

FCC CFR47 PART 15 SUBPART E INDUSTRY CANADA RSS-210 ISSUE 8

CERTIFICATION TEST REPORT

FOR

WIFI 11A/N MODULE

MODEL NUMBER: MIC-A2

FCC ID: MCLMICA2 IC: 2878D-MICA2

REPORT NUMBER: 11J13871-1

ISSUE DATE: July 5, 2011

Prepared for HON HAI PRECISION IND. CO., LTD. 5F-1, 5 HSIN-AN ROAD HSINCHU SCIENCE-BASED INDUSTRIAL PARK TAIWAN, R.O.C.

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

(R)

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
	7/5/2011	Initial Issue	T. Chan

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	HON HAI PRECISION IND. CO., LTD. 5F-1, 5 HSIN-AN ROAD HSINCHU SCIENCE-BASED INDUST TAIWAN, R.O.C.	
EUT DESCRIPTION:	WIFI 11A/N MODULE	
MODEL:	MIC-A2	
SERIAL NUMBER:	N/A	
DATE TESTED:	June 27-30, 2011	
	APPLICABLE STANDARDS	
ST	ANDARD	TEST RESULTS
CFR 47 P	art 15 Subpart E	Pass

INDUSTRY CANADA RSS-210 Issue 8 Annex 9	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass
Compliance Certification Services (UL CCS) tested the above	equipment in accordance with the

Compliance Certification Services (UL 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 UL 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 UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL 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 UL CCS By:

Tested By:

THU CHAN ENGINEERING MANAGER UL CCS T. Jamano

Tadaomi Yamano EMC ENGINEER UL CCS

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 06-96, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

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

UL 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%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is WIFI Module with 802.11A/HT20/HT40.

The radio module is manufactured by Hon Hai Precision.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range	Mode	Output Power	Output Power
(MHz)		(dBm)	(mW)
5180 - 5240	802.11a	10.94	12.42
5180 - 5240	802.11n HT20	11.06	12.76
5190 - 5230	802.11n HT40	8.37	6.87

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PiFA antenna for TX/RX diversity, with a maximum gain of 2.55dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Broadcom, rev. 4.219.124.1. The test utility software used during testing was BCM Internal, rev. 4.219.RC124.1.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst port was measured, and the worst-case data rate for each mode is determined to be as follows, based on preliminary tests of the chipset utilized in this radio.

All final tests in the 802.11a mode were made at 6 Mb/s. All final tests in the 802.11n HT20 SISO mode were made at MCS0. All final tests in the 802.11n HT40 SISO mode were made at MCS0.

For radiated emissions below 1 GHz the worst-case configuration is determined to be the mode and channel with the highest output power.

To determine the worst-position of highest emissions, the EUT's antenna was investigated for X, Y, Z positions, and the worst position was turned out to be a Y-position with long ends at left side.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST						
Description	Manufacturer	Model	Serial Number	FCC ID		
Laptop PC	DELL	PP09S	1318770010	DOC		
AC-DC Adapter(For PC)	DELL	LA65NS0-00	CN0DF26667161573K1EC0	DOC		
		BCM9SDIO2				
Extended Card	Broadcom	CONAD	1242482	-		
Evaluation Board	Broadcom	BCM9SANAD	1379054	-		
		EPS050250U				
AC-DC Adapter(For EUT)	V-INFINITY	PS-P5P-KH	-	-		

I/O CABLES

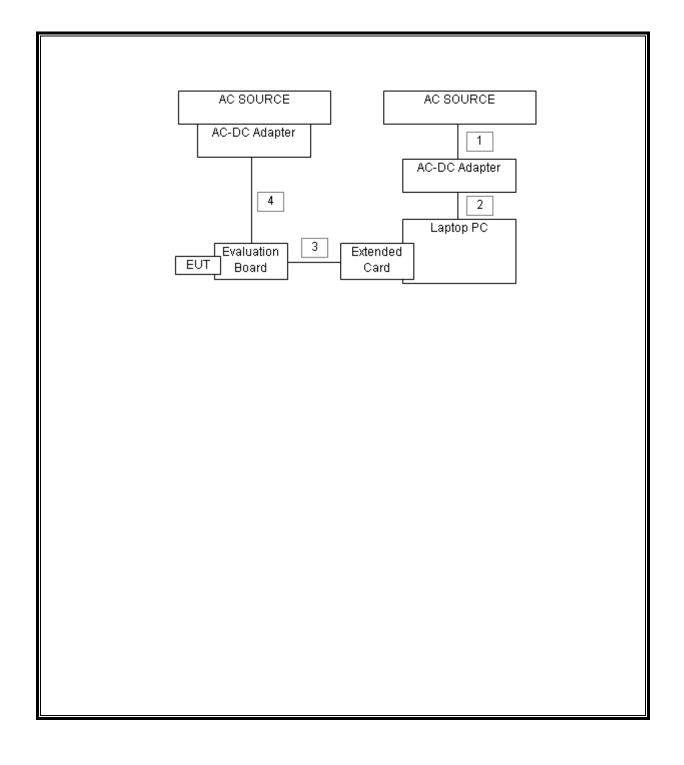
	I/O CABLE LIST							
Cable No.	Port	# of Identica Ports	Connector Type	Cable Type	Cable Length	Remarks		
1	AC	1	US 115V	Un-shielded	0.9m	-		
2	DC	2	DC	Un-shielded	1.8m	-		
3	I/O	3	Ribon	Un-shielded	0.5m	-		
4	DC	4	US 115V	Un-shielded	1.85m	-		

TEST SETUP

The EUT is attached to a evaluation board which is installed in the SDIO slot of a host laptop computer during the tests. Test software exercised the radio card.

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SETUP DIAGRAM FOR TESTS



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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 Due	
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	07/14/11	
Antenna, Horn, 18 GHz	EMCO	3115	C00872	06/29/11	
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00558	01/27/12	
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01171	07/12/11	
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/10/11	
Reject Filter, 5.15-5.35 GHz	Micro-Tronics	BRC13190	N02680	CNR	
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	12/172011	
Power Meter	Agilent / HP	437B	N02778	08/11/12	
Power Sensor, 18 GHz	Agilent / HP	8481A	N02784	07/28/11	
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01176	08/10/11	

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7. ANTENNA PORT TEST RESULTS

7.1. 802.11a MODE IN THE 5.2 GHz BAND

7.1.1. 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 7.5 dB (including 6.5 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Power
	(MHz)	(dBm)
Low	5180	10.52
Middle	5200	10.77
High	5240	10.74

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7.1.2. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

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

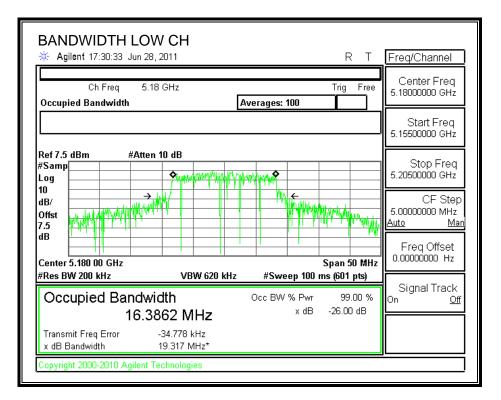
RESULTS

Channel	Frequency	26 dB Bandwidth	99% Bandwidth	
	(MHz)	(MHz)	(MHz)	
Low	5180	19.317	16.3862	
Middle	5200	19.361	16.3826	
High	5240	19.27	16.3686	

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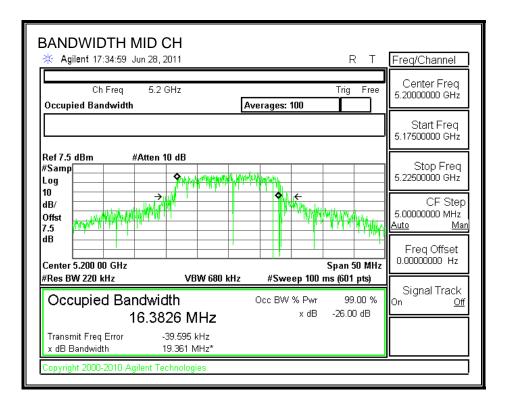
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26 dB and 99% BANDWIDTH

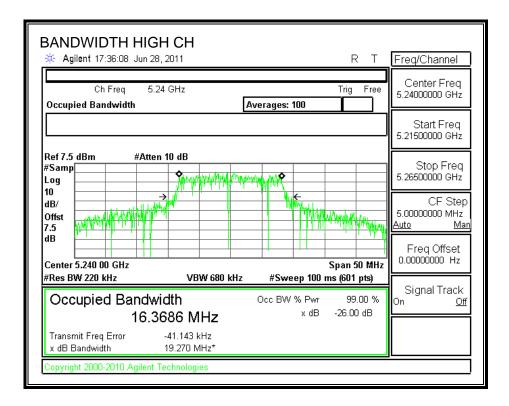


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7.1.3. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

