FCC CFR47 PART 15 SUBPART E
CERTIFICATION
TEST REPORT
FOR

BROADCOM Draft 802.11n 5GHz AP

MODEL NUMBER: BCM94705LMP

FCC ID: QDS-BRCM1025

REPORT NUMBER: 07U10812-1B

ISSUE DATE: FEBRUARY 20, 2007

Prepared for
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	02/16/07	Initial Issue	Thu
--	02/20/07	Updated Antenna's Gain Page 28	Thu

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: BROADCOM CORP.
190 MATHILDA PLACE
SUNNYVALE, CA 94086, USA

EUT DESCRIPTION: BROADCOM DRAFT 802.11n 5GHz AP

MODEL: BCM94705LMP

SERIAL NUMBER: 100 1152660030

DATE TESTED: JANUARY 22- FEBRUARY 1, 2007

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART E	NO NON-COMPLIANCE NOTED

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

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

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EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

THANH NGUYEN
EMC TECHNICIAN
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

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

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Draft 802.11n 5GHz MIMO Access Point operating with a 40 MHz nominal bandwidth in the 5250 – 5350 MHz band.

5.2. MAXIMUM OUTPUT POWER

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

5250 to 5350 MHz Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5270 - 5310	802.11n HT40	15.09	32.28

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes two Dipole antennas, each with a maximum gain of 3 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed in the Laptop support during testing was LALA-REL-4-80-1.

The test utility software used during testing was WL_tools.

5.5. WORST-CASE CONFIGURATION AND MODE

The determination of the worst-case data rate is based on measuring the PPSD, peak power, average power on conducted emissions, plus bandedge and 2nd harmonic (5GHz only) on radiated emissions across all the data rates, bandwidths, modulations and spatial stream modes.

For operation in the 40 MHz MIMO mode using this chipset in our opinion MCS Index 0 is worst case.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC Adapter	Adaptech	STD_0505	3/21/1901	DoC
Laptop	DELL	Latitude D510	N/A	N/A

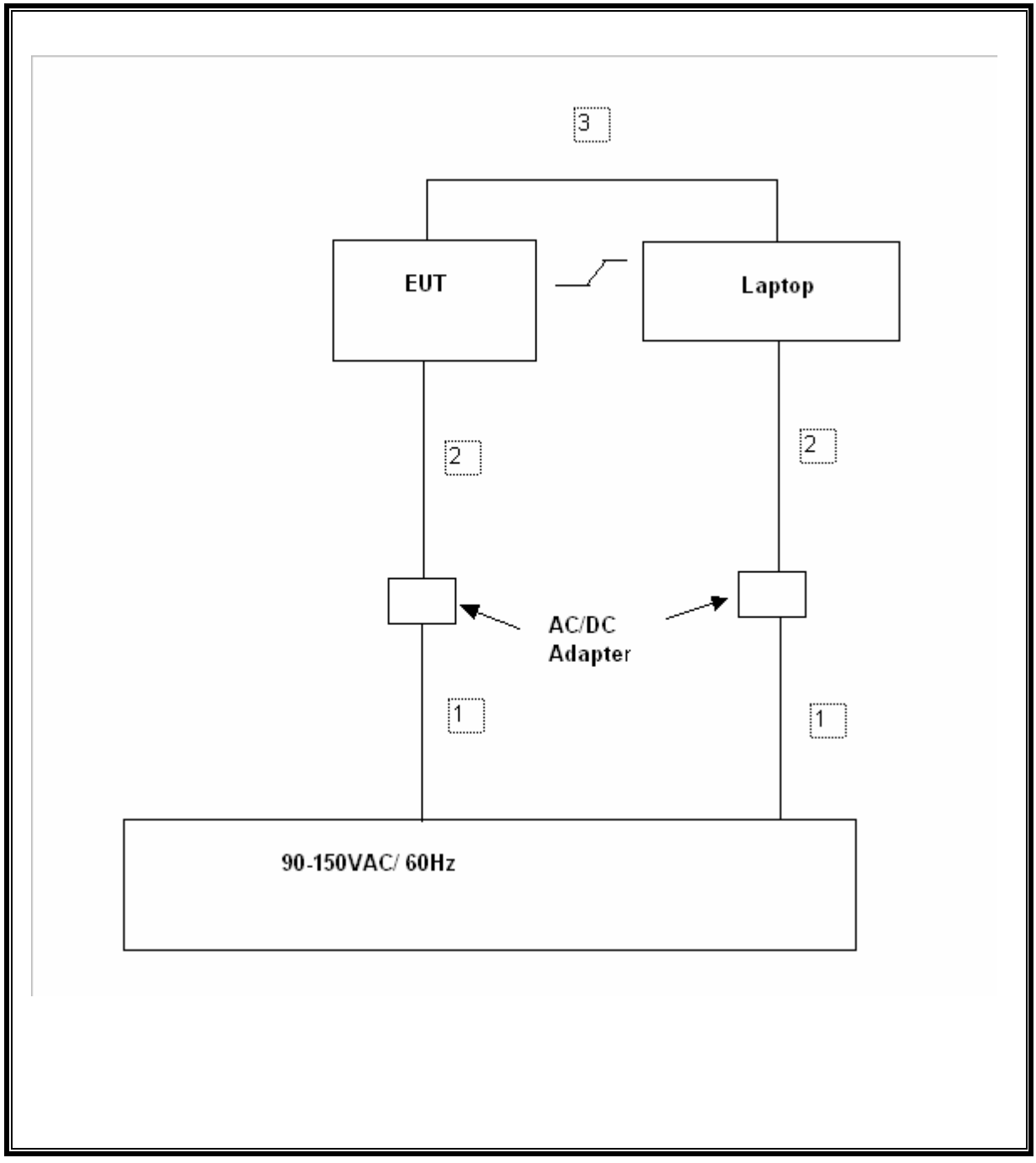
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	2	US 115V	Un-shielded	2m	N/A
2	DC	2	DC Plug	Un-shielded	2m	Ferrite bead at EUT end.
3	Serial	1	DB9	Shielded	2m	Use activate HyperTerminal

TEST SETUP

The EUT is controlled by the host laptop computer via a serial port and sset to transmit continuously.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Due**
EMI Receiver, 9 kHz ~ 2.9 GHz	Agilent / HP	8542E	3942A00286	02/04/07
RF Filter Section	Agilent / HP	85420E	3705A00256	02/04/07
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A121003	08/13/07
Antenna, Horn 1 ~ 18 GHz	ETS	3117	29301	04/22/07
Antenna, Horn 26 ~ 40 GHz	ARA	MWH-2640/B	1029	04/13/07
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent / HP	E4446A	US42070220	11/26/07
7.6 GHz Highpass Filter	Micro-Tronics	HPM13195	1	CNR
Preamplifier, 1 ~ 26.5 GHz	Agilent / HP	8449B	3008A00369	08/01/07
Preamplifier, 26 ~ 40 GHz	Miteq	NSP4000-SP2	924343	08/24/07
Peak / Average Power Sensor	Agilent	E9327A	US40440755	12/02/07
Peak Power Meter	Agilent / HP	E4416A	GB41291160	12/02/07
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	09/15/07
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	09/15/07
EMI Test Receiver	R & S	ESHS 20	827129/006	01/27/08

7. LIMITS AND RESULTS

7.1. CHANNEL TESTS FOR THE 5250 TO 5350 MHz BAND

7.1.1. AVERAGE POWER

AVERAGE POWER LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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

Total Power = 10 log (10^ (Chain 0 Power / 10) + 10^ (Chain 1 Power / 10))

RESULTS

No non-compliance noted:

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.

802.11n HT40 Mode

Mode Channel	Frequency (MHz)	Average Power Chain 0 (dBm)	Average Power Chain 1 (dBm)	Average Power Total (dBm)
Low	5270	11.3	10.7	14.0
High	5310	12.2	11.7	14.9

7.1.2. 99% BANDWIDTH AND 26 dB BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

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

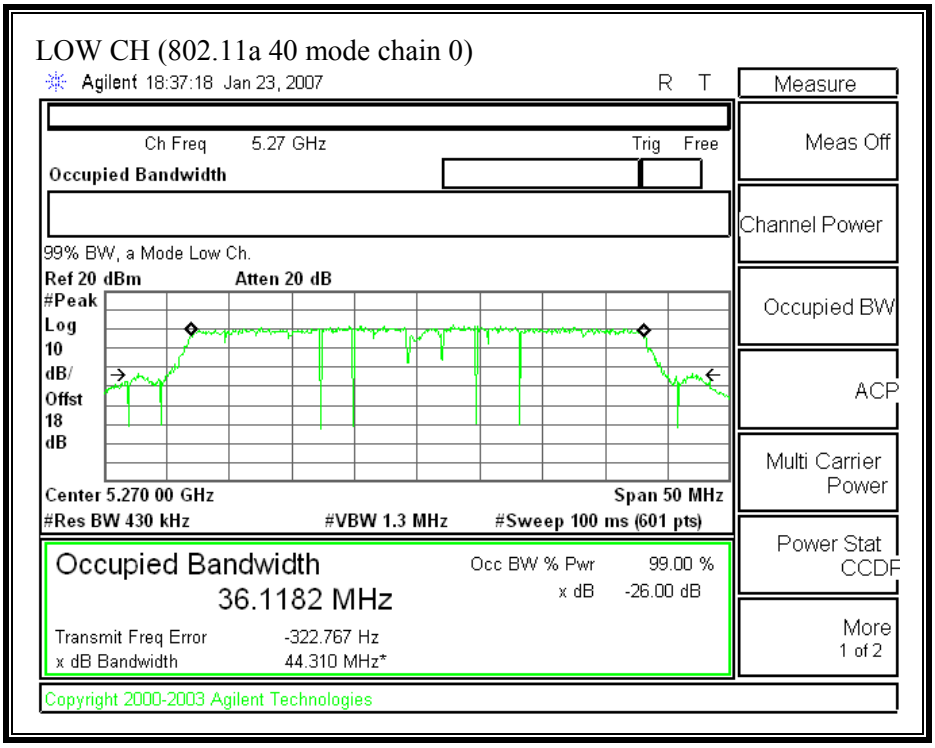
RESULTS

No non-compliance noted:

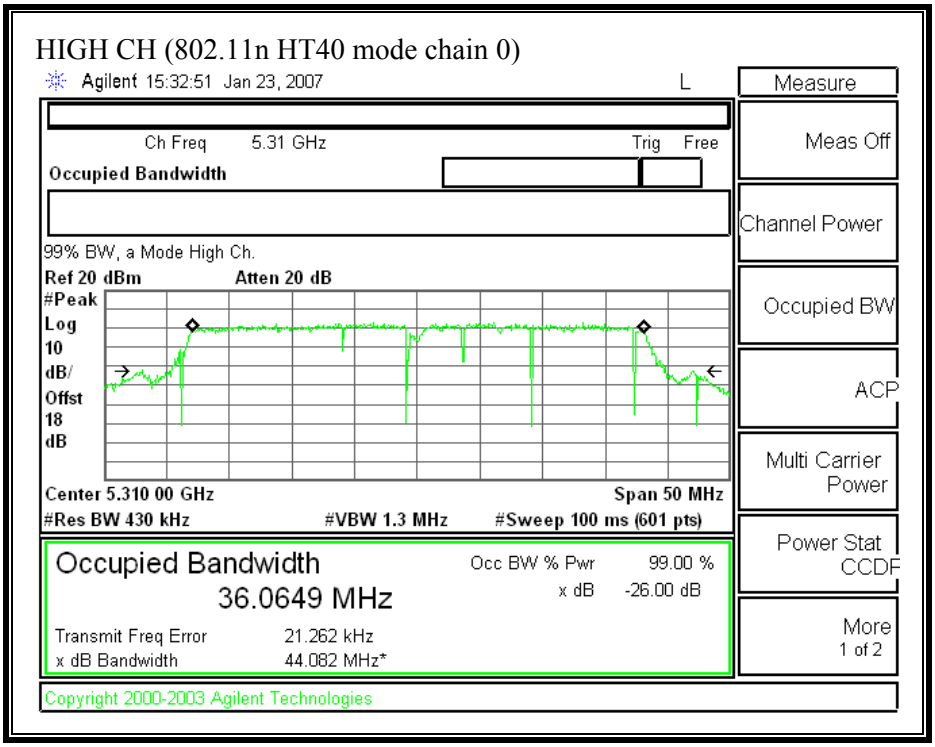
802.11n HT40 Mode

Mode Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)	Worst Case 10 Log B (dB)
Low	5270	36.118	35.974	44.310	44.764	16.509
High	5310	36.065	36.092	44.082	39.170	16.443

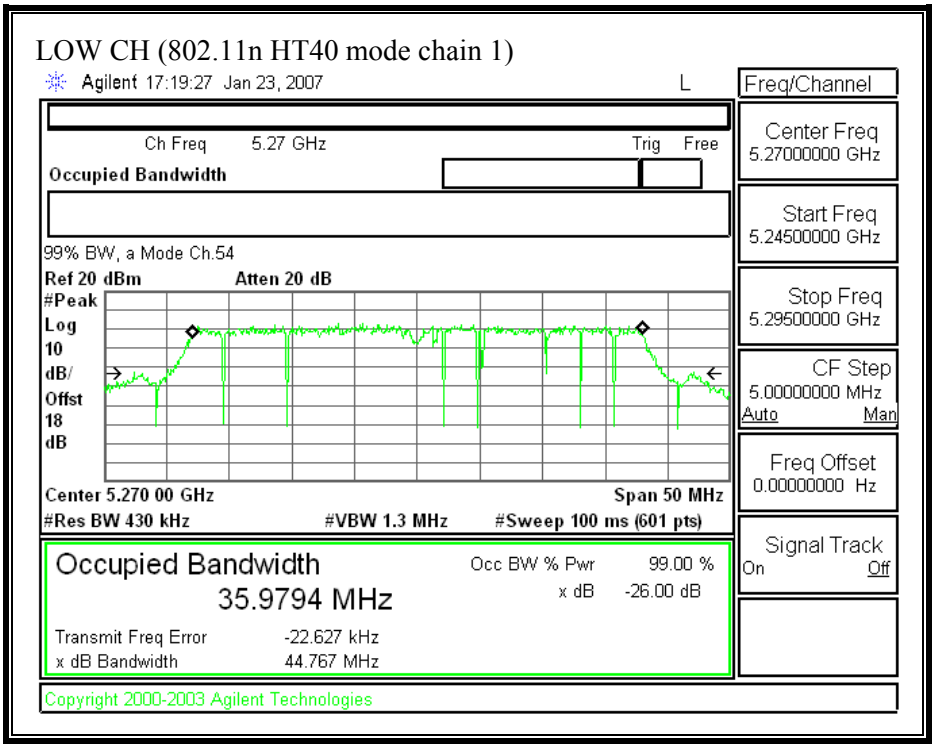
(802.11n HT40 MODE CHAIN 0)



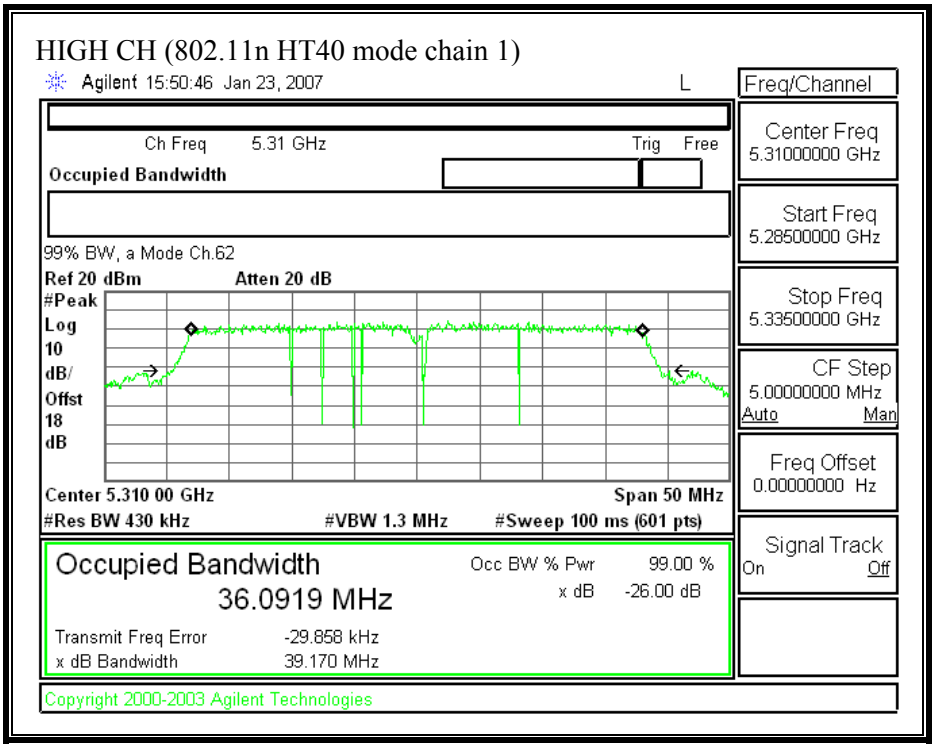
HIGH CH (802.11n HT40 mode chain 0)



(802.11n HT40 MODE CHAIN 1)



HIGH CH (802.11n HT40 mode chain 1)



7.1.3. MAXIMUM POWER

LIMIT

§15.407 (a) (1) For the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50 mW 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.

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

TEST PROCEDURE

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

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

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

Total Power = 10 log (10^ (Chain 0 Power / 10) + 10^ (Chain 1 Power / 10))

LIMITS AND RESULTS

No non-compliance noted:

5250 to 5350 Band

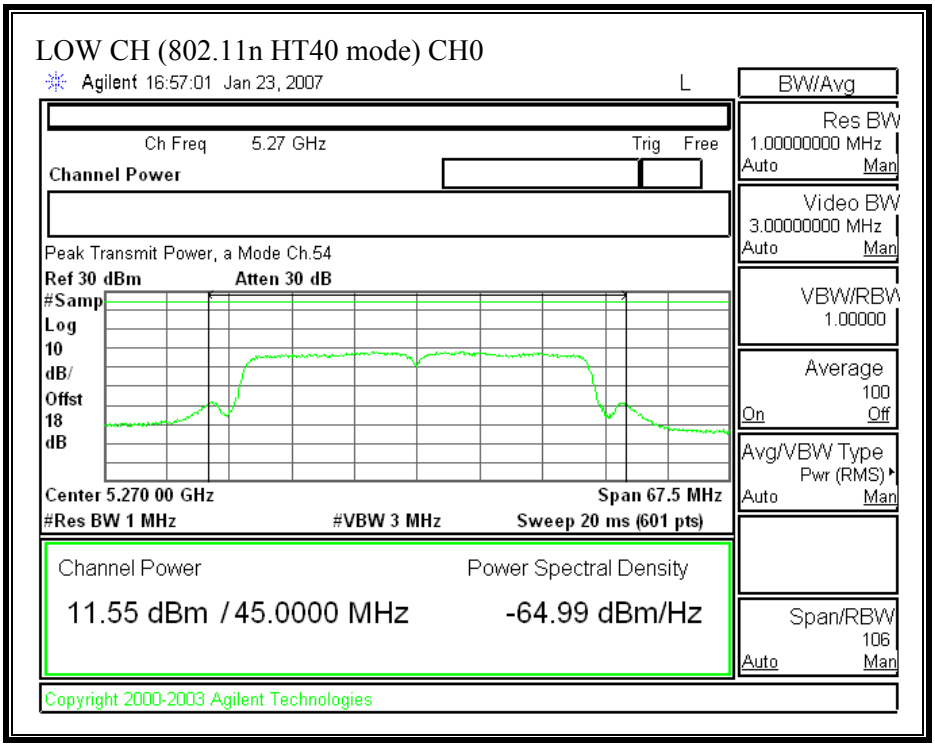
Fixed Limit (dBm)		30
Antenna Gain (dBi)		3

802.11n HT40 Mode

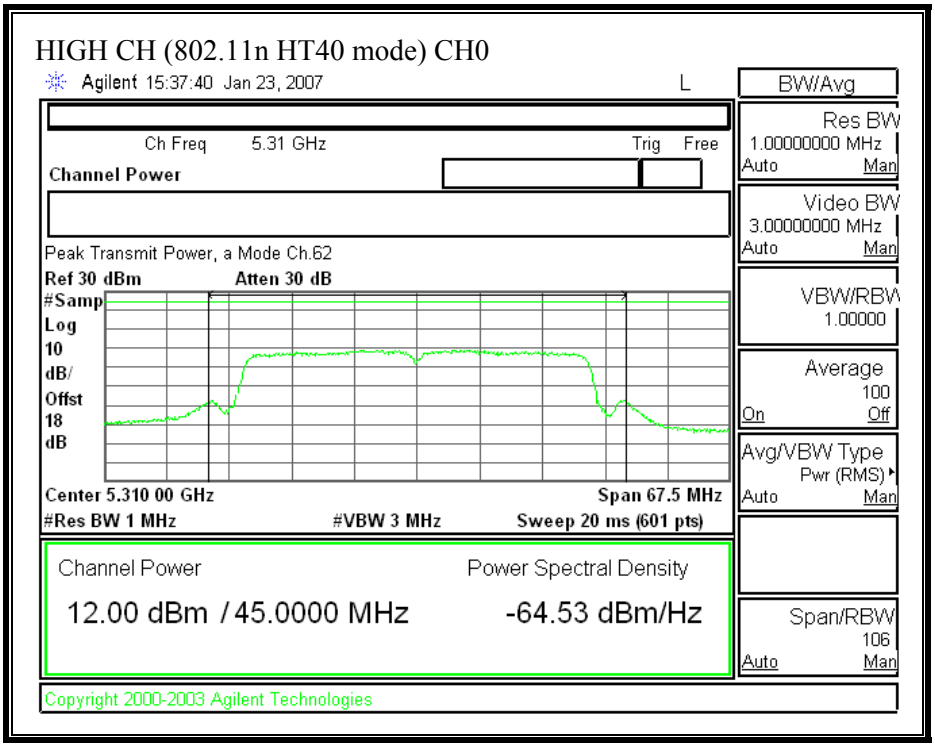
Mode Chan	Freq (MHz)	10LogB (dBm)	11+10LogB Limit (dBm)	Limit (dBm)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Margin (dB)
Low	5270	16.5	27.50	27.50	11.55	11.20	14.39	-13.11
High	5310	16.44	27.44	27.44	12.00	12.16	15.09	-12.35

Mode Chan	Freq (MHz)	10LogB (dBm)	11+10LogB Limit (dBm)	Limit (dBm)	Total Power Combiner (dBm)	Margin (dB)
Low	5270	16.5	27.50	27.50	13.75	-13.75
High	5310	16.44	27.44	27.44	14.43	-13.01

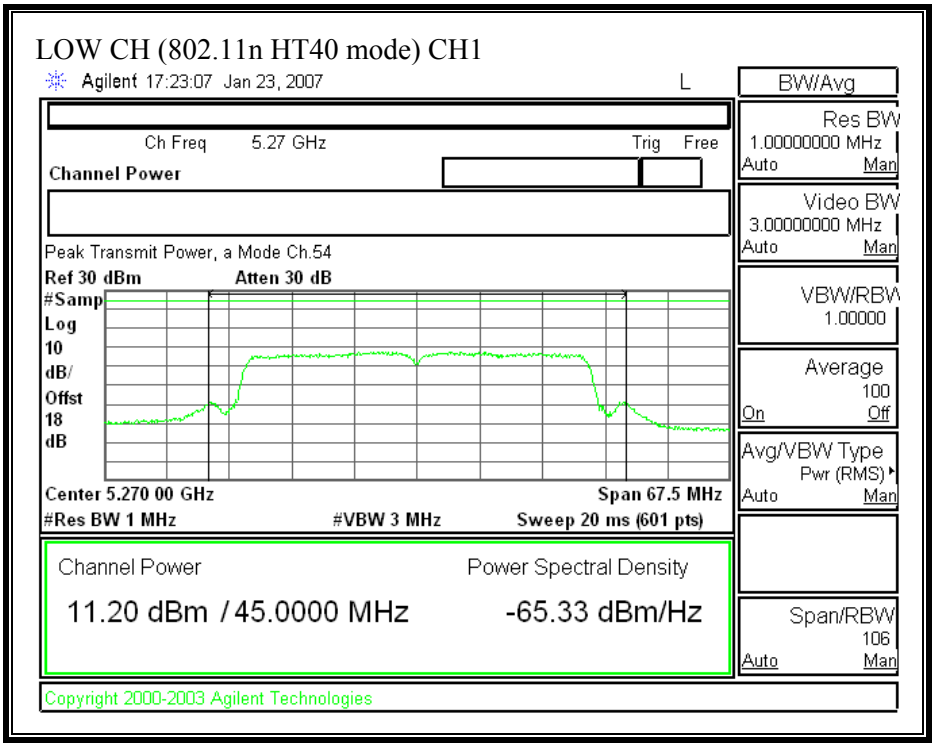
(802.11n HT40 MODE)



