FCC CFR47 PART 15 SUBPART E

TEST REPORT

FOR

WIRELESS MESH ACCESS ROUTER

MODEL NUMBER: MST2H13N0, MST2H13N1*

FCC ID: Q9DMST200DFS

REPORT NUMBER: 14U16820-1

ISSUE DATE: FEBRUARY 28, 2014

Prepared for
ARUBA NETWORKS
1344 CROSSMAN AVENUE
SUNNYVALE
CA, 94089, U.S.A.

Prepared by
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*Models differences are explained within the body of this report

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	10/11/13	Initial Issue	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: ARUBA NETWORKS
1344 CROSSMAN AVENUE
SUNNYVALE, CA 94089, U.S.A.

EUT DESCRIPTION: WIRELESS MESH ACCESS ROUTER

MODEL: MST2H13N0, MST2H13N1

SERIAL NUMBER: 54B02114600011

DATE TESTED: APRIL 8 to OCTOBER 4, 2013 (RF) and
AUGUST 21 to SEPTEMBER 24, 2013 (DFS)

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart E	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 9	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

UL Verification Services Inc. 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 Verification Services Inc. 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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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 Verification Services Inc. By:

FRANK IBRAHIM
WiSE PROGRAM MANAGER
UL Verification Services Inc.

Tested By:

Kristopher Nguyen
EMC ENGINEER
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 06-96, FCC KDB 789033, ANSI C63.10-2009, 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.

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☒ Chamber A	☐ Chamber D
☐ Chamber B	☐ Chamber E
☐ Chamber C	☐ Chamber F

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.htm.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Wireless Mesh Access Router.

5.2. DESCRIPTION OF MODEL(s) DIFFERENCES

Difference between the two models is:

MST2H13N0 is powered by PoE, and MST2H13N1 is powered by AC/DC adapter.

5.3. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range (MHz)	Mode	Chain 0 Meas (dBm)	Chain 1 Meas (dBm)	Output Power (dBm)
5500 - 5700	802.11a CDD	7.850	8.928	11.433
5500 - 5700	802.11n HT20 STBC	11.597	11.877	14.750
5510 - 5670	802.11n HT40 STBC	12.646	13.895	16.326

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an integral antenna with a maximum peak gain of **13 dBi**.

5.5. SOFTWARE AND FIRMWARE

The test utility software used during testing was Atheros Radio Test (ART), rev 09 Build B7.

Operating system is MeshOS_4.7.0.0

5.6. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Worst-case data rates as provided by the client were:

802.11a mode: 6 Mbps
802.11n HT20mode: MCS0, 6.5 Mbps
802.11n HT40mode: MCS0, 13.5 Mbps

The EUT was attached to a pole in vertical orientation similar to how it will be oriented in the field.

The radiated band edge and harmonics testing were performed on the AC powered unit, MST2H13N1, as representative unit for the radio portion.

The antenna port testing was leveraged from the AC/DC powered MSR4K43N3 model, covered by report number 14U16820-2, as the MST2H13N0 and MST2H13N1 contain identical radio to MSR4K43N3.

For radiated emissions 30-1000MHz and AC Line Conduction, testing was performed on both models; MST2H13N0, MST2H13N1.

For radiated emission testing from 18 GHz to 40 GHz, mid channel for 11a CDD mode was investigated at highest output power and no signals were found in that frequency range.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	IMB Thinkpad T60	L3-V8612	N/A
AC Adapter	IBM	92P1109	11S92P1109Z1ZACU59X2M0	N/A

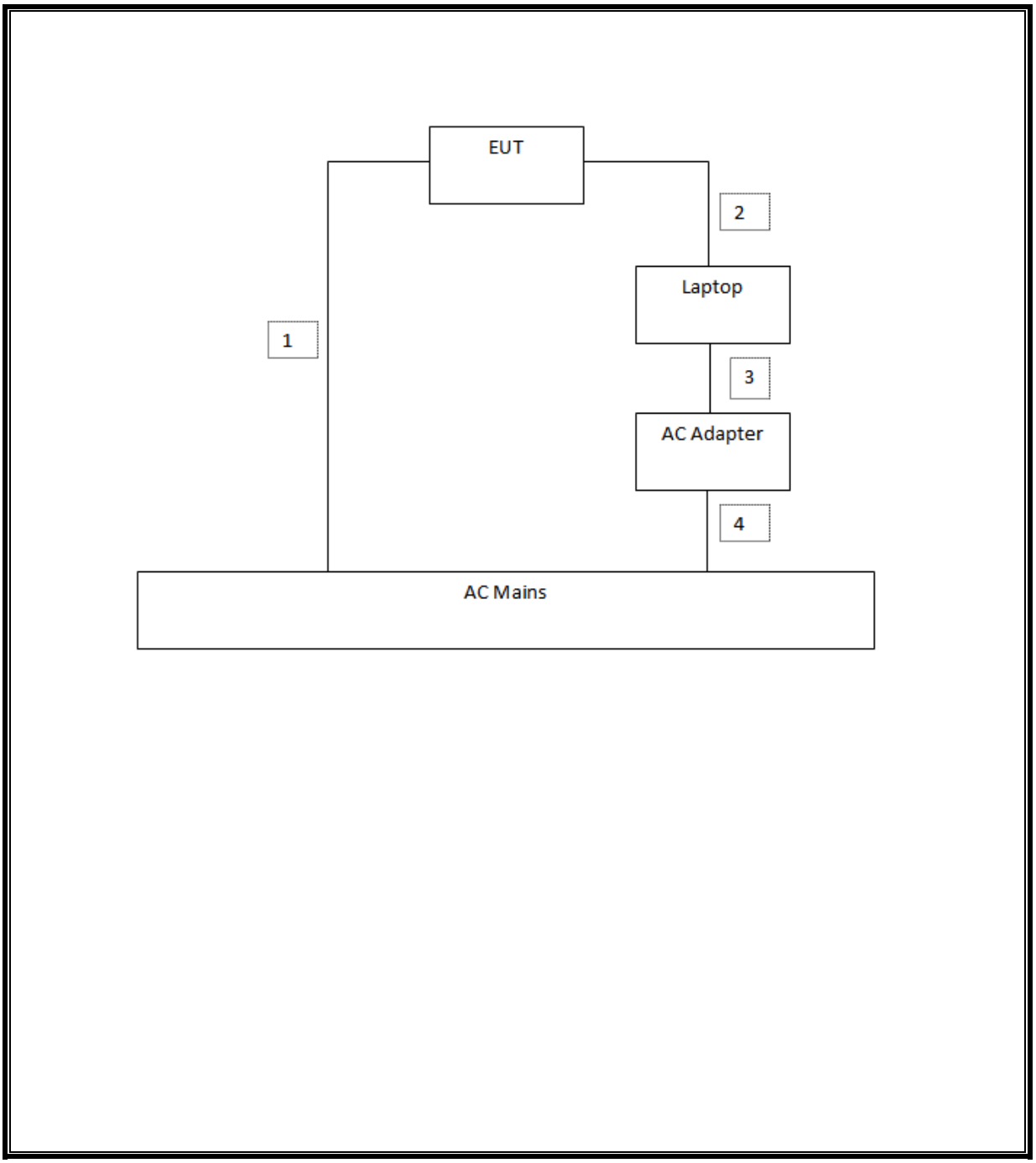
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	US 115V	Un -Shielded	4.5	N/A
2	Ethernet	1	Ethernet	Shielded	2	N/A
3	AC	1	US 115V	Un -Shielded	1	N/A
4	DC	1	DC	Un -Shielded	1.8	N/A

TEST SETUP

The EUT was mounted on a tripod stand and connected through Ethernet to a host laptop computer during the tests. Test software exercised the radio card

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**	**Asset**	**Cal Date**	**Cal Due**
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01179	02/16/13	02/16/14
EMI Test Receiver, 9kHz-7GHz	R&S	ESCI 7	1000741	07/13/12	07/13/13
PXA Signal Analyzer	Agilent	N9030A	14615711	01/22/13	01/22/14
Horn Antenna, 1-18GHz	ETS Lindgren	3117	T345	02/19/13	02/19/14
Antenna, Horn, 18 GHz	EMCO	3115	C01218/1000614	01/18/13	01/18/14
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00980	11/14/12	11/14/13
Antenna, Horn, 40 GHz	ARA	MWH-2640/B	C00981	06/28/13	06/28/14
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	10/19/12	10/19/13
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	08/20/12	08/20/13
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	08/20/13	08/20/14
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/12	12/13/13
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1	C01171	02/13/13	02/13/14
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/16/13	01/16/14
LISN, 30 MHz	FCC	50/250-25-2	C00626	08/15/13	08/15/14
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	01/14/13	01/14/14

7. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 789033 Zero-Span Spectrum Analyzer Method.

7.1. ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)
802.11a CDD	3.136	3.150	0.996	99.6%	0.00	0.010
802.11n HT20 STBC	2.918	2.932	0.995	99.5%	0.00	0.010
802.11n HT40 STBC	1.432	1.446	0.990	99.0%	0.00	0.010

7.2. MEASUREMENT METHOD FOR POWER AND PPSD

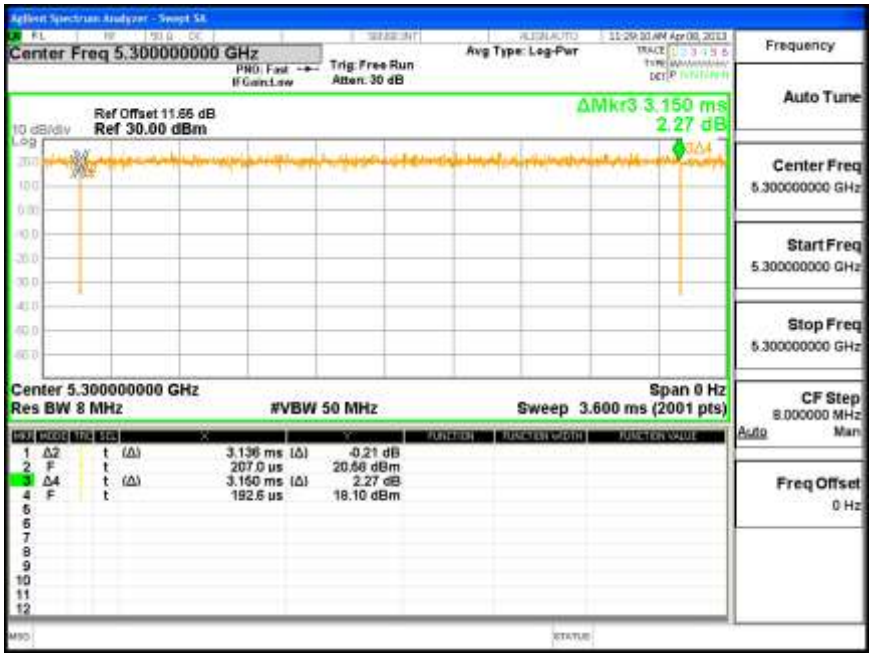
The Duty Cycle is greater than or equal to 98% therefore KDB 789033 Method SA-1 is used.

7.3. MEASUREMENT METHOD FOR AVG SPURIOUS EMISSIONS ABOVE 1 GHz

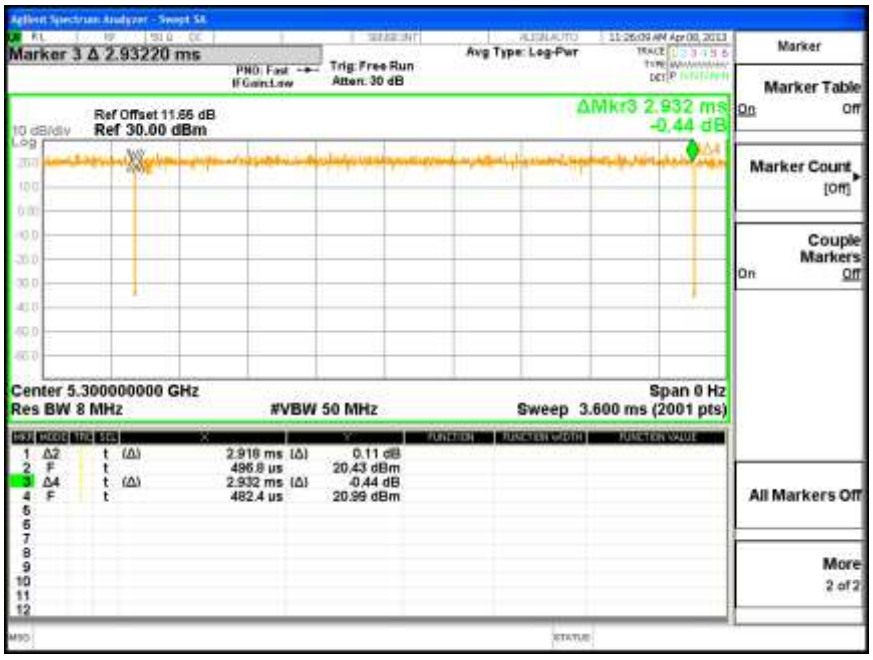
The Duty Cycle is greater than or equal to 98%, KDB 789033 Method VB with Power RMS Averaging is used.

7.4. DUTY CYCLE PLOTS

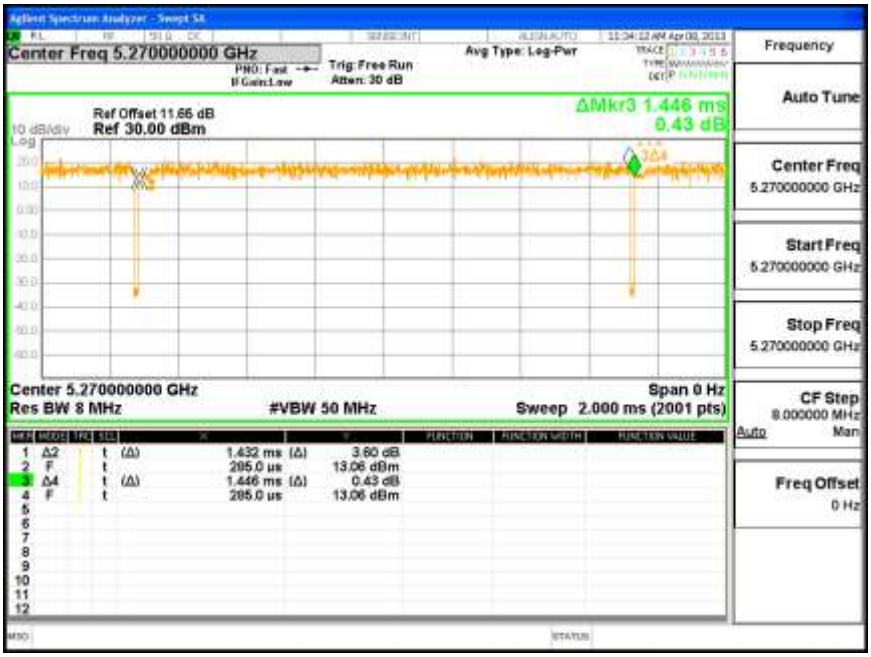
DUTY CYCLE 802.11a CDD MODE



DUTY CYCLE 802.11n HT20 STBC MODE



DUTY CYCLE 802.11n HT40 STBC MODE



8. ANTENNA PORT TEST RESULTS

8.1. 802.11a CDD 2TX MODE IN THE 5.6 GHz BAND

8.1.1. 26 dB BANDWIDTH

LIMITS

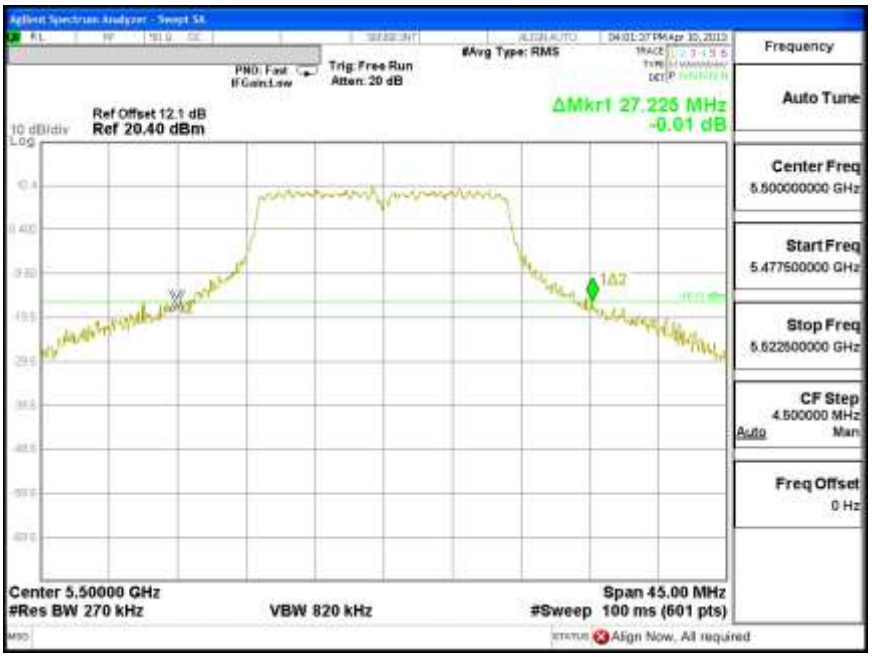
None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5500	27.225	27.525
Mid	5580	29.025	29.325
High	5700	26.100	25.800

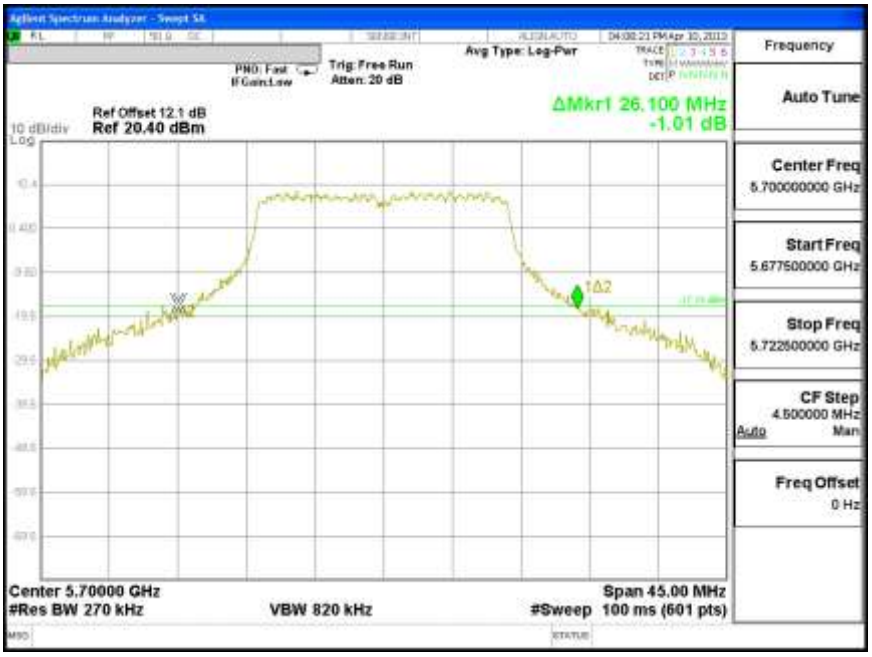
26 dB BANDWIDTH, Chain 0

BANDWIDTH Chain 0 LOW CH



BANDWIDTH Chain 0 MID CH

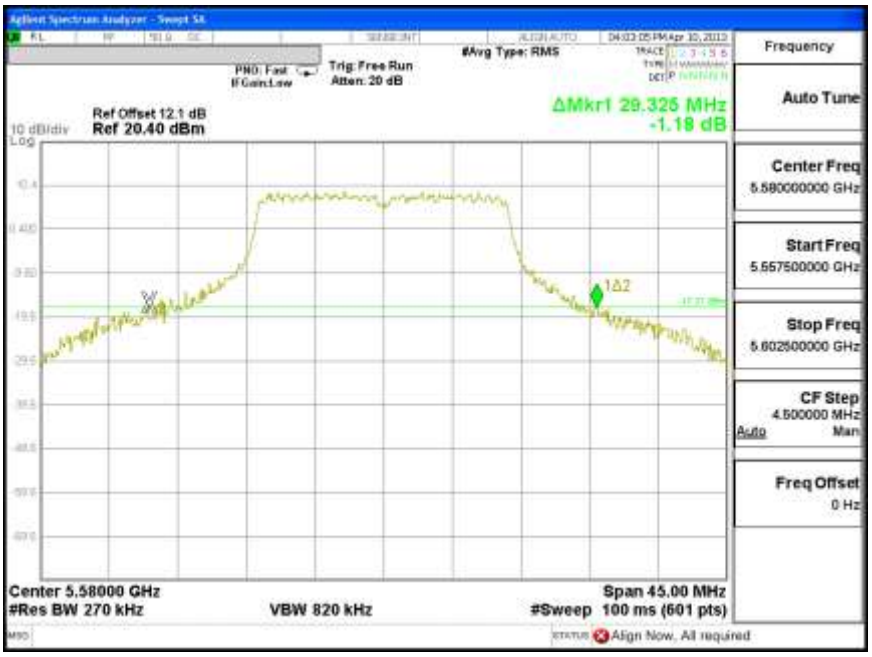
BANDWIDTH Chain 0 HIGH CH



26 dB BANDWIDTH, Chain 1

BANDWIDTH Chain 1 LOW CH

BANDWIDTH Chain 1 MID CH



BANDWIDTH Chain 1 HIGH CH

8.1.2. 99% BANDWIDTH

LIMITS

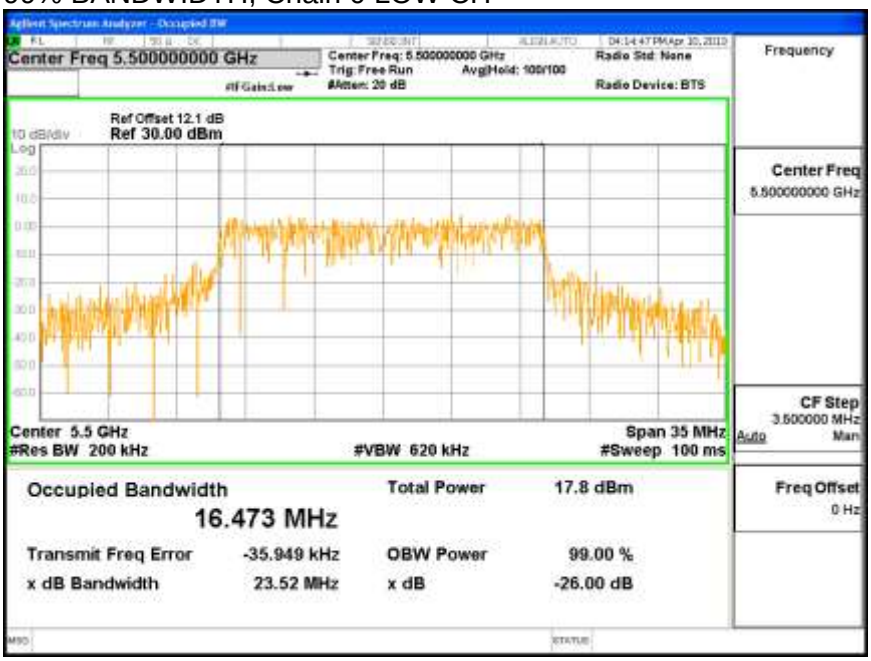
None; for reporting purposes only.

RESULTS

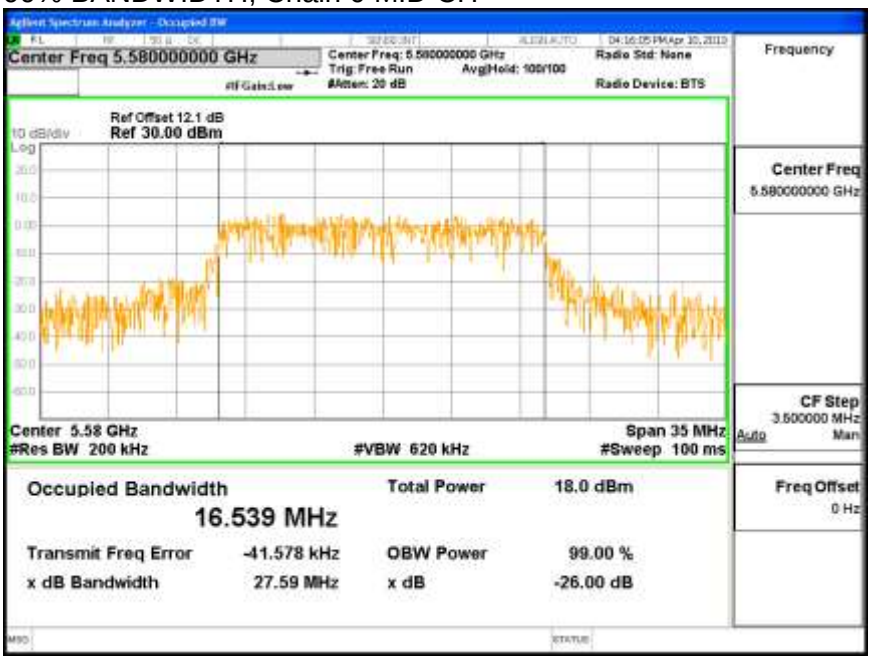
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5500	16.473	16.482
Mid	5580	16.539	16.462
High	5700	16.500	16.445

99% BANDWIDTH, Chain 0

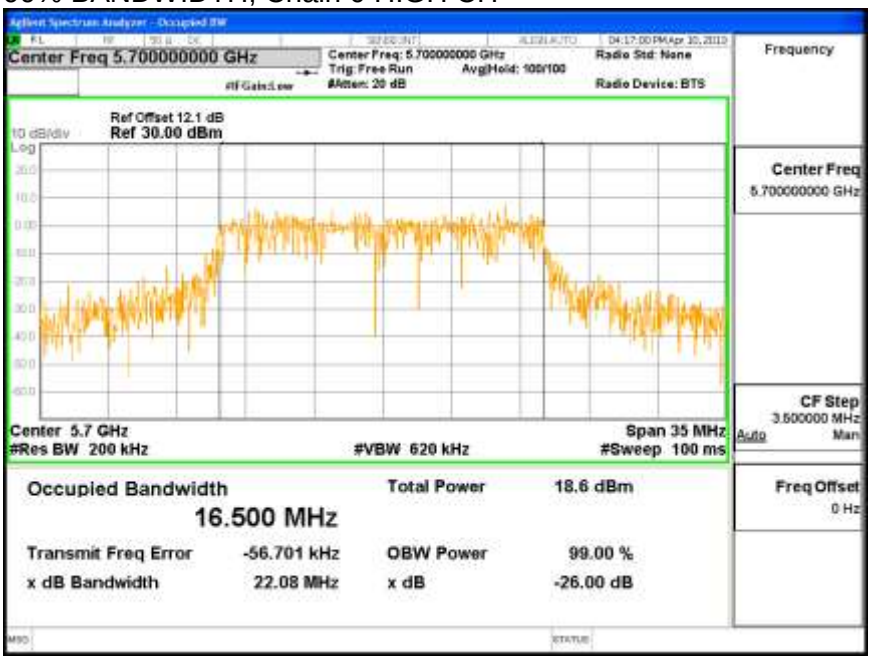
99% BANDWIDTH, Chain 0 LOW CH



99% BANDWIDTH, Chain 0 MID CH

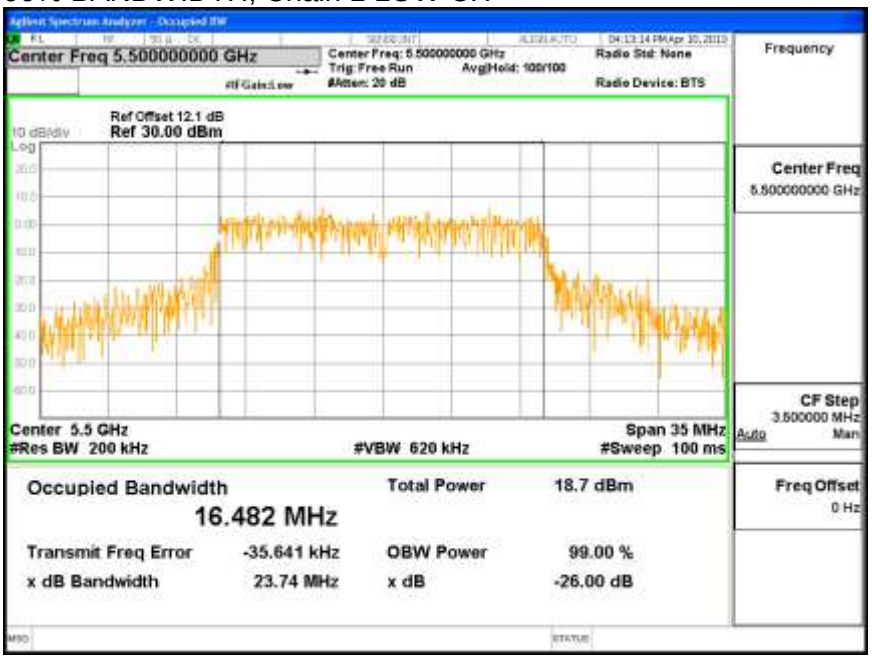


99% BANDWIDTH, Chain 0 HIGH CH

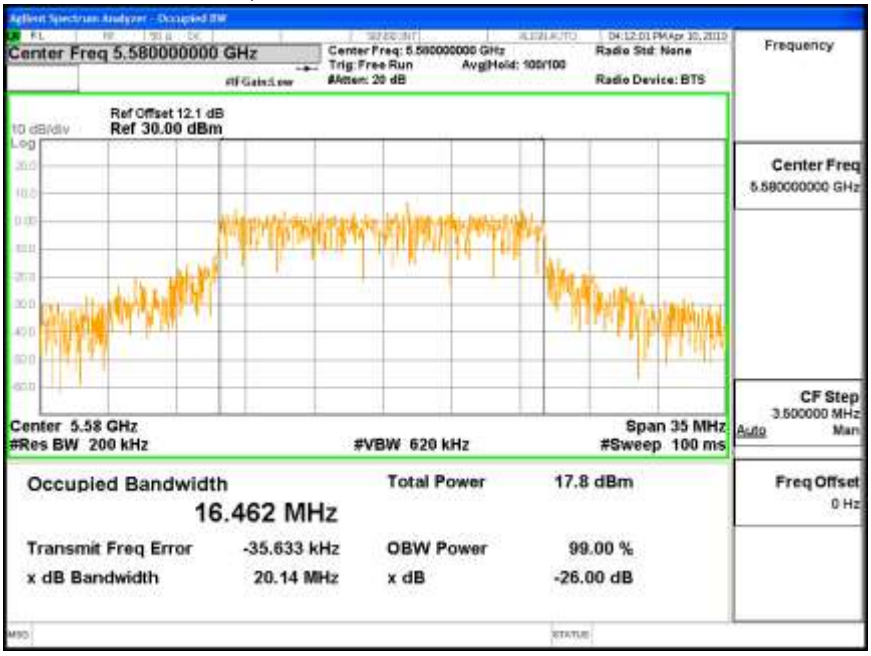


99% BANDWIDTH, Chain 1

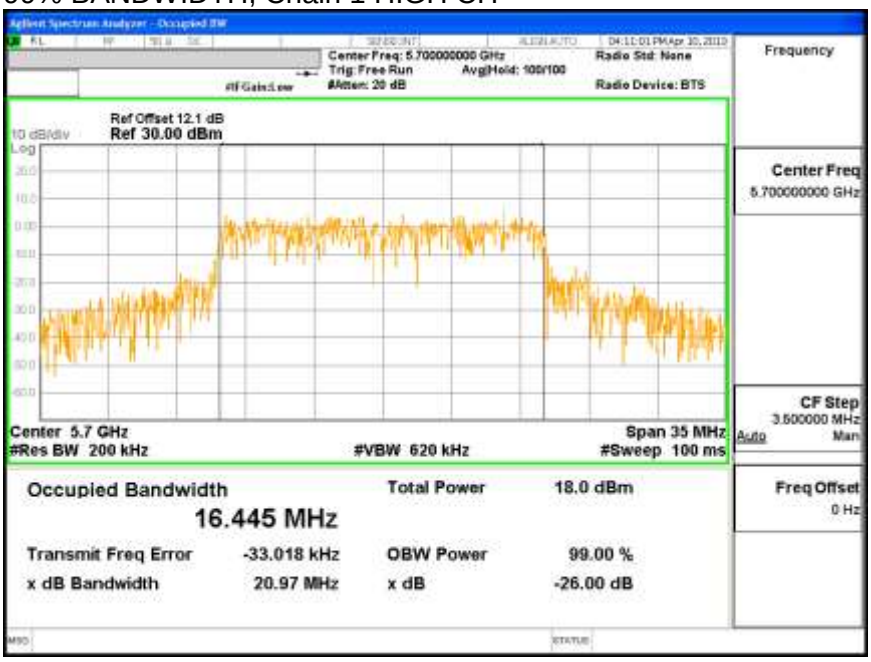
99% BANDWIDTH, Chain 1 LOW CH



99% BANDWIDTH, Chain 1 MID CH



99% BANDWIDTH, Chain 1 HIGH CH



8.1.3. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

For the band 5.5–5.7 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, 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 maximum conducted output 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.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

DIRECTIONAL ANTENNA GAIN

For output power, the TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain.

For PPSD, the TX chains are correlated and the antenna gain is the same for each chain. The directional gain is:

Antenna Gain (dBi)	10 * Log (2 chains) (dB)	Correlated Chains Directional Gain (dBi)
13.00	3.01	16.01

RESULTS

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Uncorrelated Directional Gain (dBi)	Correlated Directional Gain (dBi)
Low	5500	27.225	16.473	13.00	16.01
Mid	5580	29.025	16.462	13.00	16.01
High	5700	25.800	16.445	13.00	16.01

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC PSD Limit (dBm)	PPSD Limit (dBm)
Low	5500	17.00	23.17	29.17	16.17	0.99	11.00	0.99
Mid	5580	17.00	23.16	29.16	16.16	0.99	11.00	0.99
High	5700	17.00	23.16	29.16	16.16	0.99	11.00	0.99

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PPSD

Output Power Results

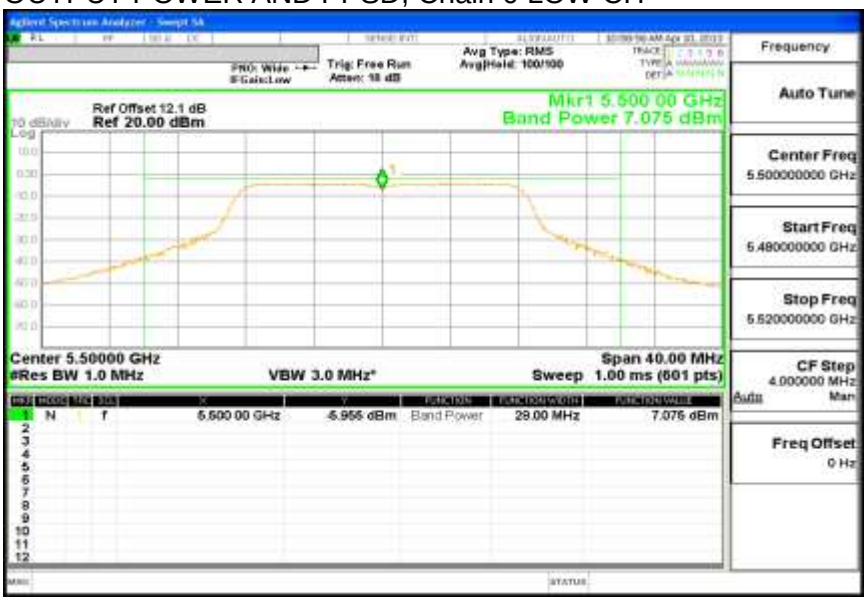
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5500	7.075	9.405	11.405	16.17	-4.763
Mid	5580	7.850	8.928	11.433	16.16	-4.732
High	5700	8.395	8.107	11.264	16.16	-4.897

PPSD Results

Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5500	-4.23	-1.96	0.06	0.99	-0.93
Mid	5580	-2.62	-2.44	0.48	0.99	-0.51
High	5700	-2.96	-3.32	-0.13	0.99	-1.12

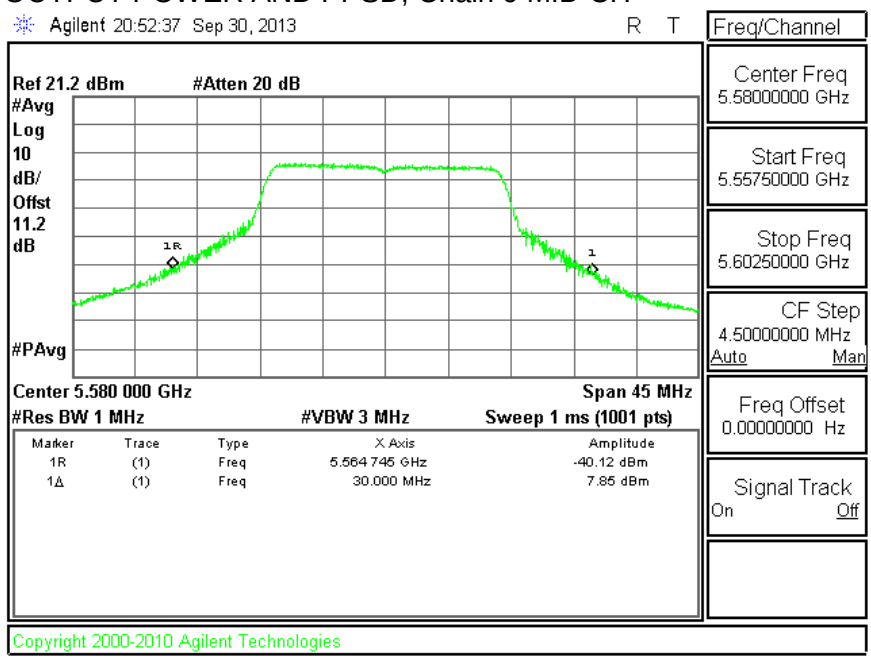
OUTPUT POWER AND PPSD, Chain 0

OUTPUT POWER AND PPSD, Chain 0 LOW CH



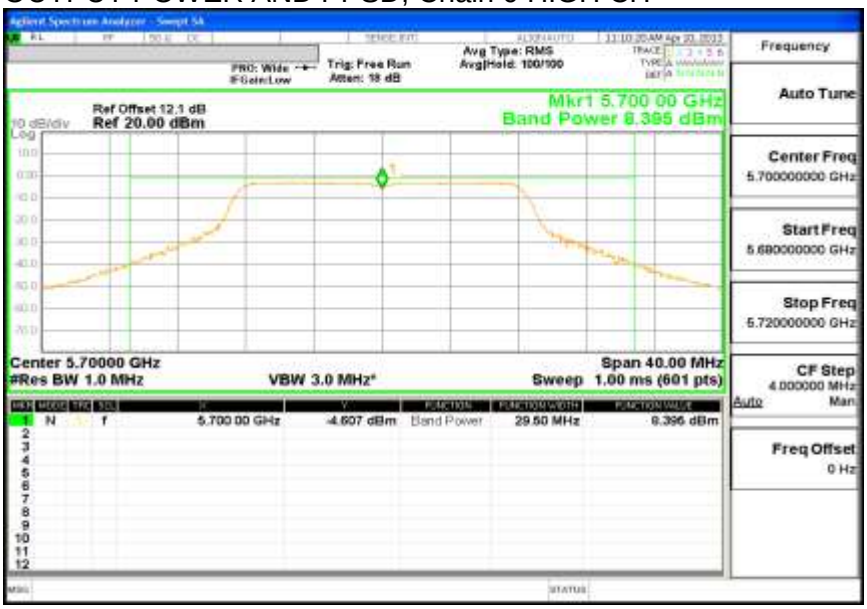
Linear Average= -4.23 dBm

OUTPUT POWER AND PPSD, Chain 0 MID CH



Linear Average= -2.62 dBm

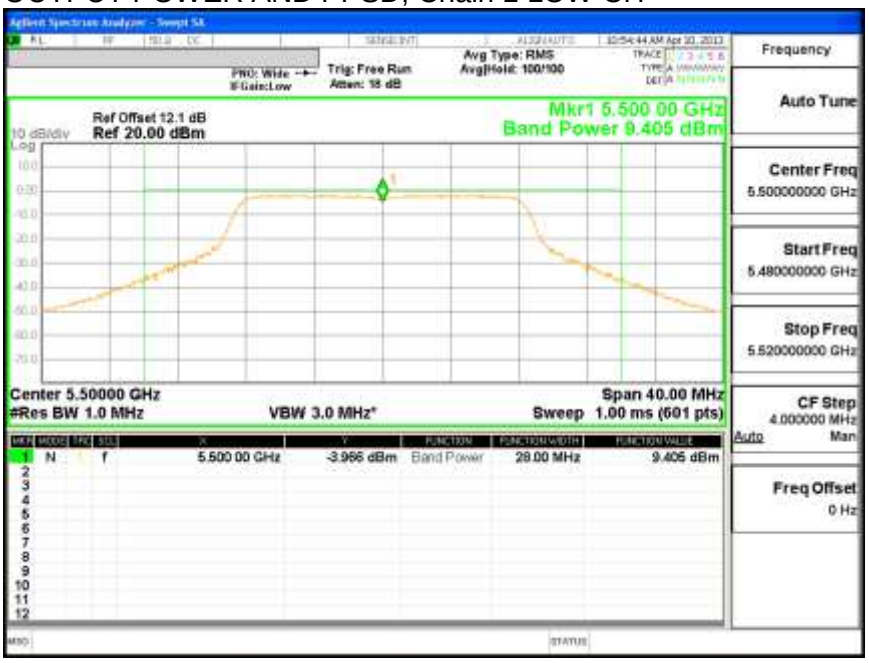
OUTPUT POWER AND PPSD, Chain 0 HIGH CH



Linear Average= -2.96 dBm

OUTPUT POWER AND PPSD, Chain 1

OUTPUT POWER AND PPSD, Chain 1 LOW CH



Linear Average= -1.96 dBm

OUTPUT POWER AND PPSD, Chain 1 MID CH

Linear Average= -2.44 dBm

OUTPUT POWER AND PPSD, Chain 1 HIGH CH

Linear Average= -3.32 dBm

8.1.4. 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.

RESULTS

Chain 0

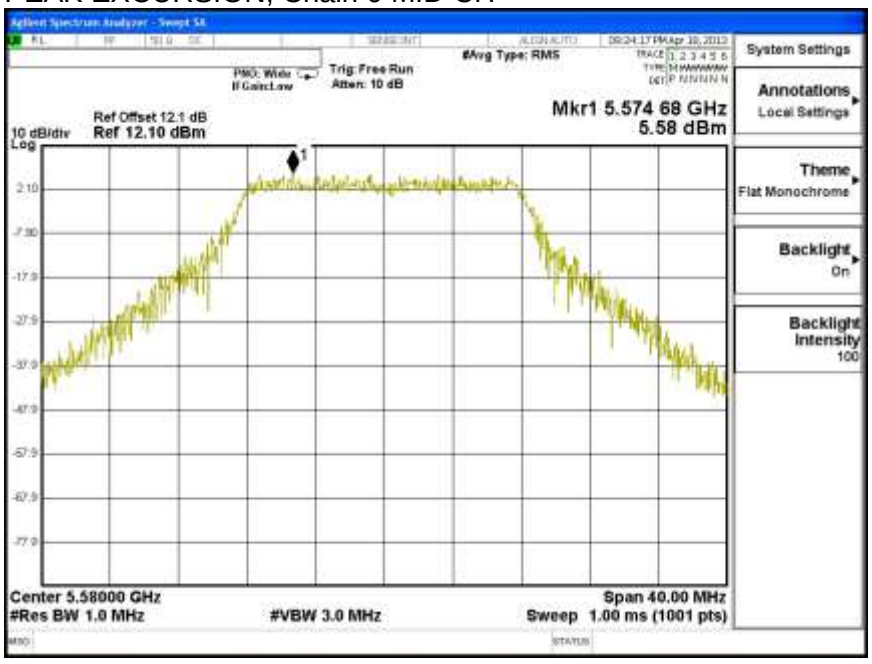
Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5580	5.58	-2.62	0.00	8.20	13	-4.80

Chain 1

Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5580	5.23	-2.44	0.00	7.67	13	-5.33

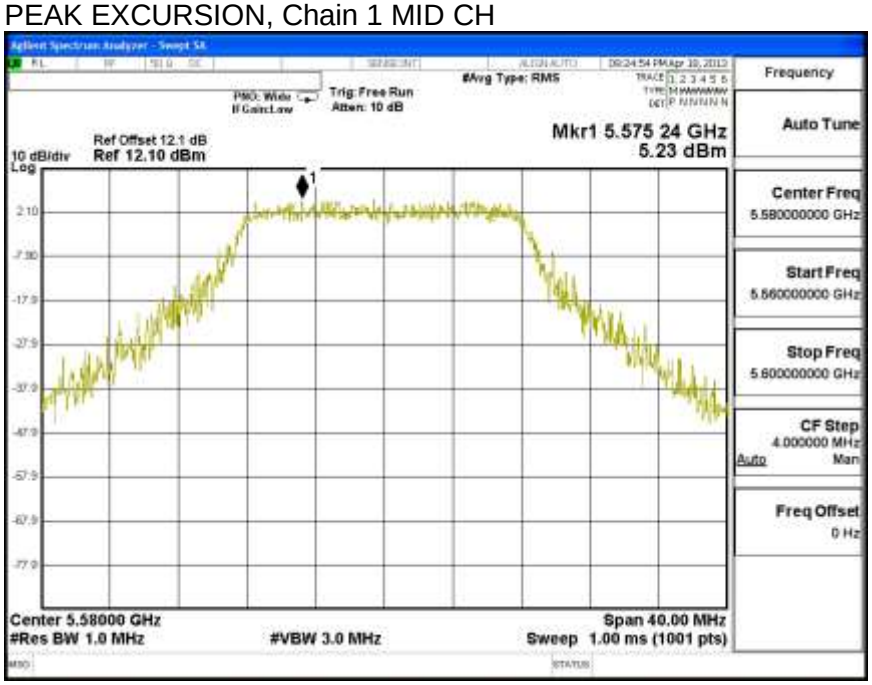
PEAK EXCURSION, Chain 0

PEAK EXCURSION, Chain 0 MID CH



PEAK EXCURSION, Chain 1

PEAK EXCURSION, Chain 1 MID CH



8.1.5. CONDUCTED WEATHER RADAR BAND EMISSIONS

LIMITS

Within 5600 – 5650 MHz band, -20 dBc relative to highest fundamental output power density per 100 kHz.

