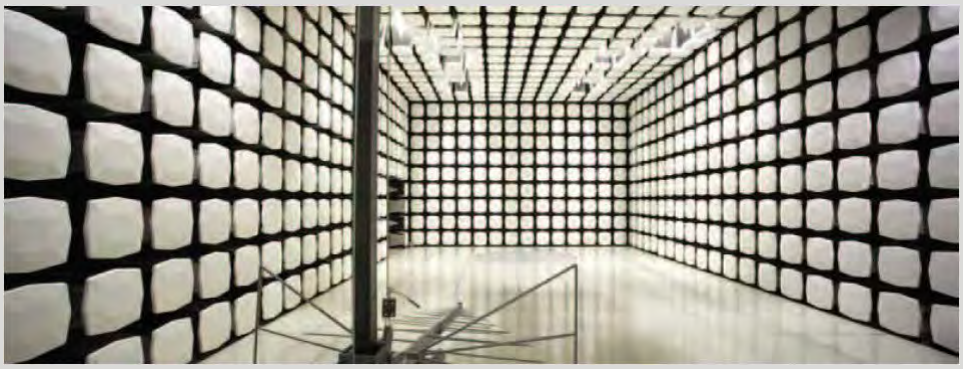
ZOLL Medical Corporation

Zoll CF Card Module

FCC 15.407:2013

Report #: LGPD0094



Report Prepared By Northwest EMC Inc.

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

California – Minnesota – Oregon – New York – Washington

CERTIFICATE OF TEST

WTD 12.5.23

Last Date of Test: May 17, 2013
ZOLL Medical Corportion
Model: Zoll CF Card Module

Emissions

Test Description	Specification	Test Method	Pass/Fail
Closing Time	FCC 15.407:2013	ANCI C63.10:2009	Pass
Move Time	FCC 15.407:2013	ANCI C63.10:2009	Pass
Non Occupancy Period	FCC 15.407:2013	ANCI C63.10:2009	Pass

Deviations From Test Standards

None

Approved By:

Kyle Holgate, Operations Manager

NVLAP Lab Code: 200676-0

Test Facility

The measurement facility used to collect the data is located at:

Northwest EMC, Inc.
41 Tesla Ave.
Irvine, CA 92618

Phone: (503) 844-4066 Fax: 844-3826

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada (Site filing #2834B-1).

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.

NORTHWEST EMC
REV 2012.08.02

REVISION HISTORY

Revision Number	Description	Date	Page Number
00	None		

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.

REV 2012.05.24

ACCREDITATIONS AND AUTHORIZATIONS

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

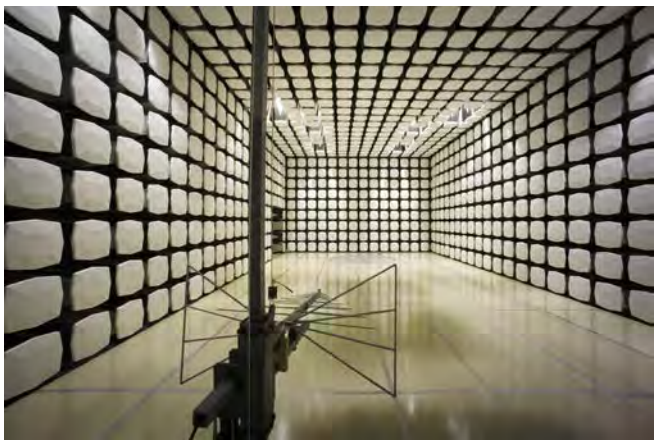
For details on the Scopes of our Accreditations, please visit:
http://www.nwemc.com/accreditations/

