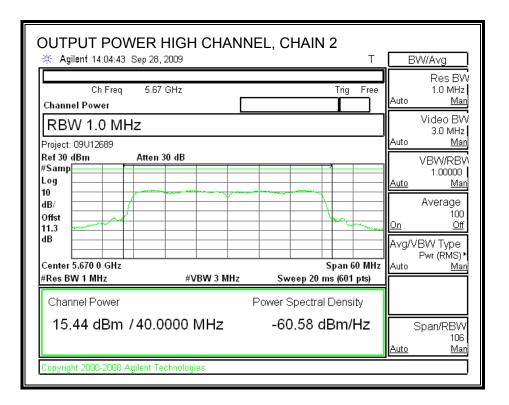
Page 165 of 292

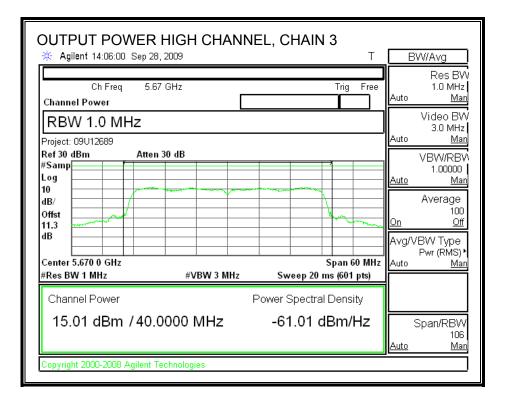
OUTPUT POWER, HIGH CHANNEL





Page 166 of 292





Page 167 of 292

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	10.94	10.93	10.94	10.99
Middle	5550	17.41	17.37	17.50	17.86
High	5700	14.12	14.02	14.13	13.72

Page 168 of 292

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 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.

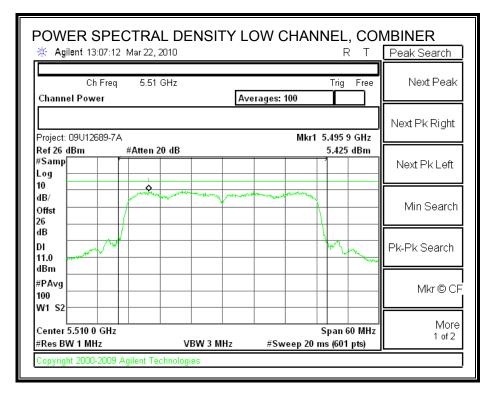
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

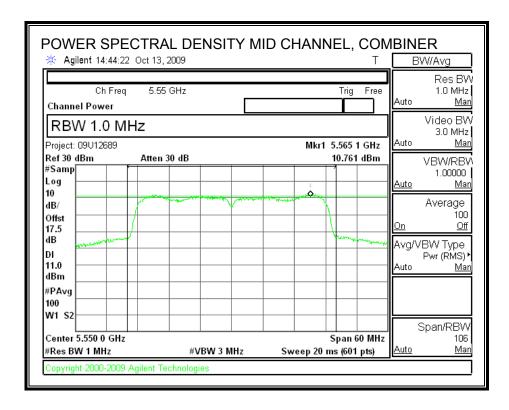
Channel	Frequency	PSD with Combiner	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5510	5.425	11.00	-5.58
Middle	5550	10.761	11.00	-0.24
High	5670	9.038	11.00	-1.96

RESULTS

Page 169 of 292

POWER SPECTRAL DENSITY





Page 170 of 292

POWER SPECTRA		GH CHANNEL, CO	MBINER BW/Avg
Ch Freq 5.67 Channel Power	GHz	Trig Free	Res BW 1.0 MHz Auto <u>Man</u>
RBW 1.0 MHz		Mkr1 5.683 5 GHz	Video BW 3.0 MHz Auto <u>Man</u>
Ref 30 dBm Atten 2 #Samp Log 10	20 dB	9.038 dBm	VBW/RBV 1.00000 <u>Auto Man</u>
dB/ Offst 25.6	and and and a start of the		Average 100 <u>On Off</u>
dB DI 11.0 dBm		- ho muse	Avg/VBW Type Pwr (RMS)∙ Auto <u>Man</u>
#PAvg 100 W1 S2			
Center 5.670 0 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 60 MHz Sweep 20 ms (601 pts)	Span/RBW 106 <u>Auto Man</u>
Copyright 2000-2009 Agilent Te	chnologies		

Page 171 of 292

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.

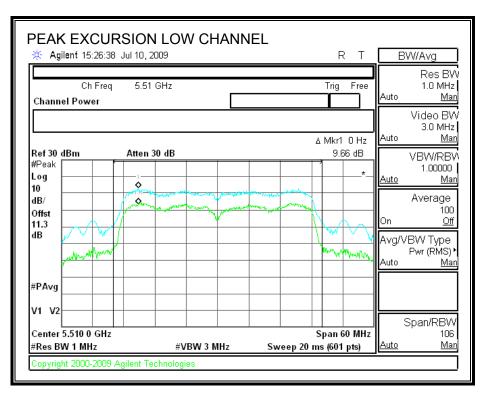
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

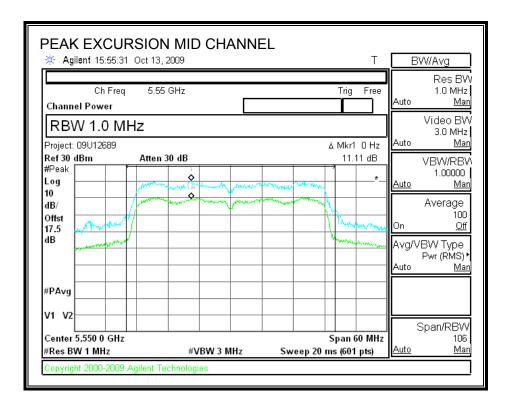
RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5510	9.66	13	-3.34
Middle	5550	11.11	13	-1.89
High	5670	10.26	13	-2.74

Page 172 of 292

PEAK EXCURSION





Page 173 of 292

🔆 Agilent 13:19:40 Jul 1	7,2009	RT		BW/Avg	
Ch Freq &	5.67 GHz	Ti	rig Free	Auto	Res BV 1.0 MHz <u>Mar</u>
		۔ ۵ M	kr1 0 Hz	Auto	Video BV 3.0 MHz <u>Mar</u>
#Peak	en 30 dB		10.26 dB	<u>Auto</u>	VBVV/RBV 1.00000 <u>Mar</u>
dB/ Offst 11.3	R Contraction of the second of	- manager and -		On	Average 100 <u>Off</u>
dB			V	Avg/Vł Auto	BW Type Pwr (RMS) [•] <u>Mar</u>
#PAvg					
V1 V2 Center 5.670 0 GHz #Res BW 1 MHz	#VBW 3 MHz	Spa Sweep 20 ms (6	in 60 MHz	S Auto	ipan/RBW 106 Mar

Page 174 of 292

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.

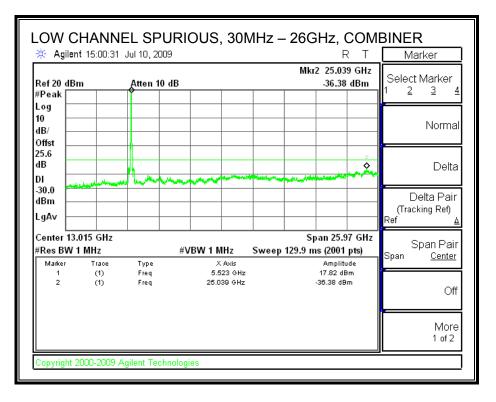
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

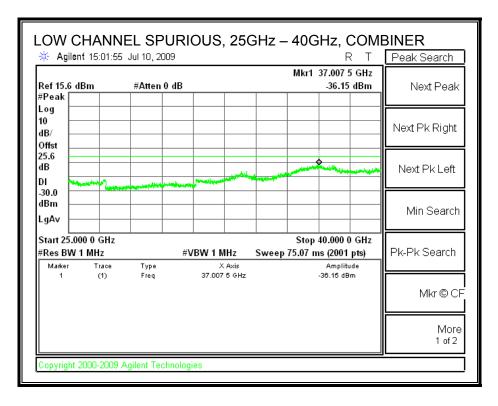
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

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 175 of 292

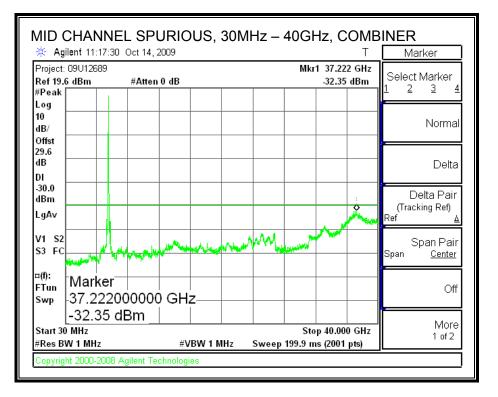
LOW CHANNEL SPURIOUS EMISSIONS





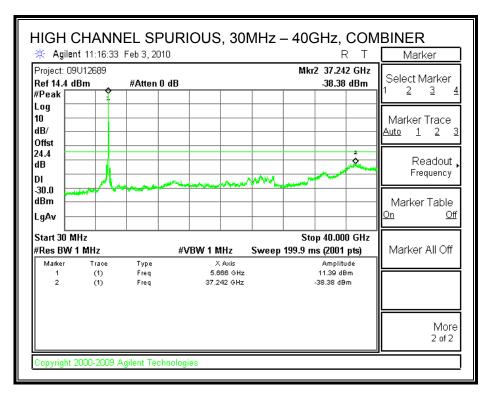
Page 176 of 292

MID CHANNEL SPURIOUS EMISSIONS



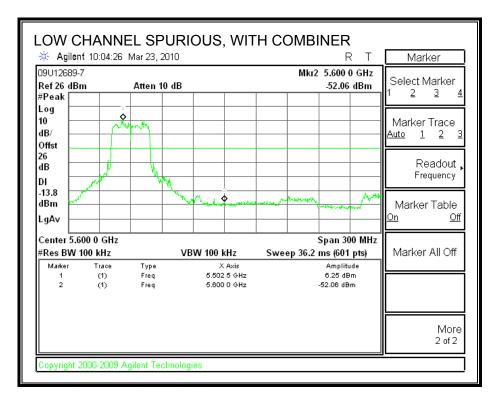
Page 177 of 292

HIGH CHANNEL SPURIOUS EMISSIONS

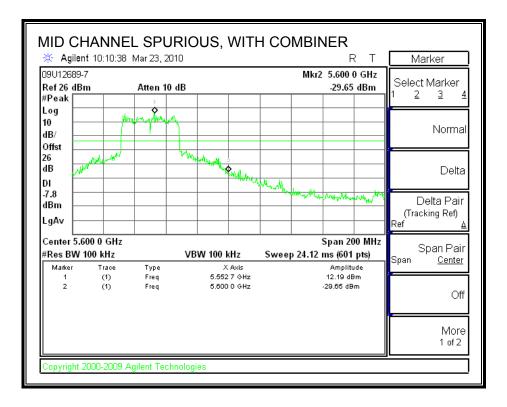


Page 178 of 292

7.9.7. CONDUCTED SPURIOUS (-20 dBc)



Page 179 of 292



Page 180 of 292

Project: 09U12689 Mkr2 5.640 50 GHz Ref 23.6 dBm Atten 20 dB #Peak	· •		Oct 19, 2009					R		Marker
Atten 20 db -12.10 dbm 1 2 3 4 Log	-						MKrZ			Select Marker
Log 10 10 10 10 10 10 10 10 10 10		Bm	Atten 20 dB					-12.16	dBm	
10 Image: Construction of the second secon										
dB/ Offst Image: Construction of the second secon					mark	way	monort	my		
Offst Image: Constraint of the second seco										
T.8 Marker Table dBm Image: Constraint of the state of				Ö						<u>Auto 1 2 3</u>
T.8 Marker Table dBm Image: Constraint of the state of	Offist			Margaret					Anony	
T.8 Marker Table dBm Image: Constraint of the state of	13.6		and							Readout
T.8 Marker Table dBm Image: Constraint of the state of	ad 🗠	Alexand South								
dBm Marker Table LgAv Stop 5.700 00 GHz #Res BW 100 kHz #VBW 100 kHz Stop 5.700 00 GHz #Res BW 100 kHz #Res BW 100 kHz 1 (1) Freq 5.840 50 6Hz -12.16 dBm More										(logdono)
LgAv Intel Keil Fable LgAv Stop 5.700 00 GHz Start 5.600 00 GHz #VBW 100 kHz #Res BW 100 kHz #VBW 100 kHz Sweep 12.08 ms (601 pts) Marker All Off Marker Trace 1 (1) 2 (1) Freq 5.840 50 6Hz -12.16 dBm										
Start 5.600 00 GHz Stop 5.700 00 GHz #Res BW 100 kHz #VBW 100 kHz Sweep 12.08 ms (601 pts) Marker Trace Type X Axis Amplitude 1 (1) Freq 5.878 83 GHz 12.20 dBm 2 (1) Freq 5.840 50 GHz -12.16 dBm	dBm –									Marker Table
#Res BW 100 kHz #VBW 100 kHz Sweep 12.08 ms (601 pts) Marker All Off Marker Trace Type X.Axis Amplitude 1 (1) Freq 5.878 83 GHz 12.20 dBm 2 (1) Freq 5.840 50 GHz -12.16 dBm	LgAv 📙									<u>On Off</u>
#Res BW 100 kHz #VBW 100 kHz Sweep 12.08 ms (601 pts) Marker All Off Marker Trace Type X.Axis Amplitude 1 (1) Freq 5.878 83 GHz 12.20 dBm 2 (1) Freq 5.840 50 GHz -12.16 dBm										
Marker Trace Type X Axis Amplitude 1 (1) Freq 5.878 83 GHz 12.20 dBm 2 (1) Freq 5.840 50 GHz -12.16 dBm	Start 5.600	00 GHz								
1 (1) Freq 5.878 83 GHz 12.20 dBm 2 (1) Freq 5.840 50 GHz -12.18 dBm	#Res BW 1	00 kHz	ź	VBW 100 k	Hz	Sweep	o 12.08	ms (601	pts)	Marker All Off
2 (1) Freq 5.840 50 GHz -12.16 dBm										
More										
	2	(1)	Freq	5.640 50	GHZ			-12.18 dBr	n	
										Moro
										2 of 2

Page 181 of 292

8. 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

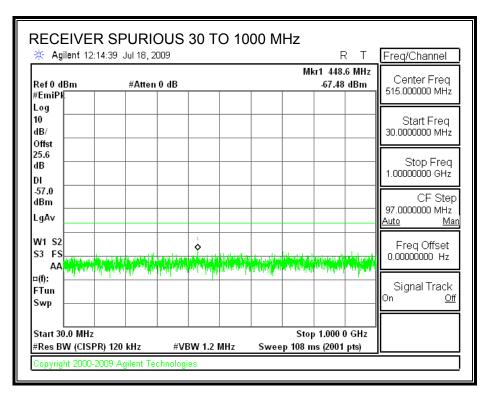
The receiver antenna port is connected to a spectrum analyzer.

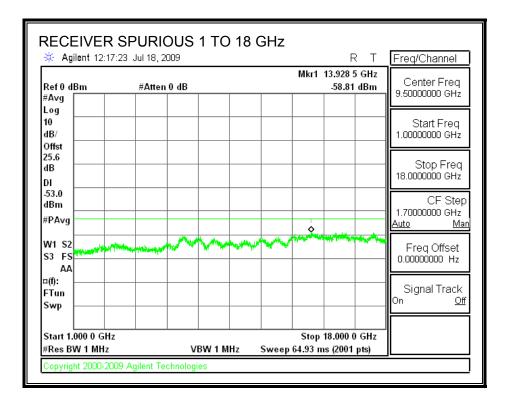
The spectrum from 30 MHz to 18 GHz is investigated with the receiver set to the middle channel of each 5 GHz band.