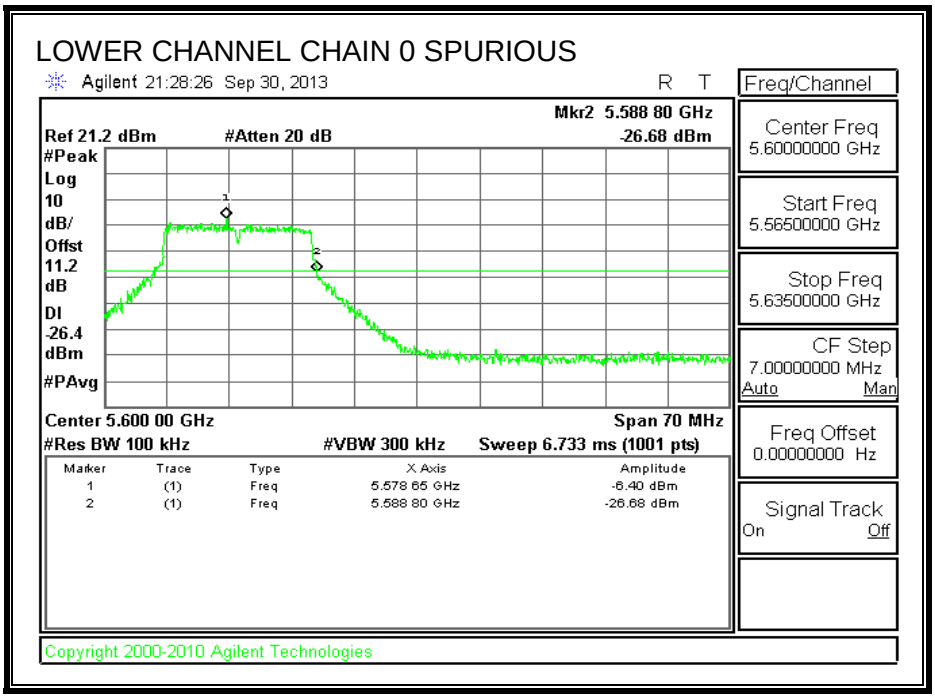
TEST PROCEDURE

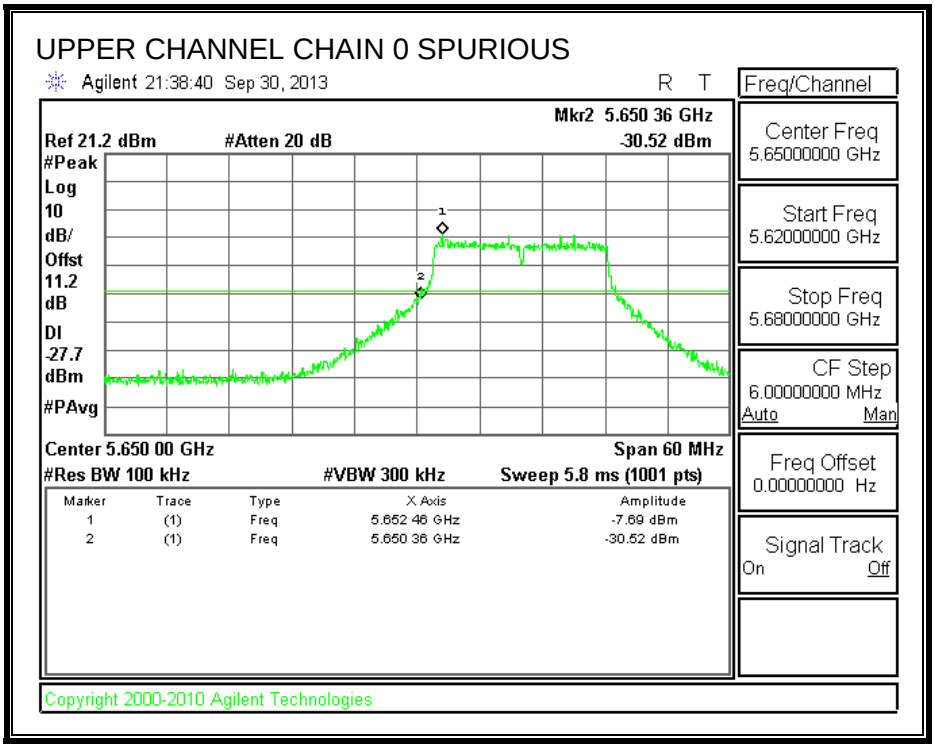
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The authorized channel nearest to and less than 5600 MHz is measured.

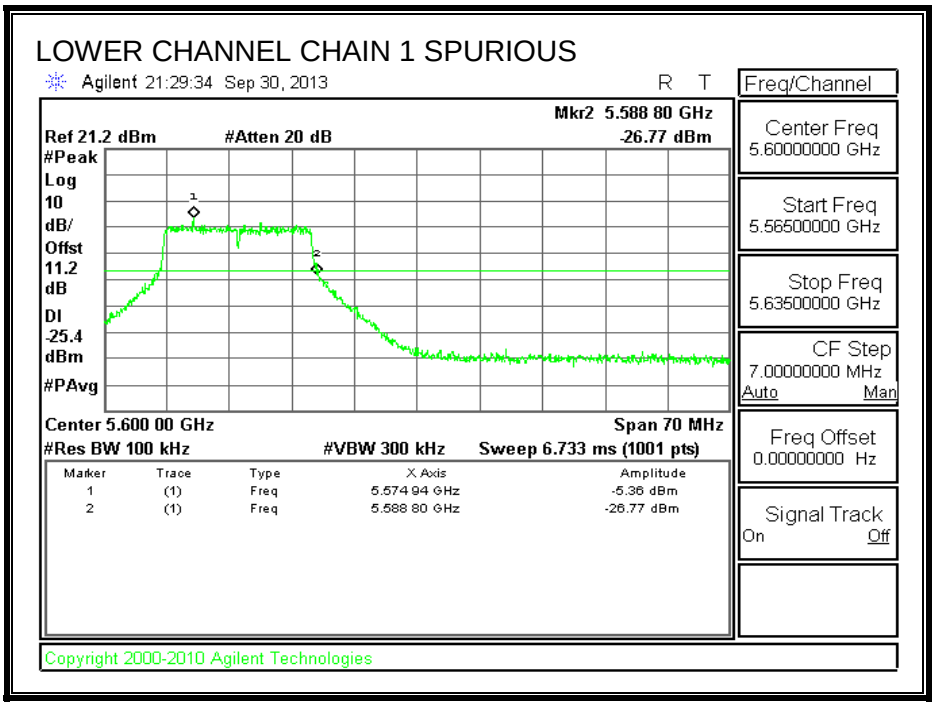
The authorized channel nearest to and greater than 5650 MHz is measured.

SPURIOUS EMISSIONS IN WEATHER RADAR BAND 5600 - 5650 MHz

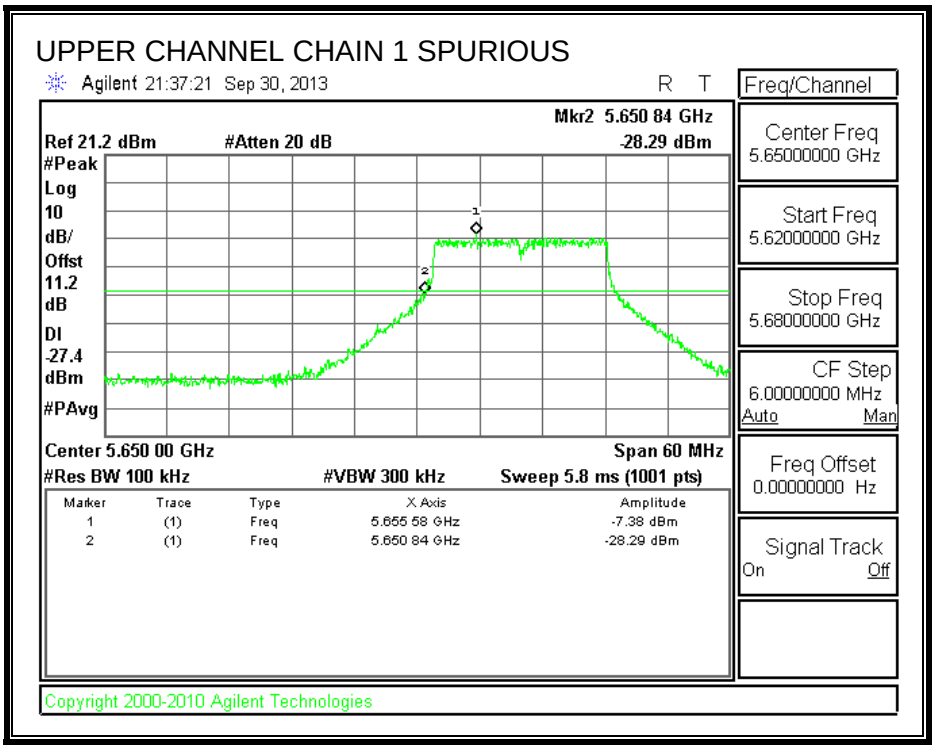




LOWER CHANNEL CHAIN 1 SPURIOUS



UPPER CHANNEL CHAIN 1 SPURIOUS



8.2. 802.11n HT20 STBC 2TX MODE IN THE 5.6 GHz BAND

8.2.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

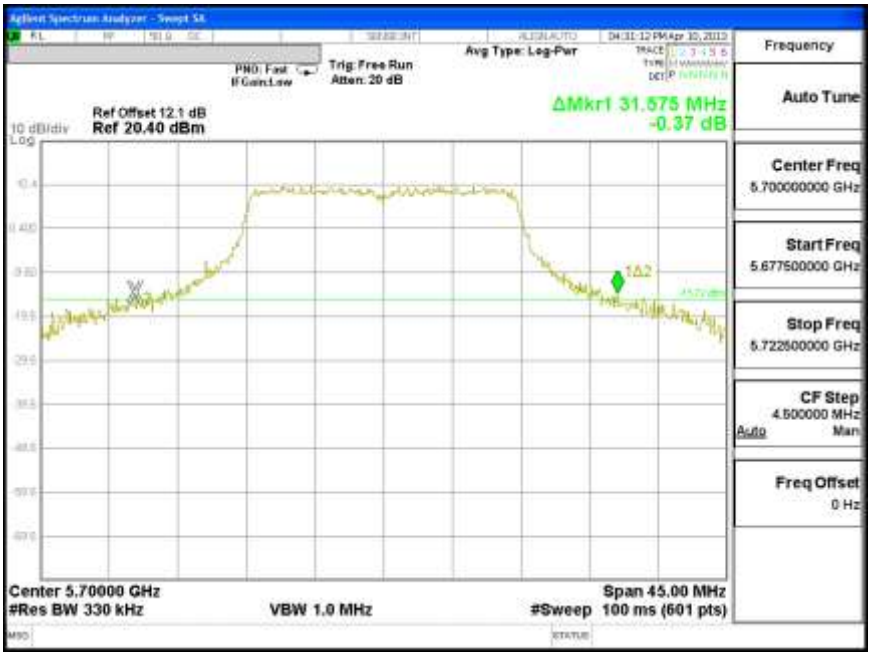
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5500	33.750	30.150
Mid	5580	33.900	30.825
High	5700	31.575	28.800

26 dB BANDWIDTH, Chain 0

BANDWIDTH Chain 0 LOW CH

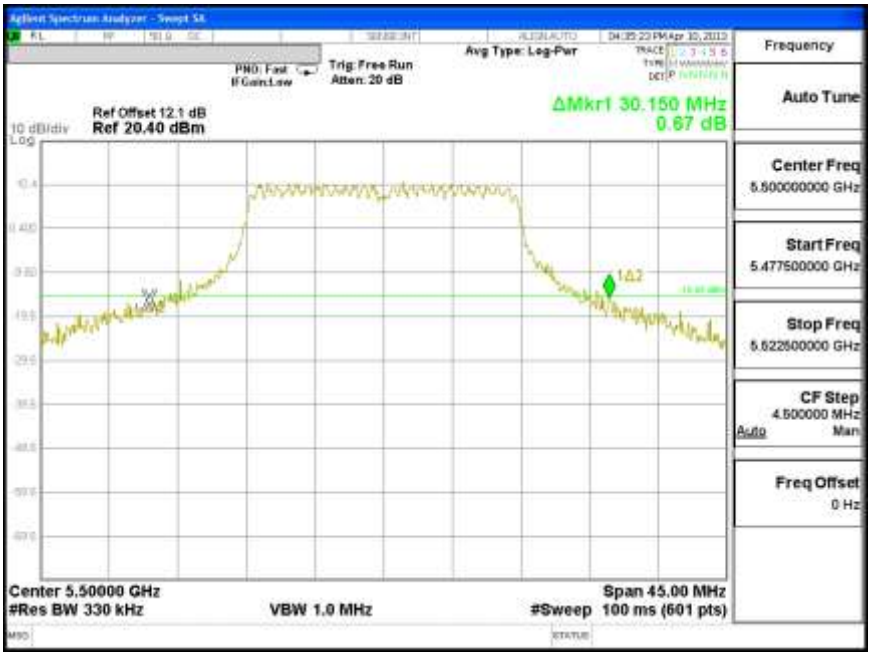
BANDWIDTH Chain 0 MID CH

BANDWIDTH Chain 0 HIGH CH

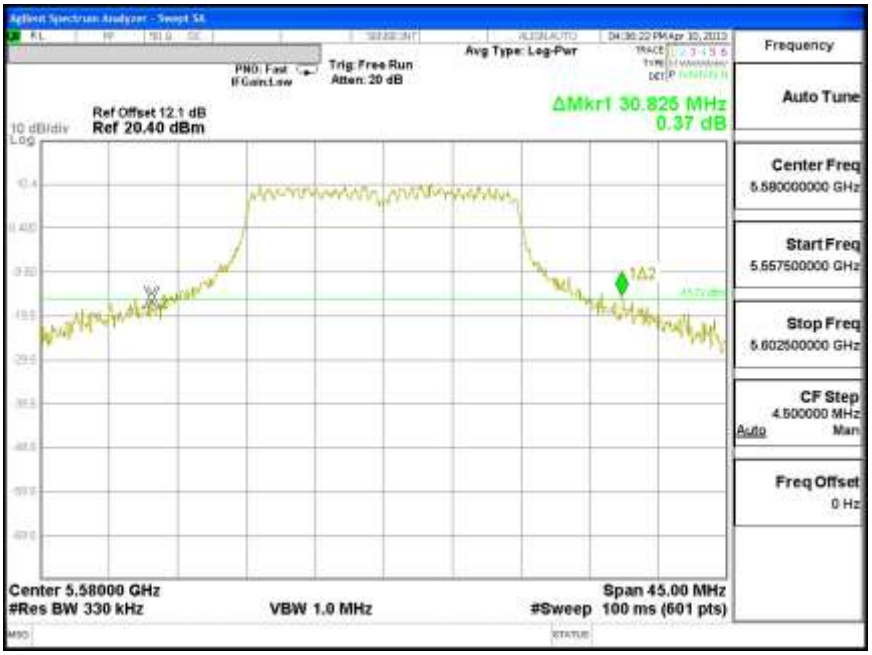


26 dB BANDWIDTH, Chain 1

BANDWIDTH Chain 1 LOW CH



BANDWIDTH Chain 1 MID CH



BANDWIDTH Chain 1 HIGH CH

8.2.2. 99% BANDWIDTH

LIMITS

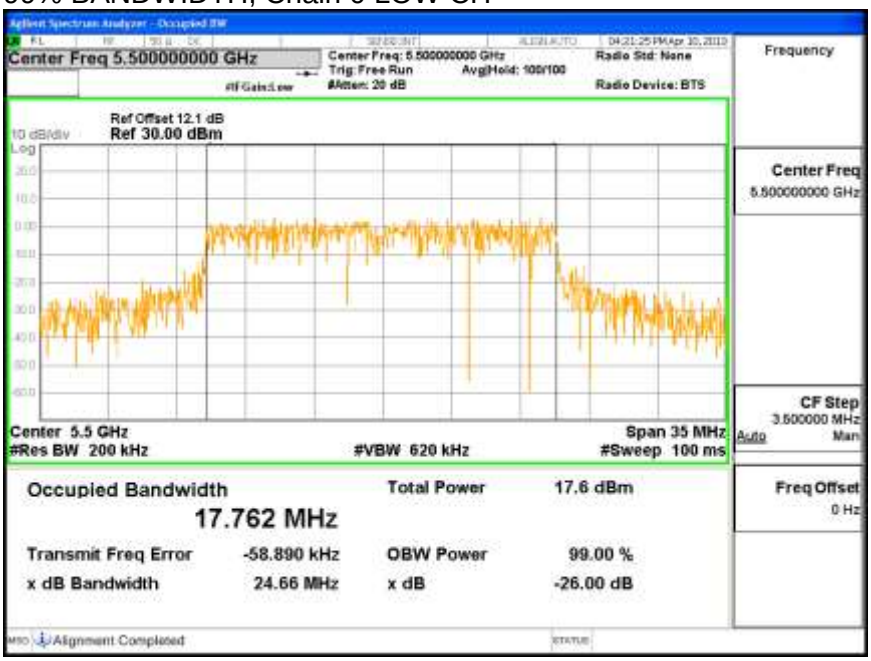
None; for reporting purposes only.

RESULTS

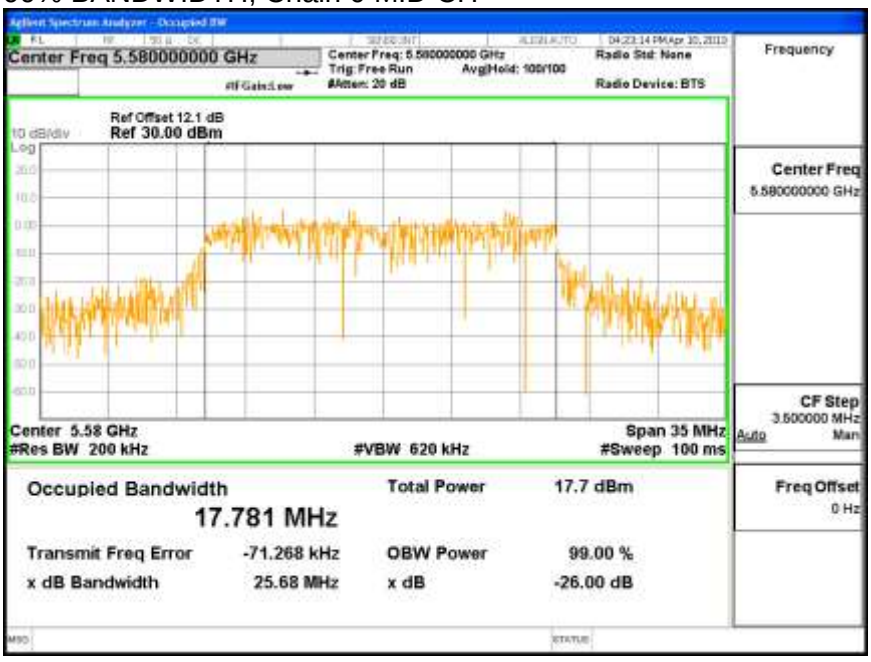
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5500	17.762	17.691
Mid	5580	17.781	17.739
High	5700	17.603	17.770

99% BANDWIDTH, Chain 0

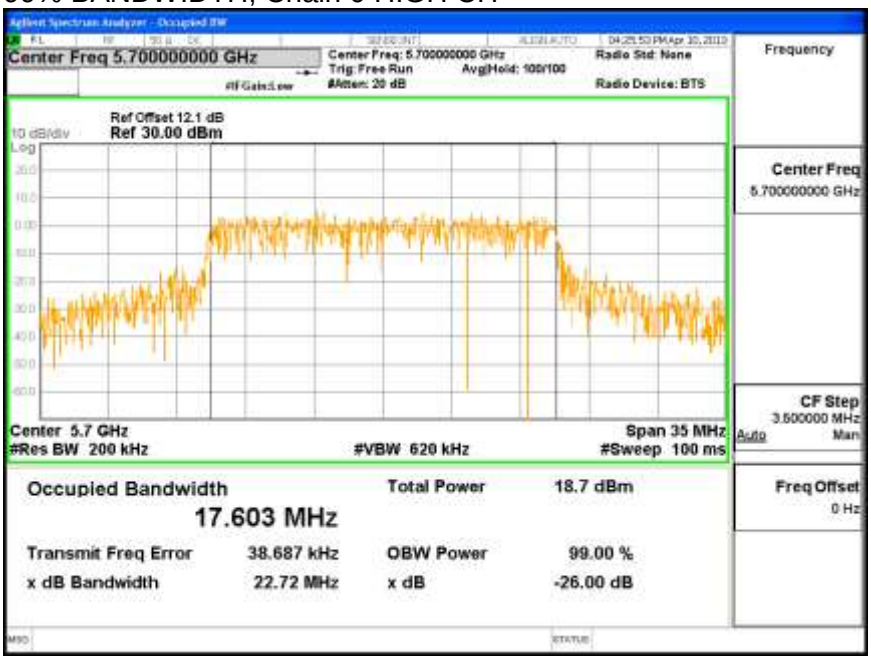
99% BANDWIDTH, Chain 0 LOW CH



99% BANDWIDTH, Chain 0 MID CH

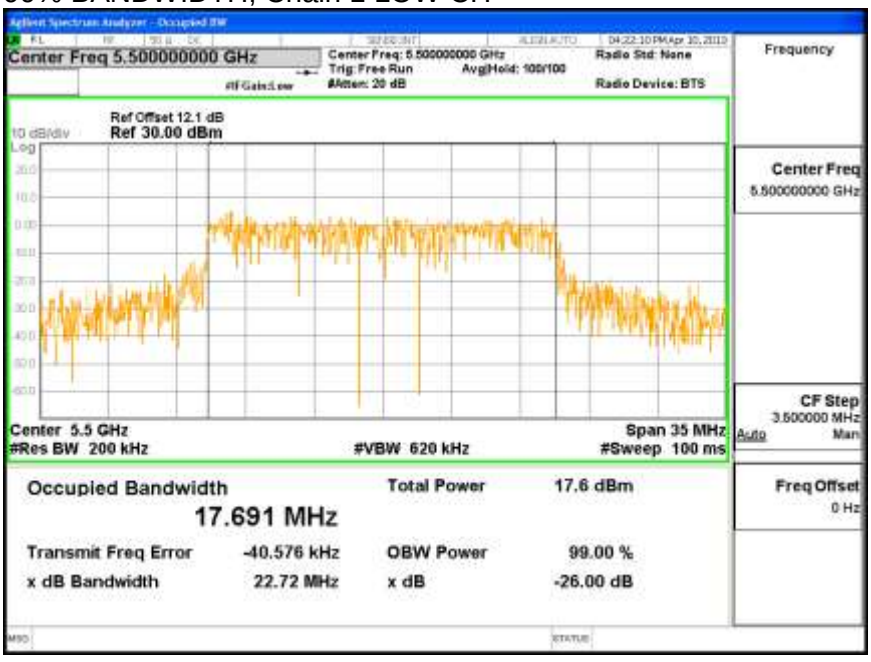


99% BANDWIDTH, Chain 0 HIGH CH

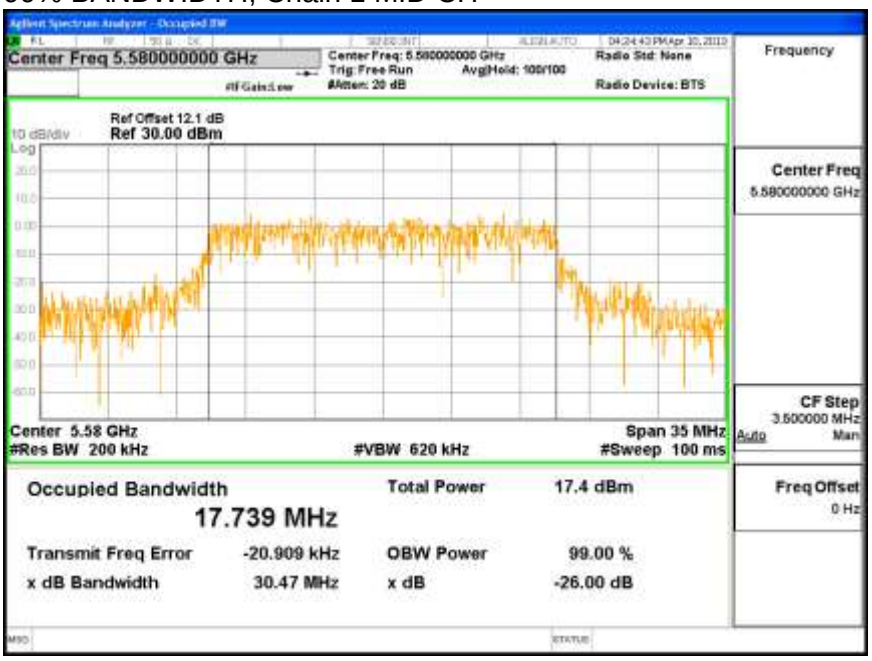


99% BANDWIDTH, Chain 1

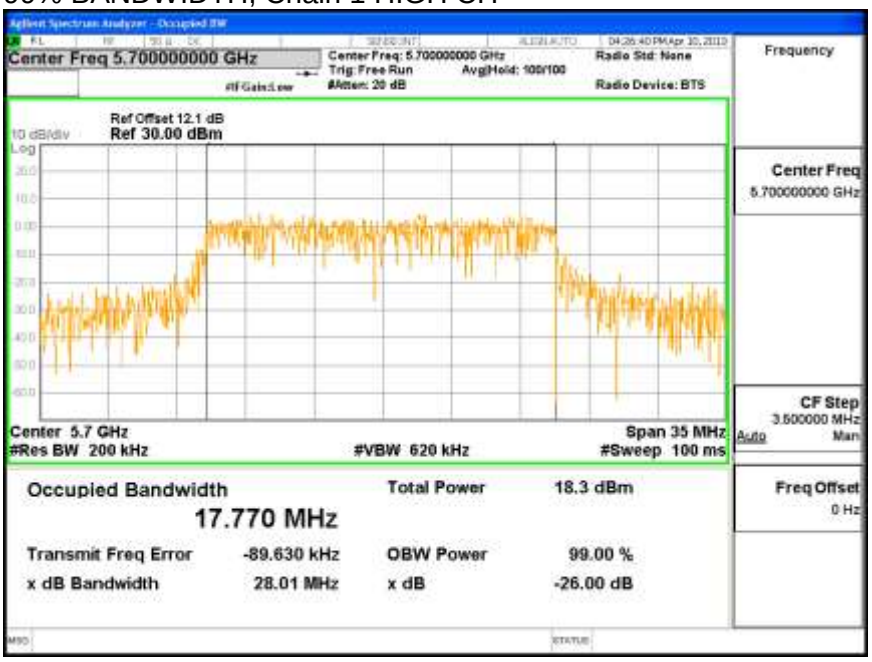
99% BANDWIDTH, Chain 1 LOW CH



99% BANDWIDTH, Chain 1 MID CH



99% BANDWIDTH, Chain 1 HIGH CH



8.2.3. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

For the band 5.5–5.7 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, 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 maximum conducted output 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.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain.

RESULTS

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5500	30.150	17.691	13.00
Mid	5580	30.825	17.739	13.00
High	5700	28.800	17.603	13.00

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC PSD Limit (dBm)	PPSD Limit (dBm)
Low	5500	17.00	23.48	29.48	16.48	4.00	11.00	4.00
Mid	5580	17.00	23.49	29.49	16.49	4.00	11.00	4.00
High	5700	17.00	23.46	29.46	16.46	4.00	11.00	4.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PPSD

Output Power Results

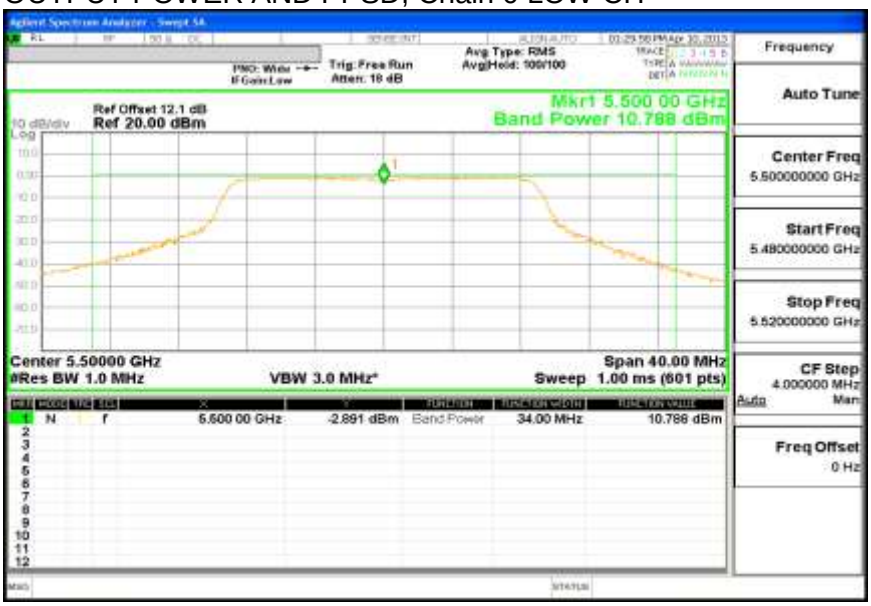
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5500	10.788	12.127	14.519	16.48	-1.958
Mid	5580	11.597	11.877	14.750	16.49	-1.740
High	5700	11.645	11.317	14.494	16.46	-1.961

PPSD Results

Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5500	-0.87	0.45	2.85	4.00	-1.15
Mid	5580	-0.04	0.31	3.15	4.00	-0.85
High	5700	-0.01	-0.39	2.82	4.00	-1.18

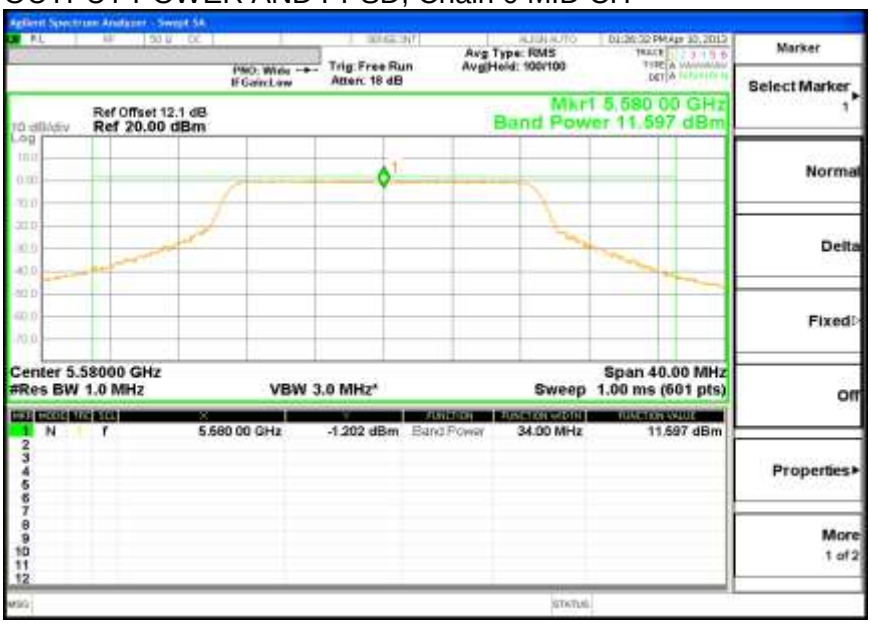
OUTPUT POWER AND PPSD, Chain 0

OUTPUT POWER AND PPSD, Chain 0 LOW CH



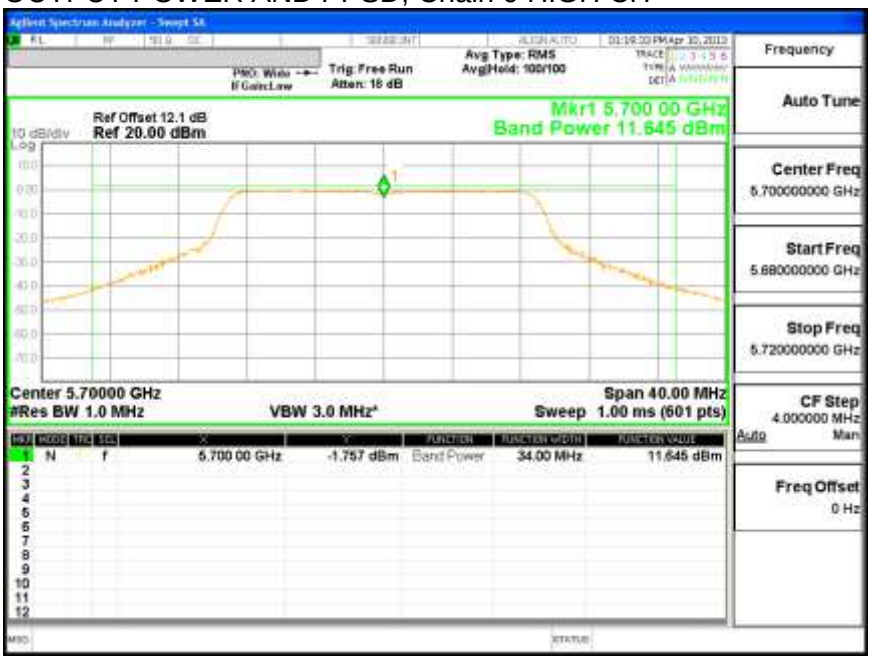
Linear Average= -0.87 dBm

OUTPUT POWER AND PPSD, Chain 0 MID CH



Linear Average= -0.04 dBm

OUTPUT POWER AND PPSD, Chain 0 HIGH CH



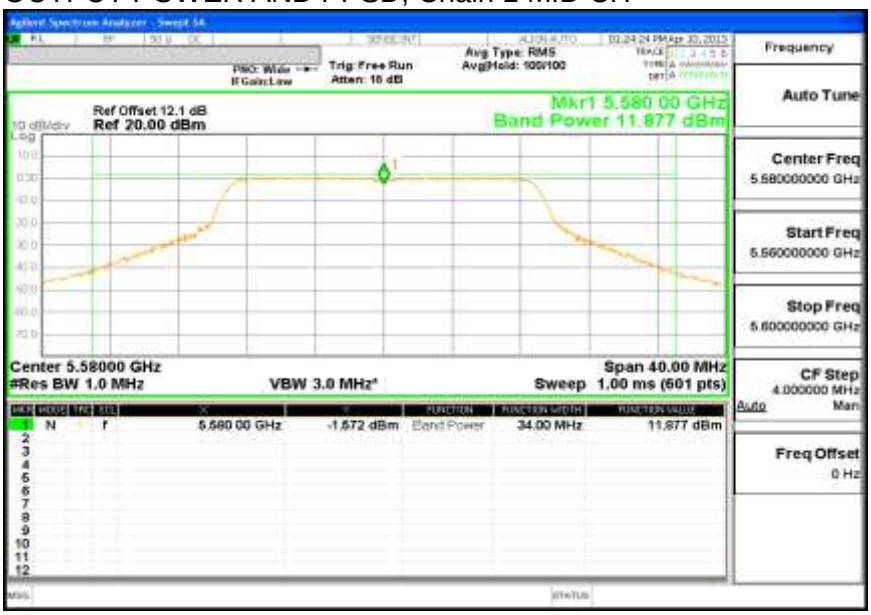
Linear Average= -0.01 dBm

OUTPUT POWER AND PPSD, Chain 1

OUTPUT POWER AND PPSD, Chain 1 LOW CH

Linear Average= 0.45 dBm

OUTPUT POWER AND PPSD, Chain 1 MID CH



Linear Average= 0.31 dBm

OUTPUT POWER AND PPSD, Chain 1 HIGH CH

Linear Average= -0.39 dBm

8.2.4. 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.

RESULTS

Chain 0

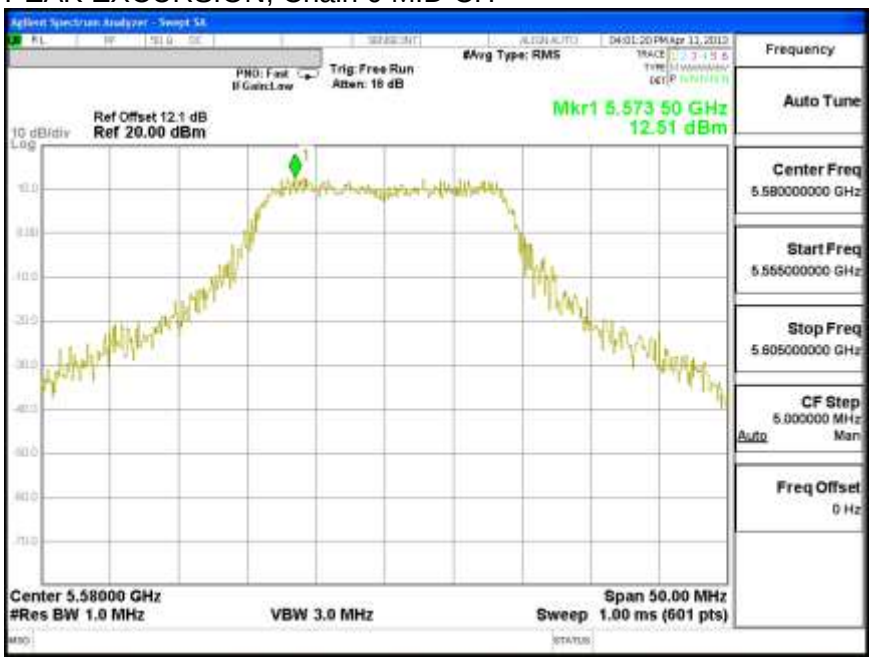
Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5580	12.51	-0.04	0.00	12.55	13	-0.45

Chain 1

Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5580	12.85	0.31	0.00	12.54	13	-0.46

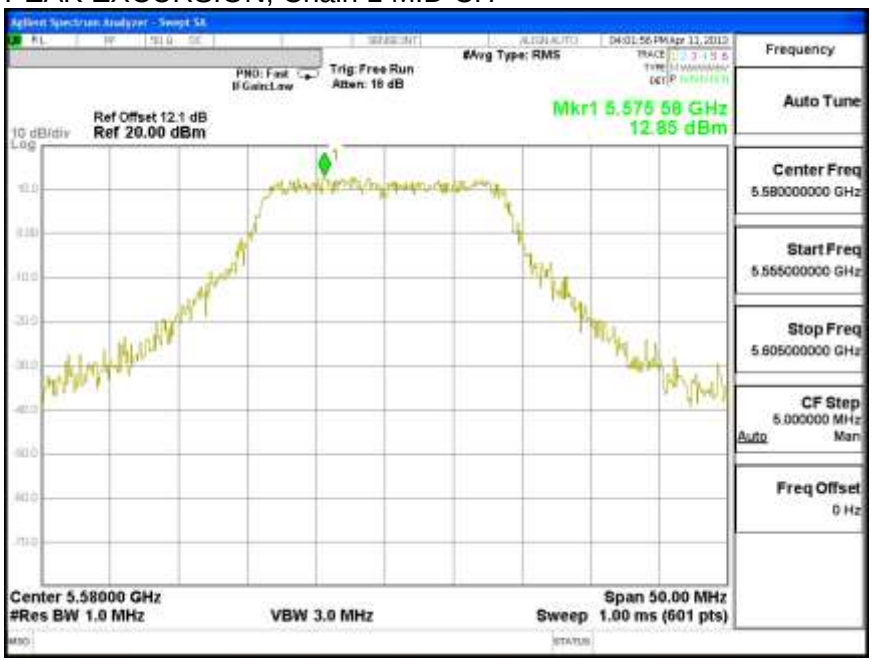
PEAK EXCURSION, Chain 0

PEAK EXCURSION, Chain 0 MID CH



PEAK EXCURSION, Chain 1

PEAK EXCURSION, Chain 1 MID CH



8.2.5. CONDUCTED WEATHER RADAR BAND EMISSIONS

LIMITS

Within 5600 – 5650 MHz band, -20 dBc relative to highest fundamental output power density per 100 kHz.

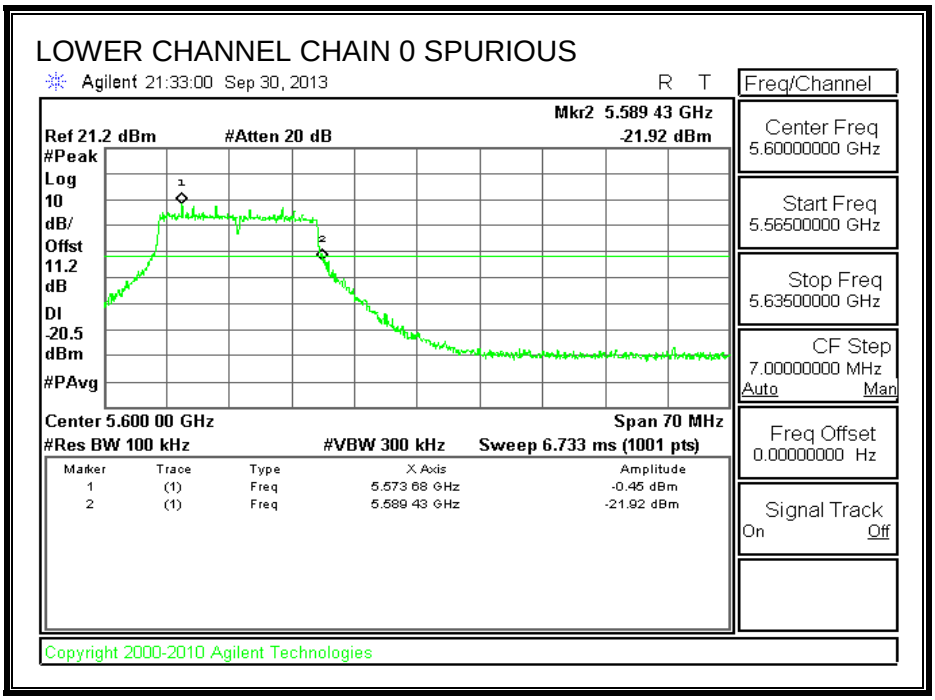
TEST PROCEDURE

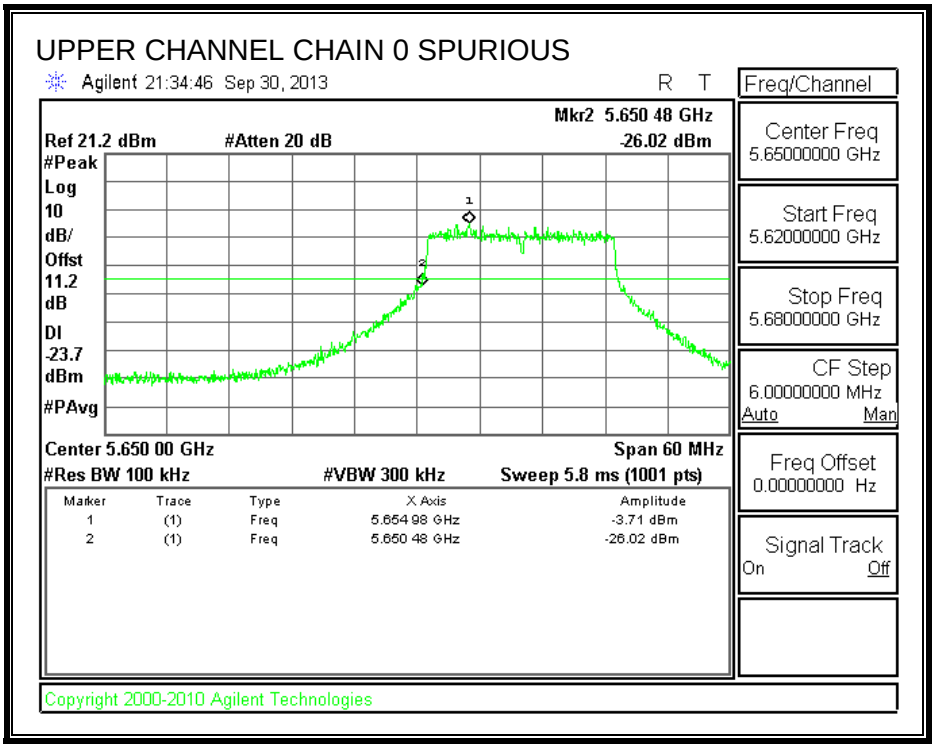
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

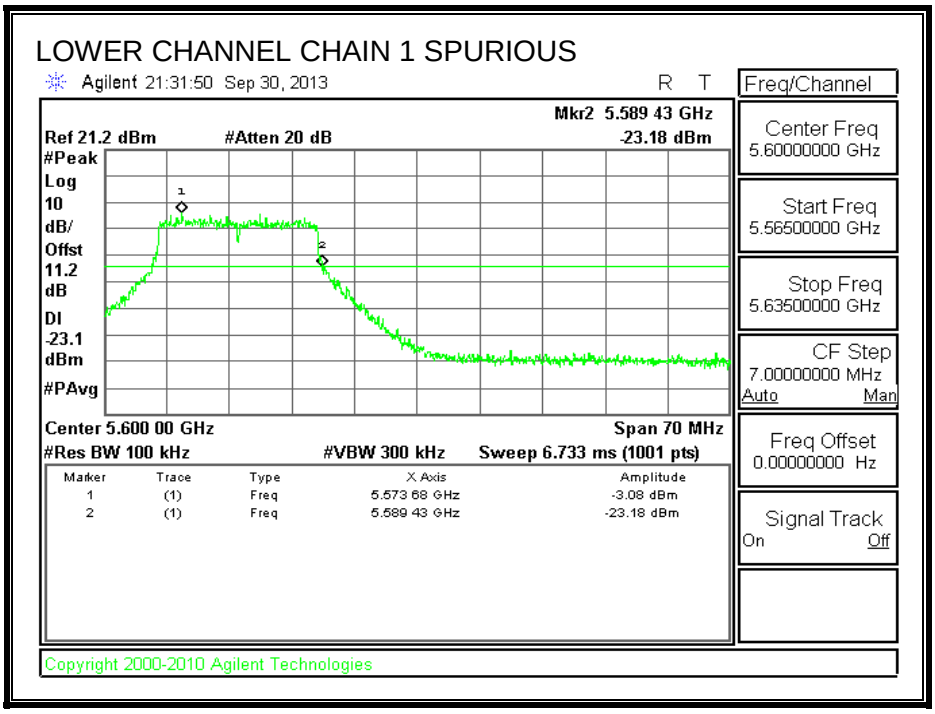
The authorized channel nearest to and less than 5600 MHz is measured.

