



Microsoft Corporation

1601

FCC 15.407:2013

Report #: MCSO1679 Rev 1



Report Prepared By Northwest EMC Inc.

NORTHWEST EMC – (888) 364-2378 – www.nwemc.com

California – Minnesota – Oregon – New York – Washington

CERTIFICATE OF TEST

Last Date of Test: July 19, 2013
Microsoft Corporation
Model: 1601

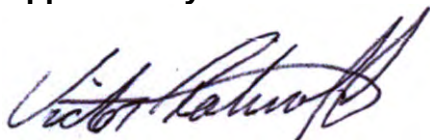
Emissions

Test Description	Specification	Test Method	Pass/Fail
Move Time	FCC 15.407:2013	FCC 06-96:2006	Pass
Closing Time	FCC 15.407:2013	FCC 06-96:2006	Pass
Non Occupancy Period	FCC 15.407:2013	FCC 06-96:2006	Pass

Deviations From Test Standards

None

Approved By:



Victor Ratinoff, Operations Manager



NVLAP Lab Code: 200676-0

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test.

REVISION HISTORY

Revision Number	Description	Date	Page Number
01	Added Test Description Page to Move Time	9-26-2013	14
01	Added Test Description Page to Closing Time	9-26-2013	25
01	Added Test Description Page to Non Occupancy Period	9-26-2013	38

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC Guide 65 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

IC - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

European Union

European Commission – Validated by the European Commission as a Conformity Assessment Body (CAB) under the EMC directive and as a Notified Body under the R&TTE Directive.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

KCC / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Hong Kong

OFTA – Recognized by OFTA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

Russia

GOST – Accredited by Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC to perform EMC and Hygienic testing for Information Technology products to GOST standards.

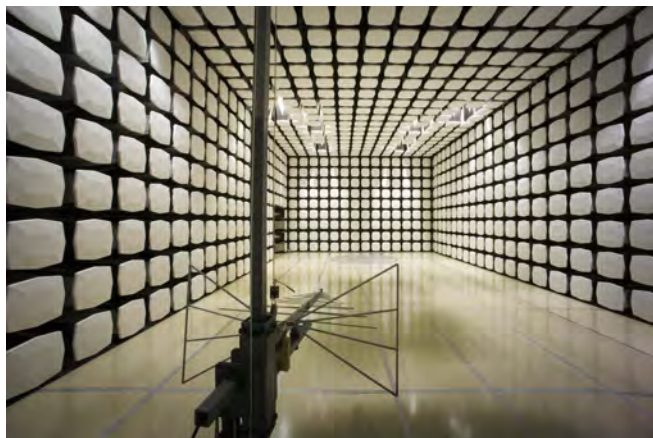
SCOPE

For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/accreditations/>



Oregon Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	California Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	New York Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 685-0796	Minnesota Labs MN01-08 9349 W Broadway Ave. Brooklyn Park, MN 55445 (763) 425-2281	Washington Labs NC01-05, SU02, SU07 19201 120 th Ave. NE Bothell, WA 98011 (425) 984-6600
VCCI				
A-0108	A-0029		A-0109	A-0110
Industry Canada				
2834D-1, 2834D-2	2834B-1, 2834B-2, 2834B-3		2834E-1	2834C-1
NVLAP				
NVLAP Lab Code: 200630-0	NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200629-0



Client and Equipment Under Test (EUT) Information

Company Name:	Microsoft Corporation
Address:	One Microsoft Way
City, State, Zip:	Redmond, WA 98052-6399
Test Requested By:	Mike Boucher
Model:	Model 1601
First Date of Test:	July 12, 2013
Last Date of Test:	July 19, 2013
Receipt Date of Samples:	July 11, 2013
Equipment Design Stage:	Preproduction
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):

A Handheld computing device with 802.11a/b/g/n 2x2 MIMO radio operating in both 20 MHz and 40 MHz channel bandwidths

Hardware, Firmware, and OS Versions:

Hardware Version: EV2-BB07

OS Version: Windows 8.1 9431.130615-1214

The operating frequency band(s) of the equipment.

2400 - 2483.5 MHz

5150 - 5250 MHz

5250 - 5350 MHz (DFS Band)

5470 - 5600 MHz (DFS Band)

5650 - 5725 MHz (DFS Band)

5725 - 5825 MHz

The operating modes (Master and/or Client) of the U-NII device.

Client device with no Ad-Hoc function and no radar detection

List the highest and the lowest possible power level

The peak Transmit power of the EUT with the permanently attached cable is 12 dBm. The maximum antenna gain in the 5GHz is 6.2 dBi.

Test sequences or messages that should be used for communication between Master and Client Devices, which are used for loading the Channel.

1. Stream the test file from the Master Device to the Client Device for IP based systems or frame based systems which dynamically allocate the talk/listen ratio.
2. For frame based systems with fixed talk/listen ratio, set the ratio to 45%/55% and stream the test file from the Master to the Client.
3. For other system architectures, supply appropriate Channel loading methodology.

The specified NTIA MPEG file was used to exercise the channel

Transmit Power Control description.

This device does not exceed 27dBm EIRP, so no transmit power control is implemented.

System architectures, data rates, U-NII Channel bandwidths.

1. Indicate the type(s) of system architecture (e.g. IP based or Frame based) that the U-NII device employs. Each type of unique architecture must be tested.

The Client device (EUT) employs IP based system architecture.

The time required for the Master Device and/or Client Device to complete its power-on cycle.

The Master device used in the test system requires 1.44 minutes to complete its power-on cycle. The client device (EUT) does not have radar detection, so its power-on time is not applicable, but was measured to be approximately 15 seconds

Manufacturer statement confirming that information regarding the parameters of the detected Radar Waveforms is not available to the end user.

The client device (EUT) does not have radar detection, so this requirement is not applicable.

Uniform Channel Spreading requirement for Master Devices. For Master Devices, indicate how the master provides, on aggregate, uniform Channel loading of the spectrum across all Channels.

The client device (EUT) does not have radar detection, so this requirement is not applicable.

List all antenna assemblies and their corresponding gains.

1. If radiated tests are to be performed, the U-NII Device should be tested with the lowest gain antenna assembly (regardless of antenna type). The report should indicate which antenna assembly was used for the tests. For devices with adjustable output power, list the output power range and the maximum EIRP for each antenna assembly.
2. If conducted tests are to be performed, indicate which antenna port/connection was used for the tests and the antenna assembly gain that was used to set the DFS Detection Threshold level during calibration of the test setup.
 - a. Indicate the calibrated conducted DFS Detection Threshold level.
 - b. For devices with adjustable output power, list the output power range and the maximum EIRP for each antenna assembly.
 - c. Indicate the antenna connector impedance. Ensure that the measurement instruments match (usually 50 Ohms) or use a minimum loss pad and take into account the conversion loss.
3. Antenna gain measurement verification for tested antenna.
 - a. Describe procedure
 - b. Describe the antenna configuration and how it is mounted
 - c. If an antenna cable is supplied with the device, cable loss needs to be taken into account. Indicate the maximum cable length and either measure the gain with this cable or adjust the measured gain accordingly. State the cable loss.

The Client device (EUT) has two 50 ohm antenna ports used for the 5GHz band. A conducted DFS test was performed on both separately at 20 and 40 MHz channel bandwidths.

The client device does not have radar detection, so details on the cable loss and antenna gain are not applicable. For reference, the maximum antenna gain in the 5 GHz bands is 6.2 dBi.

Configuration MCSO1679- 1

Software/Firmware Running during test	
Description	Version
Windows 8.1	9431.130615-1214
NTIA Test File.mpeg	None

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Handheld computing device	Microsoft Corporation	1601	017915532453

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
WLAN Master Access Point	Cisco	AIR-LAP1252G-A-K9	FTX123590JT

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	7/17/2013	DFS Testing	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	7/18/2013	DFS Testing	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	7/19/2013	DFS Testing	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

Applicability of DFS Requirements Prior to Use of a Channel

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

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
U-NII Detection Bandwidth	Yes	Not required	Yes

DFS Response Requirement Values

Parameter	Value
Non-occupancy	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds (See Note 1)
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. (See Notes 1 and 2).
U-NII Detection Bandwidth	Minimum 80% of the UNII 99% transmission power bandwidth. (See Note 3).

Note 1: 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 Waveform.

Note 2: 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 a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Note 3: During the U-NII Detection Bandwidth detection test, radar type 1 is used and for each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

DFS Detection Thresholds for Master or Client Devices Incorporating DFS

Maximum Transmit Power	Value (See Notes 1 and 2)
≥ 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.	

Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of 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

Long Pulse Radar Test Waveforms

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

Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (μsec)	PRI (μsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

Client Device DFS Conformance Test

For a Client Device without DFS, the Channel Move Time and Channel Closing Transmission Time requirements are verified with one Short Pulse Radar.

Channel Closing Transmission Time: The total duration of transmissions, consisting of data signals and the aggregate of control signals, by a U-NII device during the Channel Move Time.

Channel Move Time: The time to cease all transmissions on the current Channel upon detection of a Radar Waveform above the DFS Detection Threshold. A Client Device will not transmit before having received appropriate control signals from a Master Device.

A Client Device will stop all its transmissions whenever instructed by a Master Device to which it is associated and will meet the Channel Move Time and Channel Closing Transmission Time requirements. The Client Device will not resume any transmissions until it has again received control signals from a Master Device.

DFS Detection Thresholds for Master or Client Devices Incorporating DFS

Maximum Transmit Power	Value (See Notes 1 and 2)
≥ 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.	

DFS Response Requirement Value

Parameter	Value
<i>Non-occupancy period</i>	Minimum 30 minutes
<i>Channel Availability Check Time</i>	60 seconds
<i>Channel Move Time</i>	10 seconds See Note 1.
<i>Channel Closing Transmission Time</i>	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.

Setting the Test Signal Level

The radar test signal level is set at the Master Device, or the Client Device with In-Service Monitoring, as appropriate for the particular test. This device is known as the Radar Detection Device (RDD).

- When a Client Device without In-Service Monitoring is the UUT, the Master Device is the RDD.
- When a Client Device with In-Service Monitoring is the UUT, and is tested for response to the Master Device detections, the Master Device is the RDD.
- When a Client Device with In-Service Monitoring is the UUT, and is tested for independent response to detections by the Client Device, the Client Device is the RDD.

A spectrum analyzer is used to establish the test signal level for each radar type. During this process, there are no transmissions by either the Master Device or Client Device. The spectrum analyzer is switched to the zero span (time domain) mode at the frequency of the Radar Waveform generator. The peak detector function of the spectrum analyzer is utilized. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) are set to at least 3 MHz.

The signal generator amplitude and/or step attenuators are set so that the power level measured at the spectrum analyzer is equal to the DFS Detection Threshold that is required for the tests. The signal generator and attenuator settings are recorded for use during the test.

Move Time

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFG	5/16/2012	24
RF Vector Signal Generator	Agilent	V2920A	TIH	NCR	0
SMA Power Divider	S.M. Electronics	MP0208-2	None	NCR	0
SMA Power Divider	S.M. Electronics	MP0208-2	None	NCR	0
Step Attenuator	Aeroflex/Weinchel	3053	26834	NCR	0
Step Attenuator	Aeroflex/Weinchel	3053	26835	NCR	0

TEST DESCRIPTION

FCC KDB 905462 describes the compliance measurement procedures including acceptable instrument system configurations for performing Dynamic Frequency Selection (DFS) tests under FCC Part 15 Subpart E Rules required for Unlicensed –National Information Infrastructure (U-NII) equipment that operates in the frequency bands 5.25 GHz to 5.35 GHz and/or 5.47 GHz to 5.725 GHz. The master and client were connected using the conducted method described in the procedure via a series of splitters and attenuators which allows the radar signals to be injected and monitored. Where required, the FCC approved MPEG video was streamed through the master and client or an alternative method to load the channel. Configuration and status of the master and client devices were monitored. The Move Time test was performed by starting a transmission between the Master and Slave device, and then injecting the appropriate radar signals and making sure both the Master and Slave device vacate the DFS channel.



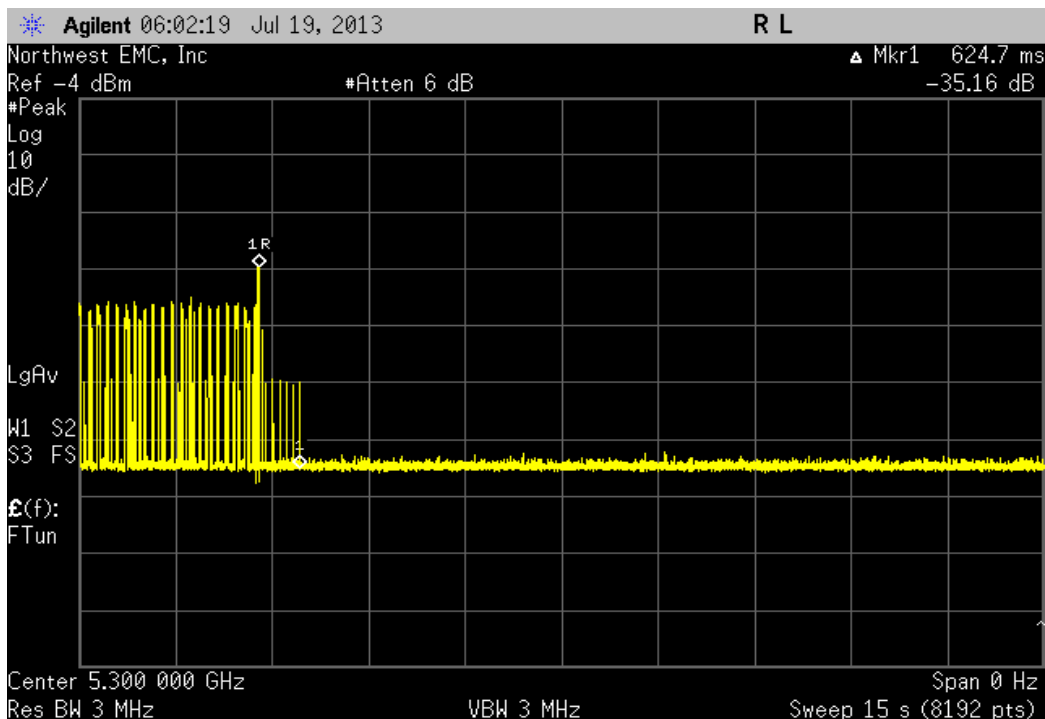
Move Time

XMit 2013.02.28

EUT: 1601		Work Order: MCSO1679		
Serial Number: 017915532453		Date: 07/18/13		
Customer: Microsoft Corporation		Temperature: 25°C		
Attendees: None		Humidity: 48%		
Project: None		Barometric Pres.: 1013		
Tested by: Jeremiah Darden		Power: 110VAC/60Hz		
		Job Site: OC11		
TEST SPECIFICATIONS		Test Method		
FCC 15.407:2013		FCC 06-96:2006		
COMMENTS				
None				
DEVIATIONS FROM TEST STANDARD				
None				
Configuration #	1	Signature 		
		Value (sec)	Limit (sec)	Result
PortA				
Radar1				
Channel 60 in 5250-5350MHz Band				
20MHz				
0.6247				
<10				
Pass				
40MHz				
0.641				
<10				
Pass				
Channel 112 in 5470-5725MHz Band				
20MHz				
0.6025				
<10				
Pass				
40MHz				
0.5476				
<10				
Pass				
Radar5				
Channel 60 in 5250-5350MHz Band				
20MHz				
0.7327				
<10				
Pass				
40MHz				
0.6155				
<10				
Pass				
Channel 112 in 5470-5725MHz Band				
20MHz				
0.6283				
<10				
Pass				
40MHz				
0.5732				
<10				
Pass				
PortB				
Radar1				
Channel 60 in 5250-5350MHz Band				
20MHz				
0.597				
<10				
Pass				
40MHz				
0.6336				
<10				
Pass				
Channel 112 in 5470-5725MHz Band				
20MHz				
0.6631				
<10				
Pass				
40MHz				
0.5972				
<10				
Pass				
Radar5				
Channel 60 in 5250-5350MHz Band				
20MHz				
0.6117				
<10				
Pass				
40MHz				
0.575				
<10				
Pass				
Channel 112 in 5470-5725MHz Band				
20MHz				
0.652				
<10				
Pass				
40MHz				
0.6831				
<10				
Pass				