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 182 of 292

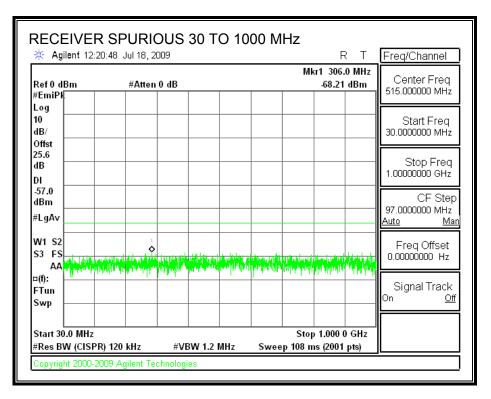
RECEIVER SPURIOUS EMISSIONS IN THE 5.2 GHz BAND

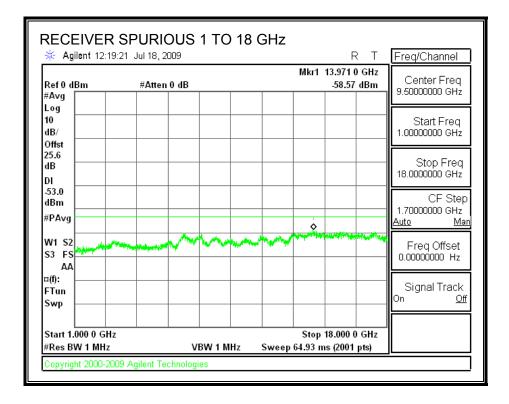




Page 183 of 292

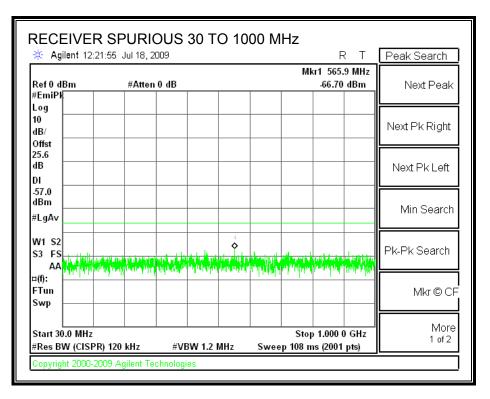
RECEIVER SPURIOUS EMISSIONS IN THE 5.3 GHz BAND

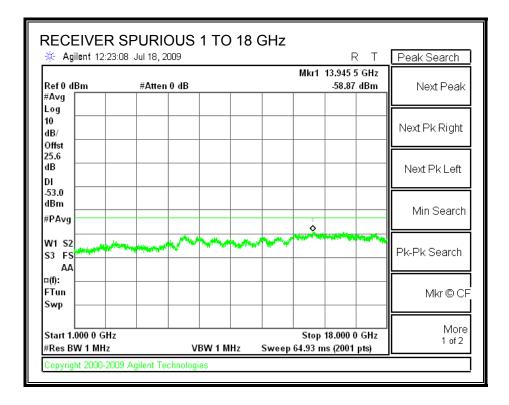




Page 184 of 292

RECEIVER SPURIOUS EMISSIONS IN THE 5.5 GHz BAND





Page 185 of 292

9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

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.

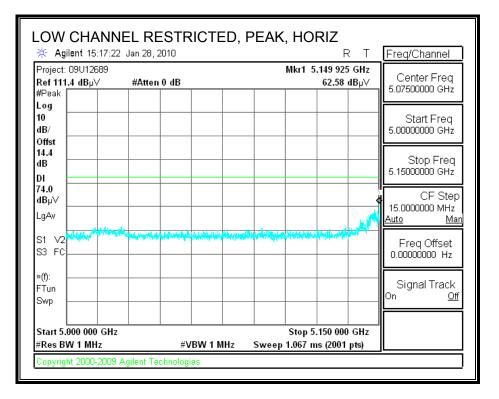
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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.

9.2. TRANSMITTER ABOVE 1 GHz

9.2.1. 802.11a MODE IN 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

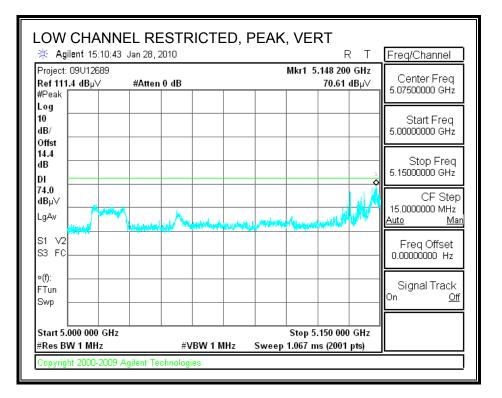


Page 187 of 292

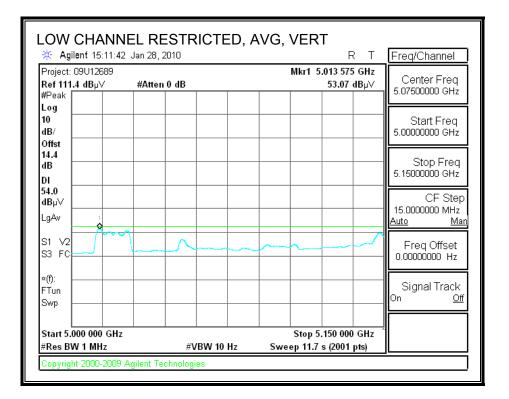
🔆 Agilent 15:18:17 Ja	an 28, 2010	R T	Freq/Channel
Project: 09∪12689 Ref 111.4 dB µ∀ #Peak	#Atten 0 dB	Mkr1 5.148 050 GHz 44.06 dBµ∨	Center Freq 5.07500000 GHz
Log 10 dB/			Start Freq 5.00000000 GHz
Offst 14.4 dB DI			Stop Freq 5.15000000 GHz
54.0 dBμV			CF Step 15.0000000 MHz
S1 V2 S3 FC			<u>Auto Mar</u> Freq Offset 0.00000000 Hz
×(f): FTun Swp			Signal Track On <u>Off</u>
Start 5.000 000 GHz #Res BW 1 MHz	#VBW 10 Hz	Stop 5.150 000 GHz Sweep 11.7 s (2001 pts)	

Page 188 of 292

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



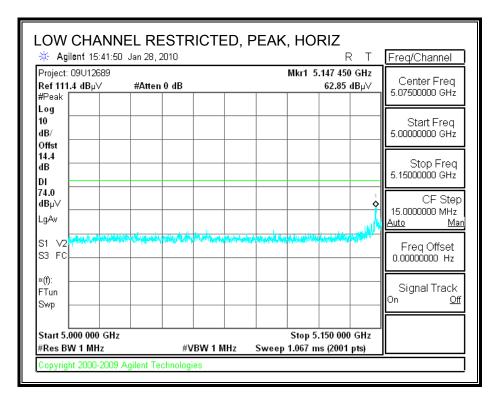
Page 189 of 292



Page 190 of 292

9.2.2. TX ABOVE 1 GHz FOR 802.11a DUAL CHAIN MODE IN 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

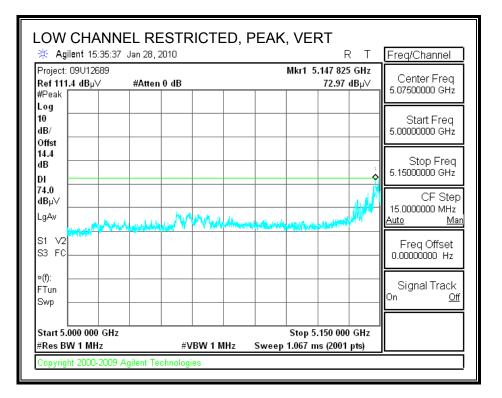


Page 191 of 292

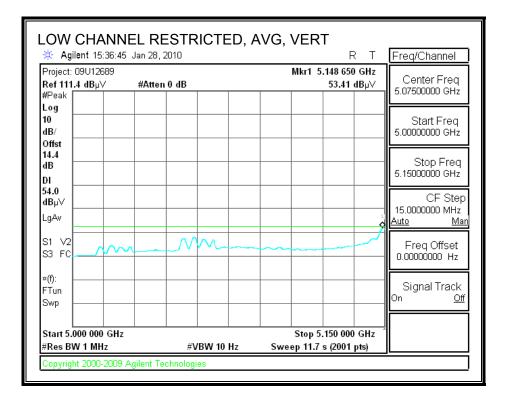
🔆 Agilent 15:43:18	Jan 28, 2010	R 1	Peak Search
Project: 09∪12689 Ref 111.4 dB µ∨ #Peak	#Atten 0 dB	Mkr1 5.150 000 GH; 43.26 dBµ∖	
Log			
10 dB/			Next Pk Right
Offst 14.4 dB			Next Pk Left
DI			
LgAv			Min Search
S1 V2 S3 FC			Pk-Pk Search
«(f): FTun			Mkr © CF
			More
Start 5.000 000 GHz #Res BW 1 MHz	#VBW 10 H	Stop 5.150 000 GHz z Sweep 11.7 s (2001 pts)	1 of 2

Page 192 of 292

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



Page 193 of 292



Page 194 of 292

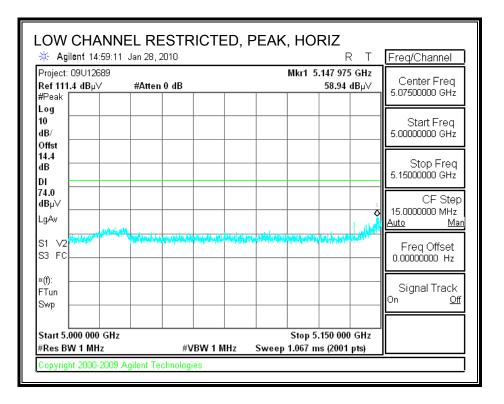
HARMONICS AND SPURIOUS EMISSIONS

		Measuren ification		s, Frei	nont 51	n Chamb	er								
Test Engr:		Thanh N	guyen												
Date:		07/15/09													
Project #:		09U1265	2												
Company:		QualCo													
EUT Descriq	ption:	Etherner	card												
EUT M/N:		65-VN66	3-P2												
Test Target:		FCC 15.3	247/15.4	07											
Mode Oper	•	Transmi	-												
f	f	Measuren				Preamp (Field Stren;				
-	Dist	Distance			D Corr	Distance					ld Strength				
I	Read	Analyzer			Avg	Average	Field S	trength @) 3 m	Margin v	rs. Average	Limit			
	AF	Antenna			Peak	Calculate			ength	Margin v	rs. Peak Liz	nit			
(CL	Cable Los	s		HPF	High Pas	s Filter								
						·	_				'				
f	Dist	Read	AF	CL	Amp	D Corr		Corr.	:		Ant. Pol.			Table Angle	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	cm	Degree	
Low ch 5180							~ -					~			
15.540	3.0	35.8	38.7	11.3	-34.8	0.0	0.7	51.7	74.0	-22.3	V	P	147.8	304.8	
15.540	3.0	23.7	38.7	11.3	-34.8	0.0	0.7	39.6	54.0 74.0	-14.4 -24.7	V	A	147.8	304.8	
15.540 15.540	3.0 3.0	34.6 21.3	38.7 38.7	11.3 11.3	-34.8 -34.8	0.0 0.0	0.7 0.7	50.7 37.2	74.0 54.0	-24.7 -16.3	H H	P A	156.5 156.5	346.0 346.0	
15.540 Mid ch 520(¥1.J	J0./	11.3	-J-1.0	0.0	U. (J(14	246U	-10.3	11	<u>а</u>	120.2	J40.0	
15.600	, 3.0	37.1	38.5	11.4	-34.8	0.0	0.7	52.9	74.0	-21.1	v	Р	147.8	296.5	
15.600	3.0	24.4	38.5	11.4		0.0	0.7	40.2	54.0	-13.8	v	Â	147.8	296.5	
15.600	3.0	37.1	38.5	11.4		0.0	0.7	52.9	74.0	-21.1	H	P	150.5	300.0	
15.600	3.0	23.4	38.5	11.4		0.0	0.7	39.4	54.0	-14.6	H	Ā	150.5	300.0	
High ch 524	40	l				[
	3.0	36.6	38.2	11.4	-34.7	0.0	0.7	52.2	74.0	- 21.8	V	Р	166.9	200.0	
15.720	3.0	25.5	38.2	11.4	-34.7	0.0	0.7	41.2	54.0	-12.8	V	A	166.9	200.0	
15.720 15.720		36.4	38.2	11.4	-34.7	0.0	0.7	52.1	74.0	-21.9	H	Р	140.6	310.0	
15.720 15.720 15.720	3.0	¢													
15.720 15.720	3.0 3.0	24.2	38.2	11.4	-34.7	0.0	0.7	39.8	54.0	-14.2	H	A	140.6	310.0	

Page 195 of 292

9.2.3. 802.11n HT20 MODE IN 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

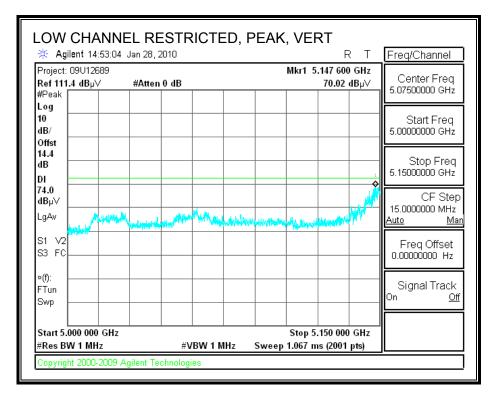


Page 196 of 292

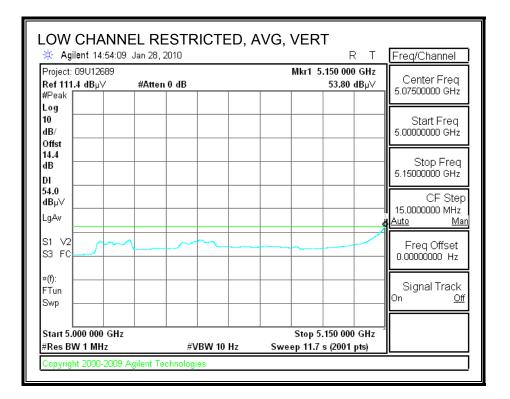
LOW CHANNEL F	,	R T	Freq/Channel
Project:09U12689 Ref111.4 dB µ∨ #Att #Peak	ten 0 dB	Mkr1 5.150 000 GHz 43.89 dBµ∨	Center Freq 5.07500000 GHz
Log			Start Freq 5.0000000 GHz
Offst 14.4 dB DI			Stop Freq 5.15000000 GHz
54.0 dBµ∨			CF Step 15.0000000 MHz
S1 V2 S3 FC			<u>Auto Mar</u> Freq Offset 0.0000000 Hz
*(f): FTun Swp			Signal Track On <u>Off</u>
Start 5.000 000 GHz #Res BW 1 MHz	#VBW 10 Hz	Stop 5.150 000 GHz Sweep 11.7 s (2001 pts)	

Page 197 of 292

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

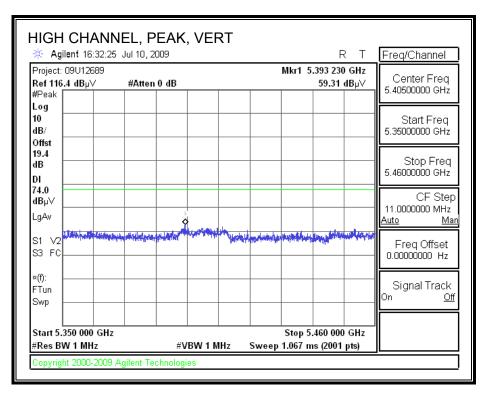


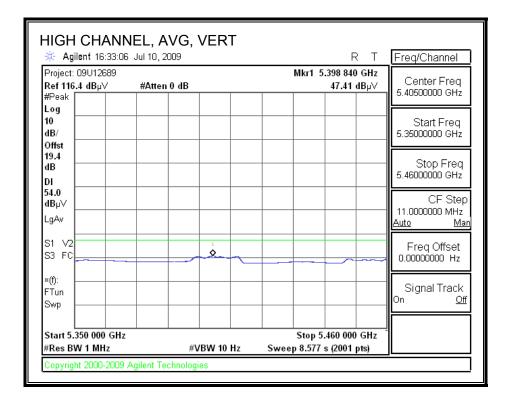
Page 198 of 292



Page 199 of 292

AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





Page 200 of 292

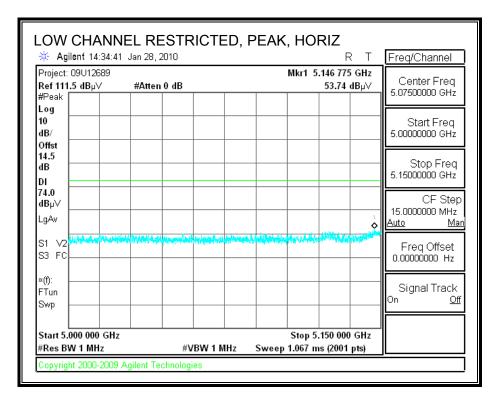
HARMONICS AND SPURIOUS EMISSIONS

	~		y Measurem												
omplia	ince Ce	rtification	Services, Fr	emont	5m Ch	amber									
ompan	y: Qual	lcomm													
	#: 09U														
	7/13/09														
		Doug And	lerson oport Notebo	-1-											
	ration: Cx / HT		ροιτ Νοτέρο	oĸ											
est Equ	uipmen	it:													
	A	18GHz	Pre-ar	mulifor	1.00	оц_	Dro. on	nlifer	26-40GH			orn > 180	2U=		Limit
				· ·			Fre-am	piller	20-40GH	<u> </u>			382		
T73; S	5/N: 671	7@3m	▼ T144 N	liteq 30	08A00	931 🗸				-				-	FCC 15.205
- Hi Freq	uency Ca	bles					1							_	
			101		0007		201		2807500					Deal	c Measurements
3' c	cable 2	2807700	12' c	able 2	28076	500	20 ca	ole 22	2807500		HPF	Re	ject Filte		W=VBW=1MHz
3' cr	able 22	307700	_ 12' ca	ble 228	07600	•	20' cab	le 228(07500 _	HPI	F_7.6GHz				ge Measurements
									•					RBW=	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	1	dBuV/m	1	-	dB	dB	(V/H)
	()														(
<u>øw Ch.: f</u>	5180 (Pe	wer = 14 dBı	ņ)	•	•							•			
5.540	3.0	43.5	29.7	38.7	113	-34.8	0.0	0.7	59.4	45.7	74	54	-14.6	-8.3	V (Noise Floor)
5.540 5.540	3.0	43.5	29.7	38.7	113	-34.8	0.0	0.7	59.3	45.0	74	54 54	-14.0	-8.4	H (Noise Floor)
												•			
GJ CL.	5200 (P)	wer = 14 dB	<u> </u>												
<u>uu. Cit.: :</u>	<u>5400 (P</u> (mer - 14 dB	<u>m</u> y												
5.600	3.0	43.1	29.4	38.5	11.4	-34.8	0.0	0.7	58.9	45.2	74	54	- 15.1	- <mark>8.8</mark>	V (Noise Floor)
5.600	3.0	43.1	31.9	38.5	11.4	-34.8	0.0	0.7	58.9	47.8	74	54	-15.1	-6.2	H (Neise Fleer)
						•									
igh Ch.:	5240 (P	ower = 14 dB	(m)									•			
5.720	3.0	42.3	31.4	38.2	11.4	-34.7	0.0	0.7	58.0	47.0	74	54	-16.0	-7.0	V (Noise Floor)
5.720 5.720	3.0	42.5	29.0	38.2	11.4	-34.7	0.0	0.7	58.6	41.0	74	54 54	-10.0	-7.0	H (Noise Floor)
						ļ			ļ						
ev. 11.10	30.														
	f	Measurem	ent Frequency	y		Amp	Preamp	Gain				Avg Lim	Average I	Field Strengt	h Limit
	Dist	Distance to	o Antenna			$\mathbb{D}\operatorname{Corr}$	Distance	Corre	ct to 3 mete	ers		Pk Lim	Peak Fiel	d Strength L	imit
		Analyzer R	~			Avg			Strength @			<u> </u>	<u> </u>	. Average L	
	AF	Antenna F				Peak			k Field Stre	ngth		Pk Mar	Margin vs	. Peak Limit	
	CL	Cable Los	s			HPF	High Pas	s Filter							