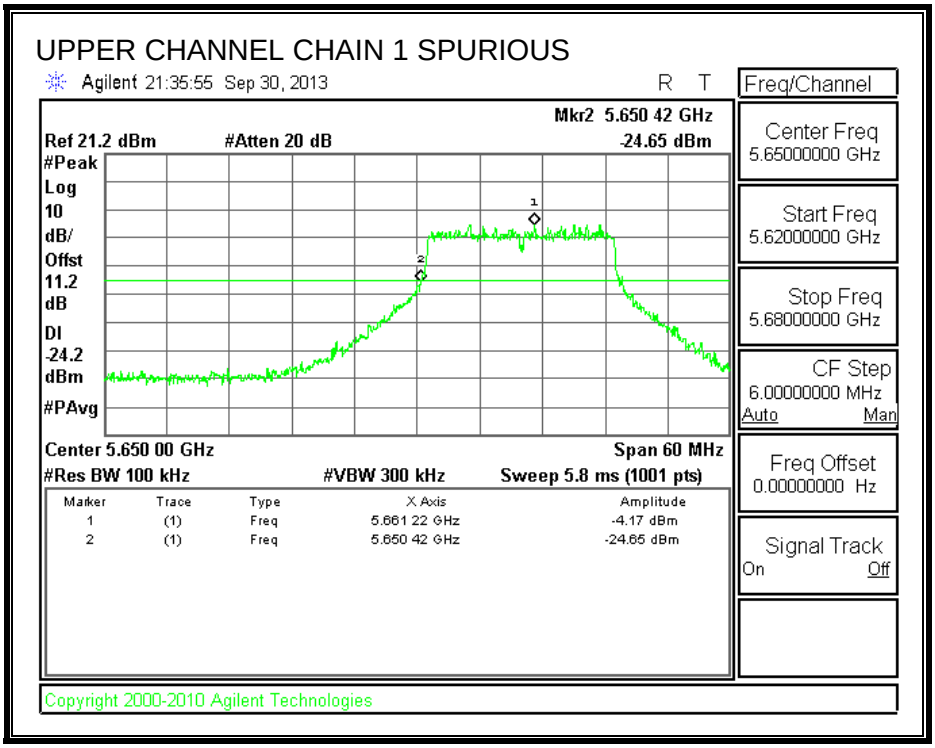
The authorized channel nearest to and greater than 5650 MHz is measured.

SPURIOUS EMISSIONS IN WEATHER RADAR BAND 5600 - 5650 MHz









8.3. 802.11n HT40 STBC 2TX MODE IN THE 5.6 GHz BAND

8.3.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

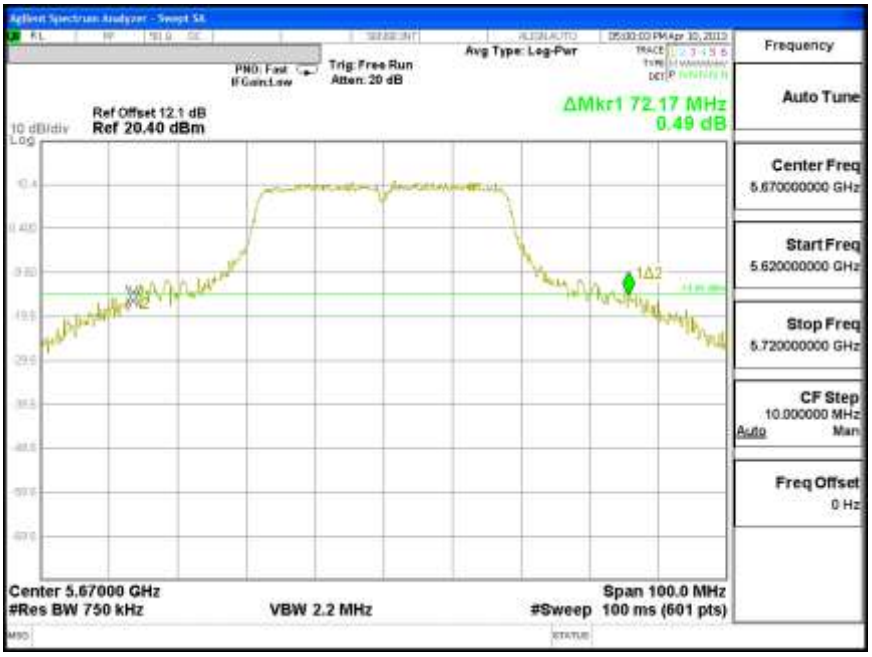
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5510	69.83	68.33
Mid	5550	71.83	63.00
High	5670	72.17	65.00

26 dB BANDWIDTH, Chain 0

BANDWIDTH Chain 0 LOW CH

BANDWIDTH Chain 0 MID CH

BANDWIDTH Chain 0 HIGH CH

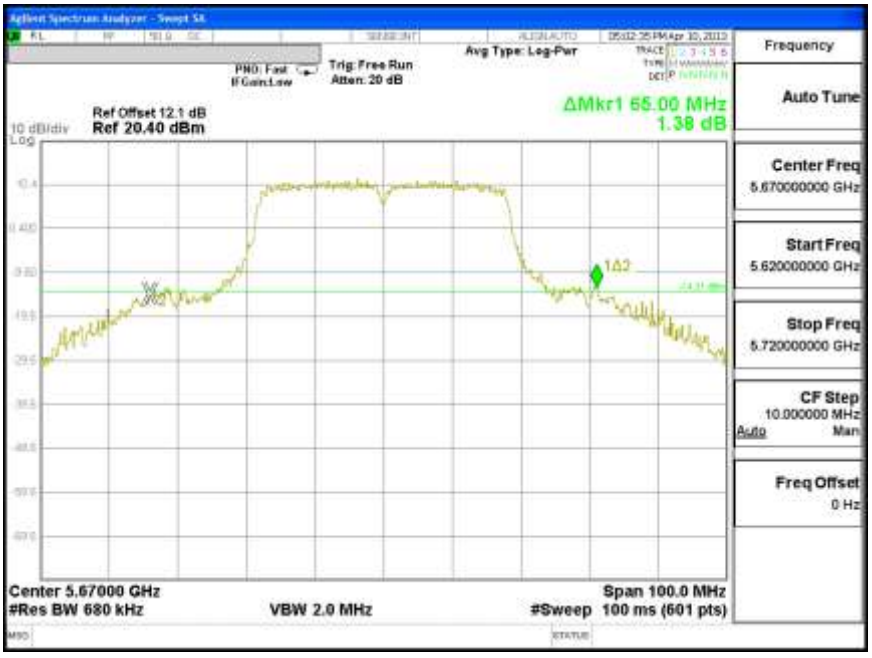


26 dB BANDWIDTH, Chain 1

BANDWIDTH Chain 1 LOW CH

BANDWIDTH Chain 1 MID CH

BANDWIDTH Chain 1 HIGH CH



8.3.2. 99% BANDWIDTH

LIMITS

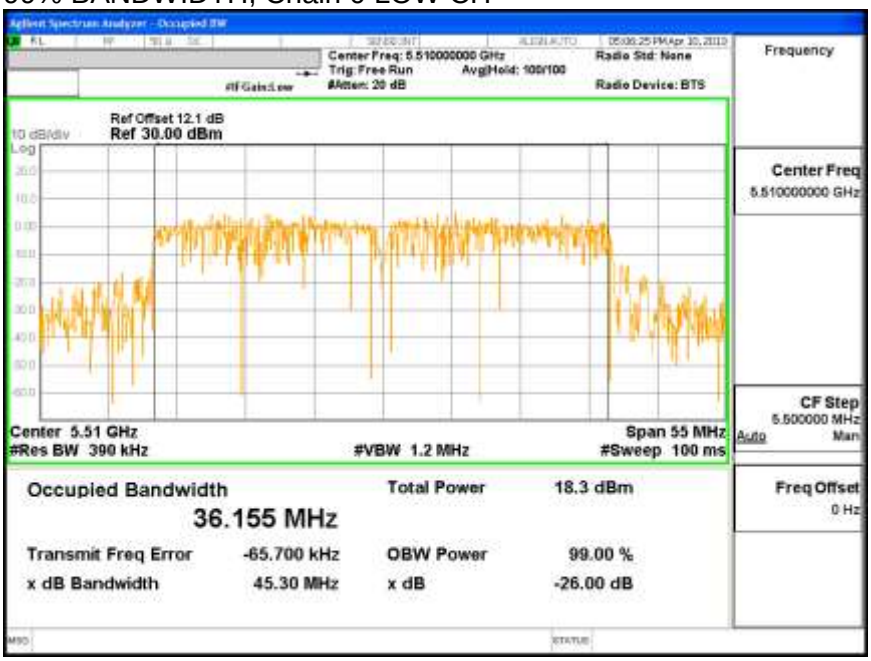
None; for reporting purposes only.

RESULTS

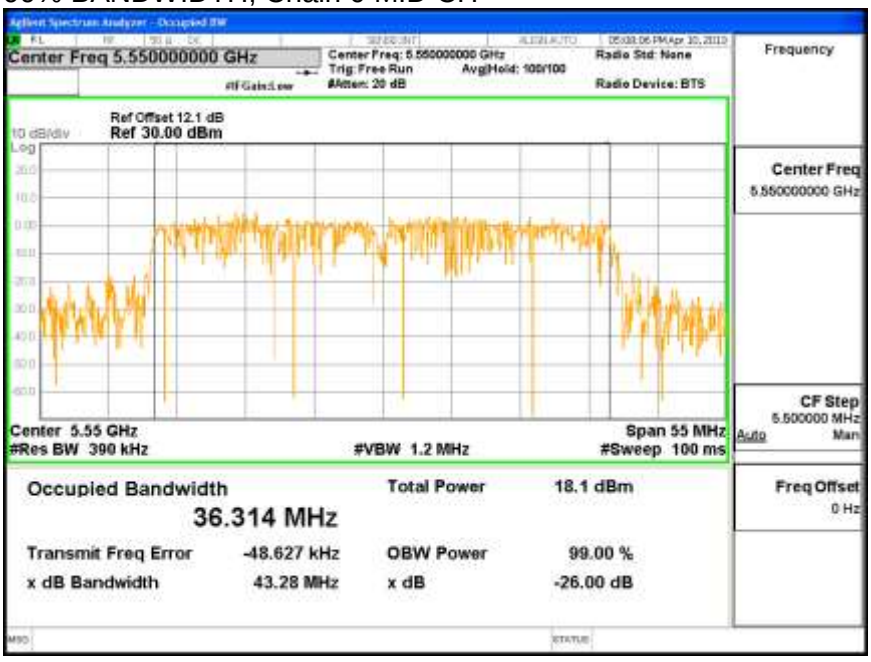
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5510	36.155	36.078
Mid	5550	36.314	36.218
High	5670	36.060	36.279

99% BANDWIDTH, Chain 0

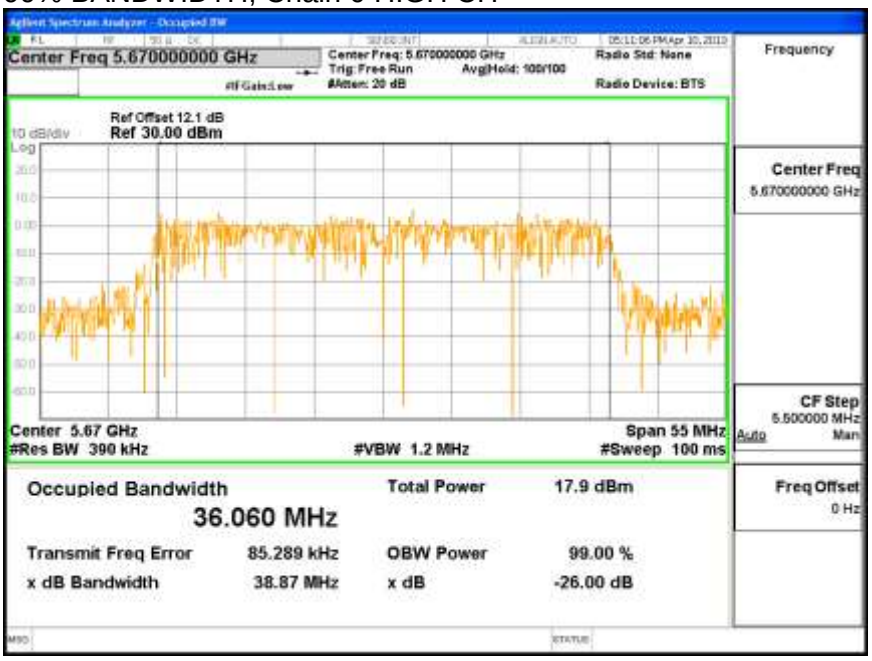
99% BANDWIDTH, Chain 0 LOW CH



99% BANDWIDTH, Chain 0 MID CH

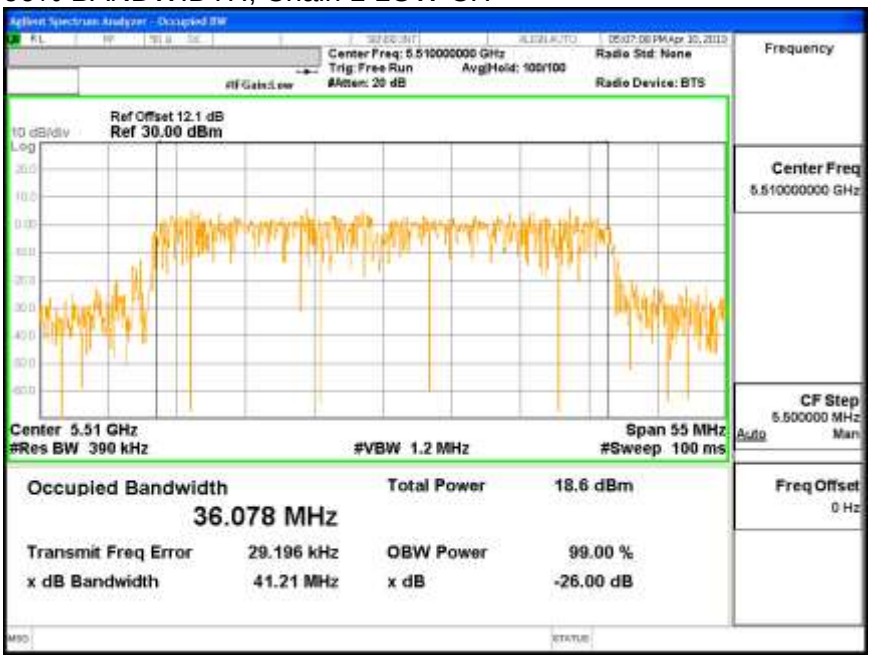


99% BANDWIDTH, Chain 0 HIGH CH

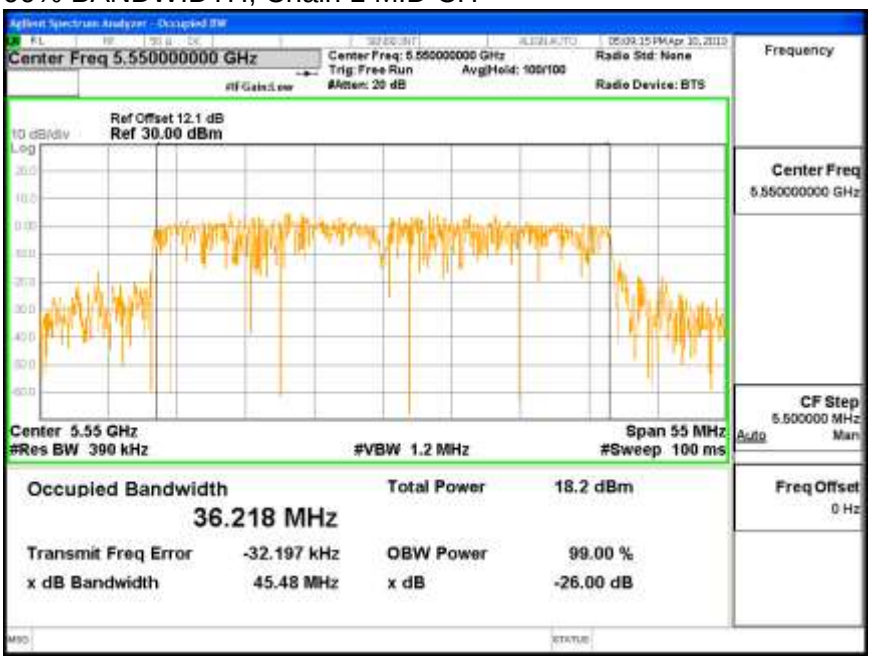


99% BANDWIDTH, Chain 1

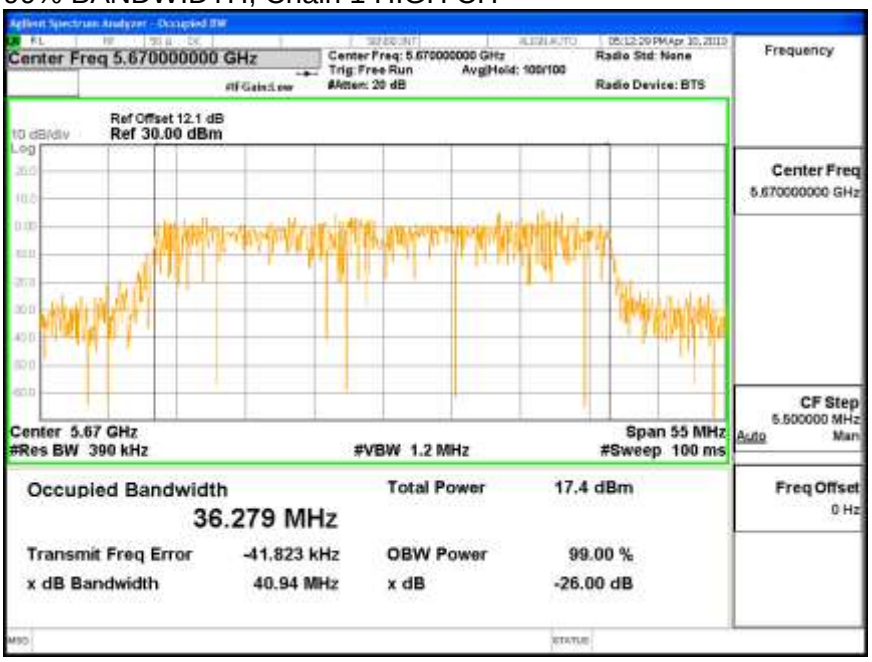
99% BANDWIDTH, Chain 1 LOW CH



99% BANDWIDTH, Chain 1 MID CH



99% BANDWIDTH, Chain 1 HIGH CH



8.3.3. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

For the band 5.5–5.7 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, 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 maximum conducted output 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.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain.

RESULTS

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5510	68.33	36.078	13.00
Mid	5550	63.00	36.218	13.00
High	5670	65.00	36.060	13.00

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC PSD Limit (dBm)	PPSD Limit (dBm)
Low	5510	17.00	24.00	30.00	17.00	4.00	11.00	4.00
Mid	5550	17.00	24.00	30.00	17.00	4.00	11.00	4.00
High	5670	17.00	24.00	30.00	17.00	4.00	11.00	4.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PPSD

Output Power Results

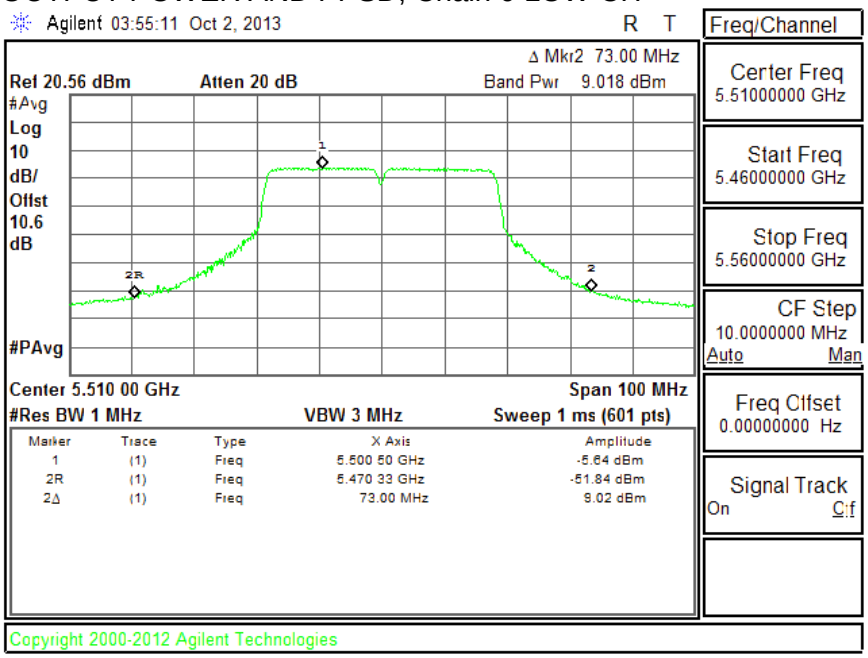
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5510	9.018	8.983	12.011	17.00	-4.989
Mid	5550	12.646	13.895	16.326	17.00	-0.674
High	5670	12.910	12.936	15.933	17.00	-1.067

PPSD Results

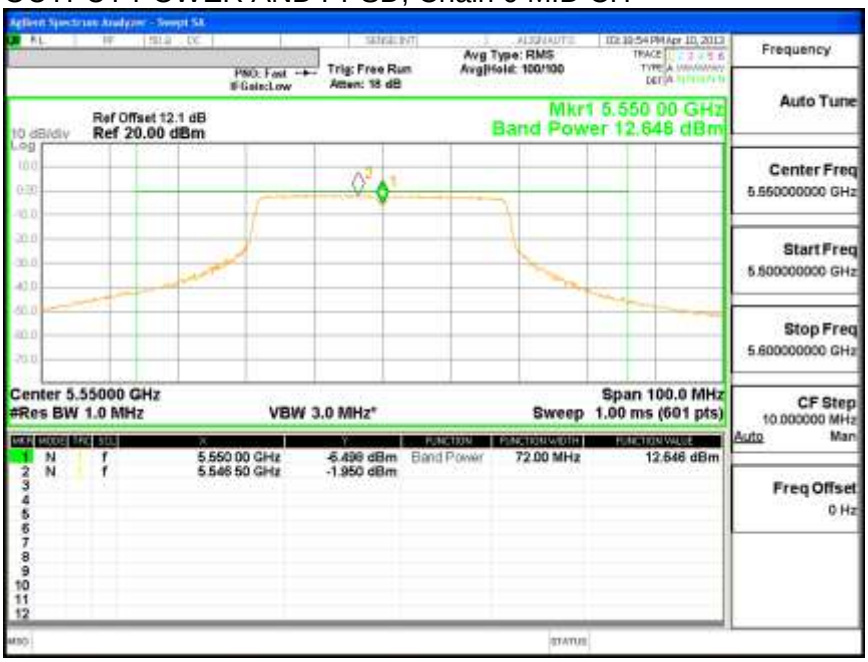
Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5510	-5.640	-5.650	-2.63	4.00	-6.63
Mid	5550	-1.950	-0.584	1.80	4.00	-2.20
High	5670	-1.077	-1.612	1.67	4.00	-2.33

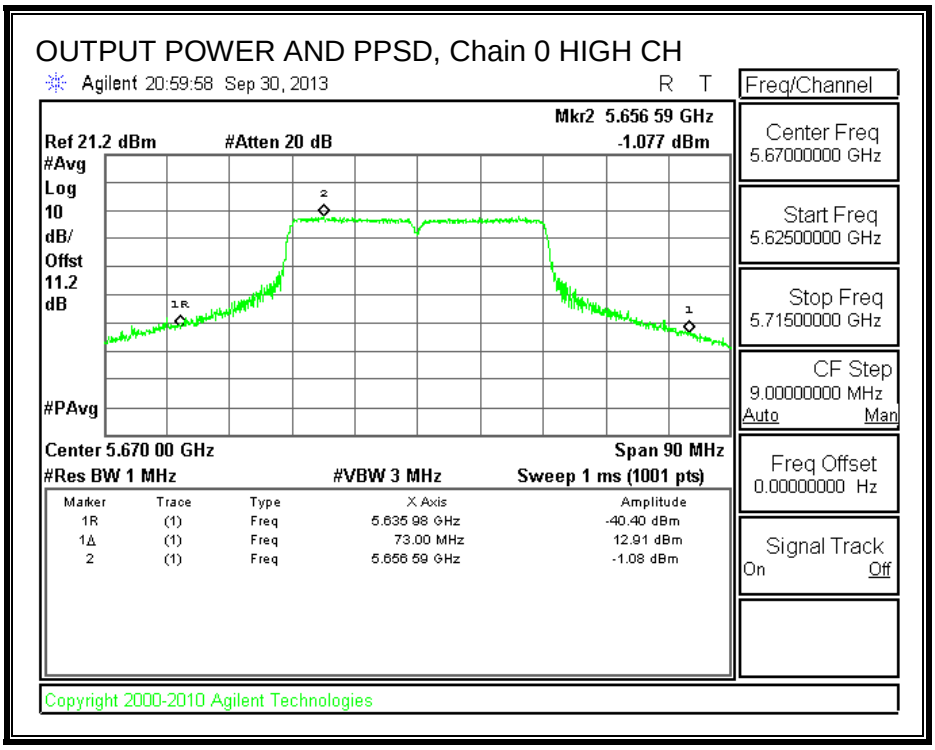
OUTPUT POWER AND PPSD, Chain 0

OUTPUT POWER AND PPSD, Chain 0 LOW CH

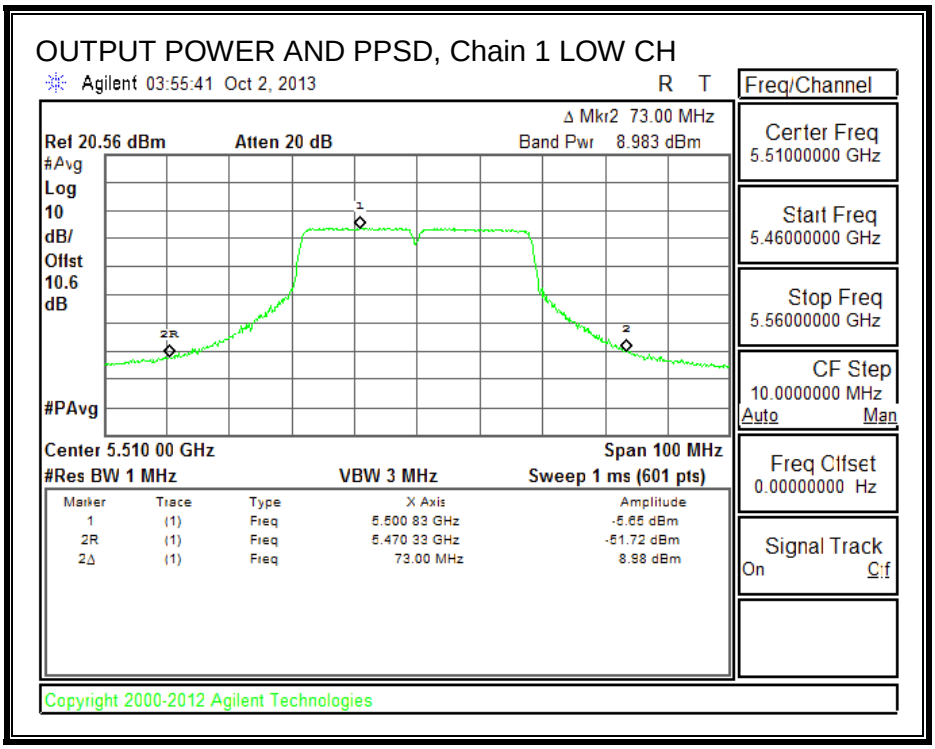


OUTPUT POWER AND PPSD, Chain 0 MID CH

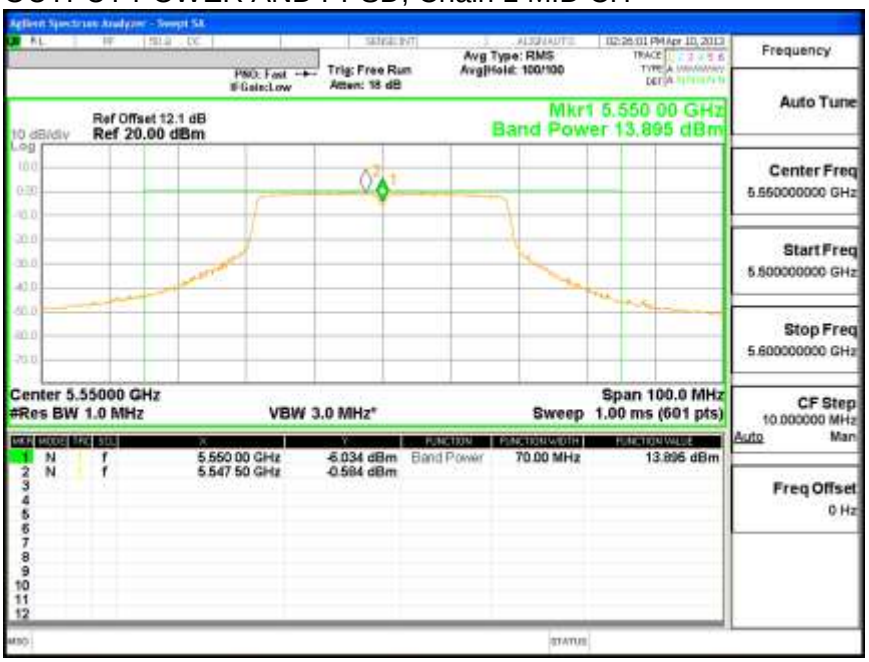




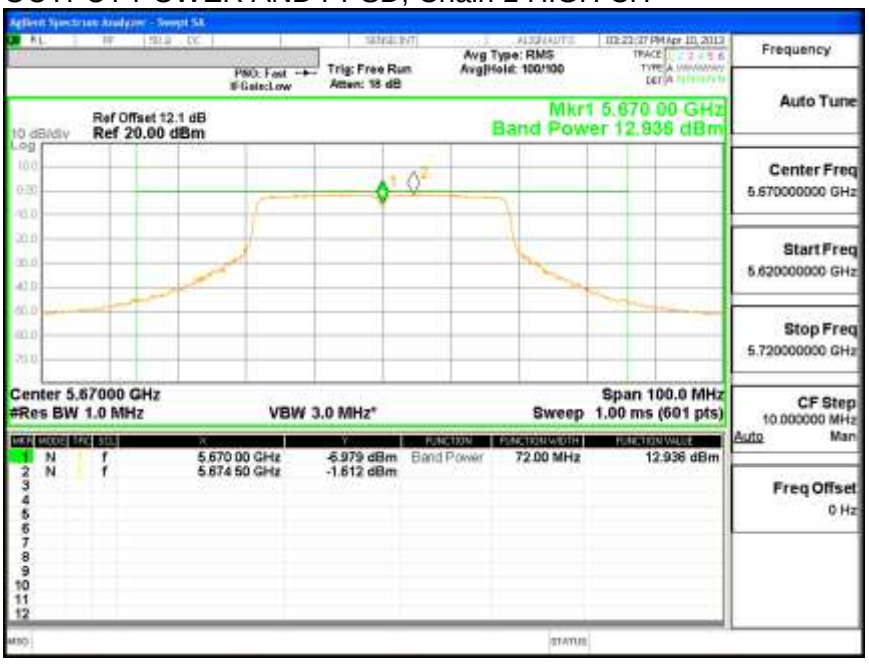
OUTPUT POWER AND PPSD, Chain 1



OUTPUT POWER AND PPSD, Chain 1 MID CH



OUTPUT POWER AND PPSD, Chain 1 HIGH CH



8.3.4. 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.

RESULTS

Chain 0

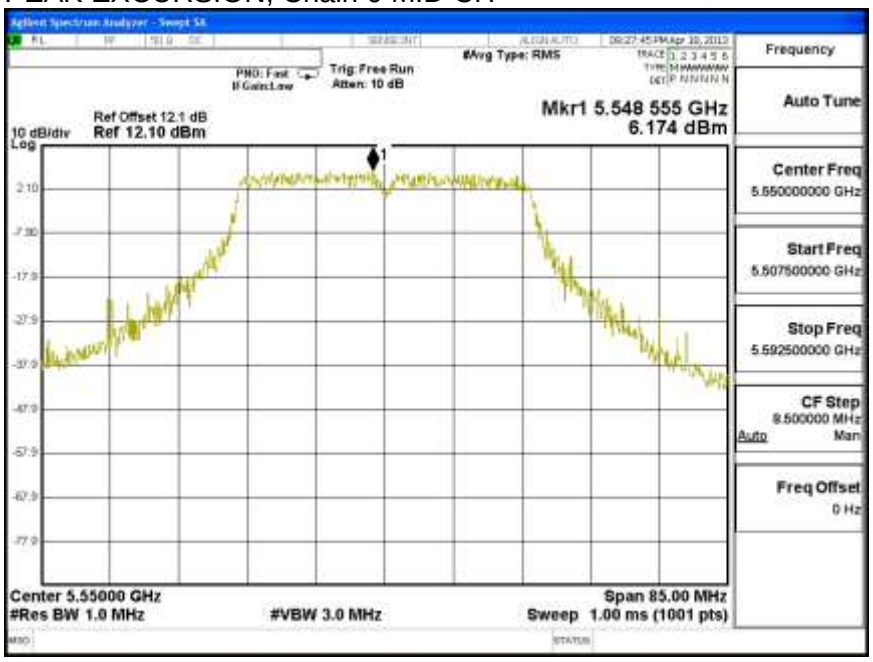
Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5550	6.174	-1.950	0.00	8.124	13	-4.876

Chain 1

Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5550	5.790	-0.584	0.00	6.374	13	-6.626

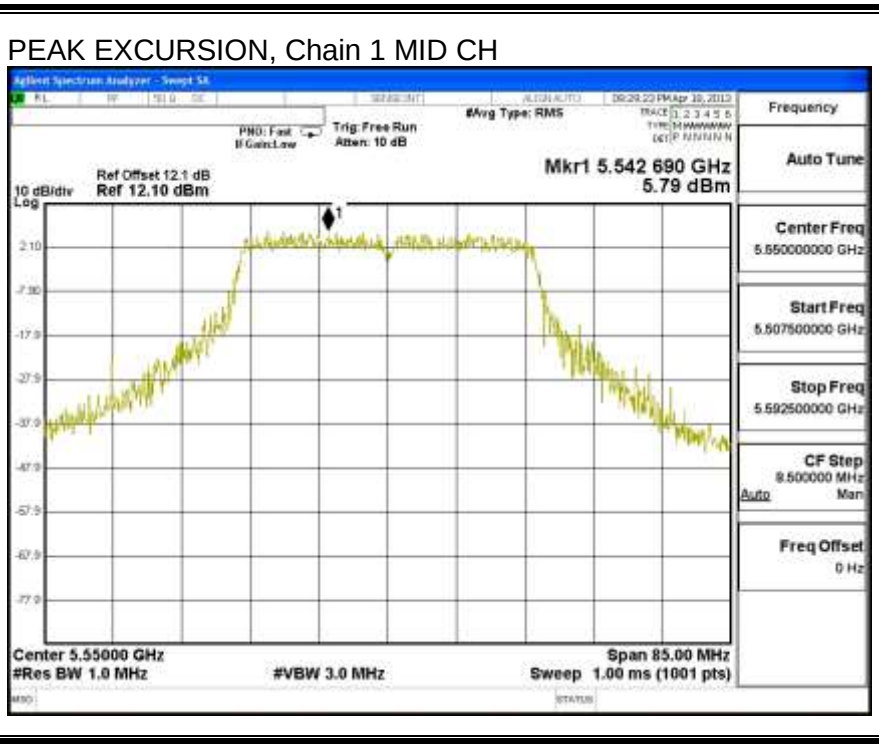
PEAK EXCURSION, Chain 0

PEAK EXCURSION, Chain 0 MID CH



PEAK EXCURSION, Chain 1

PEAK EXCURSION, Chain 1 MID CH



8.3.5. CONDUCTED WEATHER RADAR BAND EMISSIONS

LIMITS

Within 5600 – 5650 MHz band, -20 dBc relative to highest fundamental output power density per 100 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

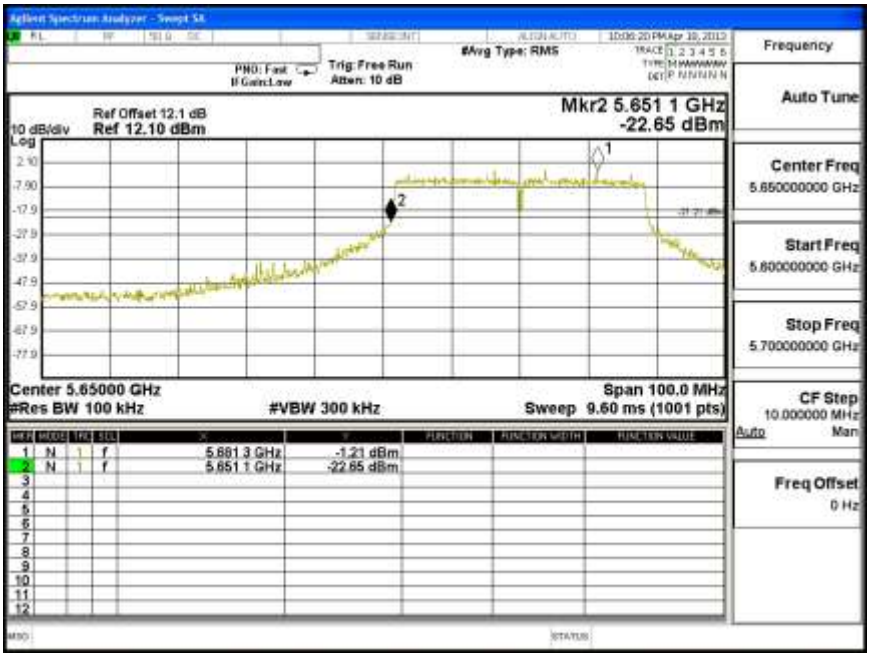
The authorized channel nearest to and less than 5600 MHz is measured.

The authorized channel nearest to and greater than 5650 MHz is measured.

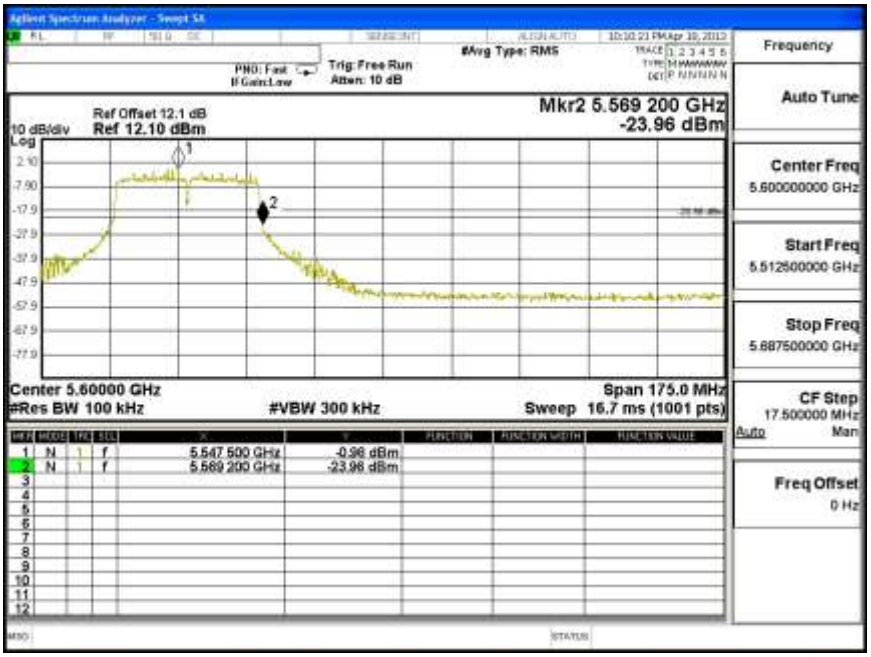
SPURIOUS EMISSIONS IN WEATHER RADAR BAND 5600 - 5650 MHz

LOWER CHANNEL CHAIN 0 SPURIOUS

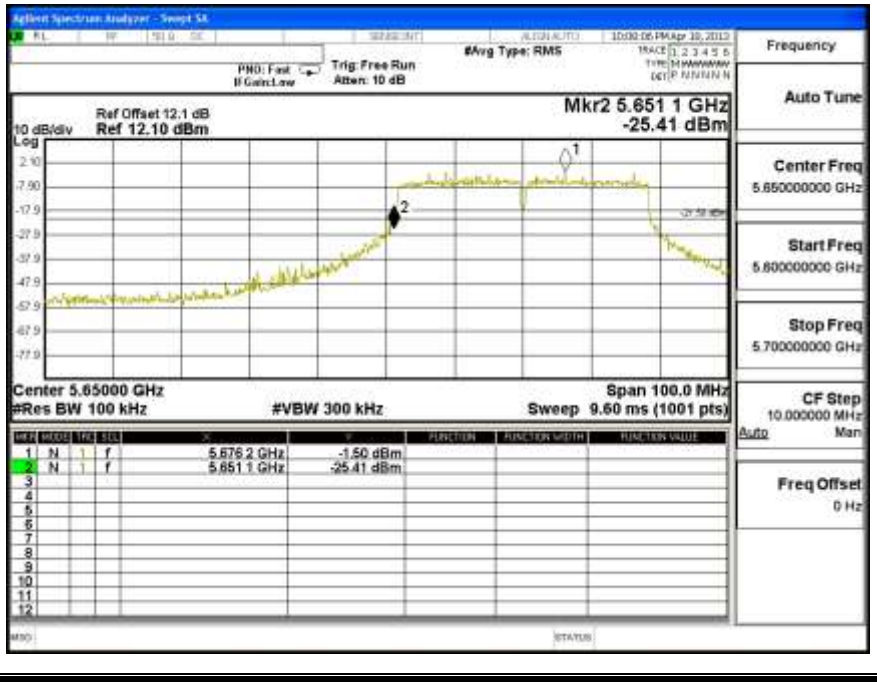
UPPER CHANNEL CHAIN 0 SPURIOUS



LOWER CHANNEL CHAIN 1 SPURIOUS



UPPER CHANNEL CHAIN 1 SPURIOUS



9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters.

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; the video bandwidth is set to 1 MHz for peak measurements and as applicable for average measurements.