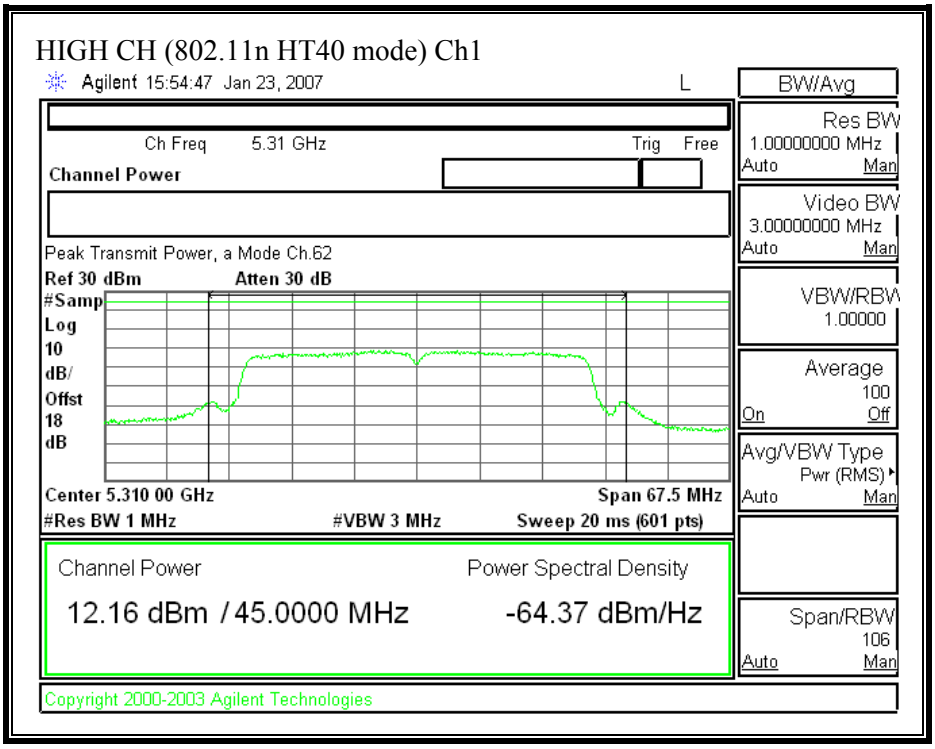
HIGH CH (802.11n HT40 mode) CH0



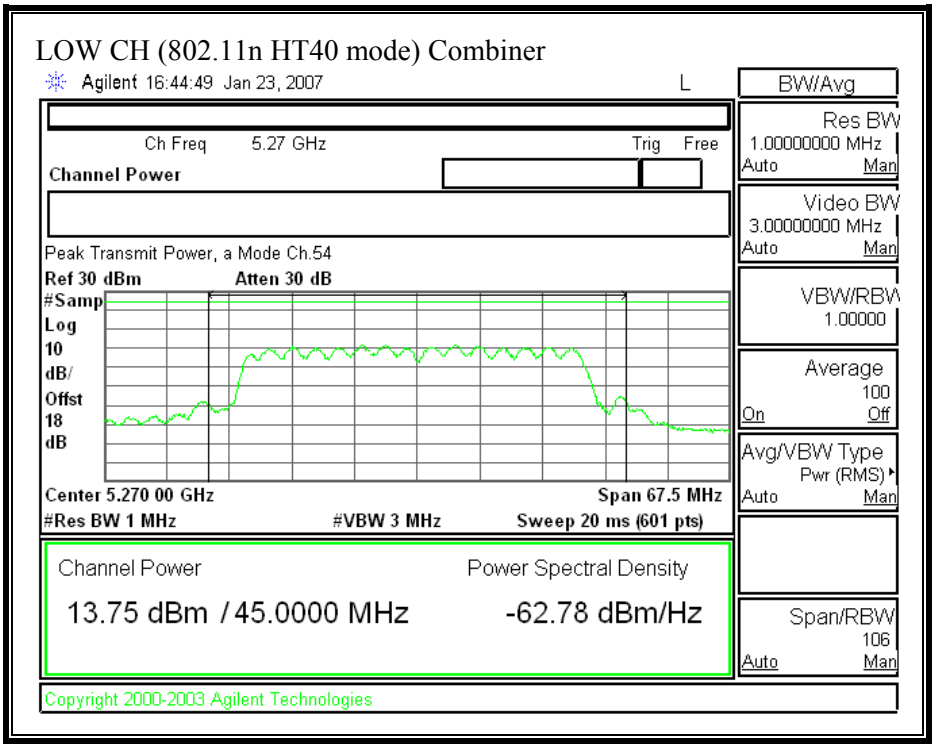
LOW CH (802.11n HT40 mode) CH1



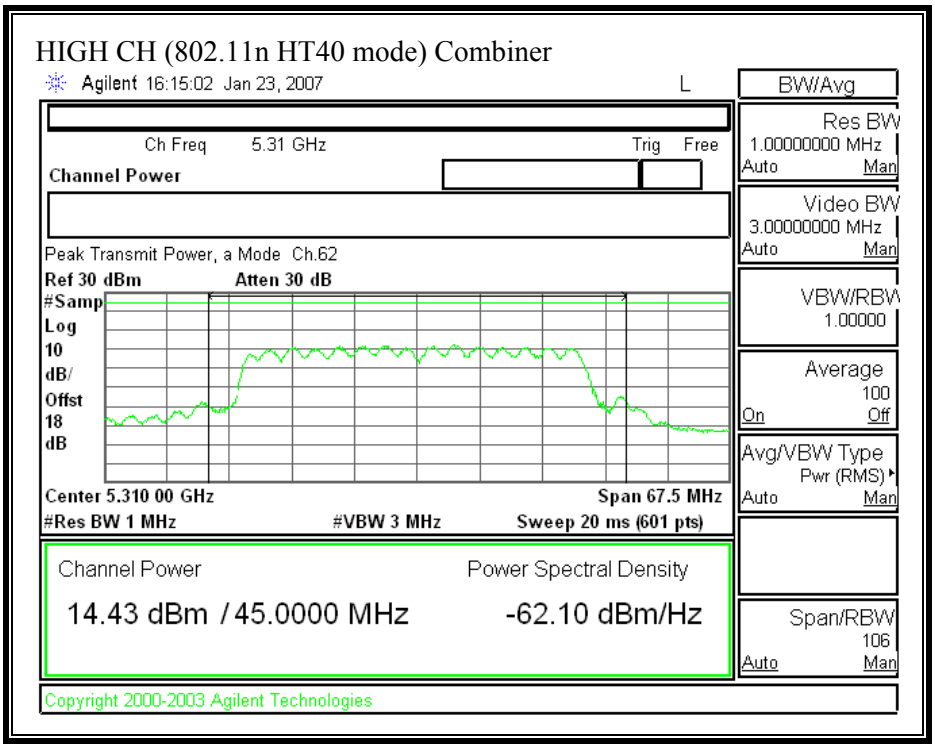
HIGH CH (802.11n HT40 mode) Ch1



(802.11 HT40 MODE) COMBINER



HIGH CH (802.11n HT40 mode) Combiner



7.1.4. PEAK POWER SPECTRAL DENSITY

LIMIT

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

§15.407 (a) (1) For the band 5.25-5.35 GHz, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

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

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

Total PPSD = 10 log (10^ (Chain 0 PPSD / 10) + 10^ (Chain 1 PPSD / 10))

RESULTS

No non-compliance noted:

5250 to 5350 Band

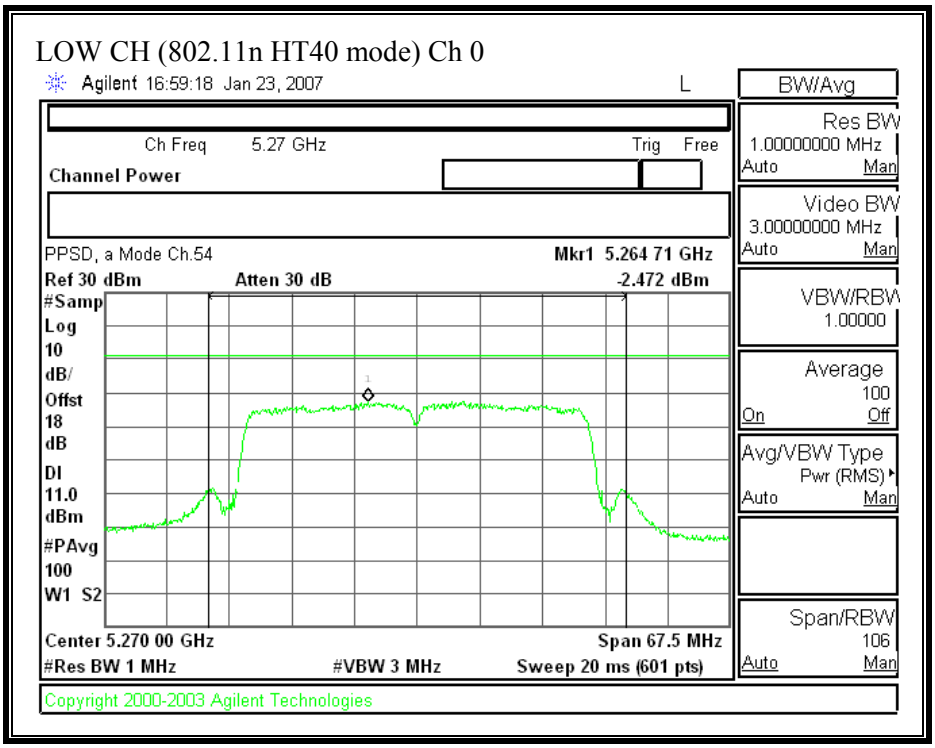
Antenna Gain (dBi)	3

802.11n HT40 Mode

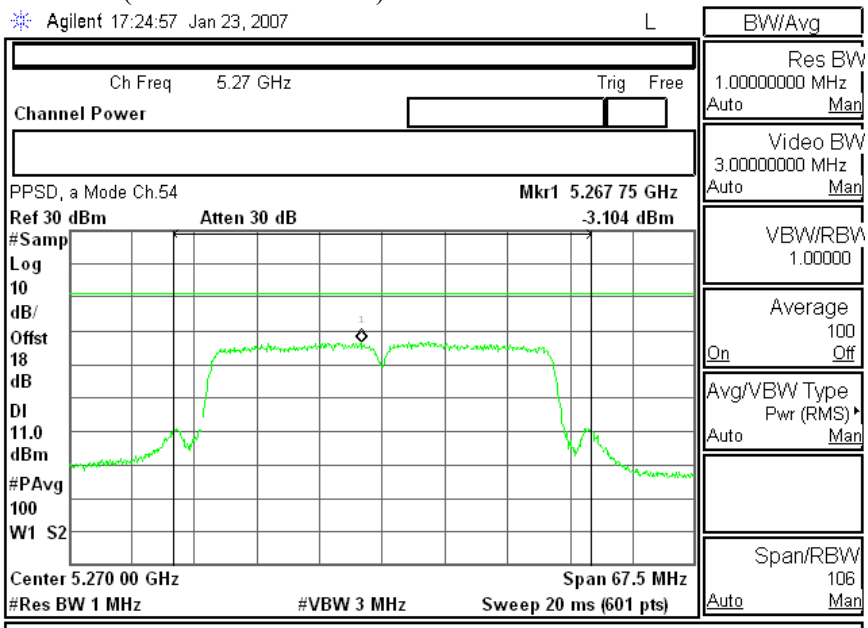
Mode Channel	**Frequency (MHz)**	**PPSD Chain 0 (dBm)**	**PPSD Chain 1 (dBm)**	**PPSD Total (dBm)**	**Limit (dBm)**	**Margin (dB)**
Low	5270	-2.47	-3.10	0.23	11.00	-10.77
High	5310	-1.59	-1.59	1.42	11.00	-9.58

Mode Channel	**Frequency (MHz)**	**PPSD With Combiner (dBm)**	**Limit (dBm)**	**Margin (dB)**
Low	5270	1.63	11.00	-9.37
High	5310	2.82	11.00	-9.37

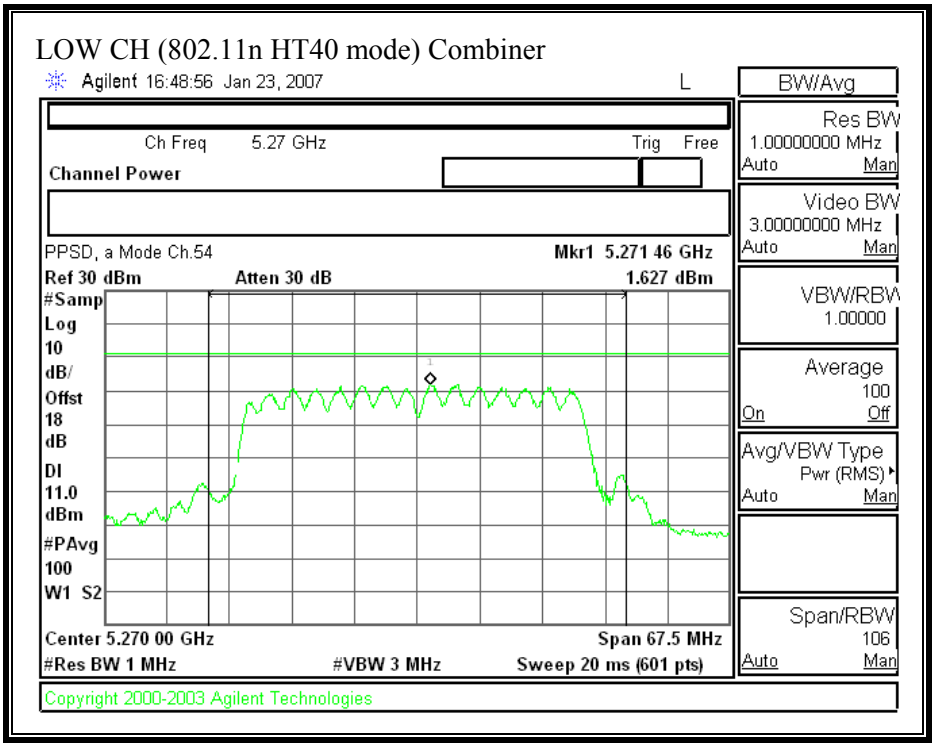
(802.11n HT40 MODE)



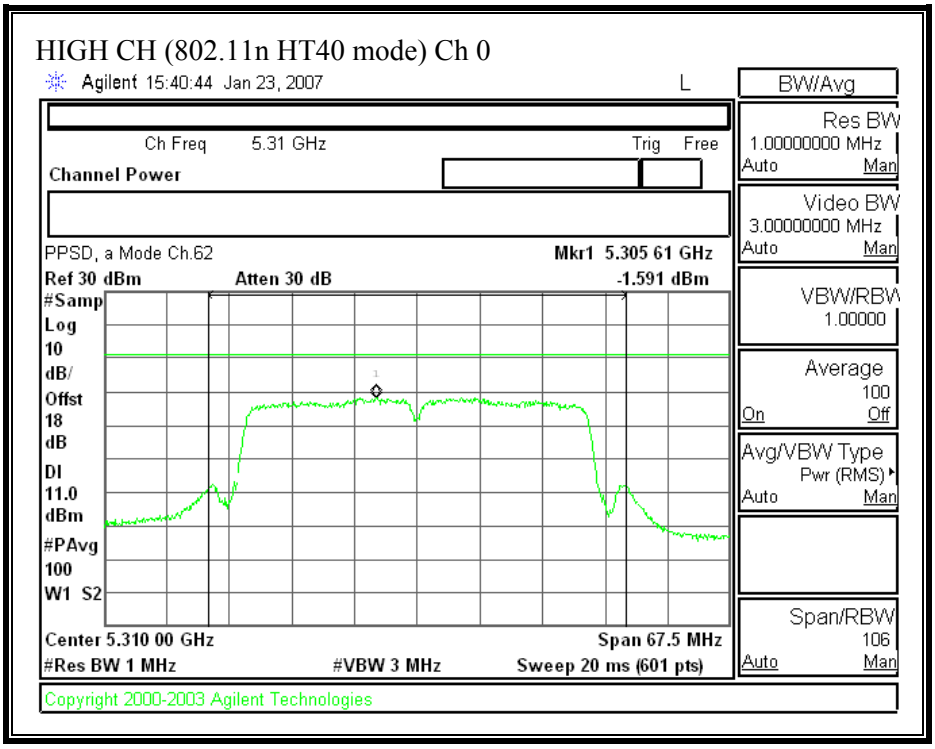
LOW CH (802.11n HT40 mode) Ch 1



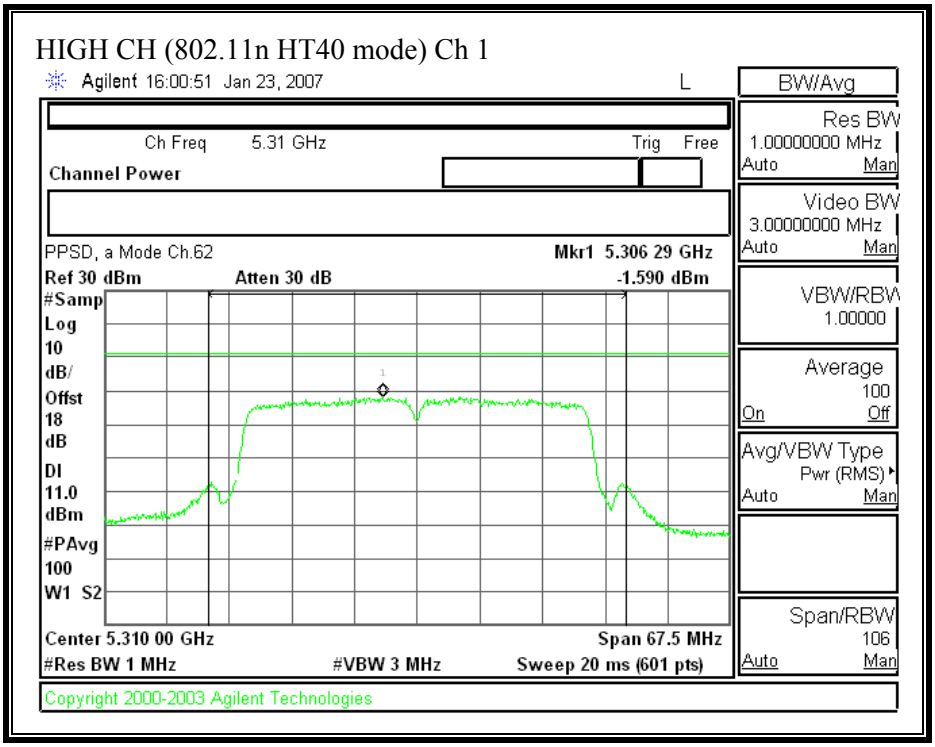
LOW CH (802.11n HT40 mode) Combiner



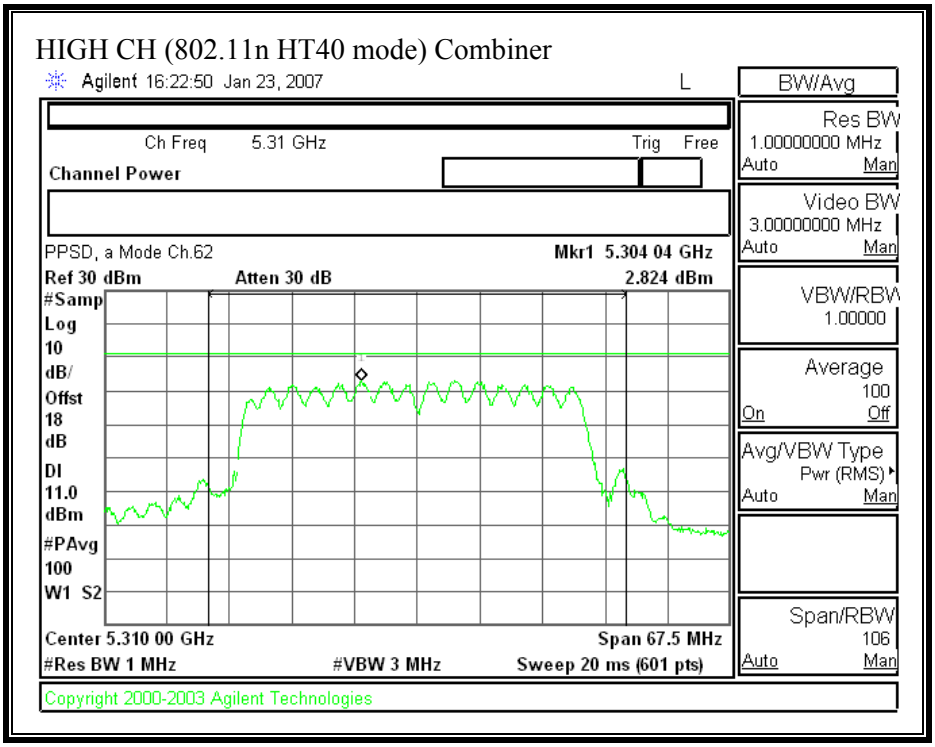
(802.11a 40 MODE)



HIGH CH (802.11n HT40 mode) Ch 1



HIGH CH (802.11n HT40 mode) Combiner



7.1.5. PEAK EXCURSION

LIMIT

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

TEST PROCEDURE

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

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

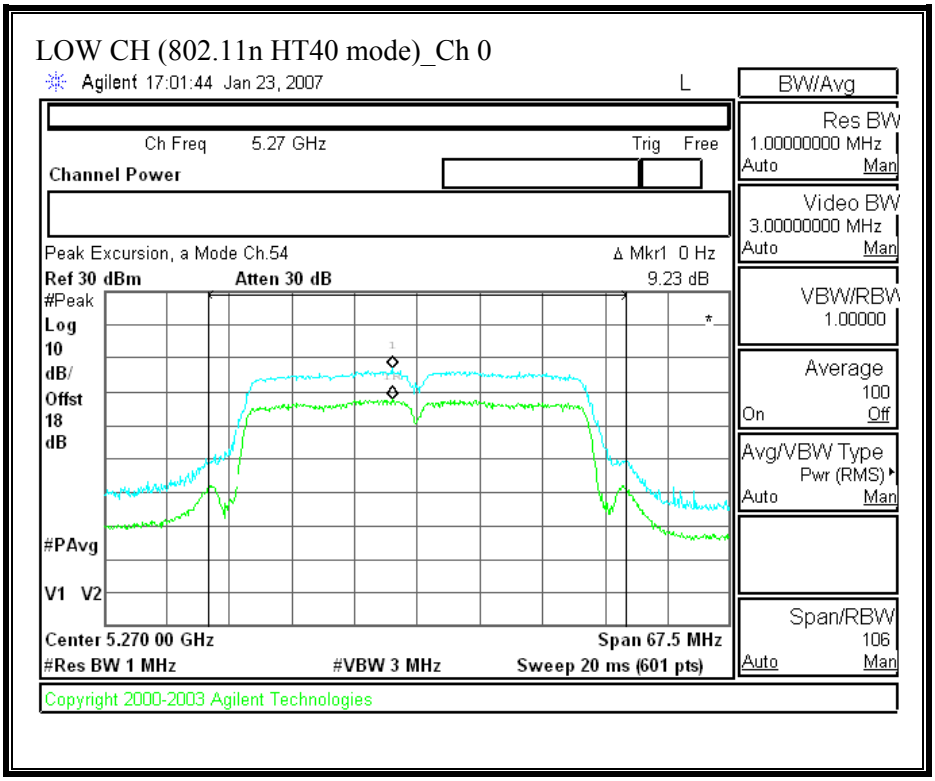
RESULTS

No non-compliance noted:

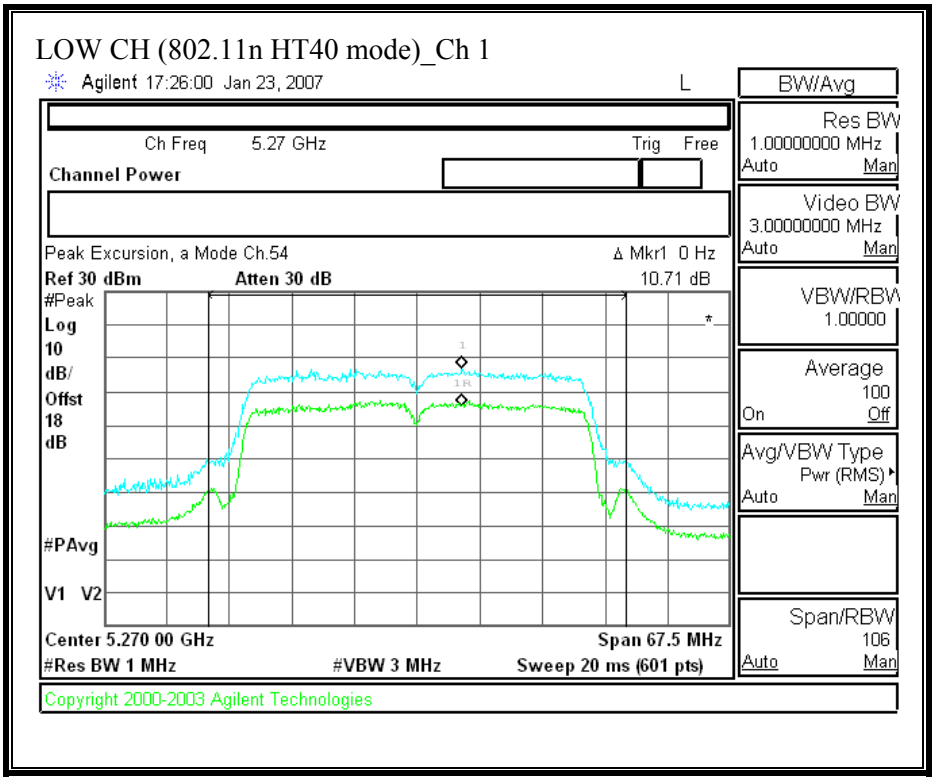
802.11n HT40 Mode

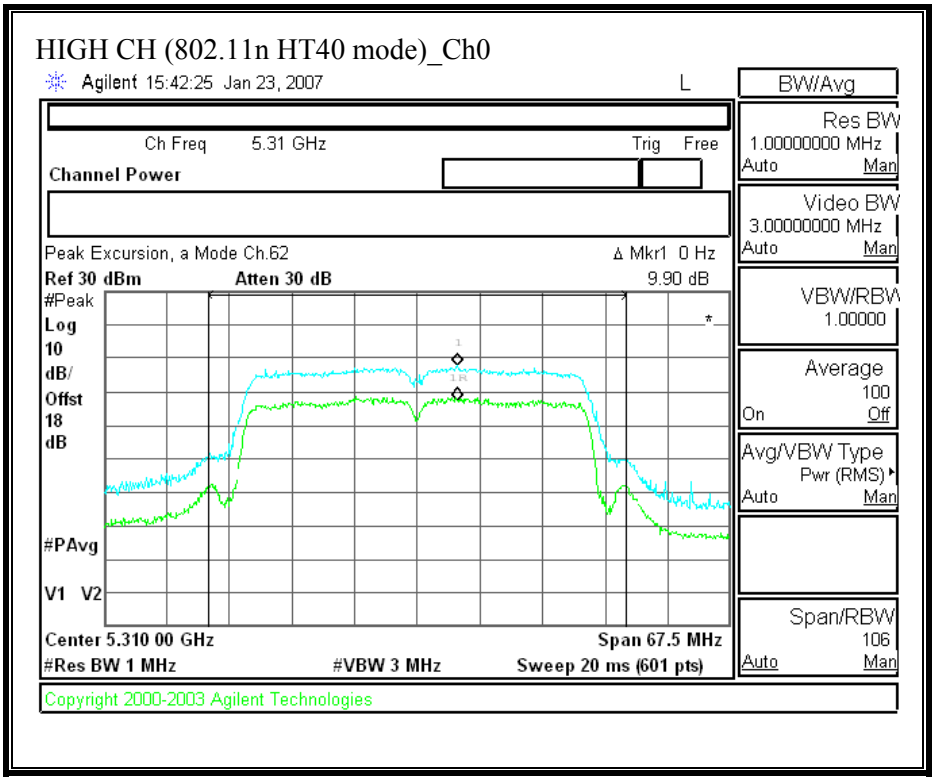
Mode Channel	Frequency (MHz)	Peak Excursion Chain 0 (dBm)	Peak Excursion Chain 1 (dBm)	Limit (dBm)	Worst Case Margin (dB)
Low	5270	9.23	10.71	13	-2.29
High	5310	9.90	10.26	13	-2.74

(802.11n HT40 MODE)

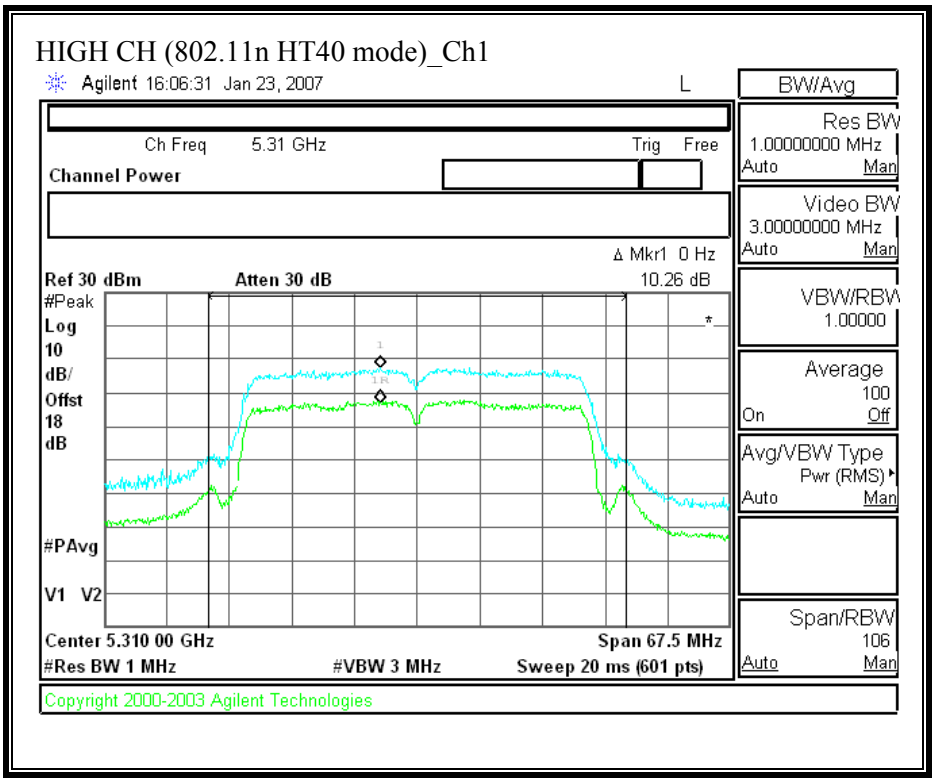


LOW CH (802.11n HT40 mode)_Ch 1





HIGH CH (802.11n HT40 mode)_Ch1



7.1.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

§15.407 (b) (1 & 2) For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27dBm / 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 1MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

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

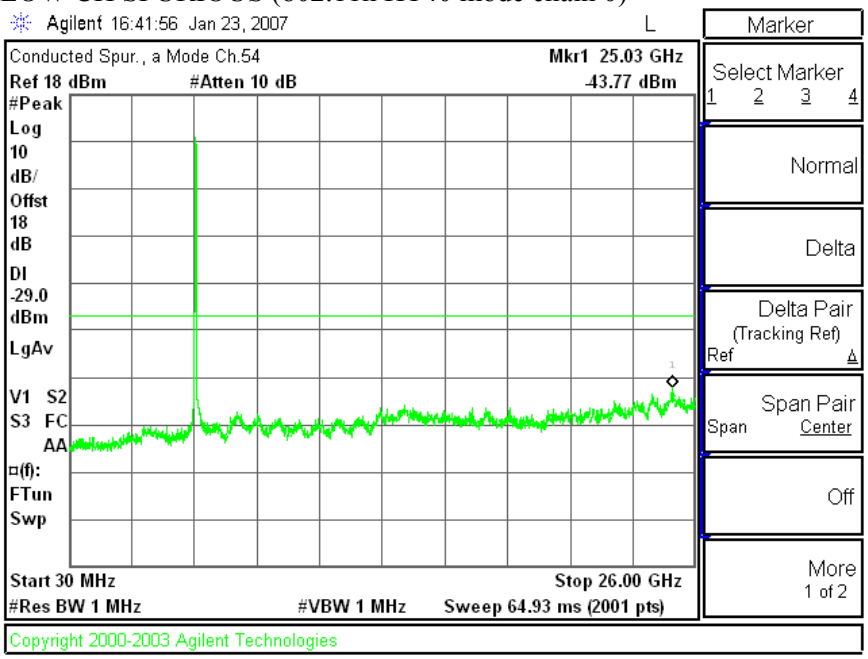
RESULTS

No non-compliance noted:

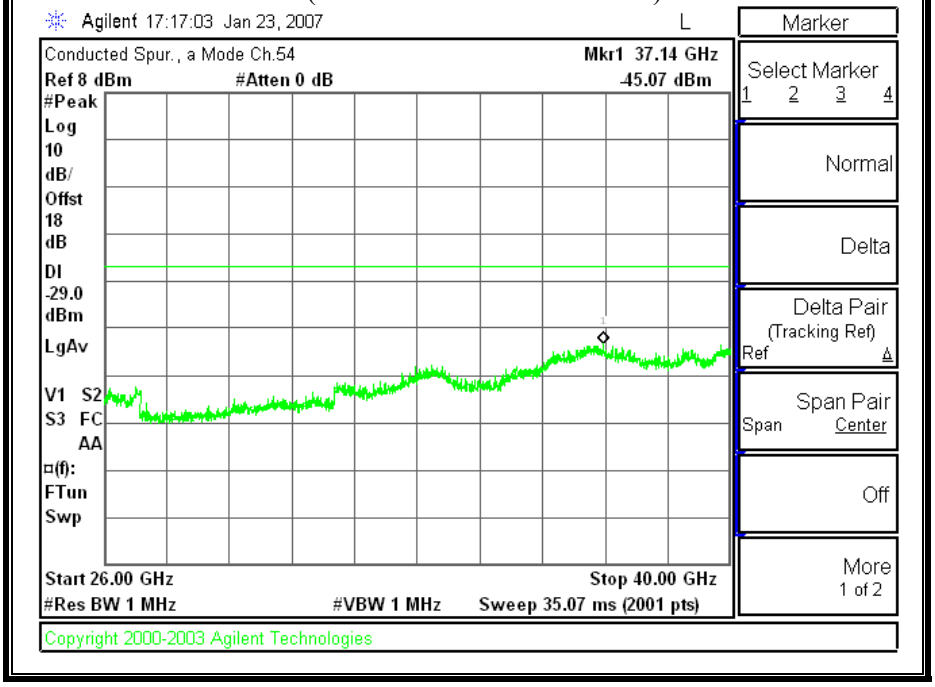
Note: The limits should be an EIRP limit of -27dBm / MHz plus 3 dBi gain=-30 dBm /MHz EIRP limit. The antenna gain was modified after testing was completed, so the plots reflect the former 2 dBi antenna gain.

SPURIOUS EMISSIONS (802.11n HT40 MODE CHAIN 0)

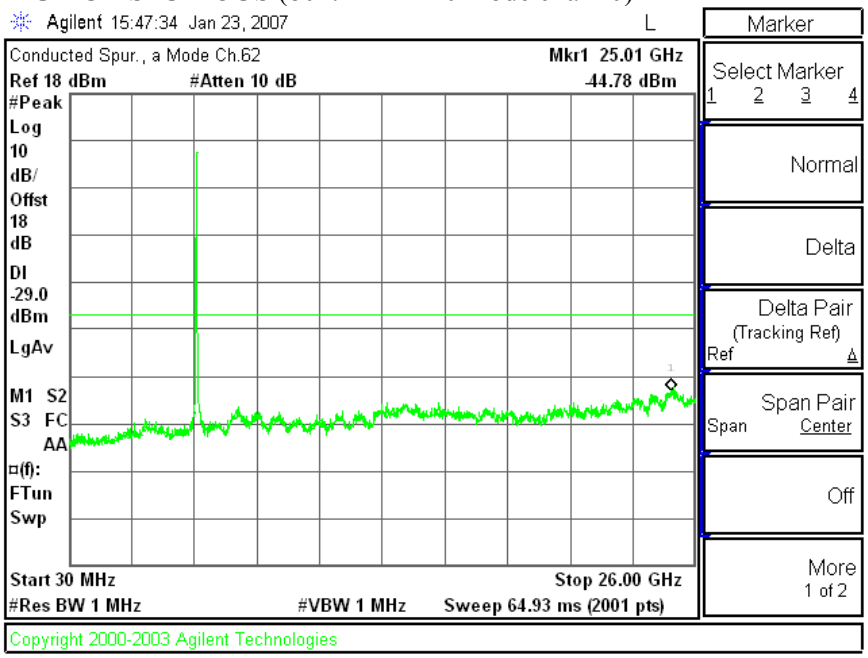
LOW CH SPURIOUS (802.11n HT40 mode chain 0)



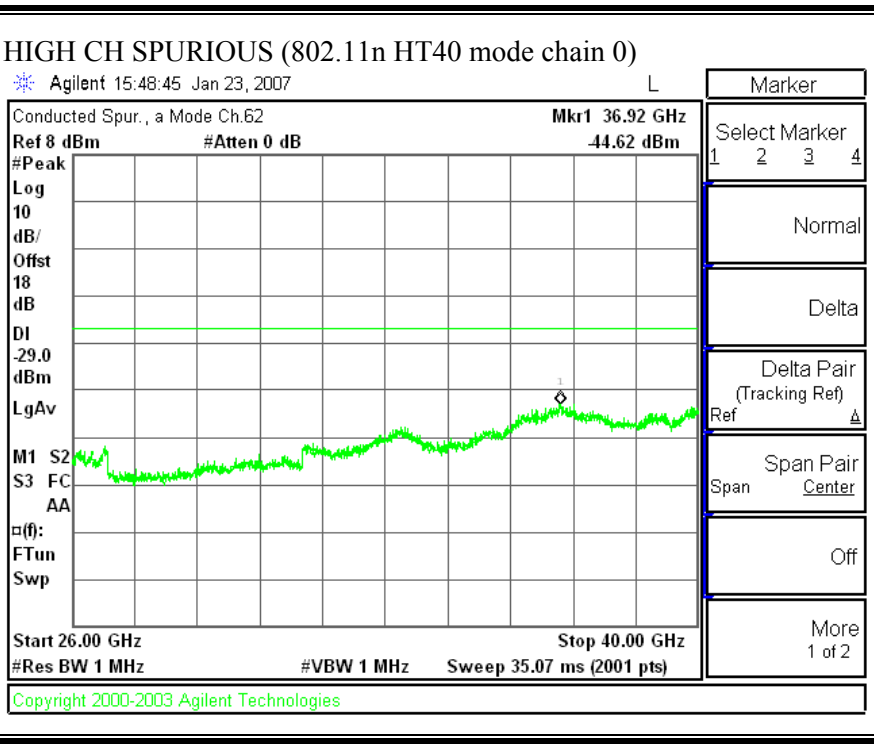
LOW CH SPURIOUS (802.11n HT40 mode chain 0)



HIGH CH SPURIOUS (802.11n HT40 mode chain 0)

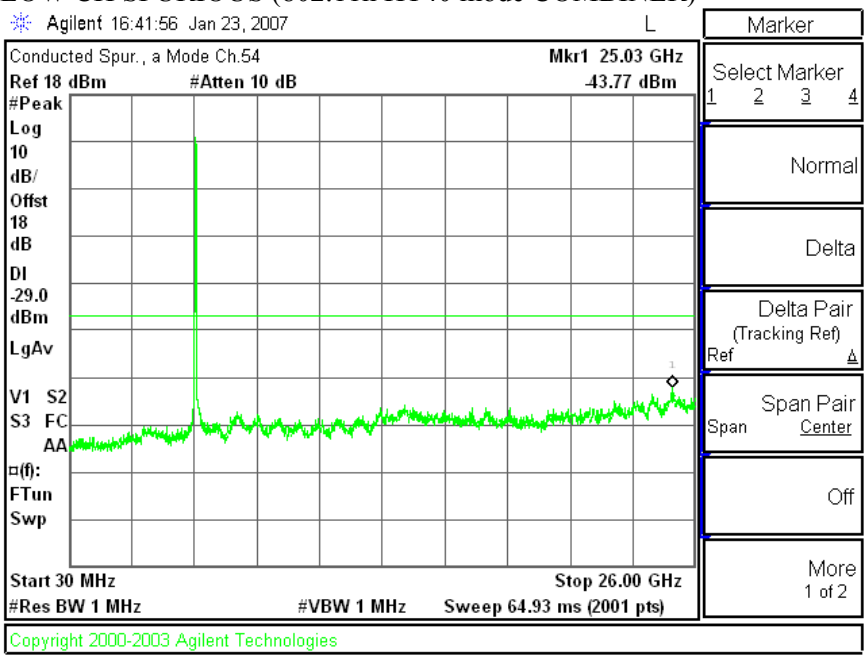


HIGH CH SPURIOUS (802.11n HT40 mode chain 0)

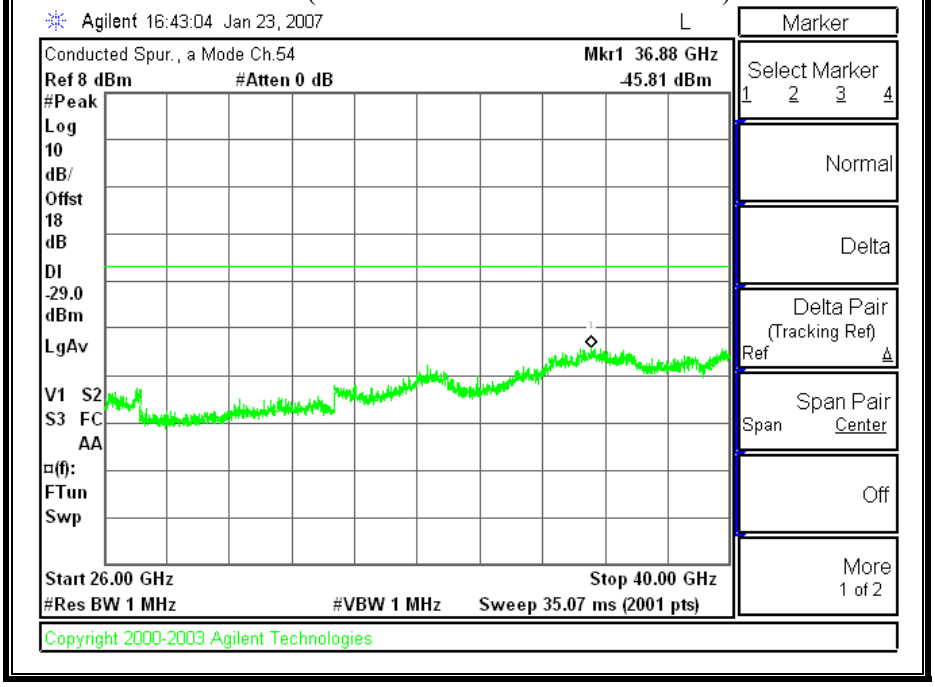


SPURIOUS EMISSIONS (802.11n HT40 MODE COMBINER)

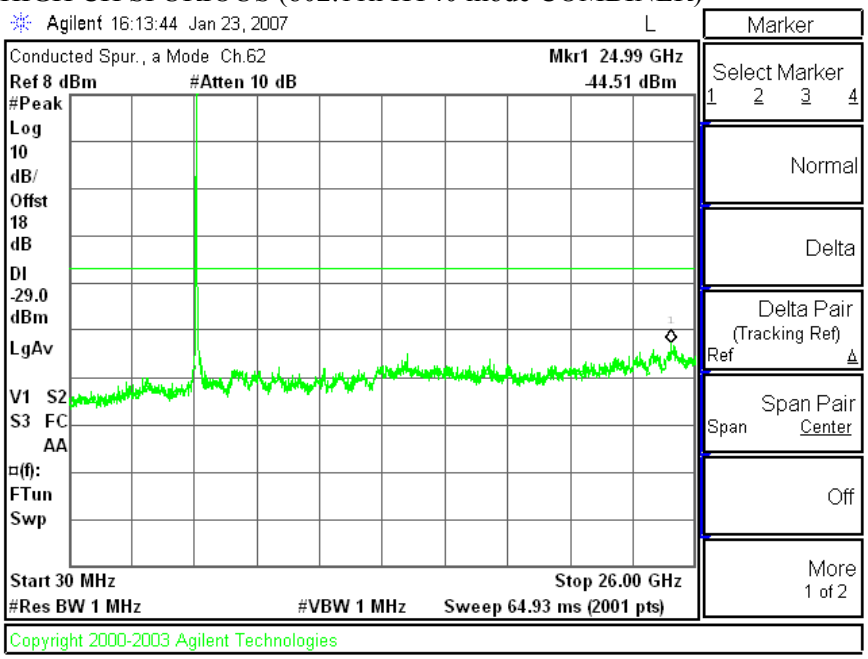
LOW CH SPURIOUS (802.11n HT40 mode COMBINER)



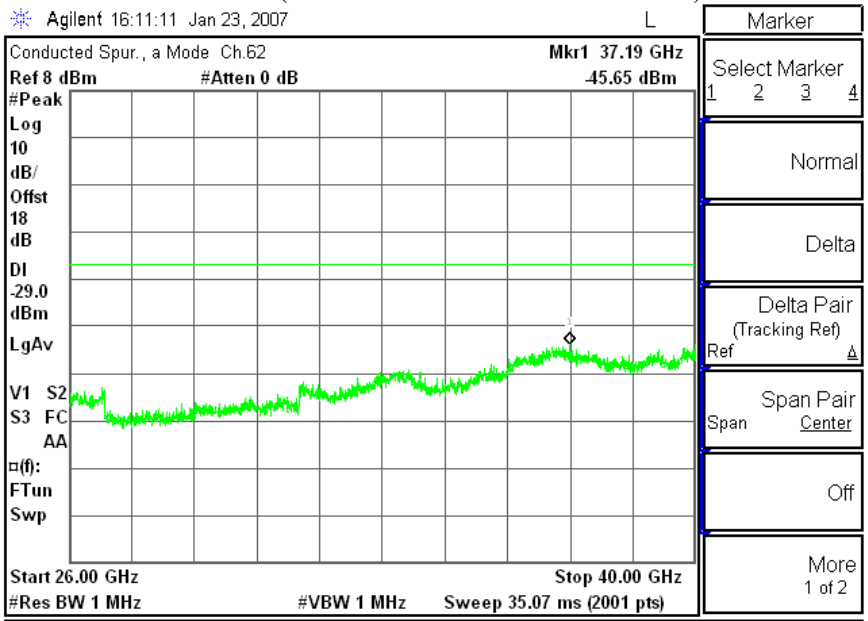
LOW CH SPURIOUS (802.11n HT40 mode COMBINER)



HIGH CH SPURIOUS (802.11n HT40 mode COMBINER)



HIGH CH SPURIOUS (802.11n HT40 mode COMBINER)



7.1.7. FREQUENCY STABILITY

LIMIT

§15.407 (g) Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

RSS-210 A9.5 (e) +/- 10 ppm

TEST PROCEDURE

Reference measurements of the carrier frequency are made at nominal conditions of +20°C and the rated supply voltage.