Page 201 of 292

9.2.4. 802.11n HT40 MODE IN 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

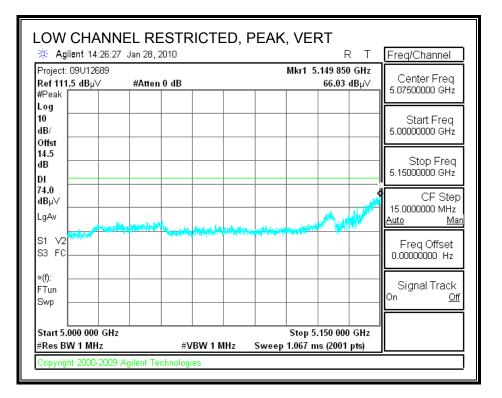


Page 202 of 292

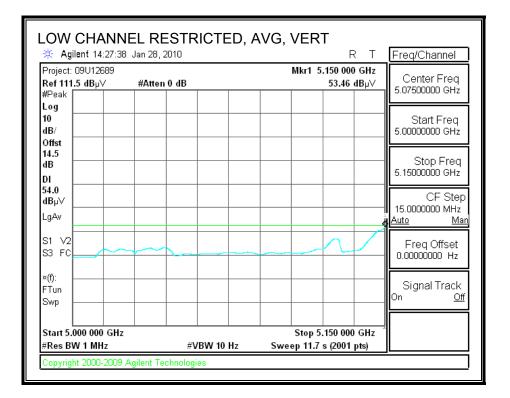
🔆 Agilent 14:36:02 -	L RESTRICTED	, ,	Freq/Channel
Project: 09∪12689 Ref 111.5 dB µ∨ #Peak	#Atten 0 dB	Mkr1 5.150 000 GH 42.54 dBμ\	Contor Frog
Log 10 dB/			Start Freq 5.00000000 GHz
Offst 14.5 dB			Stop Freq
DI 54.0 dBµ∀			CF Step 15.000000 MHz
LgAv S1 V2			Auto Mar Freq Offset
S3 FC			0.00000000 Hz
FTun Swp			Signal Track On <u>Off</u>
Start 5.000 000 GHz #Res BW 1 MHz	#VBW 10 Hz	Stop 5.150 000 GH: Sweep 11.7 s (2001 pts)	z

Page 203 of 292

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

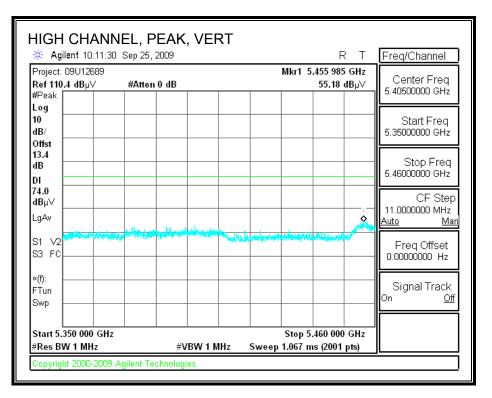


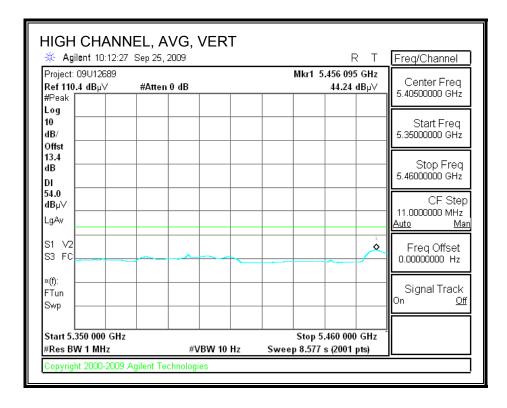
Page 204 of 292



Page 205 of 292

AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





Page 206 of 292

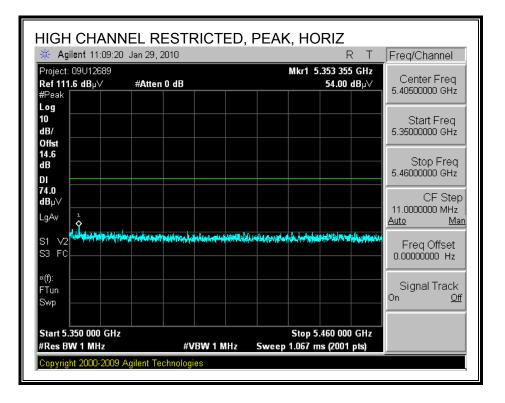
HARMONICS AND SPURIOUS EMISSIONS

est Engr: Date: Project #: Company: Configuration Mode Oper:	09/2 09U Qua n: EUI	5/09 12689 dcom		-	ook										
f Dis Rea AF CL	st Dist ad Ana ' Ant	ance to		una	-	Preamp (Distance Average I Calculate High Pass	Correc Field St I Peak	trength @ Field Stre	3 m	Peak Fie Margin v	Field Stren, ld Strength 75. Average 75. Peak Lir	Limit Limit			
:		ad	AF	CL	Amp	D Corr		Corr.			Ant. Pol.	Det.	Ant.High	Table Angle	Notes
GHz (J	m) dB	uV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	cm	Degree	
190MHz, Pov		·····													
		.5	38.6	11.4		0.0	0.7	51.3	74.0	-22.7	V	Р	170.4	360.0	
· · · · · · · · · · · · · · · · · · ·		.1		11.4		0.0	0.7	39.0	54.0	-15.0	V	A	170.4	360.0	
		.0		11.4		0.0	0.7	50.9	74.0	-23.1	H	P	122.4	156.9	
		.0		11.4	-34.8	0.0	0.7	38.9	54.0	-15.1	H	A	122.4	156.9	
230MHz, Pou								F0 0	- 4 0		T T	n	101 /		
·····		.2 .8		11.4 11.4	-34.7 -34.7	0.0 0.0	0.7	50.9 38.5	74.0 54.0	-23.1 -15.5	v v	Р	121.6 121.6	357.2 357.2	
·····		.8			-34.7	0.0	0.7	38.5 51.9	54.0 74.0	-15.5	v H	A P	121.6	••••••••••••••••••••••••••••••••••••••	
		.8			-34.7	0.0	0.7	38.5	74.0 54.0	-15.5	п Н	P A	100.0	87.3 87.3	
Rev. 4.1.2.7 Note: No othe	er emiss	ions w	vere de	tected	l ahove :	the system	n nois	e floor.							

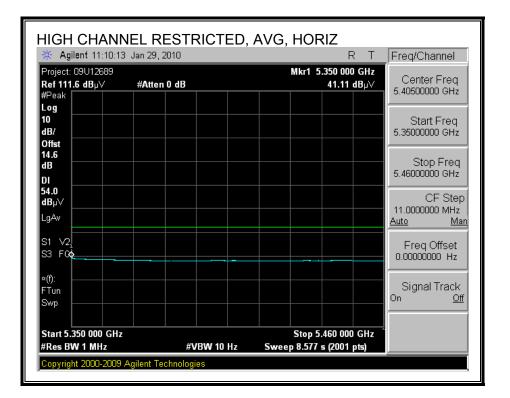
Page 207 of 292

9.2.5. 802.11a MODE IN 5.3 GHz BAND

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

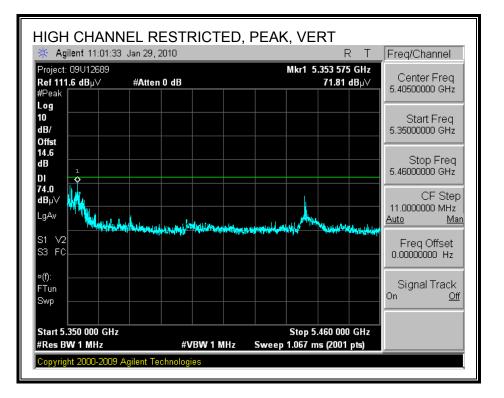


Page 208 of 292

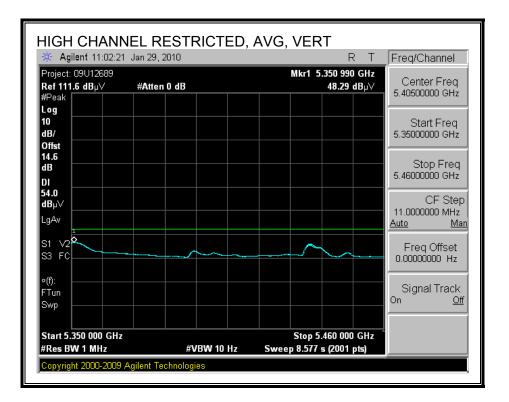


Page 209 of 292

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



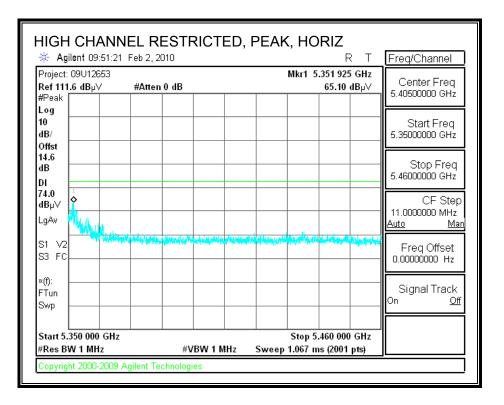
Page 210 of 292



Page 211 of 292

9.2.6. TX ABOVE 1 GHz FOR 802.11a DUAL CHAIN MODE IN 5.3 GHz BAND

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

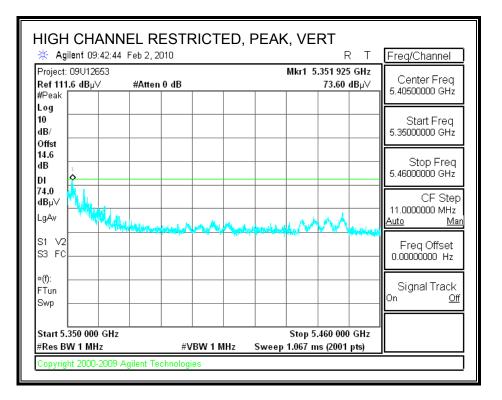


Page 212 of 292

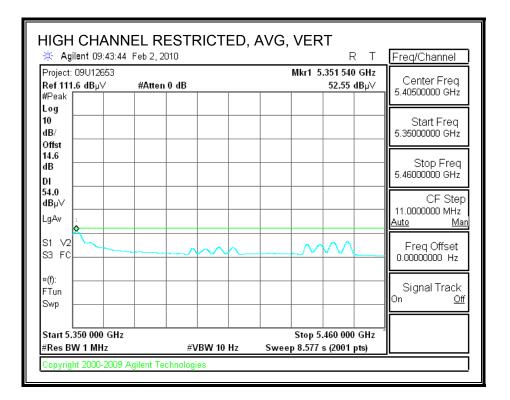
🔆 Agilent 09:52:00	3 Feb 2, 2010		RT	Freq/Channel
Project: 09U12653 Ref 111.6 dB µ∨ #Peak	#Atten 0 dB	Mkr1 5	.351 210 GHz 45.30 dBµ∀	Center Freq 5.40500000 GHz
Log				
10 dB/				Start Freq 5.3500000 GHz
Offst 14.6 dB				Stop Freq 5.4600000 GHz
DI				CF Step
LgAv				11.0000000 MHz <u>Auto Mar</u>
S1 ∨2 S3 FC		~ ~		Freq Offset 0.00000000 Hz
×(f):				Signal Track
Swp				On <u>Off</u>
Start 5.350 000 GHz #Res BW 1 MHz	#VBW 10	•	.460 000 GHz	

Page 213 of 292

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



Page 214 of 292



Page 215 of 292

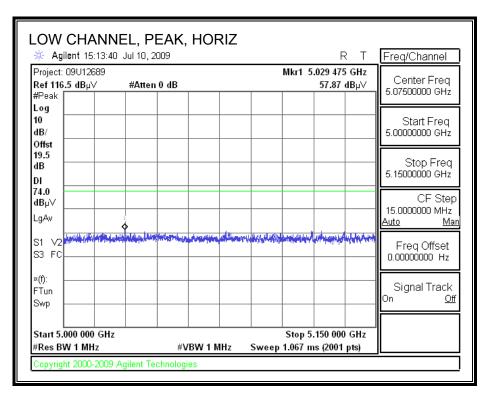
HARMONICS AND SPURIOUS EMISSIONS

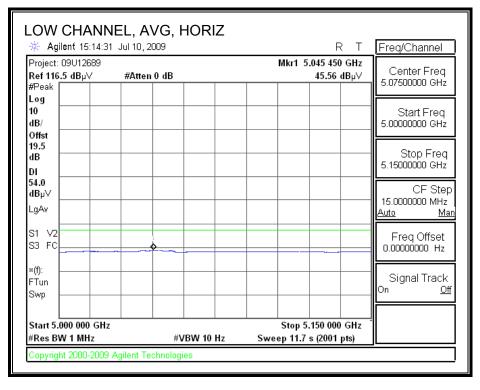
Project : Date: Fest En Configu	gineer:)/09 h Nguyen ith dongle , :	remote	Notel	ook									
lode:	uipmen		chains, 11a												
		18GHz	Pre-ar	nplifer	1-260	GHz	Pre-am	plifer	26-40GH	z	H	orn > 18(GHz		Limit
173; 9	S/N: 671	7 @3m	▼ T144 N	liteq 30	08A00)31 🗸				•				-	FCC 15.205
	quency Cal cable 2	2807700	12' c	able 2	28076	600	20' ca	ble 22	807500		HPF	Re	ject Filte		k Measurements
3' c	able 228	, 807700	- 12' ca	ıble 228	07600	•	20' cab	le 2280)7500 🔻	HP	F_7.6GHz	•		Avera	W=VBW=1MHz nge Measurements =1MHz ; VBW=10Hz
f	Dist		Read Avg.	AF	CL	Amp	D Corr		Peak	Avg		Avg 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)
	5260Mh														
5.780	3.0	41.4	28.4	38.0	11.5	-34.6	0.0	0.7	56.9	43.9	74	54	-17.1	-10.1	V
5.780 /lid. Ch.:	3.0	38.3	26.4	38.0	11.5	-34.6	0.0	0.7	53.8	41.9	74	54	-20.2	-12.1	H
0.600	3.0	38.2	28.4	37.7	9.0	-36.6	0.0	0.8	49.2	39.3	74	54	-24.8	-14.7	v
15.900	3.0	39.3	28.2	37.7	11.5	-34.6	0.0	0.7	54.7	43.6	74	54	-19.3	-10.4	V (Noise Floor)
0.600	3.0	38.6	26.2	37.7	9.0	-36.6	0.0	0.8	49.5	37.2	74	54	-24.5	- 16.8	H
5.900	3.0	38 <i>.</i> 5	26.4	37.7	115	-34.6	0.0	0.7	53.8	41.7	74	54	-20.2	-12.3	H (Noise Floor)
ligh Ch.:					~ .										
0.640	3.0 3.0	46.7 42.4	35.6 29.1	37.7 37.5	9.1 11 <i>5</i>	-36.6 -34.5	0.0 0.0	0.8 0.7	57.7 57.7	46.6 44.4	74 74	54 54	-16.3 -16.3	-7.4 -9.6	V V (Noise Floor)
0.640	3.0	42.4 38.3	29.1	37.5	9.1	-34.5	0.0	0.8	49.3	44.4 37.2	74	54 54	-10.3	-9.0 -16.8	H
5.960	3.0	41.1	28.7	37.5	11.5	-34.5	0.0	0.7	56.4	43.9	74	54	-17.6	-10.0	H (Noise Floor)
Rev. 11.10	f Dist Read	Distance to Analyzer R	eading	y		Avg	Average	Correc Field S	ct to 3 mete	3 m		Pk Lim Avg Mar	Peak Field Margin vs	ield Streng Strength L Average L	imit imit
	AF CL	Antenna Fa Cable Loss				Peak HPF	Calculate High Pas		c Field Stre	ngth		Pk Mar	Margin vs.	. Peak Limi	5