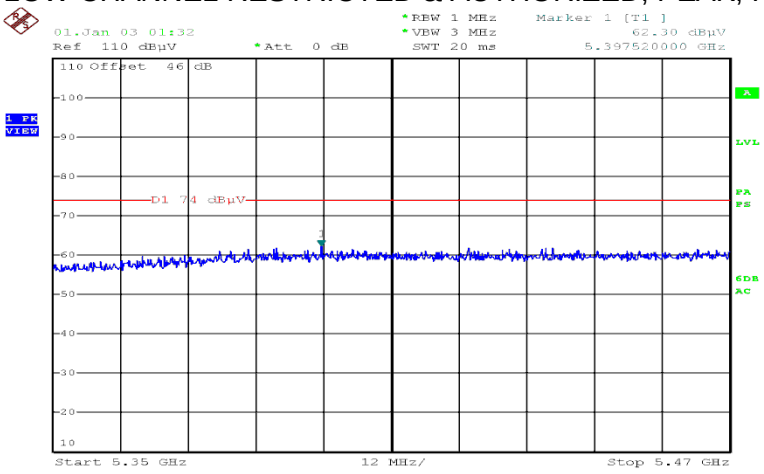
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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

9.2. TX ABOVE 1 GHz 802.11a CDD 2TX MODE IN THE 5.6 GHz BAND

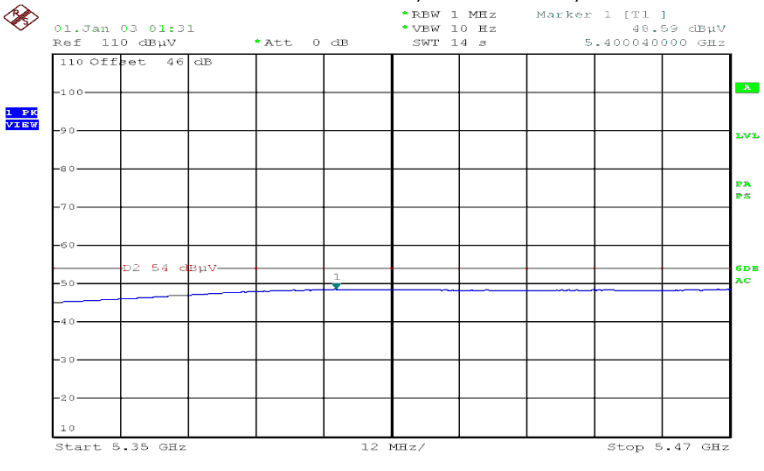
RESTRICTED & AUTHORIZED BANDEDGE (LOW CHANNEL)

LOW CHANNEL RESTRICTED & AUTHORIZED, PEAK, HORIZ



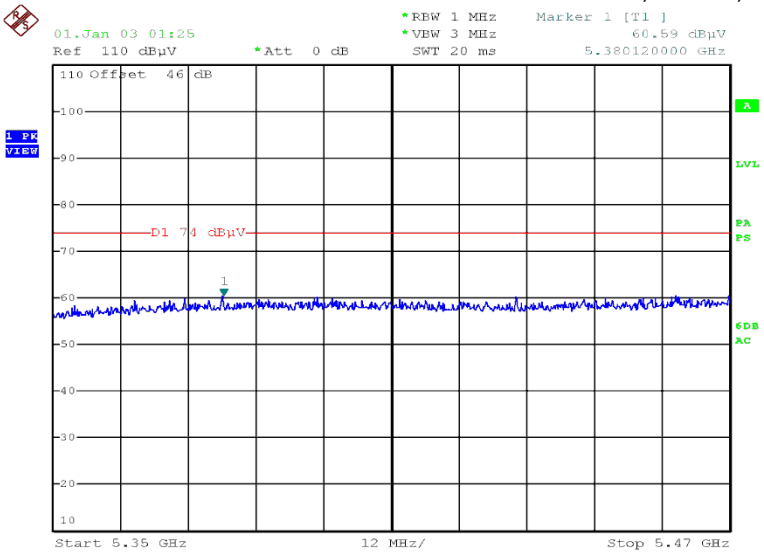
Date: 1.JAN.2003 01:32:20

LOW CHANNEL RESTRICTED, AVERAGE, HORIZ



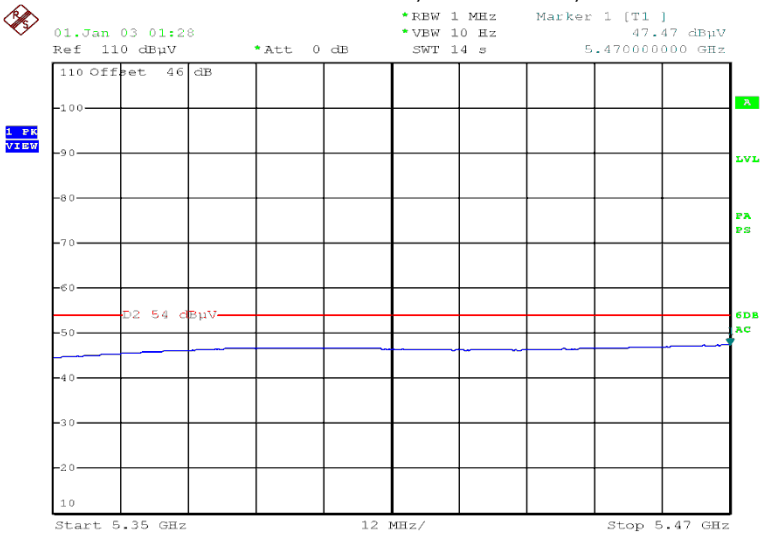
Date: 1.JAN.2003 01:31:57

LOW CHANNEL RESTRICTED & AUTHORIZED, PEAK, VERT



Date: 1.JAN.2003 01:25:58

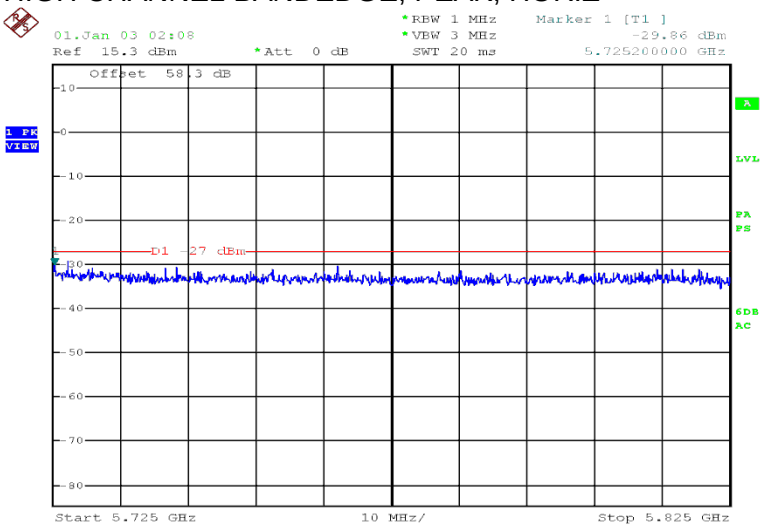
LOW CHANNEL RESTRICTED, AVERAGE, VERT



Date: 1.JAN.2003 01:28:20

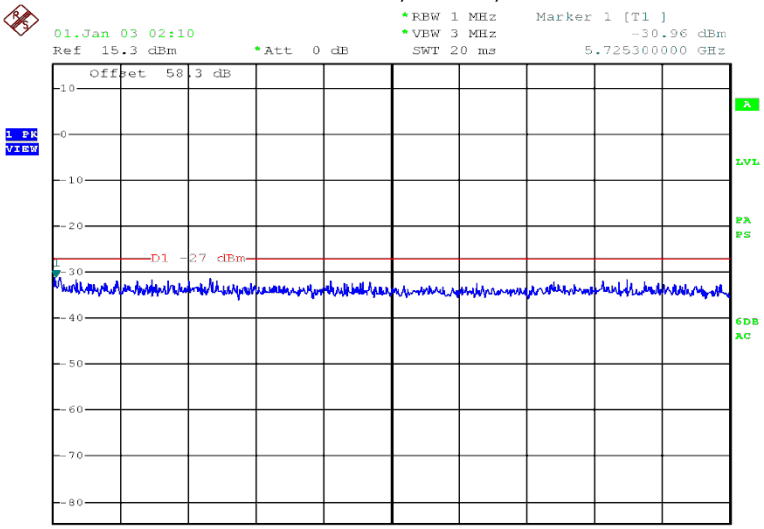
AUTHORIZED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL BANDEDGE, PEAK, HORIZ



Date: 1.JAN.2003 02:08:25

HIGH CHANNEL BANDEDGE, PEAK, VERT

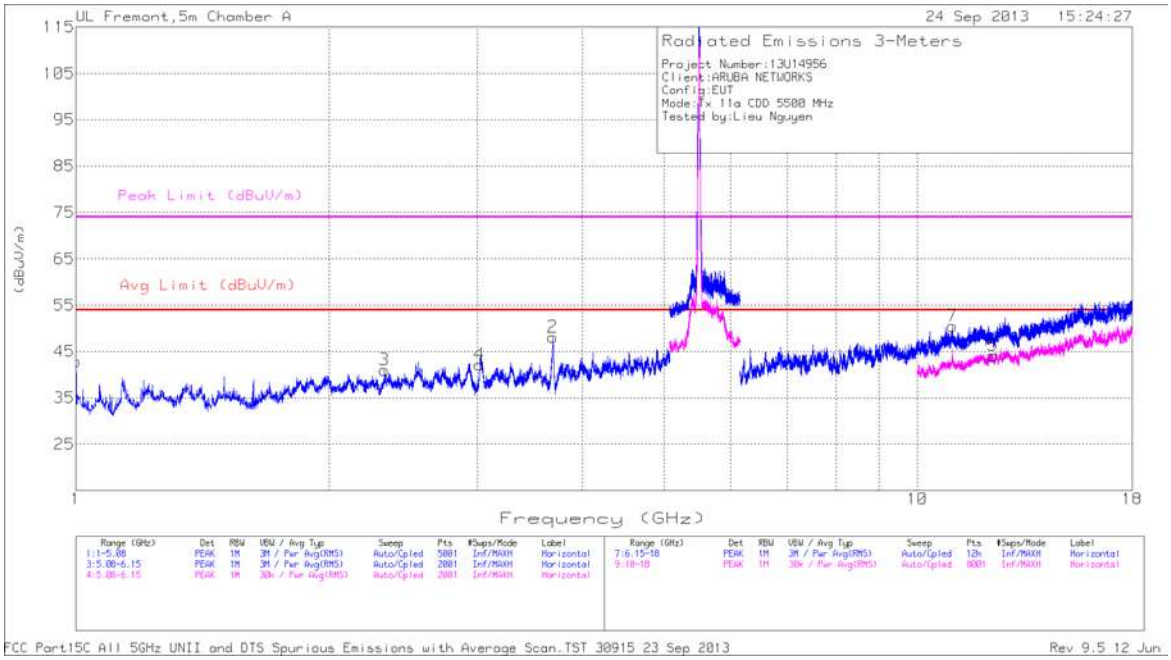


Date: 1.JAN.2003 02:10:32

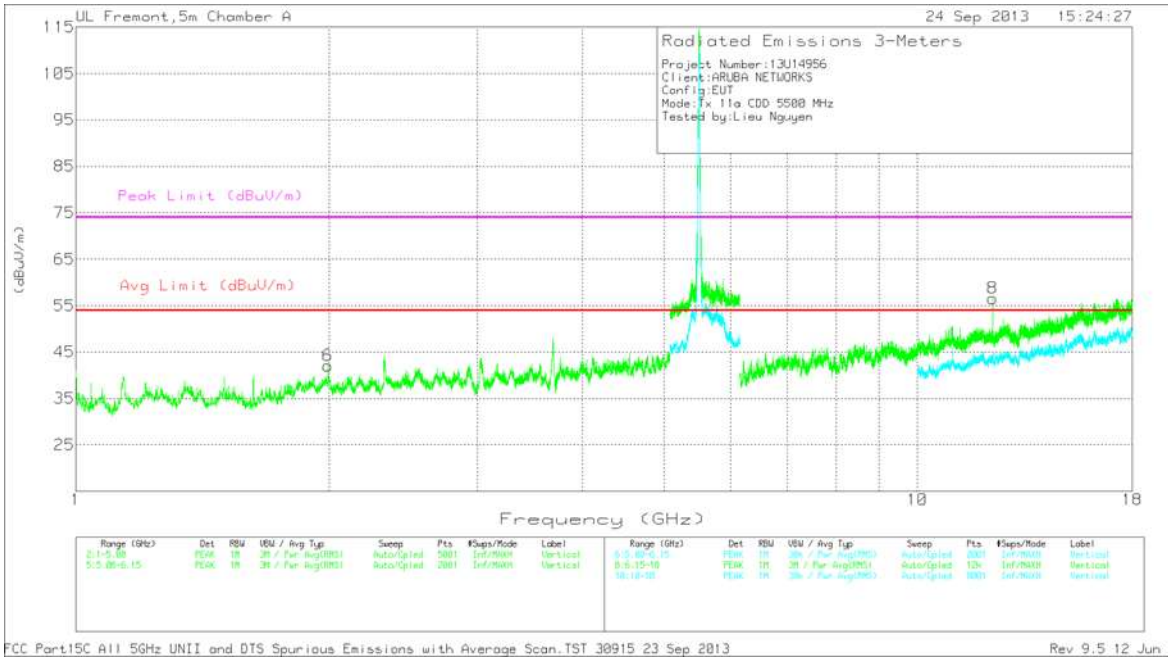
HARMONICS AND SPURIOUS EMISSIONS

Low Channel

Horizontal



Vertical



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	Peak Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1**	1	50.6	PK	28.1	-35.8	42.9	53.97	-11.07	74	-31.1	0-360	200	H
2	3.688	45.29	PK	33.3	-30.5	48.09	-	-	74	-25.91	0-360	100	H
3**	2.326	42.02	PK	31.7	-32.7	41.02	53.97	-12.95	74	-32.98	0-360	100	H
4*	3.019	40.54	PK	32.7	-31.1	42.14	-	-	68.2	-26.06	0-360	200	H
6*	1.993	44.27	PK	31.9	-34.1	42.07	-	-	68.2	-26.13	0-360	100	V
7	11.001	34.3	PK	37.8	-21.6	50.5	-	-	74	-23.5	0-360	100	H
8	12.284	39.97	PK	39	-22.4	56.57	-	-	74	-17.43	0-360	100	V
5**	12.3	27.7	PK	39	-22.6	44.1	53.97	-9.87	74	-29.9	0-360	100	H

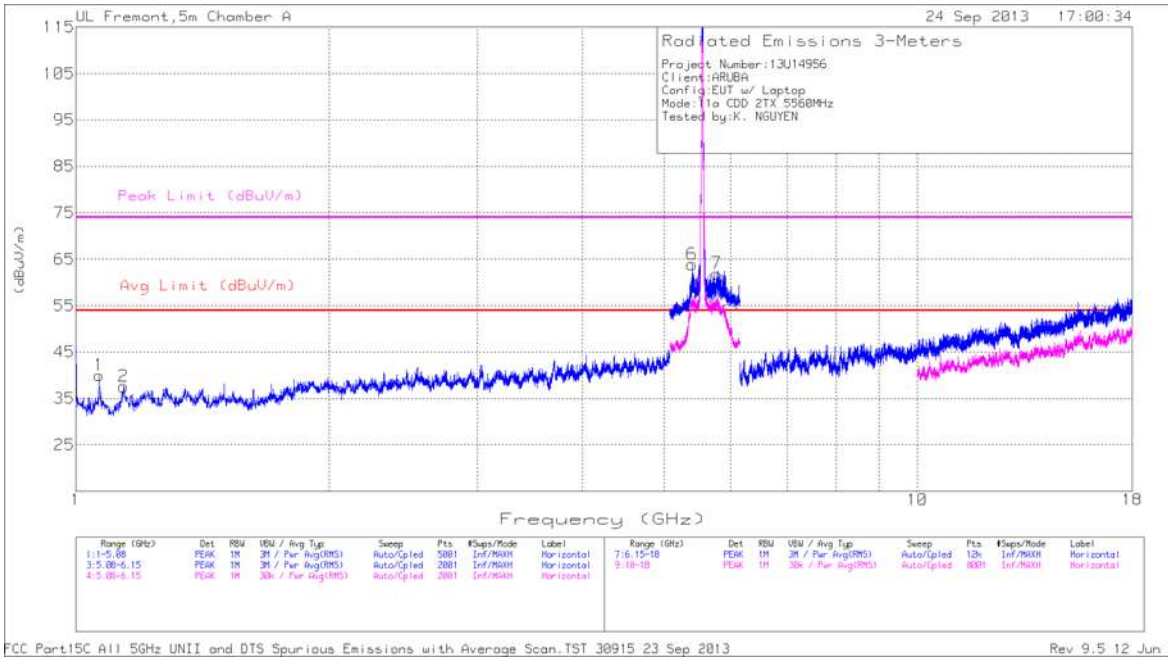
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	Peak Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3.688	36.43	VB1	33.3	-30.5	39.23	53.97	-14.74	-	-	354	245	H
11.001	20.59	VB1	37.8	-21.5	36.89	53.97	-17.08	-	-	354	258	H
12.284	21.14	VB1	39.1	-21.7	38.54	53.97	-15.43	-	-	323	365	V

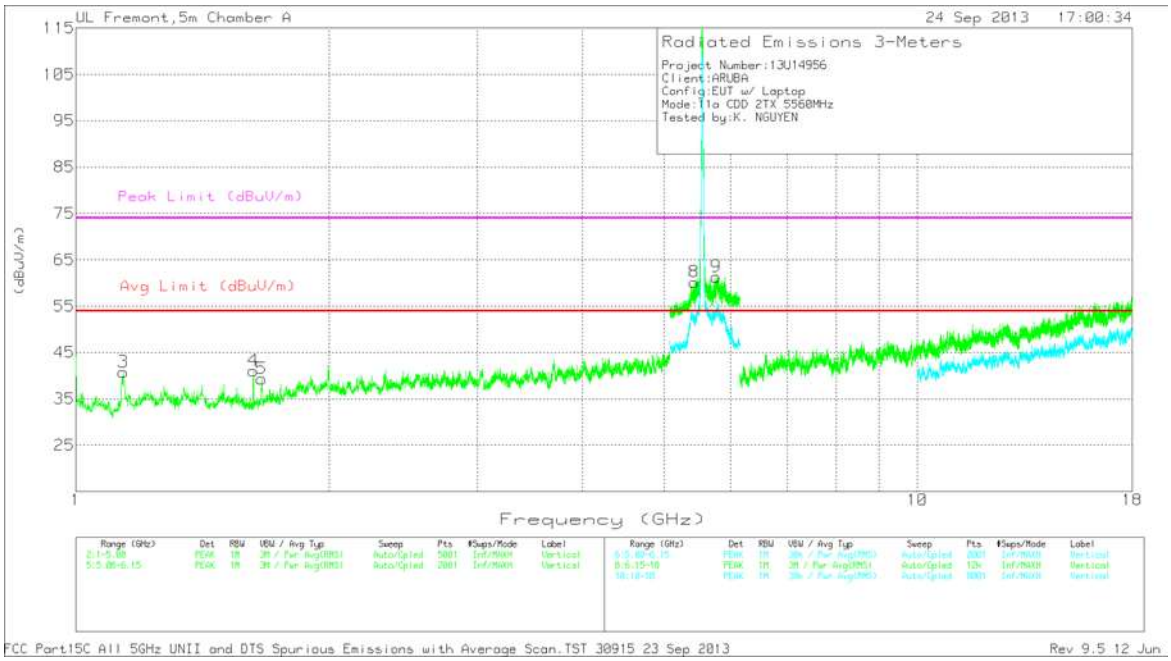
PK - Peak detector
VB1 - KDB 789033 Method: VB Alternative Reduced Video
* Denotes an emission that falls outside of the restricted bands and is subject to a peak emission limit of 68.2 dBuV (-27dBm).
** Denotes a peak measurement that satisfies both peak and average emission limits.

Mid Channel

Horizontal



Vertical



Trace Markers

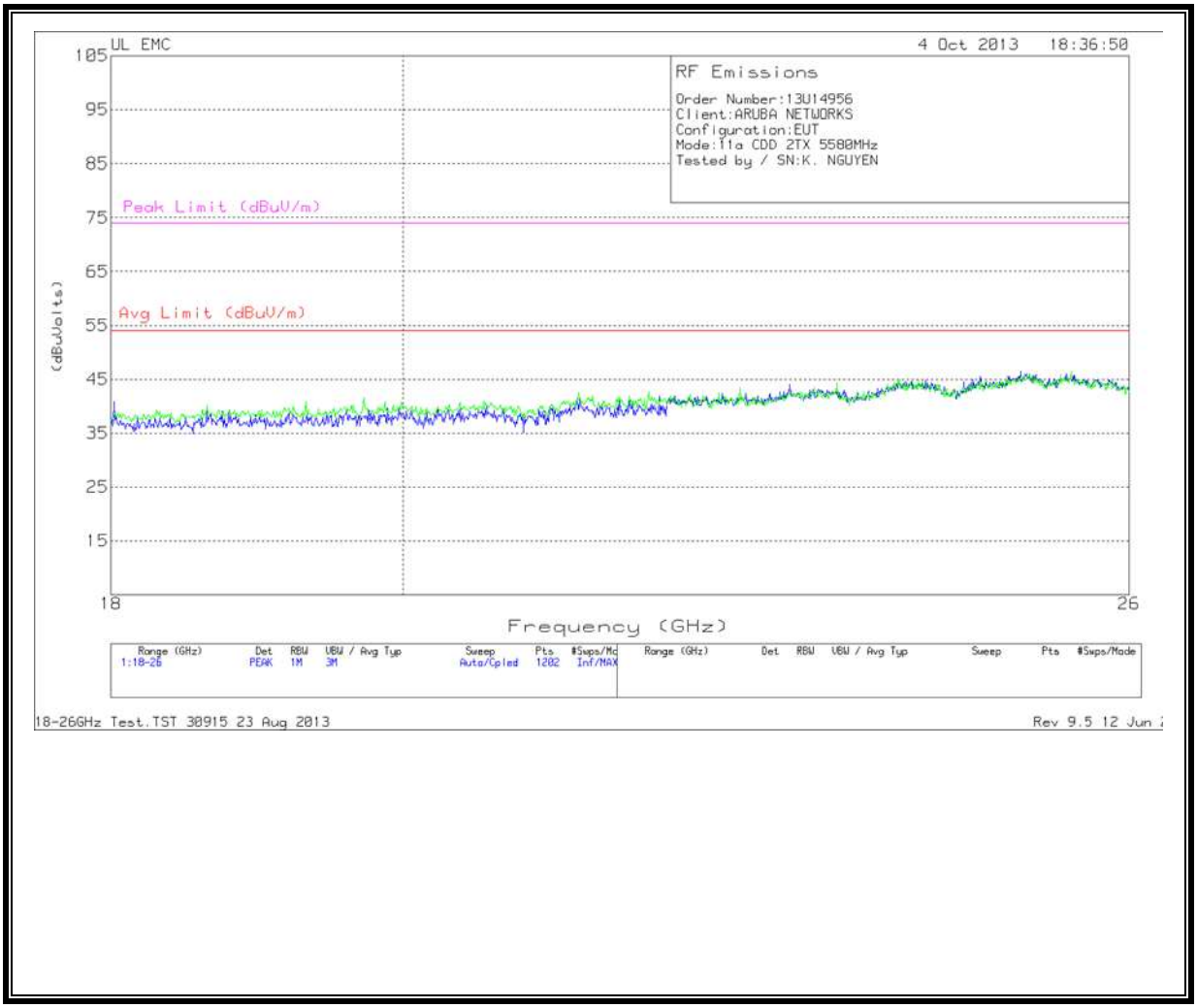
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	Peak Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1**	1.065	47.16	PK	28	-35.2	39.96	53.97	-14.01	74	-34.04	0-360	200	H
2**	1.14	43.6	PK	28.5	-34.5	37.6	53.97	-16.37	74	-36.4	0-360	200	H
3**	1.139	46.81	PK	28.5	-34.5	40.81	53.97	-13.16	74	-33.19	0-360	200	V
4**	1.625	47.01	PK	28.6	-34.5	41.11	53.97	-12.86	74	-32.89	0-360	200	V
5**	1.663	44.95	PK	29	-34.6	39.35	53.97	-14.62	74	-34.65	0-360	100	V
6	5.396	47.79	PK	34.4	-18.3	63.89	-	-	74	-10.11	0-360	100	H
7*	5.778	44.76	PK	34.8	-17.7	61.86	-	-	68.2	-6.34	0-360	100	H
8	5.428	44.09	PK	34.4	-18.3	60.19	-	-	74	-13.81	0-360	100	V
9*	5.767	44.95	PK	34.7	-18.3	61.35	-	-	68.2	-6.85	0-360	100	V

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	Peak Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5.396	48.29	PK1	34.4	-18.3	64.39	-	-	74	-9.61	178	114	H
5.396	37.77	VB1	34.4	-18.3	53.87	53.97	-0.1	-	-	178	114	H
5.428	45.77	PK1	34.4	-18.3	61.87	-	-	74	-12.13	185	111	V
5.428	34.85	VB1	34.4	-18.3	50.95	53.97	-3.02	-	-	185	111	V

PK - Peak detector
VB1 - KDB 789033 Method: VB Alternative Reduced Video
* Denotes an emission that falls outside of the restricted bands and is subject to a peak emission limit of 68.2 dBuV (-27dBm).
** Denotes a peak measurement that satisfies both peak and average emission limits.

18-26 GHz Trace Plots & Data



Trace Markers

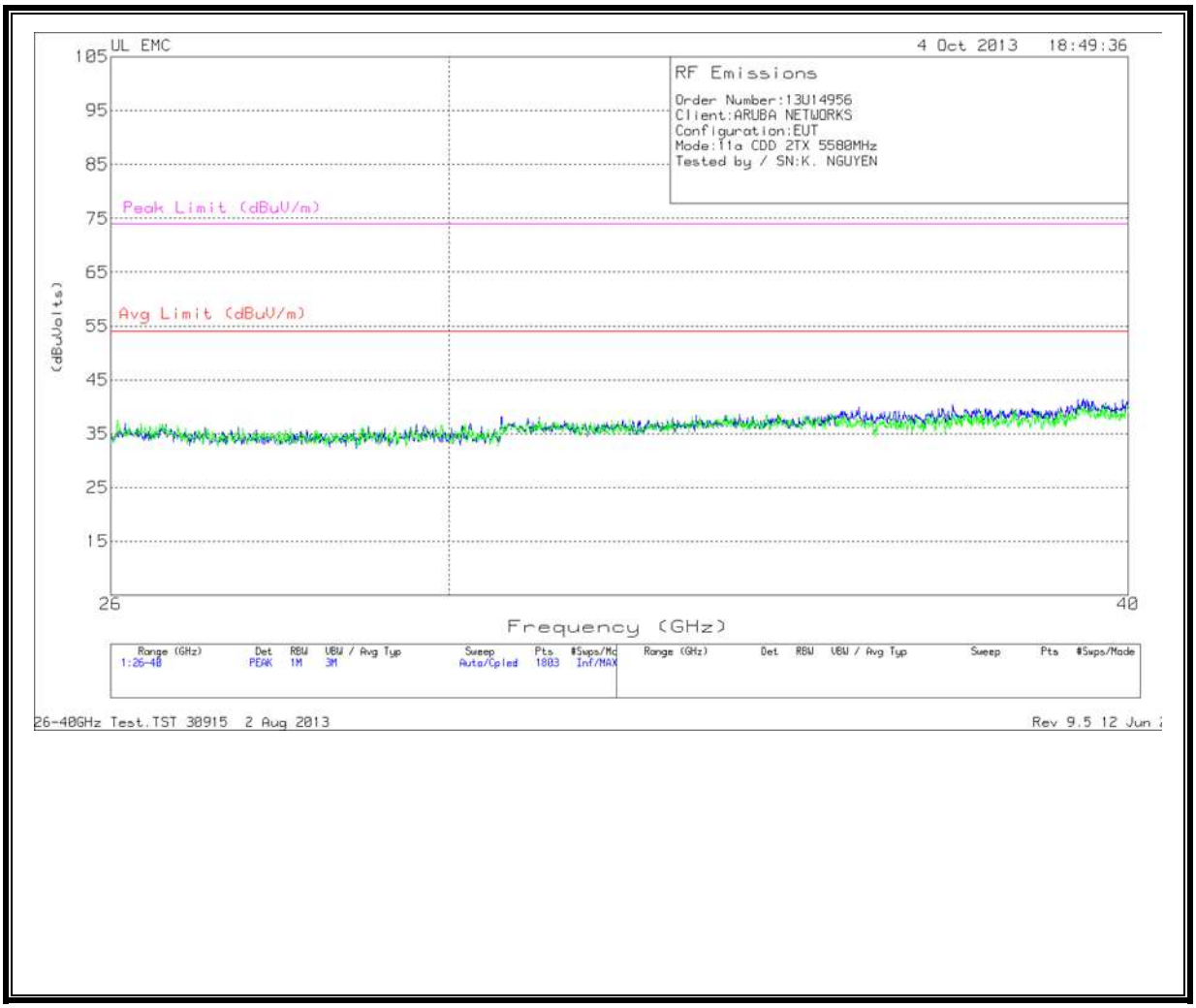
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T89 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1**	21.317	41.43	PK	33.2	-23.8	-9.5	41.33	54	-12.67	74	-32.67
2*	25.054	44.1	PK	34	-22.6	-9.5	46.00	-	-	68.2	-22.20
3**	19.719	42.57	PK	32.5	-23.9	-9.5	41.67	54	-12.33	74	-32.33
4**	22.59	42.8	PK	33.3	-23.1	-9.5	43.50	54	-10.50	74	-30.50
5*	23.396	43.13	PK	33.3	-22.6	-9.5	44.33	-	-	68.2	-23.87

PK - Peak detector

* Denotes an emission that falls outside of the restricted bands and is subject to a peak emission limit of 68.2 dBuV (-27dBm).

** Denotes a peak measurement that satisfies both peak and average emission limits.

26-40 GHz Trace Plots & Data



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T90 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1*	30.673	47.07	PK	36.1	-35.5	-9.5	38.17	-	-	68.2	-30.03
2*	35.688	49.7	PK	37.4	-37.6	-9.5	40.00	-	-	68.2	-28.20
3*	26.07	45.6	PK	35.6	-34.2	-9.5	37.50	-	-	68.2	-30.70
4*	34.321	47.37	PK	37.1	-36.3	-9.5	38.67	-	-	68.2	-29.53

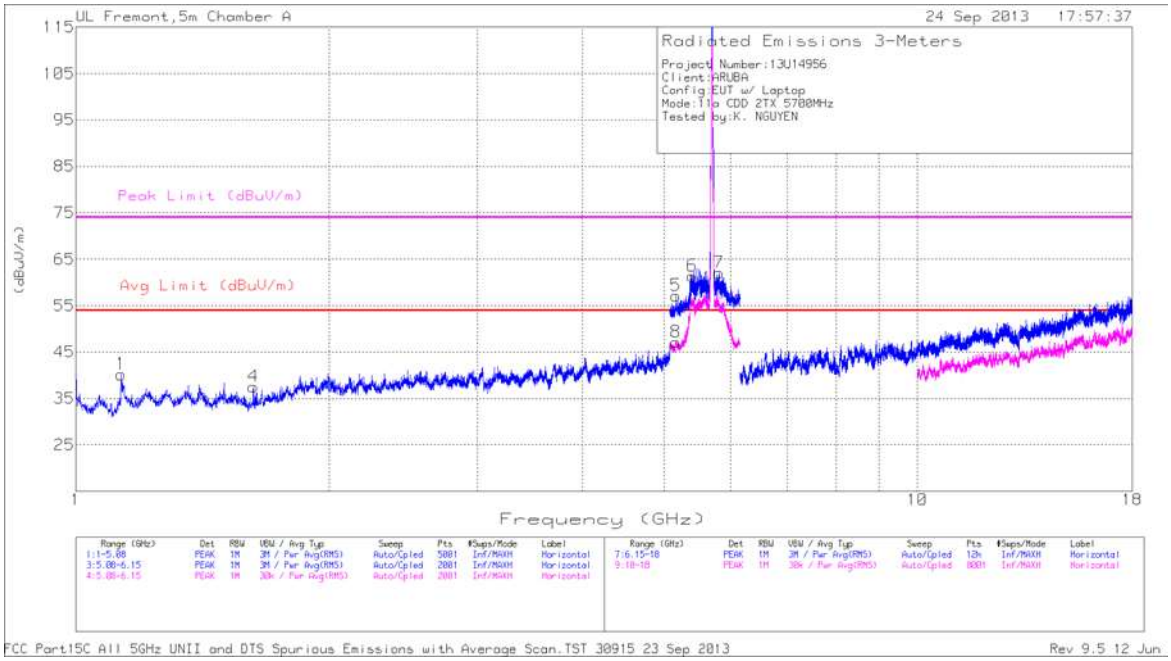
PK - Peak detector

* Denotes an emission that falls outside of the restricted bands and is subject to a peak emission limit of 68.2 dBuV (-27dBm).

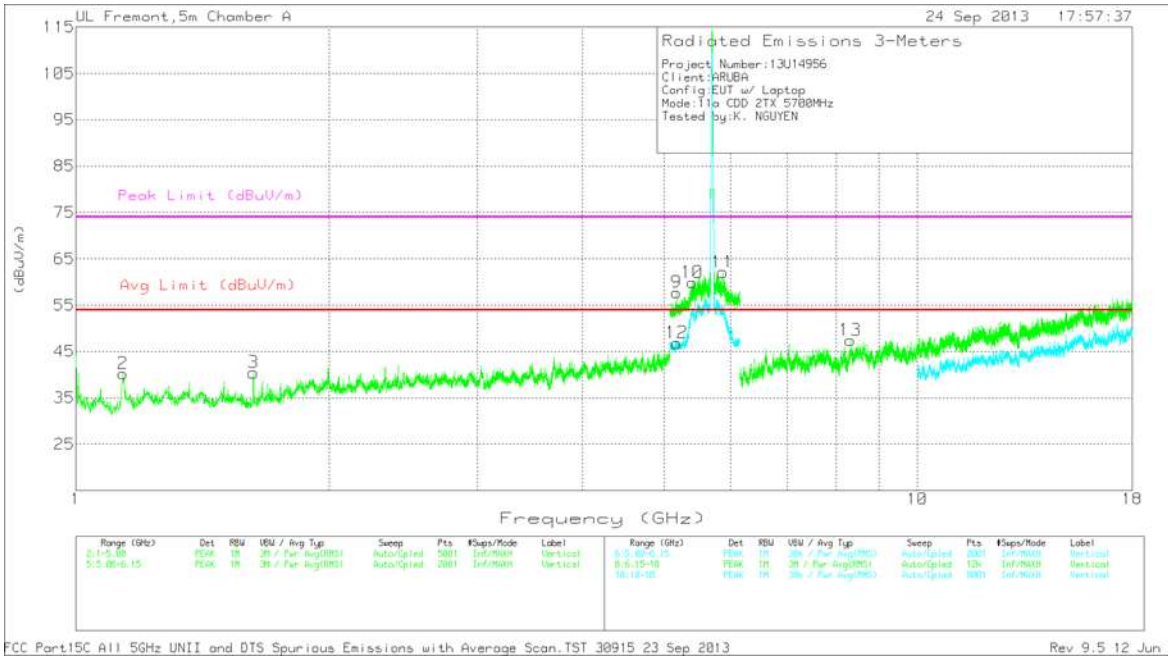
** Denotes a peak measurement that satisfies both peak and average emission limits.

High Channel

Horizontal



Vertical



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	Peak Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1**	1.132	46.31	PK	28.4	-34.5	40.21	53.97	-13.76	74	-33.79	0-360	100	H
4**	1.625	43.48	PK	28.6	-34.5	37.58	53.97	-16.39	74	-36.42	0-360	100	H
2**	1.138	46.23	PK	28.5	-34.5	40.23	53.97	-13.74	74	-33.77	0-360	200	V
3**	1.625	46.35	PK	28.6	-34.5	40.45	53.97	-13.52	74	-33.55	0-360	200	V
5*	5.163	41.25	PK	34.1	-18.2	57.15	-	-	68.2	-11.05	0-360	100	H
6	5.399	45.3	PK	34.4	-18.3	61.4	-	-	74	-12.6	0-360	100	H
7*	5.811	45.49	PK	34.8	-18.2	62.09	-	-	68.2	-6.11	0-360	100	H
8*	5.163	31.23	PK	34.1	-18.2	47.13	-	-	68.2	-21.07	0-360	100	H
9*	5.174	41.75	PK	34.1	-18.1	57.75	-	-	68.2	-10.45	0-360	100	V
10	5.4	43.78	PK	34.4	-18.3	59.88	-	-	74	-14.12	0-360	100	V
11*	5.872	45.62	PK	35	-18.5	62.12	-	-	68.2	-6.08	0-360	100	V
12*	5.174	30.84	PK	34.1	-18.1	46.84	-	-	68.2	-21.36	0-360	100	V
13**	8.325	37.01	PK	35.6	-25.2	47.41	53.97	-6.56	74	-26.59	0-360	100	V

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	Peak Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5.399	48.13	PK1	34.4	-18.3	64.23	-	-	74	-9.77	180	124	H
5.399	37.67	VB1	34.4	-18.3	53.77	53.97	-0.2	-	-	180	124	H
5.4	46.07	PK1	34.4	-18.3	62.17	-	-	74	-11.83	181	110	V
5.4	35.36	VB1	34.4	-18.3	51.46	53.97	-2.51	-	-	181	110	V

PK - Peak detector

VB1 - KDB 789033 Method: VB Alternative Reduced Video

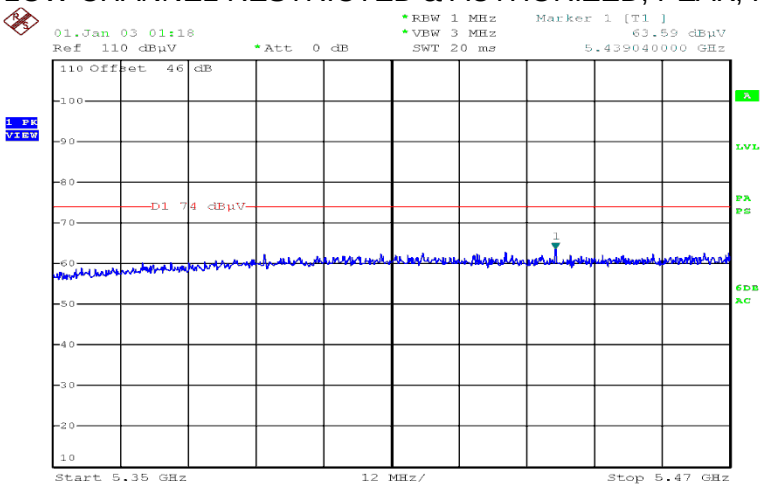
* Denotes an emission that falls outside of the restricted bands and is subject to a peak emission limit of 68.2 dBuV (-27dBm).

** Denotes a peak measurement that satisfies both peak and average emission limits.

9.3. TX ABOVE 1 GHz 802.11n HT20 STBC 2TX MODE IN THE 5.6 GHz BAND

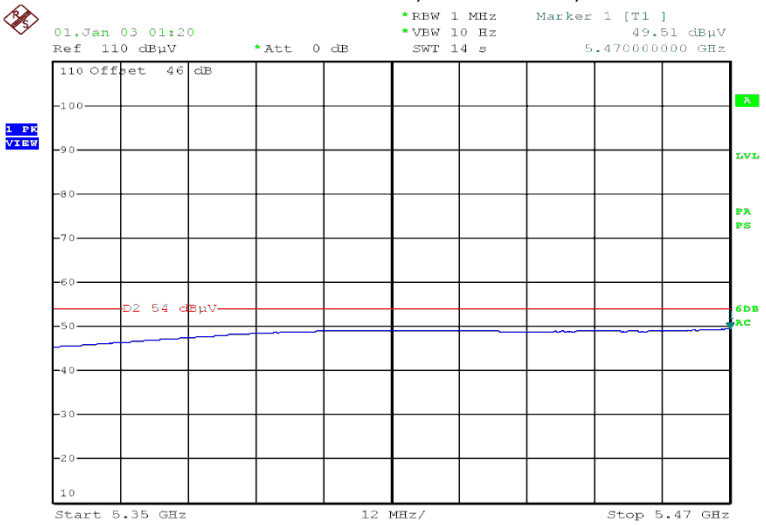
RESTRICTED & AUTHORIZED BANDEDGE (LOW CHANNEL)

LOW CHANNEL RESTRICTED & AUTHORIZED, PEAK, HORIZ



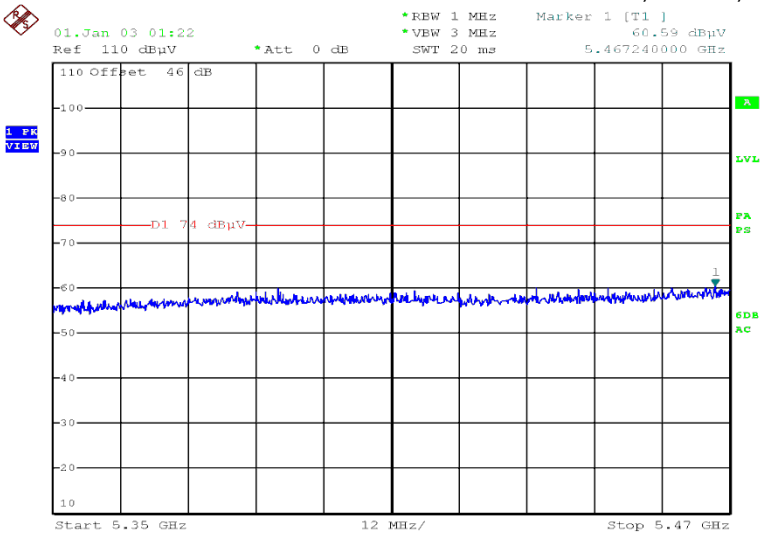
Date: 1.JAN.2003 01:18:59

LOW CHANNEL RESTRICTED, AVERAGE, HORIZ



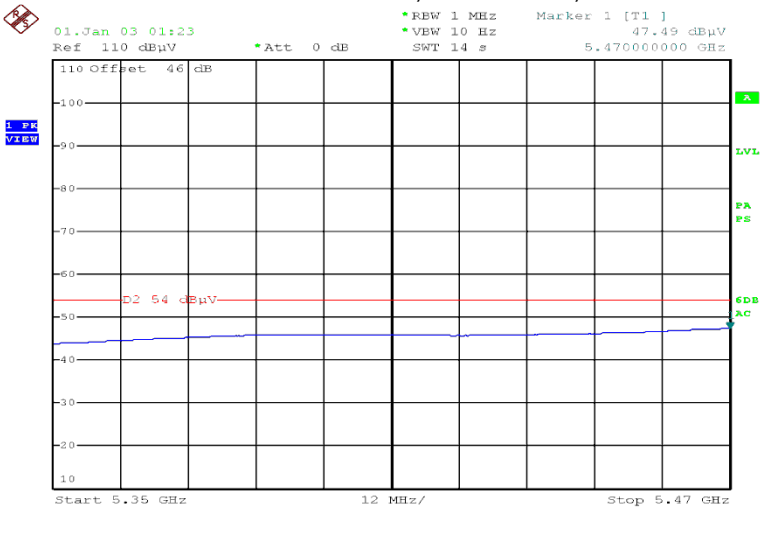
Date: 1.JAN.2003 01:20:07

LOW CHANNEL RESTRICTED & AUTHORIZED, PEAK, VERT



Date: 1.JAN.2003 01:22:33

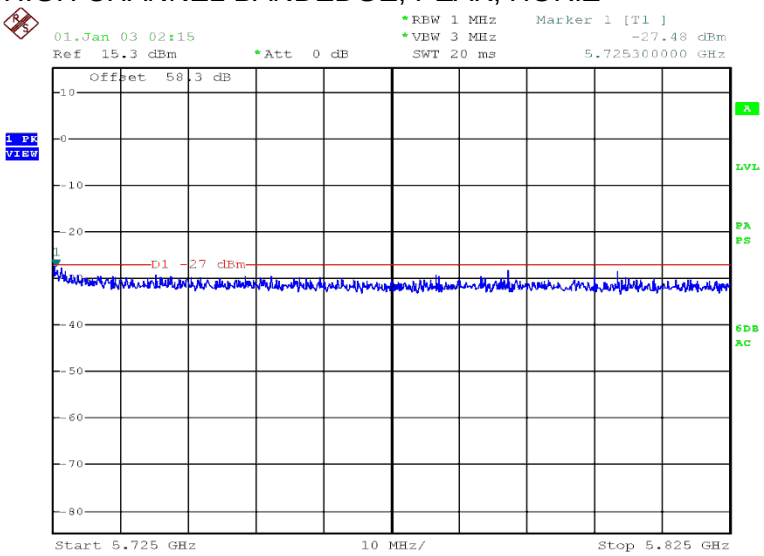
LOW CHANNEL RESTRICTED, AVERAGE, VERT



Date: 1.JAN.2003 01:23:20

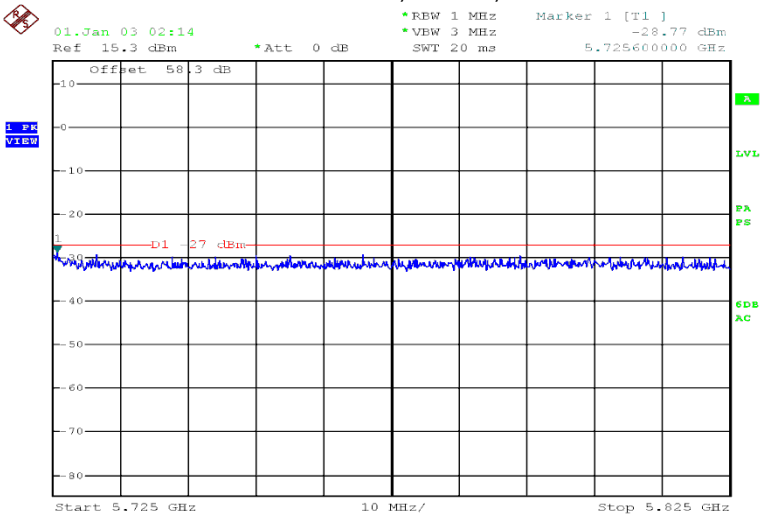
AUTHORIZED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL BANDEDGE, PEAK, HORIZ