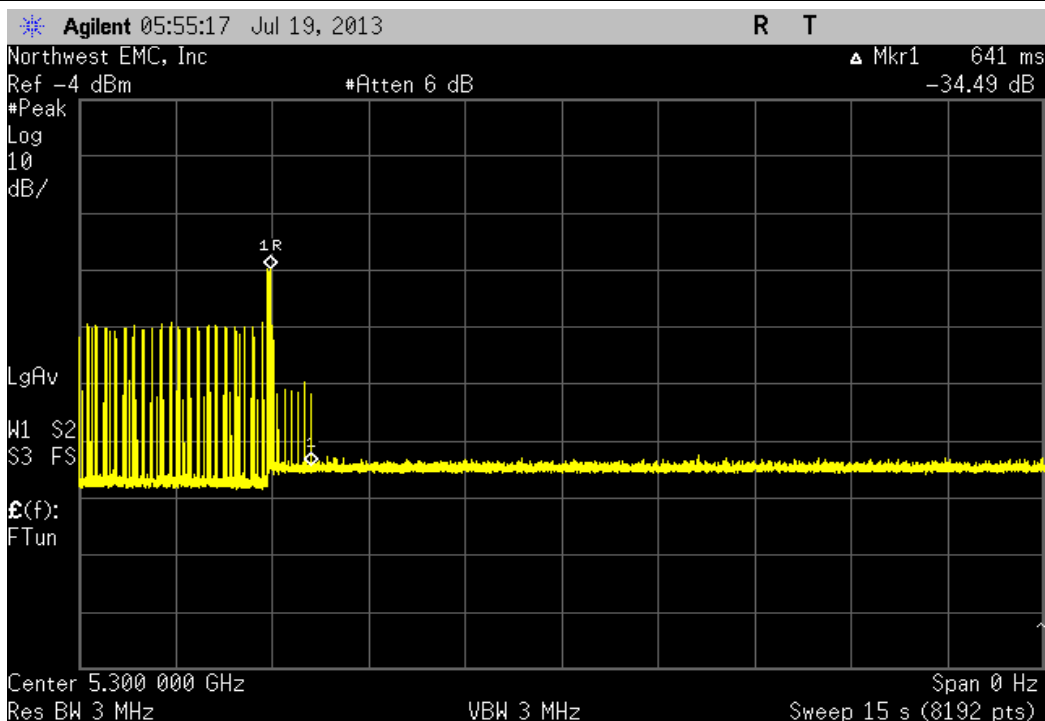
PortA, Radar1, Channel 60 in 5250-5350MHz Band , 20MHz

Value (sec)	Limit (sec)	Result
0.6247	<10	Pass



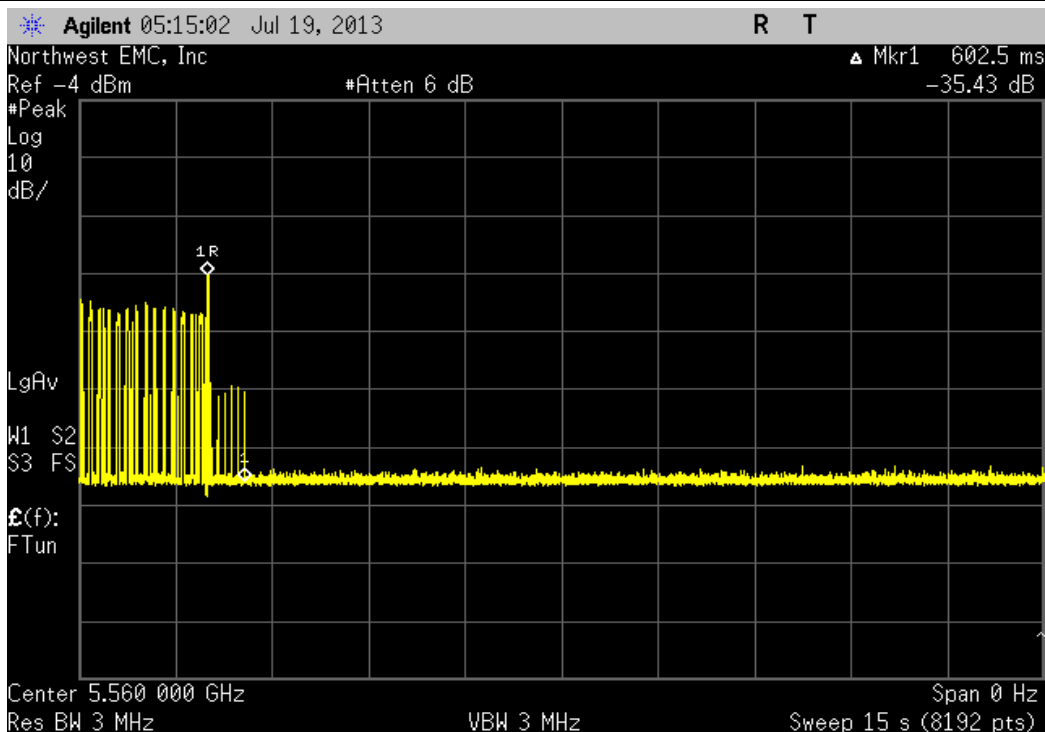
PortA, Radar1, Channel 60 in 5250-5350MHz Band , 40MHz

Value (sec)	Limit (sec)	Result
0.641	<10	Pass



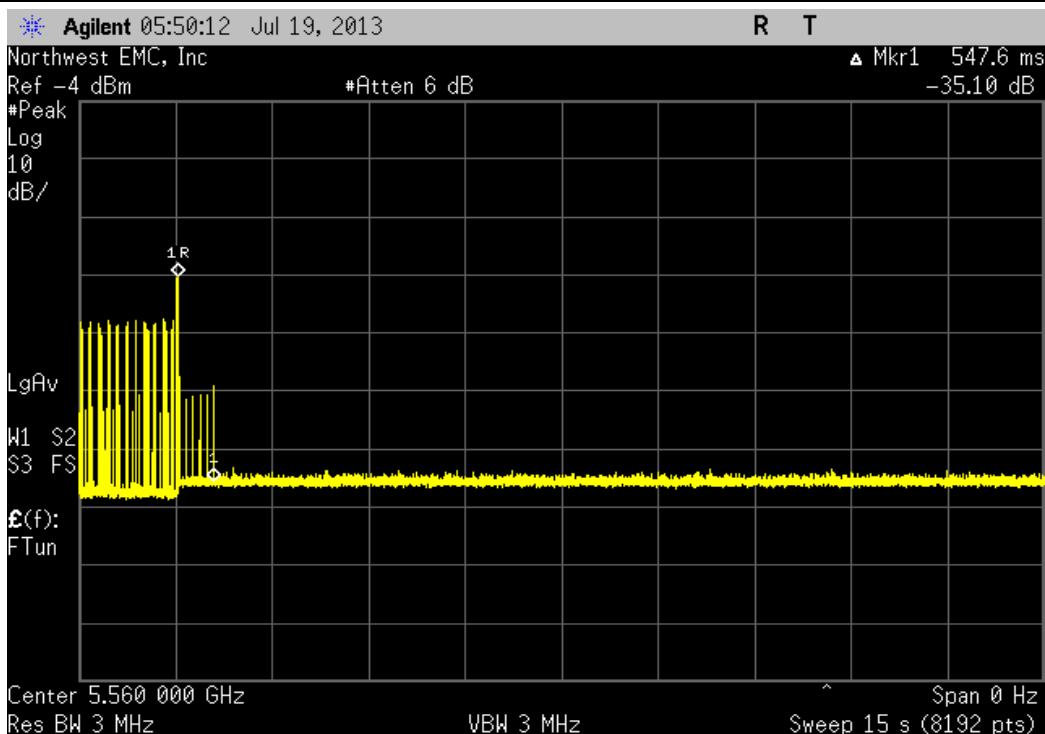
PortA, Radar1, Channel 112 in 5470-5725MHz Band, 20MHz

				Value (sec)	Limit (sec)	Result
				0.6025	<10	Pass



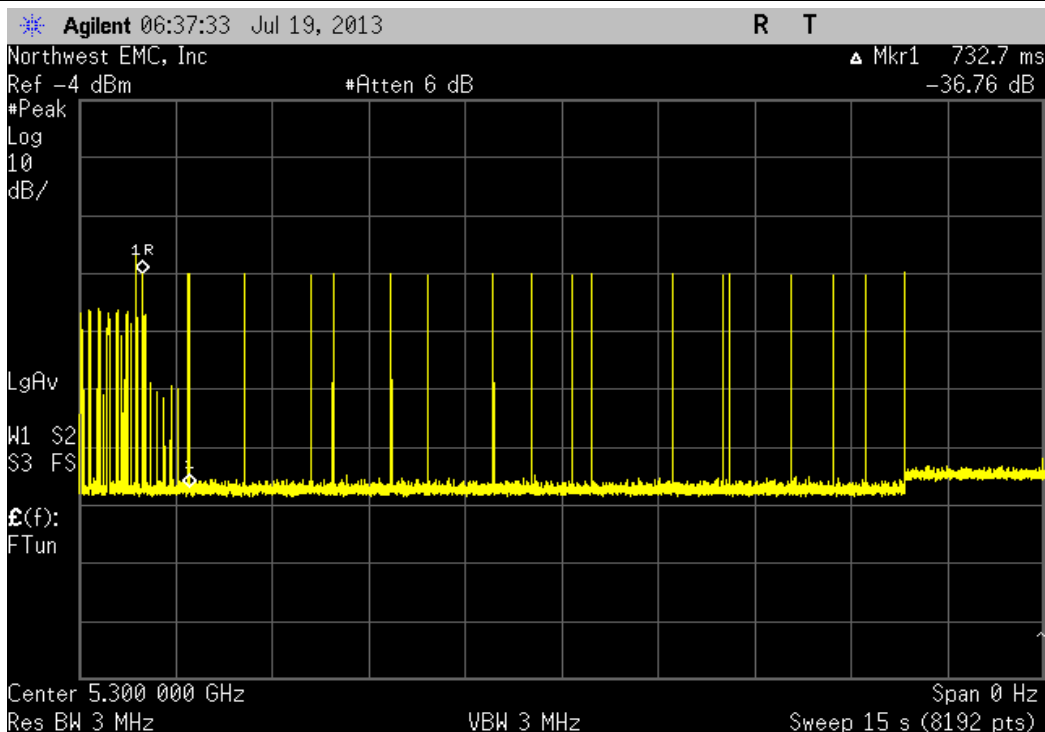
PortA, Radar1, Channel 112 in 5470-5725MHz Band, 40MHz

				Value (sec)	Limit (sec)	Result
				0.5476	<10	Pass



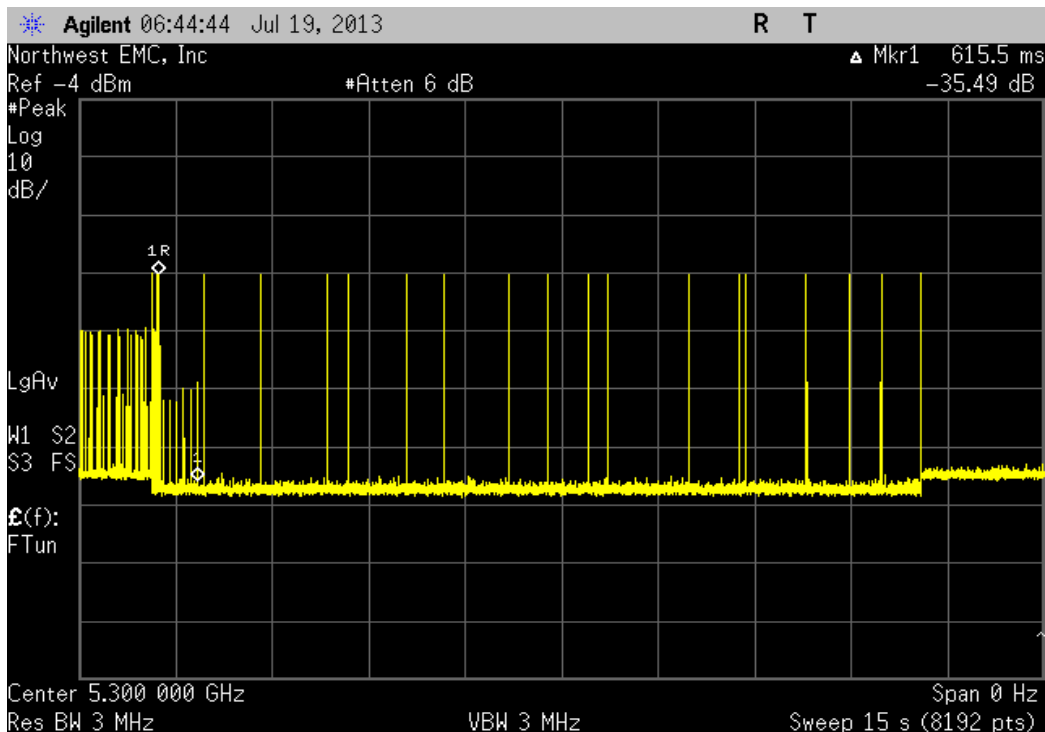
PortA, Radar5, Channel 60 in 5250-5350MHz Band , 20MHz

				Value (sec)	Limit (sec)	Result
				0.7327	<10	Pass



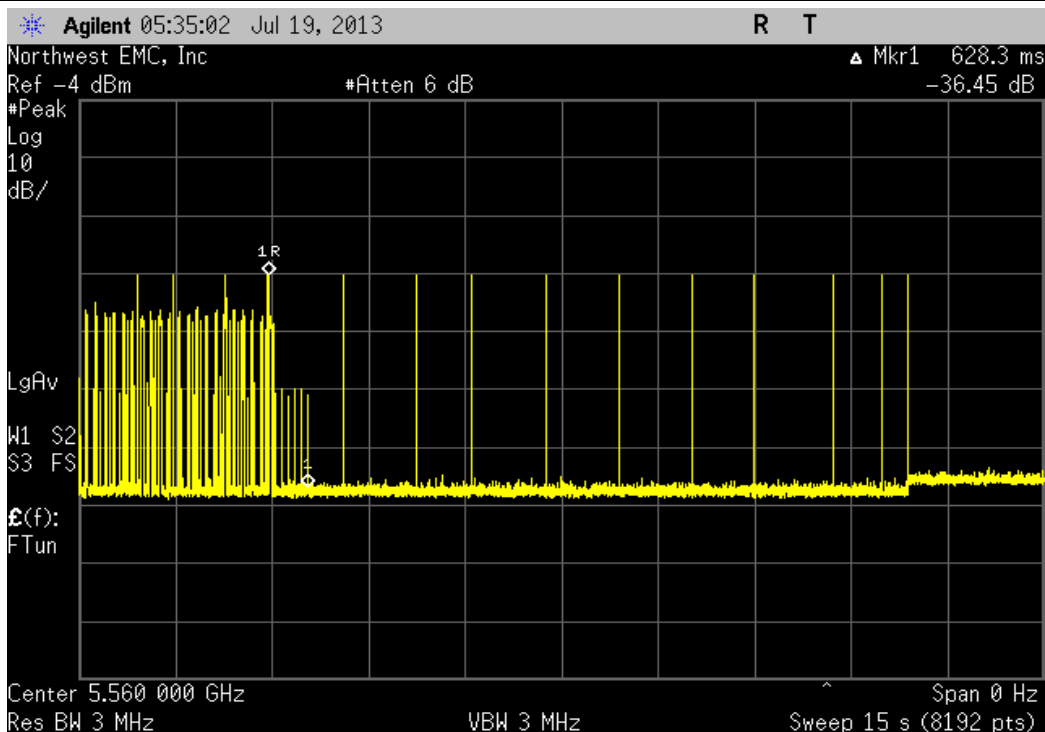
PortA, Radar5, Channel 60 in 5250-5350MHz Band , 40MHz