Additional measurements are made at temperatures of – 30°C and +50°C at the manufacturer's rated power supply voltage. Additional measurements are made at +/- 15 percent of the manufacturer's rated supply voltage temperature of +20°C.

The additional measurements are compared with the reference measurements to calculate the frequency stability.

RESULTS

No non-compliance noted:

Reference Frequency at 20 deg C and 115 VAC

Supply Voltage (VAC)	Temperature (deg C)	Frequency (MHz)	Delta (ppm)
115.00	20	5259.96411	Reference
115.00	-30	* See note	* See note
115.00	50	* See note	* See note
97.75	20	5259.96660	-0.473
132.25	20	5259.96431	-0.038

* The Frequency Tolerance vs Temperature please refers to the attached document "Frequency Stability vs Temperature Measurement BCM94705LMP.pdf" which is testing performed by Broadcom.

7.1.8. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

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

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f^2)	6
30–300	61.4	0.163	1.0	6
300–1500	.....	.....	f/300	6
1500–100,000	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f^2)	30

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

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500	.....	.....	f/1500	30
1500–100,000	.....	.....	1.0	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 occupational/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 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.

CALCULATIONS

Given

E = √ (30 * P * G) / d

and

S = E ^ 2 / 3770

where

E = Field Strength in Volts/meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power Density in milliwatts/square centimeter

Combining equations yields:

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

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

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

and substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and
G (numeric) = 10 ^ (G (dBi) / 10)

yields

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

where

d = MPE distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

LIMITS

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

RESULTS

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

Band (MHz)	MPE Distance (cm)	Total Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)
5250 to 5350	20.0	15.09	3.00	0.01

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

7.2. RADIATED EMISSIONS

7.2.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

LIMITS

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

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

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2] Above 38.6

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

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

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

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

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

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 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

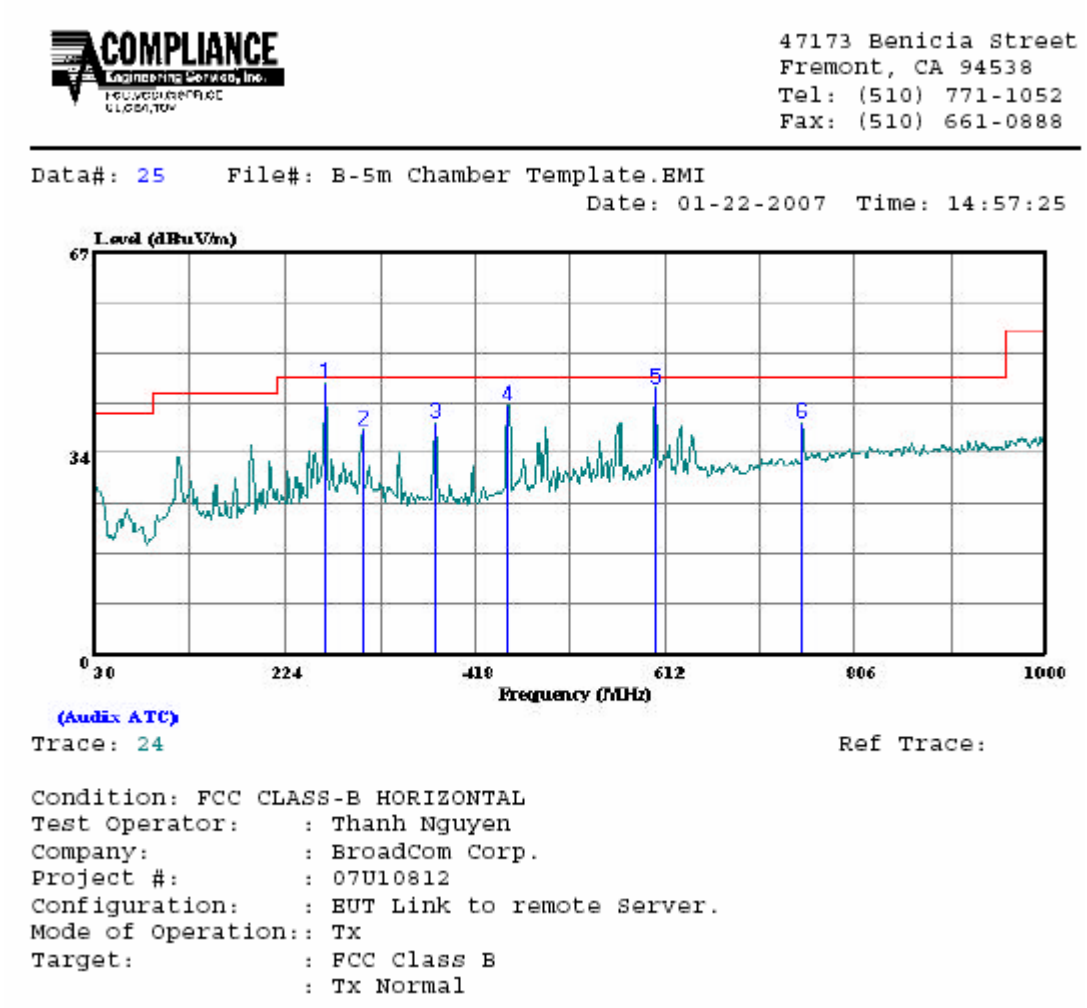
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz band.

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.

7.2.2. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

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

HORIZONTAL PLOT



HORIZONTAL DATA

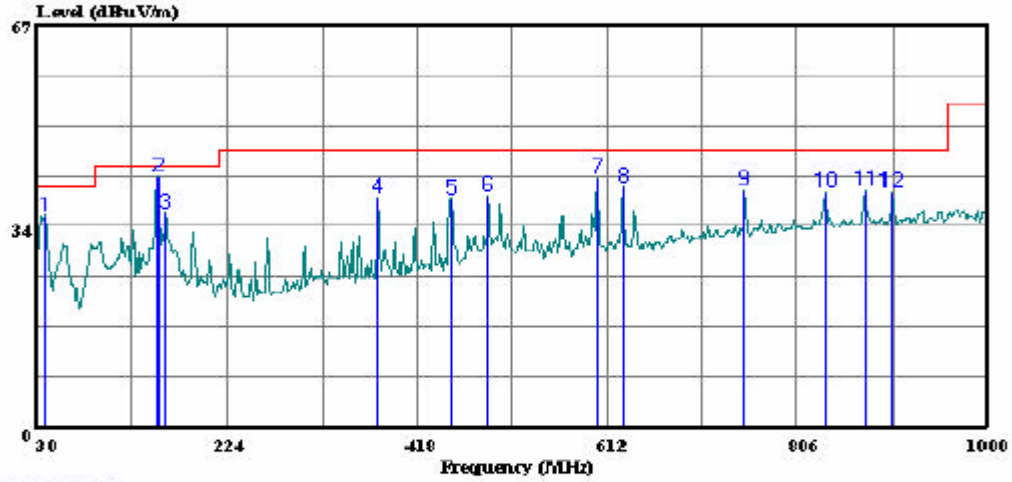
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	264.740	30.80	14.42	45.22	46.00	-0.78	Peak
2	303.540	21.66	15.86	37.52	46.00	-8.48	Peak
3	378.230	20.74	17.70	38.44	46.00	-7.56	Peak
4	451.950	21.93	19.44	41.37	46.00	-4.63	Peak
5	601.330	22.43	22.02	44.45	46.00	-1.55	Peak
6	751.680	14.29	24.23	38.52	46.00	-7.48	Peak

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

VERTICAL PLOT

COMPLIANCE Engineering Services, Inc.
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1052
Fax: (510) 661-0888

Data#: 27 File#: B-5m Chamber Template.EMI
Date: 01-22-2007 Time: 15:00:46



(Audix ATC)
Trace: 26 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : Thanh Nguyen
Company: : BroadCom Corp.
Project #: : 07U10812
Configuration: : EUT Link to remote Server.
Mode of Operation:: Tx
Target: : FCC Class B
: Tx Normal

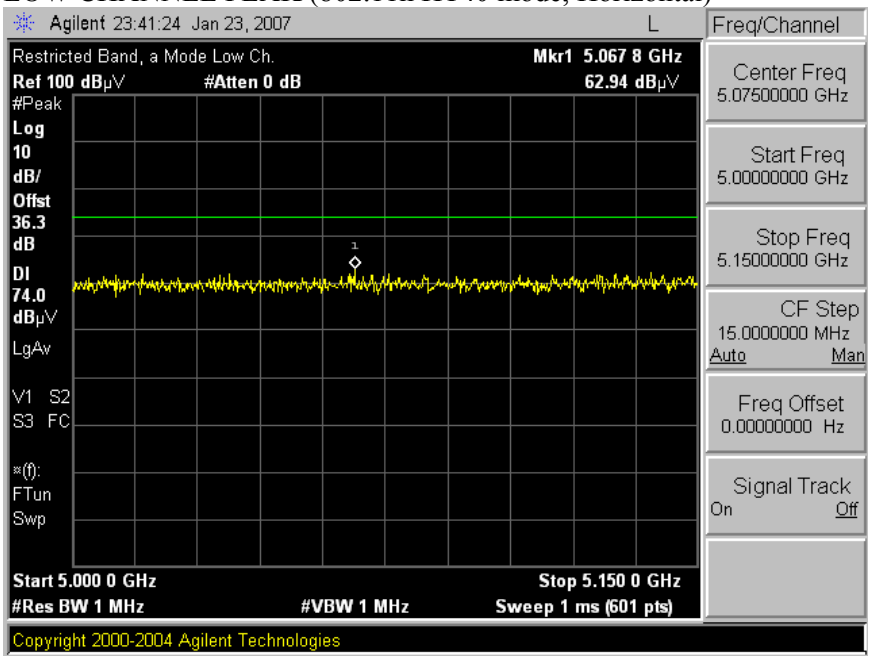
VERTICAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	37.760	17.39	17.62	35.00	40.00	-5.00	Peak
2	153.190	27.43	14.19	41.62	43.50	-1.88	Peak
3	159.980	21.83	13.99	35.82	43.50	-7.68	Peak
4	378.230	20.53	17.70	38.23	46.00	-7.77	Peak
5	452.920	18.57	19.46	38.03	46.00	-7.97	Peak
6	489.780	18.37	20.23	38.60	46.00	-7.40	Peak
7	601.330	19.58	22.02	41.60	46.00	-4.40	Peak
8	628.490	17.49	22.43	39.92	46.00	-6.08	Peak
9	751.680	15.18	24.23	39.41	46.00	-6.59	Peak
10	834.130	13.78	25.33	39.11	46.00	-6.89	Peak
11	875.840	13.66	25.85	39.51	46.00	-6.49	Peak
12	902.030	12.77	26.25	39.02	46.00	-6.98	Peak

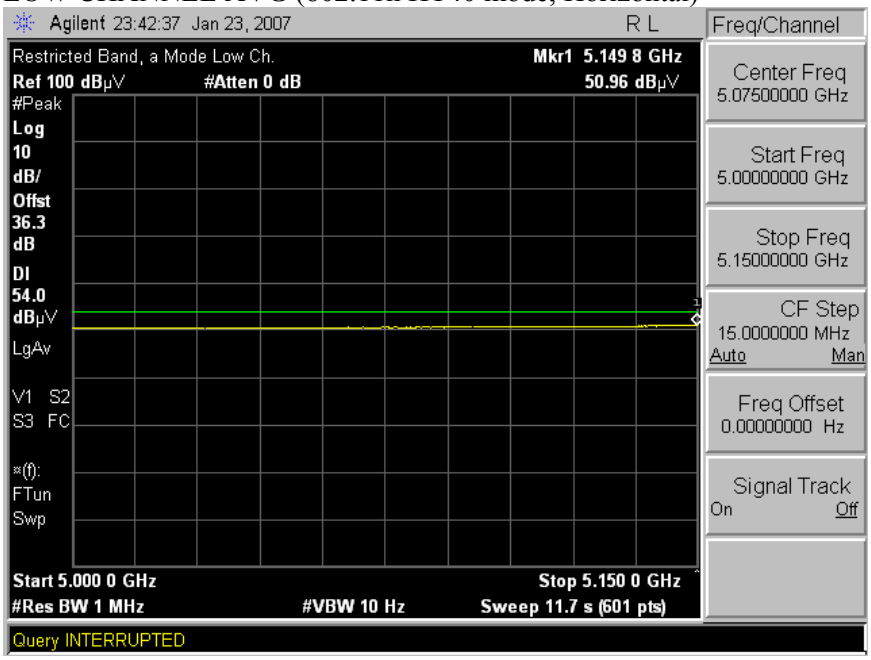
7.2.3. TRANSMITTER ABOVE 1 GHz

RESTRICTED BANDEDGE (802.11n HT40 MODE, LOW CHANNEL)

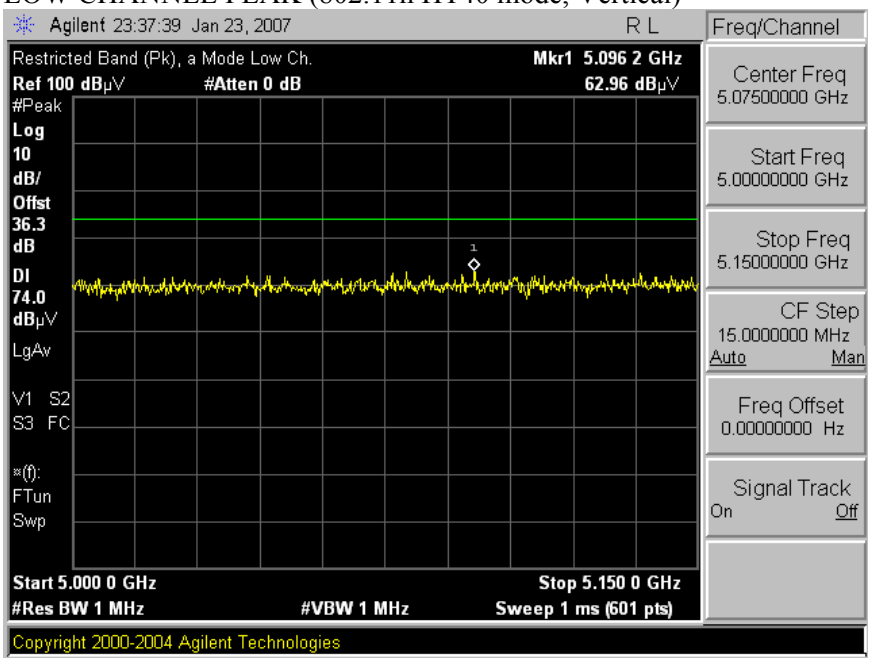
LOW CHANNEL PEAK (802.11n HT40 mode, Horizontal)



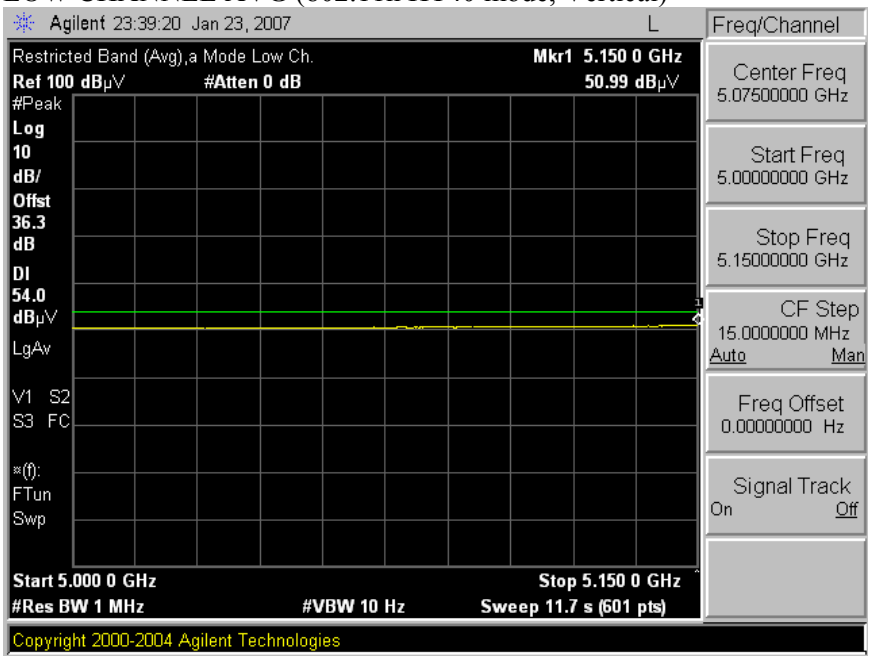
LOW CHANNEL AVG (802.11n HT40 mode, Horizontal)



LOW CHANNEL PEAK (802.11n HT40 mode, Vertical)

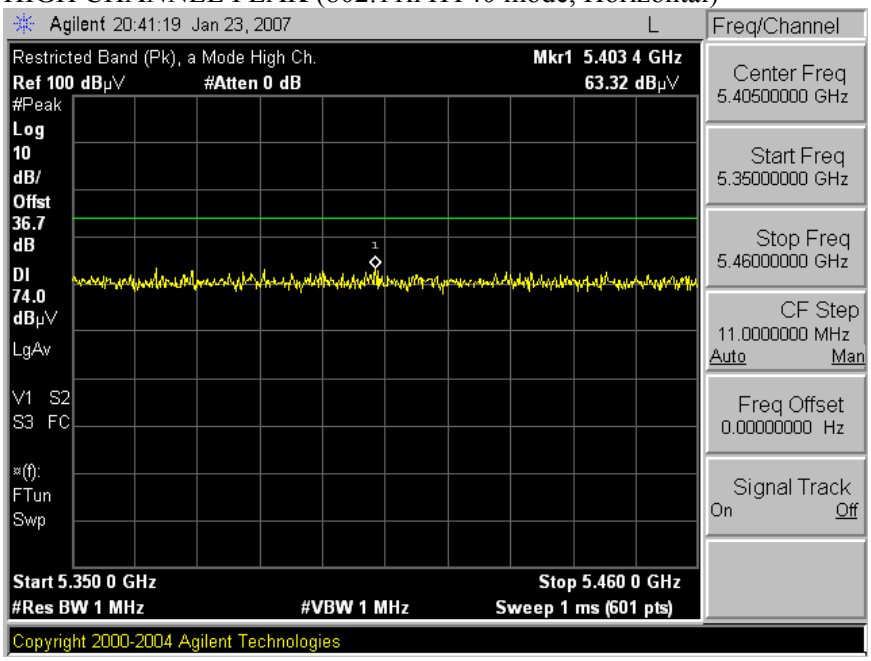


LOW CHANNEL AVG (802.11n HT40 mode, Vertical)

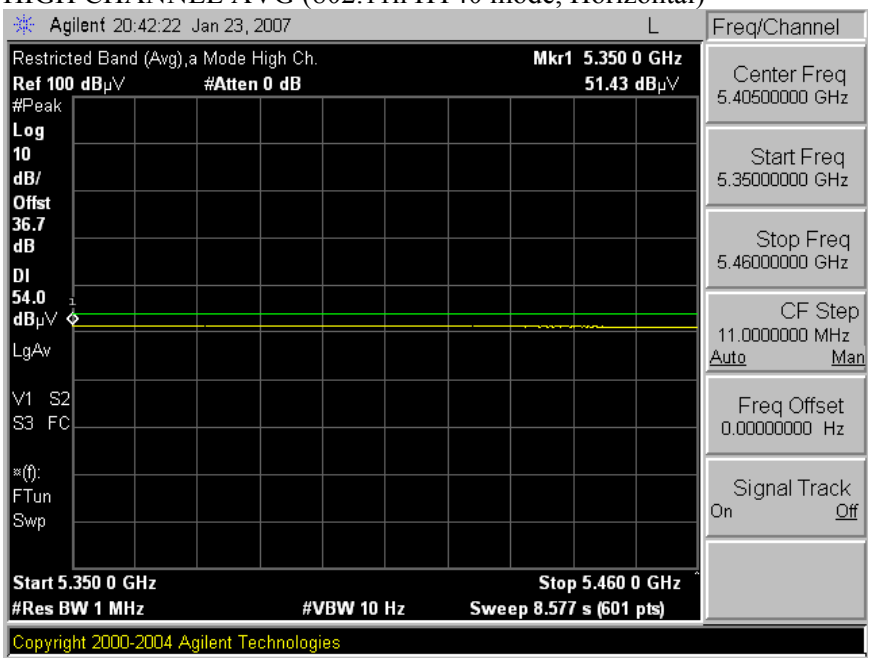


RESTRICTED BANDEDGE (802.11n HT40 MODE, HIGH CHANNEL)

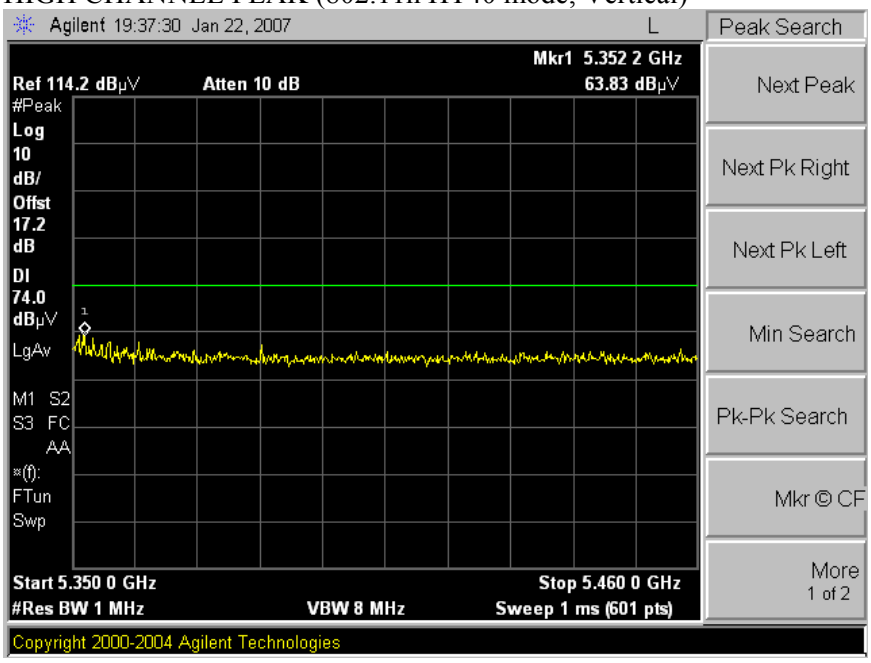
HIGH CHANNEL PEAK (802.11n HT40 mode, Horizontal)