Date: 1.JAN.2003 02:15:36

HIGH CHANNEL BANDEDGE, PEAK, VERT

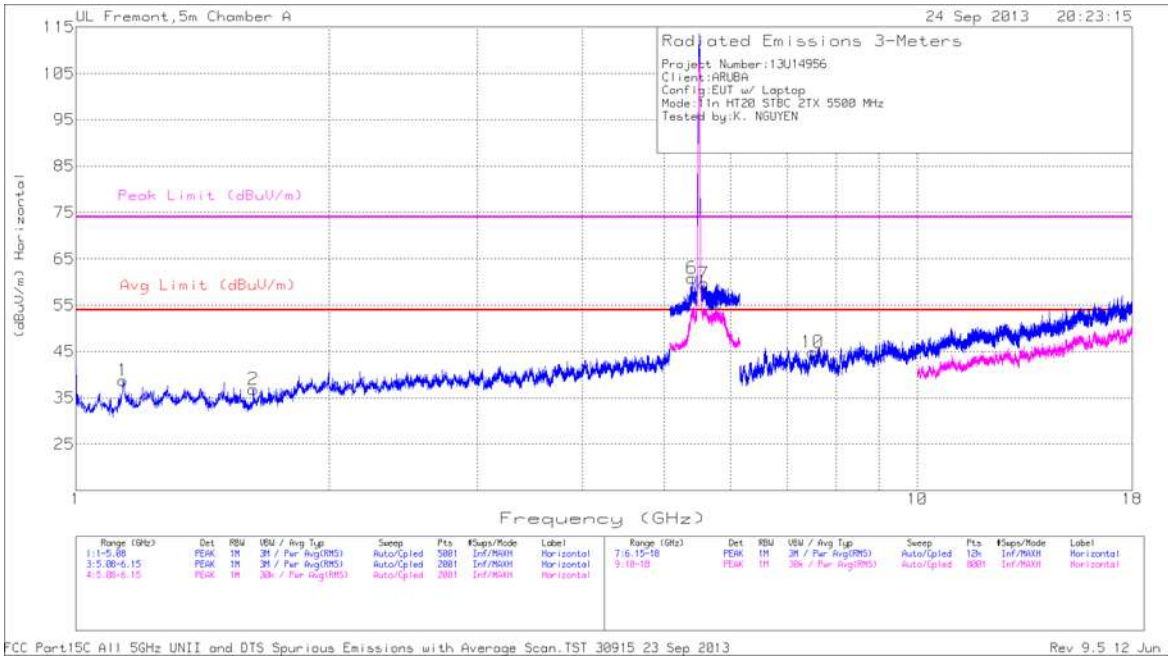


Date: 1.JAN.2003 02:14:03

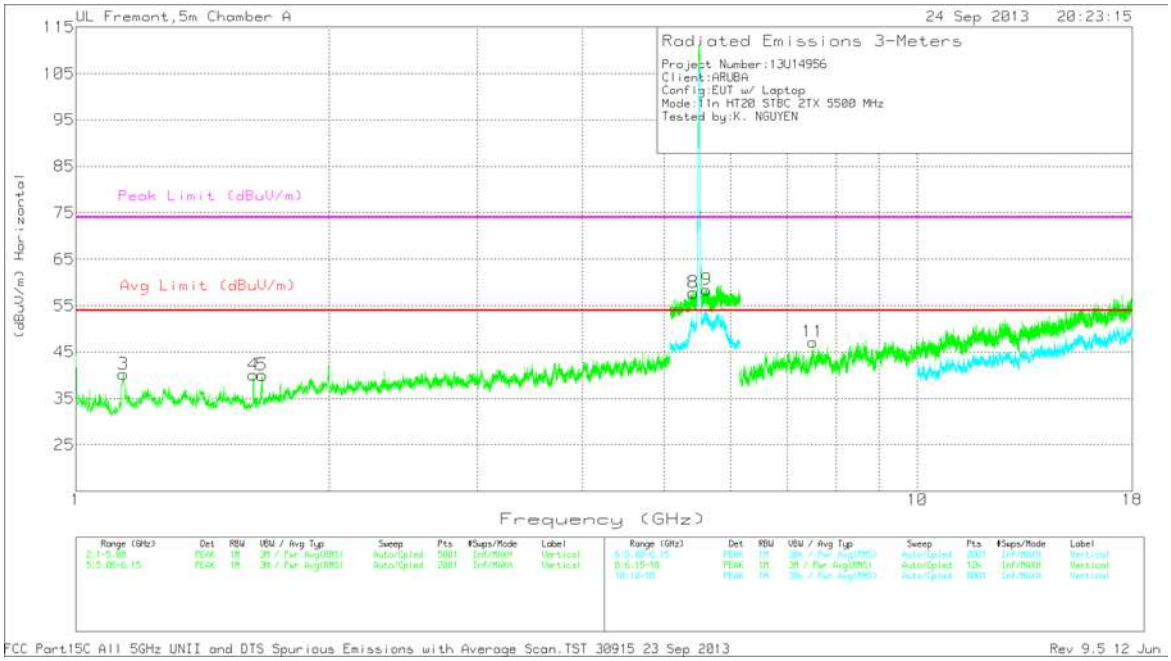
HARMONICS AND SPURIOUS EMISSIONS

Low Channel

Horizontal



Vertical



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	Peak Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1**	1.137	44.74	PK	28.5	-34.5	38.74	53.97	-15.23	74	-35.26	0-360	200	H
2**	1.625	42.74	PK	28.6	-34.5	36.84	53.97	-17.13	74	-37.16	0-360	200	H
3**	1.139	46.26	PK	28.5	-34.5	40.26	53.97	-13.71	74	-33.74	0-360	200	V
4**	1.625	45.98	PK	28.6	-34.5	40.08	53.97	-13.89	74	-33.92	0-360	200	V
5**	1.665	45.76	PK	29	-34.7	40.06	53.97	-13.91	74	-33.94	0-360	100	V
6	5.397	44.75	PK	34.4	-18.3	60.85	-	-	74	-13.15	0-360	100	H
7*	5.576	43.78	PK	34.4	-18.5	59.68	-	-	68.2	-8.52	0-360	100	H
8	5.416	41.81	PK	34.4	-18.4	57.81	-	-	74	-16.19	0-360	100	V
9*	5.618	42.65	PK	34.4	-18.6	58.45	-	-	68.2	-9.75	0-360	100	V
10**	7.51	33.91	PK	35.4	-24.5	44.81	53.97	-9.16	74	-29.19	0-360	200	H
11**	7.515	36.18	PK	35.4	-24.4	47.18	53.97	-6.79	74	-26.82	0-360	100	V

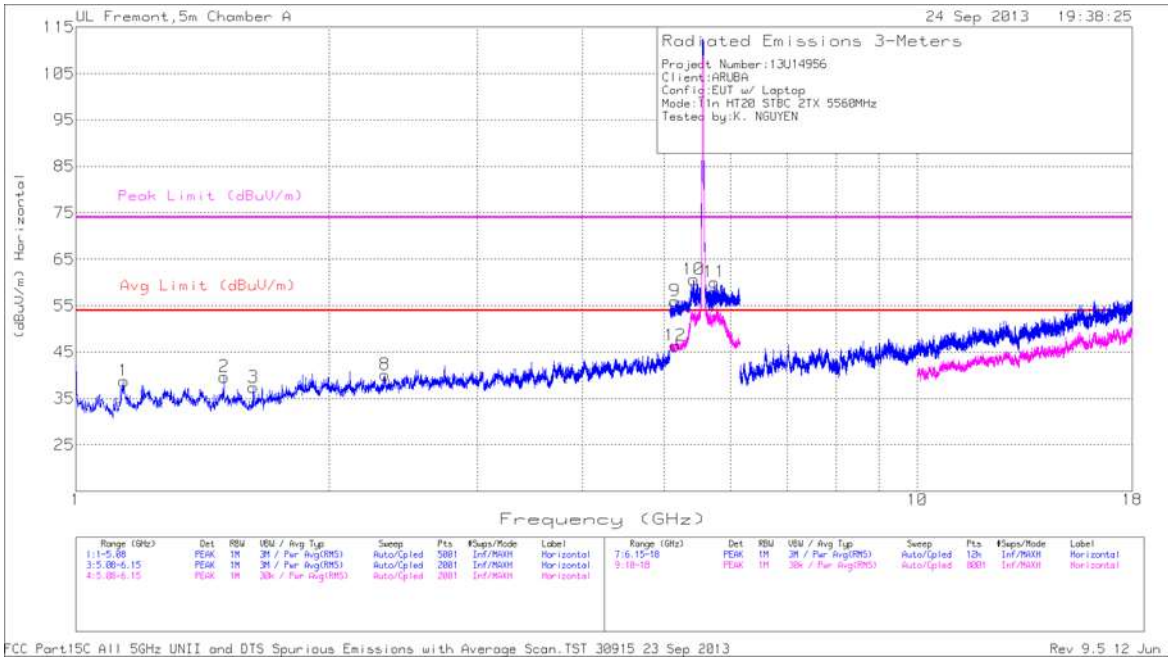
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	Peak Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5.397	46.79	PK1	34.4	-18.3	62.89	-	-	74	-11.11	178	117	H
5.397	35.49	VB1	34.4	-18.3	51.59	53.97	-2.38	-	-	178	117	H
5.416	42.66	PK1	34.4	-18.4	58.66	-	-	74	-15.34	176	119	V
5.416	32.51	VB1	34.4	-18.4	48.51	53.97	-5.46	-	-	176	119	V
5.576*	45.74	PK1	34.4	-18.5	61.64	-	-	68.2	-6.56	184	117	H
5.618*	44.91	PK1	34.4	-18.6	60.71	-	-	68.2	-7.49	172	116	V

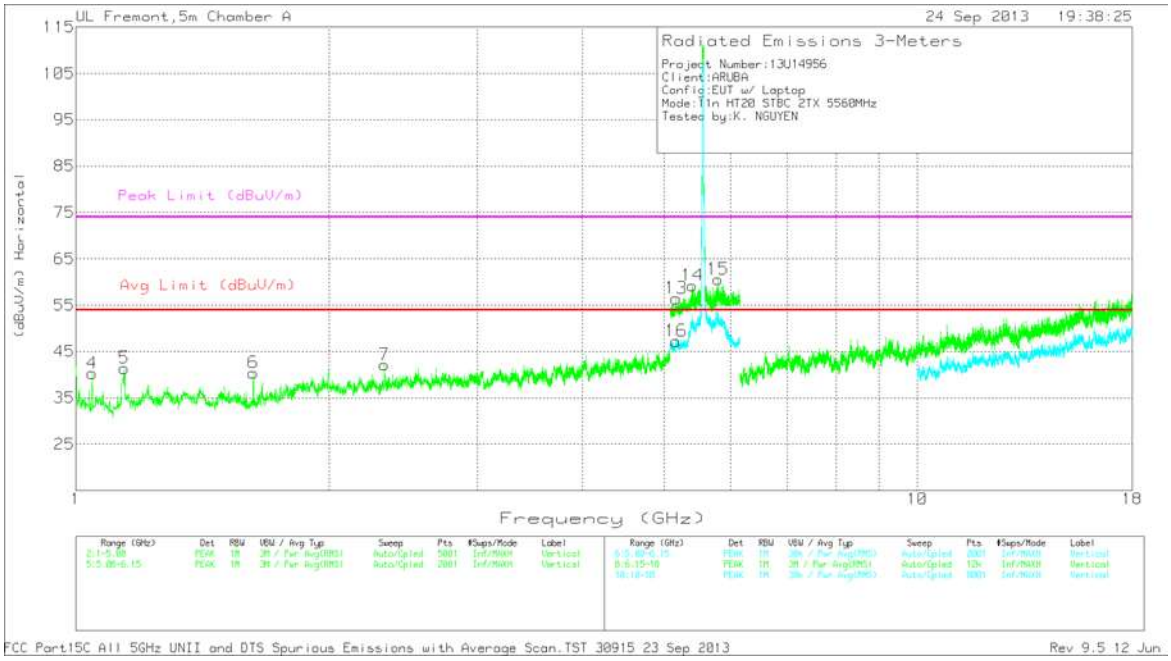
PK - Peak detector
VB1 - KDB 789033 Method: VB Alternative Reduced Video
* Denotes an emission that falls outside of the restricted bands and is subject to a peak emission limit of 68.2 dBuV (-27dBm).
** Denotes a peak measurement that satisfies both peak and average emission limits.

Mid Channel

Horizontal



Vertical



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	Peak Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1**	1.14	44.8	PK	28.5	-34.5	38.8	53.97	-15.17	74	-35.2	0-360	200	H
2**	1.5	44.76	PK	28.9	-34	39.66	53.97	-14.31	74	-34.34	0-360	100	H
3**	1.625	43.32	PK	28.6	-34.5	37.42	53.97	-16.55	74	-36.58	0-360	200	H
8**	2.331	41.03	PK	31.8	-32.7	40.13	53.97	-13.84	74	-33.87	0-360	200	H
4**	1.046	47.91	PK	28	-35.6	40.31	53.97	-13.66	74	-33.69	0-360	100	V
5**	1.142	47.41	PK	28.6	-34.6	41.41	53.97	-12.56	74	-32.59	0-360	200	V
6**	1.625	46.31	PK	28.6	-34.5	40.41	53.97	-13.56	74	-33.59	0-360	200	V
7**	2.326	43.15	PK	31.7	-32.7	42.15	53.97	-11.82	74	-31.85	0-360	100	V
9*	5.153	40.41	PK	34.1	-18.5	56.01	-	-	68.2	-12.19	0-360	100	H
10	5.423	44.63	PK	34.4	-18.4	60.63	-	-	74	-13.37	0-360	100	H
11*	5.738	43.37	PK	34.7	-18	60.07	-	-	68.2	-8.13	0-360	100	H
12*	5.155	30.79	PK	34.1	-18.5	46.39	-	-	68.2	-21.81	0-360	200	H
13*	5.168	40.56	PK	34.1	-18.2	56.46	-	-	68.2	-11.74	0-360	100	V
14	5.403	43.24	PK	34.4	-18.4	59.24	-	-	74	-14.76	0-360	100	V
15*	5.795	43.07	PK	34.8	-17.3	60.57	-	-	68.2	-7.63	0-360	100	V
16*	5.166	31.34	PK	34.1	-18.2	47.24	-	-	68.2	-20.96	0-360	200	V

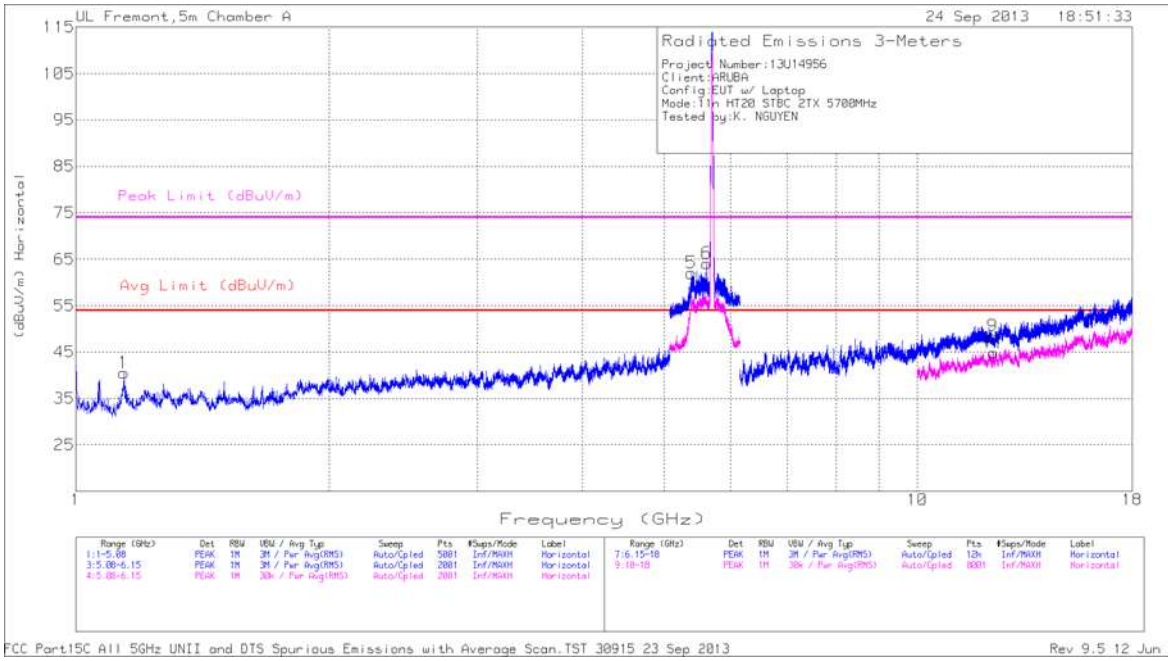
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	Peak Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5.403	43.34	PK1	34.4	-18.4	59.34	-	-	74	-14.66	187	108	V
5.403	33.16	VB1	34.4	-18.3	49.26	53.97	-4.71	-	-	187	108	V
5.423	45.13	PK1	34.4	-18.4	61.13	-	-	74	-12.87	175	125	H
5.423	34.85	VB1	34.4	-18.4	50.85	53.97	-3.12	-	-	175	125	H
5.738*	44.94	PK1	34.7	-18.1	61.54	-	-	68.2	-6.66	179	112	H
5.795*	43.7	PK1	34.8	-17.3	61.2	-	-	68.2	-7	197	114	V

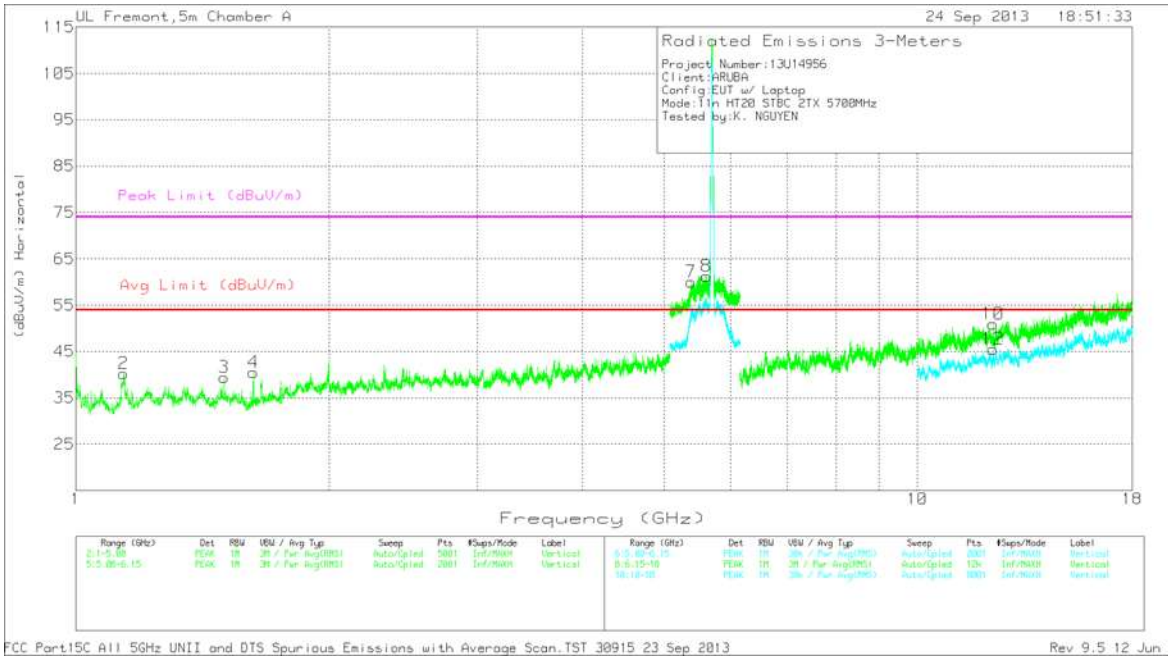
PK - Peak detector
VB1 - KDB 789033 Method: VB Alternative Reduced Video
* Denotes an emission that falls outside of the restricted bands and is subject to a peak emission limit of 68.2 dBuV (-27dBm).
** Denotes a peak measurement that satisfies both peak and average emission limits.

High Channel

Horizontal



Vertical



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	Peak Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1**	1.14	46.53	PK	28.5	-34.5	40.53	53.97	-13.44	74	-33.47	0-360	200	H
2**	1.14	46.24	PK	28.5	-34.5	40.24	53.97	-13.73	74	-33.76	0-360	200	V
3**	1.5	44.54	PK	28.9	-34	39.44	53.97	-14.53	74	-34.56	0-360	200	V
4**	1.625	46.39	PK	28.6	-34.5	40.49	53.97	-13.48	74	-33.51	0-360	200	V
5	5.388	46.02	PK	34.4	-18.4	62.02	-	-	74	-11.98	0-360	100	H
6*	5.617	48.28	PK	34.4	-18.6	64.08	-	-	68.2	-4.12	0-360	100	H
7	5.384	44.03	PK	34.4	-18.4	60.03	-	-	74	-13.97	0-360	100	V
8*	5.615	45.43	PK	34.4	-18.6	61.23	-	-	68.2	-6.97	0-360	100	V
10	12.297	34.53	PK	39	-22.6	50.93	-	-	74	-23.07	0-360	200	V
12	12.297	29.12	VB1	39	-22.6	45.52	53.97	-8.45	-	-	0-360	200	V
9	12.29	31.91	PK	39	-22.5	48.41	-	-	74	-25.59	0-360	100	H
11	12.29	28.45	VB1	39	-22.6	44.85	53.97	-9.12	-	-	0-360	200	H

Radiated Emissions

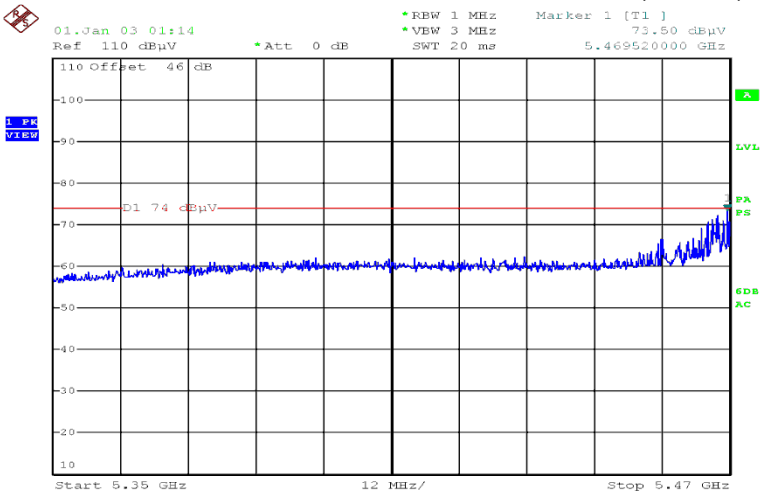
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	Peak Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5.384	45.61	PK1	34.4	-18.4	61.61	-	-	74	-12.39	182	115	V
5.384	35.27	VB1	34.4	-18.4	51.27	53.97	-2.7	-	-	182	115	V
5.388	47.98	PK1	34.4	-18.4	63.98	-	-	74	-10.02	175	118	H
5.388	37.23	VB1	34.4	-18.4	53.23	53.97	-0.74	-	-	175	118	H
5.615*	46.74	PK1	34.4	-18.6	62.54	-	-	68.2	-5.66	185	105	V
5.617*	48.02	PK1	34.4	-18.6	63.82	-	-	68.2	-4.38	184	108	H

PK - Peak detector
VB1 - KDB 789033 Method: VB Alternative Reduced Video
* Denotes an emission that falls outside of the restricted bands and is subject to a peak emission limit of 68.2 dBuV (-27dBm).
** Denotes a peak measurement that satisfies both peak and average emission limits.

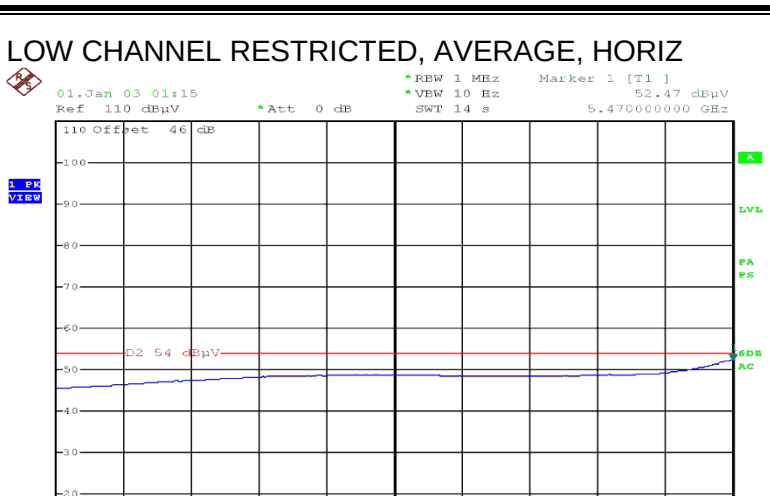
9.4. TX ABOVE 1 GHz 802.11n HT40 STBC 2TX MODE IN THE 5.6 GHz BAND

RESTRICTED & AUTHORIZED BANDEDGE (LOW CHANNEL)

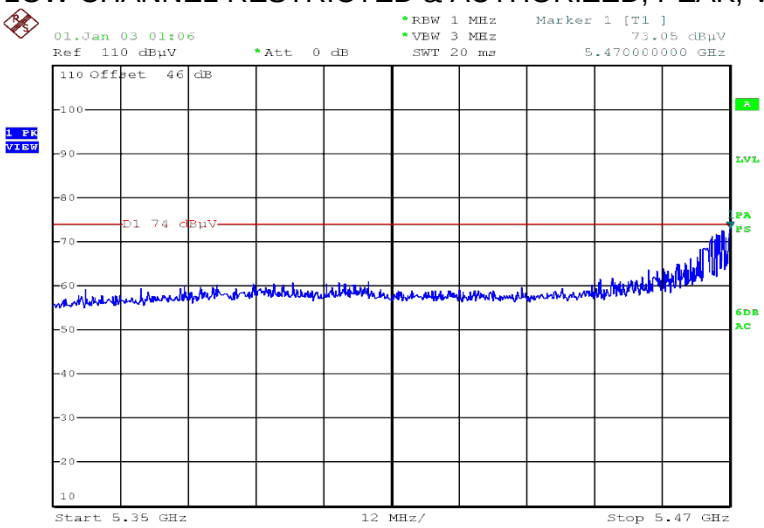
LOW CHANNEL RESTRICTED & AUTHORIZED, PEAK, HORIZ



LOW CHANNEL RESTRICTED, AVERAGE, HORIZ

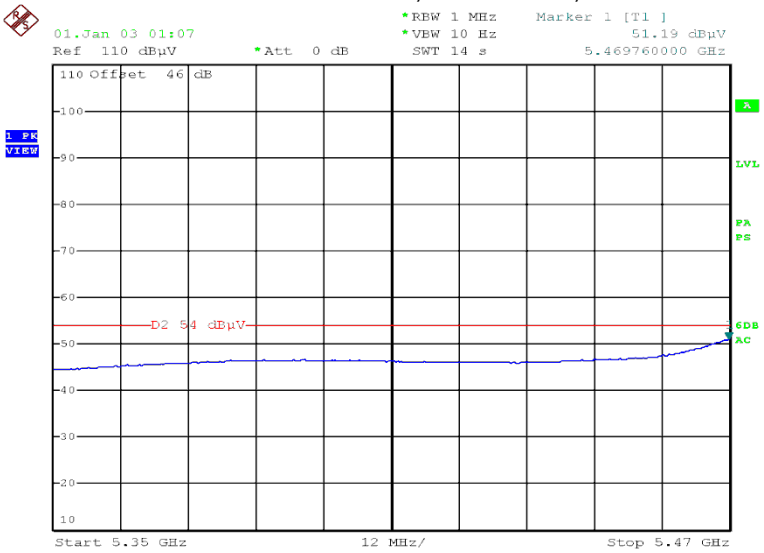


LOW CHANNEL RESTRICTED & AUTHORIZED, PEAK, VERT



Date: 1.JAN.2003 01:06:43

LOW CHANNEL RESTRICTED, AVERAGE, VERT



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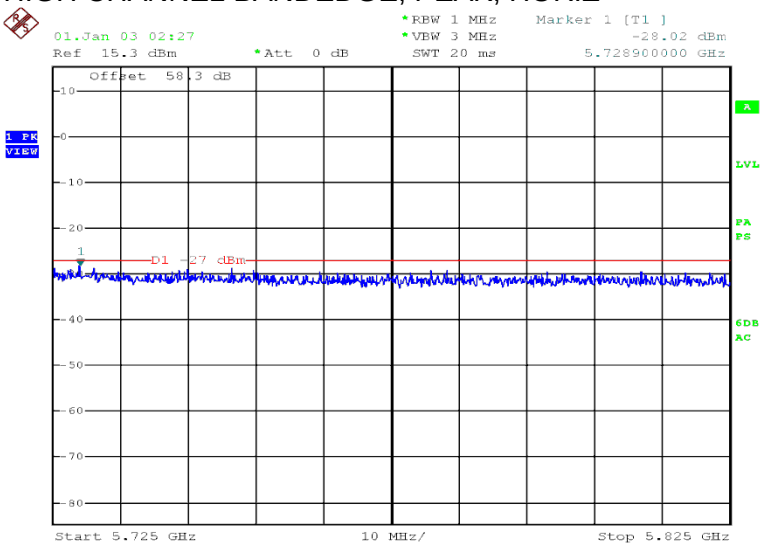
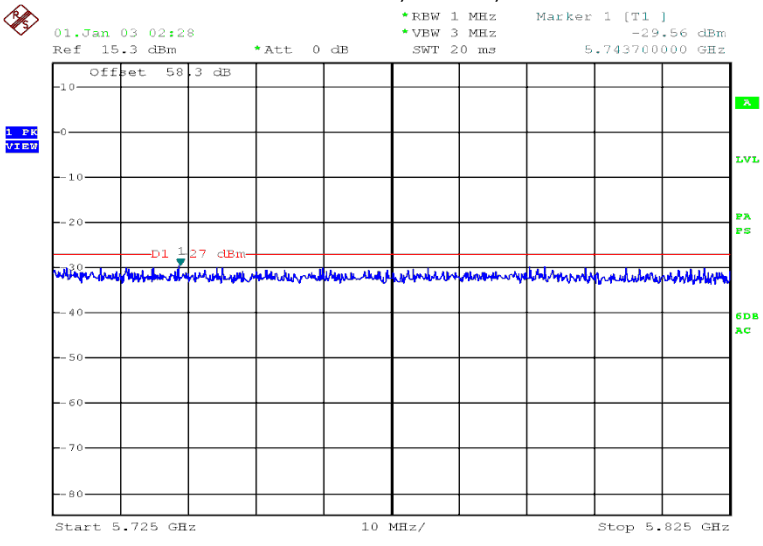
AUTHORIZED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL BANDEDGE, PEAK, HORIZ



Date: 1.JAN.2003 02:27:15

HIGH CHANNEL BANDEDGE, PEAK, VERT

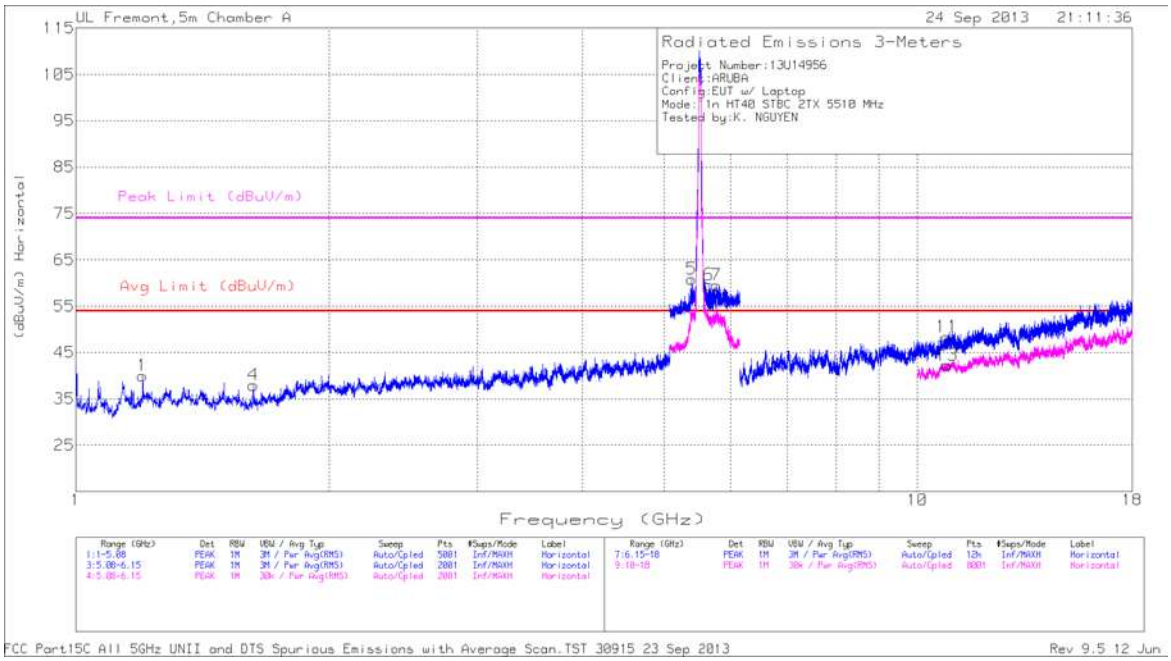


Date: 1.JAN.2003 02:28:44

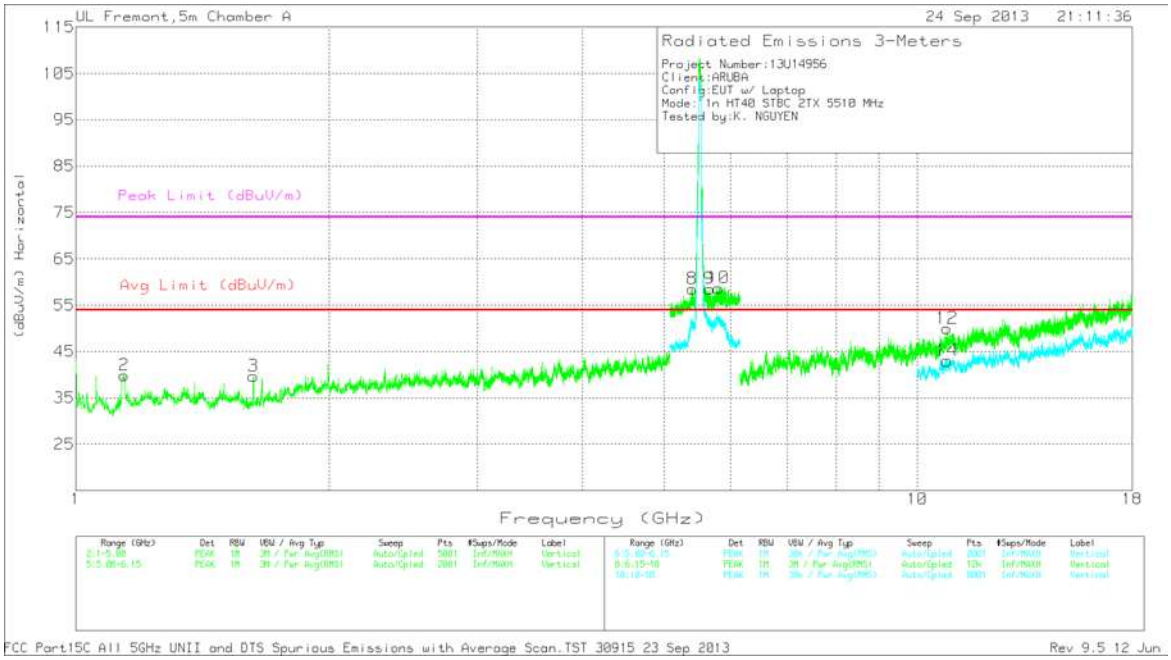
HARMONICS AND SPURIOUS EMISSIONS

Low Channel

Horizontal



Vertical



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	Peak Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1**	1.2	45.2	PK	29.5	-34.7	40	53.97	-13.97	74	-34	0-360	100	H
4**	1.625	43.89	PK	28.6	-34.5	37.99	53.97	-15.98	74	-36.01	0-360	200	H
2**	1.142	45.89	PK	28.6	-34.6	39.89	53.97	-14.08	74	-34.11	0-360	200	V
3**	1.625	45.62	PK	28.6	-34.5	39.72	53.97	-14.25	74	-34.28	0-360	200	V
5	5.392	44.84	PK	34.4	-18.4	60.84	-	-	74	-13.16	0-360	100	H
6*	5.646	43.67	PK	34.5	-18.6	59.57	-	-	68.2	-8.63	0-360	100	H
7*	5.771	43.03	PK	34.7	-18.2	59.53	-	-	68.2	-8.67	0-360	100	H
8	5.401	42.45	PK	34.4	-18.3	58.55	-	-	74	-15.45	0-360	100	V
9*	5.663	42.87	PK	34.5	-18.8	58.57	-	-	68.2	-9.63	0-360	100	V
10*	5.803	41.92	PK	34.8	-18	58.72	-	-	68.2	-9.48	0-360	100	V
11	10.843	32.65	PK	38	-22.3	48.35	-	-	74	-25.65	0-360	100	H
13	10.843	26.46	VB1	38	-22.2	42.26	53.97	-11.71	-	-	0-360	200	H
12	10.841	34.32	PK	38	-22.3	50.02	-	-	74	-23.98	0-360	200	V
14	10.841	27.24	VB1	38	-22.2	43.04	53.97	-10.93	-	-	0-360	200	V

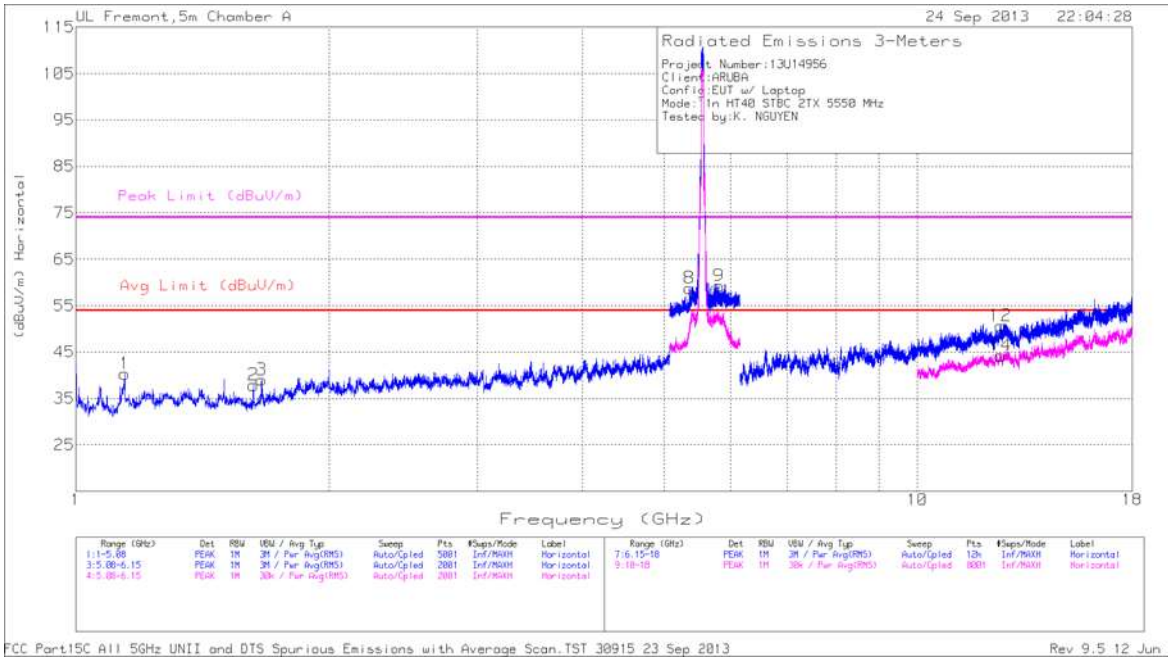
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	Peak Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5.392	46.04	PK1	34.4	-18.4	62.04	-	-	74	-11.96	178	121	H
5.392	35.17	VB1	34.4	-18.4	51.17	53.97	-2.8	-	-	178	121	H
5.401	44.39	PK1	34.4	-18.3	60.49	-	-	74	-13.51	179	107	V
5.401	33.43	VB1	34.4	-18.3	49.53	53.97	-4.44	-	-	179	107	V
5.646*	46.44	PK1	34.5	-18.6	62.34	-	-	68.2	-5.86	183	111	H
5.663*	43.66	PK1	34.5	-18.8	59.36	-	-	68.2	-8.84	196	125	V
5.771*	45.39	PK1	34.7	-18.3	61.79	-	-	68.2	-6.41	183	111	H
5.803*	43.36	PK1	34.8	-17.9	60.26	-	-	68.2	-7.94	190	125	V

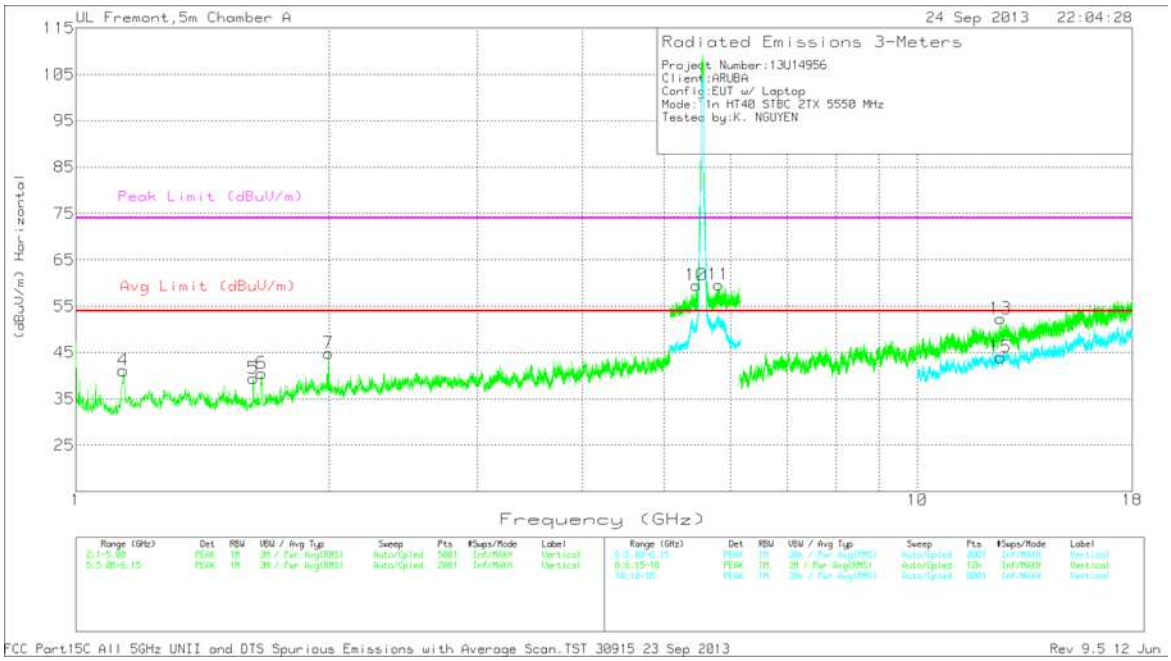
PK - Peak detector
VB1 - KDB 789033 Method: VB Alternative Reduced Video
* Denotes an emission that falls outside of the restricted bands and is subject to a peak emission limit of 68.2 dBuV (-27dBm).
** Denotes a peak measurement that satisfies both peak and average emission limits.