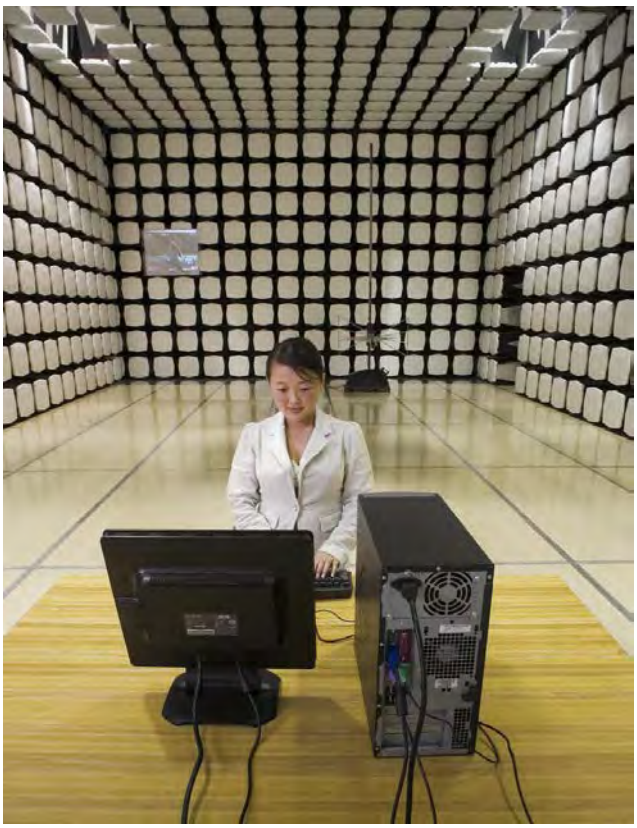
NORTHWEST EMC

REV 2013.02.26

LOCATIONS

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 120th 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





PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	ZOLL Medical Corporation
Address:	269 Mill Road
City, State, Zip:	Chelmsford, MA 01824
Test Requested By:	Curt McNamara – Logic Product Development
Model:	Z-RS-DC002
First Date of Test:	May 17, 2013
Last Date of Test:	May 17, 2013
Receipt Date of Samples:	April 29, 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):

802.11abgn CF wireless card containing 1x1 SISO radio module operating in 20 MHz channel bandwidth that is normally installed in the ZOLL R Series™ defibrillators.

Hardware, Firmware, and OS Versions:

Software: The SVN revision numbers for the various software images were:

- ESD: 133255
- Intentional: 131783
- Unintentional: 130323
- DFS 133168

These images all contain: BSP 2.2, Kernel 3.0, and WL12xx firmware = Rev 7.1.3.50.58

Hardware: The top level assembly: 2062-1023547, Rev. B-0
PCB: 2062-1023532, Rev B-2

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 ranges from 6.478 dBm to 10.655 dBm. The maximum antenna gain in the 5GHz range is 2.6 dBi.

PRODUCT DESCRIPTION

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; however, an alternate streaming method was proposed to the FCC and approved for testing since the device is not designed to play video/audio.

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 22 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.

PRODUCT DESCRIPTION

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 one 50 ohm antenna port used for the 5GHz band. A conducted DFS test was performed on one at 20 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 2.6 dBi.

Response to Inquiry to FCC

Inquiry on 05/22/2013 :

Inquiry:

Please approve attached alternative channel loading method for DFS testing.

FCC response on 05/24/2013

Tour alternative streaming proposal for the client device has been approved.

Attachment Details:

Proposal for an Alternative Streaming Method

(see following pages for text)

Proposal for an Alternative Streaming Method

FCC ID: YKP1021149

Submitted by Northwest EMC, Inc.

1. A brief description of the device
    a. The EUT is an UNII client device with no radar detection and no ad-hoc capability. The device is a CF wireless card module that is normally installed into a medical system running a closed operating system based on Linux and does not support the NTIA specified codec and video format (reference: http://ntiacsd.ntia.doc.gov/dfs/) because external devices cannot connect to the EUT and stream directly from system like a typical pc. .