Page 216 of 292

9.2.7. 802.11n HT20 MODE IN 5.3GHz BAND

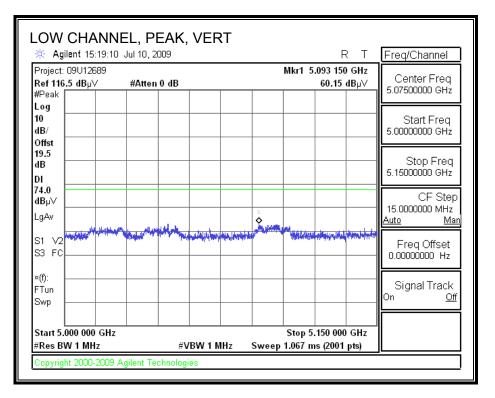
AUTHORIZED BANDEDGE (LOW CHANNEL, HORIZONTAL)

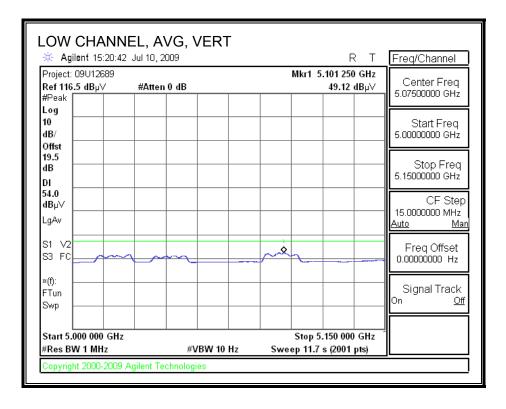




Page 217 of 292

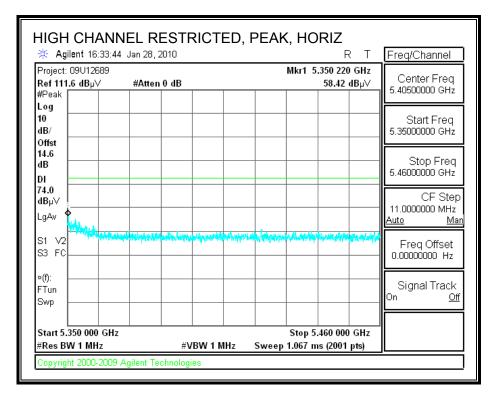
AUTHORIZED BANDEDGE (LOW CHANNEL, VERTICAL)





Page 218 of 292

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

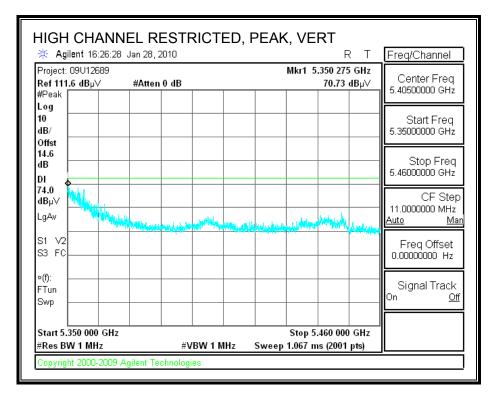


Page 219 of 292

Start 5.350 000 GHz #Res BW 1 MHz	#	VBW 10 Hz	Stop 5.46(Sweep 8.577 s (2		~
Swp					
×(f): FTun					Signal Track
S1 ∨2 S3 FC					Freq Offset 0.00000000 Hz
dBµ∨ LgAv					11.0000000 MHz Auto Mar
DI					CF Step
14.6 dB					Stop Freq 5.4600000 GHz
10 dB/ Offst					Start Freq 5.35000000 GHz
Ref 111.6 dBµ∨ #Peak Log	#Atten 0 dB		42	2.91 dBµ∨	5.40500000 GHz
Project: 09U12689			Mkr1 5.35		Center Freq
🔆 Agilent 16:34:36	Jan 28, 2010			RΤ	Freq/Channel

Page 220 of 292

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



Page 221 of 292

HIGH CHANNEL Agilent 16:27:52 Jan 2		R T	Freq/Channel
Project: 09U12689 Ref 111.6 dB µ∨ #Att #Peak	ten 0 dB	Mkr1 5.350 000 GHz 52.72 dBµ∨	Center Freq 5.40500000 GHz
Log 10 dB/			Start Freq 5.35000000 GHz
Offst 14.6 dB DI			Stop Freq 5.46000000 GHz
54.0 dBµ∨ LgAv			CF Step 11.0000000 MHz <u>Auto Man</u>
S1 V2 S3 FC			Freq Offset 0.00000000 Hz
*(f): FTun Swp			Signal Track . On <u>Off</u>
Start 5.350 000 GHz #Res BW 1 MHz	#VBW 10 Hz	Stop 5.460 000 GHz Sweep 8.577 s (2001 pts)	

Page 222 of 292

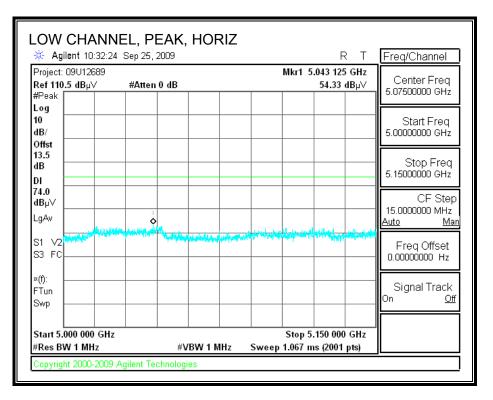
HARMONICS AND SPURIOUS EMISSIONS

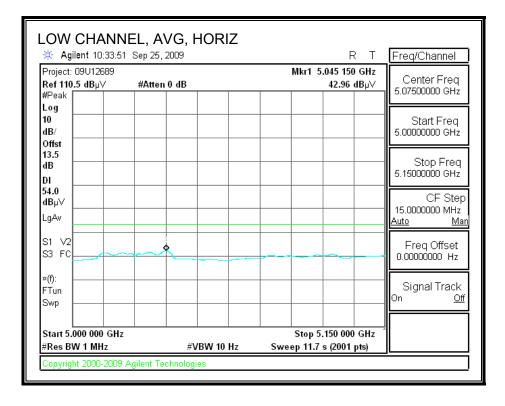
	-		7 Measurem												
Complia	ance Ce	ertification	Services, Fr	emont	5m Ch	amber									
ompai	ıy: Qua	lcomm													
roject	#: 09U	12689													
	7/10/09	Doug And	ercon												
			port Notebo	ok											
Iode: '	Tx / H1	20													
est Eq	uipmer	<u>it:</u>													
			-				-						~		1 Jun 14
		-18GHz		nplifer			Pre-am	plifer	26-40GH	z	н	orn > 18(SHZ		Limit
T73; 9	S/N: 671	7 @3m	▼ T144 M	liteq 30	08A009	31 🗸				-				-	FCC 15.205
Hi Fred	quency Ca	ibles												_	
3'	cable 2	22807700	12' c	able 2	28076	00	20' ca	ble 22	807500		HPF	Re	ject Filte		Measurements
21 -	able 22	907700	401	LL. 000	07000		20' cab	10.2204	7500		F_7.6GHz		,	RB1	N=VBW=1MHz ge Measurements
30	able ZZ	807700	▼ 12° ca	ble 228	07600	•	20 cab	Te ZZO	•		F_7.6GH2	-			MHz; VBW=10Hz
	L TOL 1	-	- , 				In a	770.			-		79.75		DT
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		Pk Mar dB	Avg Mar dB	Notes (V/H)
			, and a r						de la comme	abu mu					(1/11)
ow Ch.:	<u>5260</u>														
5.780	3.0	35.2	24.5	38.0	115	-34.6	0.0	0.7	50.7	40.1	74	54	-23.3	-13.9	V (Noise Floor)
5.780	3.0	36.8	24.1	38.0	11.5	-34.6	0.0	0.7	52.3	39.7	74	54	-21.7	-14.3	H (Noise Floor)
	5000														
lid. Ch.:															
0.600 5.900	3.0 3.0	46.4 42.6	39.3 29.1	37.7 37.7	9.0 11.5	-36.6 -34.6	0.0 0.0	0.8 0.7	57.3 57.9	50.2 44.5	74 74	54 54	-16.7 -16.1	-3.8 -9.5	V V (Noise Floor)
0.600	3.0	42.0	29.1	37.7	9.0	-34.0	0.0	0.7	57.9	44.5	74	54 54	-10.1 -20.9	-9.5	Y (Noise Floor) H
5.780	3.0	43.0	29.0	38.0	115	-34.6	0.0	0.7	58.5	44.6	74	54	-15.5	-9.4	H (Noise Floor)
igh Ch.	: 5320														
0.640	3.0	45.0	37.2	37.7	9.1	-36.6	0.0	0.8	56.0	48.2	74	54	-18.0	-5.8	v
5.960	3.0	43.5	28.9	37.5	115	-34.5	0.0	0.7	57.7	46.2	74	54 54	-16.3	-9.8	V (Noise Floor)
).640	3.0	44.1	33.6	37.7	9.1	-36.6	0.0	0.8	55.1	44.6	74	54	- 18.9	-9,4	Н
5.960 ev. 11.10	3.0	42.1	29.3	37.5	115	-34.5	0.0	0.7	57.4	44.6	74	54	-16.6	-9.4	H (Noise Floor)
	f		ent Frequency	y		Amp	Preamp (-	-	ield Strength	
	Dist	Distance to							ct to 3 mete					l Strength Li	
		Analyzer R	-			Avg	-		Strength @			-	-	Average Li	mit
	AF	Antenna Fa				Peak			c Field Stre	ngth		Pk Mar	Margin vs	Peak Limit	
	CL	Cable Loss	3			HPF	High Pas	s Filter							

Page 223 of 292

9.2.8. 802.11n HT40 MODE IN 5.3GHz BAND

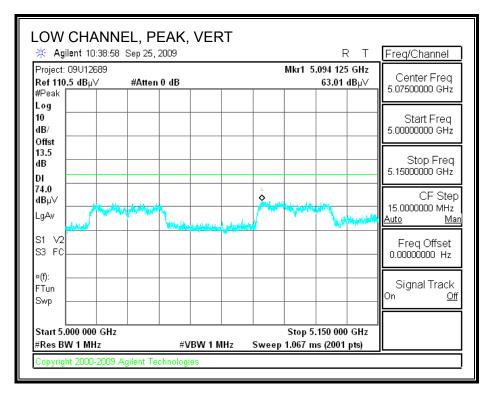
AUTHORIZED BANDEDGE (LOW CHANNEL, HORIZONTAL)

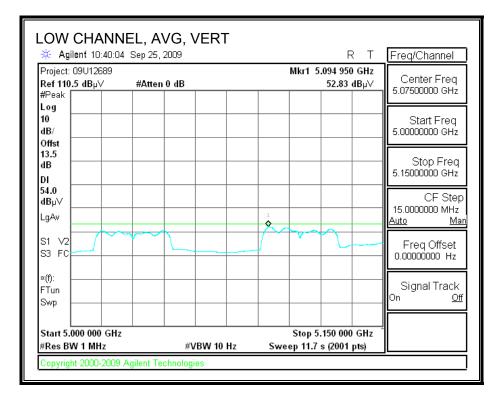




Page 224 of 292

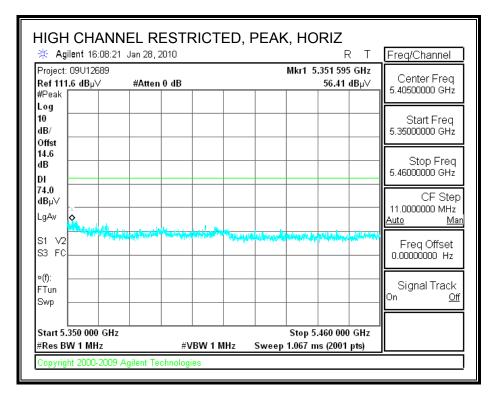
AUTHORIZED BANDEDGE (LOW CHANNEL, VERTICAL)





Page 225 of 292

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

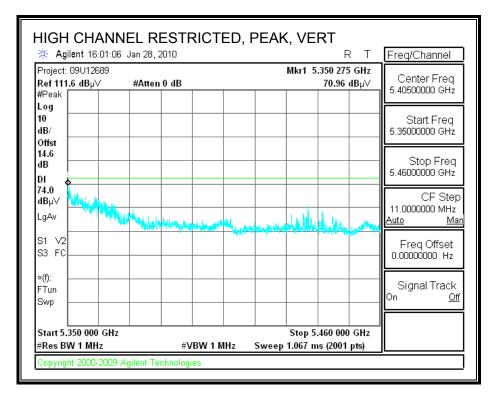


Page 226 of 292

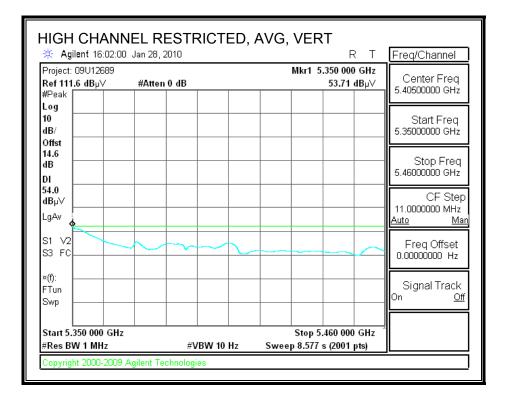
🔆 Agilent 16:09:07 Jar	28, 2010	R T	Freq/Channel
Project: 09U12689 Ref 111.6 dB µ∨ #. #Peak	Atten 0 dB	Mkr1 5.350 000 GHz 44.39 dBμ∀	Center Freq 5.40500000 GHz
Log 10 dB/			Start Freq 5.35000000 GHz
Offst 14.6 dB			Stop Freq 5.4600000 GHz
DI			CF Step 11.0000000 MHz
S1 VZ S3 FC			Auto Mar Freq Offset 0.00000000 Hz
×(f):			Signal Track
Start 5.350 000 GHz #Res BW 1 MHz	#VBW 10 Hz	Stop 5.460 000 GHz Sweep 8.577 s (2001 pts)	