Mid Channel

Horizontal



Vertical



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	Peak Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1**	1.143	46.32	PK	28.6	-34.6	40.32	53.97	-13.65	74	-33.68	0-360	200	H
2**	1.625	43.79	PK	28.6	-34.5	37.89	53.97	-16.08	74	-36.11	0-360	200	H
3**	1.662	44.62	PK	29	-34.6	39.02	53.97	-14.95	74	-34.98	0-360	200	H
4**	1.139	47.14	PK	28.5	-34.5	41.14	53.97	-12.83	74	-32.86	0-360	200	V
5**	1.625	45.34	PK	28.6	-34.5	39.44	53.97	-14.53	74	-34.56	0-360	200	V
6**	1.662	46.09	PK	29	-34.6	40.49	53.97	-13.48	74	-33.51	0-360	100	V
7**	1.996	47.06	PK	31.9	-34.1	44.86	53.97	-9.11	74	-29.14	0-360	200	V
8	5.359	42.76	PK	34.4	-18.4	58.76	-	-	74	-15.24	0-360	100	H
9*	5.809	42.68	PK	34.8	-18.2	59.28	-	-	68.2	-8.92	0-360	100	H
10	5.458	43.63	PK	34.4	-18.5	59.53	-	-	74	-14.47	0-360	100	V
11*	5.806	42.96	PK	34.8	-18.1	59.66	-	-	68.2	-8.54	0-360	100	V
12	12.556	33.7	PK	39.2	-22.2	50.7	-	-	74	-23.3	0-360	100	H
14	12.556	27.14	VB1	39.2	-22.1	44.24	53.97	-9.73	-	-	0-360	200	H
13	12.558	35.41	PK	39.2	-22.3	52.31	-	-	74	-21.69	0-360	200	V
15	12.558	26.9	VB1	39.2	-22.1	44	53.97	-9.97	-	-	0-360	100	V

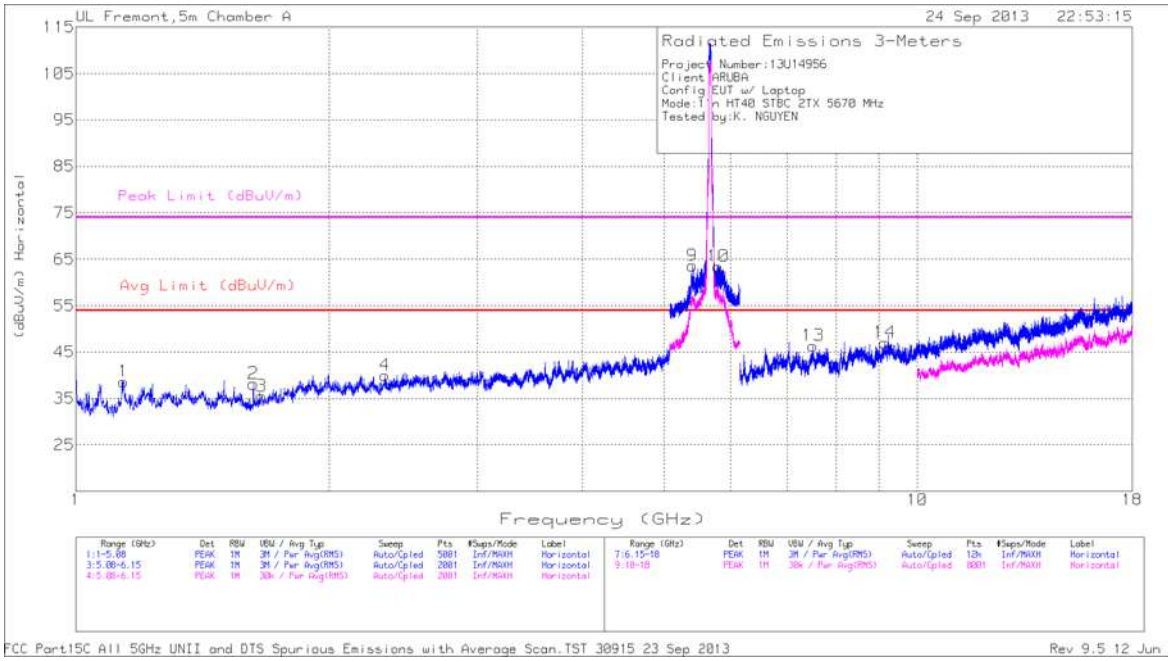
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	Peak Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5.359	42.7	PK1	34.4	-18.4	58.7	-	-	74	-15.3	170	114	H
5.359	32.31	VB1	34.4	-18.5	48.21	53.97	-5.76	-	-	170	114	H
5.458	43.89	PK1	34.4	-18.5	59.79	-	-	74	-14.21	166	116	V
5.458	33.07	VB1	34.4	-18.6	48.87	53.97	-5.1	-	-	166	116	V
5.806	45.66	PK1	34.8	-18.1	62.36	-	-	68.2	-5.84	195	102	V
5.809	44.47	PK1	34.8	-18.3	60.97	-	-	68.2	-7.23	183	112	H

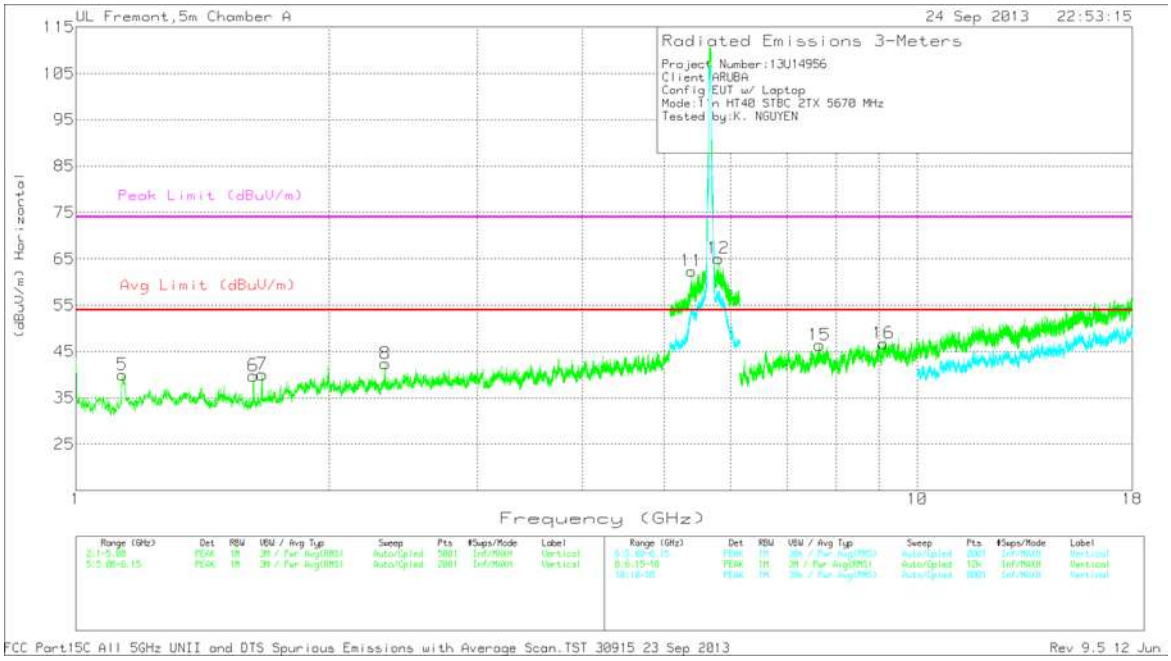
PK - Peak detector
VB1 - KDB 789033 Method: VB Alternative Reduced Video
* Denotes an emission that falls outside of the restricted bands and is subject to a peak emission limit of 68.2 dBuV (-27dBm).
** Denotes a peak measurement that satisfies both peak and average emission limits.

High Channel

Horizontal



Vertical



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	Peak Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1**	1.14	44.66	PK	28.5	-34.5	38.66	53.97	-15.31	74	-35.34	0-360	200	H
2**	1.625	44.06	PK	28.6	-34.5	38.16	53.97	-15.81	74	-35.84	0-360	200	H
3**	1.662	41.1	PK	29	-34.6	35.5	53.97	-18.47	74	-38.5	0-360	200	H
4**	2.331	40.87	PK	31.8	-32.7	39.97	53.97	-14	74	-34.03	0-360	200	H
5**	1.135	45.96	PK	28.5	-34.5	39.96	53.97	-14.01	74	-34.04	0-360	200	V
6**	1.625	45.68	PK	28.6	-34.5	39.78	53.97	-14.19	74	-34.22	0-360	200	V
7**	1.664	45.75	PK	29	-34.7	40.05	53.97	-13.92	74	-33.95	0-360	100	V
8**	2.333	43.39	PK	31.8	-32.8	42.39	53.97	-11.58	74	-31.61	0-360	200	V
9	5.4	47.51	PK	34.4	-18.3	63.61	-	-	74	-10.39	0-360	100	H
10*	5.796	46.04	PK	34.8	-17.4	63.44	-	-	68.2	-4.76	0-360	100	H
11	5.391	46.36	PK	34.4	-18.4	62.36	-	-	74	-11.64	0-360	100	V
12*	5.803	48.28	PK	34.8	-18	65.08	-	-	68.2	-3.12	0-360	100	V
13**	7.515	35.38	PK	35.4	-24.4	46.38	53.97	-7.59	74	-27.62	0-360	100	H
14**	9.147	35.14	PK	36	-24.1	47.04	53.97	-6.93	74	-26.96	0-360	200	H
15**	7.648	37.51	PK	35.5	-26.6	46.41	53.97	-7.56	74	-27.59	0-360	200	V
16**	9.109	36.1	PK	36	-25.3	46.8	53.97	-7.17	74	-27.2	0-360	200	V

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	Peak Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5.391	44.82	PK1	34.4	-18.4	60.82	-	-	74	-13.18	193	106	V
5.391	33.76	VB1	34.4	-18.4	49.76	53.97	-4.21	-	-	193	106	V
5.4	48.93	PK1	34.4	-18.3	65.03	-	-	74	-8.97	177	116	H
5.4	36.67	VB1	34.4	-18.3	52.77	53.97	-1.2	-	-	177	116	H
5.796	45.42	PK1	34.8	-17.4	62.82	-	-	68.2	-5.38	177	116	H
5.803	47.86	PK1	34.8	-17.8	64.86	-	-	68.2	-3.34	193	106	V

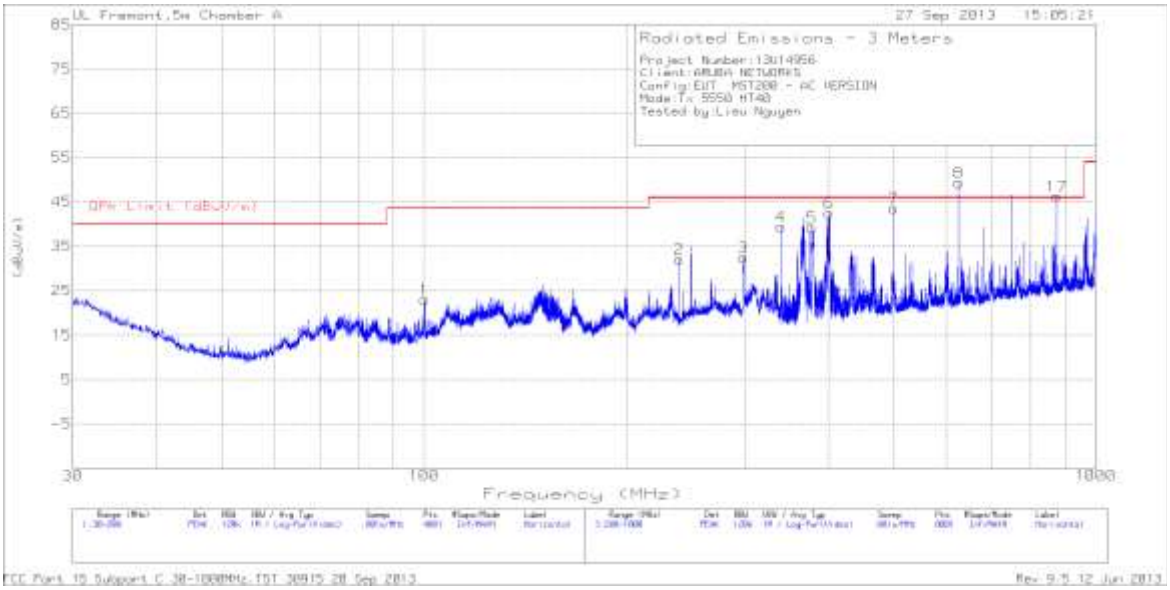
PK - Peak detector
VB1 - KDB 789033 Method: VB Alternative Reduced Video
* Denotes an emission that falls outside of the restricted bands and is subject to a peak emission limit of 68.2 dBuV (-27dBm).
** Denotes a peak measurement that satisfies both peak and average emission limits.

9.5. WORST-CASE BELOW 1 GHz

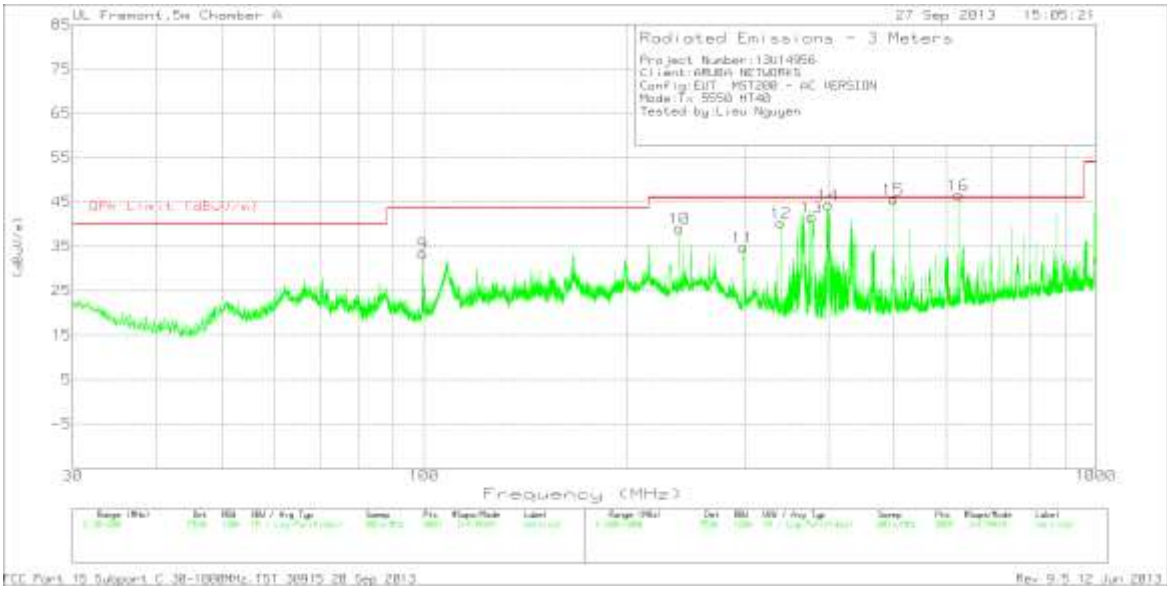
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)

AC UNIT

HORIZONTAL PLOT



VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Trace Markers

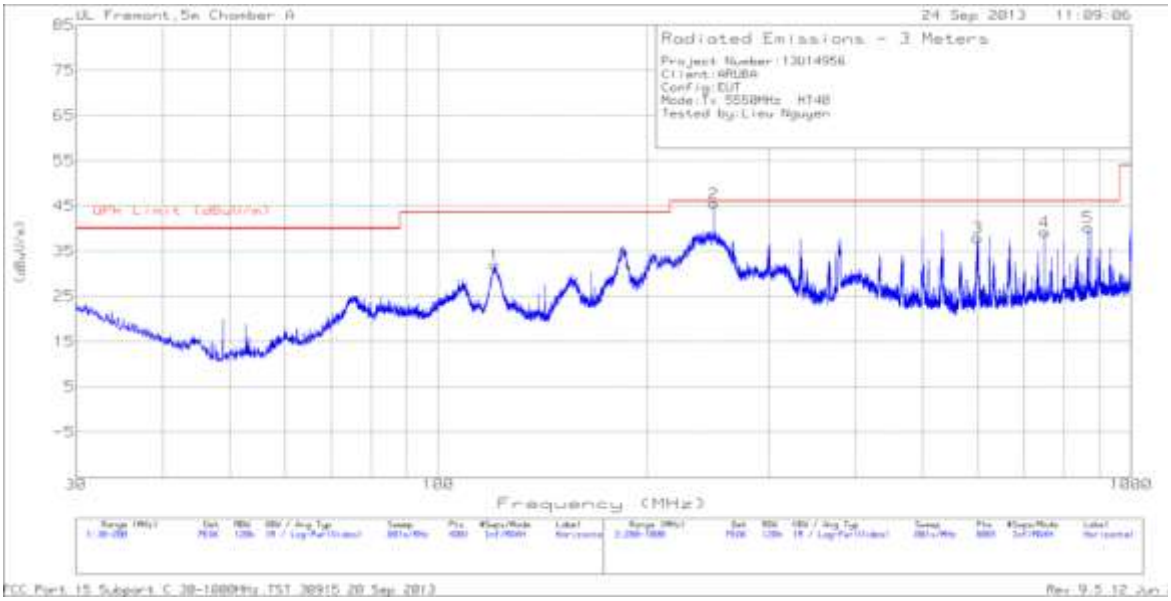
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T477 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	100.2525	39.57	PK	10.4	-26.9	23.07	43.52	-20.45	0-360	100	H
9	99.6575	50.02	PK	10.2	-26.9	33.32	43.52	-10.2	0-360	100	V
2	240	46.65	PK	11.4	-25.9	32.15	46.02	-13.87	0-360	200	H
3	298.7	44.91	PK	13.2	-25.6	32.51	46.02	-13.51	0-360	100	H
4	340	50.89	PK	13.9	-25.3	39.49	46.02	-6.53	0-360	100	H
5	377.9	49.47	PK	14.9	-25.1	39.27	46.02	-6.75	0-360	200	H
6	399.9973	45.37	QP	15.5	-25.1	35.77	46.02	-10.25	0-360	300	H
7	499.9992	46.6	QP	17.7	-24.3	40	46.02	-6.02	0-360	200	H
8	624.9976	41.79	QP	19.1	-23.3	37.59	46.02	-8.43	0-360	100	H
17	874.9967	35.04	QP	21.6	-22.5	34.14	46.02	-11.88	0-360	100	H
10	240	53.58	PK	11.4	-25.9	39.08	46.02	-6.94	0-360	100	V
11	298.7	47.16	PK	13.2	-25.6	34.76	46.02	-11.26	0-360	100	V
12	339.9926	38.59	QP	13.9	-25.3	27.19	46.02	-18.83	0-360	100	V
13	367.8827	34.9	QP	15	-25.2	24.7	46.02	-21.32	0-360	100	V
14	400	46.07	QP	15.5	-25.1	36.47	46.02	-9.55	0-360	100	V
15	500	42.5	QP	17.7	-24.3	35.9	46.02	-10.12	0-360	100	V
16	625	42.17	QP	19.1	-23.3	37.97	46.02	-8.05	0-360	100	V

PK - Peak detector

QP - Quasi-Peak detection

POE UNIT

HORIZONTAL PLOT



VERTICAL PLOT

HORIZONTAL AND VERTICAL DATA

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T477 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	120.61	44.87	PK	13.8	-26.7	31.97	43.52	-11.55	0-360	300	H
6	122.5225	39.88	QP	13.7	-26.7	26.88	43.52	-16.64	0-360	100	V
7	184.02	41.99	QP	11.3	-26.3	26.99	43.52	-16.53	0-360	100	V
2	250	42.75	QP	11.4	-25.8	28.35	46.02	-17.67	0-360	100	H
3	599.8	43	PK	18.4	-23.5	37.9	46.02	-8.12	0-360	100	H
4	750	41.54	PK	20.3	-22.6	39.24	46.02	-6.78	0-360	100	H
5	866.7	35.99	QP	21.6	-22.5	35.09	46.02	-10.93	0-360	200	H
8	250	44.43	QP	11.5	-25.9	30.03	46.02	-15.99	0-360	100	V
9	466.7	38.07	QP	17	-24.6	30.47	46.02	-15.55	0-360	100	V
10	500	38.74	QP	17.7	-24.4	32.04	46.02	-13.98	0-360	100	V
11	533.3	32.38	QP	18.3	-24.1	26.58	46.02	-19.44	0-360	100	V
12	625	34.92	QP	19.1	-23.3	30.72	46.02	-15.3	0-360	100	V

PK - Peak detector

QP - Quasi-Peak detection

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

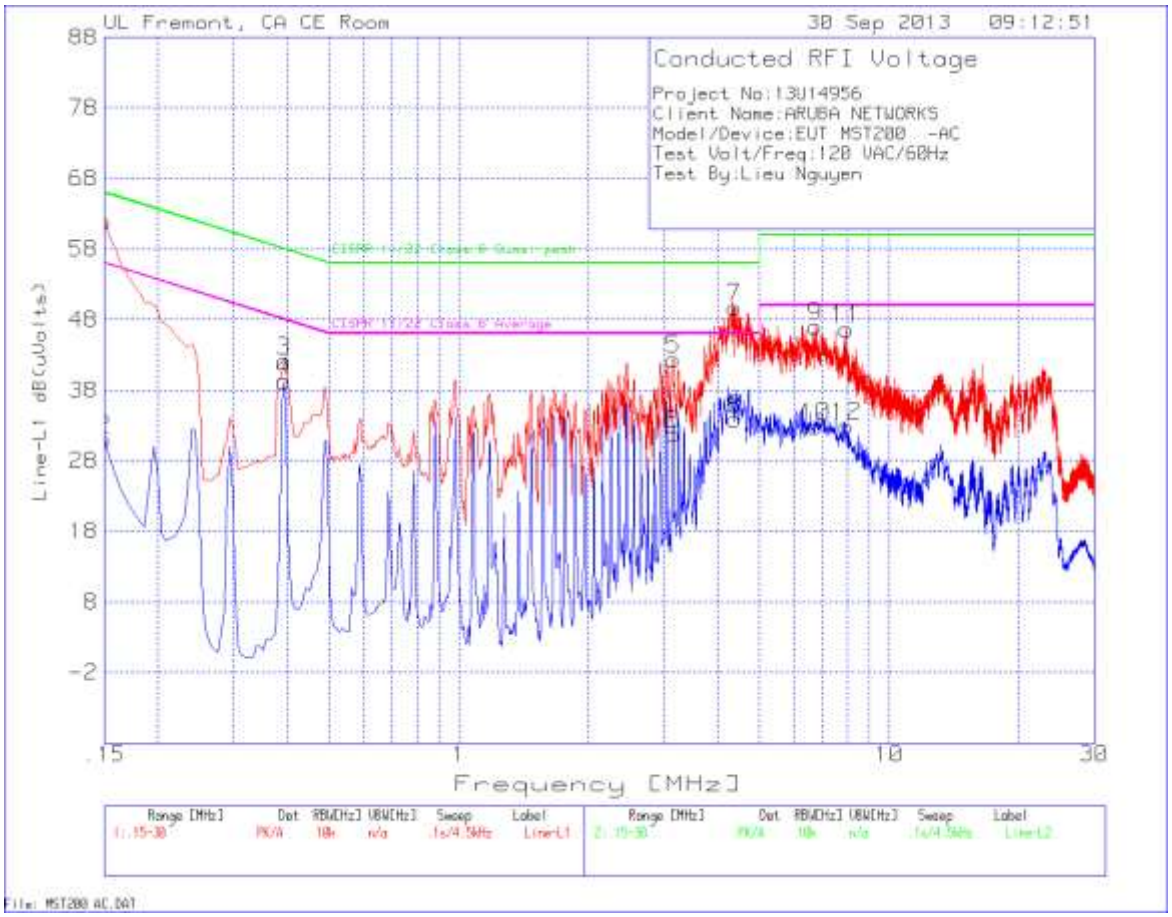
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

10.1. AC UNIT

LINE 1 RESULTS

Line 1



Line-L1 .15 - 30MHz

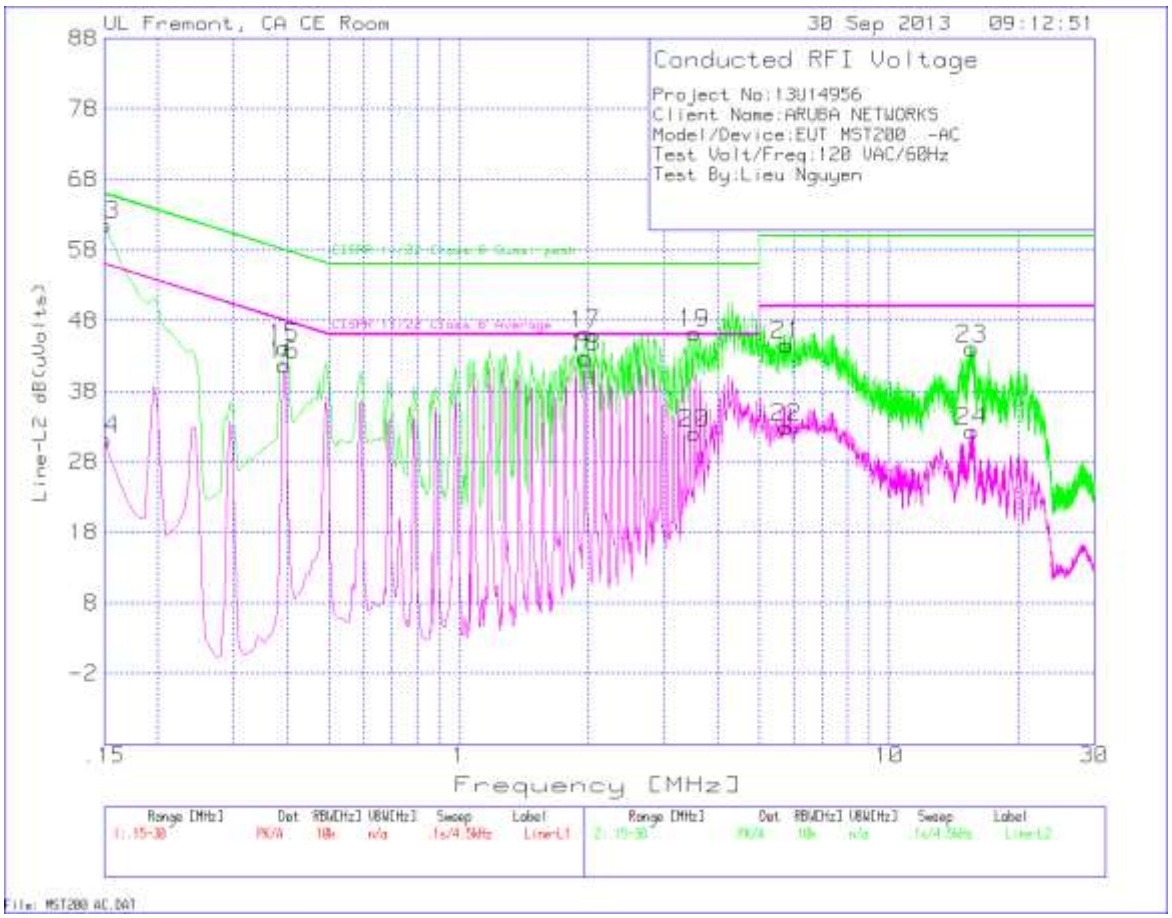
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
1	0.15	61.81	PK	0.1	0	61.91	66	-4.09	-	-
2	0.15	30.9	Av	0.1	0	31	-	-	56	-25
3	0.393	41.99	PK	0.1	0	42.09	58	-15.91	-	-
4	0.393	39.11	Av	0.1	0	39.21	-	-	48	-8.79
5	3.1515	42.11	PK	0.1	0.1	42.31	56	-13.69	-	-
6	3.1515	31.58	Av	0.1	0.1	31.78	-	-	46	-14.22
7	4.371	49.56	PK	0.1	0.1	49.76	56	-6.24	-	-
8	4.371	33.64	Av	0.1	0.1	33.84	-	-	46	-12.16
9	6.7605	46.75	PK	0.1	0.1	46.95	60	-13.05	-	-
10	6.7605	32.62	Av	0.1	0.1	32.82	-	-	50	-17.18
11	7.971	46.42	PK	0.1	0.1	46.62	60	-13.38	-	-
12	7.971	32.69	Av	0.1	0.1	32.89	-	-	50	-17.11

PK - Peak detector

Av - average detection

LINE 2 RESULTS



Line-L2 .15 - 30MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
13	0.15	61.47	PK	0.1	0	61.57	66	-4.43	-	-
14	0.15	31.07	Av	0.1	0	31.17	-	-	56	-24.83
15	0.393	44.1	PK	0.1	0	44.2	58	-13.8	-	-
16	0.393	41.58	Av	0.1	0	41.68	-	-	48	-6.32
17	1.968	45.96	PK	0.1	0.1	46.16	56	-9.84	-	-
18	1.968	42.51	Av	0.1	0.1	42.71	-	-	46	-3.29
19	3.534	45.99	PK	0.1	0.1	46.19	56	-9.81	-	-
20	3.534	31.83	Av	0.1	0.1	32.03	-	-	46	-13.97
21	5.7795	44.38	PK	0.1	0.1	44.58	60	-15.42	-	-
22	5.7795	32.68	Av	0.1	0.1	32.88	-	-	50	-17.12
23	15.5895	43.68	PK	0.2	0.2	44.08	60	-15.92	-	-
24	15.5895	31.88	Av	0.2	0.2	32.28	-	-	50	-17.72

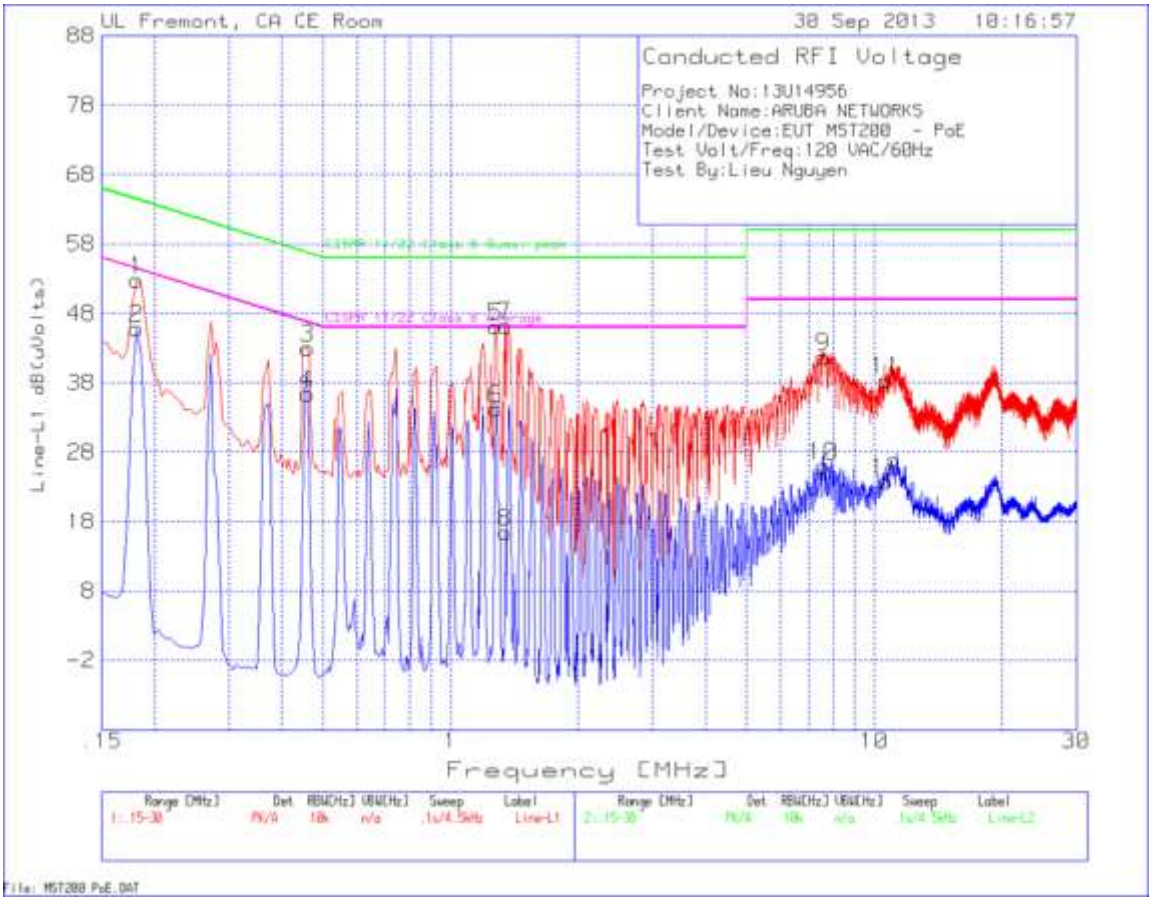
PK - Peak detector

Av - average detection

10.2. POE UNIT

LINE 1 RESULTS

Line 1



Line-L1 .15 - 30MHz

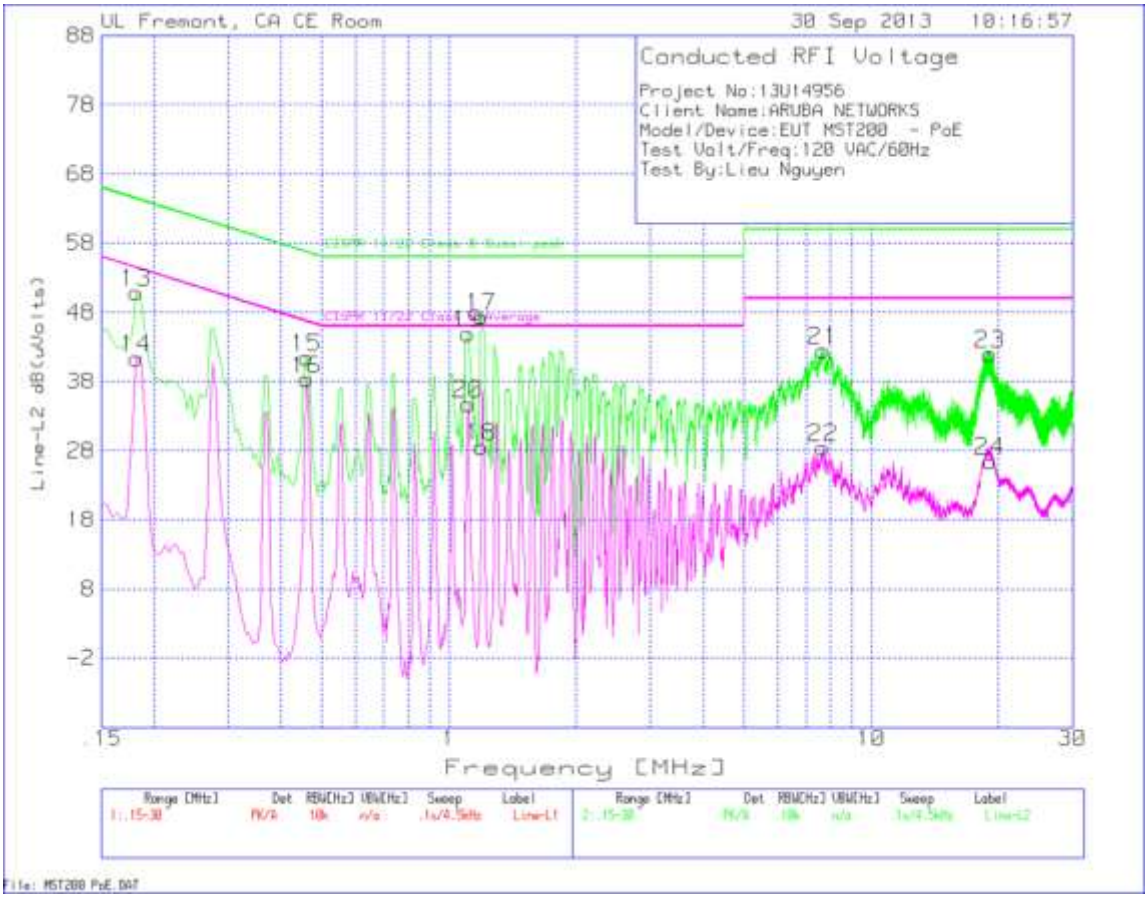
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
1	0.1815	52.71	PK	0.1	0	52.81	64.4	-11.59	-	-
2	0.1815	45.7	Av	0.1	0	45.8	-	-	54.4	-8.6
3	0.4605	42.94	PK	0.1	0	43.04	56.7	-13.66	-	-
4	0.4605	36.35	Av	0.1	0	36.45	-	-	46.7	-10.25
5	1.275	45.95	PK	0.1	0.1	46.15	56	-9.85	-	-
6	1.275	34.04	Av	0.1	0.1	34.24	-	-	46	-11.76
7	1.34475	46.03	PK	0.1	0.1	46.23	56	-9.77	-	-
8	1.34475	16.24	Av	0.1	0.1	16.44	-	-	46	-29.56
9	7.593	41.47	PK	0.1	0.1	41.67	60	-18.33	-	-
10	7.593	25.73	Av	0.1	0.1	25.93	-	-	50	-24.07
11	10.653	38.11	PK	0.1	0.2	38.41	60	-21.59	-	-
12	10.653	23.54	Av	0.1	0.2	23.84	-	-	50	-26.16

PK - Peak detector

Av - average detection

LINE 2 RESULTS



Line-L2 .15 - 30MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
13	0.1815	50.76	PK	0.1	0	50.86	64.4	-13.54	-	-
14	0.1815	41.25	Av	0.1	0	41.35	-	-	54.4	-13.05
15	0.4605	41.41	PK	0.1	0	41.51	56.7	-15.19	-	-
16	0.4605	38.2	Av	0.1	0	38.3	-	-	46.7	-8.4
19	1.1085	44.86	PK	0.1	0	44.96	56	-11.04	-	-
20	1.1085	34.7	Av	0.1	0	34.8	-	-	46	-11.2
17	1.194	47.23	PK	0.1	0.1	47.43	56	-8.57	-	-
18	1.194	28.35	Av	0.1	0.1	28.55	-	-	46	-17.45
21	7.701	42.24	PK	0.1	0.1	42.44	60	-17.56	-	-
22	7.701	28.21	Av	0.1	0.1	28.41	-	-	50	-21.59
23	19.0995	41.52	PK	0.3	0.2	42.02	60	-17.98	-	-
24	19.0995	26.01	Av	0.3	0.2	26.51	-	-	50	-23.49

PK - Peak detector

Av - average detection

11. DYNAMIC FREQUENCY SELECTION

11.1. OVERVIEW

11.1.1. LIMITS

INDUSTRY CANADA

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

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

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

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

FCC

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

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

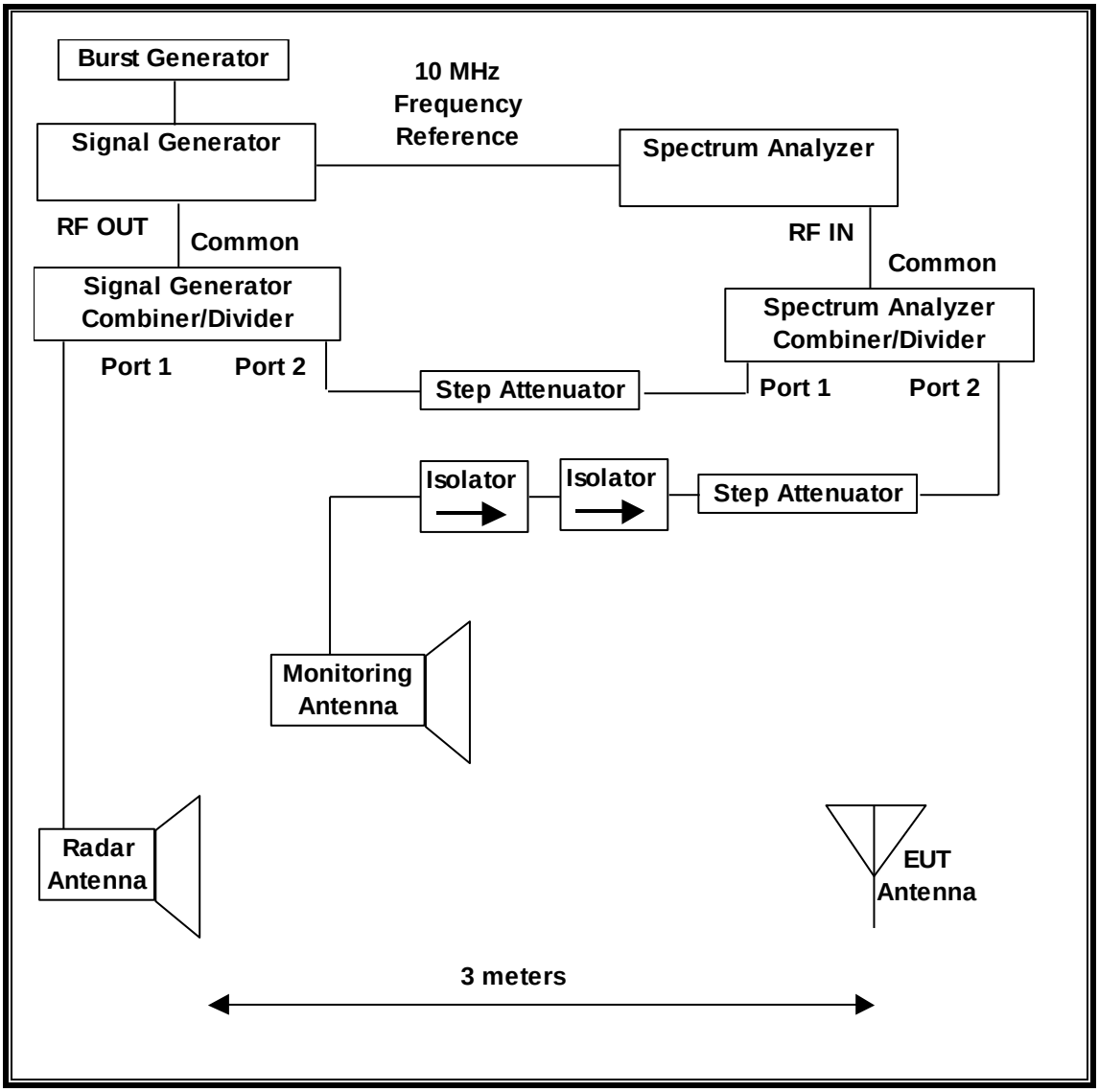
Radar Waveform	Bursts	Pulses per Burst	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Minimum Percentage of Successful Detection	Minimum Trials
5	8-20	1-3	50-100	5-20	1000-2000	80%	30

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

11.1.2. TEST AND MEASUREMENT SYSTEM

RADIATED METHOD SYSTEM BLOCK DIAGRAM



SYSTEM OVERVIEW

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

The 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 Frequency Hopping Radar Waveform Generating Subsystem of FCC 06-96 APPENDIX. The frequency of the signal generator is incremented in 1 MHz steps from F_L to F_H for each successive trial. This incremental sequence is repeated as required to generate a minimum of 30 total trials and to maintain a uniform frequency distribution over the entire Detection Bandwidth.

The signal monitoring equipment consists of a spectrum analyzer. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection and max hold.

SYSTEM CALIBRATION

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

Without changing any of the instrument settings, the spectrum analyzer is reconnected to the Common port of the Spectrum Analyzer Combiner/Divider. The Reference Level Offset of the spectrum analyzer is adjusted so that the displayed amplitude of the signal is –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.

ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

A link is established between the Master and Slave and the distance between the units is adjusted as needed to provide a suitable received level at the Master and Slave devices. The video test file is streamed to generate WLAN traffic. The monitoring antenna is adjusted so that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

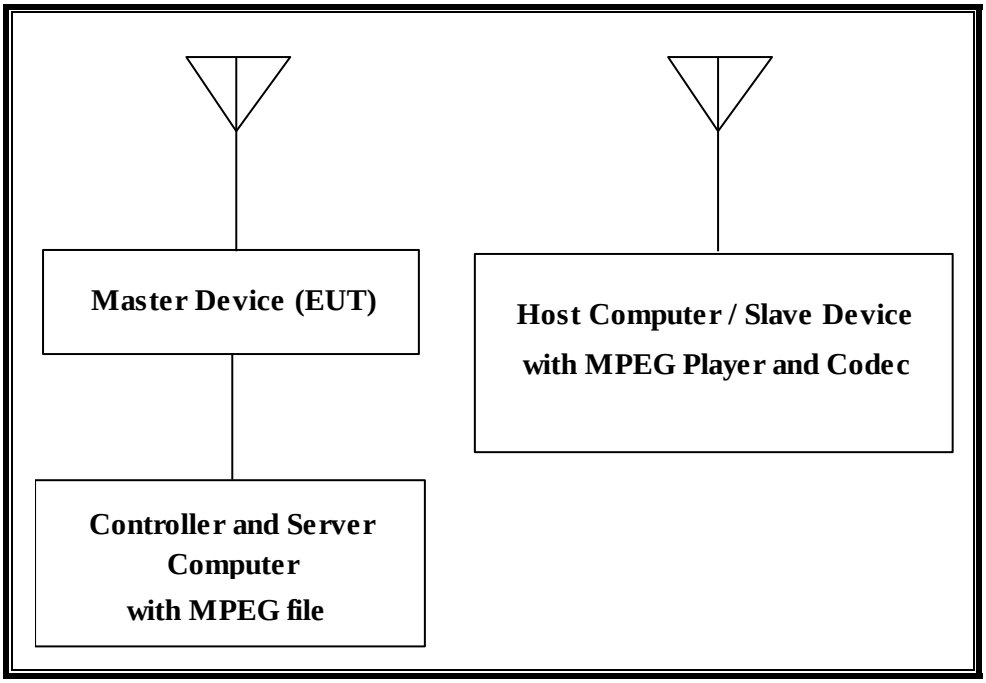
TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset Number**	**Cal Due**
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	08/18/13
Vector Signal Generator, 20GHz	Agilent / HP	E8267C	C01066	11/20/13
Arbitrary Waveform Generator	Agilent / HP	33220A	C01146	09/25/13

11.1.3. SETUP OF EUT

RADIATED METHOD EUT TEST SETUP



SUPPORT EQUIPMENT

The following support equipment was utilized for the DFS tests documented in this report:

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Notebook PC (Controller/Server)	Lenovo	Type 7663-04U	L3-KE324 08/09	DoC
AC Adapter (Controller/Server PC)	Lenovo	ADLX65NLT2A	11S45N0319Z1ZLZF34G9P5	DoC
Notebook PC (Host/Slaver Radio)	Lenovo	Type 4173-B74	R9-LC5GV 12/01	QDS-BRCM1046
AC Adapter (Host PC)	Lenovo	92P1156	11S92P1156Z1ZDXN14L577	Doc

11.1.4. DESCRIPTION OF EUT

The EUT operates over the 5470-5725 MHz ranges excluding operation in the 5600 to 5650 MHz band.

The EUT is a Master Device.

The highest power level within these bands is 29.383 dBm EIRP in the 5470-5725 MHz band.