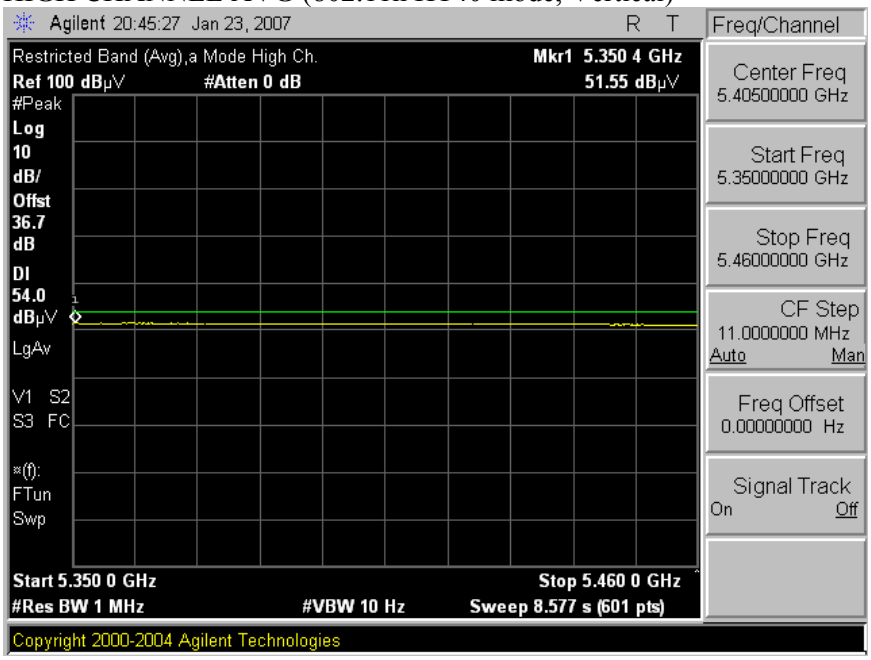
HIGH CHANNEL AVG (802.11n HT40 mode, Horizontal)



HIGH CHANNEL PEAK (802.11n HT40 mode, Vertical)



HIGH CHANNEL AVG (802.11n HT40 mode, Vertical)



HARMONICS AND SPURIOUS EMISSIONS (802.11n HT40 MODE)

High Frequency Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Company: BroadCom Corp.
Project #: 06U10708
Date: 01/23/2007
Test Engineer: Thanh Nguyen
Configuration: EUT, Antenna.
Mode: Transmit

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T119; S/N: 29301 @3m	T145 Agilent 3008A005(			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
Thanh 177079008		Gordon 203134001	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Tx Ch 62															
10.620	1.0	46.6	33.5	36.8	11.4	-34.3	-9.5	0.8	51.7	38.7	74	54	-22.3	-15.3	V
15.930	1.0	41.0	30.2	38.8	13.6	-32.2	-9.5	0.7	52.3	41.6	74	54	-21.7	-12.4	Noise floor
10.620	1.0	46.5	31.3	36.8	11.4	-34.3	-9.5	0.8	51.7	36.5	74	54	-22.3	-17.5	H
15.930	1.0	41.8	30.3	38.8	13.6	-32.2	-9.5	0.7	53.1	41.7	74	54	-20.9	-12.3	H
Tx Ch 54															
10.540	1.0	50.7	39.1	36.8	11.3	-34.4	-9.5	0.8	55.7	44.1	74	54	-18.3	-9.9	V
15.810	1.0	45.4	30.3	38.8	13.6	-32.2	-9.5	0.7	56.7	41.5	74	54	-17.3	-12.5	Noise floor
10.540	1.0	46.3	34.3	36.8	11.3	-34.4	-9.5	0.8	51.3	39.2	74	54	-22.7	-14.8	H
15.810	1.0	41.9	30.4	38.8	13.6	-32.2	-9.5	0.7	53.1	41.6	74	54	-20.9	-12.4	H
Spurious emissions															
1.037	1.0	68.1	47.0	27.8	3.4	-36.1	-9.5	0.0	53.6	32.5	74	54	-20.4	-21.5	H
1.355	1.0	68.9	42.8	29.1	3.8	-35.9	-9.5	0.0	56.4	30.2	74	54	-17.6	-23.8	H
1.433	1.0	65.5	44.6	29.4	3.9	-35.8	-9.5	0.0	53.4	32.5	74	54	-20.6	-21.5	H
1.038	1.0	75.5	47.4	27.8	3.4	-36.1	-9.5	0.0	61.0	32.9	74	54	-13.0	-21.1	H
1.357	1.0	67.1	43.5	29.1	3.8	-35.9	-9.5	0.0	54.6	30.9	74	54	-19.4	-23.1	V
1.860	1.0	64.8	44.6	31.0	4.5	-35.5	-9.5	0.0	55.3	35.1	74	54	-18.7	-18.9	V

Rev. 5.1.6

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

7.3. POWERLINE CONDUCTED EMISSIONS

LIMIT

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

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

Frequency of Emission (MHz)	Conducted 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 resolution bandwidth is set to 9 kHz for both peak detection and quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

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

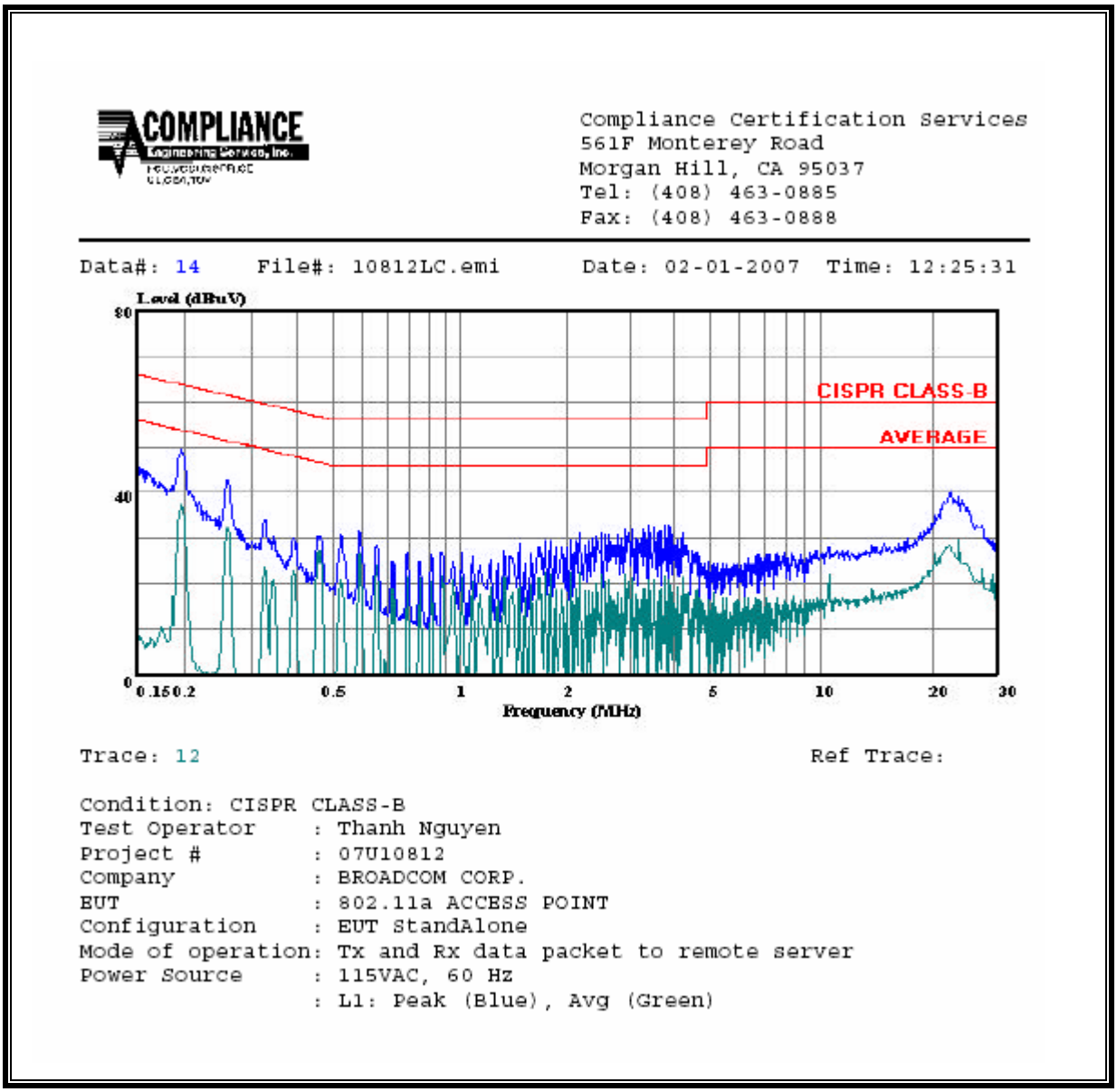
RESULTS

No non-compliance noted:

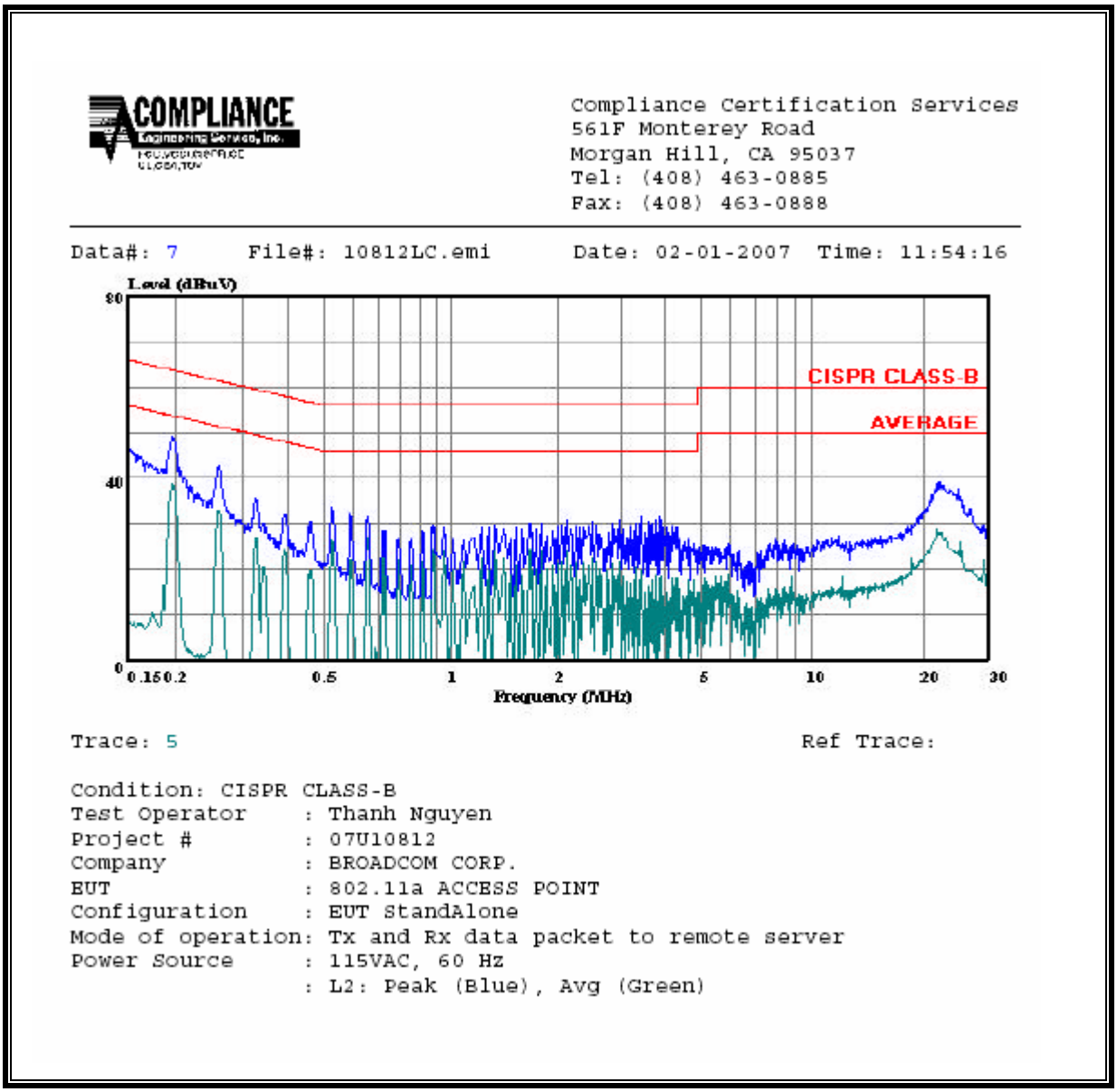
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.20	49.28	--	--	0.00	63.82	53.82	-14.54	-4.54	L1
3.94	31.52	--	--	0.00	56.00	46.00	-24.48	-14.48	L1
22.30	39.15	--	--	0.00	60.00	50.00	-20.85	-10.85	L1
0.20	49.52	--	--	0.00	63.82	53.82	-14.30	-4.30	L2
3.47	32.76	--	--	0.00	56.00	46.00	-23.24	-13.24	L2
22.18	39.78	--	--	0.00	60.00	50.00	-20.22	-10.22	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS



7.4. DYNAMIC FREQUENCY SELECTION

7.4.1. LIMITS

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

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

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

Table 2: Applicability of DFS requirements during normal operation

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

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

Maximum Transmit Power	**Value (see note)**
≥ 200 milliwatt	-64 dBm
< 200 milliwatt	-62 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna Note 2: Throughout these test procedures an additional 1 dB has 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 threshold level to trigger a DFS response.	

Table 4: DFS Response requirement values

Parameter	**Value**
Non-occupancy period	30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds
Channel Closing Transmission Time	200 milliseconds + approx. 60 milliseconds over remaining 10 second period
The instant that the *Channel Move Time* and the *Channel Closing Transmission Time* begins is as follows: • For the Short pulse radar Test Signals this instant is the end of the *Burst*. • For the Frequency Hopping radar Test Signal, this instant is the end of the last radar burst generated. • For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission. The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate channel changes (an aggregate of approximately 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.	

Table 5 – Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (Microseconds)	PRI (Microseconds)	Pulses	Minimum Percentage of Successful Detection	Minimum Trials
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 (Radar Types 1-4)				80%	120

Table 6 – Long Pulse Radar Test Signal

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

Table 7 – Frequency Hopping Radar Test Signal

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

7.4.2. TEST AND MEASUREMENT SYSTEM

SYSTEM OVERVIEW

The measurement system is based on a conducted test method.

The short pulse and long pulse signal generating system utilizes the NTIA software. 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.

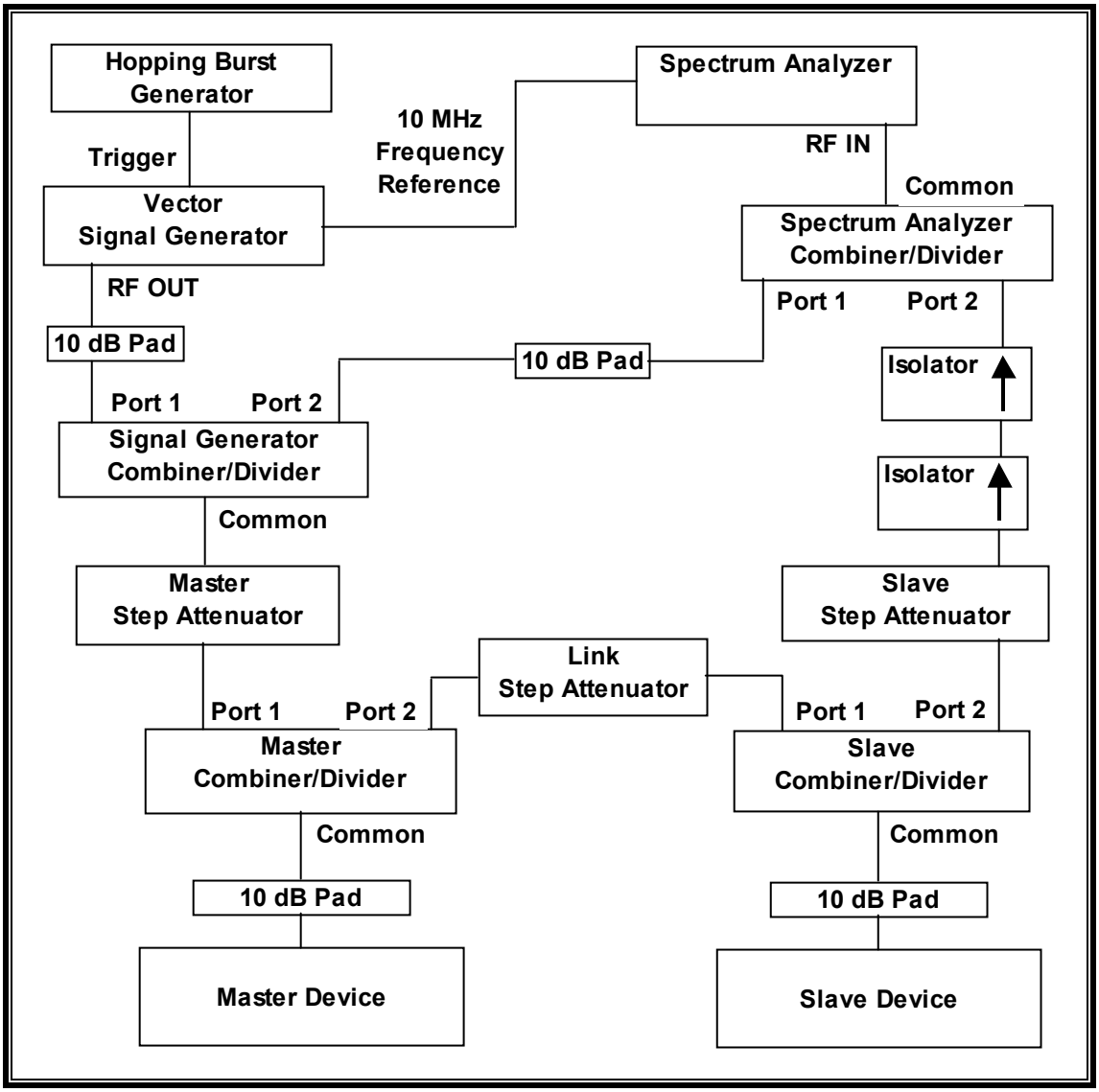
The short pulse types 2, 3 and 4, and the long pulse type 5 parameters are randomized at run-time.

The hopping type 6 pulse parameters are fixed while the hopping sequence is based on the August 2005 NTIA Hopping Frequency List. The initial starting point randomized at run-time and each subsequent starting point is incremented by 475. Each frequency in the 100-length segment is compared to the boundaries of the EUT Detection Bandwidth and the software creates a hopping burst pattern in accordance with Section 7.4.1.3 Method #2 Simulated Freqeuncy Hopping Radar Waveform Generating Subsystem of FCC 06-96 APPENDIX. The frequency of the signal generator is incremented in 1 MHz steps from F_L to F_H for each successive trial. This incremental sequence is repeated as required to generate a minimum of 30 total trials and to maintain a uniform frequency distribution over the entire Detection Bandwidth.

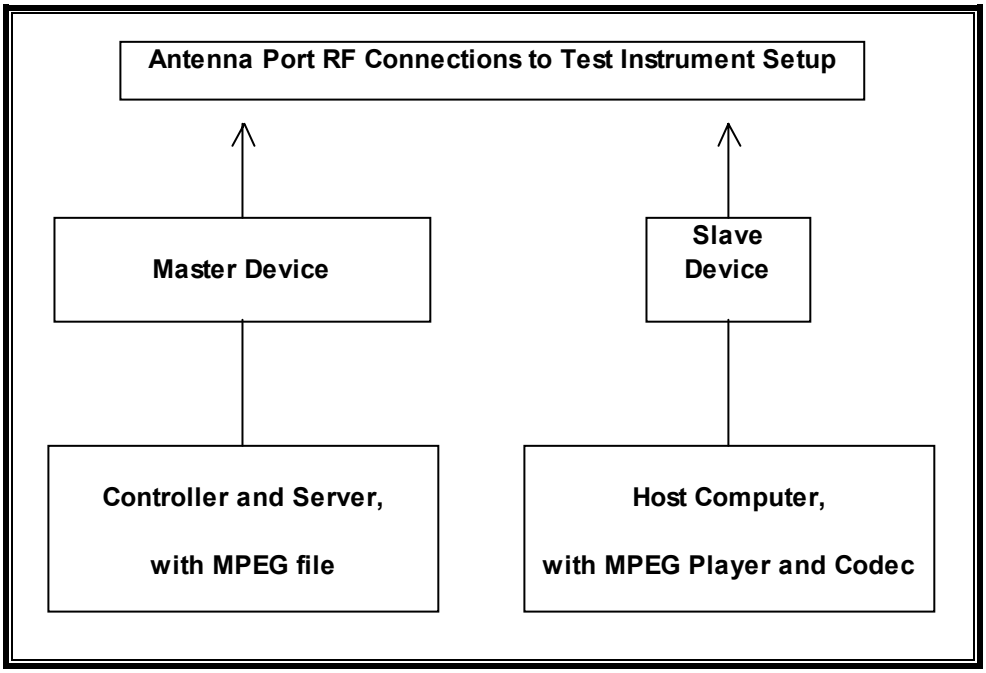
The signal monitoring equipment consists of a spectrum analyzer set to display 8001 bins on the horizontal axis. The time-domain resolution is 2 msec / bin with a 16 second sweep time, meeting the 10 second short pulse reporting criteria. The aggregate ON time is calculated by multiplying the number 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. The time-domain resolution is 3 msec / bin with a 24 second sweep time, meeting the 22 second long pulse reporting criteria and allowing a minimum of 10 seconds after the end of the long pulse waveform.

Should multiple RF ports be utilized for the Master and/or Slave devices (for example, for diversity or MIMO implementations), additional combiner/dividers are inserted between the Master Combiner/Divider and the 10 dB pad connected to the Master Device (and/or between the Slave Combiner/Divider and the 10 dB pad connected to the Slave Device). Additional 10 dB pads are connected as needed, such that there is one pad at each RF port on each EUT.

CONDUCTED METHOD SYSTEM BLOCK DIAGRAM



EUT TEST SETUP



SYSTEM CALIBRATION

Connect the spectrum analyzer to the test system in place of the master device. Set the signal generator to CW mode. Adjust the amplitude of the signal generator to yield a measured level of –64 dBm on the spectrum analyzer.

Without changing any of the instrument settings, reconnect the spectrum analyer to the Common port of the Spectrum Analyzer Combiner/Divider and connect a 50 ohm load to the Master Device port of the test system.

Measure the amplitude and calculate the difference from –64 dBm. Adjust the Reference Level Offset of the spectrum analyzer to this difference. Confirm that the signal is displayed at –64 dBm. Readjust the RBW and VBW to 3 MHz, set the span to 10 MHz, and confirm that the signal is still displayed at –64 dBm.

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.

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

ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

Establish a link between the Master and Slave, adjusting the Link Step Attenuator 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. Confirm that the displayed traffic is from the Master Device. Confirm that the displayed traffic does not include Slave Device traffic.

If a different setting of the Master Step Attenuator is required to meet the above conditions, perform a new System Calibration for the new Master Step Attenuator setting.

7.4.3. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	Cal Due
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent / HP	E4446A	US42070220	7/29/2007
Vector Signal Generator 250kHz-20GHz	Agilent / HP	E8267C	US43320336	11/2/2007
High Speed Digital I/O Card	National Instruments	PCI-6534	HA1612845	1/16/2008

7.4.4. SETUP OF EUT

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	ADAPTER TECH	STD-0505	446	DoC
Laptop	HP	Pavilion zv6000	00045-584-707-717	DoC
AC Adapter	HP	PA-1121-12HD	58B240ALLRQCEE	DoC
Laptop	DELL	LATITUDE D510	JP-OY1338-42016-4C5-1104	DoC
AC Adapter	DELL	HP-OQ065B83	05U092-47890-31D-0049	DoC
WLAN Card	BROADCOM	BCM94321MP	1100141	N/A*
* This is a prototype radio module, not available for sale.				

7.4.5. DESCRIPTION OF EUT

The EUT operates over the 5250-5350 MHz range.

The EUT is a Master Device.

The highest power level is 15.09 dBm conducted and 18.09 dBm EIRP.

The only antenna assembly utilized with the EUT has a gain of 3 dBi.

Two identical antennas are utilized to meet the transmit diversity operational requirements.