Page 227 of 292

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



Page 228 of 292



Page 229 of 292

HARMONICS AND SPURIOUS EMISSIONS

Low channel:

est Eng		William	Zhuana	5											
ate:		09/25/09													
roject #		09U1268	9												
Company	y:	Qualcon	տ												
Configu		EUT w/Sy	apport P	lotebo	ok										
Iode Op	er:	Tx HT40													
	f	Measuren	uent Fred	nency	Amp	Preamp G	eamp Gain Average Field Strength Limit								
	Dist	Distance				-	istance Correct to 3 meters Peak Field Strength Limit								
	Read	Analyzer	Reading		Avg	Average H	verage Field Strength @ 3 m Margin vs. Average Limit								
	AF	Antenna	Factor		Peak	Calculated	culated Peak Field Strength Margin vs. Peak Limit								
	CL	Cable Los	s		HPF	High Pass	Filter								
f	Dist	Read	AF	CL	Amp	D Corr	Fltr	Corr.	Limit		Ant. Pol.	Det		Table Angle	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB		· · · ·	dBuV/m		V/H	P/A/QP	cm	Degree	
5.810 5.810	3.0 3.0	36.6 24.4	37.9 37.9	11.5 11.5	-34.6 -34.6	0.0 0.0	0.7	52.2 39.9	74.0 54.0	-21.8 -14.1	v v	P A	106.8 106.8	63.8 63.8	
	3.0														
5 8 1 0	3.0						0.7				н				
5.810 ev. 4.1.2		36.0 23.2	37.9 37.9	11.5 11.5	-34.6 -34.6	0.0 0.0 the system	0.7 0.7	51.6 38.7	74.0 54.0	-22.4 -15.3	H H	P A	173.3 173.3	166.5 166.5	
5.810 lev. 4.1.2	3.0 2.7	36.0 23.2	37.9 37.9	11.5 11.5	-34.6 -34.6	0.0 0.0	0.7 0.7	51.6 38.7	74.0	-22.4		P	173.3	166.5	
5.810 lev. 4.1.2	3.0 2.7	36.0 23.2	37.9 37.9	11.5 11.5	-34.6 -34.6	0.0 0.0	0.7 0.7	51.6 38.7	74.0	-22.4		P	173.3	166.5	
5.810 lev. 4.1.2	3.0 2.7	36.0 23.2	37.9 37.9	11.5 11.5	-34.6 -34.6	0.0 0.0	0.7 0.7	51.6 38.7	74.0	-22.4		P	173.3	166.5	
5.810 ev. 4.1.2	3.0 2.7	36.0 23.2	37.9 37.9	11.5 11.5	-34.6 -34.6	0.0 0.0	0.7 0.7	51.6 38.7	74.0	-22.4		P	173.3	166.5	
5.810 ev. 4.1.2	3.0 2.7	36.0 23.2	37.9 37.9	11.5 11.5	-34.6 -34.6	0.0 0.0	0.7 0.7	51.6 38.7	74.0	-22.4		P	173.3	166.5	
5.810 lev. 4.1.2	3.0 2.7	36.0 23.2	37.9 37.9	11.5 11.5	-34.6 -34.6	0.0 0.0	0.7 0.7	51.6 38.7	74.0	-22.4		P	173.3	166.5	
5.810 lev. 4.1.2	3.0 2.7	36.0 23.2	37.9 37.9	11.5 11.5	-34.6 -34.6	0.0 0.0	0.7 0.7	51.6 38.7	74.0	-22.4		P	173.3	166.5	
5.810 5.810 Rev. 4.1.2 Note: No	3.0 2.7	36.0 23.2	37.9 37.9	11.5 11.5	-34.6 -34.6	0.0 0.0	0.7 0.7	51.6 38.7	74.0	-22.4		P	173.3	166.5	
5.810 Rev. 4.1.2	3.0 2.7	36.0 23.2	37.9 37.9	11.5 11.5	-34.6 -34.6	0.0 0.0	0.7 0.7	51.6 38.7	74.0	-22.4		P	173.3	166.5	
5.810 Rev. 4.1.2	3.0 2.7	36.0 23.2	37.9 37.9	11.5 11.5	-34.6 -34.6	0.0 0.0	0.7 0.7	51.6 38.7	74.0	-22.4		P	173.3	166.5	
5.810 Rev. 4.1.2	3.0 2.7	36.0 23.2	37.9 37.9	11.5 11.5	-34.6 -34.6	0.0 0.0	0.7 0.7	51.6 38.7	74.0	-22.4		P	173.3	166.5	
5.810 Rev. 4.1.2	3.0 2.7	36.0 23.2	37.9 37.9	11.5 11.5	-34.6 -34.6	0.0 0.0	0.7 0.7	51.6 38.7	74.0	-22.4		P	173.3	166.5	

Page 230 of 292

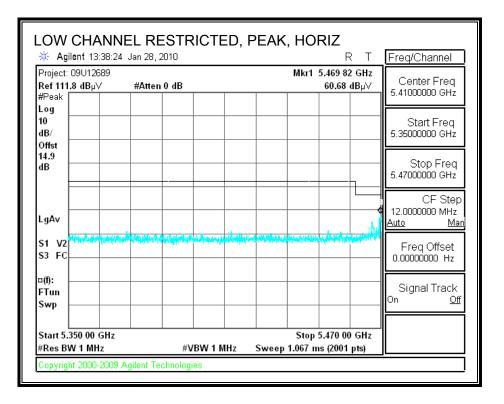
High channel:

Date: Project #: Company Configur	roject #: 09U12689 'ompany: Qualcomm onfiguration: EUT w/Support Notebook lode Oper: Tx HT40				ook										
	f Dist Read AF CL	Measurer Distance Analyzer Antenna Cable Lo	to Anter Reading Factor	nna			Correc Field Si d Peak	trength @ Field Stre	3 m	Peak Fie Margin v	Field Stren, Id Strength 75. Average 75. Peak Lir	Limit Limit			
f	Dist	Read	AF	CL	Amp	D Corr	Fltr	Corr.	Limit	Margin	Ant. Pol.	Det.	AntHigh	Table Angle	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB		dBuV/m		V/H	P/A/QP	cm	Degree	
10.620	3.0	44.8	37.7	9.1	-36.6	0.0	0.8	55.8	74.0	-18.2	v	Р	133.4	86.5	
0.620	3.0	40.6	37.7	9.1	-36.6	0.0	0.8	51.6	54.0	-2.4	V	A	133.4	86.5	
.620	3.0	37.2	37.7	9.1	-36.6	0.0	0.8	48.2	74.0	-25.8	H	P	143.9	199.0	
0.620	3.0	29.2	37.7	9.1	-36.6	0.0	0.8	40.2	54.0	-13.8	H	A	143.9	199.0	
5.930	3.0	35.1	37.6	11.5		0.0	0.7	50.4	74.0	-23.6	V	P	197.2	188.8	
5.930	3.0 3.0	23.8 34.7	37.6	11.5		0.0 0.0	0.7	39.1 50.0	54.0 74.0	-14.9 -24.0	V H	A P	197.2 158.9	188.8	
5.930 5.930	3.0	34.7 22.6	37.6 37.6	11.5 11.5		0.0	0.7	50.0 38.0	74.0 54.0	-24.0 -16.0	н Н	P A	158.9	35.2 35.2	
ev. 4.1.2			: 0110		-0-60	. 0.0	•••		2.40	-1010	:		1000		

Page 231 of 292

9.2.9. 802.11a MODE IN 5.6 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

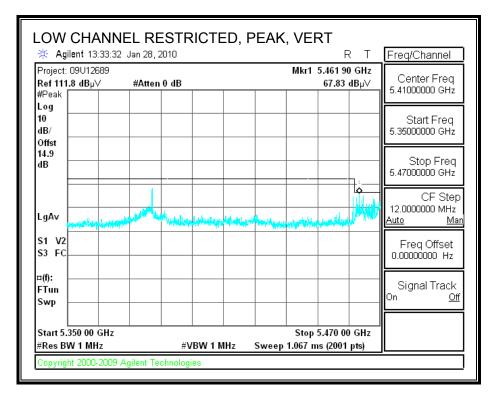


Page 232 of 292

🔆 Agilent 13:39:	09 Jan 28, 201	0		RΤ	Freq/Channel
Project: 09U12689 Ref 111.8 dB µ∨ #Peak	#Atten 0	lB	Mkr1 5.372 41.	605 GHz 24 dBµ∨	Center Freq 5.40500000 GHz
Log 10 dB/					Start Freq 5.3500000 GHz
Offst 14.9 dB DI					Stop Freq 5.46000000 GHz
54.0 dBµ∨ LqAv					CF Step 11.0000000 MHz
S1 V2 S3 FC	1 •				Auto Mar Freq Offset 0.00000000 Hz
×(f): FTun Swp					Signal Track On <u>Off</u>
Start 5.350 000 GF #Res BW 1 MHz	lz	#VBW 10 Hz	Stop 5.460 Sweep 8.577 s (20		

Page 233 of 292

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

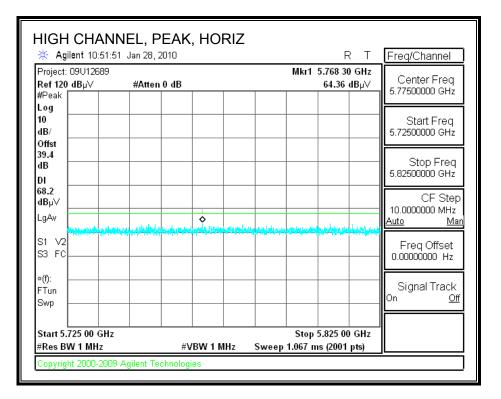


Page 234 of 292

🔆 Agilent 13:34:29 Jan	RESTRICTED, A	, R T	Freq/Channel
Project:09U12689 Ref 111.8 dB µ∨ #A #Peak	tten 0 dB	Mkr1 5.381 295 GHz 51.28 dBµ∀	Center Freq 5.40500000 GHz
Log 10 dB/			Start Freq 5.3500000 GHz
Offst 14.9 dB DI			Stop Freq 5.46000000 GHz
54.0 dBµ∨ LqAv			CF Step 11.0000000 MHz
S1 V2	1 •		Auto Mar Freq Offset 0.00000000 Hz
*(f): FTun Swp			Signal Track
Start 5.350 000 GHz #Res BW 1 MHz	#VBW 10 Hz	Stop 5.460 000 GHz Sweep 8.577 s (2001 pts)	

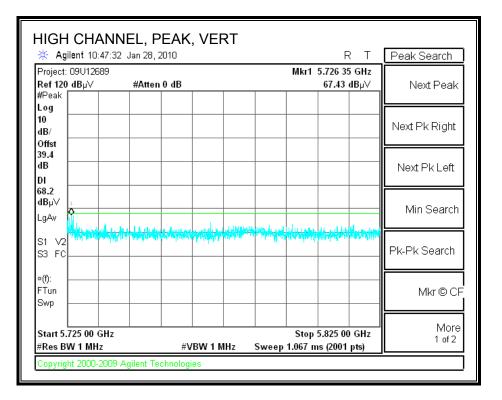
Page 235 of 292

AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



Page 236 of 292

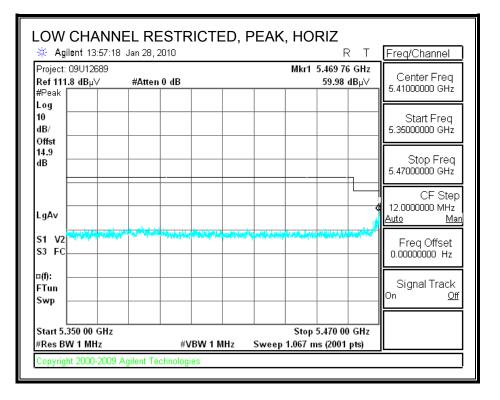
AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



Page 237 of 292

9.2.10. TX ABOVE 1 GHz FOR 802.11a DUAL CHAIN MODE IN 5.6 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

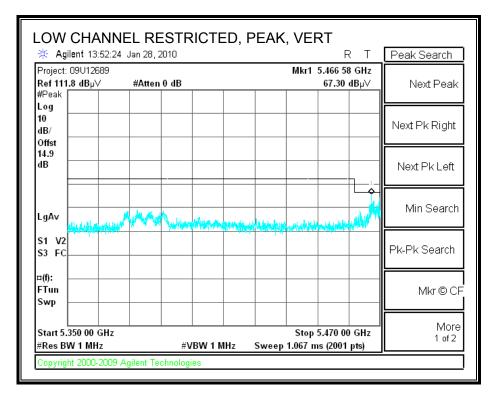


Page 238 of 292

🔆 Agilent 13:58:0)4 Jan 28, 20 [.]	10		RT	Freq/Channel
Project: 09∪12689 Ref 111.8 dB µ∨ #Peak	#Atten 0	dB	Mkı	r1 5.378 820 GHz 42.56 dBµ∀	Center Freq 5.40500000 GHz
Log 10 dB/					Start Freq 5.35000000 GHz
Offst 14.9 dB					Stop Freq
DI 54.0 dBµ∀					CF Step
LgAv					<u>Auto Mar</u>
S1 V2 S3 FC					Freq Offset 0.00000000 Hz
×(f): FTun					Signal Track
Swp					<u> </u>
Start 5.350 000 GH #Res BW 1 MHz	Z	#VBW 10 Hz		op 5.460 000 GHz 577 s (2001 pts)	7

Page 239 of 292

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

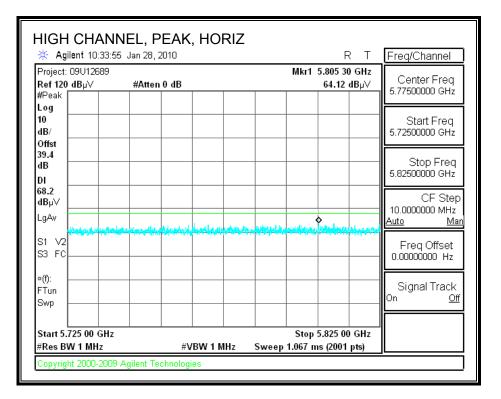


Page 240 of 292

🔆 Agilent 13:53:14	4 Jan 28, 2010	R T	Peak Search		
Project: 09∪12689 Ref 111.8 dB µ∀ #Peak □ □ □	#Atten 0 dB	Mkr1 5.387 015 GHz 51.03 dBµ∀			
Log					
10 dB/			Next Pk Right		
Offst 14.9 1B			Next Pk Left		
DI			Next PK Leit		
54.0 IBµ∨			Min Search		
_gAv	1				
51 V2 53 FC	- mm-		Pk-Pk Search		
×(f):			_		
FTun Swp			Mkr©C		
			b dama		
Start 5.350 000 GHz ≉Res BW 1 MHz	#VBW 10 H	Stop 5.460 000 GHz z Sweep 8.577 s (2001 pts)	More 1 of 2		

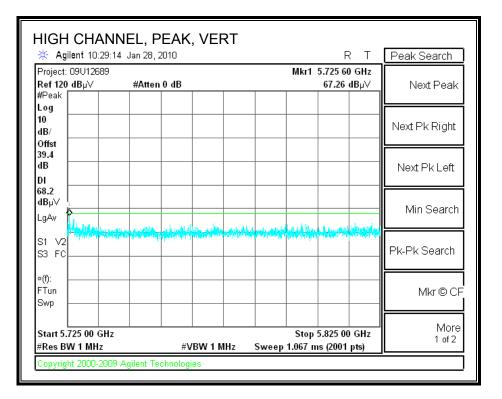
Page 241 of 292

AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



Page 242 of 292

AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



Page 243 of 292

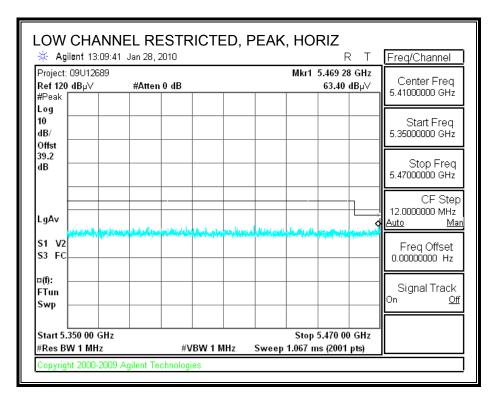
HARMONICS AND SPURIOUS EMISSIONS

Test Engr Date:		Thanh N 07/15/09													
Project #		09U1268													
Company	r:	QualCo	mm												
EUT Desc	ription:	Etherner	t Card												
EUT M/N:		65-VN66	3-P1												
Test Targ		FCC15.2	47/15.4	07											
Mode Op	er:	Transmi	t 2x4												
	f	Measuren				Preamp (-	Field Stren;	-			
	Dist	Distance				Distance					ld Strength				
	Read	Analyzer			Avg		verage Field Strength @ 3 m Margin vs. Average Limit								
	AF	Antenna						nit							
	CL	Cable Los	55		HPF	High Pas:	gh Pass Filter								
f	Dist	Read	AF	CL	Атр	D Corr	Fltz	Corr.	Limit	Margin	Ant. Pol.	Det.	Ant High	Table Angle	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB		dBuV/m		V/H	P/A/QP	cm	Degree	Tioles
Low ch 5	1 3 6														
11.000	3.0	39.6	37.9	9.2	-36.3	0.0	0.7	51.1	74.0	-22.9	v	Р	172.9	139.5	
11.000	3.0	33.2	37.9	9.2	-36.3	0.0	0.7	44.8	54.0	-9.2	v	Ā	172.9	139.5	
11.000	3.0	37.7	37.9	9.2	-36.3	0.0	0.7	49.3	74.0	-24.7	H	Р	139.5	199.3	
11.000	3.0	29.2	37.9	9.2	-36.3	0.0	0.7	40.8	54.0	- 13.2	H	A	139.5	199.3	
Mid ch 5				ļ											
11.160	3.0	38.8	38.1	9.3	-36.1	0.0	0.7	50.9	74.0	-23.1	V	Р	181.5	207.7	
	3.0	32.1	38.1	9.3	-36.1	0.0	0.7	44.1	54.0	-9,9	V	A	181.5	207.7	
11.160 11.160	3.0 3.0	37.9 31.3	38.1 38.1	9.3 9.3	-36.1 -36.1	0.0 0.0	0.7 0.7	50.0 43.3	74.0 54.0	-24.0 -10.7	H H	P A	162.7 162.7	204.2 204.2	
11.100 High ch i		31.3	J0.1	7.3	-30.1	0.0	0.7	40.0	24.U	-10.7	п		104.7	104.1	
11.400	3.0	40.5	38.3	9.4	-35.9	0.0	0.7	53.0	74.0	-21.0	v	Р	129.5	252.8	
11.400	3.0	35.7	38.3	9.4	-35.9	0.0	0.7	48.3	54.0	-5.8	v	Â	129.5	252.8	
11.400	3.0	36.0	38.3	9.4	-35.9	0.0	10.0		74.0	-16.2	H	P	142.1	230.6	
11.400	3.0	23.8	38.3	9.4	-35.9	0.0	10.0	45.6	54.0	- 8.4	H	A	142.1	230.6	
				ļ											
Rev. 4.1.2						the system									