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

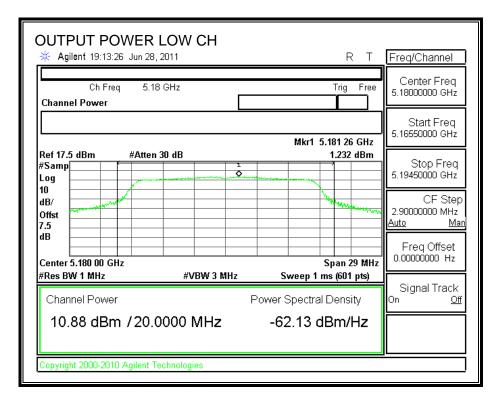
Channel	Frequency	Fixed	В	4 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5180	17	19.317	16.86	2.55	16.86
Mid	5200	17	19.361	16.87	2.55	16.87
High	5240	17	19.27	16.85	2.55	16.85

Results

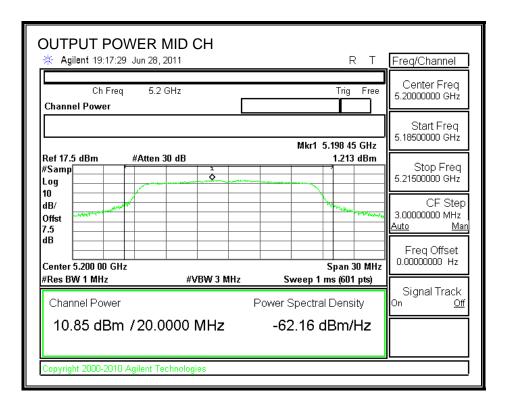
Channel	Frequency	Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5180	10.88	16.86	-5.98
Mid	5200	10.85	16.87	-6.02
High	5240	10.94	16.85	-5.91

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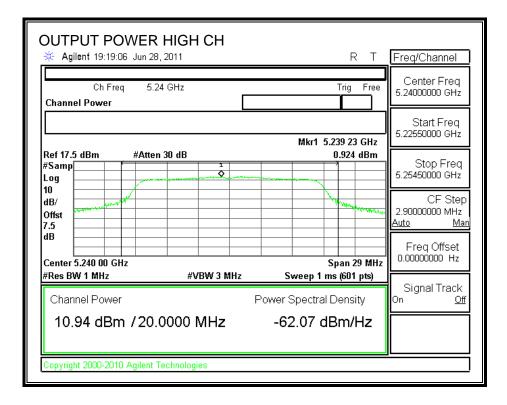
OUTPUT POWER



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7.1.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

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 or equal to 6 dBi, therefore the limit is 4 dBm.

TEST PROCEDURE

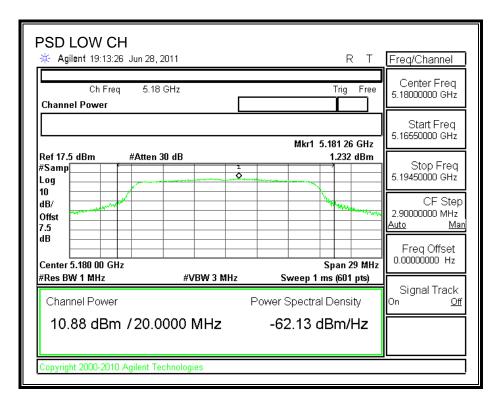
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

Channel	Frequency	PPSD	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5180	1.23	4	-2.77
Middle	5200	1.21	4	-2.79
High	5240	0.92	4	-3.08

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POWER SPECTRAL DENSITY

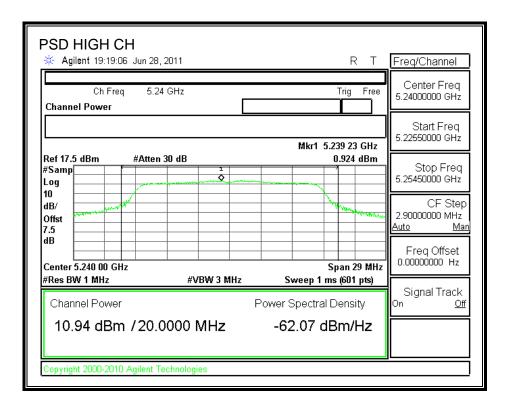


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PSD MID CH	2011	RT	Freq/Channel	
Ch Freq 5.2 (Channel Power				
		Mkr1 5.198 45 GHz	Start Freq 5.18500000 GHz	
Ref 17.5 dBm #Atten 3 #Samp	0 dB	1.213 dBm	Stop Freq 5.21500000 GHz	
10 dB/ Offst 7.5			CF Step 3.0000000 MHz <u>Auto Man</u>	
dB Center 5.200 00 GHz #Res BW 1 MHz	#VBW 3 MHz	Span 30 MHz Sweep 1 ms (601 pts)	Freq Offset 0.00000000 Hz	
Channel Power 10.85 dBm / 20.0	Signal Track On <u>Off</u>			
10.85 dBm / 20.0000 MHz -62.16 dBm/Hz				
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7.1.5. PEAK EXCURSION

<u>LIMITS</u>

FCC §15.407 (a) (6)

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

TEST PROCEDURE

The 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.

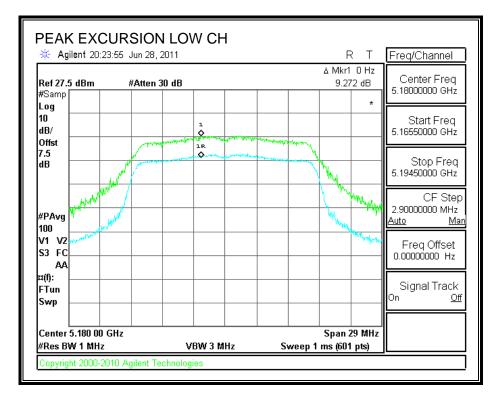
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

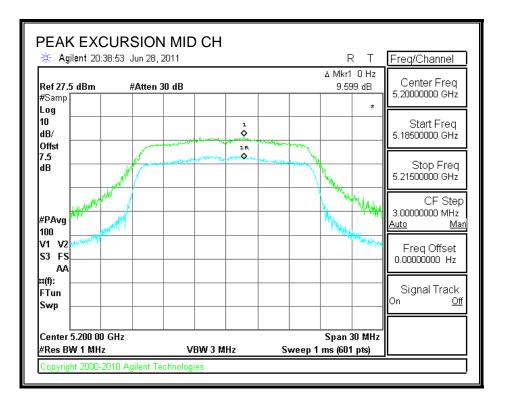
Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5180	9.27	13	-3.73
Middle	5200	9.60	13	-3.40
High	5240	7.93	13	-5.07

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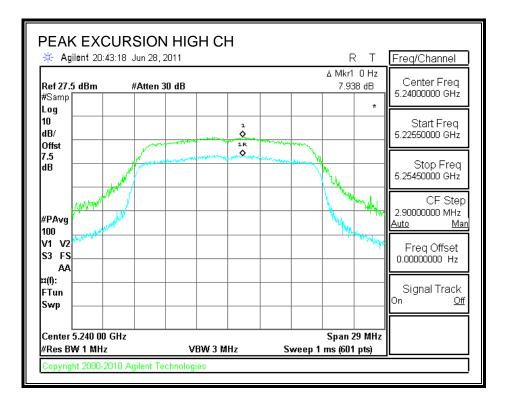
PEAK EXCURSION



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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.