				Value (sec)	Limit (sec)	Result
				0.6155	<10	Pass



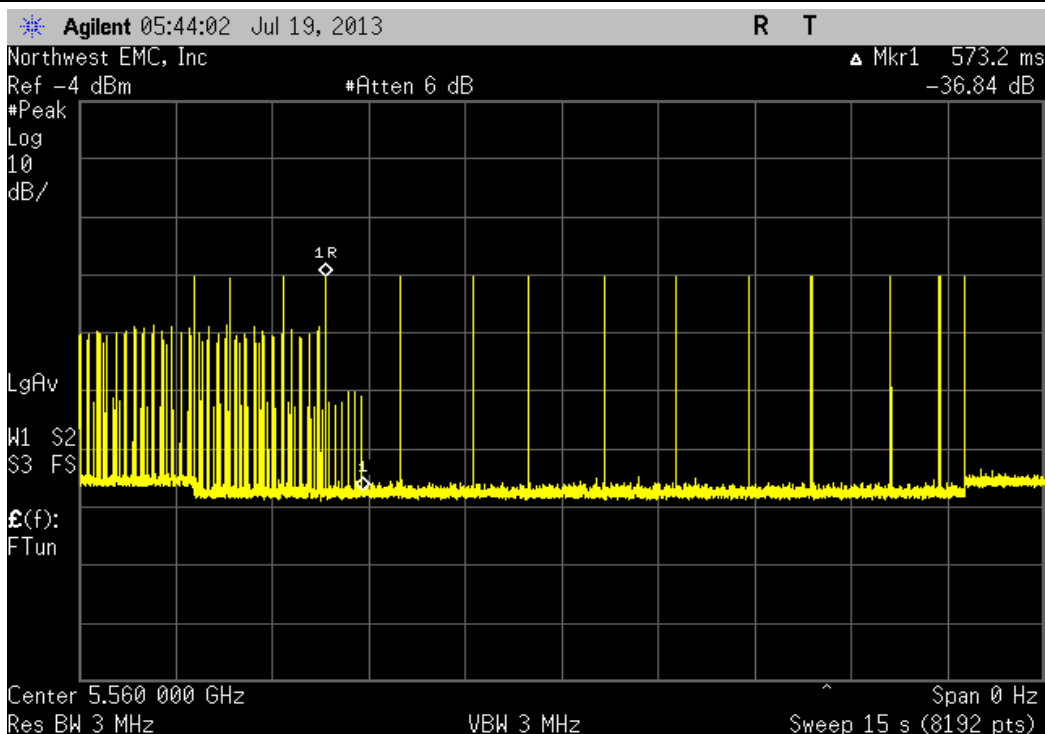
PortA, Radar5, Channel 112 in 5470-5725MHz Band, 20MHz

				Value (sec)	Limit (sec)	Result
				0.6283	<10	Pass



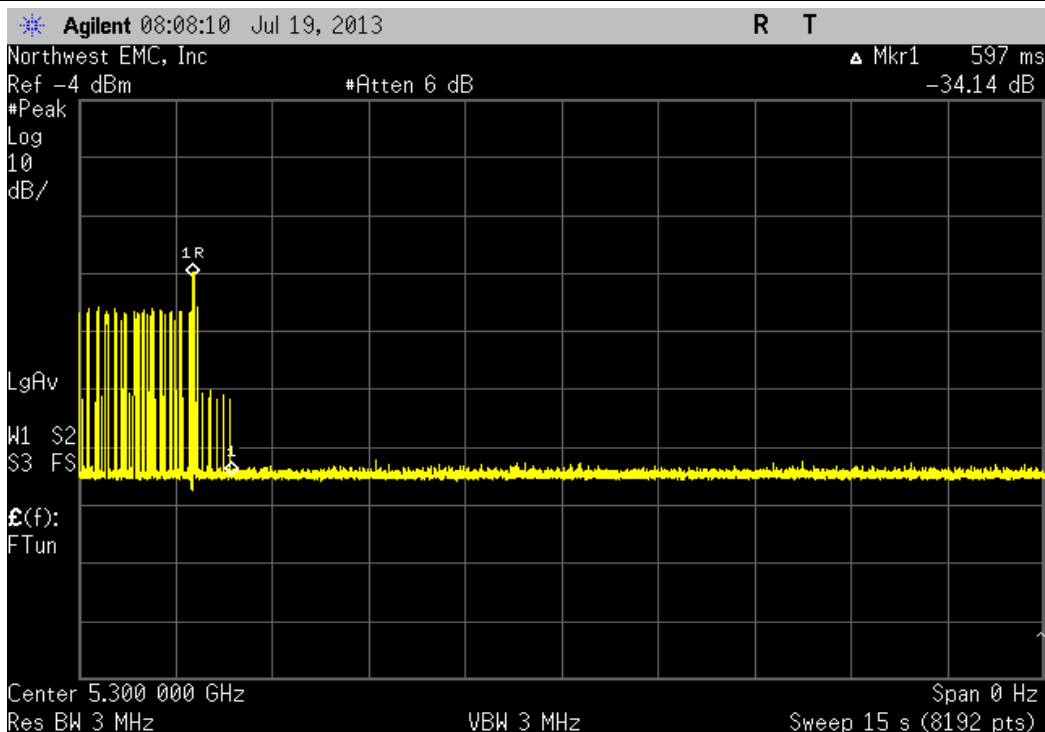
PortA, Radar5, Channel 112 in 5470-5725MHz Band, 40MHz

				Value (sec)	Limit (sec)	Result
				0.5732	<10	Pass



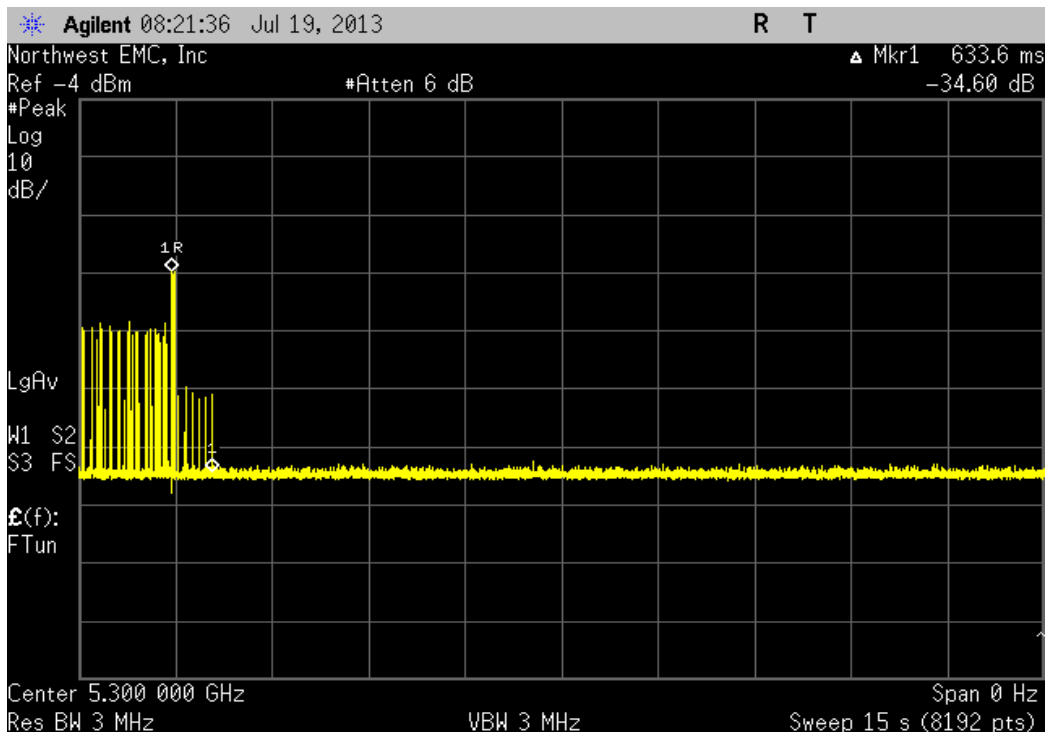
PortB, Radar1, Channel 60 in 5250-5350MHz Band , 20MHz

				Value (sec)	Limit (sec)	Result
				0.597	<10	Pass



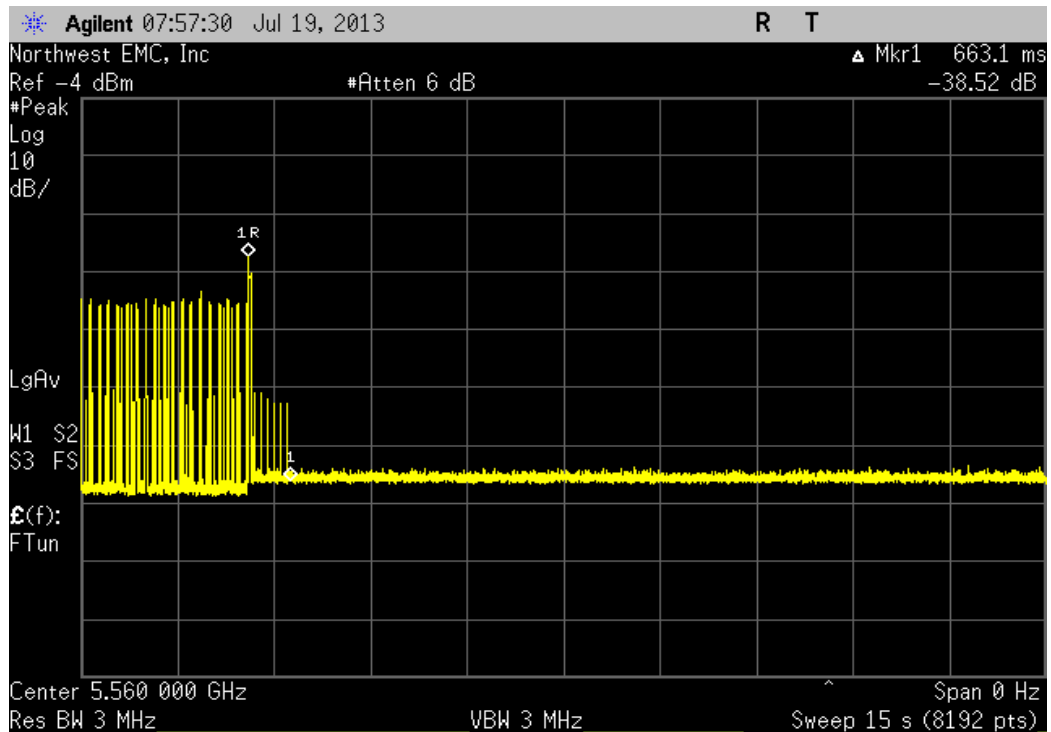
PortB, Radar1, Channel 60 in 5250-5350MHz Band , 40MHz

				Value (sec)	Limit (sec)	Result
				0.6336	<10	Pass



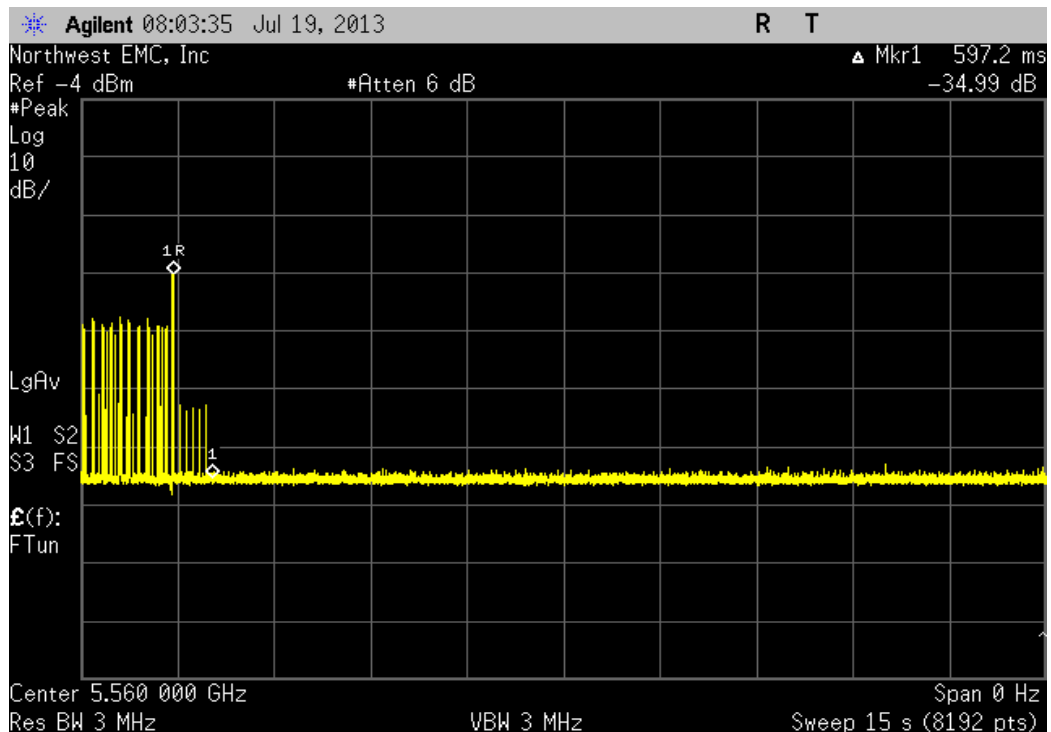
PortB, Radar1, Channel 112 in 5470-5725MHz Band, 20MHz

				Value (sec)	Limit (sec)	Result
				0.6631	<10	Pass



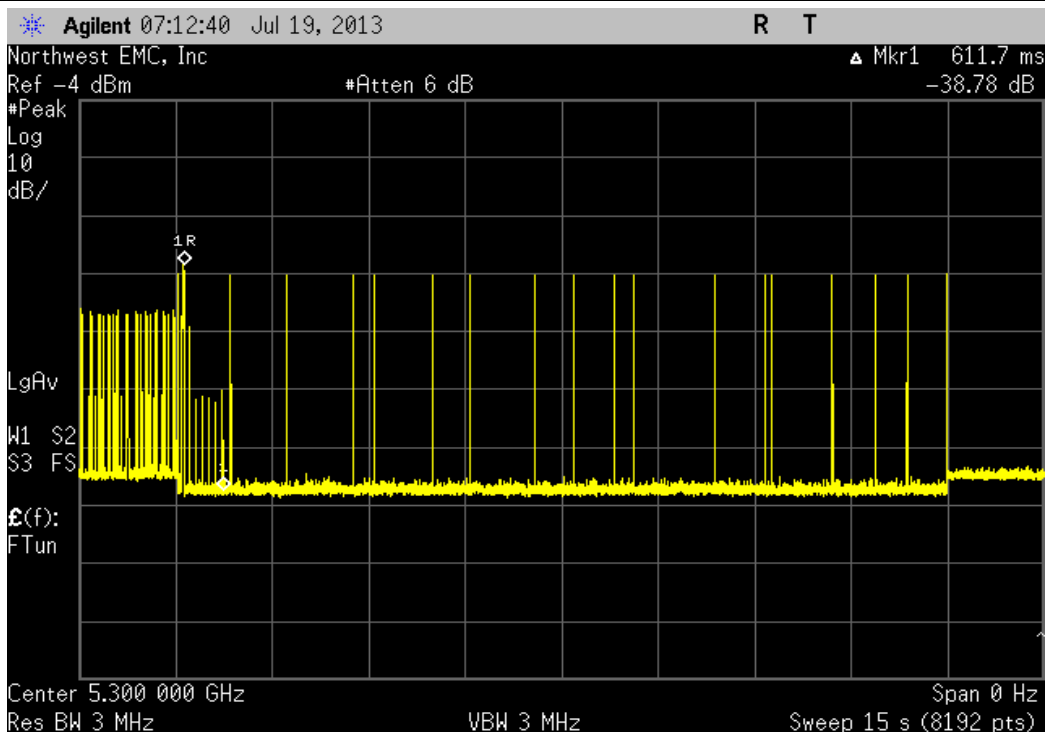
PortB, Radar1, Channel 112 in 5470-5725MHz Band, 40MHz