The rated output power of the Master unit is < 23dBm (EIRP). Therefore the required interference threshold level is –62 dBm. After correction for antenna gain and procedural adjustments, the required conducted threshold at the antenna port is –62 + 3 + 1 = -58 dBm.

The calibrated conducted DFS Detection Threshold level is set to –61 dBm. The tested level is lower than the required level hence it provides margin to the limit.

The EUT uses one transmitter connected to two 50-ohm coaxial antenna ports via a diversity switch. Both antenna ports are connected to the test system via a power divider to perform conducted tests.

The Slave device associated with the EUT during these tests does not have radar detection capability.

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).

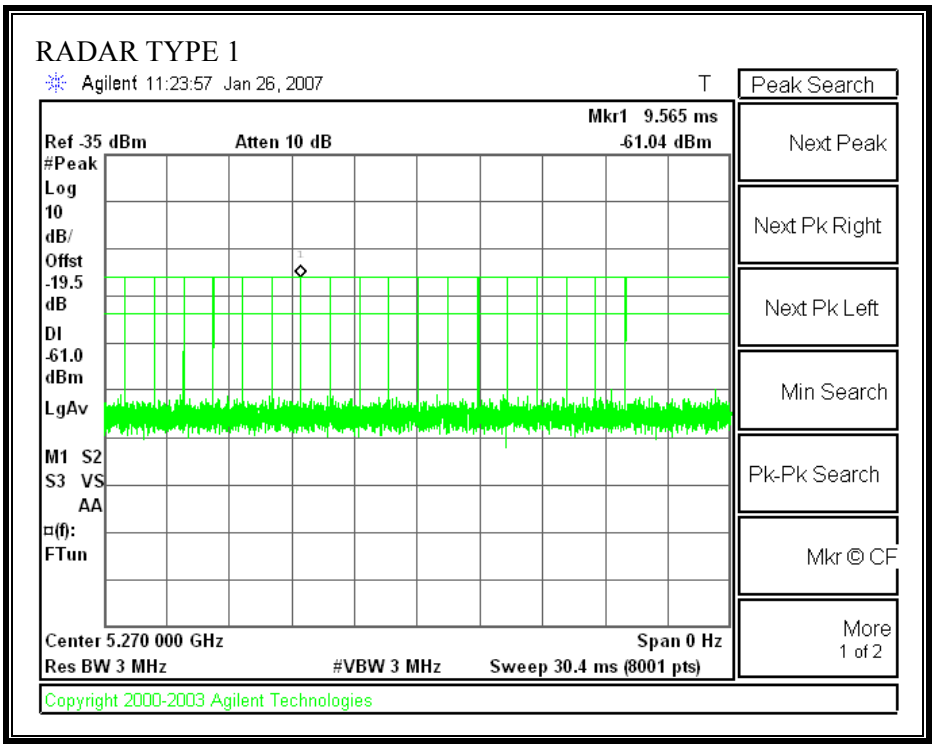
The EUT utilizes the 802.11n architecture. One nominal channel bandwidth, 40 MHz, is implemented.

The software installed in the access point is PO_4_100_22_2.

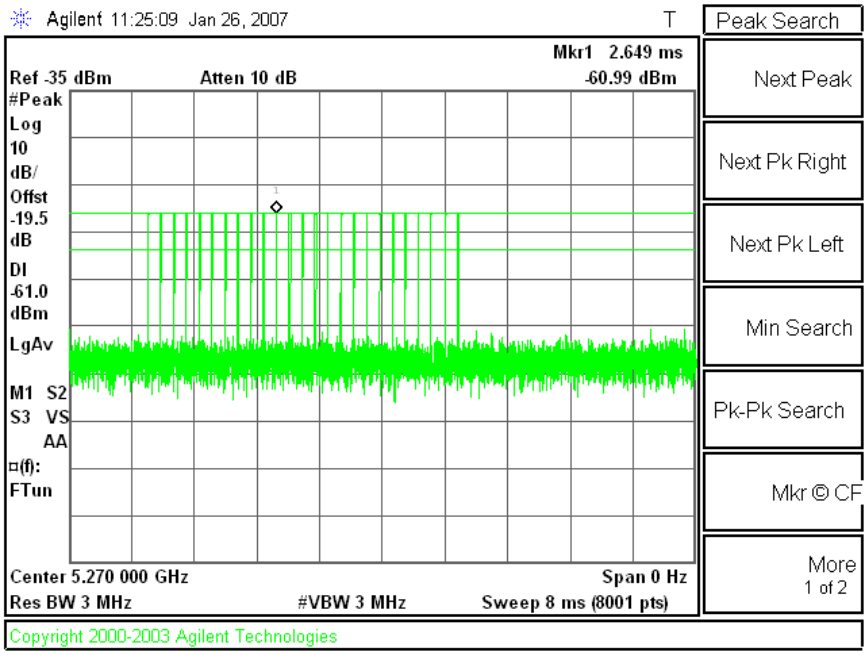
Test results show that the EUT requires 22.48 seconds to complete its initial power-up cycle.

7.4.6. PLOTS OF RADAR WAVEFORM, AND WLAN TRAFFIC

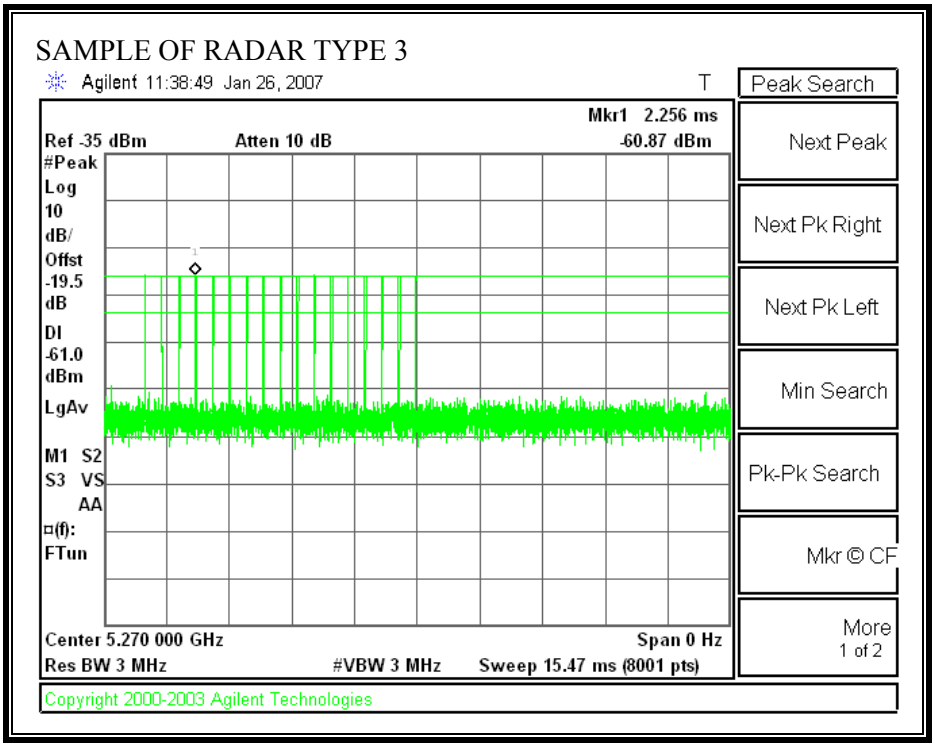
PLOTS OF RADAR WAVEFORMS



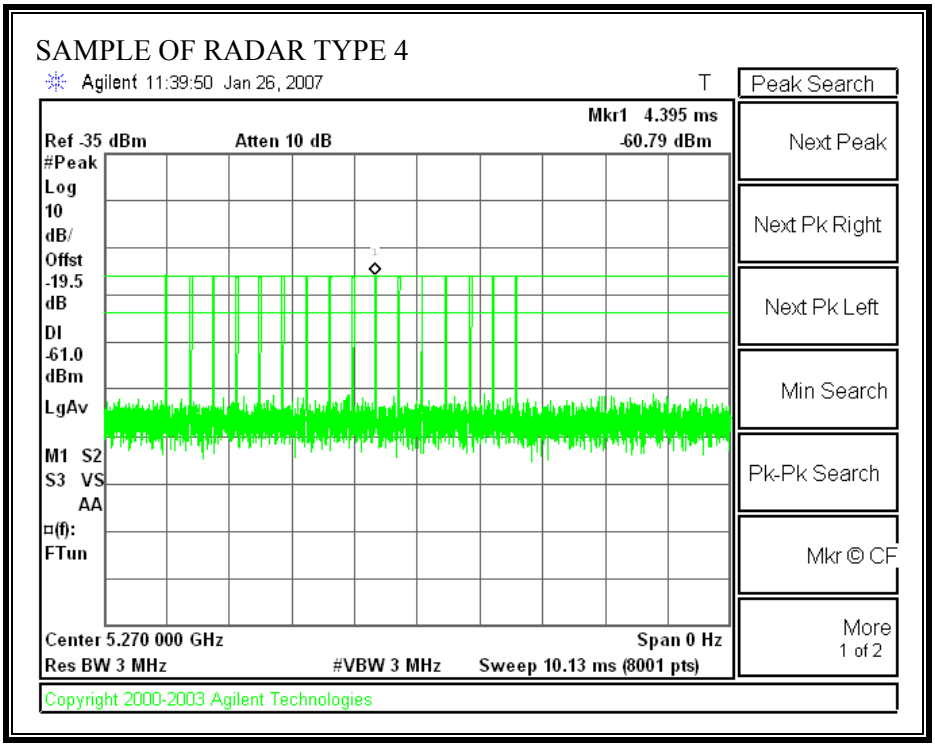
SAMPLE OF RADAR TYPE 2



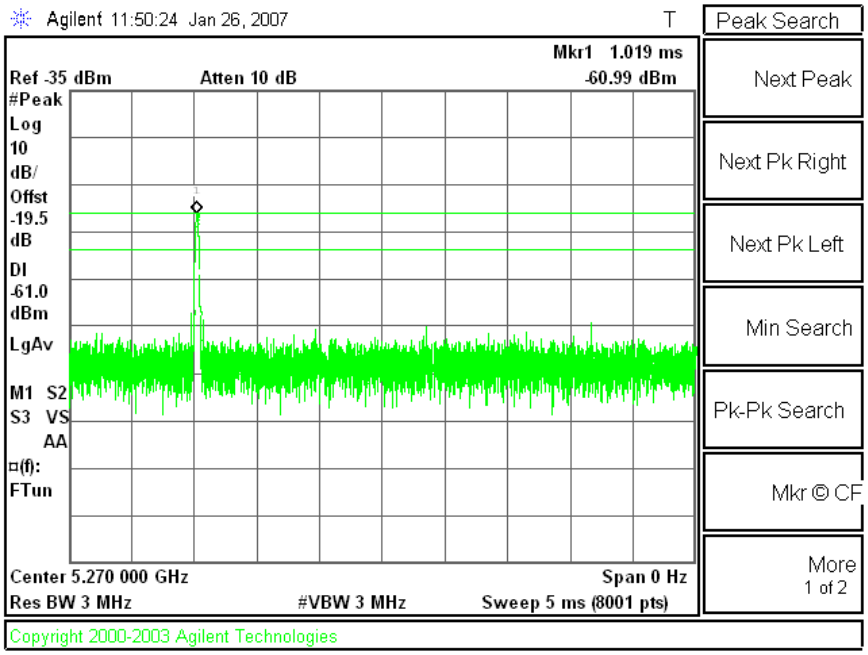
SAMPLE OF RADAR TYPE 3



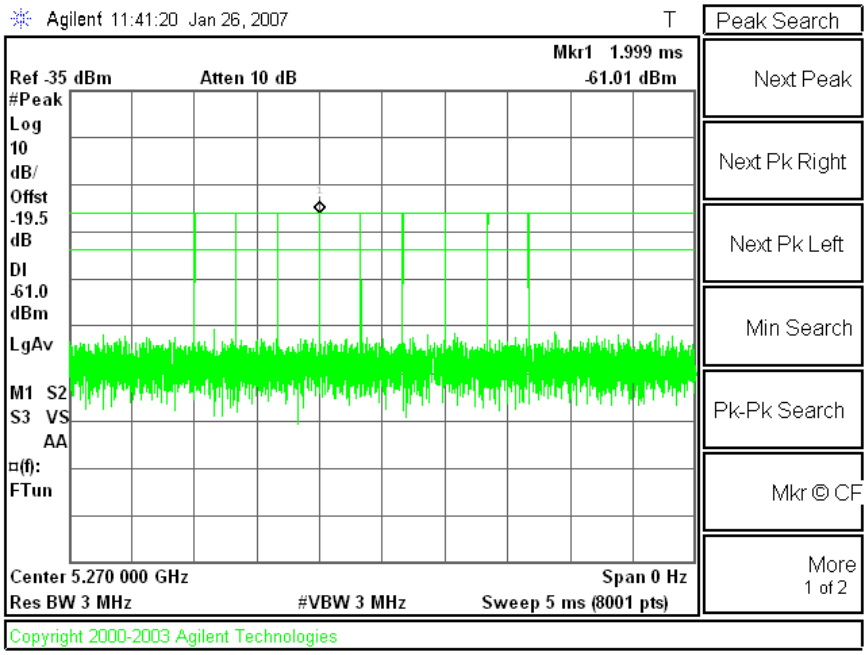
SAMPLE OF RADAR TYPE 4



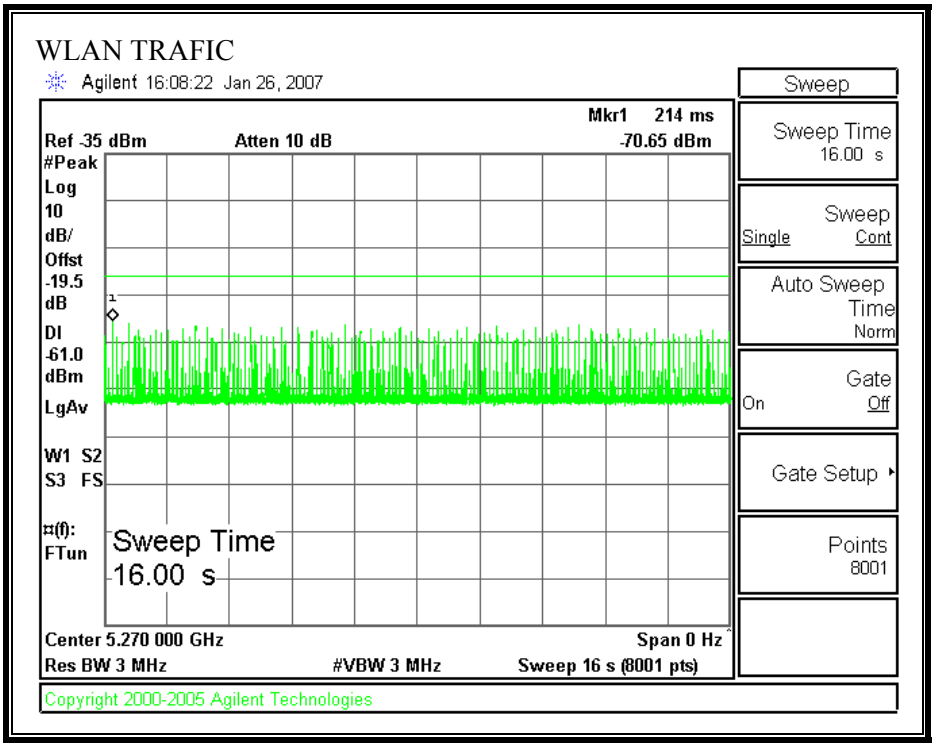
SAMPLE OF SINGLE BURST OF RADAR TYPE 5



SINGLE BURST OF RADAR TYPE 6



PLOT OF WLAN TRAFFIC FROM MASTER



7.4.7. TEST CHANNEL AND METHOD

All tests were performed at a channel center frequency of 5270 MHz utilizing a conducted test method.

7.4.8. CHANNEL AVAILABILITY CHECK TIME

TEST PROCEDURE TO DETERMINE INITIAL POWER-UP CYCLE TIME

A link was established on channel, then the EUT was rebooted. The time from the cessation of traffic to the re-initialization of traffic was measured as the time required for the EUT to complete the total power-up cycle. The time to complete the initial power-up period is 60 seconds less than this total power-up time.

TEST PROCEDURE FOR TIMING OF RADAR BURST

With a link established on channel, the EUT was rebooted. A radar signal was triggered within 0 to 6 seconds after the initial power-up period, and transmissions on the channel were monitored on the spectrum analyzer.

The Non-Occupancy list was cleared. With a link established on channel, the EUT was rebooted. A radar signal was triggered within 54 to 60 seconds after the initial power-up period, and transmissions on the channel were monitored on the spectrum analyzer.

CHANNEL AVAILABILITY CHECK TIME RESULTS

No non-compliance noted:

Time required for EUT to complete the initial power-up cycle (sec)
22.48

If a radar signal is detected during the channel availability check then the PC controlling the EUT displays a message stating that radar was detected.

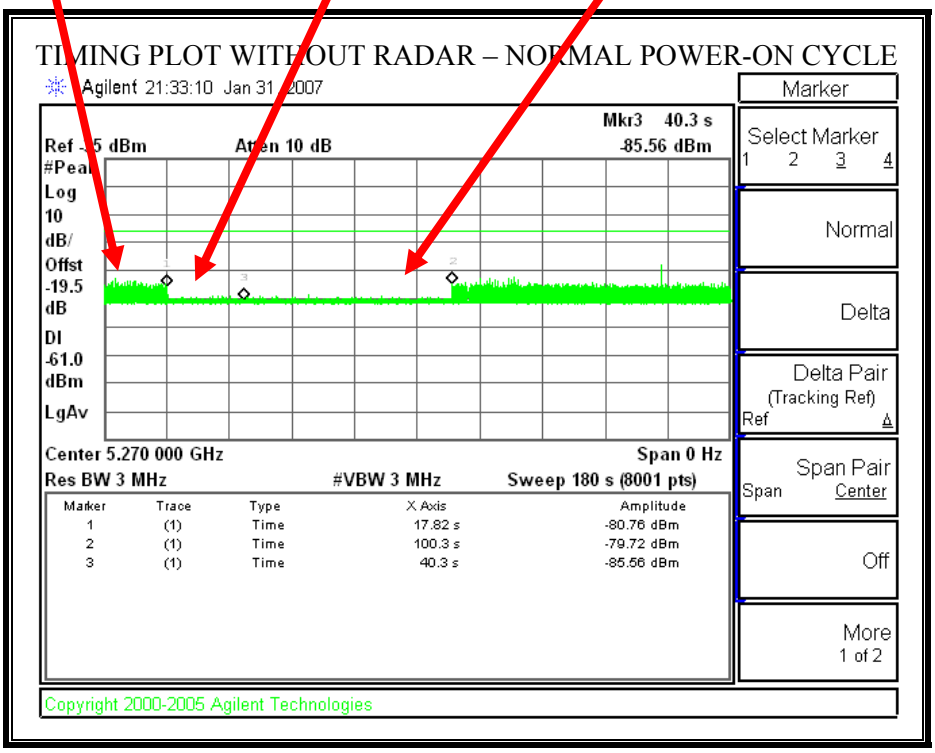
Timing of Radar Burst	Display on EUT / PC Control Computer	Spectrum Analyzer Display
No Radar Triggered	(EUT Initiates Transmisisons)	Transmissions begin on channel after completion of the initial power-up cycle and the 60 second CAC
Within 0 to 6 second window	EUT indicates radar detected EUT does not display any radar parameter values	No transmissions on channel
Within 54 to 60 second window	EUT indicates radar detected EUT does not display any radar parameter values	No transmissions on channel

TIMING PLOT WITHOUT RADAR DURING CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

End of CAC
Traffic is Initiated



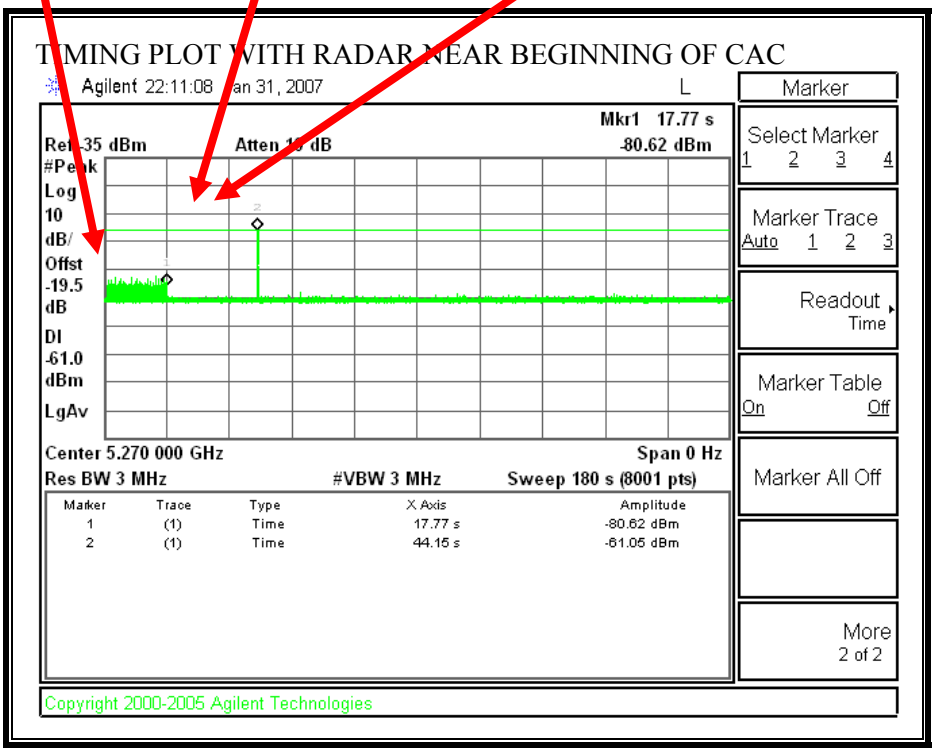
The initial power-up cycle requires (100.3 – 17.82 – 60) = 22.48 seconds.

TIMING PLOT WITH RADAR NEAR BEGINNING OF CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

Radar Signal Applied

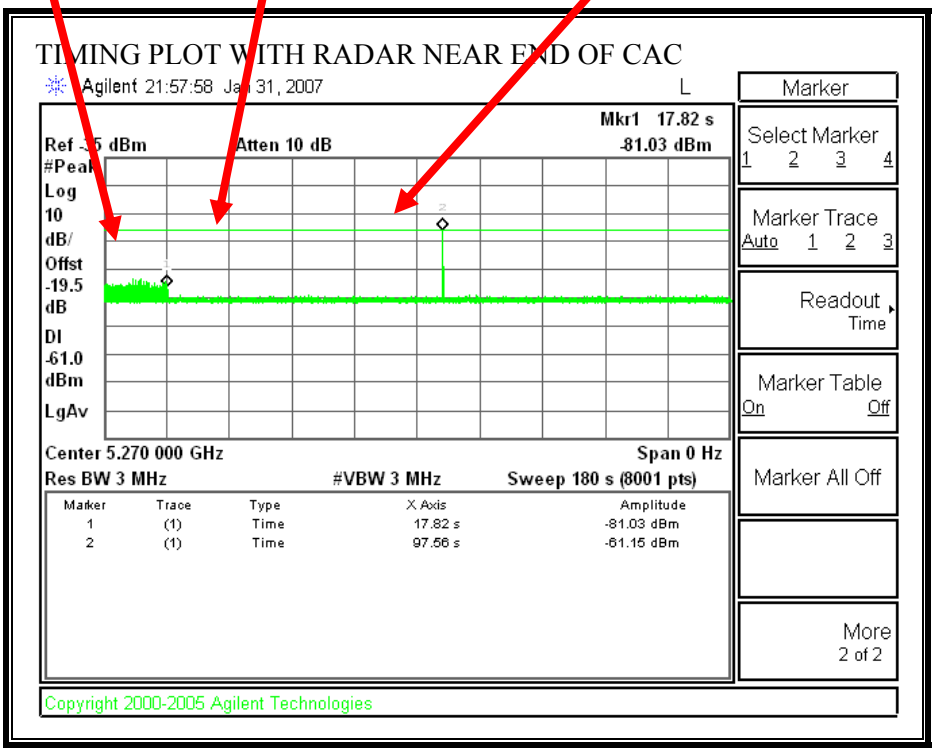


The radar signal is applied (44.15 – 17.77) = 26.38 seconds after reboot, which is (26.38 – 22.48) = 3.9 seconds after the start of the CAC period.