2. The reason you cannot stream the NTIA MPG or Wav File
    a. The medical device's operating system does not support the NTIA specified V2.61 codec and is not meant for audio or video streaming. To use the media file specified by the NTIA would require a significant software effort to modify the EUT's system and since the device is typically used for logging medical data and transferring it to a host, this application would not be applicable in most cases.

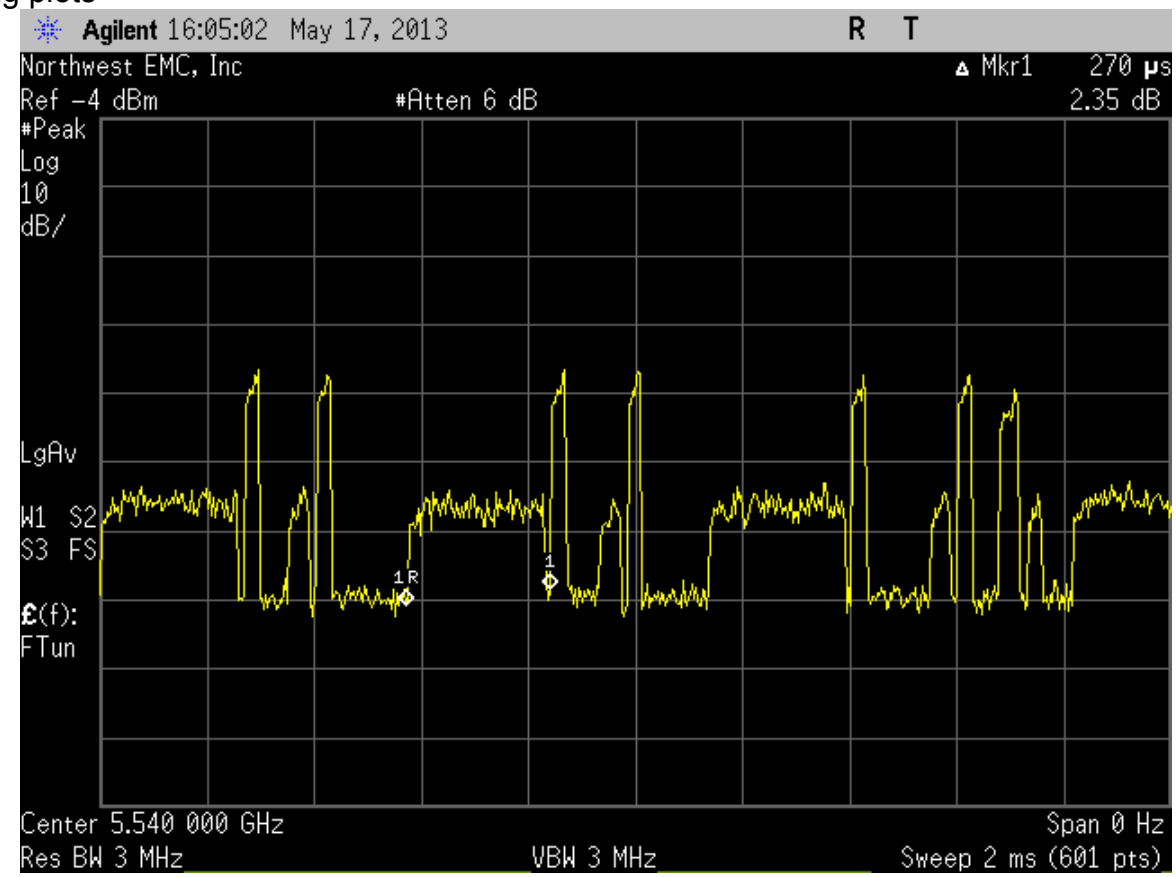
3. A description on how you propose to do the data streaming
    a. The Client (EUT) device's firmware was slightly altered to allow the direct file transfer of the NTIA mpeg file. To configure this special test mode, a wired serial connection was made between the EUT and an external Laptop which controlled the EUT (the Laptop is not part of EUT and is only used during testing and debug). On the Master side, the NTIA mpeg file was placed onto a Desktop PC. The Master Access Point was wired to the PC so the NTIA mpeg file could be accessed through the wireless connection. Once a wireless link was established between the Master Access Point and the Client (EUT), the NTIA mpeg file was transferred through HTTP protocol from the Desktop PC to the EUT's internal storage.