				Value (sec)	Limit (sec)	Result
				0.5972	<10	Pass



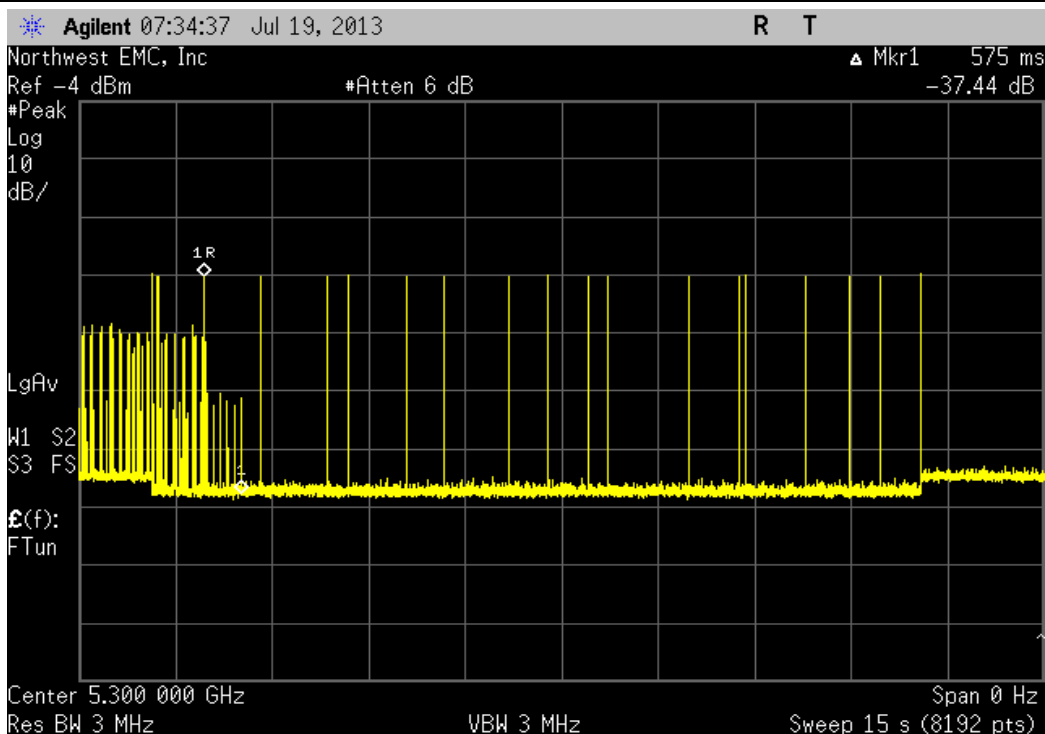
PortB, Radar5, Channel 60 in 5250-5350MHz Band , 20MHz

				Value (sec)	Limit (sec)	Result
				0.6117	<10	Pass



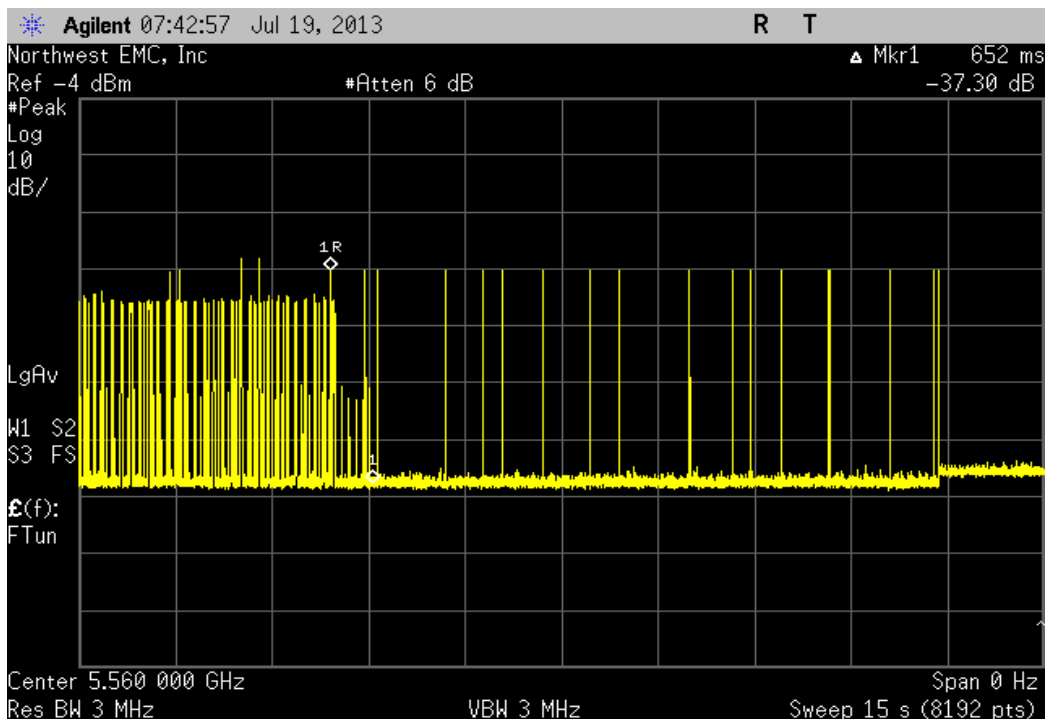
PortB, Radar5, Channel 60 in 5250-5350MHz Band , 40MHz

				Value (sec)	Limit (sec)	Result
				0.575	<10	Pass



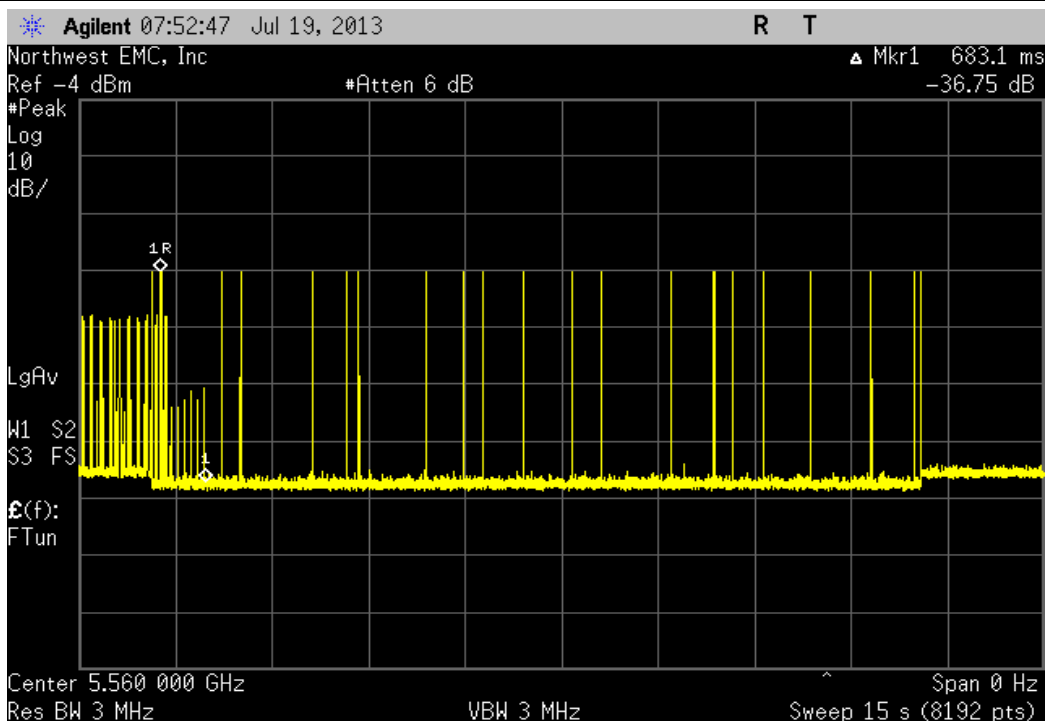
PortB, Radar5, Channel 112 in 5470-5725MHz Band, 20MHz

Value (sec)	Limit (sec)	Result
0.652	<10	Pass

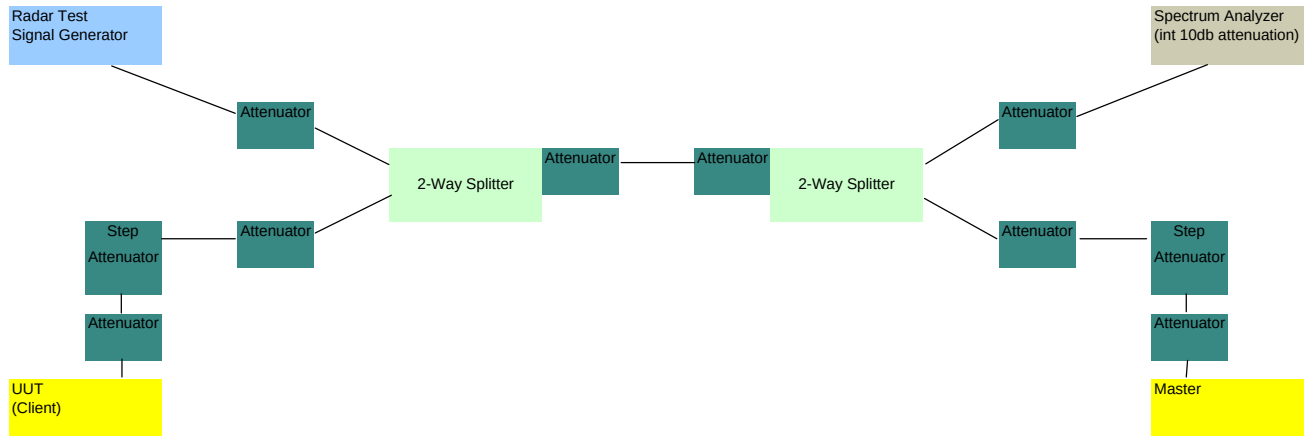


PortB, Radar5, Channel 112 in 5470-5725MHz Band, 40MHz

Value (sec)	Limit (sec)	Result
0.6831	<10	Pass



System Block Diagram



Closing Time

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFG	5/16/2012	24
RF Vector Signal Generator	Agilent	V2920A	TIH	NCR	0
SMA Power Divider	S.M. Electronics	MP0208-2	None	NCR	0
SMA Power Divider	S.M. Electronics	MP0208-2	None	NCR	0
Step Attenuator	Aeroflex/Weinchel	3053	26834	NCR	0
Step Attenuator	Aeroflex/Weinchel	3053	26835	NCR	0

TEST DESCRIPTION

FCC KDB 905462 describes the compliance measurement procedures including acceptable instrument system configurations for performing Dynamic Frequency Selection (DFS) tests under FCC Part 15 Subpart E Rules required for Unlicensed –National Information Infrastructure (U-NII) equipment that operates in the frequency bands 5.25 GHz to 5.35 GHz and/or 5.47 GHz to 5.725 GHz. The master and client were connected using the conducted method described in the procedure via a series of splitters and attenuators which allows the radar signals to be injected and monitored. Where required, the FCC approved MPEG video was streamed through the master and client or an alternative method to load the channel. Configuration and status of the master and client devices were monitored. The Closing Time test was performed by starting a transmission between the Master and Client device, and then injecting the appropriate radar signals. All transmission signals between the Master and Client in the first 200mS are allowed. After this time period, the number of transmissions signals are counted and multiplied by the pulse width value. This aggregate is then added to the 200mS allowance for the final value.



Closing Time

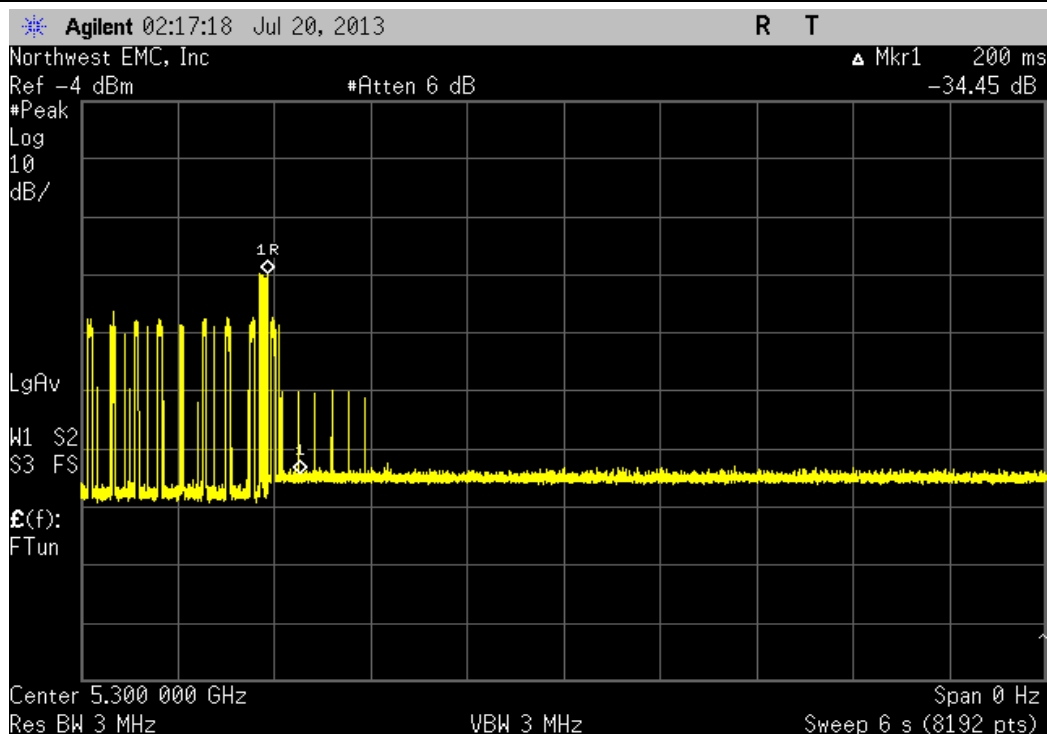
XMIT 2013.02.28

EUT: 1601		Work Order: MCSO1679				
Serial Number: 017915532453		Date: 07/19/13				
Customer: Microsoft Corporation		Temperature: 24°C				
Attendees: None		Humidity: 44%				
Project: None		Barometric Pres.: 1012				
Tested by: Jeremiah Darden		Power: 110VAC/60Hz				
		Job Site: OC11				
TEST SPECIFICATIONS		Test Method				
FCC 15.407:2013		FCC 06-96:2006				
COMMENTS						
None						
DEVIATIONS FROM TEST STANDARD						
None						
Configuration #	1	Signature 				
		# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result
PortA						
Radar1						
Channel 60 in 5250-5350MHz Band						
Control Signal Pulse Width						
20MHz(200mS+Aggregate)						
40MHz(200mS+Aggregate)						
Channel 112 in 5470-5725MHz Band						
Control Signal Pulse Width						
20MHz(200mS+Aggregate)						
40MHz(200mS+Aggregate)						
Radar5						
Channel 60 in 5250-5350MHz Band						
20MHz(200mS+Aggregate)						
40MHz(200mS+Aggregate)						
Channel 112 in 5470-5725MHz Band						
20MHz(200mS+Aggregate)						
40MHz(200mS+Aggregate)						
PortB						
Radar1						
Channel 60 in 5250-5350MHz Band						
Control Signal Pulse Width						
20MHz(200mS+Aggregate)						
40MHz(200mS+Aggregate)						
Channel 112 in 5470-5725MHz Band						
Control Signal Pulse Width						
20MHz(200mS+Aggregate)						
40MHz(200mS+Aggregate)						
Radar5						
Channel 60 in 5250-5350MHz Band						
20MHz(200mS+Aggregate)						
40MHz(200mS+Aggregate)						
Channel 112 in 5470-5725MHz Band						
20MHz(200mS+Aggregate)						
40MHz(200mS+Aggregate)						