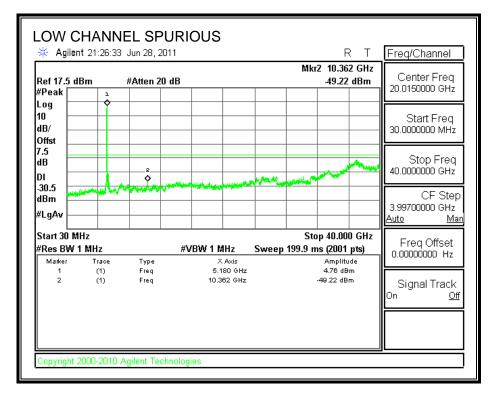
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

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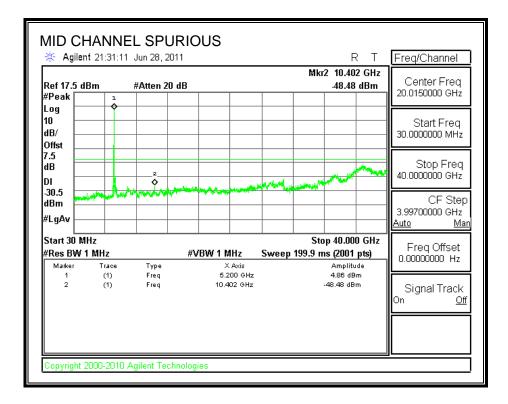
RESULTS

SPURIOUS EMISSIONS

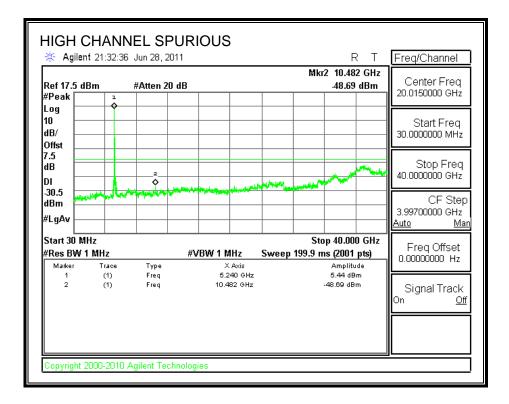


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7.2. 802.11n HT20 IN THE 5.2 GHz BAND

7.2.1. AVERAGE POWER

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

<u>RESULTS</u>

The cable assembly insertion loss of 7.5 dB (including 6.5 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Power
	(MHz)	(dBm)
Low	5180	10.69
Middle	5200	10.83
High	5240	10.84

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7.2.2. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

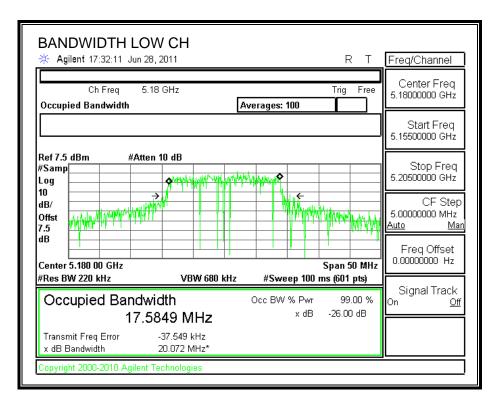
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

RESULTS

Channel	Frequency	26 dB Bandwidth	99% Bandwidth
	(MHz)	(MHz)	(MHz)
Low	5180	20.072	17.5849
Middle	5200	20.159	17.5717
High	5240	20.074	17.574

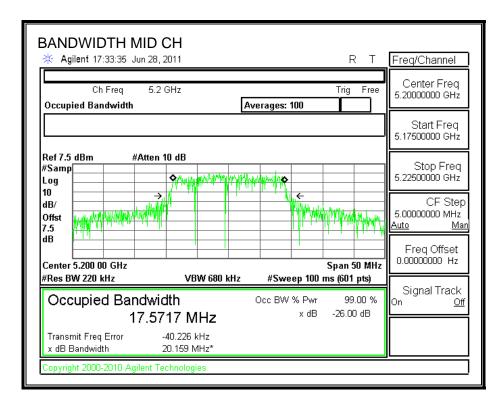
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26 dB and 99% BANDWIDTH

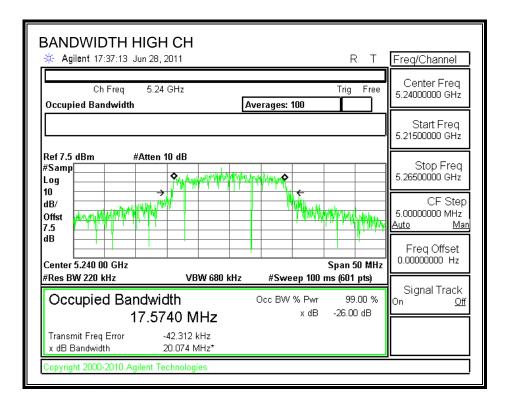


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7.2.3. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

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>

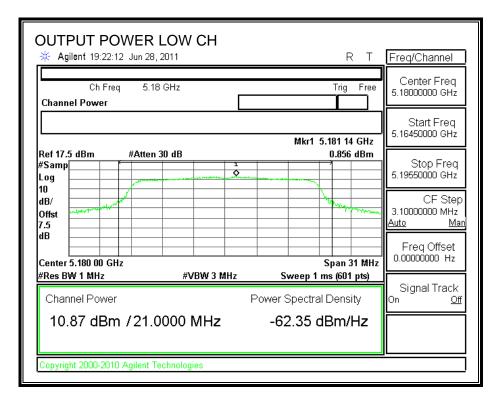
Limit

Channel	Frequency	Fixed	В	4 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5180	17	20.072	17.03	2.55	17.00
Mid	5200	17	20.159	17.04	2.55	17.00
High	5240	17	20.674	17.15	2.55	17.00

Results

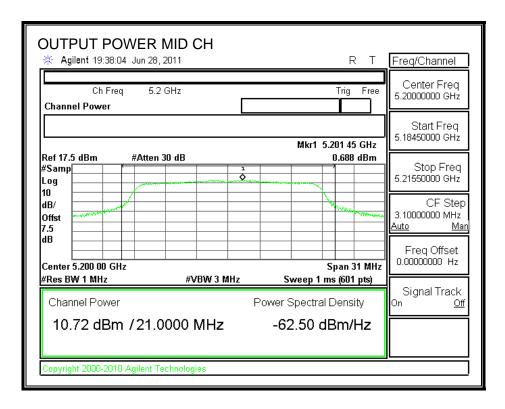
Channel	Frequency	Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5180	10.87	17.00	-6.13
Mid	5200	10.72	17.00	-6.28
High	5240	11.06	17.00	-5.94

OUTPUT POWER

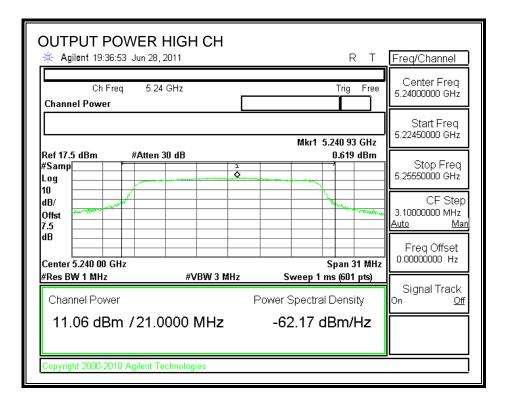


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7.2.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

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 or equal to 6 dBi, therefore the limit is 4 dBm.

TEST PROCEDURE

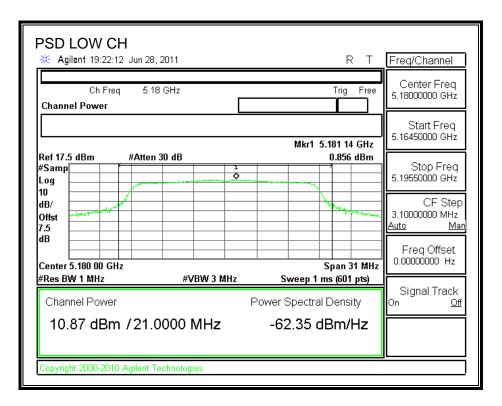
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

Channel	Frequency	PPSD	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5180	0.86	4	-3.14
Middle	5200	0.69	4	-3.31
High	5240	0.62	4	-3.38

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POWER SPECTRAL DENSITY

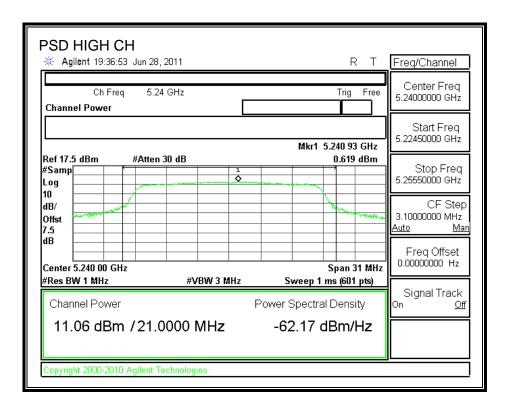


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PSD MID CH	2011	RT	Freq/Channel
Ch Freq 5.2 Channel Power	GHz	Trig Free	Center Freq 5.20000000 GHz
		Mkr1 5.201 45 GHz	Start Freq 5.18450000 GHz
Ref 17.5 dBm #Atten 3 #Samp Log		0.688 dBm	Stop Freq 5.21550000 GHz
10 dB/ Offst 7.5			CF Step 3.10000000 MHz <u>Auto Man</u>
dB		Span 31 MHz	Freq Offset 0.00000000 Hz
#Res BW 1 MHz Channel Power		Sweep 1 ms (601 pts) Power Spectral Density	Signal Track On <u>Off</u>
10.72 dBm /21.0	000 MHz	-62.50 dBm/Hz	
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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	9.73	13	-3.27
Middle	5200	7.59	13	-5.41
High	5240	10.06	13	-2.94