4. An estimate of the percentage of channel loading. Explain how you derived this estimate
    a. Channel loading was measured with the use of a spectrum analyzer using a method outlined in ETSI 301 893 section 5.1.2.2. Data packets were measured over time at 2mS, 100mS, and 30seconds. This was done to show a consistent amount of data being transmitted and received. The width of each data packet in a 2mS windows is approximately .270mS. On average there are about 4 pulses in each 2mS window, which amounts to roughly

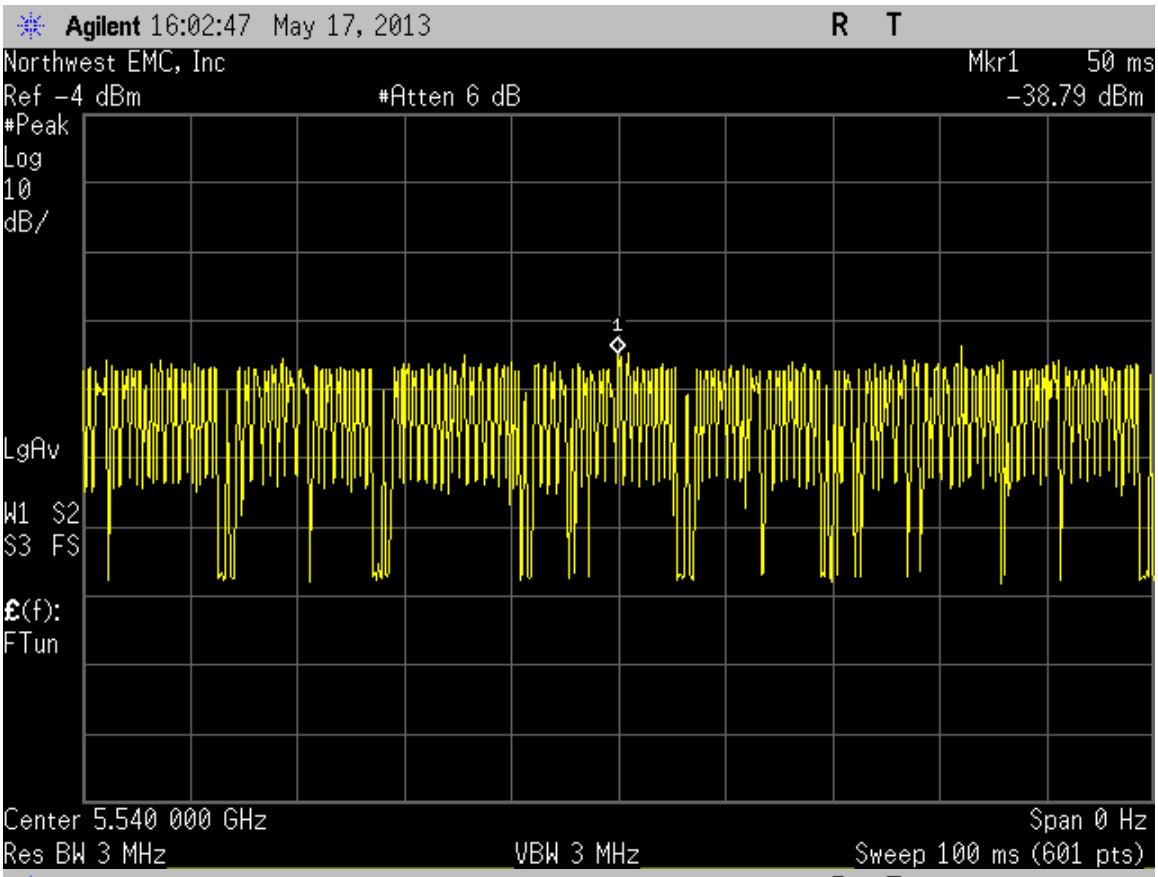
1.1mS of data packets total over 2mS. This transmission remains consistent across 100mS and 30 second windows, so the average channel loading is at least 50%