PortA, Radar1, Channel 60 in 5250-5350MHz Band , Control Signal Pulse Width						
	# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result	
	N/A	0.3299	N/A	N/A	N/A	

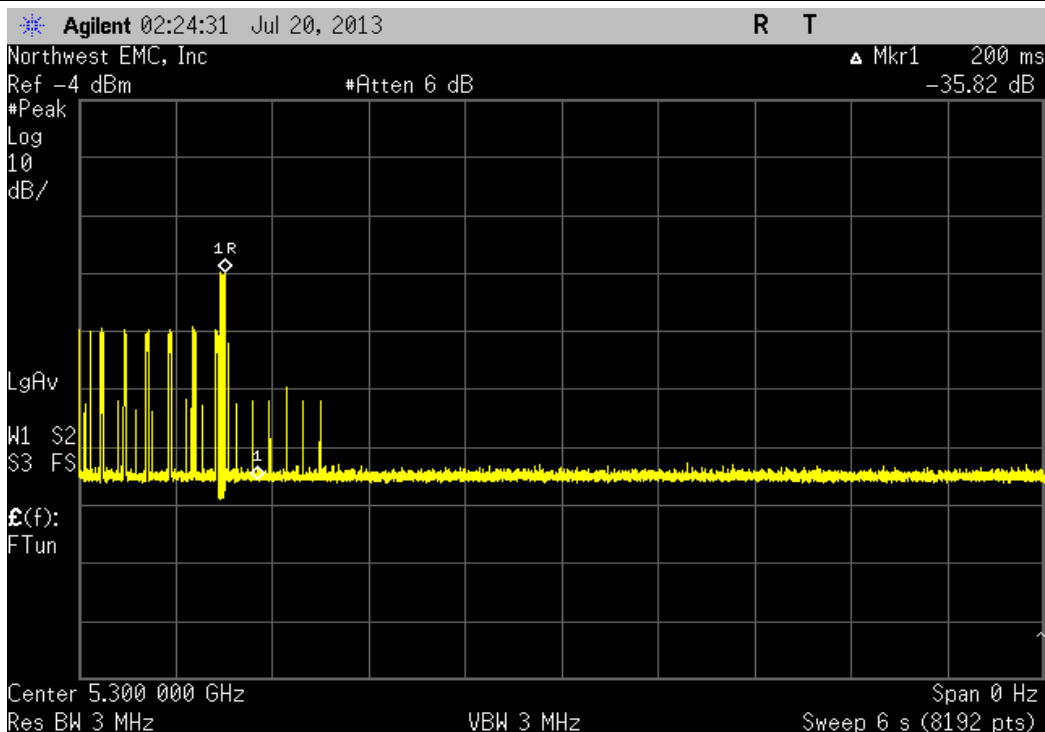


PortA, Radar1, Channel 60 in 5250-5350MHz Band , 20MHz(200mS+Aggregate)						
	# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result	
	6	0.3299	201.9794	260	Pass	



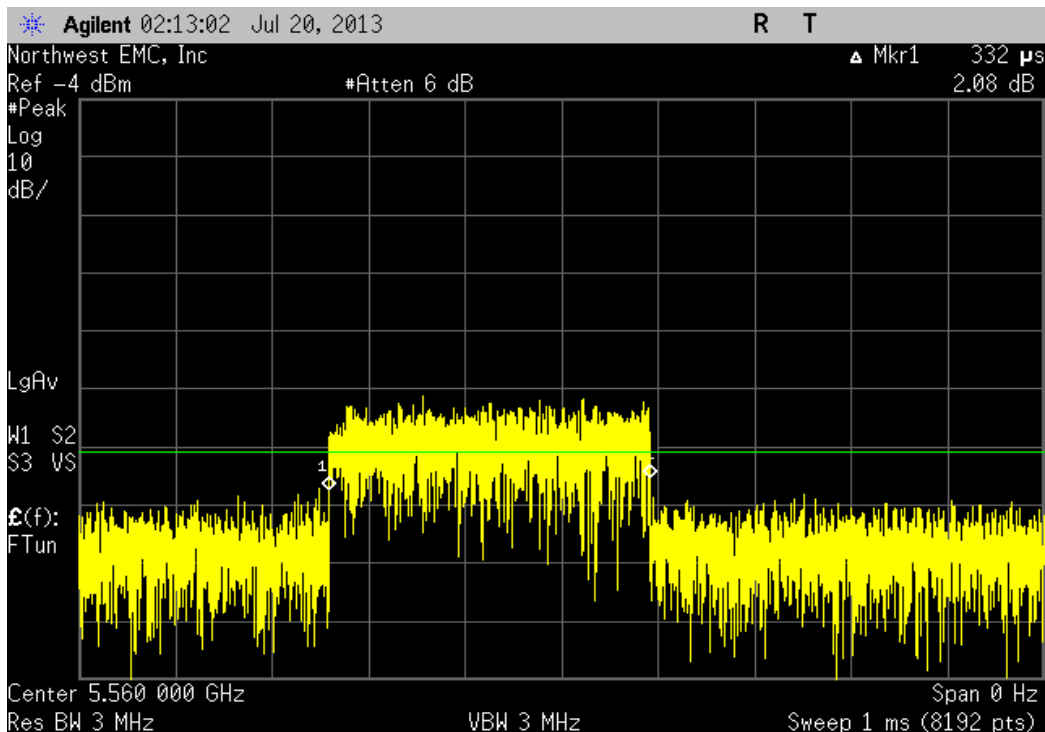
PortA, Radar1, Channel 60 in 5250-5350MHz Band, 40MHz(200mS+Aggregate)

# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result
8	0.3299	202.6392	260	Pass



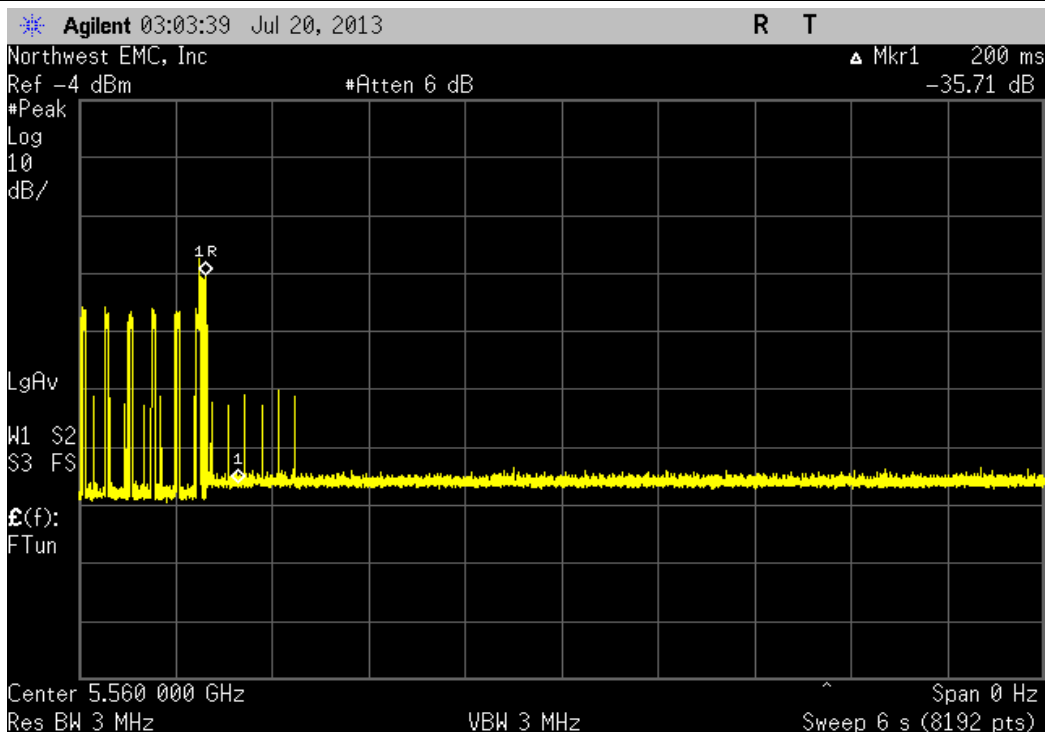
PortA, Radar1, Channel 112 in 5470-5725MHz Band, Control Signal Pulse Width

# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result
N/A	0.332	N/A	N/A	N/A



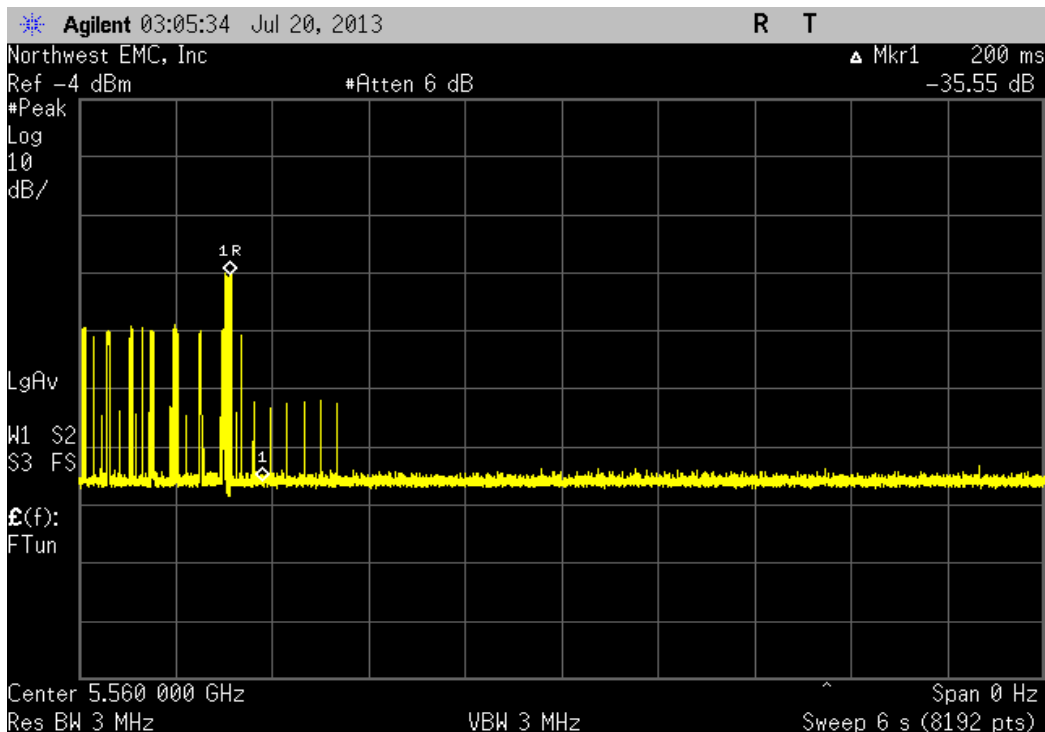
PortA, Radar1, Channel 112 in 5470-5725MHz Band, 20MHz(200mS+Aggregate)

# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result
4	0.332	201.328	260	Pass



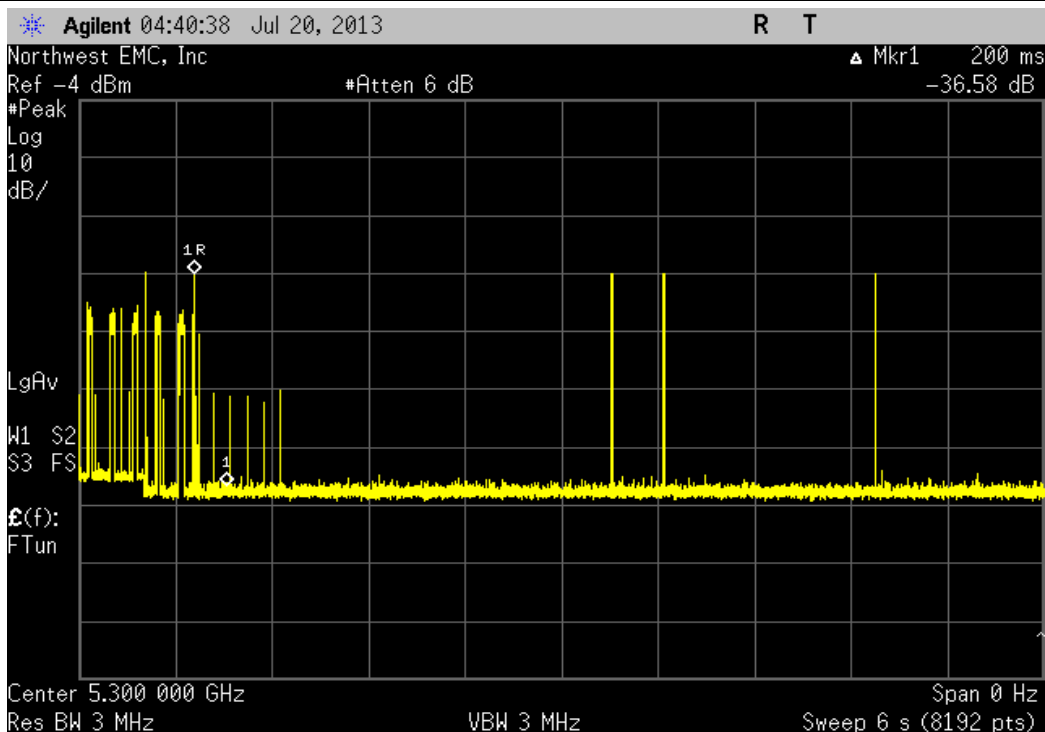
PortA, Radar1, Channel 112 in 5470-5725MHz Band, 40MHz(200mS+Aggregate)

# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result
6	0.332	201.992	260	Pass



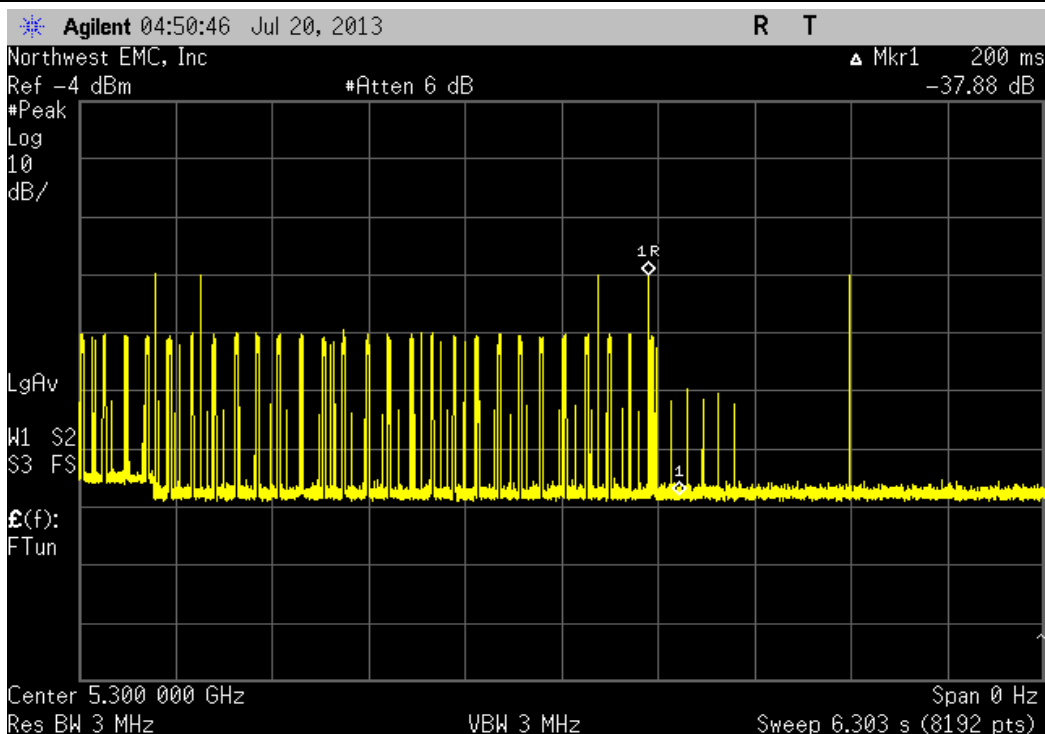
PortA, Radar5, Channel 60 in 5250-5350MHz Band , 20MHz(200mS+Aggregate)

# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result
4	0.3299	201.3196	260	Pass



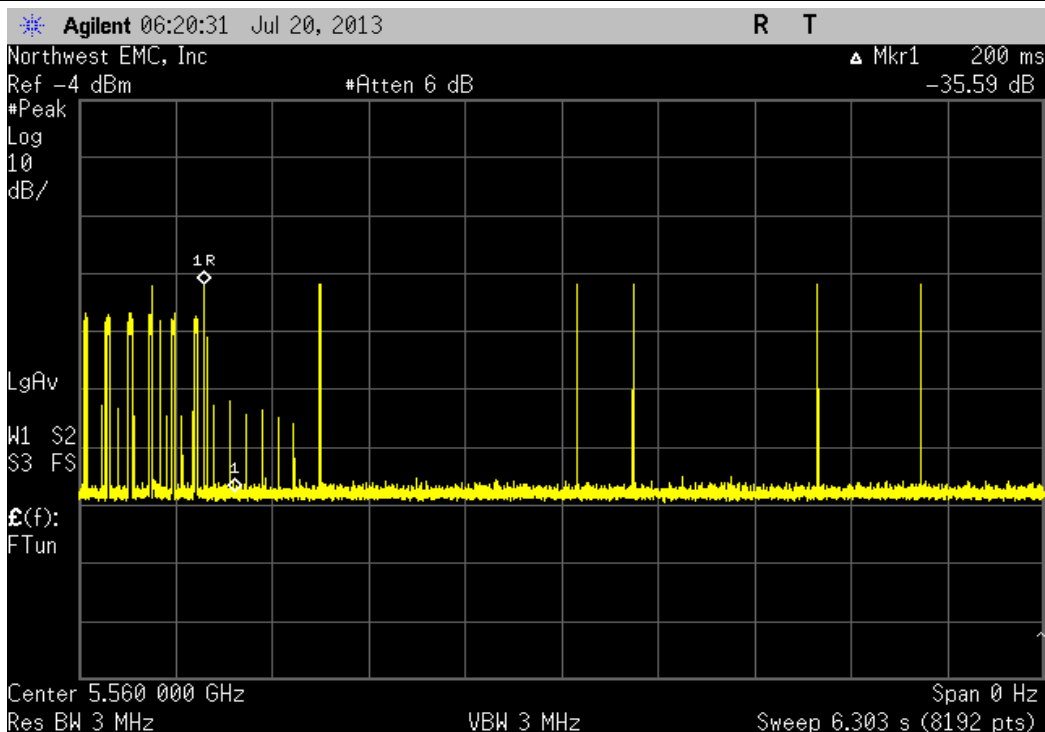
PortA, Radar5, Channel 60 in 5250-5350MHz Band , 40MHz(200mS+Aggregate)

# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result
6	0.3299	201.9794	260	Pass



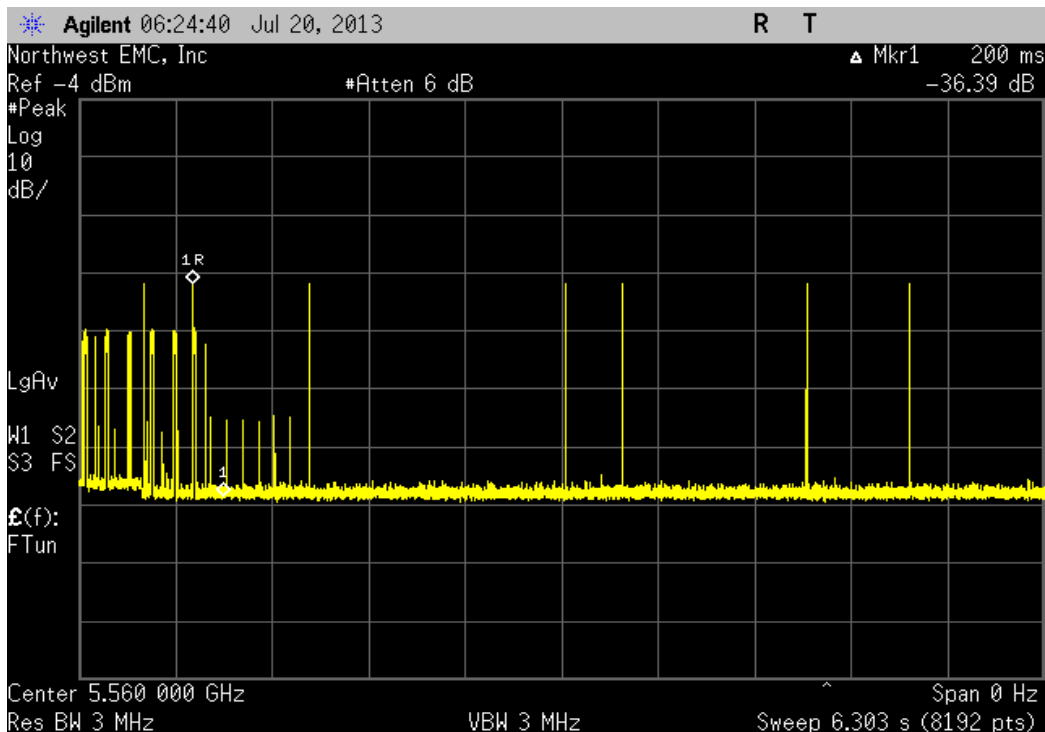
PortA, Radar5, Channel 112 in 5470-5725MHz Band, 20MHz(200mS+Aggregate)

# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result
5	0.332	201.66	260	Pass



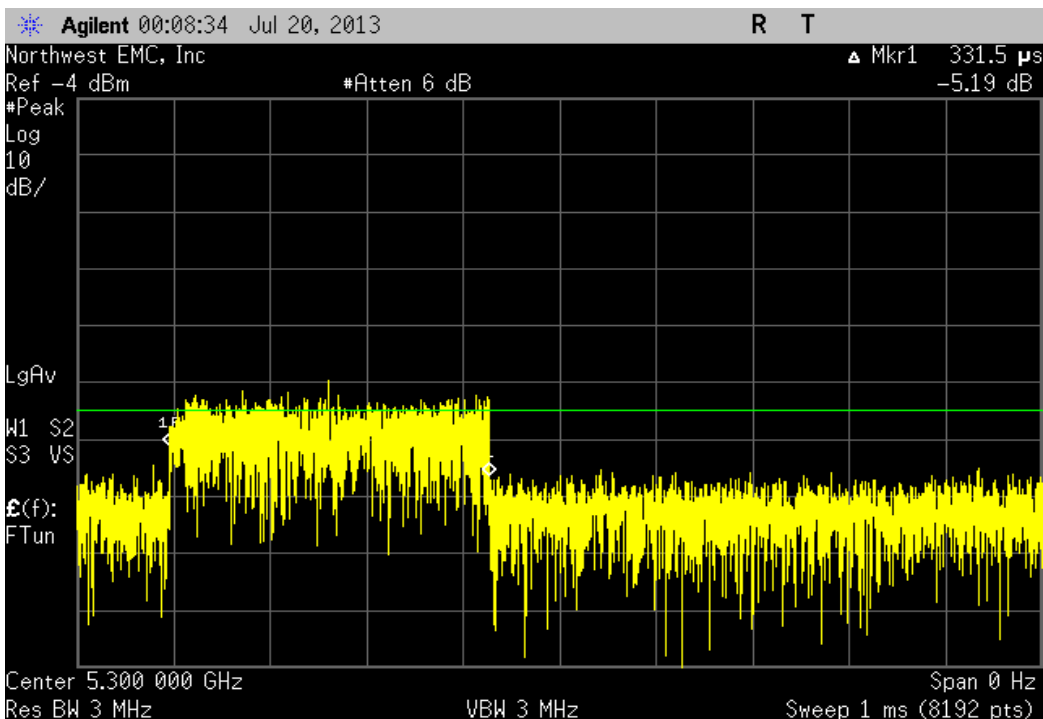
PortA, Radar5, Channel 112 in 5470-5725MHz Band, 40MHz(200mS+Aggregate)

# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result
6	0.332	201.992	260	Pass



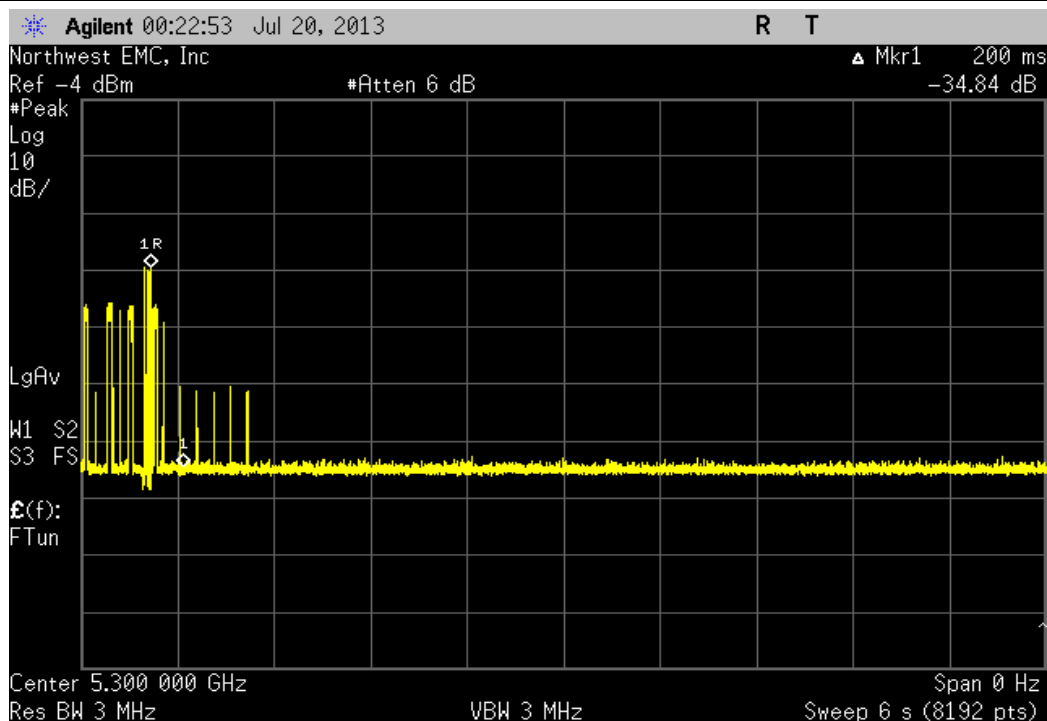
PortB, Radar1, Channel 60 in 5250-5350MHz Band , Control Signal Pulse Width

# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result
N/A	0.3315	N/A	N/A	N/A



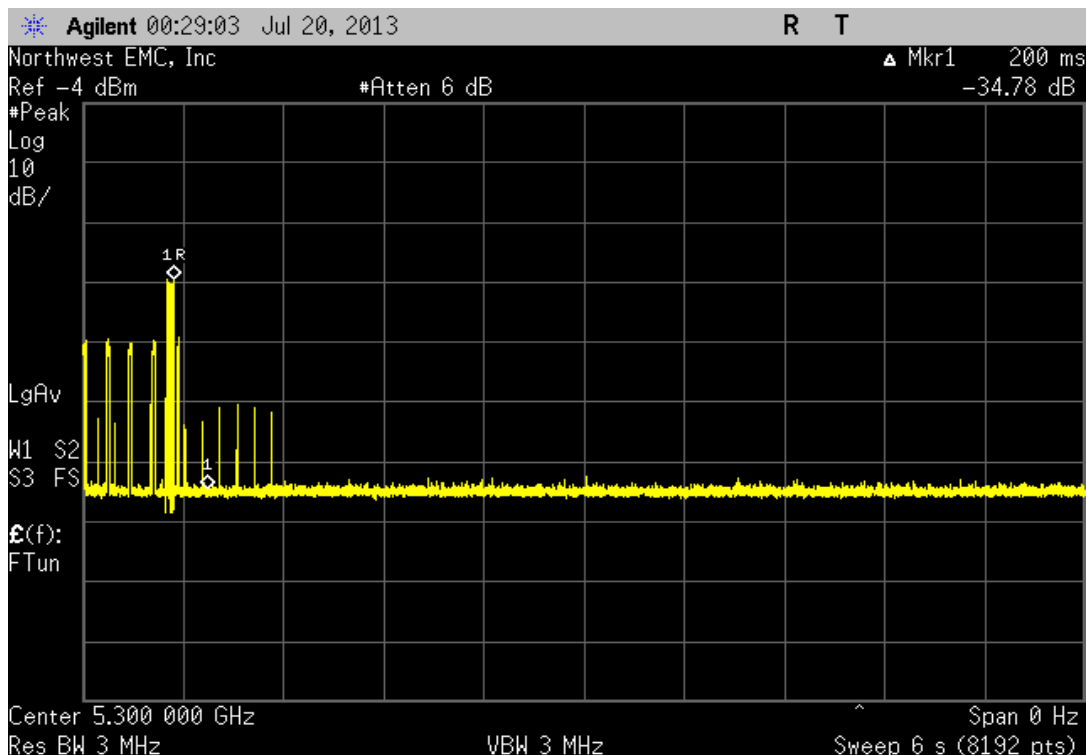
PortB, Radar1, Channel 60 in 5250-5350MHz Band , 20MHz(200mS+Aggregate)

# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result
7	0.3315	202.3205	260	Pass



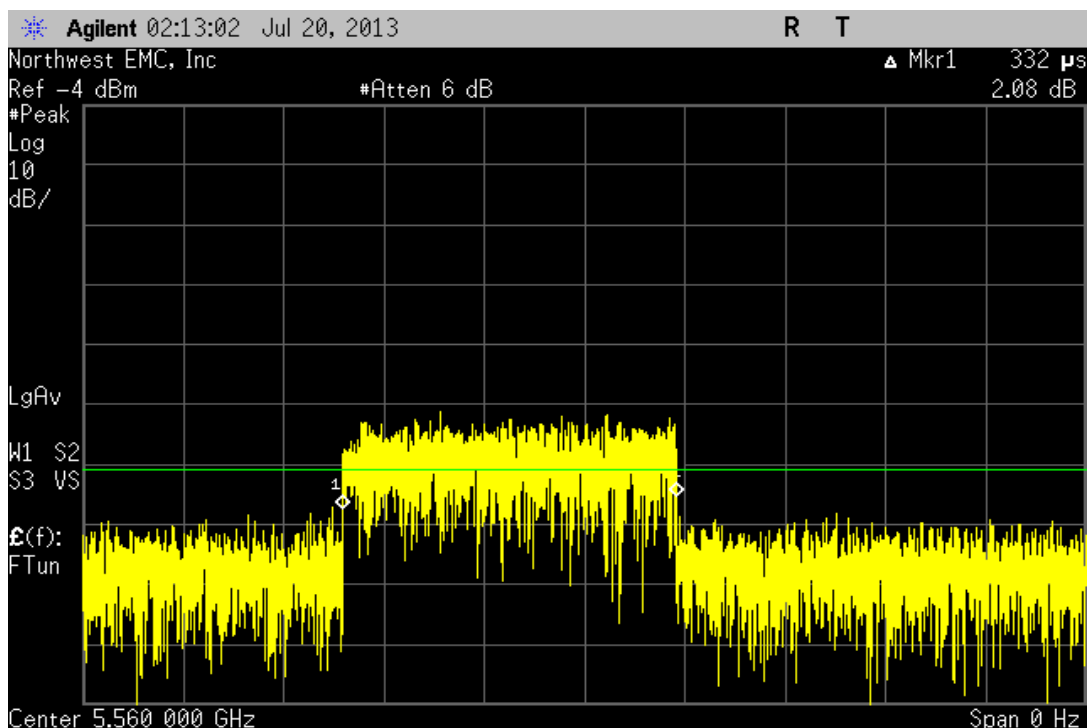
PortB, Radar1, Channel 60 in 5250-5350MHz Band , 40MHz(200mS+Aggregate)

# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result
5	0.3315	201.6575	260	Pass



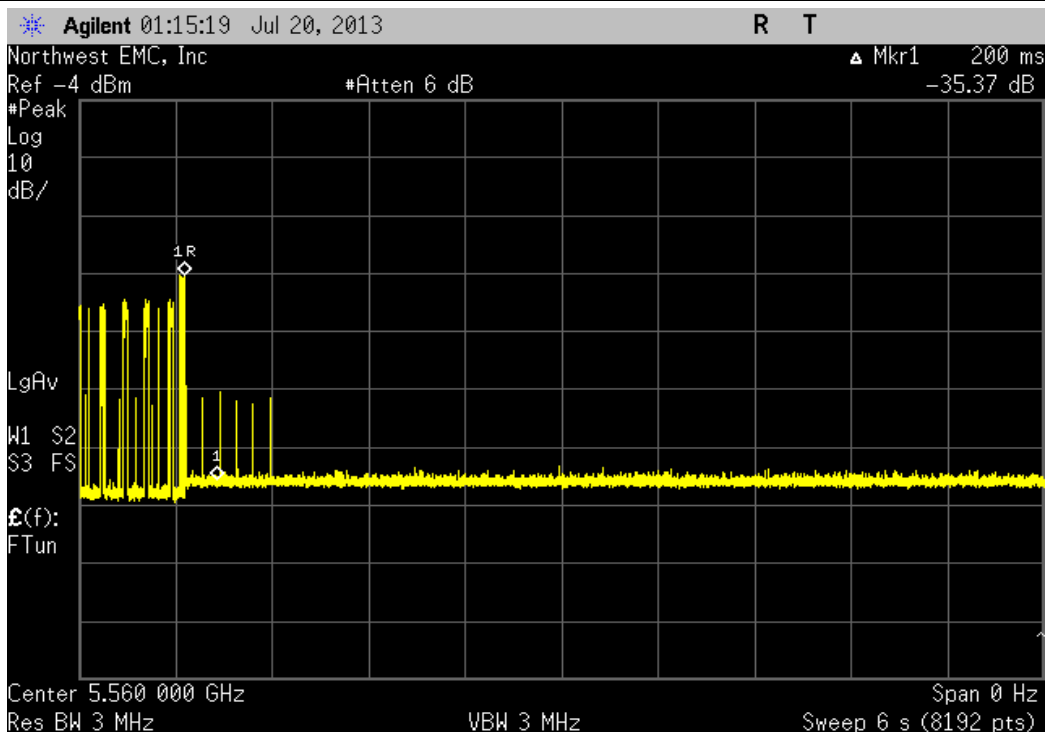
PortB, Radar1, Channel 112 in 5470-5725MHz Band, Control Signal Pulse Width

# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result
N/A	0.332	N/A	N/A	N/A



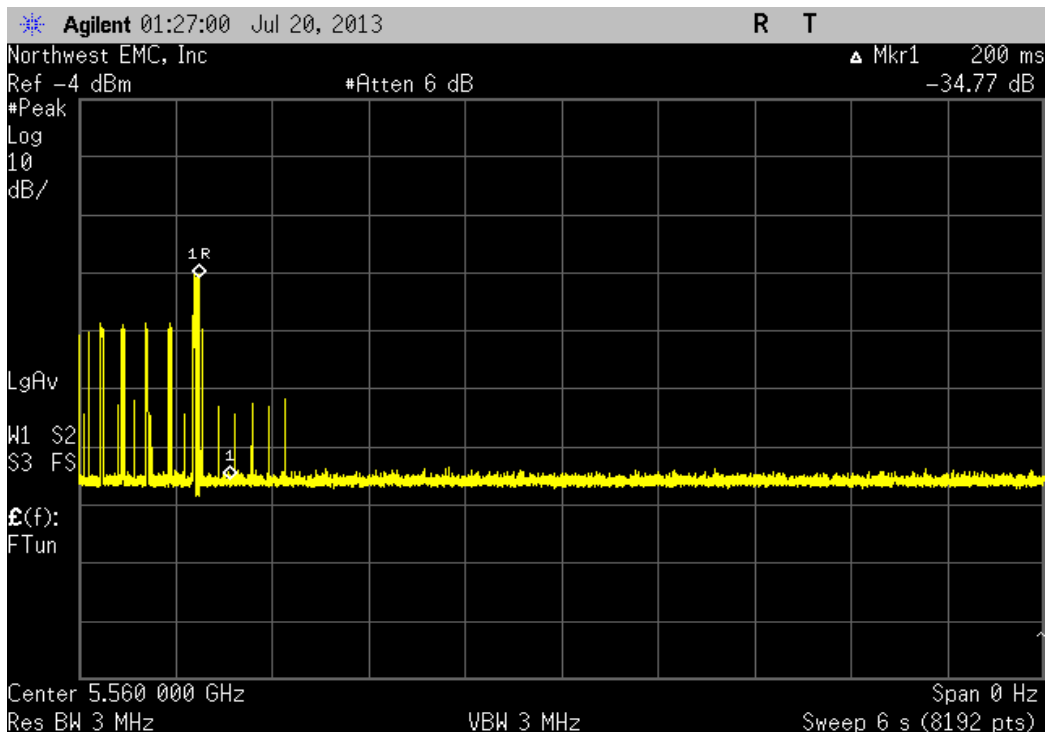
PortB, Radar1, Channel 112 in 5470-5725MHz Band, 20MHz(200mS+Aggregate)

# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result
4	0.332	201.328	260	Pass



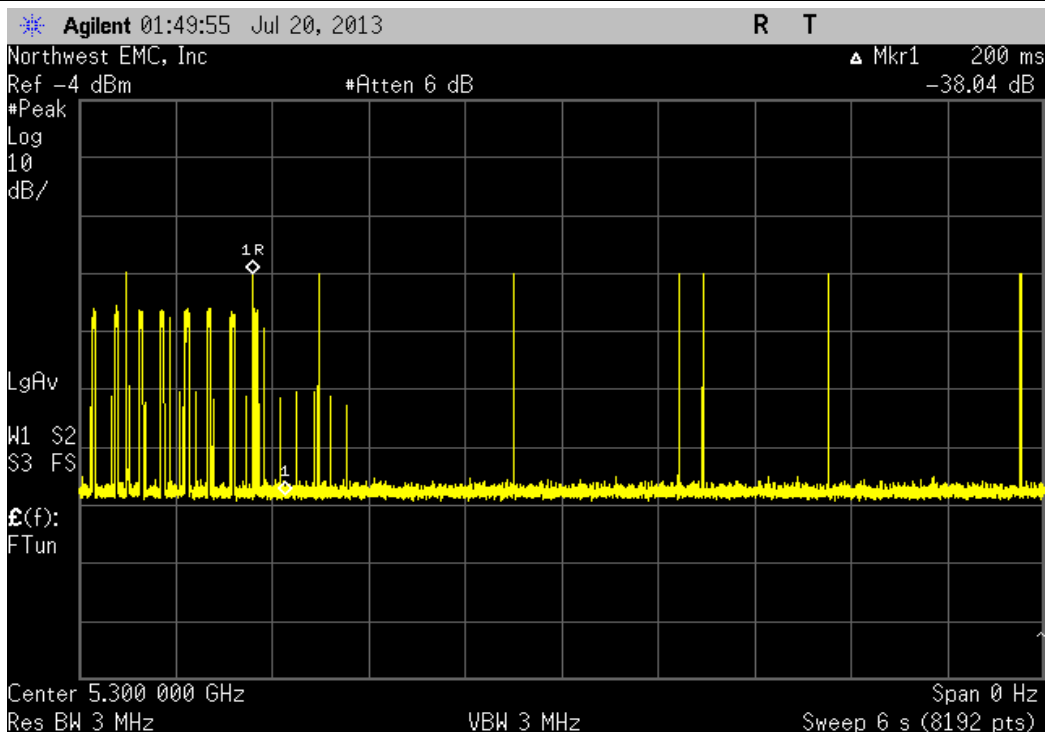
PortB, Radar1, Channel 112 in 5470-5725MHz Band, 40MHz(200mS+Aggregate)

# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result
4	0.332	201.328	260	Pass



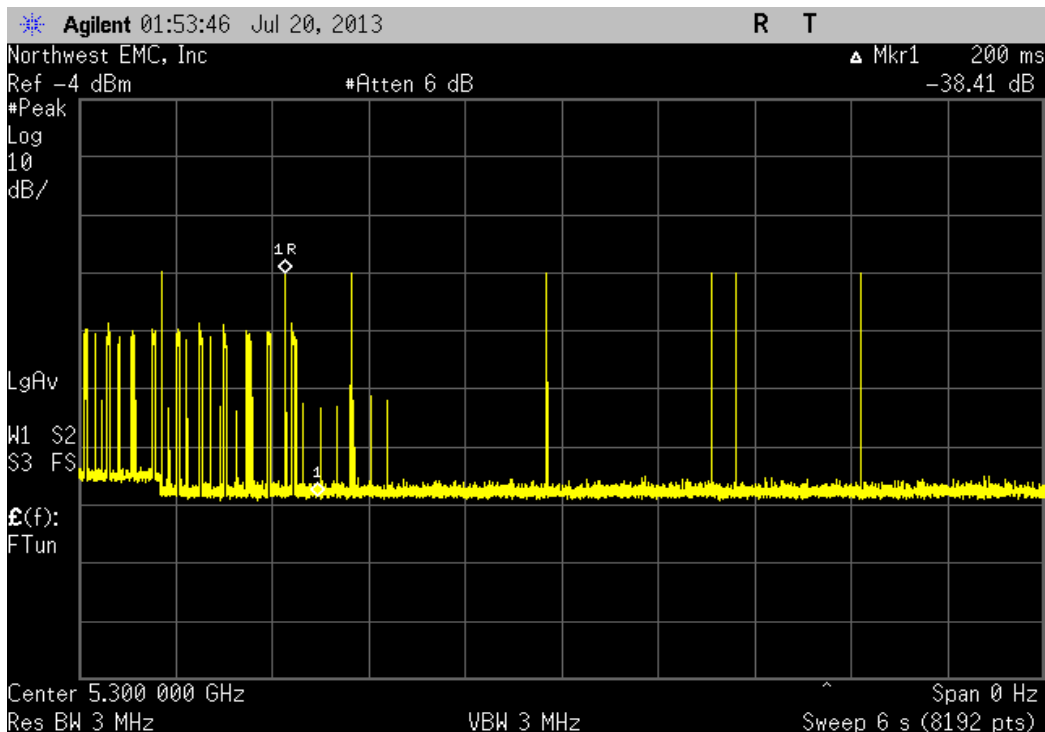
PortB, Radar5, Channel 60 in 5250-5350MHz Band , 20MHz(200mS+Aggregate)

# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result
4	0.3315	201.326	260	Pass



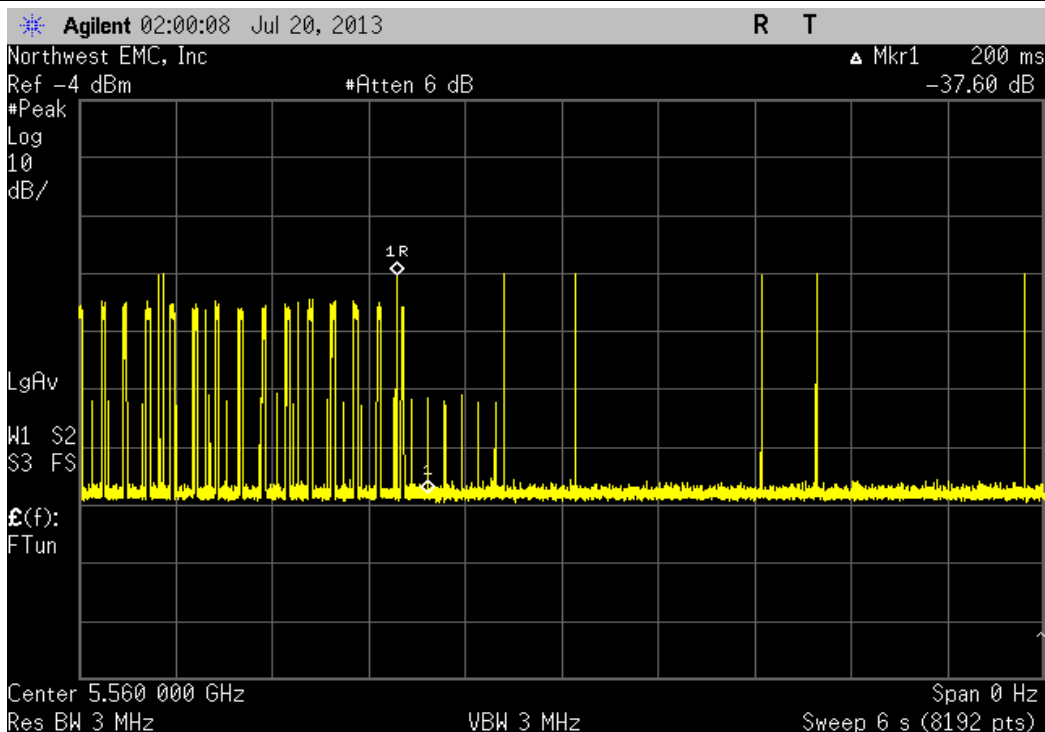
PortB, Radar5, Channel 60 in 5250-5350MHz Band , 40MHz(200mS+Aggregate)

# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result
5	0.3315	201.6575	260	Pass



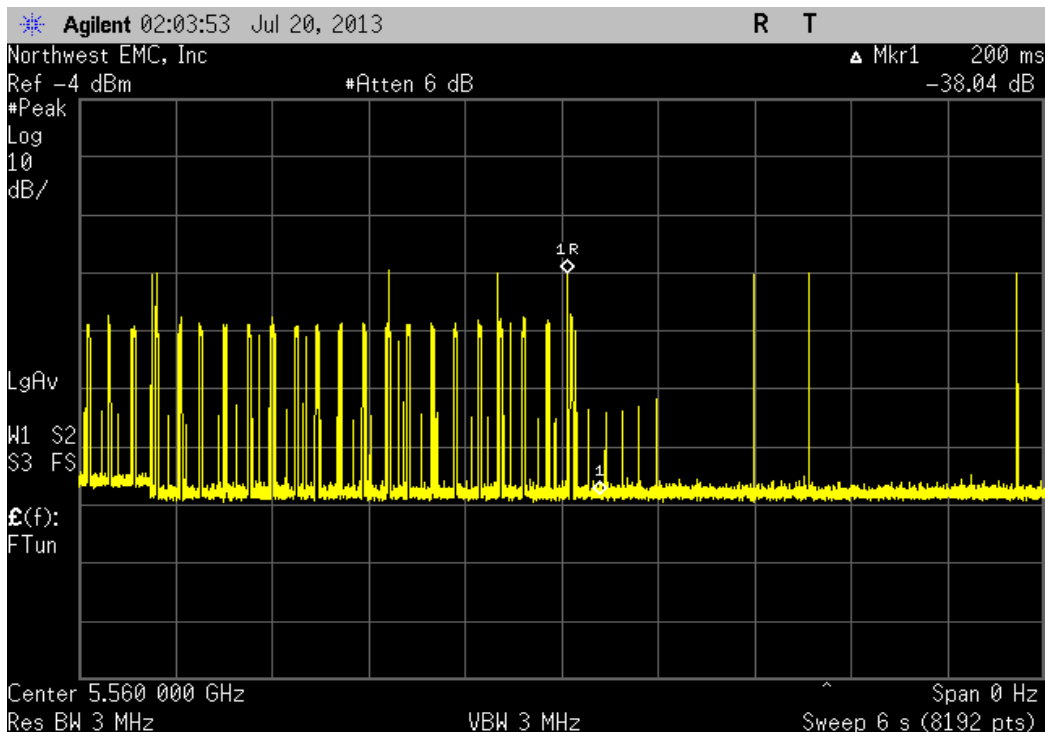
PortB, Radar5, Channel 112 in 5470-5725MHz Band, 20MHz(200mS+Aggregate)

# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result
8	0.332	202.656	260	Pass

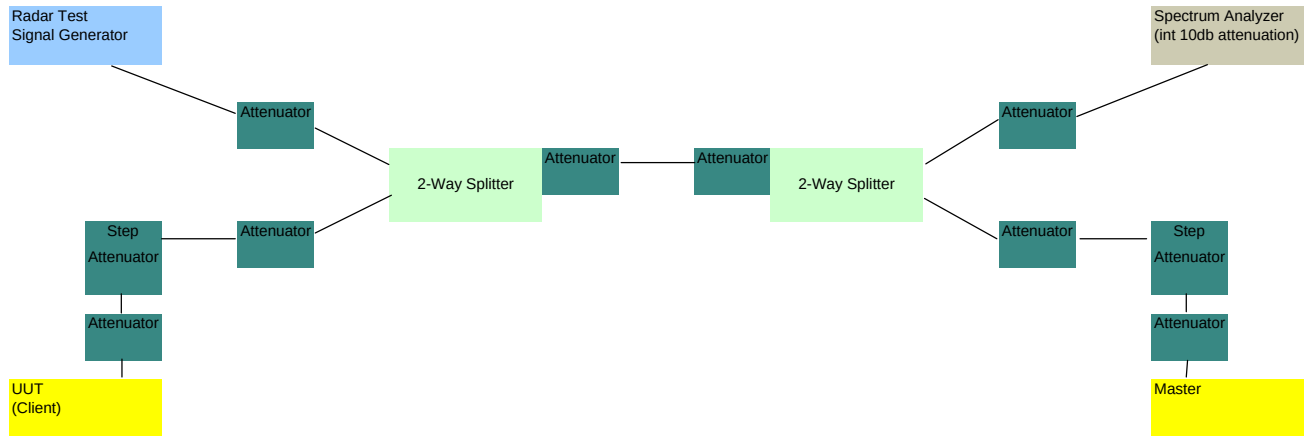


PortB, Radar5, Channel 112 in 5470-5725MHz Band, 40MHz(200mS+Aggregate)

# of Pulses	PW (mSec)	Value (mSec)	Limit (mSec)	Result
7	0.332	202.324	260	Pass



System Block Diagram



Non Occupancy Period

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFG	5/16/2012	24
RF Vector Signal Generator	Agilent	V2920A	TIH	NCR	0
SMA Power Divider	S.M. Electronics	MP0208-2	None	NCR	0
SMA Power Divider	S.M. Electronics	MP0208-2	None	NCR	0
Step Attenuator	Aeroflex/Weinchel	3053	26834	NCR	0
Step Attenuator	Aeroflex/Weinchel	3053	26835	NCR	0

TEST DESCRIPTION

FCC KDB 905462 describes the compliance measurement procedures including acceptable instrument system configurations for performing Dynamic Frequency Selection (DFS) tests under FCC Part 15 Subpart E Rules required for Unlicensed –National Information Infrastructure (U-NII) equipment that operates in the frequency bands 5.25 GHz to 5.35 GHz and/or 5.47 GHz to 5.725 GHz. The master and client were connected using the conducted method described in the procedure via a series of splitters and attenuators which allows the radar signals to be injected and monitored. Where required, the FCC approved MPEG video was streamed through the master and client or an alternative method to load the channel. Configuration and status of the master and client devices were monitored. The Non Occupancy Period test was performed by starting a transmission between the Master and Client device, and then injecting the appropriate radar signals. After the channel is vacated, it is monitored for a minimum of 30 minutes to ensure the channel is not used during this time period.



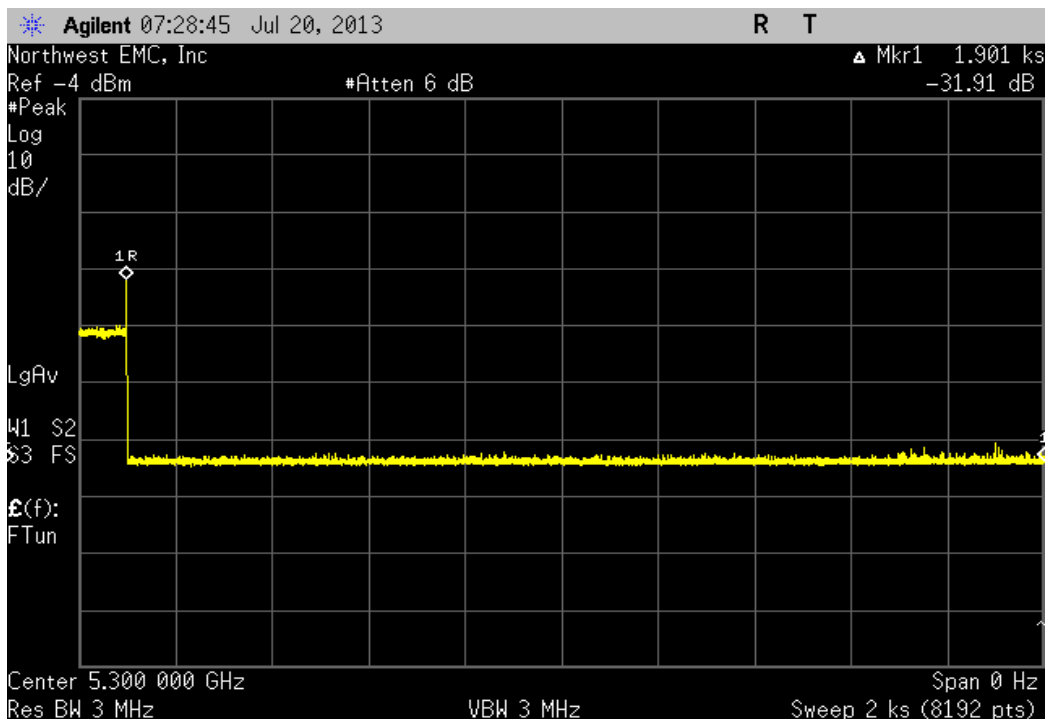
Non Occupancy Period

XMit 2013.02.28

EUT: 1601		Work Order: MCSO1679	
Serial Number: 017915532453		Date: 07/19/13	
Customer: Microsoft Corporation		Temperature: 25°C	
Attendees: None		Humidity: 46%	
Project: None		Barometric Pres.: 1014	
Tested by: Jeremiah Darden		Power: 110VAC/60Hz	
		Job Site: OC11	
TEST SPECIFICATIONS		Test Method	
FCC 15.407:2013		FCC 06-96:2006	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Value	Limit
		Result	
PortA			
Radar 1			
Channel 60 in 5250-5350MHz Band			
40MHz		>30min	>=30min
Channel 112 in 5470-5725MHz Band			
40MHz		>30min	>=30min
PortB			
Radar 1			
Channel 60 in 5250-5350MHz Band			
40MHz		>30min	>=30min
Channel 112 in 5470-5725MHz Band			
40MHz		>30min	>=30min

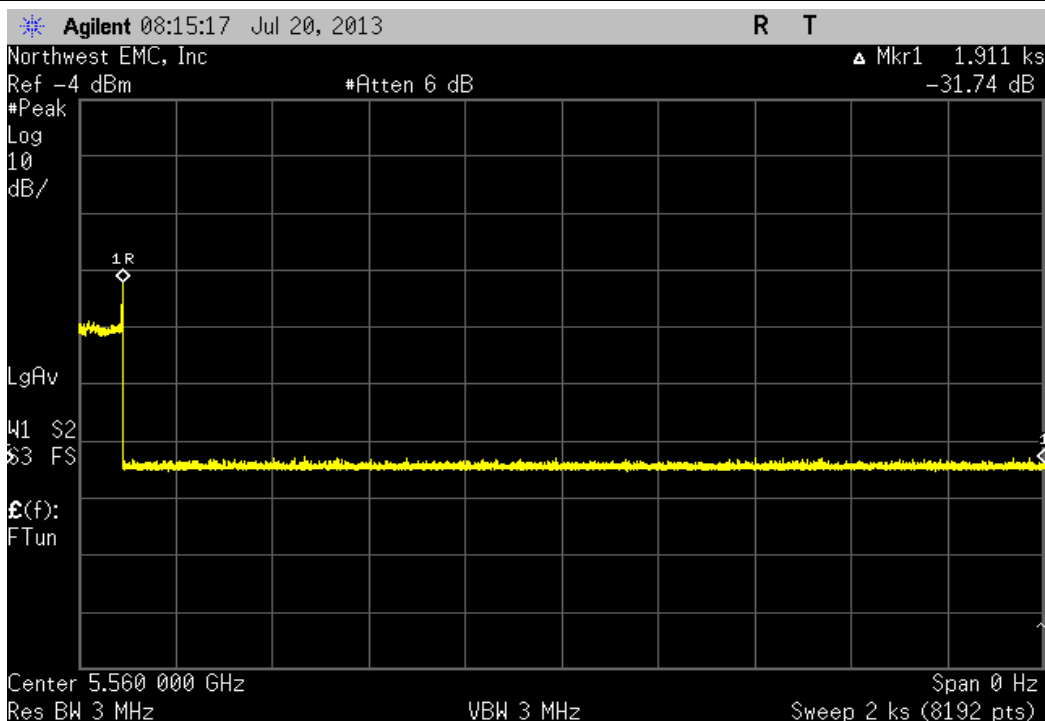
PortA, Radar 1, Channel 60 in 5250-5350MHz Band , 40MHz

Value	Limit	Result
>30min	>=30min	Pass



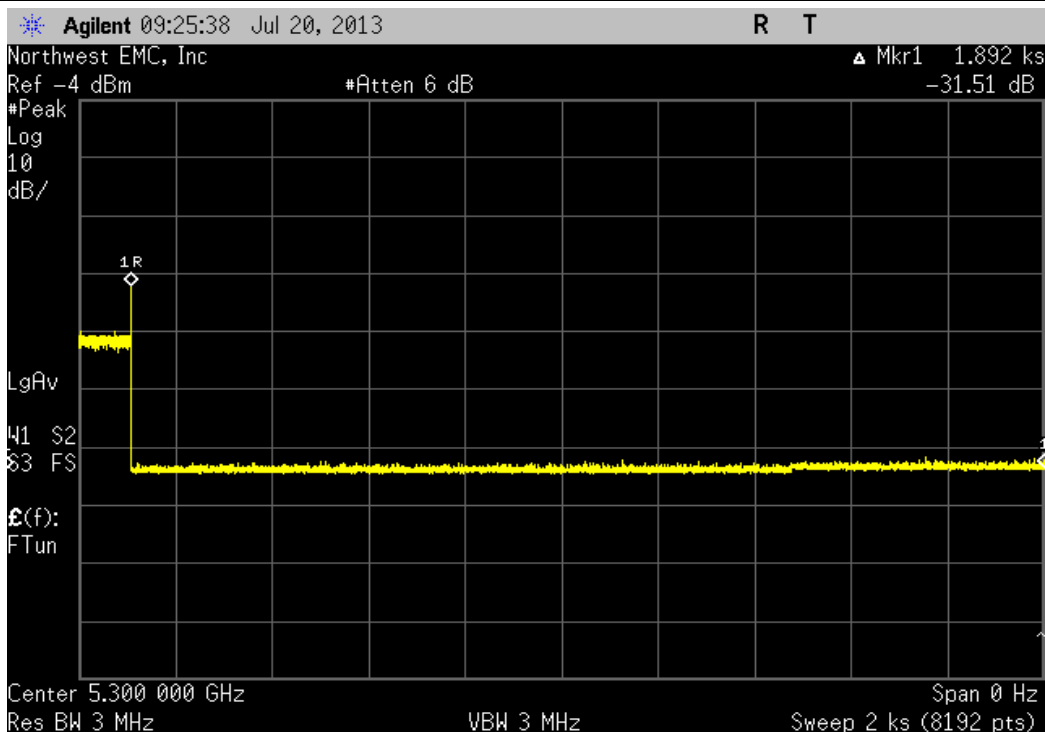
PortA, Radar 1, Channel 112 in 5470-5725MHz Band, 40MHz

Value	Limit	Result
>30min	>=30min	Pass



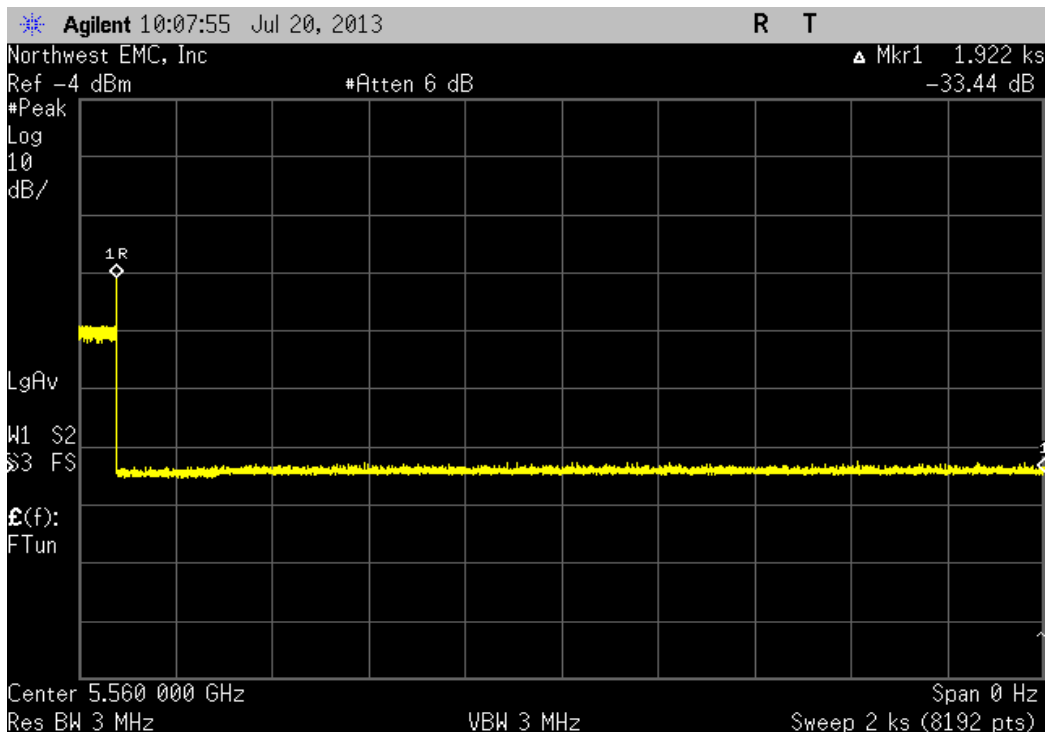
PortB, Radar 1, Channel 60 in 5250-5350MHz Band , 40MHz

				Value	Limit	Result
				>30min	>=30min	Pass



PortB, Radar 1, Channel 112 in 5470-5725MHz Band, 40MHz

				Value	Limit	Result
				>30min	>=30min	Pass



System Block Diagram