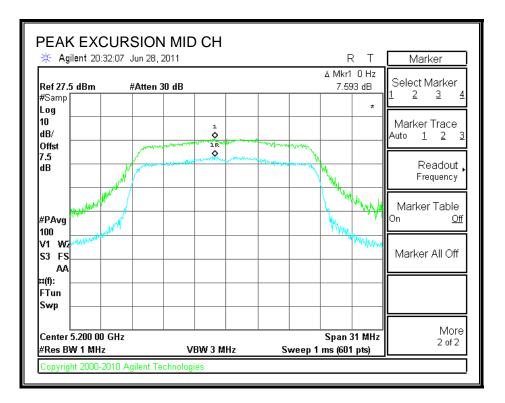
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PEAK EXCURSION

PEAK EXCURSION * Agilent 20:29:05 Jun 28, 2		R T	
Ref 27.5 dBm #Atten 3 #Samp		∆ Mkr1 0 Hz 9.726 dB	Freq/Channel Center Freq 5.18000000 GHz
Log 10 dB/ Offst	1	*	Start Freq 5.16450000 GHz
7.5 dB			Stop Freq 5.19550000 GHz
#PAvg		hanse here here	CF Step 3.1000000 MHz <u>Auto Man</u>
100 ((())) V1 V2 ((()))(()) S3 FS AA			Freq Offset 0.00000000 Hz
¤(f): FTun Swp			Signal Track On <u>Off</u>
Center 5.180 00 GHz #Res BW 1 MHz	VBW 3 MHz	Span 31 MHz Sweep 1 ms (601 pts)	
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🔆 Agilent 20:46:39 Jun 2	8, 2011	RT	Freq/Channel
Ref 27.5 dBm #Atte #Samp	n 30 dB	∆ Mkr1 0 Hz 10.058 dB	Center Freq 5.24000000 GHz
Log 10 dB/		*	Start Freq 5.22450000 GHz
Offst 7.5 dB			Stop Freq 5.25550000 GHz
#PAvg		and the second s	CF Step 3.10000000 MHz <u>Auto Mar</u>
100 V1 V2 S3 FS AA		"Nyphine and a second s	Freq Offset 0.00000000 Hz
¤(f): FTun Swp			Signal Track ^{On <u>Off</u>}
Center 5.240 00 GHz #Res BW 1 MHz	VBW 3 MHz	Span 31 MHz Sweep 1 ms (601 pts)	

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7.2.6. 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.

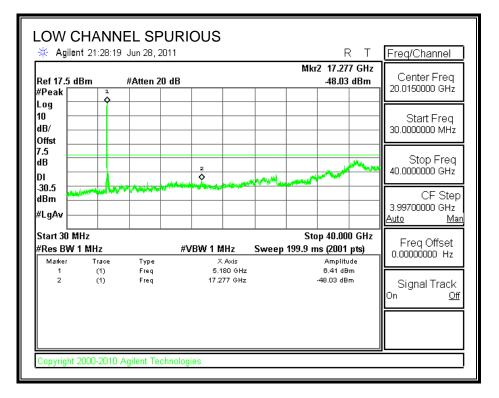
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

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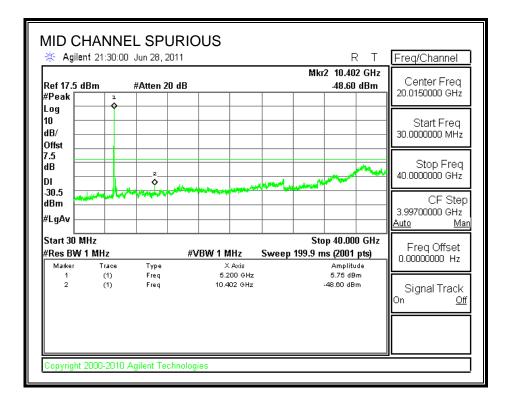
RESULTS

SPURIOUS EMISSIONS

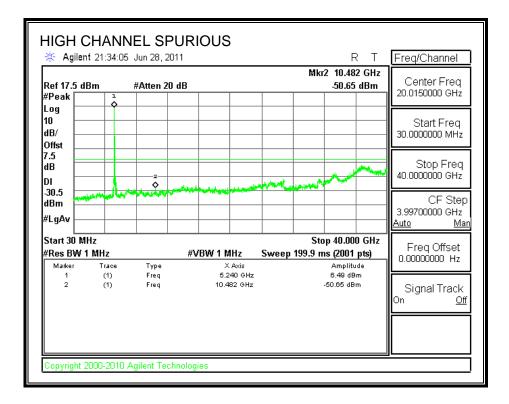


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7.3. 802.11n HT40 IN THE 5.2 GHz BAND

7.3.1. AVERAGE POWER

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

<u>RESULTS</u>

The cable assembly insertion loss of 7.5 dB (including 6.5dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Power
	(MHz)	(dBm)
Low	5190	7.84
High	5230	7.82

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7.3.2. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

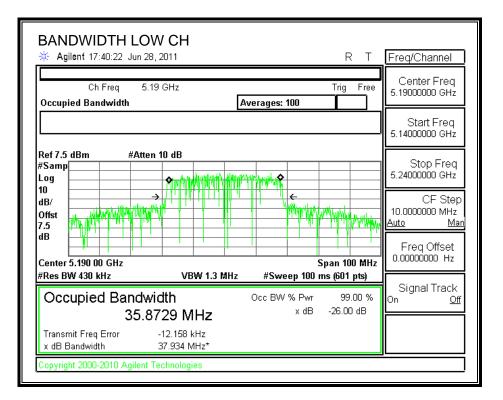
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

RESULTS

Channel	Frequency	26 dB Bandwidth	99% Bandwidth
	(MHz)	(MHz)	(MHz)
Low	5190	37.934	35.8729
High	5230	37.827	35.8754

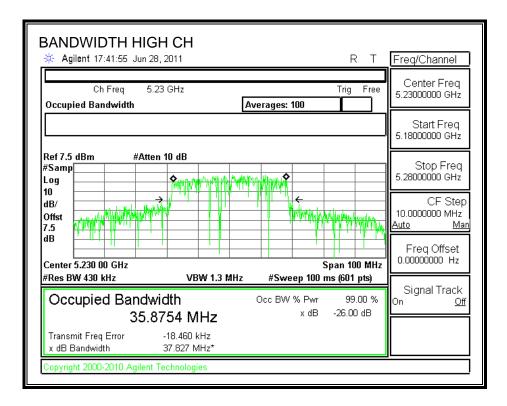
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26 dB and 99% BANDWIDTH



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7.3.3. OUTPUT POWER

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

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.

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RESULTS

Limit

Channel	Frequency	Fixed	В	4 + 10 Log B	Antenna	Limit
		Limit		Limit	Gain	
	(MHz)	(dBm)	(MHz)	(dBm)	(dBi)	(dBm)
Low	5190	17	37.934	19.79	2.55	17.00
High	5230	17	37.827	19.78	2.55	17.00

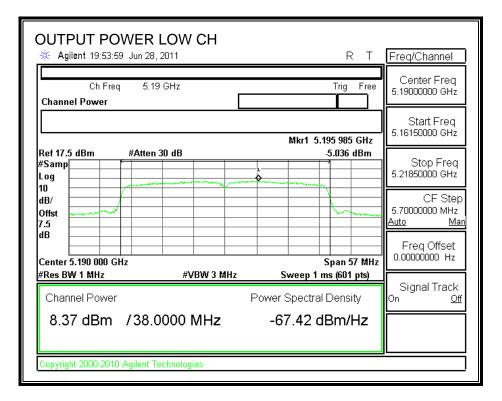
Results

Channel	Frequency	Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5190	8.37	17.00	-8.63
High	5230	8.30	17.00	-8.70

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OUTPUT POWER



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OUTPUT POWER HIGH CH Agilent 19:55:39 Jun 28, 2011	R T Freq/Channel
Ch Freq 5.23 GHz Channel Power	Trig Free Center Freq 5.23000000 GHz
	Mkr1 5.235 985 GHz 5.20150000 GHz
Ref 17.5 dBm #Atten 30 dB #Samp Log 10	5.994 dBm Stop Freq 5.25850000 GHz
dB/	CF Step 5.7000000 MHz <u>Auto Man</u>
Center 5.230 000 GHz #Res BW 1 MHz #VBW 3 MHz	Span 57 MHz Sweep 1 ms (601 pts)
Channel Power 8.30 dBm /38.0000 MHz	Power Spectral Density On <u>Off</u>
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7.3.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

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 or equal to 6 dBi, therefore the limit is 4 dBm.