5. Timing plots

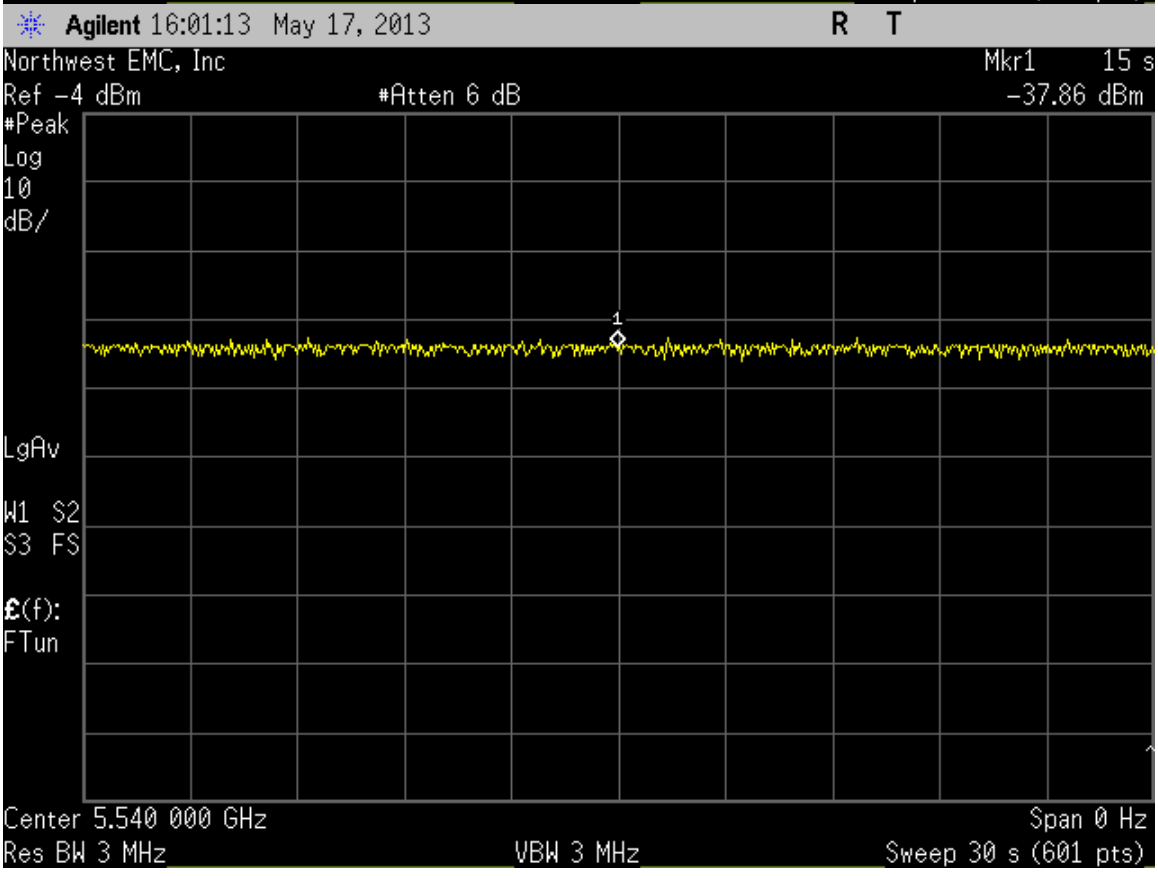
a.



b.