The only antenna assembly utilized with the EUT has a gain of 13 dBi.

Two identical internal antennas are utilized to meet the diversity and MIMO operational requirements.

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

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

The EUT uses two transmitter/receiver chains, each connected to an antenna to perform radiated 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 required since the maximum EIRP is greater than 500 mW (27 dBm).

The EUT utilizes the 802.11a/n architecture. Two nominal channel bandwidths are implemented: 20 MHz and 40 MHz.

The software installed in the access point is revision 4.7.0.0.

UNIFORM CHANNEL SPREADING

See Manufacturer’s Attestation.

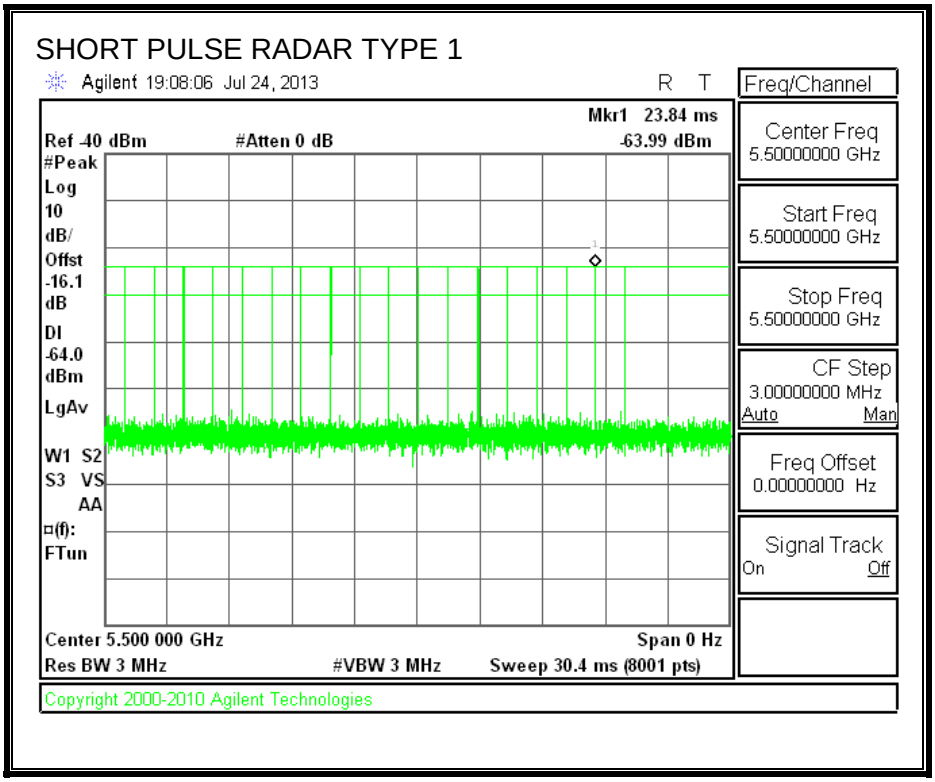
11.2. RESULTS FOR 20 MHz BANDWIDTH

11.2.1. TEST CHANNEL

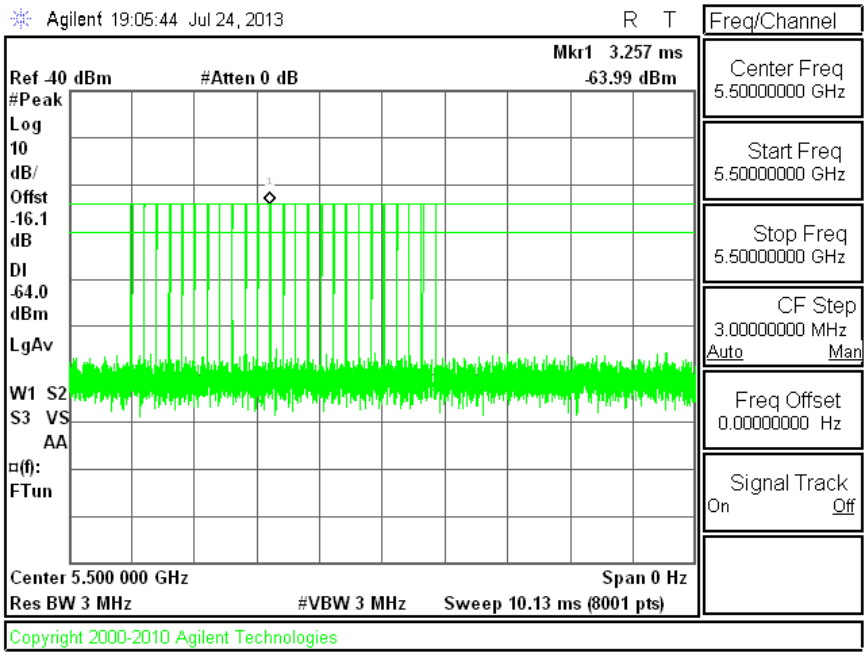
All tests were performed at a channel center frequency of 5500 MHz.

11.2.2. RADAR WAVEFORMS AND TRAFFIC

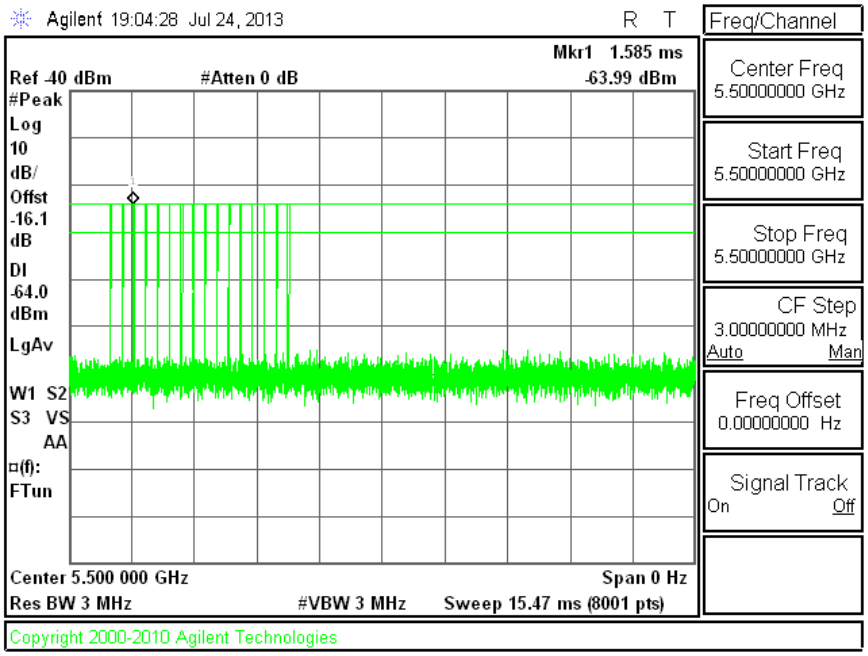
RADAR WAVEFORMS



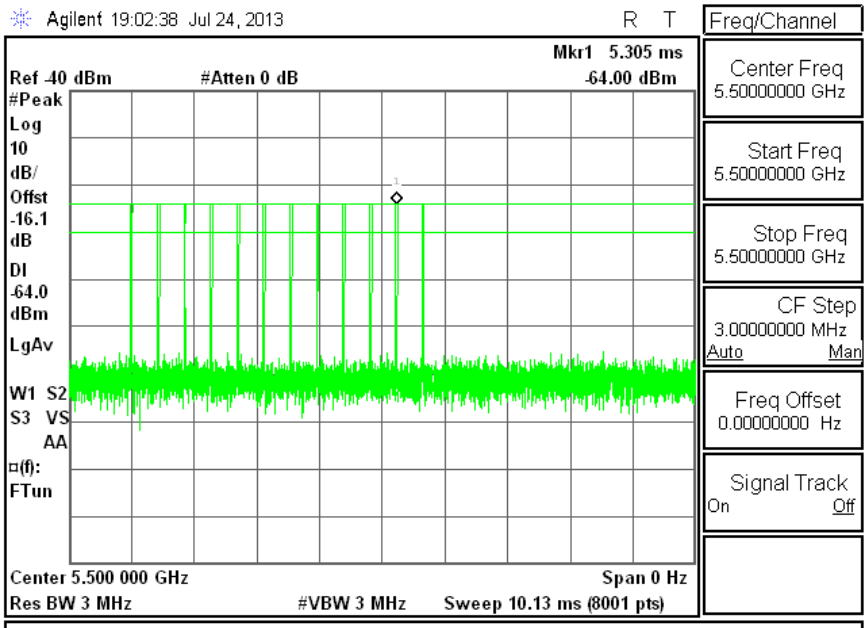
SAMPLE OF RADAR TYPE 2



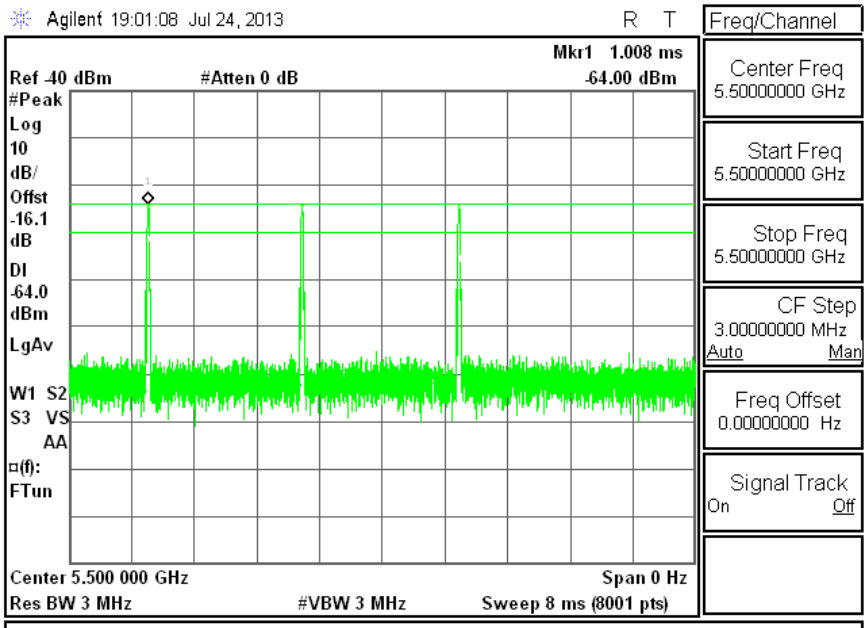
SAMPLE OF RADAR TYPE 3



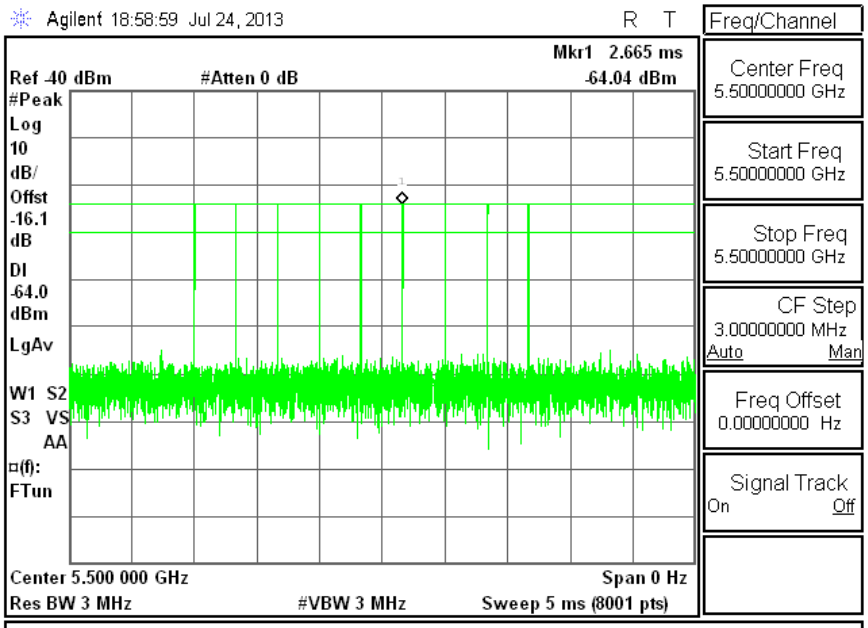
SAMPLE OF RADAR TYPE 4



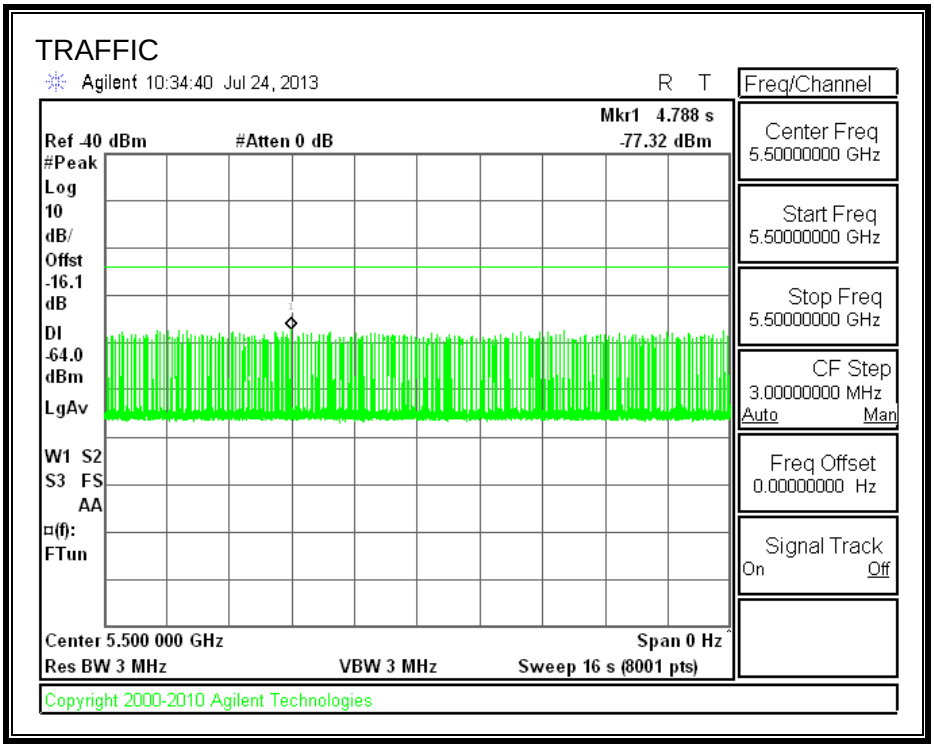
SAMPLE OF SINGLE BURST OF RADAR TYPE 5



SINGLE BURST OF RADAR TYPE 6



TRAFFIC



11.2.3. CHANNEL AVAILABILITY CHECK TIME

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.

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.

QUANTITATIVE RESULTS

No Radar Triggered

Timing of Reboot (sec)	Timing of Start of Traffic (sec)	Total Power-up Cycle Time (sec)	Initial Power-up Cycle Time (sec)
31.45	161.8	130.4	70.4

Radar Near Beginning of CAC

Timing of Reboot (sec)	Timing of Radar Burst (sec)	Radar Relative to Reboot (sec)	Radar Relative to Start of CAC (sec)
28.5	100.9	72.4	2.0

Radar Near End of CAC

Timing of Reboot (sec)	Timing of Radar Burst (sec)	Radar Relative to Reboot (sec)	Radar Relative to Start of CAC (sec)
29.18	157.5	128.3	58.0

QUALITATIVE RESULTS

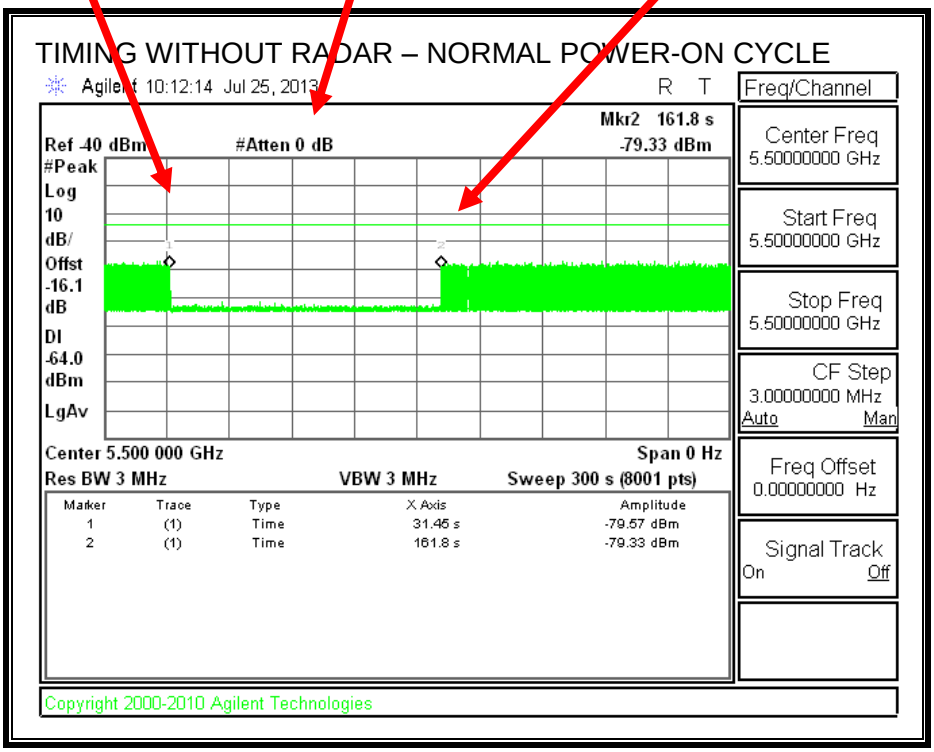
Timing of Radar Burst	Display on Control Computer	Spectrum Analyzer Display
No Radar Triggered	EUT marks Channel as active	Transmissions begin on channel after completion of the initial power-up cycle and the CAC
Within 0 to 6 second window	EUT indicates radar detected	No transmissions on channel
Within 54 to 60 second window	EUT indicates radar detected	No transmissions on channel

TIMING 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



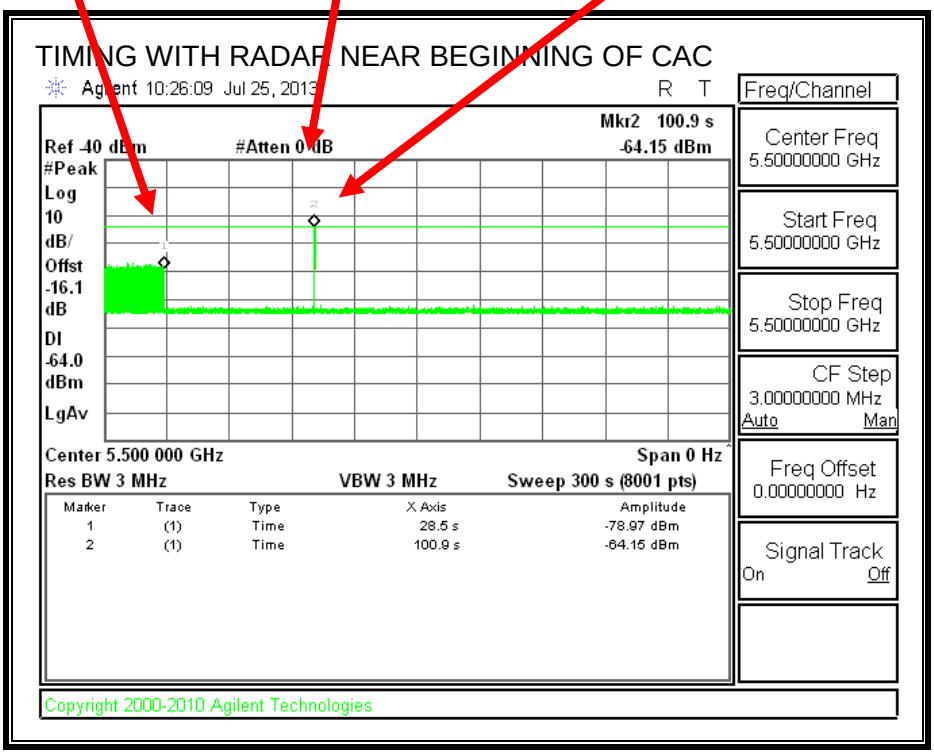
Transmissions begin on channel after completion of the initial power-up cycle and the CAC.

TIMING 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



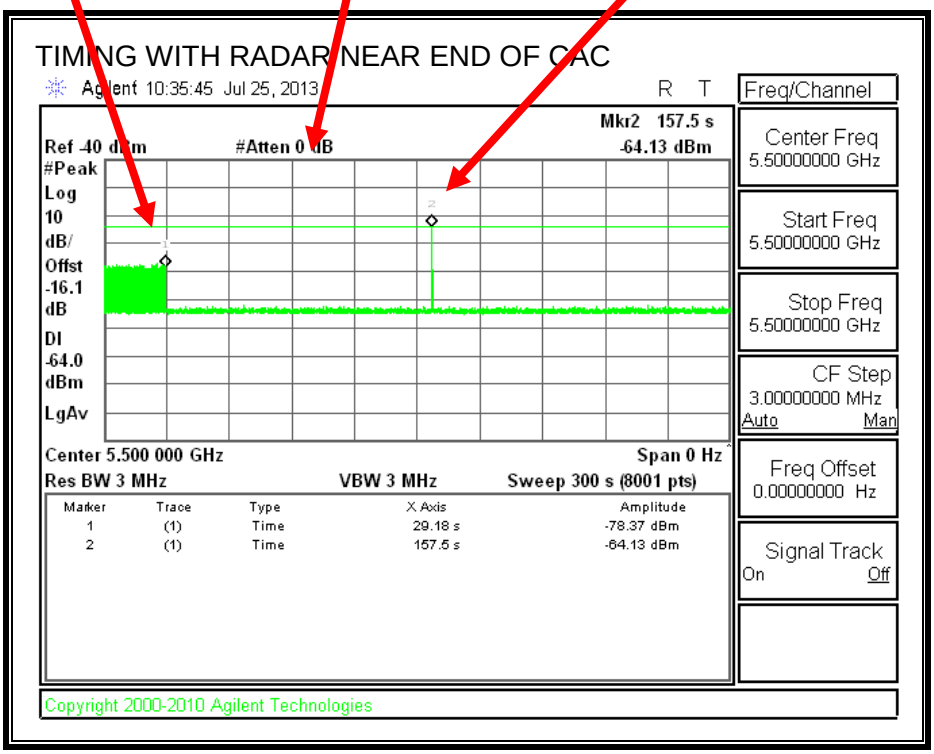
No EUT transmissions were observed after the radar signal.

TIMING 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



No EUT transmissions were observed after the radar signal.

11.2.4. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

11.2.5. MOVE AND CLOSING TIME

REPORTING NOTES

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

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

The aggregate channel closing transmission time is calculated as follows:

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

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

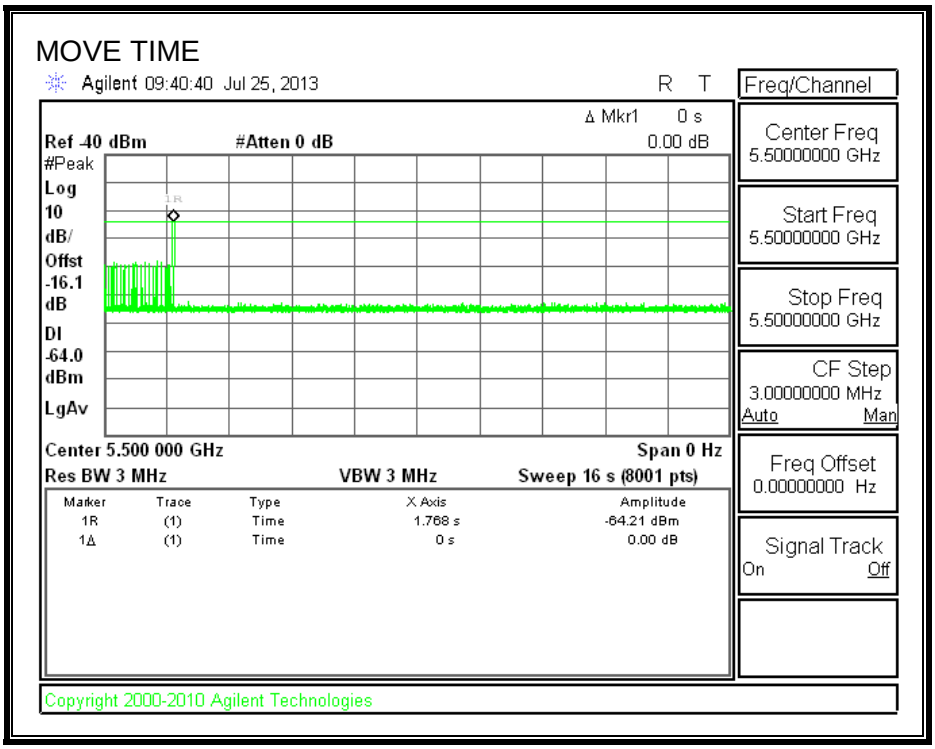
The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

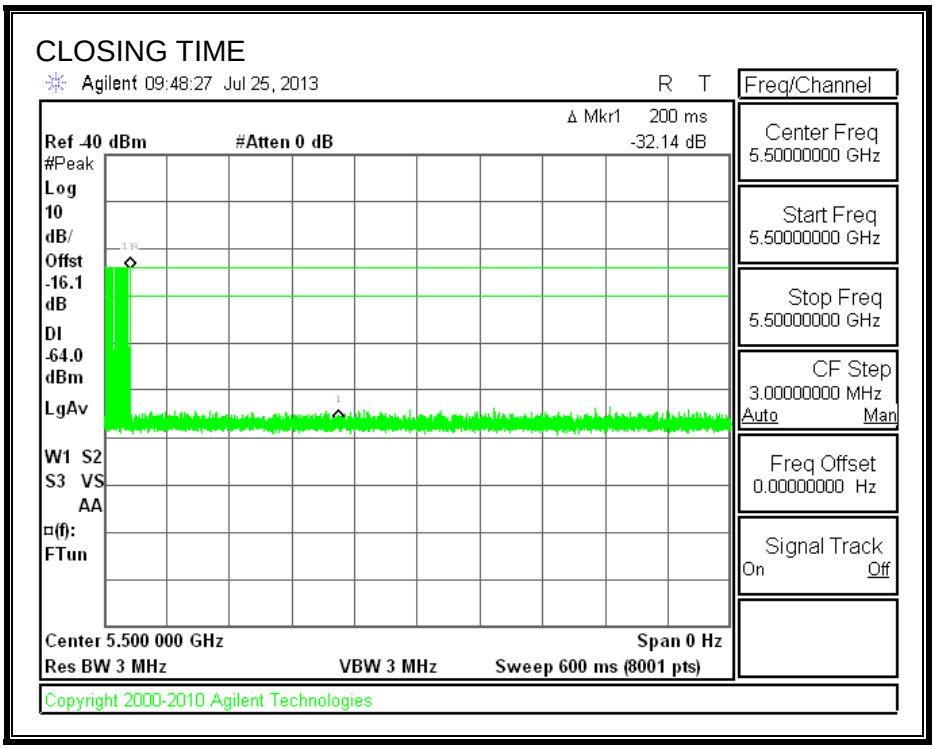
Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.000	10

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

MOVE TIME



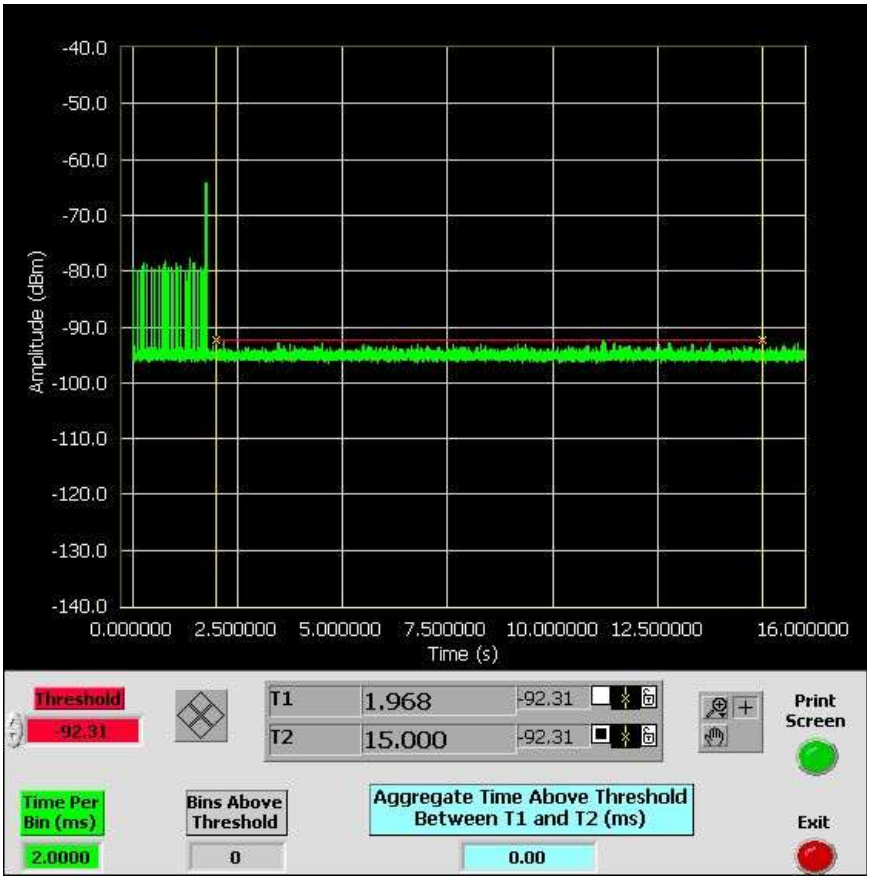
CHANNEL CLOSING TIME



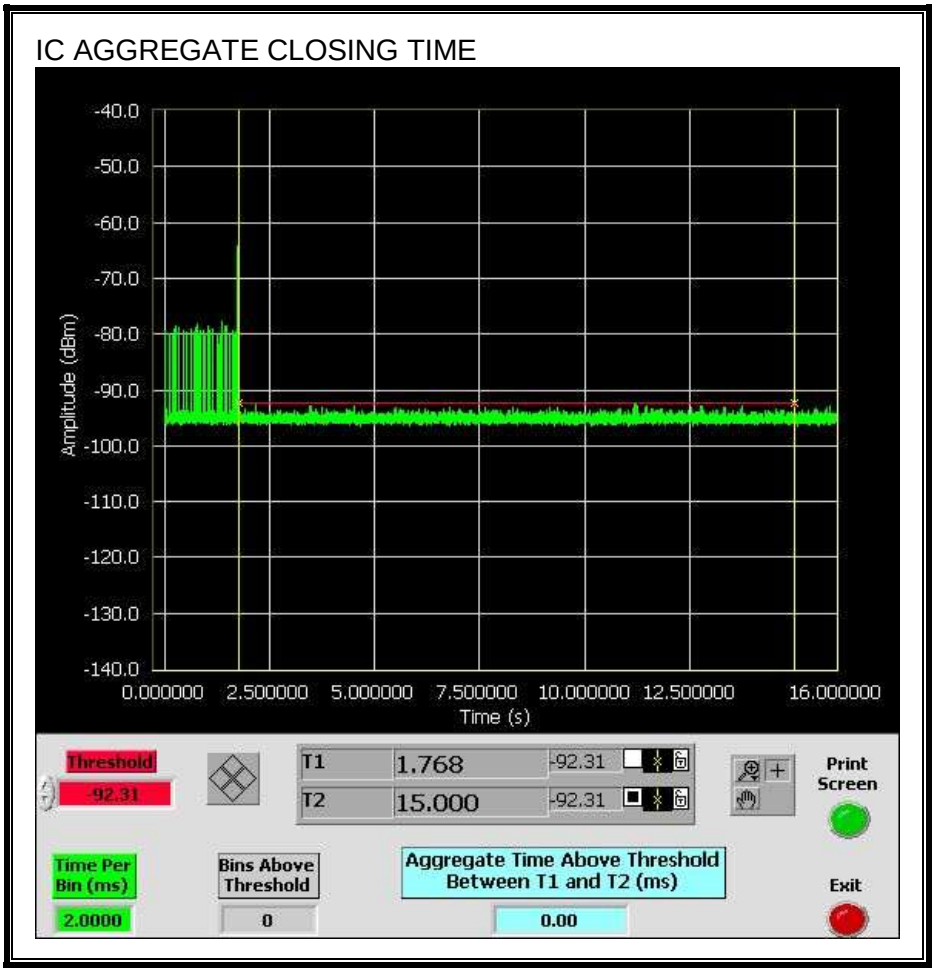
AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME

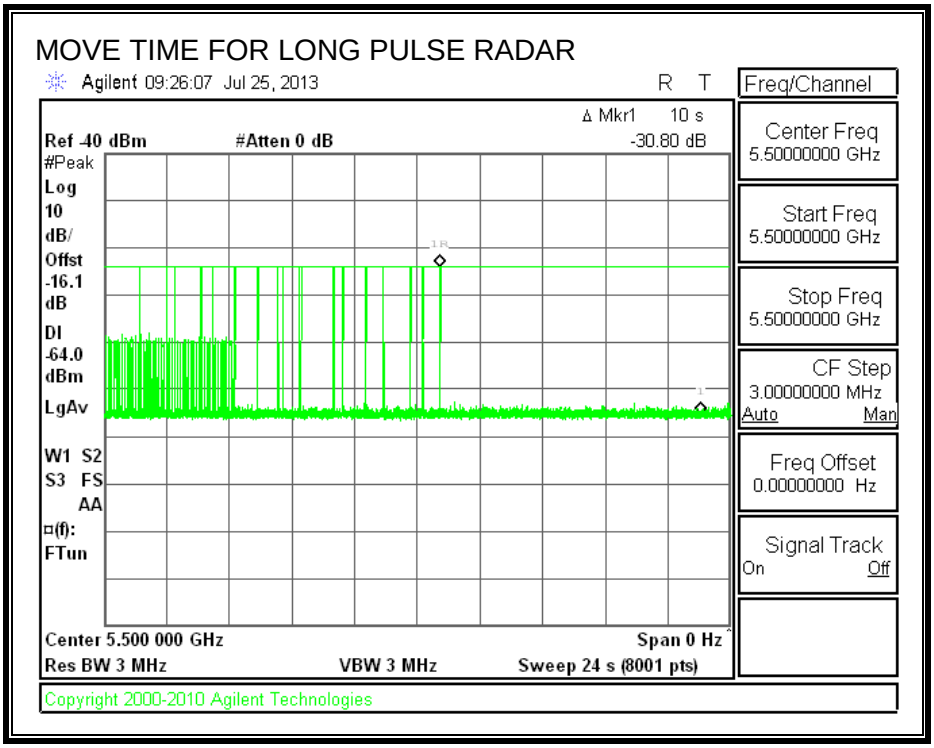


No transmissions are observed during the IC aggregate monitoring period.



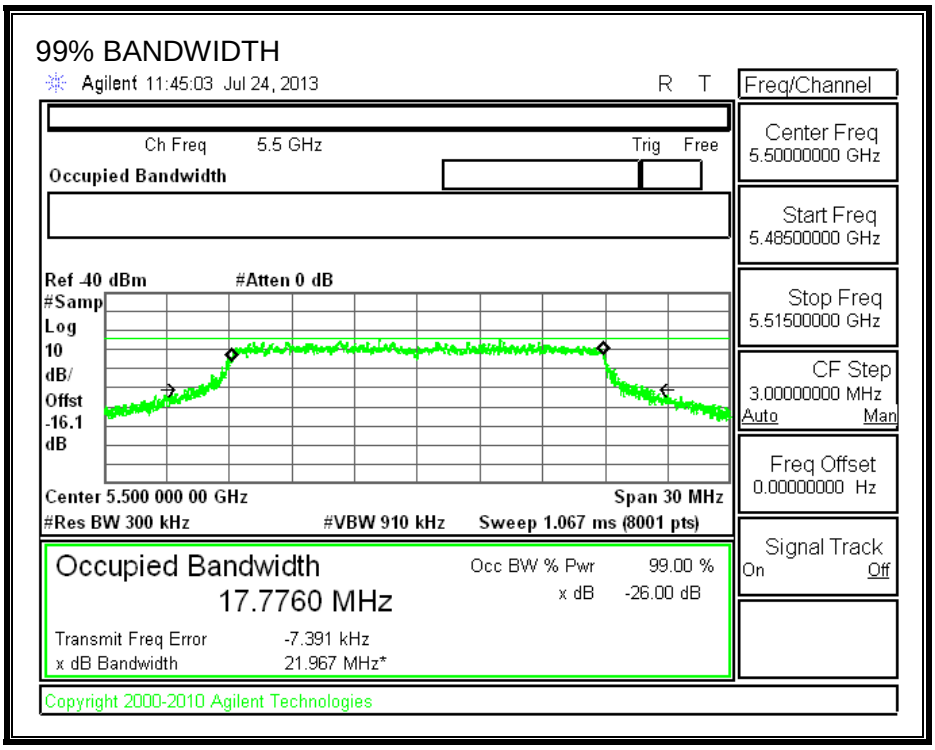
LONG PULSE CHANNEL MOVE TIME

The traffic ceases prior to 10 seconds after the end of the radar waveform.



11.2.6. DETECTION BANDWIDTH

REFERENCE PLOT OF 99% POWER BANDWIDTH



RESULTS

FL (MHz)	FH (MHz)	Detection Bandwidth (MHz)	99% Power Bandwidth (MHz)	Ratio of Detection BW to 99% Power BW (%)	Minimum Limit (%)
5492	5508	16	17.776	90.0	80

DETECTION BANDWIDTH PROBABILITY

DETECTION BANDWIDTH PROBABILITY RESULTS

Detection Bandwidth Test Results				
FCC Type 1 Waveform: 1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst				
Frequency (MHz)	Number of Trials	Number Detected	Detection (%)	Mark
5492	10	10	100	FL
5493	10	10	100	
5494	10	10	100	
5495	10	10	100	
5496	30	27	90	
5497	10	9	90	
5498	10	10	100	
5499	10	10	100	
5500	10	10	100	
5501	10	10	100	
5502	10	10	100	
5503	10	10	100	
5504	10	10	100	
5505	10	10	100	
5506	10	10	100	
5507	10	10	100	
5508	10	10	100	FH

11.2.7. IN-SERVICE MONITORING

RESULTS

FCC Radar Test Summary				
Signal Type	Number of Trials	Detection (%)	Limit (%)	Pass/Fail
FCC Short Pulse Type 1	30	100.00	60	Pass
FCC Short Pulse Type 2	30	100.00	60	Pass
FCC Short Pulse Type 3	30	93.33	60	Pass
FCC Short Pulse Type 4	30	96.67	60	Pass
Aggregate		97.50	80	Pass
FCC Long Pulse Type 5	30	100.00	80	Pass
FCC Hopping Type 6	34	100.00	70	Pass

TYPE 1 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 1 1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst	
Trial	**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	Yes
25	Yes
26	Yes
27	Yes
28	Yes
29	Yes
30	Yes

TYPE 2 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 2				
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
2001	3.7	205.00	25	Yes
2002	1.3	182.00	23	Yes
2003	3.9	153.00	25	Yes
2004	1.1	218.00	23	Yes
2005	2	154.00	28	Yes
2006	4.4	163.00	28	Yes
2007	2.4	180.00	29	Yes
2008	2.5	156.00	28	Yes
2009	2.4	182.00	29	Yes
2010	1.5	205.00	29	Yes
2011	1.8	190.00	26	Yes
2012	4.2	153.00	24	Yes
2013	2.8	195.00	25	Yes
2014	4.2	225.00	28	Yes
2015	1.7	230.00	28	Yes
2016	2.8	218.00	25	Yes
2017	1.1	197.00	27	Yes
2018	1.7	157.00	25	Yes
2019	1.3	158.00	26	Yes
2020	1.6	221.00	28	Yes
2021	2.9	207.00	28	Yes
2022	4.1	165.00	27	Yes
2023	2.6	173.00	28	Yes
2024	4.3	197.00	29	Yes
2025	1.2	164.00	24	Yes
2026	4.5	179.00	24	Yes
2027	1.7	188.00	24	Yes
2028	4.8	207.00	25	Yes
2029	4	181.00	28	Yes
2030	2.2	213.00	29	Yes

TYPE 3 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 3				
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
3001	6.4	294.00	16	Yes
3002	6.8	338.00	18	No
3003	9.9	445.00	17	Yes
3004	7.2	314.00	17	Yes
3005	7.6	480.00	17	Yes
3006	6	464.00	18	Yes
3007	5.5	485.00	17	Yes
3008	7	427.00	16	Yes
3009	7.3	346.00	16	Yes
3010	7.5	496.00	17	Yes
3011	7.8	367.00	18	Yes
3012	6.5	370.00	17	Yes
3013	5.2	253.00	18	Yes
3014	6.1	414.00	17	Yes
3015	6.5	317.00	16	Yes
3016	7.4	426.00	17	No
3017	9.3	276.00	18	Yes
3018	9.1	335.00	16	Yes
3019	9.6	461.00	17	Yes
3020	8.6	335.00	18	Yes
3021	7.2	388.00	17	Yes
3022	8	340.00	16	Yes
3023	6.3	385.00	18	Yes
3024	5.6	492.00	18	Yes
3025	8.5	427.00	18	Yes
3026	5.6	355.00	18	Yes
3027	9.2	360.00	17	Yes
3028	7.6	281.00	18	Yes
3029	6.3	444	18	Yes
3030	10	476	16	Yes

TYPE 4 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 4				
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
4001	16.7	430.00	12	Yes
4002	12.1	324.00	14	Yes
4003	11.4	394.00	12	Yes
4004	17.1	393.00	16	Yes
4005	19.9	397.00	14	Yes
4006	16.8	453.00	14	Yes
4007	19.2	400.00	12	Yes
4008	15.1	264.00	12	Yes
4009	16	415.00	14	Yes
4010	16.1	404.00	16	Yes
4011	14.5	288.00	15	Yes
4012	14.9	352.00	15	Yes
4013	16.6	307.00	13	Yes
4014	14.3	320.00	14	Yes
4015	17.9	314.00	12	Yes
4016	19.2	446.00	14	No
4017	12.1	282.00	12	Yes
4018	16.6	320.00	14	Yes
4019	16.1	373.00	13	Yes
4020	12.7	465.00	16	Yes
4021	15	487.00	12	Yes
4022	16.2	294.00	13	Yes
4023	18.3	270.00	16	Yes
4024	14.6	305.00	16	Yes
4025	12.2	270.00	13	Yes
4026	16.8	436.00	12	Yes
4027	15	500.00	13	Yes
4028	19.6	380.00	13	Yes
4029	17.8	416.00	16	Yes
4030	19.2	278.00	12	Yes

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5	
Trial	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	Yes
25	Yes
26	Yes
27	Yes
28	Yes
29	Yes
30	Yes

Note: The Type 5 randomized parameters are shown in a separate document.