TEST PROCEDURE

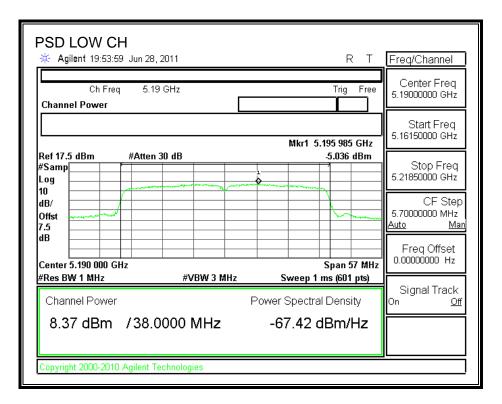
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

Channel	Frequency	PPSD	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	5190	-5.04	4	-9.04
High	5230	-5.90	4	-9.90

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POWER SPECTRAL DENSITY



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PSD HIGH CH		RT	Freq/Channel
Ch Freq 5.23 GHz Channel Power		Trig Free	Center Freq 5.2300000 GHz
		Mkr1 5.235 985 GHz	Start Freq 5.20150000 GHz
Ref 17.5 dBm #Atten 30 dB #Samp Log		-5.904 dBm	Stop Freq 5.25850000 GHz
10 dB/ Offst 7.5			CF Step 5.70000000 MHz <u>Auto Man</u>
dB	¥VBW 3 MHz	Span 57 MHz Sweep 1 ms (601 pts)	Freq Offset 0.00000000 Hz
Channel Power		Power Spectral Density	Signal Track On <u>Off</u>
8.30 dBm /38.0000	MHZ	-67.50 dBm/Hz	
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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.

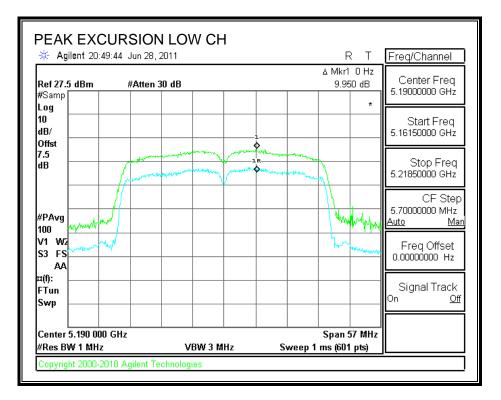
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

<u>RESULTS</u>

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	5190	9.95	13	-3.05
High	5230	9.47	13	-3.53

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PEAK EXCURSION



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* Agilent 20:54:2	RSION HIGH CH 3 Jun 28, 2011	R	T Freq/Channel
Ref 27.5 dBm #Samp	#Atten 30 dB	∆ Mkr1 0 9.471 (Contor From
Log 10 dB/ Offst			* Start Freq 5.20150000 GHz
dB	IR W	Marine and a second second	Stop Freq 5.25850000 GHz
#PAvg			CF Step 5.70000000 MHz Auto Man
100 V1 W2 S3 FS AA		- h	Freq Offset 0.00000000 Hz
¤(f): FTun Swp			Signal Track On <u>Off</u>
Center 5.230 000 GI #Res BW 1 MHz	lz VBW 3 MH	Span 57 z Sweep 1 ms (601 pi	

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7.3.6. 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.

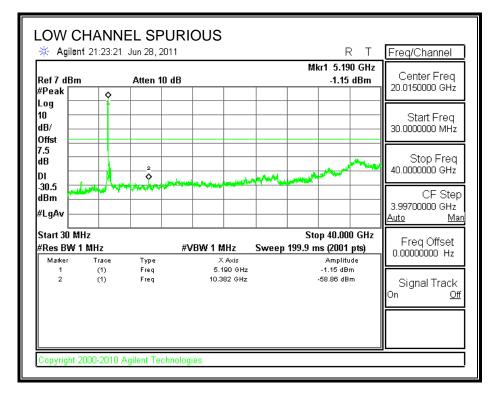
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

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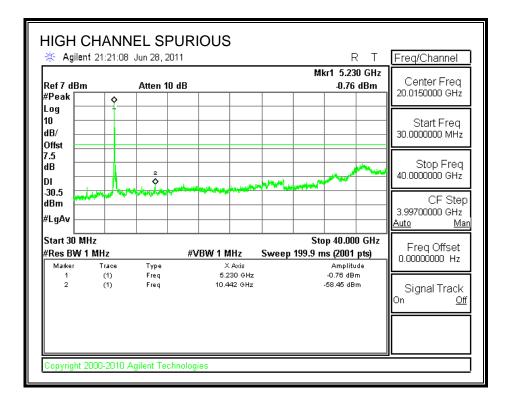
RESULTS

SPURIOUS EMISSIONS



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8. RADIATED TEST RESULTS

8.1. 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.

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8.2. **TRANSMITTER ABOVE 1 GHz**

8.2.1. TX ABOVE 1 GHz FOR 802.11a MODE IN THE LOWER 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

Agilent 11:22:4	0 00012012011			R	, 	Freq/Channel
tef 121.5 dBµ∀	Atten 10 dB		Mkr	1 5.149 50 (57.36 dE		Center Freq 5.07500000 GHz
Peak 🛛						5.07500000 GHZ
og D B/					_	Start Freq
ffst						3.0000000 3112
4.5 B					_	Stop Freq 5.1500000 GHz
						3.13000000 0112
4.0 Βμ∨					_	CF Ste 15.000000 MHz
gAv						<u>Auto M</u>
11 S2 3 FC	and many of the states	hime he are and him	mikitan si Provinsi yang		1 	Freq Offset 0.00000000 Hz
(f): Tun wp						Signal Track On <u>O</u>
b						L
tart 5.000 00 GHz			Sto	p 5.150 00 0		
Res BW 1 MHz	#VE	W 1 MHz		1 ms (601 p		

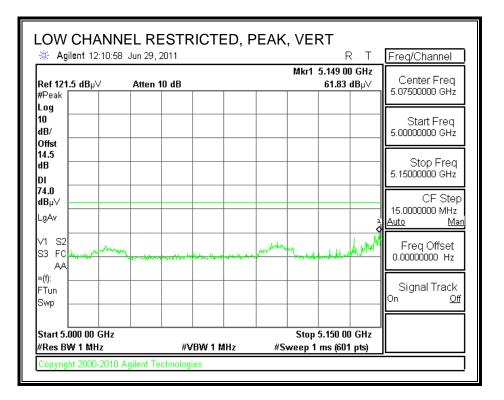
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🔆 Agilent 11:3	9:30 Jun 29, 2011		R	T Freq/Channel
Ref 121.5 dB µ∨	Atten 10 dB		Mkr1 5.150 00 (41.28 dE	Contor From I
Log 10 dB/ Offst				Start Freq
dB				Stop Freq 5.15000000 GHz
54.0 dBµ∀ LgAv				CF Step 15.0000000 MHz Auto Man
M1 S2				Freq Offset 0.00000000 Hz
×(f): FTun Swp	<u> </u>			Signal Track
Start 5.000 00 GI #Res BW 1 MHz		BW 10 Hz	Stop 5.150 00 (Sweep 11.7 s (601 pt	

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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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🔆 Agilent 12:16:57	Jun 29, 2011				RT	Freq/Channel
Ref 121.5 dBµ∀ #Peak	Atten 10 dB)98 25 GHz 7.49 dBµ∀	Center Freq 5.07500000 GHz
Log 10 dB/						Start Freq
Offst 14.5						Stop Freq
DI						5.15000000 GHz
dBµ∨ _gAv						CF Step 15.0000000 MHz <u>Auto Mar</u>
V1 S2 S3 FC			1			Freq Offset 0.00000000 Hz
«(f): =Tun	\~			\sim	_	Signal Track
Swp						On <u>Off</u>
Start 5.000 00 GHz ¥Res BW 1 MHz		v 10 Hz		Stop 5.1 ep 11.7 s	150 00 GHz	*

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HARMONICS AND SPURIOUS EMISSIONS