Agilent 16:02:47 May 17, 2013
R T
Northwest EMC, Inc
Mkr1 50 ms
Ref -4 dBm
#Atten 6 dB
-38.79 dBm
#Peak
Log
10
dB/
LgAv
W1 S2
S3 FS
£(f):
FTun
Center 5.540 000 GHz
Span 0 Hz
Res BW 3 MHz
VBW 3 MHz
Sweep 100 ms (601 pts)

c.


Agilent 16:01:13 May 17, 2013
R T
Northwest EMC, Inc
Mkr1 15 s
Ref -4 dBm
#Atten 6 dB
-37.86 dBm
#Peak
Log
10
dB/
LgAv
W1 S2
S3 FS
£(f):
FTun
Center 5.540 000 GHz
Span 0 Hz
Res BW 3 MHz
VBW 3 MHz
Sweep 30 s (601 pts)

Please confirm that this channel loading method is acceptable. Your attention to this matter is greatly appreciated.

Best Regards,

Greg Kiemel, Director of Engineering
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Main: 888-364-2378 Fax: 503-844-3826
www.nwemc.com
email: gkiemel@nwemc.com

CONFIGURATIONS

Configuration LGPD0094- 2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Zoll CF Card Module	ZOLL Medical Corporation	Z-RS-DC002	0024

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop	Dell Technologies Inc.	PP18L	33583998997

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Serial Cable	No	1.8m	No	Laptop	Zoll CF Card Module
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	5/17/2013	Closing Time	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	5/17/2013	Move Time	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	5/17/2013	Non Occupancy Period	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

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
Non-occupancy period	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.

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.

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	AFA	6/15/2012	24
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
RF Vector Signal Generator	Agilent	V2920A	TIH	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 decribed 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 and controlled through a serial/usb connection linked to a host pc. 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

EUT:	Zoll CF Card Module			**Work Order:**	LGPD0094
Serial Number:	SN0024			**Date:**	05/17/13
Customer:	Logic Product Development			**Temperature:**	23°C
Attendees:	None			**Humidity:**	40%
Project:	None			**Barometric Pres.:**	1014mb
Tested by:	Jeremiah Darden	**Power:**	110VAC/60Hz	**Job Site:**	OC11