Page 244 of 292

9.2.11. 802.11n HT20 MODE 5.6 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

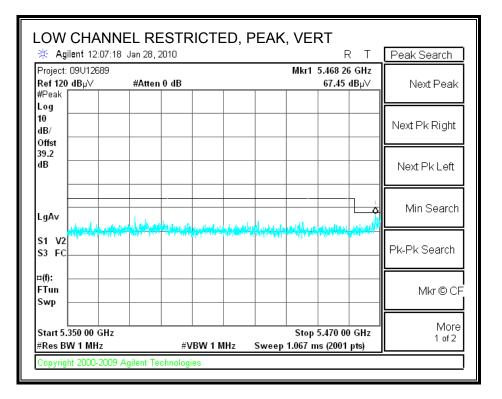


Page 245 of 292

🔆 Agilent 13:10	:27 Jan 28, 2010			R	T Freq/Channel
Project: 09U12689 Ref 120 dB µ∨ #Peak	#Atten 0 dB		MI	α1 5.393 890 GH 51.30 dBμ	Contor Frog
Log 10 dB/					Start Freq 5.35000000 GHz
Offst 39.2 dB DI					
54.0 dBµ∨					CF Step 11.0000000 MHz
LgAv S1 V2 S3 FC					Auto <u>Mai</u> Freq Offset 0.00000000 Hz
×(f): FTun Swp					Signal Track On
Start 5.350 000 G #Res BW 1 MHz		W 10 Hz		top 5.460 000 GH .577 s (2001 pts)	Iz Î

Page 246 of 292

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

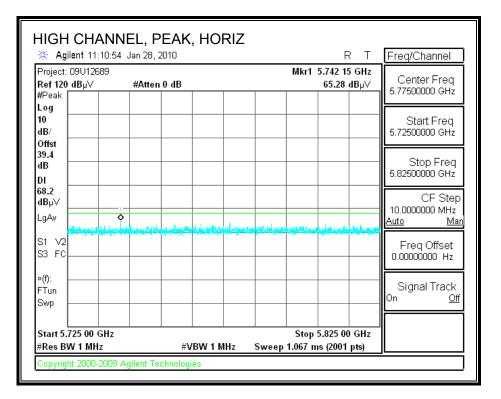


Page 247 of 292

🔆 Agilent 12:08:1	54 Jan 20, 2010			RT	Peak Search
Project: 09U12689			Mkr1 5.		
Ref 120 dBµ∨ #Peak	#Atten 0 dB			Next Peak	
#Peak					
10					-
dB/					Next Pk Right
Offst					
39.2					
dB					Next Pk Left
DI					
54.0					
dBµ∨					Min Search
LgAv					
	1				
S1 V2					Pk-Pk Search
S3 FC					
*(f):					
FTun					Mkr©CF
Swp					
					
				460 000 GHz	More
Start 5.350 000 GH #Res BW 1 MHz	-	W 10 Hz	Stop 5. Sweep 8.577 s	1 of 2	

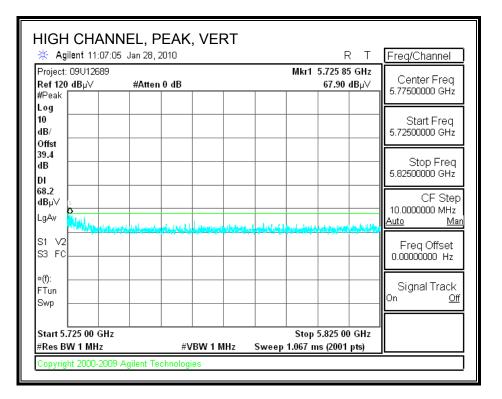
Page 248 of 292

AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



Page 249 of 292

AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



Page 250 of 292

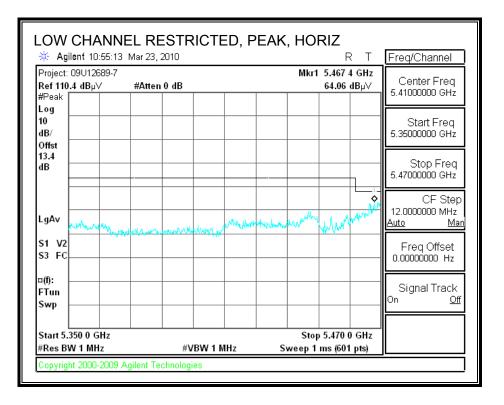
HARMONICS AND SPURIOUS EMISSIONS

ſx / HT		port Notebo	00K												
		Pro or	a n lifar	1.060		Dro. on	nlifer	26 40 CH	_		orm > 10/	211-		Limit	
Horn 1-18GHz Pre-amplifer 1-26GHz T73; S/N: 6717 @3m T144 Miteq 3008A00931												FCC 15.205			
uency Cal	bles —				_										
3' cable 22807700 12' cable 22807600			00	20' cable 22807500 HPF 20' cable 22807500			HPF				Peak Measurements RBW=VBW=1MHz Verage Measurements W=1MHz; VBW=10Hz				
3' cable 22807700		•													
1		0	1	CL dB	Amp dB	1	1	Peak dBuV/m	Avg dBnV/m	1			-	Notes (V/H)	
			uD/m	, LD	<u></u>				ubu v/m					(1)	
3.0	47.0 41.9	40.8 29.0	379 379	9.2 9.2	-36.3	0.0	0.7	58.5	52.A 40.6	74 74	54 54	-15.5 -20.5	-1.0 -13.4	V H	
5580															
30	44.6	35.2	38.0	93	-36.1	۱IJ	0.7	56.5	47.1	74	54	-17.5	-6.9	v	
3.0	44.3	34.4	38.D	93	-36.1	0.0	0.7	56.2	46.4	74	54	-17.8	-7.6	H	
5700						•									
	41.3	35.3	38.3	94	.35.0	0.0	0.7	53.8	47.8	74	54	-20.2	-6.2	v	
3.D	43.9	28.0	38.3	9.4 9.4	-35.9	0.0	0.7	56.4	40.5	74	54	-17.6	-13.5	H	
.08 f	Measureme	ent Frequenc	y		Amp	Preamp	Gain		λ		Avg Lim	Average I	Field Strength	ı Limit	
Dist	Distance to	Antenna				Distance	Corre				Pk Lim	Peak Fiel	d Strength Li	mit	
Kead AF	Analyzer K Antenna Fa	-			Avg Peak	-		Strength @ k Field Stre			-	-	: Average Lu : Peak Limit		
	uipmen orn 1- /N: 671 uency Ca able 2 bble 228 Dist (m) 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	uipment: orn 1-18GHz /N: 6717 @3m uency Cables cable 22807700 able 22807700 bist Read Pk (m) dBuV 5500 3.0 41.9 5580 3.0 44.6 3.0 44.3 5700 3.0 41.3 5700 3.0 41.3 08	uipment: orn 118GHz Pre-al i/N: 6717 @3m T144 I uency Cables 12' c sable 22807700 12' c bile 22807700 12' c Dist Read Pk Read Pk Read Avg. (m) dBuV 3.0 41.9 3.0 44.6 3.0 44.3 3.0 41.3 3.0 43.9 28.0 08	uipment: orn 118GHz Pre-amplifer r/N: 6717 @3m T144 Miteq 30 uency Cables 12' cable 22 sable 22807700 12' cable 22 bite 22807700 12' cable 22 Dist Read Pk (m) dBuV dBuV dBuV 3.0 47.0 3.0 41.9 29.0 37.9 5500 5700 3.0 44.4 3.0 44.3 3.0 41.3 3.0 43.9 28.0 38.3 3.0 43.9 28.0 38.3 08 Distance to Antema Read Analyzer Reading	uipment: orn 118GHz Pre-amplifer 1260 vik: 6717 @3m T144 Miteq 3008A009 uency Cables 12' cable 2280760 sable 22807700 12' cable 2280760 bble 22807700 10' able 2280 bble 22807 12' able 2280760 bble 22807 12' abl	upment: Pre-amplifer 1.26GHz vn: 6717 @3m T144 Miteq 3008A00931 uency Cables 12' cable 22807600 sable 22807700 12' cable 22807600 uble 22807700 12' cable 22807600 12' cable 22807600 12' cable 22807600 12' cable 22807600 12' cable 22807600 12' cable 22807600 12' cable 22807600 30 410 29.0 37.9 9.2 -36.3 30 41.9 29.0 37.9 9.2 -36.3 30 44.3 34.4 38.0 9.3 -36.1 30 41.3 35.3 38.3 9.4 -35.9 30 41.3 35.3 38.3 9.4 -35.9 30 41.3 35.3 38.3	upment: Pre-amplifer 1-26GHz Pre-amplifer	uipment: Pre-amplifer 1-26 GHz T144 Miteq 3008A00931 Pre-amplifer Pre-amplifer VIN: 6717 @3m Pre-amplifer 1-26 GHz T144 Miteq 3008A00931 Pre-amplifer uency Cables 20' cable 22807600 isable 22807700 20' cable 2280 Dist Read Avg. AF CL Amp D Corr Flr MBuV dB/M dB dB dB 3.0 41.9 29.0 37.9 9.2 -36.3 0.0 0.7 3.0 44.6 35.2 38.0 9.3 -36.1 0.0 0.7 3.0 44.6 35.2 38.0 9.3 -36.1 0.0 0.7 3.0 44.3 34.4 38.0 9.3 -36.1 0.0 0.7 <t< td=""><td>mipment: Pre-amplifer 1-26 GHz T144 Miteq 3008A00931 Pre-amplifer 26-40 GH vency Cables T144 Miteq 3008A00931 20' cable 22807500 sable 22807700 12' cable 22807600 20' cable 22807500 bite 22807700 12' cable 22807600 10' cable 22807500 cable 22807500 10' cable 22807500 10' cable 22807500 cable 22807500 10' cable 22807500 10' cable 22807500 cable 22807500<</td><td>upment: orn 1-18GHz Pre-amplifer 1-26GHz Pre-amplifer 2640GHz Image: Constraint of the state of t</td><td>minment: Pre-amplifer 1-26 GHz T144 Miteq 3008A00931 Pre-amplifer 26-40 GHz T144 Miteq 3008A00931 Pre-amplifer 26-40 GHz H wrery Cable 20' cable 22807500 U HPF isable 22807700 12' cable 22807600 20' cable 22807500 U'' HPF Dist Read Avg AF CL Amp D Corr Flr Peak Avg Pk Lim JDist Read Avg AF CL Amp D Corr Flr Peak Avg Pk Lim JDist Read Avg AF CL Amp D Corr Flr Peak Avg Pk Lim JDist Read Avg AF CL Amp D Corr Flr Peak Avg Pk Lim <!--</td--><td>minment: Pre-amplifer 1-26GHz (N: 6717 @3m Pre-amplifer 26-40GHz (144 Miteq 3008A00931 Horn > 180 ender 22807700 12' cable 22807600 20' cable 22807500 HPF_7.6GHz HPF Re Dist Read Pk Read Avg AF CL Anp D Corr Ftr Peak Avg PK Lim Avg Lim Dist Read Avg AF CL Anp D Corr Ftr Peak Avg PK Lim Avg Lim MBuV dBm V dBm V/m dBm V/m dBm V/m dBm V/m 3.0 47.0 6 Colspan="6" 3.0 47.0 6 Avg PK Lim Avg Lim 3.0 47.0 6 6 3.0 47.0 <th< td=""><td>minment: Pre-amplifer 1-26GHz T144 Miteg 3008A00931 Pre-amplifer 26-40GHz T144 Miteg 3008A00931 Horn > 18GHz Unit 6717 @3m T144 Miteg 3008A00931 Pre-amplifer 26-40GHz Horn > 18GHz unov Cable 2807700 Pre-amplifer 26-40GHz HPF Reject Filte Dist Read Avg AF CT Avg Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2" Dist Reject Filte Dist Read Avg AF CT Pre-amplifer 26-40GHz HPF Reject Filte Dist Read Avg AF CT Avg Colspan="2" Pre-amplifer 26-40GHz HPF Meject Filte Dist Read Avg AF CT Avg Colspan= Colspan="2" Pre-amplifer 26-40700 Colspan="2" Dist <th colspa<="" td=""><td>minimum Pre-amplifer 1-26GHz T144 Miteq 3008A00931 Pre-amplifer 26-40GHz T144 Miteq 3008A00931 Horn > 18GHz uerry Cables able 22807700 12' cable 22807600 20' cable 22807500 Dist Read Avg. AF CL Amp D Corr Ftr Peak Avg Bk Lim Avg Lim Avg</td></th></td></th<></td></td></t<>	mipment: Pre-amplifer 1-26 GHz T144 Miteq 3008A00931 Pre-amplifer 26-40 GH vency Cables T144 Miteq 3008A00931 20' cable 22807500 sable 22807700 12' cable 22807600 20' cable 22807500 bite 22807700 12' cable 22807600 10' cable 22807500 cable 22807500 10' cable 22807500 10' cable 22807500 cable 22807500 10' cable 22807500 10' cable 22807500 cable 22807500<	upment: orn 1-18GHz Pre-amplifer 1-26GHz Pre-amplifer 2640GHz Image: Constraint of the state of t	minment: Pre-amplifer 1-26 GHz T144 Miteq 3008A00931 Pre-amplifer 26-40 GHz T144 Miteq 3008A00931 Pre-amplifer 26-40 GHz H wrery Cable 20' cable 22807500 U HPF isable 22807700 12' cable 22807600 20' cable 22807500 U'' HPF Dist Read Avg AF CL Amp D Corr Flr Peak Avg Pk Lim JDist Read Avg AF CL Amp D Corr Flr Peak Avg Pk Lim JDist Read Avg AF CL Amp D Corr Flr Peak Avg Pk Lim JDist Read Avg AF CL Amp D Corr Flr Peak Avg Pk Lim </td <td>minment: Pre-amplifer 1-26GHz (N: 6717 @3m Pre-amplifer 26-40GHz (144 Miteq 3008A00931 Horn > 180 ender 22807700 12' cable 22807600 20' cable 22807500 HPF_7.6GHz HPF Re Dist Read Pk Read Avg AF CL Anp D Corr Ftr Peak Avg PK Lim Avg Lim Dist Read Avg AF CL Anp D Corr Ftr Peak Avg PK Lim Avg Lim MBuV dBm V dBm V/m dBm V/m dBm V/m dBm V/m 3.0 47.0 6 Colspan="6" 3.0 47.0 6 Avg PK Lim Avg Lim 3.0 47.0 6 6 3.0 47.0 <th< td=""><td>minment: Pre-amplifer 1-26GHz T144 Miteg 3008A00931 Pre-amplifer 26-40GHz T144 Miteg 3008A00931 Horn > 18GHz Unit 6717 @3m T144 Miteg 3008A00931 Pre-amplifer 26-40GHz Horn > 18GHz unov Cable 2807700 Pre-amplifer 26-40GHz HPF Reject Filte Dist Read Avg AF CT Avg Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2" Dist Reject Filte Dist Read Avg AF CT Pre-amplifer 26-40GHz HPF Reject Filte Dist Read Avg AF CT Avg Colspan="2" Pre-amplifer 26-40GHz HPF Meject Filte Dist Read Avg AF CT Avg Colspan= Colspan="2" Pre-amplifer 26-40700 Colspan="2" Dist <th colspa<="" td=""><td>minimum Pre-amplifer 1-26GHz T144 Miteq 3008A00931 Pre-amplifer 26-40GHz T144 Miteq 3008A00931 Horn > 18GHz uerry Cables able 22807700 12' cable 22807600 20' cable 22807500 Dist Read Avg. AF CL Amp D Corr Ftr Peak Avg Bk Lim Avg Lim Avg</td></th></td></th<></td>	minment: Pre-amplifer 1-26GHz (N: 6717 @3m Pre-amplifer 26-40GHz (144 Miteq 3008A00931 Horn > 180 ender 22807700 12' cable 22807600 20' cable 22807500 HPF_7.6GHz HPF Re Dist Read Pk Read Avg AF CL Anp D Corr Ftr Peak Avg PK Lim Avg Lim Dist Read Avg AF CL Anp D Corr Ftr Peak Avg PK Lim Avg Lim MBuV dBm V dBm V/m dBm V/m dBm V/m dBm V/m 3.0 47.0 6 Colspan="6" 3.0 47.0 6 Avg PK Lim Avg Lim 3.0 47.0 6 6 3.0 47.0 <th< td=""><td>minment: Pre-amplifer 1-26GHz T144 Miteg 3008A00931 Pre-amplifer 26-40GHz T144 Miteg 3008A00931 Horn > 18GHz Unit 6717 @3m T144 Miteg 3008A00931 Pre-amplifer 26-40GHz Horn > 18GHz unov Cable 2807700 Pre-amplifer 26-40GHz HPF Reject Filte Dist Read Avg AF CT Avg Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2" Dist Reject Filte Dist Read Avg AF CT Pre-amplifer 26-40GHz HPF Reject Filte Dist Read Avg AF CT Avg Colspan="2" Pre-amplifer 26-40GHz HPF Meject Filte Dist Read Avg AF CT Avg Colspan= Colspan="2" Pre-amplifer 26-40700 Colspan="2" Dist <th colspa<="" td=""><td>minimum Pre-amplifer 1-26GHz T144 Miteq 3008A00931 Pre-amplifer 26-40GHz T144 Miteq 3008A00931 Horn > 18GHz uerry Cables able 22807700 12' cable 22807600 20' cable 22807500 Dist Read Avg. AF CL Amp D Corr Ftr Peak Avg Bk Lim Avg Lim Avg</td></th></td></th<>	minment: Pre-amplifer 1-26GHz T144 Miteg 3008A00931 Pre-amplifer 26-40GHz T144 Miteg 3008A00931 Horn > 18GHz Unit 6717 @3m T144 Miteg 3008A00931 Pre-amplifer 26-40GHz Horn > 18GHz unov Cable 2807700 Pre-amplifer 26-40GHz HPF Reject Filte Dist Read Avg AF CT Avg Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2" Dist Reject Filte Dist Read Avg AF CT Pre-amplifer 26-40GHz HPF Reject Filte Dist Read Avg AF CT Avg Colspan="2" Pre-amplifer 26-40GHz HPF Meject Filte Dist Read Avg AF CT Avg Colspan= Colspan="2" Pre-amplifer 26-40700 Colspan="2" Dist <th colspa<="" td=""><td>minimum Pre-amplifer 1-26GHz T144 Miteq 3008A00931 Pre-amplifer 26-40GHz T144 Miteq 3008A00931 Horn > 18GHz uerry Cables able 22807700 12' cable 22807600 20' cable 22807500 Dist Read Avg. AF CL Amp D Corr Ftr Peak Avg Bk Lim Avg Lim Avg</td></th>	<td>minimum Pre-amplifer 1-26GHz T144 Miteq 3008A00931 Pre-amplifer 26-40GHz T144 Miteq 3008A00931 Horn > 18GHz uerry Cables able 22807700 12' cable 22807600 20' cable 22807500 Dist Read Avg. AF CL Amp D Corr Ftr Peak Avg Bk Lim Avg Lim Avg</td>	minimum Pre-amplifer 1-26GHz T144 Miteq 3008A00931 Pre-amplifer 26-40GHz T144 Miteq 3008A00931 Horn > 18GHz uerry Cables able 22807700 12' cable 22807600 20' cable 22807500 Dist Read Avg. AF CL Amp D Corr Ftr Peak Avg Bk Lim Avg