No EUT transmissions were observed after the radar signal.

TIMING PLOT WITH RADAR NEAR END OF CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle
End of Initial Power-up cycle
Start of CAC
Radar Signal Applied



The radar signal is applied (97.56 – 17.82) = 79.74 seconds after reboot, which is (79.74 – 22.48) = 57.26 seconds after the start of the CAC period.

No EUT transmissions were observed after the radar signal.

7.4.9. CHANNEL MOVE TIME AND CHANNEL CLOSING TRANSMISSION TIME

GENERAL REPORTING NOTES

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

TYPE 1 RADAR REPORTING NOTES

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

The aggregate channel closing transmission time is calculated as follows:

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

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

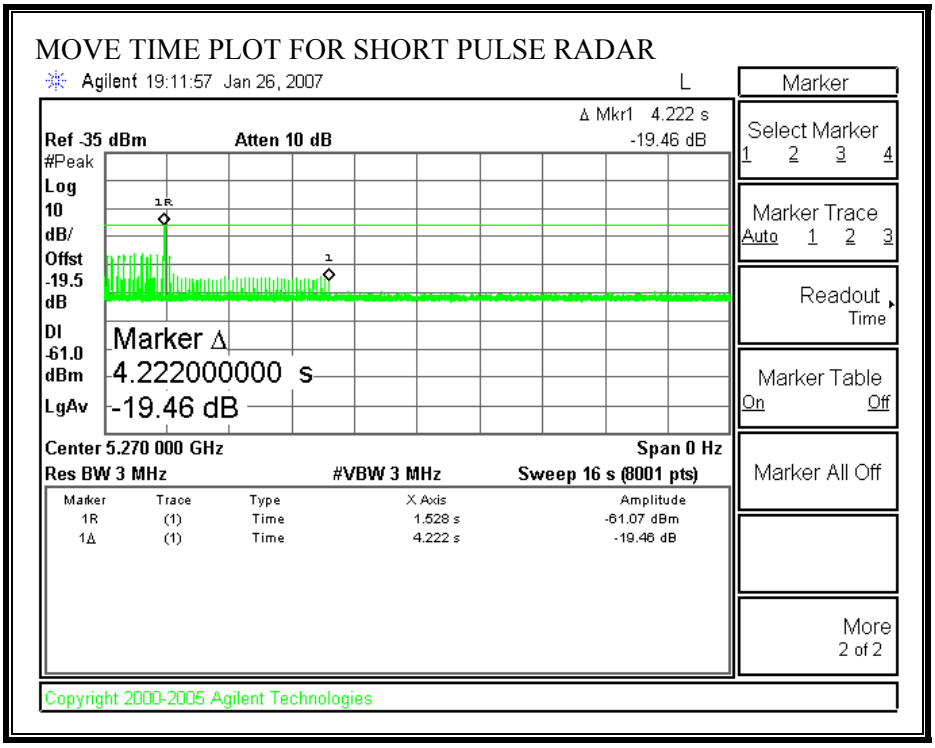
TYPE 5 RADAR REPORTING NOTES

The delta marker is set to 10 seconds after the end of the radar pulse.

TYPE 1 CHANNEL MOVE TIME RESULTS

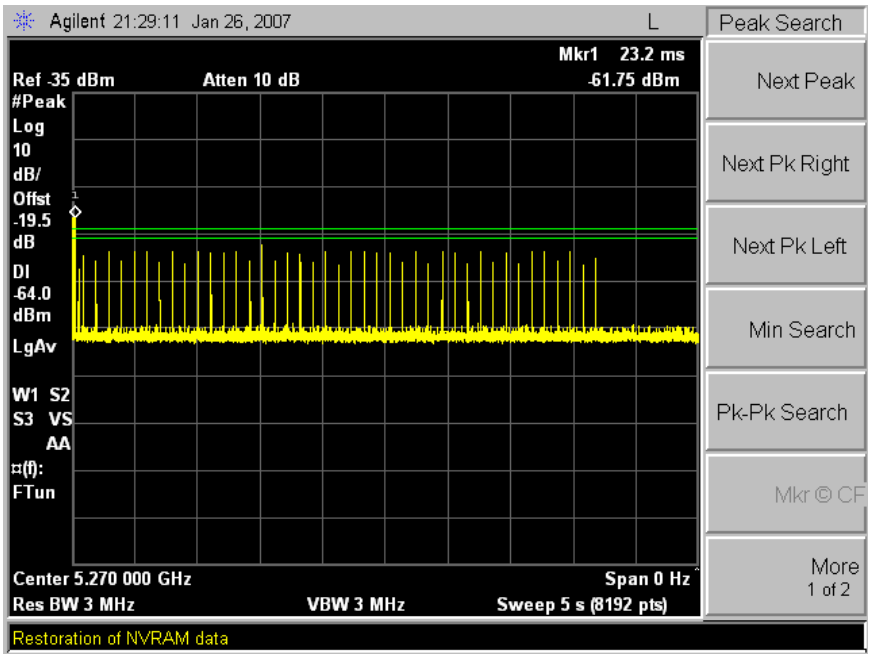
No non-compliance noted:

Channel Move Time (s)	Limit (s)
4.222	10



CLOSE UP OF MOVE TIME

CLOSE UP OF MOVE TIME FOR SHORT PULSE RADAR



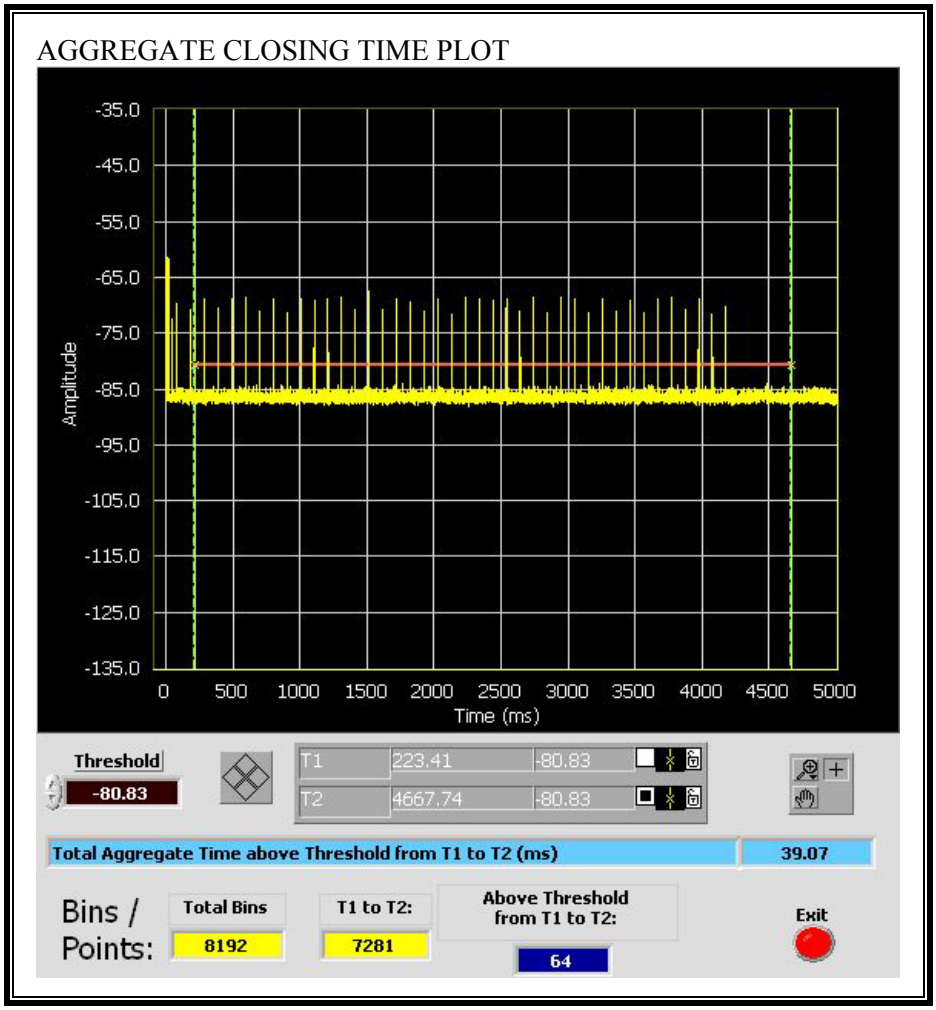
TYPE 1 CHANNEL CLOSING TRANSMISSION TIME RESULTS

No non-compliance noted:

Aggregate Transmission Time (ms)	Limit (ms)	Margin (ms)
39.07	60	20.93

Only intermittent transmissions are observed during the aggregate monitoring period.

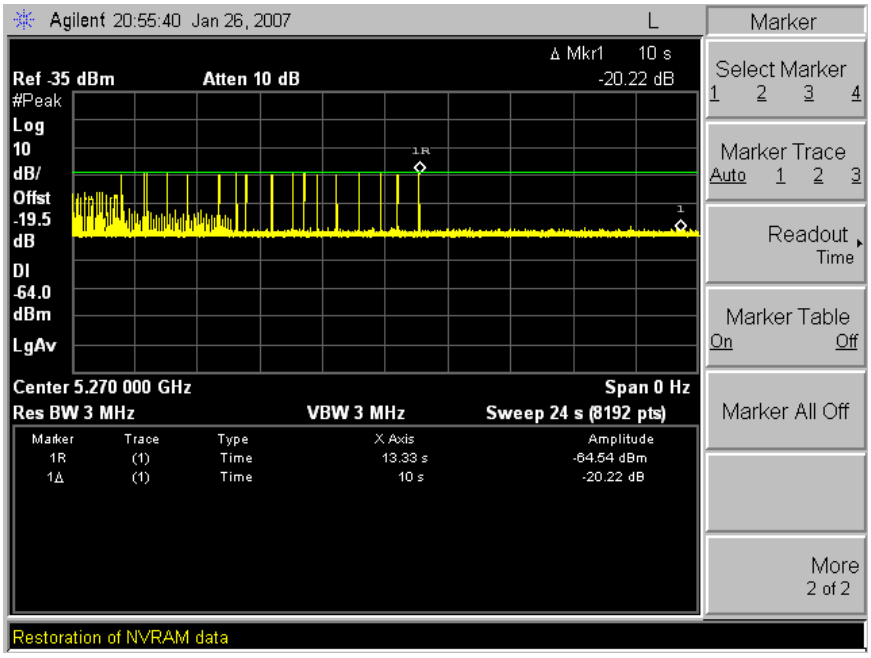
AGGREGATE CLOSING TIME PLOT



TYPE 5 CHANNEL MOVE TIME RESULTS

No non-compliance noted: The traffic ceases prior to the end of the radar waveform, therefore it also ceases prior to 10 seconds after the end of the radar waveform.

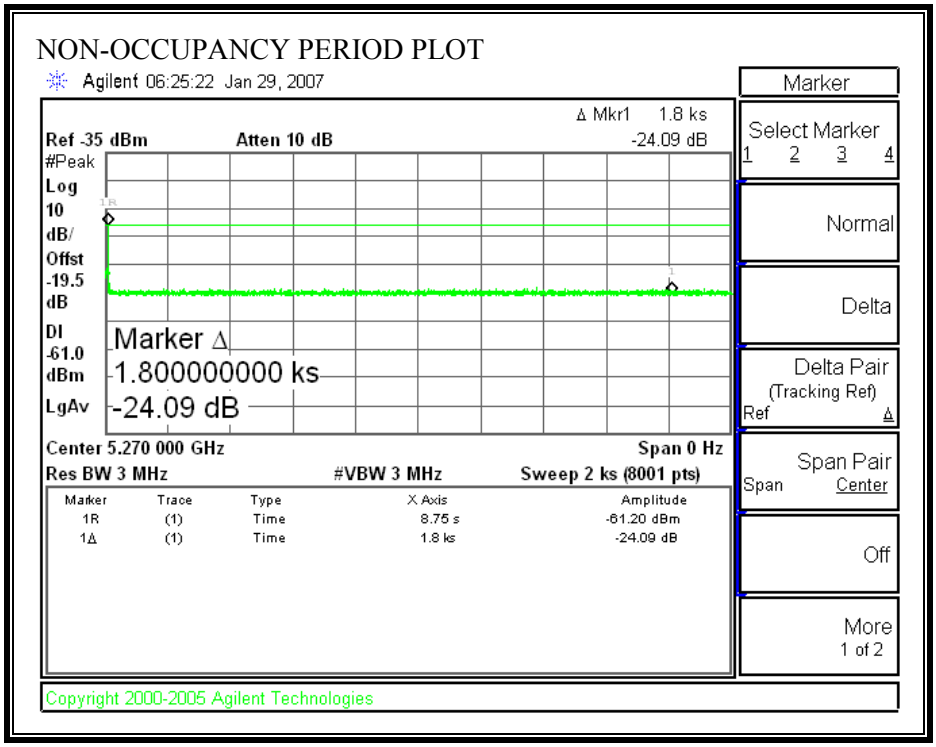
MOVE TIME PLOT FOR LONG PULSE RADAR



7.4.10. NON-OCCUPANCY PERIOD

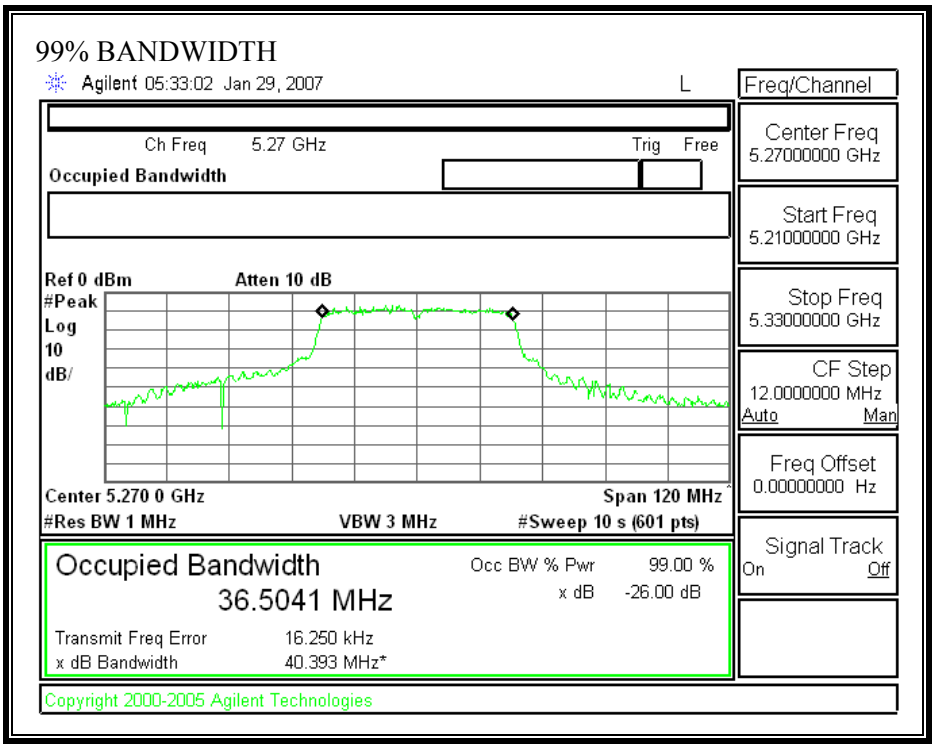
RESULTS

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



7.4.11. DETECTION BANDWIDTH

REFERENCE PLOT OF 99% POWER BANDWIDTH



RESULTS

No non-compliance noted:

FL (MHz)	FH (MHz)	Detection Bandwidth (MHz)	99% Power Bandwidth (MHz)	Ratio of Detection BW to 99% Power BW (%)	Minimum Limit (%)
5249	5291	42	36.504	115.1	80

Detection Bandwidth Test Results: Waveform: TYPE 1

Frequency (MHz)	Number of Trials	Number Detected	Detection (%)	Mark
5248	10	4	40.00	
5249	10	10	100.00	FL
5250	10	10	100.00	
5251	10	10	100.00	
5252	10	10	100.00	
5253	10	10	100.00	
5254	10	10	100.00	
5255	10	10	100.00	
5256	10	10	100.00	
5257	10	10	100.00	
5258	10	10	100.00	
5259	10	10	100.00	
5260	10	10	100.00	
5261	10	10	100.00	
5262	10	10	100.00	
5263	10	10	100.00	
5264	10	10	100.00	
5265	10	10	100.00	
5266	10	10	100.00	
5267	10	10	100.00	
5268	10	10	100.00	
5269	10	10	100.00	
5270	10	10	100.00	
5271	10	10	100.00	
5272	10	10	100.00	
5273	10	10	100.00	
5274	10	10	100.00	
5275	10	10	100.00	
5276	10	10	100.00	
5277	10	10	100.00	
5278	10	10	100.00	
5279	10	10	100.00	
5280	10	10	100.00	
5281	10	10	100.00	
5282	10	10	100.00	
5283	10	10	100.00	
5284	10	10	100.00	
5285	10	10	100.00	
5286	10	10	100.00	
5287	10	10	100.00	
5288	10	10	100.00	
5289	10	10	100.00	
5290	10	10	100.00	
5291	10	10	100.00	FH
5292	10	2	20.00	

7.4.12. IN-SERVICE MONITORING

RESULTS

No non-compliance noted:

Radar Test Summary:

Signal Type	Waveform/Trial No.	Detection (%)	Limit (%)	Pas/Fail
FCC TYPE 1	30	96.67	60.00	Pass
FCC TYPE 2	30	90.00	60.00	Pass
FCC TYPE 3	30	83.33	60.00	Pass
FCC TYPE 4	30	76.67	60.00	Pass
Aggregate	4	86.67	80.00	Pass
FCC TYPE 5	30	100.00	80.00	Pass
FCC TYPE 6	43	97.67	70.00	Pass

TYPE 1 DETECTION PROBABILITY

Data Sheet for Short Pulse Radar Type 1

Trial No.	Successful Detection (Yes/No)
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes
8	Yes
9	Yes
10	Yes
11	Yes
12	Yes
13	Yes
14	Yes
15	Yes
16	Yes
17	Yes
18	Yes
19	Yes
20	Yes
21	Yes
22	Yes
23	Yes
24	No
25	Yes
26	Yes
27	Yes
28	Yes
29	Yes
30	Yes

TYPE 2 DETECTION PROBABILITY

Data Sheet for Short Pulse Radar Type 2

Waveform No.	# Pulses per burst	Pulse Width (us)	Pulse repetition Interval (us)	Successful Detection (Yes/No)
2001	25	2.70	165	Yes
2002	24	4.60	185	Yes
2003	28	3.20	172	Yes
2004	26	1.60	212	Yes
2005	26	1.80	219	Yes
2006	27	3.20	222	No
2007	25	4.00	155	Yes
2008	28	4.80	226	Yes
2009	23	1.00	163	Yes
2010	24	3.20	173	Yes
2011	24	4.10	197	Yes
2012	26	4.70	178	Yes
2013	29	3.90	216	Yes
2014	29	4.50	198	Yes
2015	26	1.00	202	Yes
2016	28	2.90	185	Yes
2017	29	2.30	224	No
2018	27	4.30	209	Yes
2019	24	1.30	168	Yes
2020	29	4.50	198	Yes
2021	25	2.40	173	Yes
2022	26	4.30	222	Yes
2023	24	2.60	178	Yes
2024	24	3.90	151	Yes
2025	25	1.30	153	Yes
2026	29	4.00	218	No
2027	26	3.80	223	Yes
2028	25	4.40	210	Yes
2029	28	2.20	187	Yes
2030	23	1.20	193	Yes

TYPE 3 DETECTION PROBABILITY

Data Sheet for Short Pulse Radar Type 3

Waveform No.	# Pulses per burst	Pulse Width (us)	Pulse repetition Interval (us)	Successful Detection (Yes/No)
3001	17	6.70	419	Yes
3002	16	6.20	357	No
3003	16	10.00	341	Yes
3004	18	8.50	407	Yes
3005	17	5.30	280	Yes
3006	17	8.30	333	No
3007	18	5.50	380	Yes
3008	16	8.40	298	Yes
3009	16	9.80	491	No
3010	18	5.90	339	Yes
3011	18	7.90	305	Yes
3012	17	8.10	408	Yes
3013	18	8.40	259	Yes
3014	16	5.30	305	Yes
3015	16	8.30	448	Yes
3016	18	7.70	323	Yes
3017	17	7.00	396	Yes
3018	17	5.40	457	Yes
3019	17	7.60	490	No
3020	16	5.50	295	Yes
3021	17	7.00	476	Yes
3022	17	5.40	376	Yes
3023	18	8.80	321	Yes
3024	17	5.60	347	Yes
3025	16	7.60	348	Yes
3026	18	9.50	401	Yes
3027	16	8.20	495	Yes
3028	16	7.40	425	Yes
3029	18	7.50	302	Yes
3030	18	5.60	440	No

TYPE 4 DETECTION PROBABILITY

Data Sheet for Short Pulse Radar Type 4

Waveform No.	# Pulses per burst	Pulse Width (us)	Pulse repetition Interval (us)	Successful Detection (Yes/No)
4001	16	19.40	377	No
4002	14	15.50	346	Yes
4003	12	14.10	391	Yes
4004	14	16.60	444	Yes
4005	13	16.00	366	Yes
4006	16	16.40	495	No
4007	14	11.40	415	Yes
4008	15	10.80	324	Yes
4009	13	19.20	460	No
4010	12	12.20	342	Yes
4011	13	17.40	333	Yes
4012	15	18.60	400	Yes
4013	13	10.20	264	No
4014	15	13.00	446	Yes
4015	15	19.50	396	No
4016	12	15.20	443	No
4017	14	16.00	487	Yes
4018	13	17.00	334	No
4019	14	18.60	316	Yes
4020	16	17.20	302	Yes
4021	15	14.40	274	Yes
4022	16	15.20	334	Yes
4023	15	14.00	341	Yes
4024	12	10.50	337	Yes
4025	16	18.30	315	Yes
4026	15	19.90	430	Yes
4027	13	18.00	264	Yes
4028	14	14.60	480	Yes
4029	16	19.60	356	Yes
4030	16	14.50	442	Yes

TYPE 5 DETECTION PROBABILITY

Data Sheet for Long Pulse Radar Type 5

Waveform No.	Successful Detection (Yes/No)
5001	Yes
5002	Yes
5003	Yes
5004	Yes
5005	Yes
5006	Yes
5007	Yes
5008	Yes
5009	Yes
5010	Yes
5011	Yes
5012	Yes
5013	Yes
5014	Yes
5015	Yes
5016	Yes
5017	Yes
5018	Yes
5019	Yes
5020	Yes
5021	Yes
5022	Yes
5023	Yes
5024	Yes
5025	Yes
5026	Yes
5027	Yes
5028	Yes
5029	Yes
5030	Yes