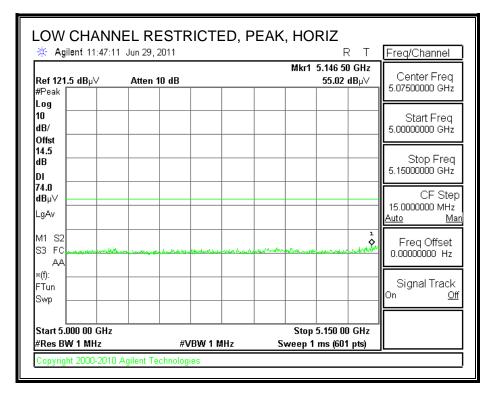
onfigu Iode :	ngineer: ration: <u>uipmen</u> t		2011/6/29 Tadaomi Yama Antenna-Y Ax Tx mode	is											
	orn 1- S/N: 2238		Pre-ar	nplifer 8449B			Pre-am	plifer	26-40GH	_ ⊢	Но	rn > 180	Hz		Limit
			▼ 134 Hr	* 8449B		•				•				•	
3' 0	quency Cat cable 2 able 228	2807700		able 2		600	20' cal 20' cab		2 807500		HPF	Re	ject Filte	R Ave	<u>ak Measurements</u> BW=VBW=1MHz rage Measurements
ļ														RBW	/=1MHz;VBW=10Hz
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Ma dB	r Notes (V/H)
80MHz	z Low CH								Ì						
	3.0 z Low CH	37.6	24.8	37.6	8.9	-32.6	0.0	0.0	51.5	38.7	74	54	-22.5	-15.3	Н
.360 00MHz	3.0 z Mid CH	37.2	24.9	37.6	8.9	-32.6	0.0	0.0	51.1	38.8	74	54	-22.9	-15.2	V
.400 00MHz	3.0 z Mid CH	35.4	23.7	37.6	8.9	-32.6	0.0	0.0	49.3	37.6	74	54	-24.7	-16.4	Н
.400	3.0	35.7	25.5	37.6	8.9	-32.6	0.0	0.0	49.6	39.4	74	54	-24.4	-14.6	v
40MHz .480	z High CH 3.0	36.8	24.5	37.6	9.0	-32.6	0.0	0.0	50.7	38.4	74	54	-23.3	-15.6	Н
	z High CF 3.0	I 36.2	24.7	37.6	9.0	-32.6	0.0	0.0	50.1	38.6	74	54	-23.9	-15.4	v
ev. 07.22	f Dist Read AF	Measurema Distance to Analyzer R Antenna Fa Cable Loss	eading actor	y		Amp D Corr Avg Peak HPF	Average	Correc Field S ed Peal	ct to 3 mete Strength @ c Field Stre	3 m		Avg Lim Pk Lim Avg Mar Pk Mar	Peak Fiek	l Strength . Average	Limit Limit

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8.2.2. TX ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE LOWER 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

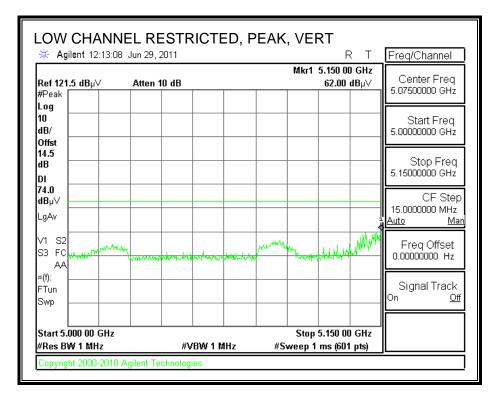


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🔆 Agilent 13:13	3:02 Jun 29, 2011	R	T Freq/Channel
Ref 121.5 dB µ∀	Atten 10 dB	Mkr1 5.150 00 Gł 41.10 dBµ	Contor Eron
Log 10 dB/ Offst			Start Freq 5.00000000 GHz
dB			
54.0 dBµ∀ LgAv			CF Step 15.000000 MHz
M1 S2 S3 FC			<u>Auto Man</u> Freq Offset 0.00000000 Hz
*(f): FTun Swp			Signal Track
Start 5.000 00 GH #Res BW 1 MHz	lz #VBW 10	Stop Ŝ.150 00 GF) Hz Sweep 11.7 s (601 pts)	

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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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🔆 Agilent 12:14:4	l6 Jun 29, 2011			RT	Freq/Channel
Ref 121.5 dBµ∨ #Peak □ □	Atten 10 dB		Mk	r1 5.098 75 GHz 47.33 dBµ∀	Center Freq 5.07500000 GHz
Log					Start Freq
dB/ Offst 14.5					5.00000000 GHz
dB DI					Stop Freq 5.15000000 GHz
54.0 dBµ∨ _gAv					CF Step 15.000000 MHz
v1 S2					Freq Offset
S3 FC	<u></u>		, è		0.00000000 Hz
=Tun Swp					Signal Track On <u>Off</u>
Start 5.000 00 GHz #Res BW 1 MHz		V 10 Hz		op 5.150 00 GHz 11.7 s (601 pts)	Ĺ

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HARMONICS AND SPURIOUS EMISSIONS

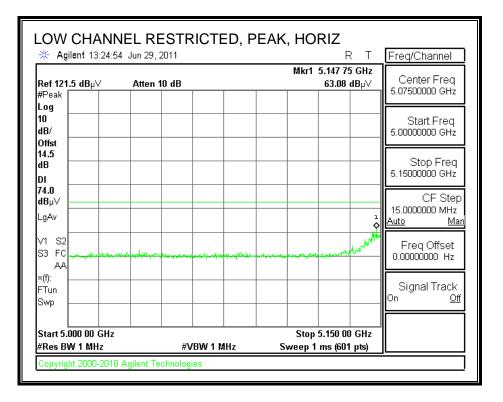
est Eng configur lode: <u>est Equ</u>	ration:		Tadaomi Yama Antenna-Y Ax Tx mode Pre-an	is	1.26		Pro. om	plifor	26-40GH	-	Ha	rn > 180	211-7		Limit
	/N: 2238			9 8449B			Fie-alli	piner		- -	по	11 > 180	5112	.	FCC 15.209
- Hi Frequ						•									
3' c	able 2	2807700	12' c	able 2	28076	500			807500		HPF	Re	ject Filte	R	<u>ak Measurements</u> BW=VBW=1MHz
3' ca	ble 228	07700	12' ca	ble 228	07600	-	20' cab	le 2280	7500			-			rage Measurements /=1MHz ; VBW=10Hz
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Ma dB	r Notes (V/H)
	Low CH 3.0		25.3	37.6	8.9	-32.6	0.0	0.0	50.7	39.2	74	54	-23.3	-14.8	Н
	Low CH 3.0		25.7	37.6	8.9	-32.6	0.0	0.0	50.7	39.6	74	54	-23.3	-14.4	v
00MHz 400	Mid CH 3.0	37.5	24.1	37.6	8.9	-32.6	0.0	0.0	51.4	38.0	74	54	-22.6	-16.0	н
00MHz 400	Mid CH 3.0	36.4	24.6	37.6	8.9	-32.6	0.0	0.0	50.3	38.5	74	54	-23.7	-15.5	v
40MHz 480	High CF 3.0	I 35.8	25.6	37.6	9.0	-32.6	0.0	0.0	49.7	39.5	74	54	-24.3	-14.5	Н
40MHz .480	High CF 3.0	I 35.4	24.6	37.6	9.0	-32.6	0.0	0.0	49.3	38.5	74	54	-24.7	-15.5	v
	f Dist Read AF	Measurema Distance to Analyzer R Antenna Fa Cable Loss	eading ctor	y		Amp D Corr Avg Peak HPF	Average	Correc Field S ed Peal	ct to 3 mete Strength @ c Field Stre	3 m		Avg Lim Pk Lim Avg Mar Pk Mar	Peak Fiek	d Strength . Average	Limit Limit

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8.2.3. TX ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE LOWER 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

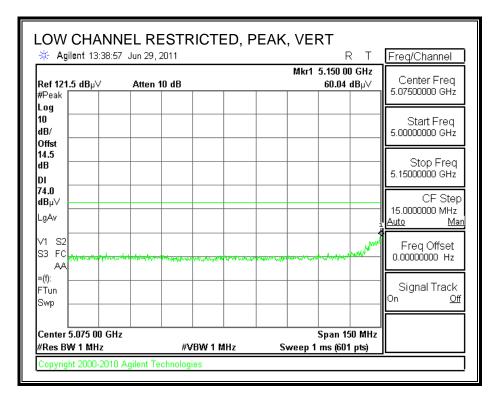


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🔆 Agilent 13:20	6:51 Jun 29, 2011	RT	Freq/Channel
Ref 121.5 dB µ∀	Atten 10 dB	Mkr1 5.150 00 GHz 47.45 dBµ∨	Center Freq 5.07500000 GHz
Log 10 dB/ Offst			Start Freq 5.00000000 GHz
dB DI			Stop Freq 5.1500000 GHz
54.0 dBµ∨ LgAv			CF Step 15.0000000 MHz <u>Auto Man</u>
V1 S2 S3 FC			Freq Offset 0.00000000 Hz
≈(f): FTun Swp			Signal Track On <u>Off</u>
Center 5.075 00 (#Res BW 1 MHz	GHz #VBW 10 H	Span 150 MHz Iz Sweep 11.7 s (601 pts)	