Page 251 of 292

9.2.12. 802.11n HT40 MODE 5.6 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

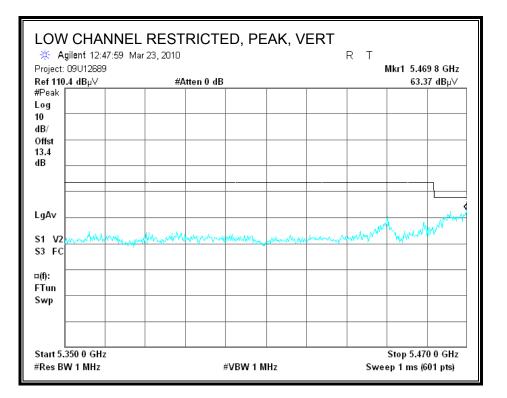


Page 252 of 292

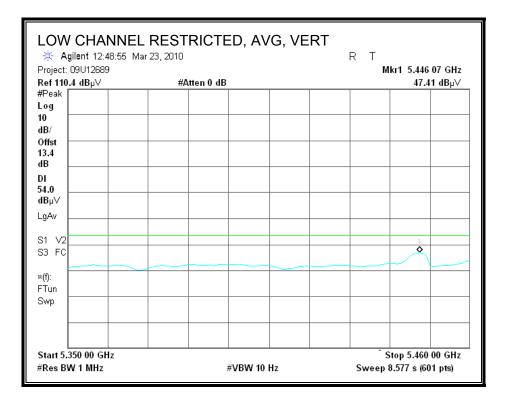
🔆 Agilent 11:06:1	0 Mar 23, 2010			RT	Freq/Channel
Project: 09U12689-7 Ref 110.4 dB µ∨ #Peak	#Atten 0 dB		Mkr1 5	5.460 00 GHz 40.96 dBµ∨	Center Freq 5.40500000 GHz
Log 10 dB/					Start Freq 5.35000000 GHz
Offst 13.4 dB					Stop Freq 5.46000000 GHz
DI					CF Step 11.000000 MHz
LgAv S1 V2 S3 FC					Auto Mar Freq Offset 0.00000000 Hz
»(f): FTun					Signal Track
Swp					On <u>Off</u>
Start 5.350 00 GHz #Res BW 1 MHz	#	VBW 10 Hz	Stop 5 Sweep 8.577	.460 00 GHz s (601 pts)	

Page 253 of 292

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

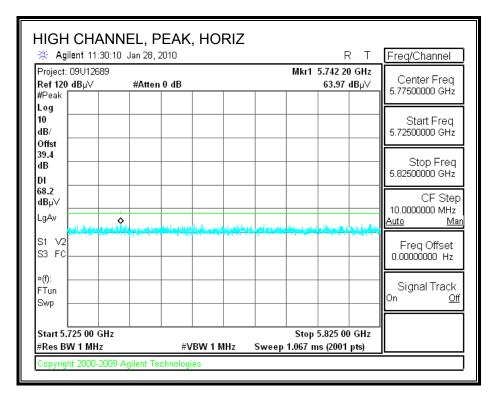


Page 254 of 292



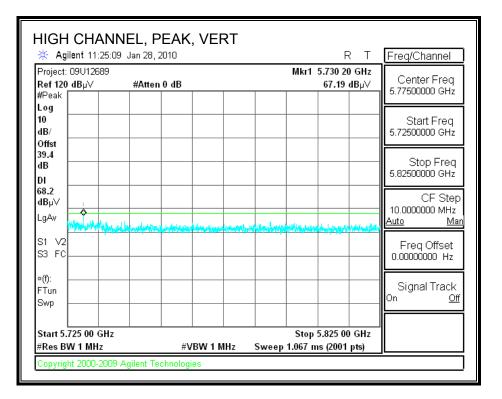
Page 255 of 292

AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



Page 256 of 292

AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



Page 257 of 292

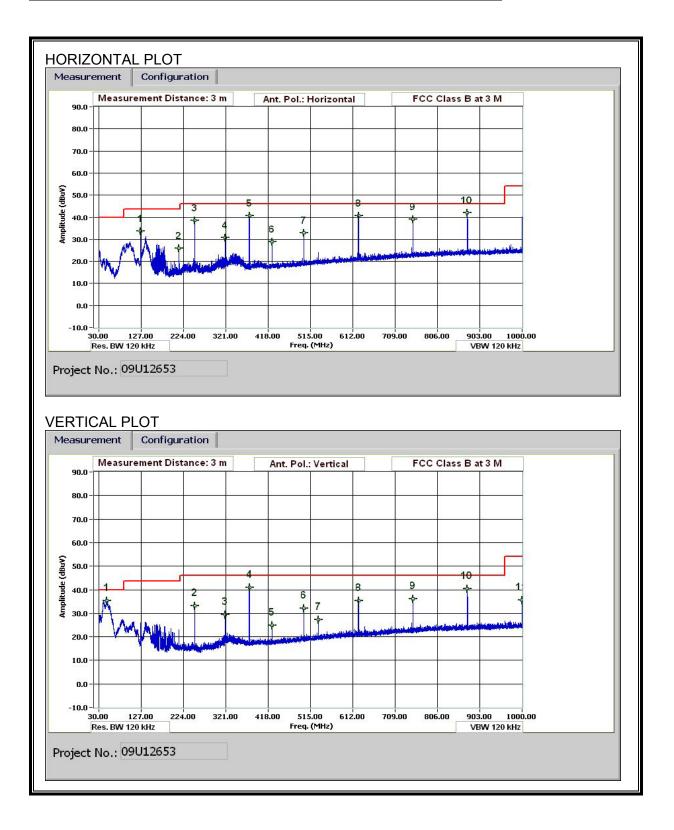
HARMONICS AND SPURIOUS EMISSIONS

	n 1.	18GHz	Pre-a	mplifer	1.260	Hz	Pre-am	nlifer	26-40GH	7	н	orn > 18(3117		Limit
T73; S/N				Miteq 30			Fie-ani	piner	20-40-011				9112	+	FCC 15.205
Hi Frequen			•												
		2807700	12' 0	able 2	28076	00	20' cal	ble 22	807500		HPF	Re	ject Filter		. Measurements
3' cabl				able 228			20' cabl	le 2280	7500		F_7.6GHz		Jeen	RB	W=VBW=1MHz ge Measurements
	•		· ·	IDIC ZEG	11000	•			_						1MHz; VBW=10Hz
f I	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
w Ch. 5510 D20	OMHz 3.0	45.4	36.7	37.9	9.2	-36.3	0.0	0.7	57.0	48.3	74	54	-17.0	-5.7	v
.020	3.0	41.2	27.2	37.9	9.2	-36.3	0.0	0.7	52.8	38.8	74	54 54	-21.2	-15.2	H
d Ch. 5550		-116		49.0		~~ ^	- 0	0.7			-1			140	v
	3.0 3.0	41.5 41.1	27.4 29.8	38.0 38.0	9.3 9.3	-36.2 -36.2	0.0 0.0	0.7 0.7	53.3 52.9	39.2 41.7	74 74	54 54	-20.7 -21.1	-14.8 -12.3	 Н
gh Ch. 567	70MHz	E													
	3.0 3.0	45 <i>5</i> 41 <i>9</i>	35.5 28.4	38.2 38.2	9.4 9.4	-36.0 -36.0	0.0 0.0	0.7 0.7	57.9 54.3	47.8 40.8	74 74	54 54	-16.1 -19.7	-6.2 -13.2	V H
							A					A			
			ent Frequenc	у		-	Preamp (
R	eau	-	0			<u> </u>	-					-	-	-	
R) Al	F	Antenna Fa	actor												
	ist	Distance to Analyzer R	Antenna Reading	у		D Corr Avg	Distance Average	Correc Field S	ct to 3 mete Strength @ c Field Stre	3 m		Pk Lim Avg Mar	Average Fi Peak Field Margin vs. Margin vs.	Strength Li	mit mit

Page 258 of 292

9.3. WORST-CASE BELOW 1 GHz

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



Page 259 of 292

EMISSIONS DATA 30-1000MHz Frequency Measurement Compliance Certification Services, Fremont 5m Chamber Test Engr: Vien Tran 06/26/09 Date: Project #: 09U12653 Company: Oualcomm EUT Description: 802.11n 4x4 WLAN Ethernet Adapter EUT M/N: Non-DFS:65-VN663-P1 FCC Class B Test Target: Tx HT20 MCS31, 5805MHz Mode Oper: f Measurement Frequency Preamp Gain Margin Margin vs. Limit Amp Dist Distance to Antenna D Corr Distance Correct to 3 meters Read Analyzer Reading Filter Filter Insert Loss Calculated Field Strength AF Antenna Factor Corr. CLCable Loss Field Strength Limit Limit Dist Read AF \mathbf{CL} D Corr Filter Margin Ant. Pol. Det. Notes f Amp Corr. Limit MHz dBuV dB dBuV/m dBuV/m P/A/QP (m) dB/m dB dB dB dB V/H 5805MHz_Horizontal 28.3 EP 125.044 47.3 13.7 1.1 0.0 0.0 33.7 43.5 9.8 н 3.0 213.368 3.0 40.9 11.9 28.2 0.0 0.0 25.9 43.5 EP 1.3 -17.6 н 249.969 3.0 11.8 46.0 EP 53.5 28.2 0.0 0.0 38.5 H 1.4 -7.5 319.932 3.0 -15.2 43.6 13.7 28.1 0.0 0.0 30.8 46.0 н EP 1.6 375.014 3.0 52.5 14.5 28.1 0.0 0.0 40.7 46.0 н EP 1.7 -5.3 426.616 3.0 28.0 0.0 28.8 17.2 EP 39.5 15.4 1.9 0.0 46.0 H 41.9 499.939 3.0 16.7 2.0 27.8 0.0 0.0 32.9 46.0 -13.1 н EP 624.985 3.0 2.3 47.2 18.7 27.4 0.0 0.0 40.7 46.0 -5.3 н EP 749.910 3.0 43.5 20.3 2.5 27.3 0.0 0.0 39.0 46.0 7.0 н EP 874.955 3.0 45.4 21.6 2.8 27.7 0.0 0.0 42.1 46.0 -3.9 н EP 5805MHz Vertical 48.001 3.0 53.6 9.3 0.6 28.4 0.0 0.0 35.2 40.0 4.8 V EP 48.3 249.969 3.0 11.8 1.4 28.2 0.0 0.0 33.2 46.0 -12.8 v EP 320.052 3.0 42.2 13.7 1.6 28.1 0.0 0.0 29.4 46.0 v EP -16.6 375.014 3.0 52.8 14.5 28.1 0.0 0.0 41.0 46.0 EP 1.7 -5.0 v 426.736 3.0 EP 35.5 15.4 1.9 28.0 0.0 0.0 24.8 46.0 -21.2 τ 499.939 3.0 41.2 16.7 2.027.8 0.0 0.0 32.1 46.0 -13.9 V EP 533.301 3.0 35.7 17.3 2.1 27.7 0.0 0.0 27.3 46.0 -**18.7** v EP 624.985 3.0 41.8 18.7 2.3 27.4 0.0 35.4 46.0 -**10.6** EP 0.0 V 749.910 3.0 40.6 2.5 v EP 20.3 27.3 0.0 0.0 36.1 46.0 -9.9 874.955 3.0 -5.6 EP 43.7 21.6 2.8 27.7 v 0.0 0.0 40.4 46.0 EP 999.880 3.0 37.9 22.5 3.0 27.9 0.0 0.0 35.4 54.0 -18.6 v Rev. 1.27.09 Note: No other emissions were detected above the system noise floor.

Page 260 of 292

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted I	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.

RESULTS

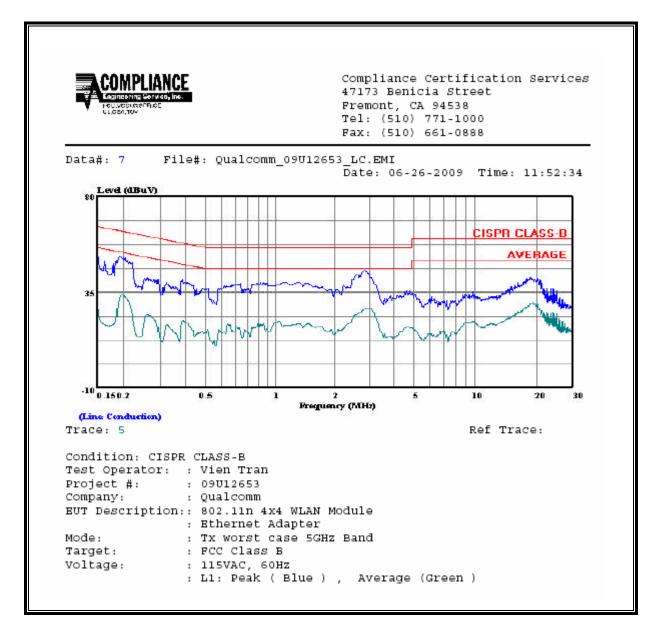
Page 261 of 292

<u>6 WORST EMISSIONS</u>

	CONDUCTED EMISSIONS DATA (115VAC 60Hz)											
Freq.	Reading			Closs	Limit	FCC_B	B Margin		Remark			
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV(dB)	L1/L2			
0.19	51.41		33.87	0.00	63.86	53.86	-12.45	-19.99	L1			
2.95	44.80		27.60	0.00	56.00	46.00	-11.20	-18.40	L1			
19.12	41.71		30.40	0.00	60.00	50.00	-18.29	-19.60	L1			
0.19	51.34		33.94	0.00	63.86	53.86	-12.52	-19.92	L2			
2.95	44.13		27.56	0.00	56.00	46.00	-11.87	-18.44	L2			
19.12	40.89		29.56	0.00	60.00	50.00	-19.11	-20.44	L2			
6 Worst I	Data											

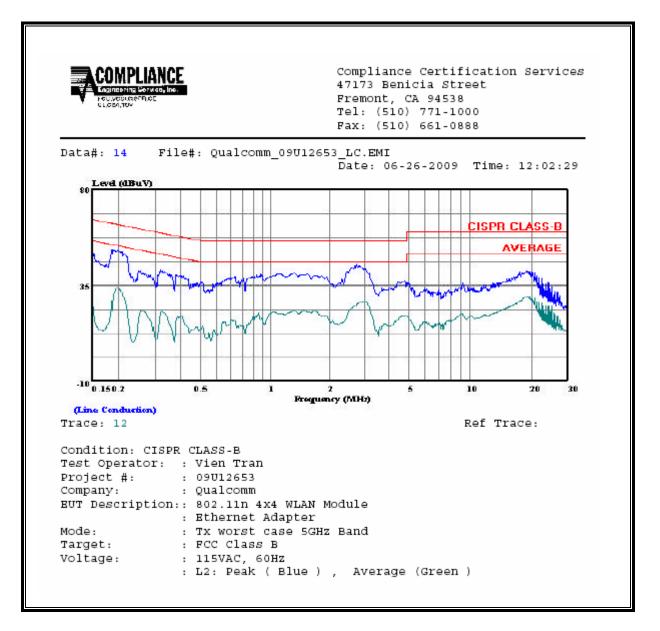
Page 262 of 292

LINE 1 RESULTS



Page 263 of 292

LINE 2 RESULTS



Page 264 of 292

11. DYNAMIC FREQUENCY SELECTION

11.1. OVERVIEW

11.1.1. 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.