TYPE 5 WAVEFORM PARAMETERS

Waveform Parameters for Long Pulse Radar Test Signal 5

Burst #	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1 to 2 Pri (usec)	Pulse 2 to 3 Pri (usec)	Starting Location Within Interval (usec)
Waveform Num = 1; Num of Bursts = 17; Burst Interval (us) = 705882.0; Total number of pulses = 33						
1	1	95	15	---	---	439880
2	3	90	18	1073	1457	1348668
3	2	70	10	1061	---	1428897
4	3	55	20	1673	1982	2234463
5	1	90	15	---	---	2980166
6	3	85	18	1768	1292	4211489
7	1	55	5	---	---	4879929
8	2	95	14	1181	---	5215359
9	2	70	7	1596	---	6205484
10	1	70	10	---	---	7046459
11	2	95	5	1915	---	7464868
12	2	55	13	1657	---	7977400
13	1	55	13	---	---	8712255
14	3	50	10	1455	1893	9598129
15	2	60	13	1954	---	10430306
16	2	80	15	1841	---	11045789
17	2	80	12	1950	---	11906587
Waveform Num = 2; Num of Bursts = 9; Burst Interval (us) = 1333333.0; Total number of pulses = 16						
1	1	95	16	---	---	1234053
2	3	85	17	1003	1545	1243896
3	1	80	15	---	---	1246765
4	2	50	10	1172	---	1004779
5	2	55	17	1748	---	1443085
6	3	90	14	1511	1794	1116727
7	1	50	20	---	---	1140432
8	1	95	17	---	---	987102
9	2	55	8	1127	---	2393061
Waveform Num = 3; Num of Bursts = 10; Burst Interval (us) = 1200000.0; Total number of pulses = 20						
1	2	75	8	1002	---	34704
2	3	95	16	1154	1345	1990064
3	3	85	11	1644	1369	702319
4	2	55	16	1163	---	1297490
5	1	100	7	---	---	1542881
6	2	70	20	1550	---	1479836
7	1	80	19	---	---	241874
8	2	80	5	1890	---	2137788
9	2	90	15	1721	---	1014347
10	2	50	11	1230	---	1251164

Burst #	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1 to 2 Pri (usec)	Pulse 2 to 3 Pri (usec)	Starting Location Within Interval (usec)
Waveform Num = 4; Num of Bursts = 13; Burst Interval (us) = 923077.0; Total number of pulses = 26						
1	2	75	8	1121	---	522045
2	3	65	17	1220	1231	625840
3	2	55	7	1475	---	1541263
4	1	85	17	---	---	527230
5	3	100	19	1807	1159	974382
6	1	50	16	---	---	489394
7	2	50	17	1542	---	1538427
8	2	80	17	1442	---	576858
9	2	90	9	1934	---	711499
10	3	95	11	1850	1149	1554384
11	1	95	16	---	---	154788
12	3	100	19	1954	1289	1344422
13	1	50	8	---	---	711815
Waveform Num = 5; Num of Bursts = 10; Burst Interval (us) = 1200000.0; Total number of pulses = 18						
1	3	55	14	1792	1958	1010026
2	3	85	7	1563	1357	929831
3	1	50	8	---	---	966594
4	2	90	20	1692	---	882346
5	2	65	17	1432	---	1501514
6	1	80	11	---	---	760211
7	1	80	11	---	---	1816834
8	2	65	9	1879	---	941091
9	1	80	10	---	---	919966
10	2	100	18	1097	---	1694041
Waveform Num = 6; Num of Bursts = 8; Burst Interval (us) = 1500000.0; Total number of pulses = 15						
1	2	55	17	1441	---	1126575
2	3	70	14	1247	1586	933749
3	1	55	19	---	---	2360519
4	1	55	10	---	---	1328632
5	1	50	13	---	---	690014
6	3	50	15	1993	1412	1426225
7	1	65	13	---	---	1873983
8	3	90	8	1042	1314	755867

Burst #	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1 to 2 Pri (usec)	Pulse 2 to 3 Pri (usec)	Starting Location Within Interval (usec)
Waveform Num = 7; Num of Bursts = 18; Burst Interval (us) = 666667.0; Total number of pulses = 43						
1	2	85	12	1412	---	454289
2	3	65	6	1071	1517	531384
3	1	90	16	---	---	1002648
4	2	60	8	1281	---	264015
5	1	90	5	---	---	431280
6	3	65	11	1760	1721	1100401
7	1	50	15	---	---	217488
8	2	95	17	1086	---	910095
9	3	50	13	1541	1062	970522
10	3	50	16	1802	1703	196726
11	3	75	20	1279	1977	982005
12	3	55	7	1862	1036	433043
13	2	85	10	1499	---	927638
14	2	80	12	1244	---	455256
15	3	50	19	1799	1143	1012287
16	3	50	6	1156	1391	314685
17	3	85	18	1333	1987	561030
18	3	85	13	1480	1030	515905
Waveform Num = 8; Num of Bursts = 20; Burst Interval (us) = 600000.0; Total number of pulses = 39						
1	1	100	15	---	---	479575
2	1	75	16	---	---	155667
3	2	75	20	1230	---	973586
4	1	65	18	---	---	208755
5	2	100	13	1051	---	656732
6	2	50	6	1513	---	549645
7	3	85	14	1003	1847	991441
8	2	95	13	1126	---	400919
9	2	85	15	1679	---	785708
10	3	100	17	1014	1034	474723
11	2	70	14	1426	---	686450
12	1	50	16	---	---	786703
13	1	70	9	---	---	369645
14	1	90	16	---	---	452309
15	2	60	7	1267	---	443784
16	1	75	11	---	---	965967
17	3	60	8	1460	1286	489669
18	3	95	16	1793	1809	362740
19	3	50	20	1473	1413	775411
20	3	55	10	1165	1769	460656

Burst #	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1 to 2 Pri (usec)	Pulse 2 to 3 Pri (usec)	Starting Location Within Interval (usec)
Waveform Num = 9; Num of Bursts = 20; Burst Interval (us) = 600000.0; Total number of pulses = 39						
1	2	85	6	1733	---	493721
2	2	95	9	1645	---	576768
3	2	95	12	1397	---	320445
4	3	95	13	1617	1198	530953
5	1	50	7	---	---	738795
6	1	80	17	---	---	670450
7	2	85	9	1706	---	407698
8	2	80	16	1252	---	543138
9	2	75	15	1964	---	548483
10	2	65	19	1047	---	931049
11	3	75	18	1570	1110	674458
12	2	80	18	1600	---	267556
13	2	65	15	1245	---	605894
14	1	65	16	---	---	691649
15	1	55	19	---	---	885804
16	3	55	11	1621	1574	436678
17	2	75	11	1442	---	263012
18	1	95	5	---	---	1107570
19	2	55	6	1671	---	192441
20	3	80	20	1103	1006	562184
Waveform Num = 10; Num of Bursts = 13; Burst Interval (us) = 923077.0; Total number of pulses = 23						
1	3	95	11	1675	1631	315888
2	1	100	13	---	---	1403887
3	1	80	15	---	---	957501
4	2	55	6	1195	---	241674
5	3	95	12	1421	1519	1282700
6	1	55	11	---	---	517134
7	1	55	18	---	---	1508163
8	2	75	13	1796	---	1088740
9	1	95	13	---	---	476084
10	1	100	12	---	---	625305
11	3	75	12	1937	1034	1245925
12	1	50	6	---	---	856530
13	3	50	5	1465	1258	814254

Burst #	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1 to 2 Pri (usec)	Pulse 2 to 3 Pri (usec)	Starting Location Within Interval (usec)
Waveform Num = 11; Num of Bursts = 14; Burst Interval (us) = 857143.0; Total number of pulses = 25						
1	1	50	20	---	---	77805
2	2	95	15	1869	---	1065226
3	2	70	7	1802	---	1034698
4	1	60	17	---	---	435932
5	1	75	15	---	---	1106143
6	3	60	9	1516	1194	698289
7	1	70	6	---	---	760559
8	2	70	5	1880	---	1168389
9	2	55	15	1464	---	595561
10	1	95	5	---	---	1392657
11	2	80	17	1944	---	511255
12	3	95	17	1788	1602	558777
13	2	60	14	1693	---	1531017
14	2	85	6	1839	---	201358
Waveform Num = 12; Num of Bursts = 17; Burst Interval (us) = 705882.0; Total number of pulses = 35						
1	2	100	13	1511	---	48779
2	3	80	20	1170	1133	703895
3	3	80	5	1971	1255	735928
4	2	65	5	1816	---	1077047
5	1	55	13	---	---	889251
6	3	60	11	1687	1725	527934
7	1	65	20	---	---	309711
8	1	80	6	---	---	1015513
9	1	75	7	---	---	849840
10	1	95	6	---	---	761023
11	1	100	18	---	---	169083
12	2	100	17	1232	---	779841
13	3	70	12	1388	1301	685117
14	3	75	8	1025	1072	839846
15	3	90	14	1666	1176	482154
16	2	70	5	1469	---	1352626
17	3	55	16	1789	1537	82906
Waveform Num = 13; Num of Bursts = 12; Burst Interval (us) = 1000000.0; Total number of pulses = 25						
1	1	85	20	---	---	295517
2	1	60	10	---	---	970201
3	3	50	8	1395	1686	795925
4	1	95	15	---	---	1175871
5	3	60	9	1267	1938	1055373
6	2	60	8	1153	---	1140626
7	3	70	15	1451	1065	1330162
8	2	75	5	1183	---	703337
9	2	85	14	1601	---	655128
10	3	70	18	1121	1851	1722467
11	1	60	8	---	---	959478
12	3	90	13	1225	1697	788805

Burst #	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1 to 2 Pri (usec)	Pulse 2 to 3 Pri (usec)	Starting Location Within Interval (usec)
Waveform Num = 14; Num of Bursts = 9; Burst Interval (us) = 1333333.0; Total number of pulses = 22						
1	3	90	14	1060	1539	1188603
2	2	85	8	1397	---	1278237
3	3	90	20	1457	1363	1167849
4	3	55	16	1602	1907	1438857
5	3	80	16	1672	1140	873236
6	2	50	10	1616	---	1753417
7	1	75	14	---	---	897589
8	3	90	19	1056	1541	1004887
9	2	95	7	1875	---	1295414
Waveform Num = 15; Num of Bursts = 20; Burst Interval (us) = 600000.0; Total number of pulses = 41						
1	2	75	17	1936	---	16504
2	3	85	5	1878	1493	876477
3	2	75	5	1127	---	622117
4	2	80	14	1330	---	503775
5	2	55	11	1861	---	570018
6	2	75	18	1488	---	827178
7	2	85	11	1812	---	317049
8	1	50	9	---	---	831326
9	3	60	5	1312	1999	318505
10	3	80	16	1039	1342	985606
11	2	85	15	1666	---	144549
12	2	85	10	1896	---	623378
13	3	95	8	1730	1669	637222
14	1	60	20	---	---	518888
15	2	75	10	1228	---	809956
16	1	80	16	---	---	881527
17	2	75	10	1923	---	506402
18	2	90	17	1681	---	550389
19	1	80	8	---	---	376281
20	3	95	15	1529	1467	447406

Burst #	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1 to 2 Pri (usec)	Pulse 2 to 3 Pri (usec)	Starting Location Within Interval (usec)
Waveform Num = 16; Num of Bursts = 16; Burst Interval (us) = 750000.0; Total number of pulses = 32						
1	1	65	15	---	---	735563
2	1	85	6	---	---	242865
3	1	100	14	---	---	1041851
4	3	60	10	1802	1284	910890
5	2	95	18	1000	---	609185
6	3	80	15	1285	1312	589646
7	1	80	8	---	---	740148
8	2	95	5	1931	---	812674
9	3	85	18	1021	1741	854694
10	3	70	11	1671	1754	505219
11	1	80	7	---	---	909200
12	2	85	17	1970	---	522188
13	1	100	10	---	---	724763
14	2	60	11	1474	---	923966
15	3	65	16	1401	1303	951357
16	3	70	7	1825	1191	539210
Waveform Num = 17; Num of Bursts = 12; Burst Interval (us) = 1000000.0; Total number of pulses = 28						
1	3	50	18	1213	1004	975698
2	2	80	15	1615	---	79873
3	2	85	16	1509	---	1639345
4	2	55	15	1914	---	308831
5	3	90	9	1916	1089	1332414
6	1	65	16	---	---	993453
7	1	75	20	---	---	1056718
8	3	80	16	1921	1691	716146
9	3	80	10	1418	1749	1294318
10	3	60	16	1441	1653	1455757
11	3	50	8	1639	1166	138191
12	2	80	9	1411	---	1369680
Waveform Num = 18; Num of Bursts = 17; Burst Interval (us) = 705882.0; Total number of pulses = 37						
1	3	95	6	1555	1194	498478
2	1	75	5	---	---	462541
3	3	75	11	1863	1141	545804
4	2	65	13	1086	---	921433
5	3	80	5	1086	1153	771781
6	2	50	16	1759	---	769459
7	2	85	9	1713	---	904095
8	2	55	20	1193	---	689177
9	3	85	14	1656	1630	232425
10	1	90	12	---	---	1036947
11	1	95	9	---	---	828038
12	3	70	18	1848	1273	746340
13	2	80	11	1124	---	201216
14	3	75	9	1059	1301	582663
15	1	50	19	---	---	1161804
16	3	80	15	1479	1087	819206
17	2	55	11	1899	---	480099

Burst #	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1 to 2 Pri (usec)	Pulse 2 to 3 Pri (usec)	Starting Location Within Interval (usec)
Waveform Num = 19; Num of Bursts = 20; Burst Interval (us) = 600000.0; Total number of pulses = 34						
1	2	95	18	1987	---	188631
2	3	100	5	1660	1862	1000309
3	2	100	8	1497	---	46364
4	1	80	16	---	---	915551
5	1	70	14	---	---	546445
6	2	65	7	1251	---	607828
7	1	95	6	---	---	554939
8	1	65	9	---	---	440380
9	3	65	9	1311	1103	590768
10	2	50	7	1889	---	777339
11	3	80	14	1416	1658	817716
12	1	65	13	---	---	135030
13	2	60	14	1001	---	1010167
14	1	80	20	---	---	172637
15	1	50	7	---	---	631583
16	3	50	19	1640	1554	989654
17	1	90	13	---	---	428028
18	2	50	19	1298	---	369648
19	1	75	18	---	---	838873
20	1	80	16	---	---	618778
Waveform Num = 20; Num of Bursts = 9; Burst Interval (us) = 1333333.0; Total number of pulses = 17						
1	1	50	7	---	---	248474
2	2	50	16	1192	---	2271842
3	2	95	5	1100	---	326382
4	3	60	15	1681	1445	2421082
5	1	85	18	---	---	76910
6	3	50	15	1133	1938	1825522
7	1	60	14	---	---	1427576
8	3	95	20	1175	1030	1530170
9	1	80	14	---	---	1777972
Waveform Num = 21; Num of Bursts = 16; Burst Interval (us) = 750000.0; Total number of pulses = 29						
1	2	75	14	1153	---	391806
2	1	70	16	---	---	731538
3	1	95	20	---	---	604103
4	3	60	10	1666	1638	975827
5	2	50	5	1770	---	304789
6	1	95	14	---	---	880189
7	1	90	7	---	---	752247
8	3	80	10	1896	1918	619131
9	3	70	17	1491	1586	920697
10	1	90	16	---	---	703024
11	1	60	13	---	---	849432
12	3	95	5	1440	1459	1146690
13	1	50	5	---	---	781310
14	3	60	16	1807	1583	594636
15	1	80	16	---	---	492065
16	2	75	14	1900	---	1074530

Burst #	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1 to 2 Pri (usec)	Pulse 2 to 3 Pri (usec)	Starting Location Within Interval (usec)
Waveform Num = 22; Num of Bursts = 12; Burst Interval (us) = 1000000.0; Total number of pulses = 25						
1	2	65	20	1005	---	436903
2	3	60	15	1196	1513	1544642
3	1	85	14	---	---	289414
4	3	100	18	1444	1784	1593463
5	2	95	12	1885	---	1032749
6	2	80	11	1944	---	1064607
7	3	55	17	1330	1451	658511
8	1	65	10	---	---	495060
9	2	60	20	1137	---	1379615
10	1	85	18	---	---	918286
11	2	55	14	1450	---	1055606
12	3	85	19	1823	1275	654545
Waveform Num = 23; Num of Bursts = 16; Burst Interval (us) = 750000.0; Total number of pulses = 31						
1	1	100	9	---	---	218615
2	2	55	12	1224	---	744789
3	2	95	20	1903	---	1188122
4	1	80	15	---	---	543013
5	2	70	12	1585	---	628443
6	3	60	11	1088	1189	775651
7	1	60	5	---	---	945431
8	3	75	17	1165	1165	921619
9	2	90	11	1816	---	98507
10	2	70	6	1921	---	1068988
11	1	80	20	---	---	484006
12	2	70	14	1568	---	1024031
13	3	90	6	1835	1292	329747
14	3	95	10	1200	1333	1066980
15	2	50	6	1773	---	1033183
16	1	80	13	---	---	451043
Waveform Num = 24; Num of Bursts = 14; Burst Interval (us) = 857143.0; Total number of pulses = 29						
1	3	95	20	1290	1690	131167
2	3	100	18	1544	1150	986163
3	3	75	13	1812	1250	650725
4	3	95	8	1296	1077	1296952
5	1	85	17	---	---	791785
6	2	90	10	1664	---	605337
7	3	75	13	1111	1809	820184
8	1	80	14	---	---	1330639
9	1	70	11	---	---	777805
10	3	100	9	1021	1340	861276
11	2	60	9	1838	---	907716
12	1	75	16	---	---	547754
13	2	55	15	1824	---	998361
14	1	90	6	---	---	950106

Burst #	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1 to 2 Pri (usec)	Pulse 2 to 3 Pri (usec)	Starting Location Within Interval (usec)
Waveform Num = 25; Num of Bursts = 20; Burst Interval (us) = 600000.0; Total number of pulses = 40						
1	1	100	12	---	---	435341
2	1	80	13	---	---	636918
3	3	75	6	1130	1171	502888
4	1	60	5	---	---	699524
5	3	100	7	1469	1370	679886
6	3	75	6	1274	1853	619507
7	1	65	15	---	---	192782
8	3	85	12	1072	1672	993848
9	2	50	8	1172	---	98721
10	1	70	5	---	---	654703
11	2	55	16	1972	---	656831
12	3	85	8	1738	1162	497946
13	2	75	11	1624	---	1019047
14	2	90	18	1072	---	525634
15	3	70	11	1199	1680	643769
16	2	80	16	1967	---	669976
17	2	70	10	1485	---	105525
18	1	80	5	---	---	520317
19	3	70	7	1804	1134	977724
20	1	55	14	---	---	307913
Waveform Num = 26; Num of Bursts = 16; Burst Interval (us) = 750000.0; Total number of pulses = 39						
1	2	95	17	1841	---	283793
2	3	80	9	1927	1221	581019
3	3	70	7	1208	1892	853956
4	1	70	20	---	---	700410
5	3	85	12	1968	1208	960998
6	3	60	19	1518	1289	758197
7	3	85	20	1726	1338	581477
8	3	100	14	1010	1057	851427
9	3	95	17	1604	1383	563281
10	2	60	20	1411	---	1132687
11	2	85	17	1533	---	494380
12	2	85	5	1696	---	1049511
13	1	95	14	---	---	318607
14	2	95	17	1259	---	578166
15	3	75	16	1085	1295	995871
16	3	75	14	1536	1814	747207

Burst #	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1 to 2 Pri (usec)	Pulse 2 to 3 Pri (usec)	Starting Location Within Interval (usec)
Waveform Num = 27; Num of Bursts = 14; Burst Interval (us) = 857143.0; Total number of pulses = 30						
1	2	65	6	1690	---	579377
2	1	75	14	---	---	607873
3	3	55	15	1972	1359	785055
4	3	60	13	1443	1768	1230905
5	3	50	19	1483	1902	773723
6	3	60	11	1733	1375	1116862
7	1	60	7	---	---	307875
8	1	60	17	---	---	580265
9	2	65	20	1407	---	1299872
10	1	100	9	---	---	725856
11	3	75	10	1016	1774	717542
12	3	60	6	1761	1847	1100870
13	1	70	5	---	---	1093522
14	3	80	18	1522	1294	509691
Waveform Num = 28; Num of Bursts = 18; Burst Interval (us) = 666667.0; Total number of pulses = 37						
1	2	70	16	1548	---	558487
2	2	70	20	1788	---	113210
3	2	55	5	1611	---	877693
4	3	100	7	1062	1597	1036454
5	2	60	12	1637	---	90085
6	2	100	18	1728	---	690661
7	3	75	12	1529	1788	973960
8	1	85	20	---	---	341598
9	2	95	19	1563	---	688465
10	1	80	9	---	---	1230973
11	2	90	10	1532	---	241284
12	3	100	14	1252	1984	903556
13	3	85	8	1924	1646	862587
14	1	75	11	---	---	356518
15	2	60	20	1341	---	380090
16	3	90	14	1778	1573	1194657
17	1	65	17	---	---	338024
18	2	55	7	1004	---	883039
Waveform Num = 29; Num of Bursts = 14; Burst Interval (us) = 857143.0; Total number of pulses = 29						
1	3	80	18	1369	1305	130780
2	1	50	10	---	---	1489774
3	3	50	16	1552	1714	494191
4	3	85	10	1791	1943	963446
5	2	85	8	1432	---	591445
6	3	80	20	1703	1859	1020750
7	1	65	16	---	---	1215342
8	1	55	10	---	---	170186
9	1	75	15	---	---	1495148
10	2	50	6	1382	---	933481
11	3	90	17	1937	1022	431980
12	1	75	17	---	---	860135
13	2	80	10	1747	---	941659
14	3	80	8	1931	1658	1041814

Burst #	Number of Pulses	Pulse Width (usec)	Chirp Width (MHz)	Pulse 1 to 2 Pri (usec)	Pulse 2 to 3 Pri (usec)	Starting Location Within Interval (usec)
Waveform Num = 30; Num of Bursts = 16; Burst Interval (us) = 750000.0; Total number of pulses = 32						
1	3	70	6	1076	1062	190062
2	1	65	19	---	---	1039135
3	3	75	20	1930	1348	469605
4	2	85	15	1179	---	696215
5	2	95	10	1259	---	958283
6	1	50	20	---	---	1024925
7	3	100	8	1188	1708	819719
8	3	80	7	1374	1108	32736
9	1	100	16	---	---	921825
10	3	60	7	1015	1991	627564
11	1	80	7	---	---	743773
12	3	70	5	1095	1265	1168000
13	1	85	15	---	---	381828
14	1	55	6	---	---	752656
15	1	85	19	---	---	970270
16	3	90	5	1670	1864	573486

TYPE 6 DETECTION PROBABILITY

Data Sheet for Hopping Signal

Trial No.	Starting Index within NTIA August 2005 Sequence	Signal Generator Frequency (MHz)	Hops within Detection BW	Successful Detection (Yes/No)
1	221	5249	8	Yes
2	696	5250	5	Yes
3	1171	5251	5	Yes
4	1646	5252	10	Yes
5	2121	5253	11	Yes
6	2596	5254	9	Yes
7	3071	5255	17	No
8	3546	5256	9	Yes
9	4021	5257	7	Yes
10	4496	5258	8	Yes
11	4971	5259	7	Yes
12	5446	5260	3	Yes
13	5921	5261	10	Yes
14	6396	5262	8	Yes
15	6871	5263	6	Yes
16	7346	5264	9	Yes
17	7821	5265	5	Yes
18	8296	5266	8	Yes
19	8771	5267	11	Yes
20	9246	5268	11	Yes
21	9721	5269	14	Yes
22	10196	5270	8	Yes
23	10671	5271	13	Yes
24	11146	5272	10	Yes
25	11621	5273	5	Yes
26	12096	5274	8	Yes
27	12571	5275	11	Yes
28	13046	5276	9	Yes
29	13521	5277	10	Yes
30	13996	5278	13	Yes
31	14471	5279	9	Yes
32	14946	5280	7	Yes
33	15421	5281	3	Yes
34	15896	5282	10	Yes
35	16371	5283	6	Yes
36	16846	5284	10	Yes
37	17321	5285	3	Yes
38	17796	5286	6	Yes
39	18271	5287	5	Yes
40	18746	5288	8	Yes
41	19221	5289	8	Yes
42	19696	5290	4	Yes
43	20171	5291	7	Yes