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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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🔆 Agilent 13:3	1:57 Jun 29, 2011		T Freq/Channel
Ref 121.5 dB µ∨ #Peak □ □	Atten 10 dB	Mkr1 5.150 00 45.87 d	Contor From
Log 10 dB/ Offst			Start Freq 5.00000000 GHz
14.5 dB DI 54.0			Stop Freq 5.15000000 GHz
54.0 dBµ∀ LgAv			CF Step 15.0000000 MHz <u>Auto Man</u>
V1 S2 S3 FC			Freq Offset 0.00000000 Hz
≈(f): FTun Swp			Signal Track
Center 5.075 00 / #Res BW 1 MHz	GHz #VBW [/]	 Span 150 Sweep 11.7 s (601 p	

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HARMONICS AND SPURIOUS EMISSIONS

90MHz Low CH 3.80 3.0 36.6 24.2 37.6 8.9 -32.6 0.0 50.5 38.1 74 54 -23.5 -15.9 H 90MHz Low CH 380 3.0 37.1 24.8 37.6 8.9 -32.6 0.0 0.0 50.5 38.1 74 54 -23.5 -15.9 H 380 3.0 37.1 24.8 37.6 8.9 -32.6 0.0 0.0 51.0 38.7 74 54 -23.0 -15.3 V 30MHz High CH
H Frequency Cables 12' cable 22807600 20' cable 22807500 HPF Reject Filter Peak Measurements RBW=VBW=1MHz 3' cable 22807700 12' cable 22807600 20' cable 22807500 3' cable 22807700 PE Lim Reject Filter Peak Measurements RBW=VBW=1MHz 3' cable 22807600 20' cable 22807500 PK Lim Avg Lim Pk Mar Avg Mar Notes 12' cable 22807600 20' cable 22807500 PK Lim Reject Filter Peak Measurements RBW=10Hz 10' cable 22807500 PK Lim Avg Read Avg Mar Motes GHz (m) dBuV dBuV Bus Measurements RBW=10Hz 10' cable 22807500 PK Lim Avg Read Avg Mar Motes (PH Lim) Add BuV/m dB MB Mag War Margin vs. Parge Field Strength Imit PS and 30 30. 35.6 24.0 0.0 0.0

Page 85 of 106 COMPLIANCE CERTIFICATION SERVICES (UL CCS) 47173 BENICIA STREET, FREMONT, CA 94538, USA This report shall not be reproduced except in full, without the written approval of UL CCS. FORM NO: CCSUP4701D FAX: (510) 661-0888 This report shall not be reproduced except in full, without the written approval of UL CCS.

8.3. RECEIVER ABOVE 1 GHz

8.3.1. RECEIVER ABOVE 1 GHz FOR 20 MHz BANDWIDTH IN THE 5.2 GHz BAND

			y Measurem												
-		runcation	Services, Fr	emont 3	om Cna	mber									
Company:			Hon Hai												
Project #: Date :	•		11J13781 2011/6/29												
Fest Engi	ineer:		Tadaomi Yama	ano											
Configura	ation:		Antenna-Y Ax	ds											
Aode:			Rx mode												
lest Equi	ipme nt	t <u>:</u>													
Но	rn 1-'	18GHz	Pre-ar	nplifer	1-26G	iHz	Pre-am	plifer	26-40GH	z	Но	rn > 18G	iHz		Limit
T60; S/N	N: 2238	3 @3m	T34 HF	P 8449B		•				- I				•	FCC 15.209
Hi Freque			12' 0	able 2'	28076	00	20' cal	nle 22	807500	Ī	LIDE	Pea	k Measurements		
		ble 22807700 12' cable 22807600 20' cable 22807500 HPF Reject Filter								RB	BW=VBW=1MHz				
3' cab	ble 228	07700	- 12' ca	able 2280)7600	-	20' cab	e 2280	07500 -			7	age Measurements =1MHz ; VBW=10Hz		
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m		dBuV/m	dBuV/m	dB	dB	(V/H)
.329	3.0	50.8 52.3	33.5 35.2	25.6 25.6	2.7	-37.8 -37.8	0.0	0.0	41.3 42.8	24.0 25.7	74 74	54 54	-32.7 -31.2	-30.0 -28.3	H V
.598	3.0	51.6	31.0	25.0	3.0	-37.4	0.0	0.0	43.7	23.0	74	54	-31.2	-28.5	н
1.598	3.0	54.4	33.2	26.5	3.0	-37.4	0.0	0.0	46.5	25.3	74	54	-27.5	-28.7	V
.861 .861	3.0	43.2 46.3	30.9 30.2	27.3 27.3	3.3 3.3	-37.1	0.0	0.0	36.8 39.9	24.5 23.8	74 74	54 54	-37.2 -34.1	-29.5 -30.2	H H
I F	f Dist Read	Measurem Distance to Analyzer R Antenna Fa	Reading	y	1	Amp D Corr Avg Peak	Average	Correc Field S	ct to 3 mete Strength @ < Field Stre	3 m		Pk Lim Avg Mar	Peak Fiel Margin vs	Field Streng d Strength L . Average L . Peak Limi	_imit _imit
	CL	Cable Loss	s]	HPF	High Pas	s Filter							

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8.3.2. RECEIVER ABOVE 1 GHz FOR 40 MHz BANDWIDTH IN THE 5.2 GHz BAND

Company Project #: Date: Fest Engi Configura Mode: Fest Equi	: ineer: ation:		Hon Hai 11J13781 2011/6/29 Tadaomi Yama Antenna-Y Ax Rx mode												
Но	rn 1-	18GHz	Pre-ar	nplifer	1-260	GHz	Pre-am	plifer	26-40GH	z	Но	rn > 180	Hz		Limit
T60; S/	T60; S/N: 2238 @3m 🔻 T34 HP 8449B 🔻									↓				•	FCC 15.209
Hi Frequ	uency Cables														
3' ca									er	<u>k Measurements</u> W=VBW=1MHz					
3' cat	able 22807700 12' cable 22807600 20' cable 22807500 4								Avera	age Measurements -1MHz ; VBW=10Hz					
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m		dBuV/m	dBuV/m	dB	dB	(V/H)
329 329	3.0 3.0	54.3 54.3	34.2 36.5	25.6 25.6	2.7	-37.8 -37.8	0.0	0.0	44.8	24.7 27.0	74 74	54 54	-29.2 -29.2	-29.3 -27.0	H V
598	3.0	52.4	32.5	26.5	3.0	-37.4	0.0	0.0	44.5	24.6	74	54	-29.5	-29.4	Н
598	3.0	55.2	32.4	26.5	3.0	-37.4	0.0	0.0	47.3	24.5	74	54	-26.7	-29.5	V
.861 .861	3.0 3.0	42.5 45.7	29.8 32.5	27.3 27.3	3.3	-37.1	0.0	0.0	36.1 39.3	23.4 26.1	74 74	54 54	-37.9 -34.7	-30.6 -27.9	H H
1	f Dist Read AF	Measureme Distance to Analyzer Ra Antenna Fa Cable Loss	eading actor	y		Amp D Corr Avg Peak HPF	Average	Corre Field S d Peal	ct to 3 mete Strength @ c Field Stre	3 m		Pk Lim Avg Mar	Peak Fiel Margin vs	Field Streng d Strength L s. Average L s. Peak Limi	.imit .imit