<u>FCC</u>

§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".

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 M	Operational Mode						
	Master	Master 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 266 of 292

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	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 h	as been added to the amplitude						
of the test transmission waveforms to account for variations in	measurement equipment. This						
will ensure that the test signal is at or above the detection thre	shold level to trigger a DFS						
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						
	· · · · · · · · · · ·						

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.

Page 267 of 292

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	Aggregate (Radar Types 1-4) 80%							

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

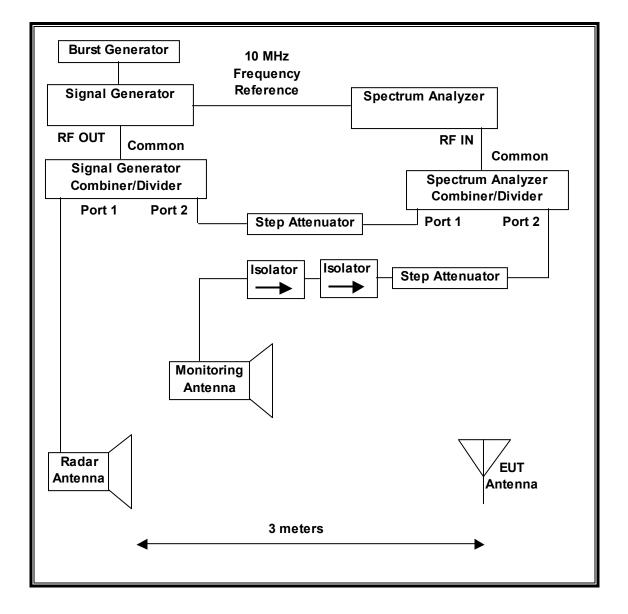
Table 7 – Frequency Hopping Radar Test Signal

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

Page 268 of 292

11.1.2. TEST AND MEASUREMENT SYSTEM

RADIATED METHOD SYSTEM BLOCK DIAGRAM



Page 269 of 292

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 analyer 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 270 of 292

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

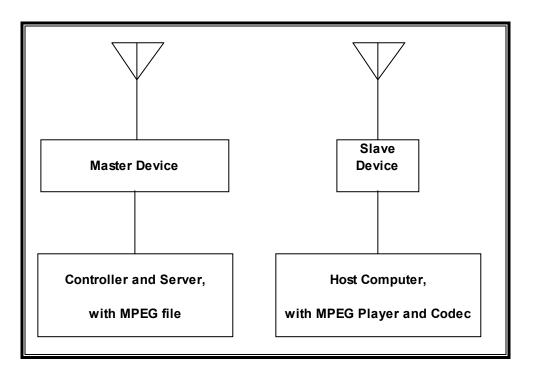
The following test and measurement equipment was utilized for the DFS tests documented in this report:

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 271 of 292

11.1.3. 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-	FTX120690N2	LDK102061			
(Master Device)		A-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-ODF263-71615-	DoC			
	Technology Corp.		687-49E				
Notebook PC (Client)	IBM	Type 2668-46U	L3-XDLW 06/02	DoC			
AC Adapter (Client PC)	IBM	08K8212	11S08K8212Z1Z7U	DoC			
			B4BX0FA				
USB to RS-232 Adapter	Keyspan	USA-19HS	02300	DoC			
AC Adapter (EUT)	Phihong	PSA-15R-050P	P84701739A3	DoC			

Page 272 of 292

11.1.4. 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 26.62 dBm EIRP in the 5250-5350 MHz band and 26.4 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 a 50-ohm coaxial antenna port. All antenna ports are connected to the test system via a power divider 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 5.0.200.23.

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 at the antenna port 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 273 of 292

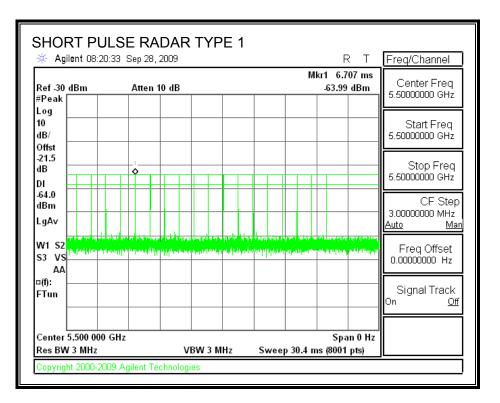
11.2. 20 MHz BANDWIDTH RESULTS

11.2.1. TEST CHANNEL

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

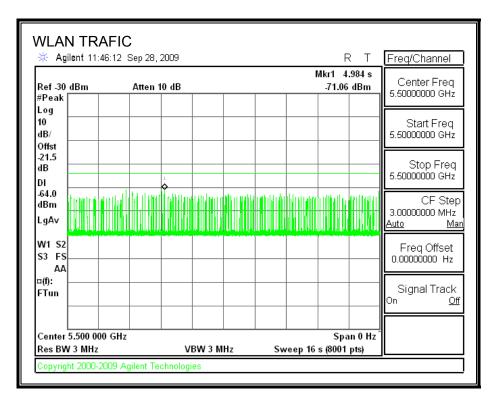
11.2.2. PLOTS OF RADAR WAVEFORM AND WLAN TRAFFIC

PLOTS OF RADAR WAVEFORM



Page 274 of 292

PLOT OF WLAN TRAFFIC



Page 275 of 292

11.2.3. 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).

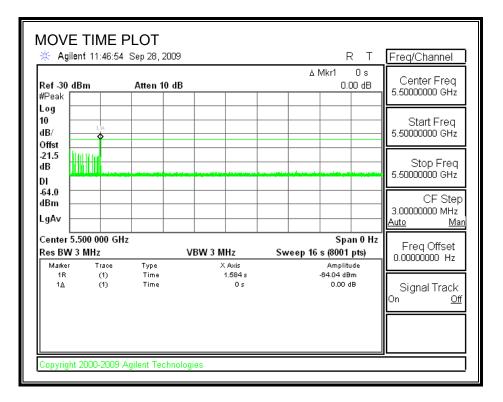
RESULTS

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

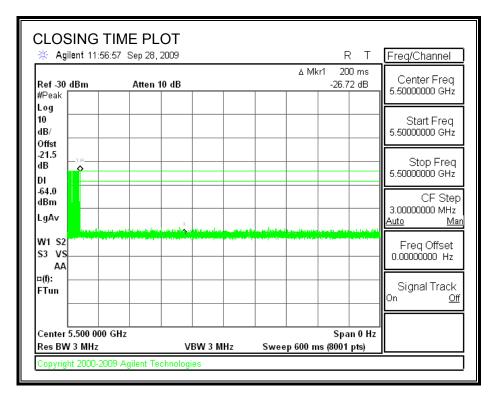
Page 276 of 292

MOVE TIME



Page 277 of 292

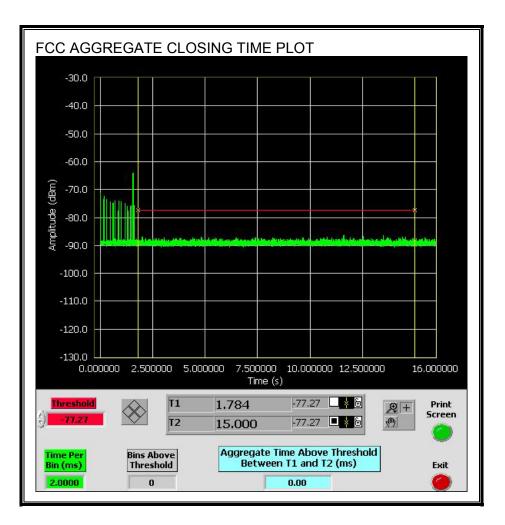
CHANNEL CLOSING TIME



Page 278 of 292

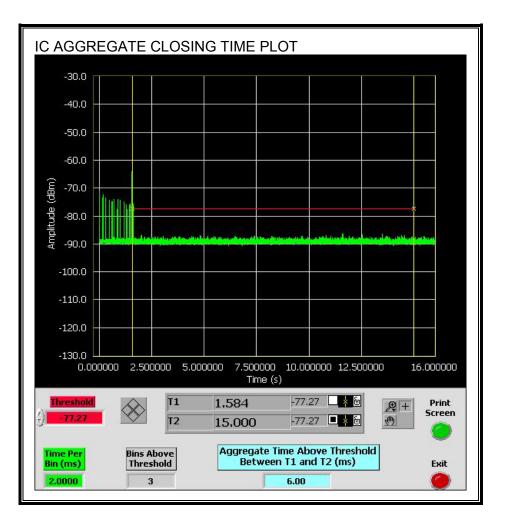
AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the FCC aggregate monitoring period.



Page 279 of 292

No transmissions are observed during the IC aggregate monitoring period.



Page 280 of 292

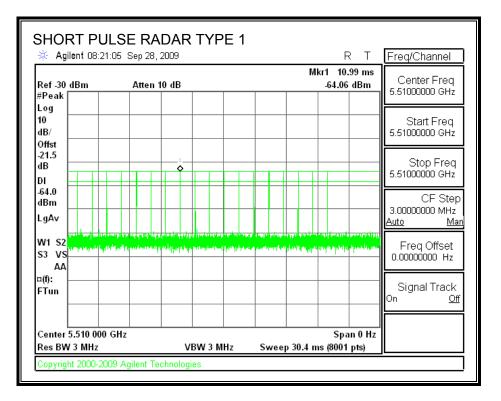
11.3. 40 MHz BANDWIDTH RESULTS

11.3.1. TEST CHANNEL

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

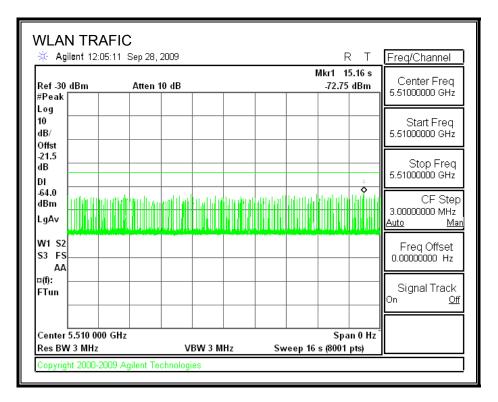
11.3.2. PLOTS OF RADAR WAVEFORM AND WLAN TRAFFIC

PLOTS OF RADAR WAVEFORM



Page 281 of 292

PLOT OF WLAN TRAFFIC



Page 282 of 292

11.3.3. 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).

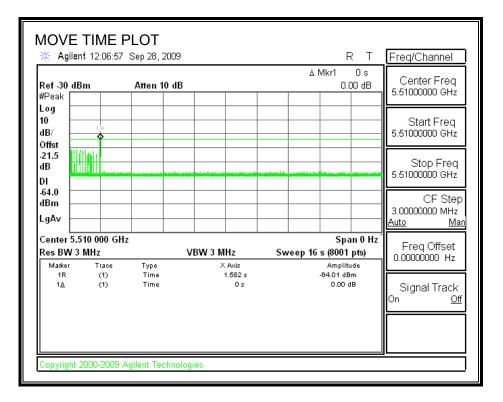
RESULTS

Agency	Channel Move Time	Limit
	(sec)	(sec)
FCC / IC	0.000	10

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

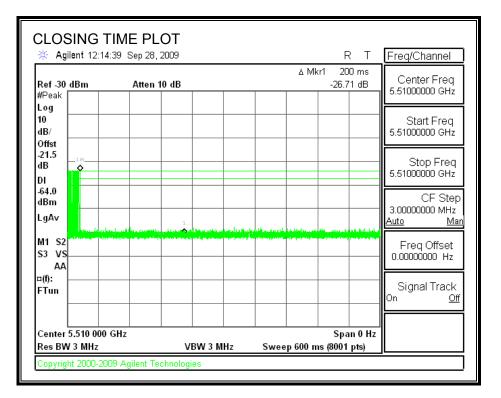
Page 283 of 292

MOVE TIME



Page 284 of 292

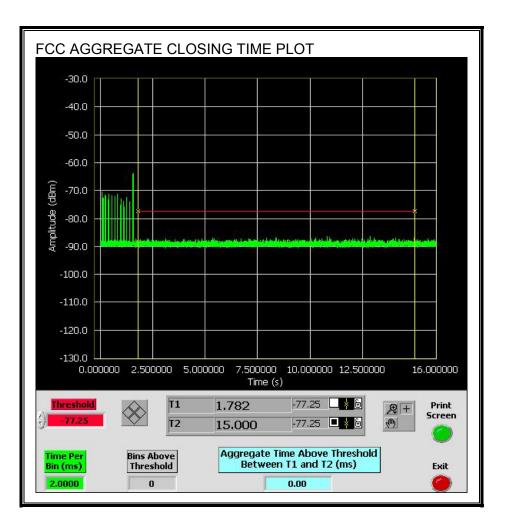
CHANNEL CLOSING TIME



Page 285 of 292

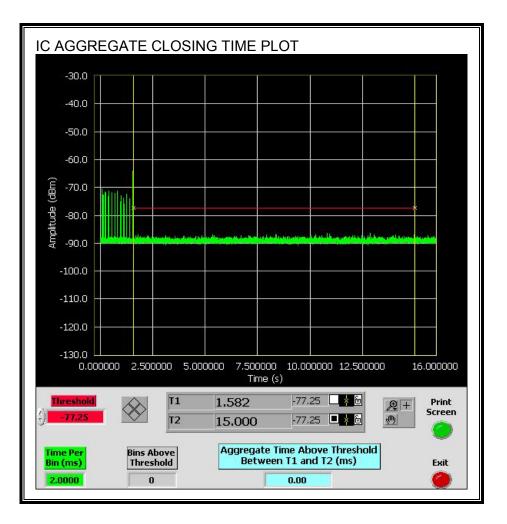
AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the FCC aggregate monitoring period.



Page 286 of 292

No transmissions are observed during the IC aggregate monitoring period.



Page 287 of 292

11.3.4. SLAVE NON-OCCUPANCY

TEST RESULTS

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

🔆 Agilent 13:00):30 Sep 28, 2009			R T	Freq/Channel
Ref -30 dBm #Peak	Atten 10 dB			/lkr1 1.8 ks -23.43 dB	Center Freq 5.51000000 GHz
Log 10 dB/ Offst					Start Freq 5.5100000 GHz
21.5 dB					Stop Freq 5.51000000 GHz
-64.0 dBm LgAv				1. 	CF Step 3.00000000 MHz <u>Auto Ma</u>
W1 S2 S3 FS AA					Freq Offset 0.00000000 Hz
¤(f): FTun					Signal Track On <u>Of</u>
Center 5.510 000 Res BW 3 MHz	GHz	VBW 3 MHz	Sweep 2	Span 0 Hz´ ks (8001 pts)	

Page 288 of 292

12. 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) Lim	its for Occupational	l/Controlled Exposu	res	
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f2)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits	for General Populati	on/Uncontrolled Exp	posure	
0.3–1.34	614	1.63	*(100)	30
1.34–30	824 <i>/</i> f	2.19/f	*(180/f ²)	30

TABLE 1-LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

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

f = frequency in MHz

t = trequency in MHz
 * = Plane-wave equivalent power density
 NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled imits 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 exposed, 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 289 of 292

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)	4 Power Density (W/m ²)	5 Averaging Time (min)
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	0.158 <i>f</i> ^{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 290 of 292

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.

<u>LIMITS</u>

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 291 of 292

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	12.10	6.01	0.13	0.013
5.2 GHz	11n HT20 (4 Chains)	0.20	13.67	3.0	0.09	0.009
5.2 GHz	11n HT40 (4 Chains)	0.20	16.88	3.0	0.19	0.019
5.3 GHz	11a (2 Chains)	0.20	18.62	6.01	0.58	0.058
5.3 GHz	11n HT20 (4 Chains)	0.20	20.50	3.0	0.45	0.045
5.3 GHz	11n HT40 (4 Chains)	0.20	23.62	3.0	0.91	0.091
5.6 GHz	11a (2 Chains)	0.20	18.68	6.01	0.59	0.059
5.6 GHz	11n HT20 (4 Chains)	0.20	20.76	3.0	0.47	0.047
5.6 GHz	11n HT40 (4 Chains)	0.20	23.40	3.0	0.87	0.087

END OF REPORT

Page 292 of 292