TYPE 6 DETECTION PROBABILITY

Data Sheet for FCC Hopping Radar Type 6				
1 us Pulse Width, 333 us PRI, 9 Pulses per Burst, 1 Burst per Hop				
NTIA August 2005 Hopping Sequence				
Trial	Starting Index Within Sequence	Signal Generator Frequency (MHz)	Hops within Detection BW	Successful Detection (Yes/No)
1	40	5492	4	Yes
2	515	5493	3	Yes
3	990	5494	4	Yes
4	1465	5495	4	Yes
5	1940	5496	7	Yes
6	2415	5497	6	Yes
7	2890	5498	4	Yes
8	3365	5499	3	Yes
9	3840	5500	4	Yes
10	4315	5501	5	Yes
11	4790	5502	4	Yes
12	5265	5503	4	Yes
13	5740	5504	2	Yes
14	6215	5505	5	Yes
15	6690	5506	3	Yes
16	7165	5507	4	Yes
17	7640	5508	7	Yes
18	8115	5492	2	Yes
19	8590	5493	3	Yes
20	9065	5494	3	Yes
21	9540	5495	5	Yes
22	10015	5496	5	Yes
23	10490	5497	1	Yes
24	10965	5498	4	Yes
25	11440	5499	4	Yes
26	11915	5500	5	Yes
27	12390	5501	3	Yes
28	12865	5502	3	Yes
29	13340	5503	5	Yes
30	13815	5504	1	Yes
31	14290	5505	4	Yes
32	14765	5506	3	Yes
33	15240	5507	4	Yes
34	15715	5508	4	Yes

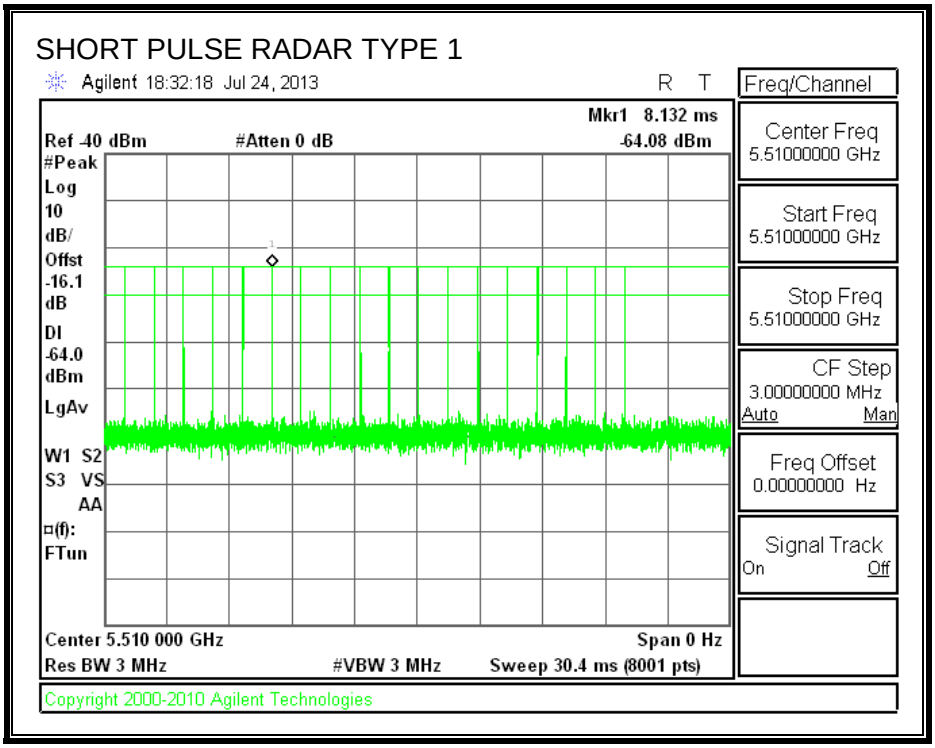
11.3. RESULTS FOR 40 MHz BANDWIDTH

11.3.1. TEST CHANNEL

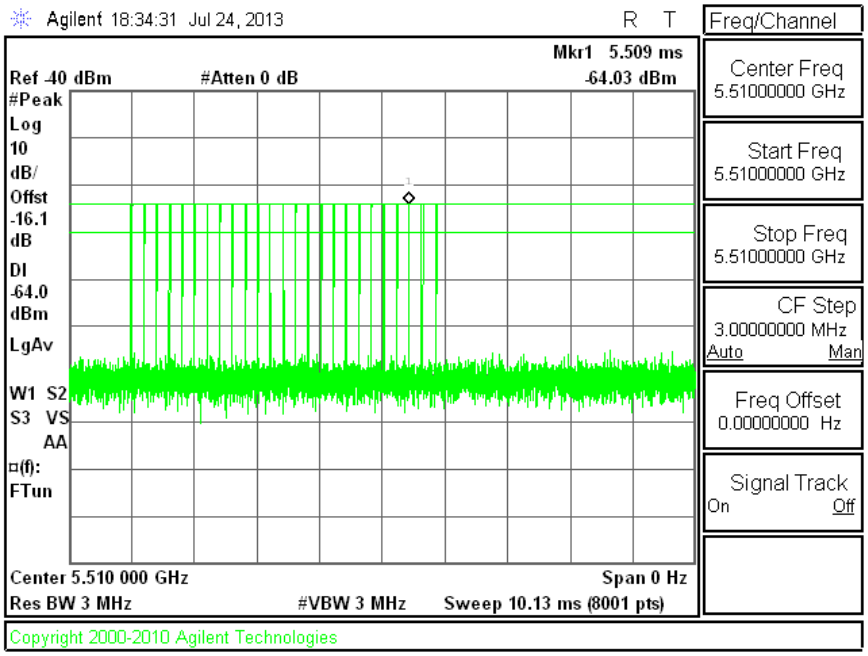
All tests were performed at a channel center frequency of 5510 MHz.

11.3.2. RADAR WAVEFORMS AND TRAFFIC

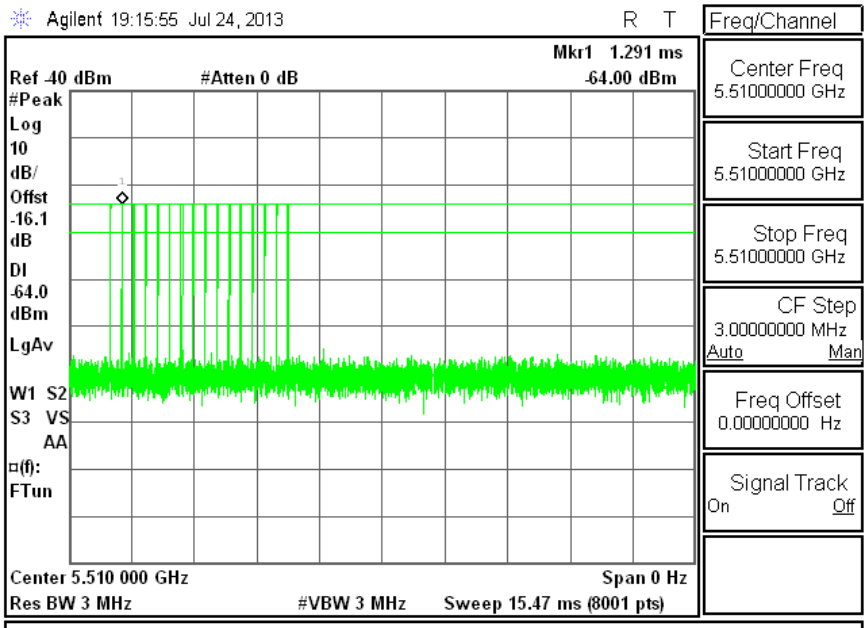
RADAR WAVEFORMS



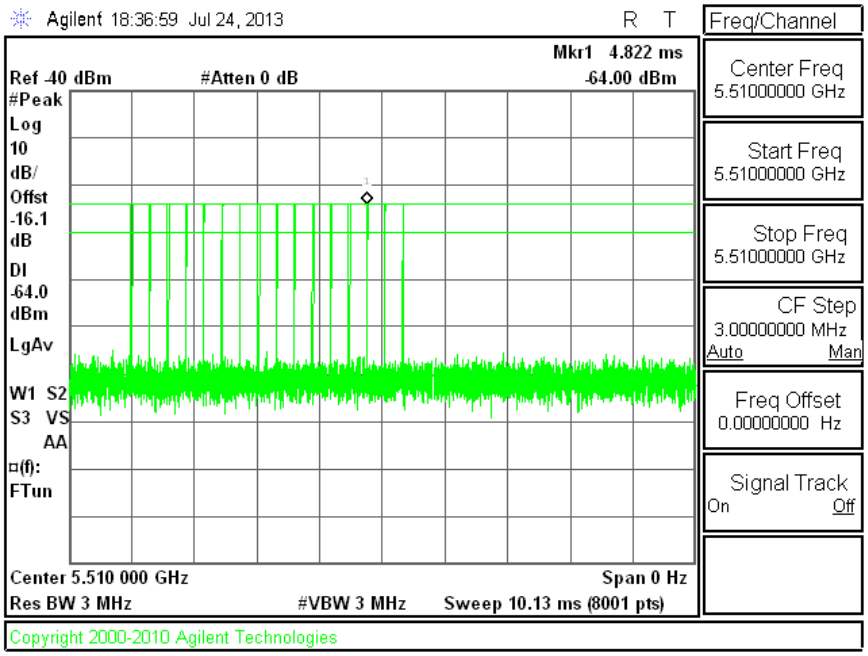
SAMPLE OF RADAR TYPE 2



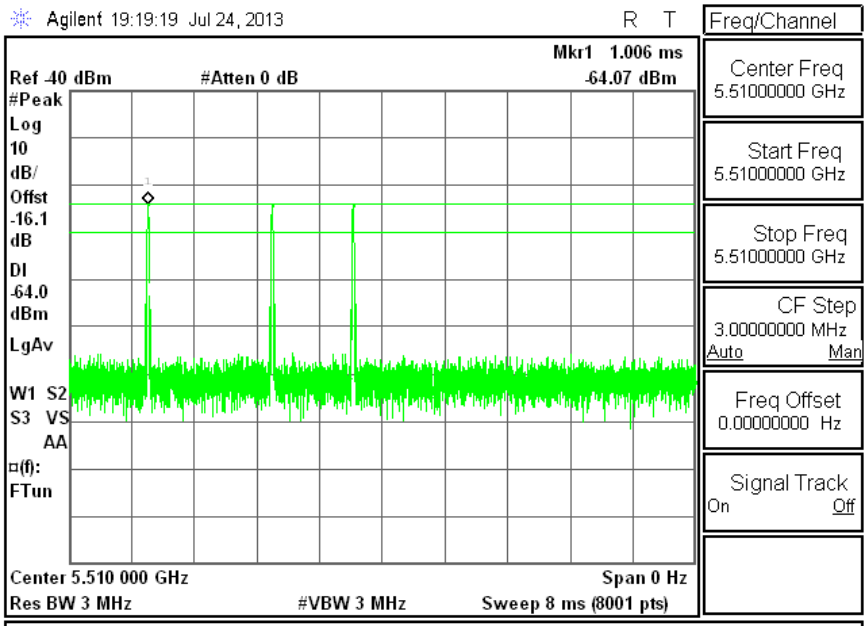
SAMPLE OF RADAR TYPE 3



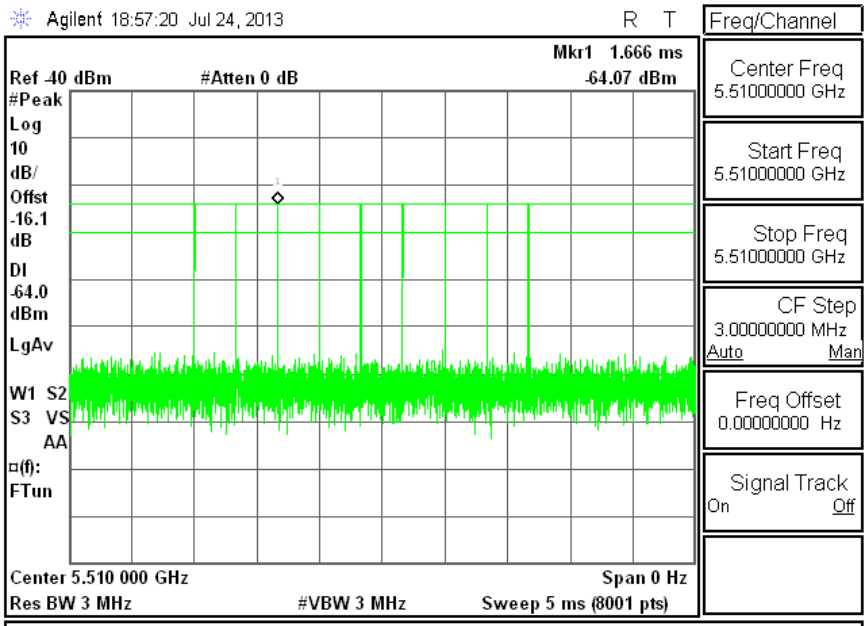
SAMPLE OF RADAR TYPE 4



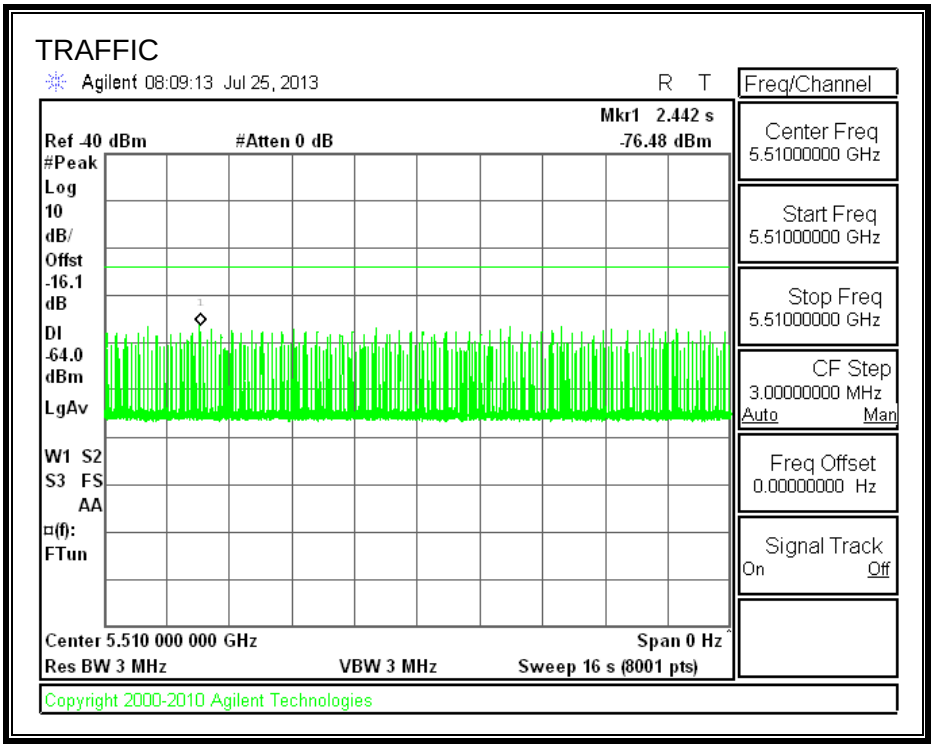
SAMPLE OF SINGLE BURST OF RADAR TYPE 5



SINGLE BURST OF RADAR TYPE 6



TRAFFIC



11.3.3. CHANNEL AVAILABILITY CHECK TIME

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.

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.

QUANTITATIVE RESULTS

No Radar Triggered

Timing of Reboot (sec)	Timing of Start of Traffic (sec)	Total Power-up Cycle Time (sec)	Initial Power-up Cycle Time (sec)
28.69	160.2	131.5	71.5

Radar Near Beginning of CAC

Timing of Reboot (sec)	Timing of Radar Burst (sec)	Radar Relative to Reboot (sec)	Radar Relative to Start of CAC (sec)
30.4	102.9	72.5	1.0

Radar Near End of CAC

Timing of Reboot (sec)	Timing of Radar Burst (sec)	Radar Relative to Reboot (sec)	Radar Relative to Start of CAC (sec)
30.68	160.1	129.4	57.9

QUALITATIVE RESULTS

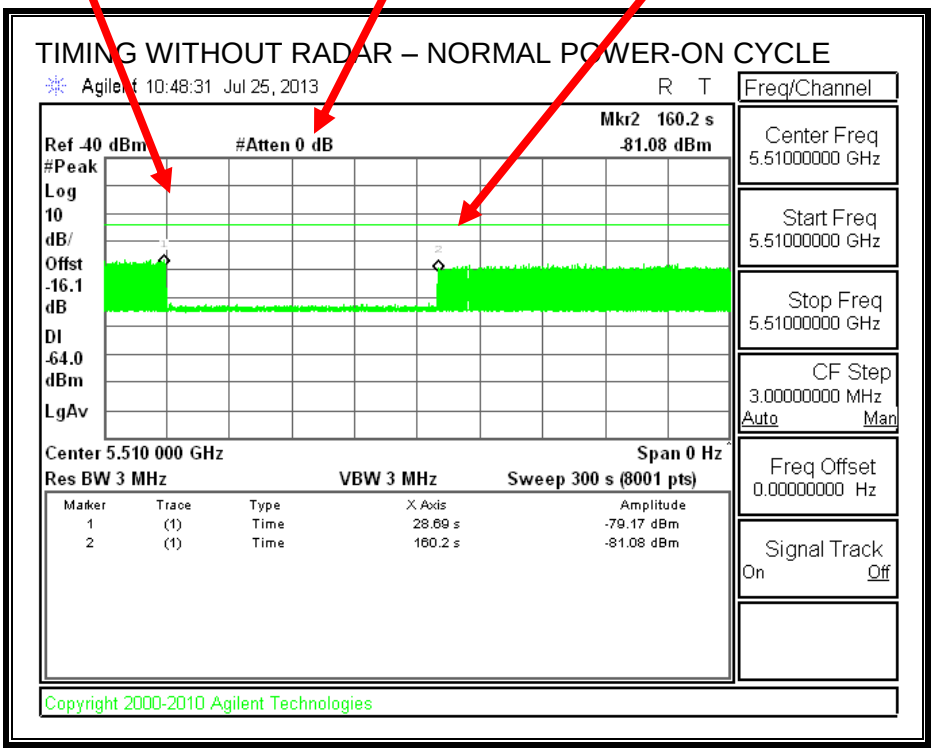
Timing of Radar Burst	Display on Control Computer	Spectrum Analyzer Display
No Radar Triggered	EUT marks Channel as active	Transmissions begin on channel after completion of the initial power-up cycle and the CAC
Within 0 to 6 second window	EUT indicates radar detected	No transmissions on channel
Within 54 to 60 second window	EUT indicates radar detected	No transmissions on channel

TIMING 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



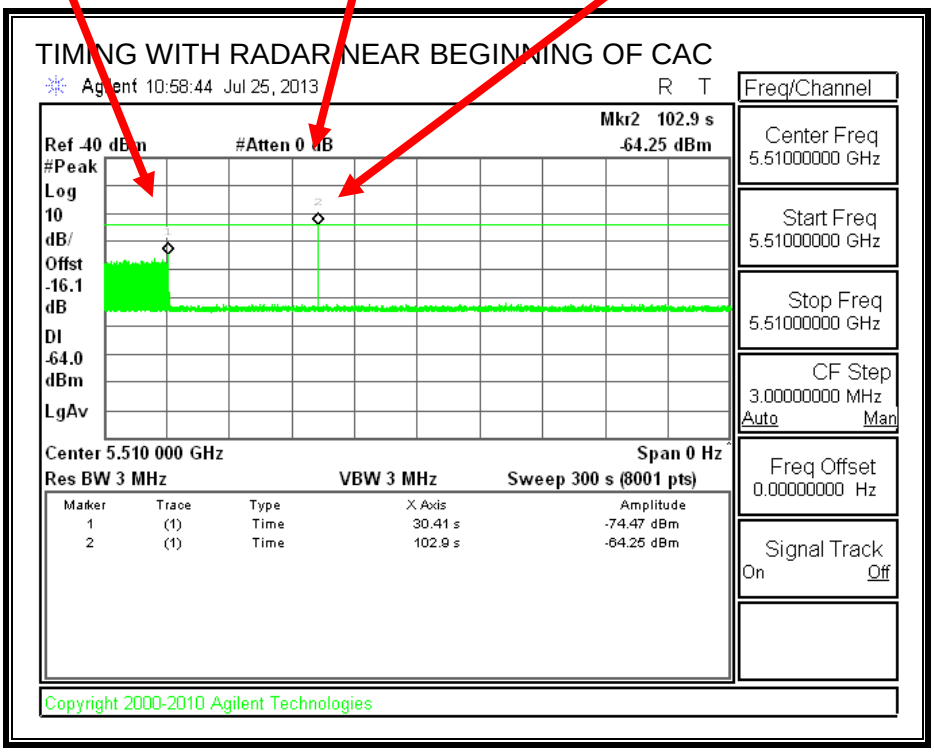
Transmissions begin on channel after completion of the initial power-up cycle and the CAC.

TIMING 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



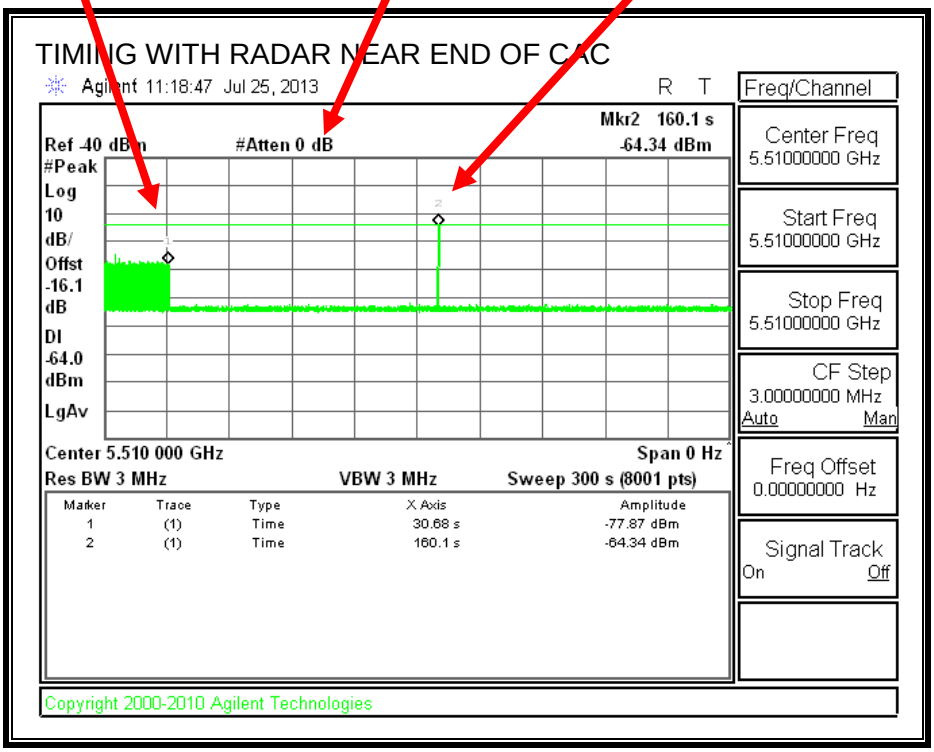
No EUT transmissions were observed after the radar signal.

TIMING 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



No EUT transmissions were observed after the radar signal.

11.3.4. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

11.3.5. MOVE AND CLOSING TIME

REPORTING NOTES

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

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

The aggregate channel closing transmission time is calculated as follows:

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

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

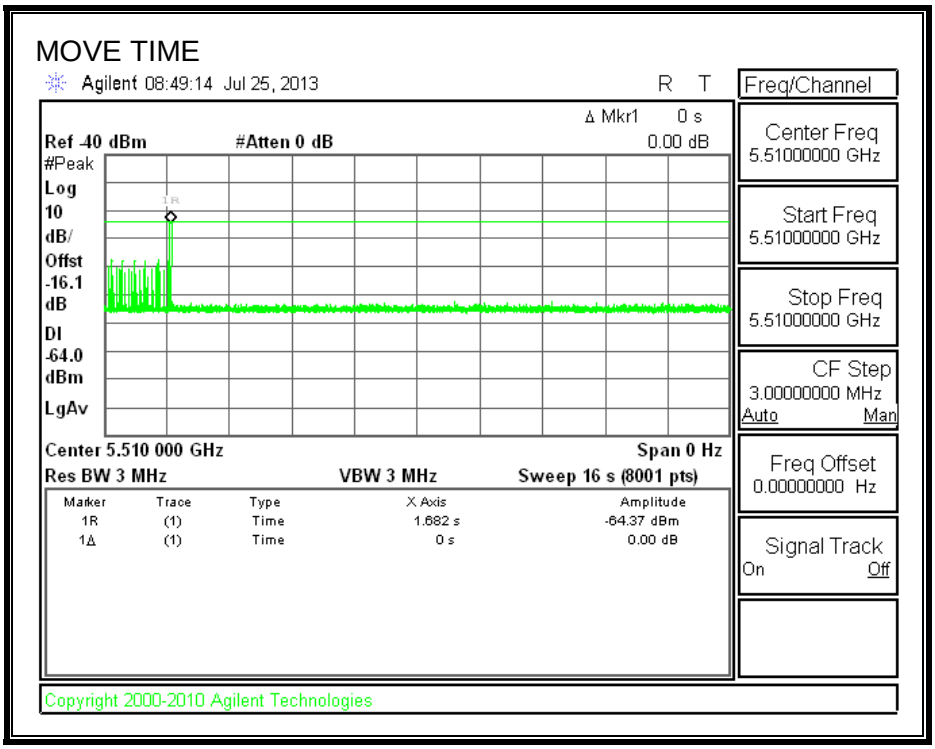
The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

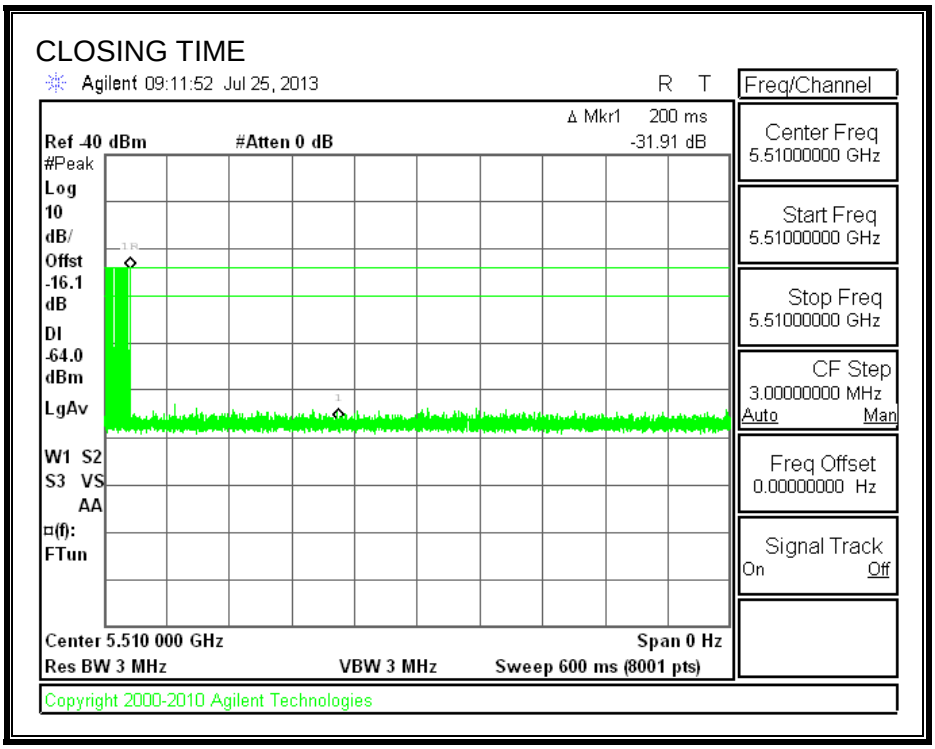
Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.000	10

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

MOVE TIME



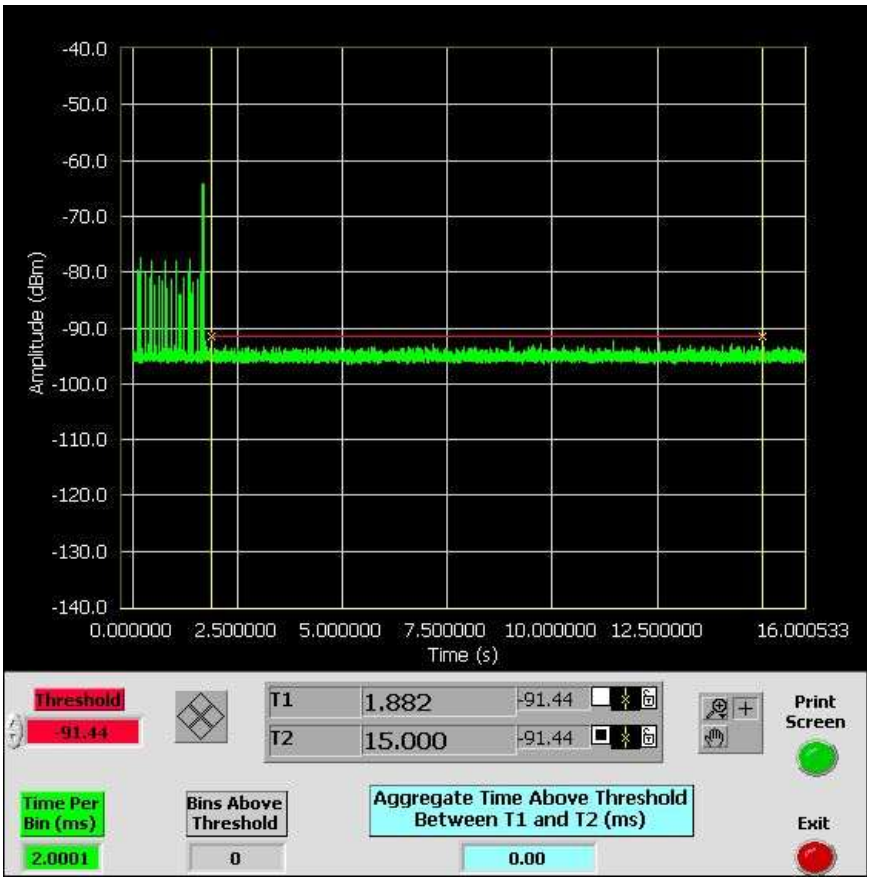
CHANNEL CLOSING TIME



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

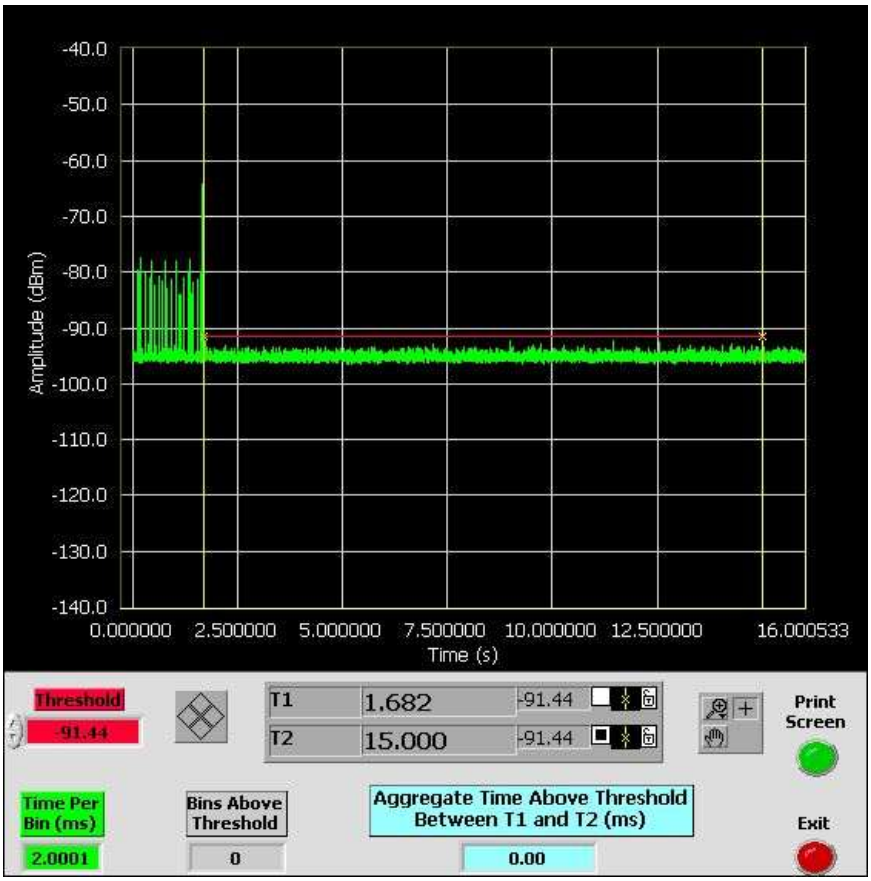
Only intermittent transmissions are observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME



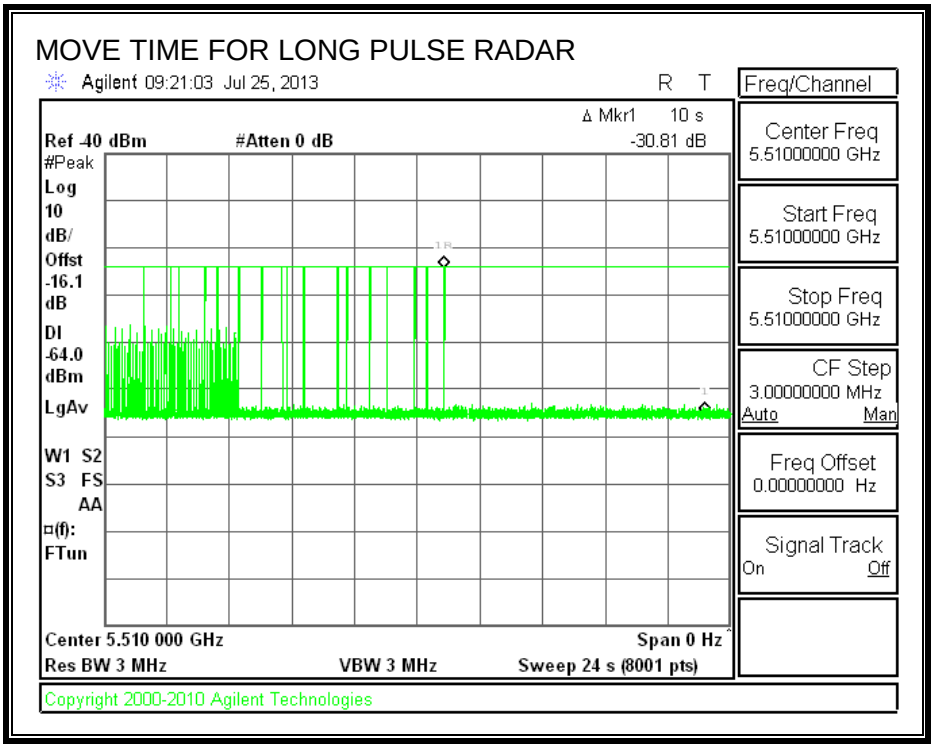
Only intermittent transmissions are observed during the IC aggregate monitoring period.

IC AGGREGATE CLOSING TIME



LONG PULSE CHANNEL MOVE TIME

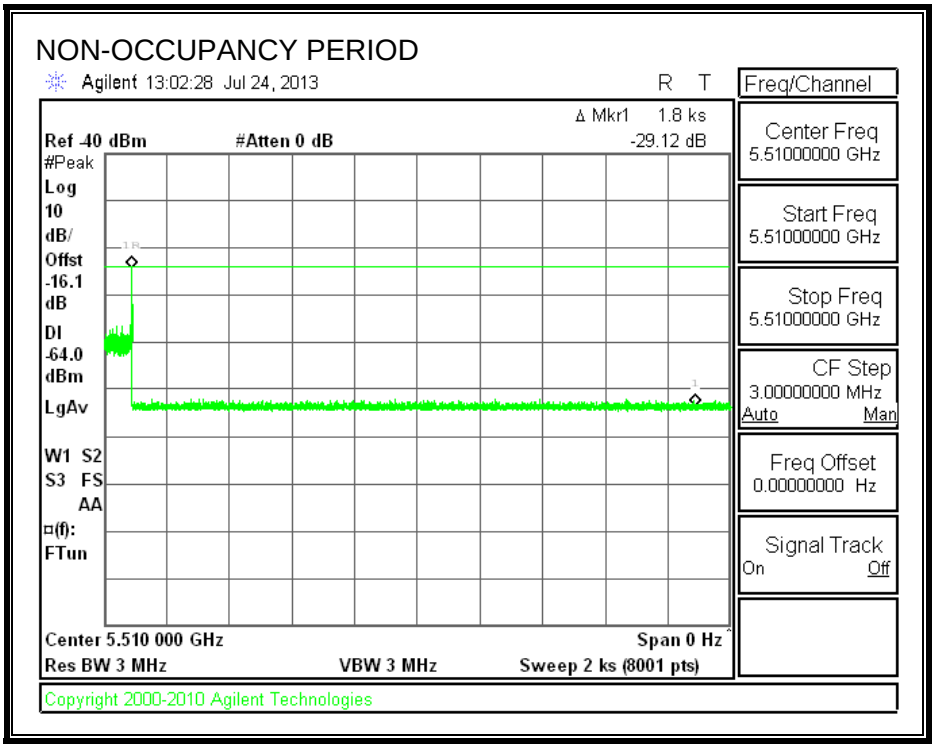
The traffic ceases prior to 10 seconds after the end of the radar waveform.



11.3.6. NON-OCCUPANCY PERIOD

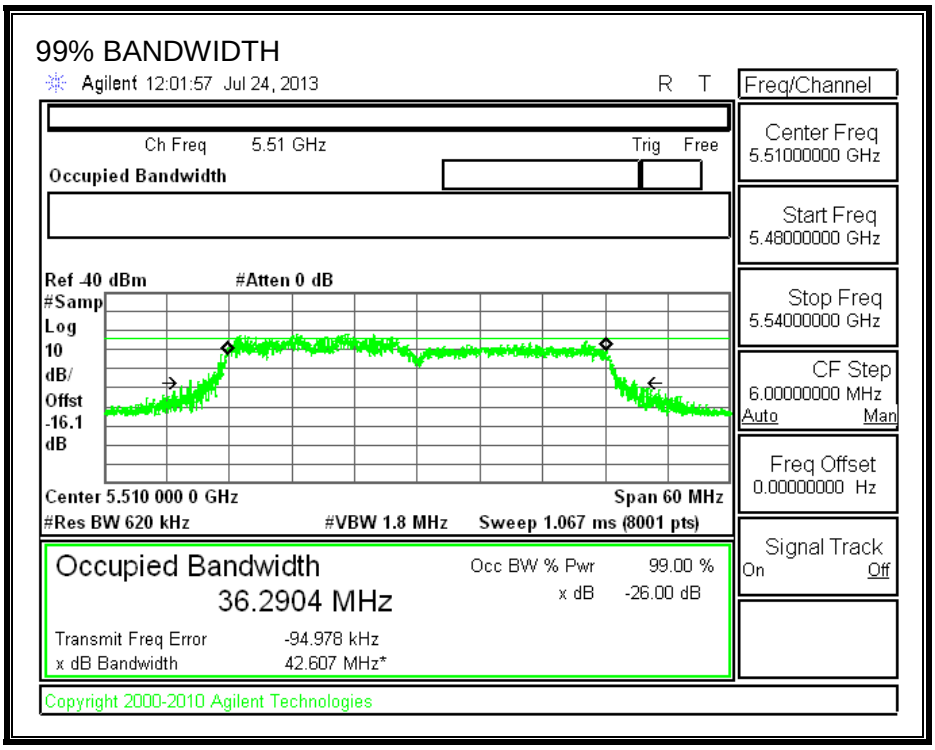
RESULTS

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



11.3.7. DETECTION BANDWIDTH

REFERENCE PLOT OF 99% POWER BANDWIDTH



RESULTS

FL (MHz)	FH (MHz)	Detection Bandwidth (MHz)	99% Power Bandwidth (MHz)	Ratio of Detection BW to 99% Power BW (%)	Minimum Limit (%)
5492	5528	36	36.290	99.2	80

DETECTION BANDWIDTH PROBABILITY

DETECTION BANDWIDTH PROBABILITY RESULTS

Detection Bandwidth Test Results				
FCC Type 1 Waveform: 1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst				
Frequency (MHz)	Number of Trials	Number Detected	Detection (%)	Mark
5492	10	10	100	FL
5493	10	10	100	
5494	10	10	100	
5495	10	10	100	
5496	10	10	100	
5497	10	10	100	
5498	10	10	100	
5499	10	10	100	
5500	10	10	100	
5501	10	10	100	
5502	10	10	100	
5503	10	10	100	
5504	10	10	100	
5505	10	10	100	
5506	10	10	100	
5507	10	10	100	
5508	10	10	100	
5509	10	10	100	
5510	10	10	100	
5511	10	10	100	
5512	10	10	100	
5513	10	10	100	
5514	10	10	100	
5515	10	10	100	
5516	10	10	100	
5517	10	10	100	
5518	10	10	100	
5519	10	10	100	
5520	10	10	100	
5521	10	10	100	
5522	10	10	100	
5523	10	10	100	
5524	10	10	100	
5525	10	10	100	
5526	10	10	100	
5527	10	10	100	
5528	10	10	100	FH

11.3.8. IN-SERVICE MONITORING

RESULTS

FCC Radar Test Summary				
Signal Type	Number of Trials	Detection (%)	Limit (%)	Pass/Fail
FCC Short Pulse Type 1	30	100.00	60	Pass
FCC Short Pulse Type 2	30	100.00	60	Pass
FCC Short Pulse Type 3	30	100.00	60	Pass
FCC Short Pulse Type 4	30	96.67	60	Pass
Aggregate		99.17	80	Pass
FCC Long Pulse Type 5	30	100.00	80	Pass
FCC Hopping Type 6	37	100.00	70	Pass

TYPE 1 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 1 1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst	
Trial	**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	Yes
25	Yes
26	Yes
27	Yes
28	Yes
29	Yes
30	Yes

TYPE 2 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 2				
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
2001	3.7	205.00	25	Yes
2002	1.3	182.00	23	Yes
2003	3.9	153.00	25	Yes
2004	1.1	218.00	23	Yes
2005	2	154.00	28	Yes
2006	4.4	163.00	28	Yes
2007	2.4	180.00	29	Yes
2008	2.5	156.00	28	Yes
2009	2.4	182.00	29	Yes
2010	1.5	205.00	29	Yes
2011	1.8	190.00	26	Yes
2012	4.2	153.00	24	Yes
2013	2.8	195.00	25	Yes
2014	4.2	225.00	28	Yes
2015	1.7	230.00	28	Yes
2016	2.8	218.00	25	Yes
2017	1.1	197.00	27	Yes
2018	1.7	157.00	25	Yes
2019	1.3	158.00	26	Yes
2020	1.6	221.00	28	Yes
2021	2.9	207.00	28	Yes
2022	4.1	165.00	27	Yes
2023	2.6	173.00	28	Yes
2024	4.3	197.00	29	Yes
2025	1.2	164.00	24	Yes
2026	4.5	179.00	24	Yes
2027	1.7	188.00	24	Yes
2028	4.8	207.00	25	Yes
2029	4	181.00	28	Yes
2030	2.2	213.00	29	Yes

TYPE 3 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 3				
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
3001	6.4	294.00	16	Yes
3002	6.8	338.00	18	Yes
3003	9.9	445.00	17	Yes
3004	7.2	314.00	17	Yes
3005	7.6	480.00	17	Yes
3006	6	464.00	18	Yes
3007	5.5	485.00	17	Yes
3008	7	427.00	16	Yes
3009	7.3	346.00	16	Yes
3010	7.5	496.00	17	Yes
3011	7.8	367.00	18	Yes
3012	6.5	370.00	17	Yes
3013	5.2	253.00	18	Yes
3014	6.1	414.00	17	Yes
3015	6.5	317.00	16	Yes
3016	7.4	426.00	17	Yes
3017	9.3	276.00	18	Yes
3018	9.1	335.00	16	Yes
3019	9.6	461.00	17	Yes
3020	8.6	335.00	18	Yes
3021	7.2	388.00	17	Yes
3022	8	340.00	16	Yes
3023	6.3	385.00	18	Yes
3024	5.6	492.00	18	Yes
3025	8.5	427.00	18	Yes
3026	5.6	355.00	18	Yes
3027	9.2	360.00	17	Yes
3028	7.6	281.00	18	Yes
3029	6.3	444	18	Yes
3030	10	476	16	Yes

TYPE 4 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 4				
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
4001	16.7	430.00	12	Yes
4002	12.1	324.00	14	Yes
4003	11.4	394.00	12	Yes
4004	17.1	393.00	16	Yes
4005	19.9	397.00	14	Yes
4006	16.8	453.00	14	Yes
4007	19.2	400.00	12	Yes
4008	15.1	264.00	12	Yes
4009	16	415.00	14	Yes
4010	16.1	404.00	16	Yes
4011	14.5	288.00	15	Yes
4012	14.9	352.00	15	Yes
4013	16.6	307.00	13	Yes
4014	14.3	320.00	14	Yes
4015	17.9	314.00	12	Yes
4016	19.2	446.00	14	Yes
4017	12.1	282.00	12	Yes
4018	16.6	320.00	14	Yes
4019	16.1	373.00	13	Yes
4020	12.7	465.00	16	Yes
4021	15	487.00	12	Yes
4022	16.2	294.00	13	Yes
4023	18.3	270.00	16	Yes
4024	14.6	305.00	16	Yes
4025	12.2	270.00	13	No
4026	16.8	436.00	12	Yes
4027	15	500.00	13	Yes
4028	19.6	380.00	13	Yes
4029	17.8	416.00	16	Yes
4030	19.2	278.00	12	Yes

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5	
Trial	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	Yes
25	Yes
26	Yes
27	Yes
28	Yes
29	Yes
30	Yes

Note: The Type 5 randomized parameters are shown in a separate document.

TYPE 6 DETECTION PROBABILITY

Data Sheet for FCC Hopping Radar Type 6				
1 us Pulse Width, 333 us PRI, 9 Pulses per Burst, 1 Burst per Hop				
NTIA August 2005 Hopping Sequence				
Trial	Starting Index Within Sequence	Signal Generator Frequency (MHz)	Hops within Detection BW	Successful Detection (Yes/No)
1	239	5492	10	Yes
2	714	5493	10	Yes
3	1189	5494	9	Yes
4	1664	5495	5	Yes
5	2139	5496	2	Yes
6	2614	5497	10	Yes
7	3089	5498	11	Yes
8	3564	5499	6	Yes
9	4039	5500	6	Yes
10	4514	5501	10	Yes
11	4989	5502	6	Yes
12	5464	5503	12	Yes
13	5939	5504	5	Yes
14	6414	5505	7	Yes
15	6889	5506	9	Yes
16	7364	5507	6	Yes
17	7839	5508	10	Yes
18	8314	5509	8	Yes
19	8789	5510	6	Yes
20	9264	5511	5	Yes
21	9739	5512	14	Yes
22	10214	5513	10	Yes
23	10689	5514	9	Yes
24	11164	5515	7	Yes
25	11639	5516	10	Yes
26	12114	5517	5	Yes
27	12589	5518	5	Yes
28	13064	5519	8	Yes
29	13539	5520	2	Yes
30	14014	5521	10	Yes
31	14489	5522	9	Yes
32	14964	5523	6	Yes
33	15439	5524	9	Yes
34	15914	5525	8	Yes
35	16389	5526	7	Yes
36	16864	5527	8	Yes
37	17339	5528	9	Yes

12. SETUP PHOTOS

12.1. ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

Note: Antenna port testing was leveraged from the AC/DC powered MSR4K43N3 model. Please refer to UL Verifications Services, Inc. Report 13U14957-1 FCC IC UNII WLAN.