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8.4. WORST-CASE BELOW 1 GHz

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

Complianc	e Certif	ication Ser	vices, Fre	emont 3	8m Char	nber							
ompany:			Hon Hai										
roject #:			11J13781										
Date:			6/30/11										
lest Engine			Tadaomi)								
èst Target Aode:			FCC15B (Tx Conti										
ioue.			I x Conti	inuousiy									
	f	Measureme	ent Freque	ncy	Amp	Preamp	Gain			Margin	Margin vs.	Limit	
	Dist	Distance to	o Antenna		D Corr	Distance	Correct	to 3 meters					
	Read	Analyzer F	Reading		Filter	Filter Ins	ert Loss						
	AF	Antenna F			Corr.	Calculate							
	CL	Cable Loss			Limit	Field Stre	ength Lir	nit					
f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Pad dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Iorizontal		ubur	ub/m								.,		
03.842	3.0	36.6	13.2	2.4	24.3	0.0	0.0	14.7	46.0	-31.3	Н	Р	
02.471	3.0	23.4	16.4	3.1	19.9	0.0	0.0	6.6	46.0	-39.4	Н	Р	
					26.4	0.0	0.0	-0.6	46.0	-46.6	Н	P	
02.325	3.0	22.1	20.4	3.7	20.4	0.0	0.0	-0.0				1	
02.325 'ertical													
02.325 /ertical 03.842	3.0	36.4	13.2	2.4	24.3	0.0	0.0	14.5	46.0	-31.5	v	P	
02.325 /ertical 03.842 02.471	3.0 3.0	36.4 23.1	13.2 16.4	2.4 3.1	24.3 19.9	0.0	0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 /ertical 03.842 02.471	3.0	36.4	13.2	2.4	24.3	0.0	0.0	14.5	46.0	-31.5	v	P	
02.325 /ertical 03.842 02.471 02.325 Rev. 1.27.09	3.0 3.0 3.0	36.4 23.1	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 (ertical 03.842 02.471 02.325 Rev. 1.27.09	3.0 3.0 3.0	36.4 23.1 21.8	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 (ertical 03.842 02.471 02.325 Rev. 1.27.09	3.0 3.0 3.0	36.4 23.1 21.8	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 fertical 03.842 02.471 02.325 Rev. 1.27.09	3.0 3.0 3.0	36.4 23.1 21.8	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 ertical 03.842 02.471 02.325 eev. 1.27.09	3.0 3.0 3.0	36.4 23.1 21.8	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 ertical 03.842 02.471 02.325 eev. 1.27.09	3.0 3.0 3.0	36.4 23.1 21.8	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 ertical 03.842 02.471 02.325 eev. 1.27.09	3.0 3.0 3.0	36.4 23.1 21.8	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 ertical 03.842 02.471 02.325 ev. 1.27.09	3.0 3.0 3.0	36.4 23.1 21.8	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 ertical 03.842 02.471 02.325 ev. 1.27.09	3.0 3.0 3.0	36.4 23.1 21.8	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 ertical 03.842 02.471 02.325 ev. 1.27.09	3.0 3.0 3.0	36.4 23.1 21.8	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 ertical 03.842 02.471 02.325 ev. 1.27.09	3.0 3.0 3.0	36.4 23.1 21.8	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 ertical 03.842 02.471 02.325 eev. 1.27.09	3.0 3.0 3.0	36.4 23.1 21.8	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 ertical 03.842 02.471 02.325 eev. 1.27.09	3.0 3.0 3.0	36.4 23.1 21.8	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 ertical 03.842 02.471 02.325 ev. 1.27.09	3.0 3.0 3.0	36.4 23.1 21.8	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 ertical 03.842 02.471 02.325 eev. 1.27.09	3.0 3.0 3.0	36.4 23.1 21.8	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 fertical 03.842 02.471 02.325 Rev. 1.27.09	3.0 3.0 3.0	36.4 23.1 21.8	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 fertical 03.842 02.471 02.325 Rev. 1.27.09	3.0 3.0 3.0	36.4 23.1 21.8	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 fertical 03.842 02.471 02.325 Rev. 1.27.09	3.0 3.0 3.0	36.4 23.1 21.8	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 Vertical 03.842 02.471 02.325 Rev. 1.27.09	3.0 3.0 3.0	36.4 23.1 21.8	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 Vertical 03.842 02.471 02.325 Rev. 1.27.09	3.0 3.0 3.0	36.4 23.1 21.8	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	
02.325 ertical 03.842 02.471 02.325 eev. 1.27.09	3.0 3.0 3.0	36.4 23.1 21.8	13.2 16.4 20.4	2.4 3.1 3.7	24.3 19.9 26.4	0.0 0.0 0.0	0.0 0.0 0.0	14.5 6.3	46.0 46.0	-31.5 -39.7	V V	P P	

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9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

The 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

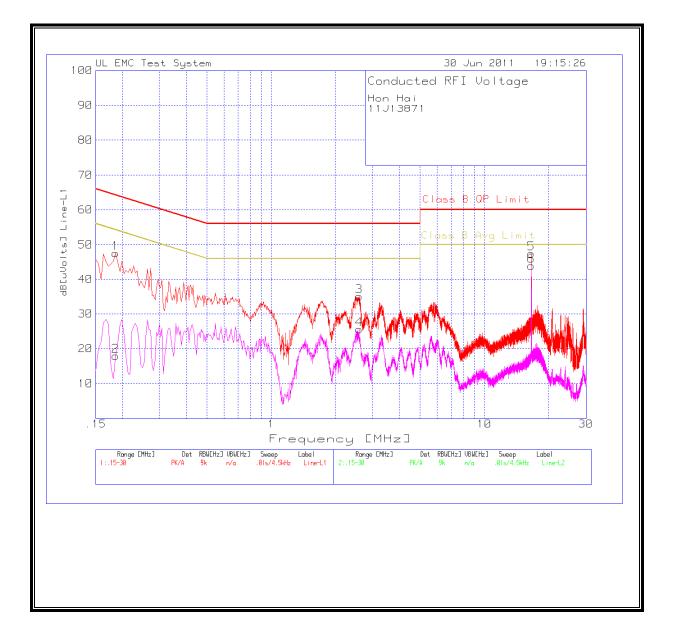
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<u>6 WORST EMISSIONS</u>

Hon Hai							
11J13871							
Line-L1.1	5 - 30MHz						
Test	Meter	Detector	dB[uVolts	Class B	Margin	Class B	Margin
Frequenc	Reading			QP Limit		Avg Limit	
0.186	47.54		47.54	64.2	-16.66	54.2	-6.66
0.186	17.94	Av	17.94	64.2	-46.26	54.2	-36.26
2.5845	35.04		35.04	56	-20.96	46	-10.96
2.5845	25.58		25.58	56	-30.42	46	-20.42
16.6245	47.41		47.41	60	-12.59	50	-2.59
16.6245	43.9	Av	43.9	60	-16.1	50	-6.1
Line-L2 .1	<u>5 - 30MHz</u>						
Test	Meter	Detector	dB[uVolts		Margin	Class B	Margin
Frequenc	Reading			QP Limit		Avg Limit	
0.1635	49.31		49.31	65.3	-15.99	55.3	-5.99
0.1635	34.52		34.52	65.3	-30.78	55.3	-20.78
2.4	34.31		34.31	56	-21.69	46	-11.69
2.4	20.16		20.16	56	-35.84	46	-25.84
16.6245	47.43		47.43	60	-12.57	50	-2.57
16.6245	44.53	Av	44.53	60	-15.47	50	-5.47

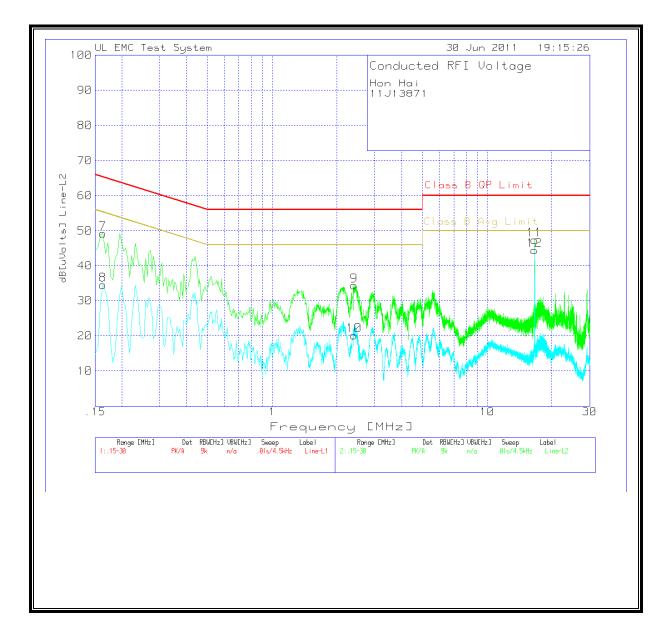
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LINE 1 RESULTS



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LINE 2 RESULTS



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10. 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	nits for Occupational	/Controlled Exposu	res	
0.3–3.0 3.0–30 30–300 300–1500 1500–100,000	614 1842/f 61.4	1.63 4.89/f 0.163	*(100) *(900/f²) 1.0 f/300 5	6 6 6 8
(B) Limits	for General Populati	on/Uncontrolled Exp	posure	
0.3–1.34 1.34–30	614 824/f	1.63 2.19/f	*(100) *(180/f²)	30 30

TABLE 1-LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)
30–300 300–1500 1500–100.000	27.5	0.073	0.2 f/1500 1.0	30 30 30

f = frequency in MHz

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

pational/controlled limits apply provided he or she is made aware of the potential for exposure. NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be ex-posed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

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	0.158f ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616 000 /f ^{1.2}

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

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

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

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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 mW/cm² by dividing by 10.

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

LIMITS

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m^2

<u>RESULTS</u>

Band	Mode	Separation	Output	Antenna	IC Power	FCC Power
		Distance	Power	Gain	Density	Density
		(m)	(dBm)	(dBi)	(W/m^2)	(mW/cm^2)
5 GHz	WLAN	0.20	10.84	2.55	0.04	0.004

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