TEST SPECIFICATIONS	Test Method
FCC 15.407:2013	ANSI C63.10:2009

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

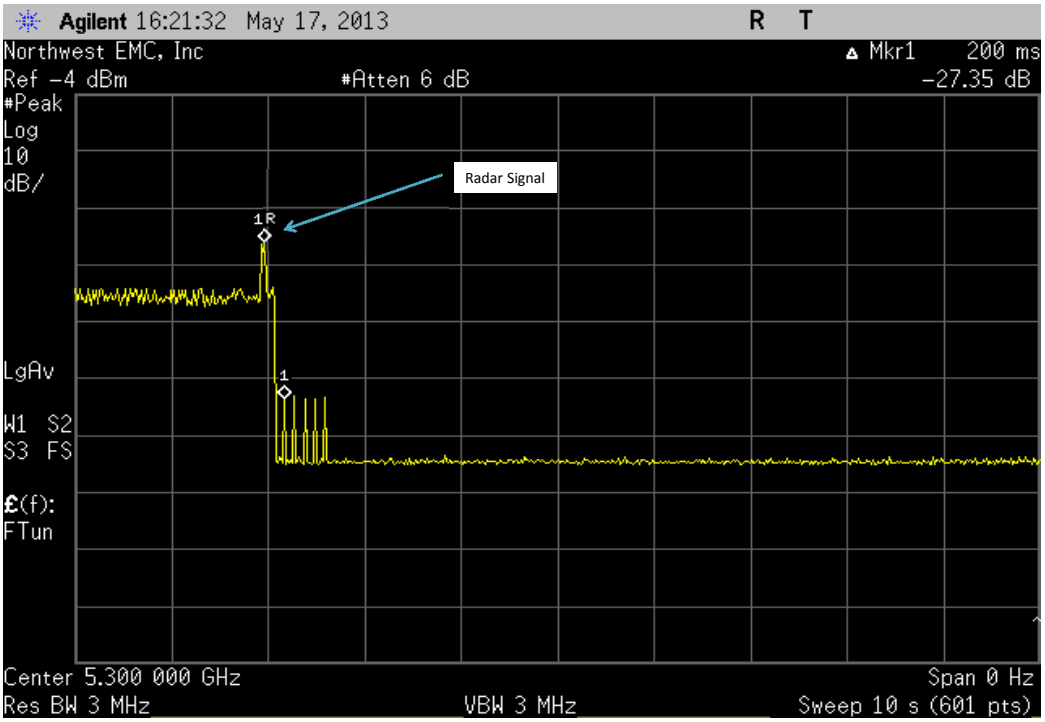
None

Configuration #	2	Signature

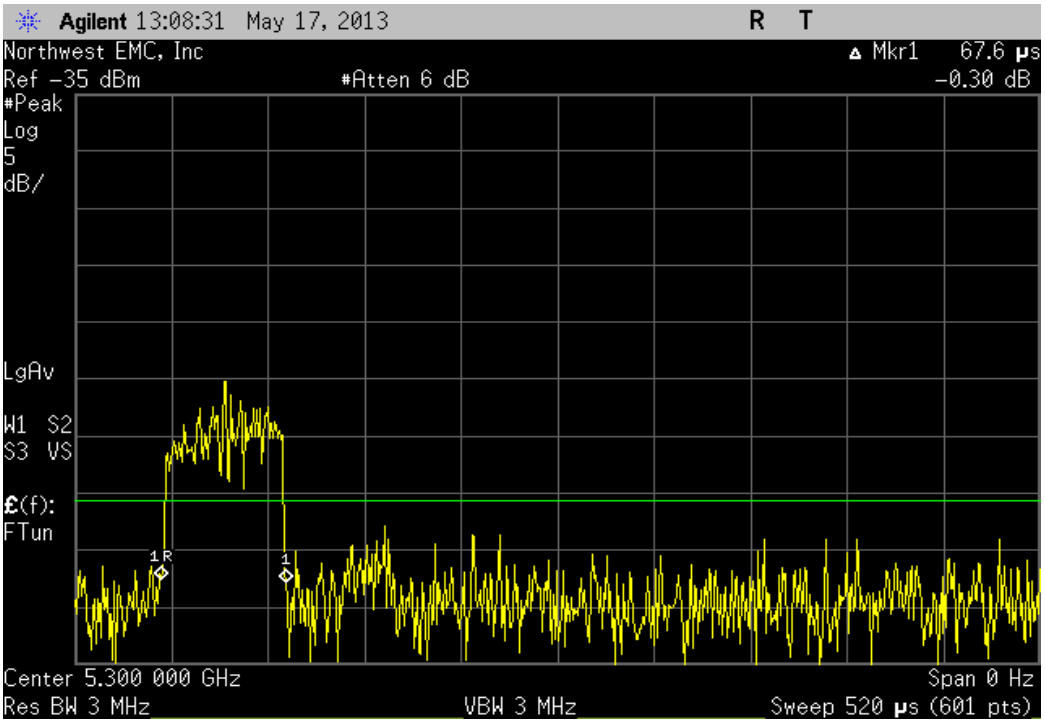
		# of Signals	Pulse Width (mS)	Value (mS)	Limit	Result
20MHz						
	5.3GHz					
	Radar1 200mS	N/A	N/A	200	200mS	Pass
	Rader1 Aggregate	5	0.0676	200.338	260mS	Pass
	Radar5 200mS	N/A	N/A	200	200mS	Pass
	Rader5 Aggregate	4	0.0676	200.2704	260mS	Pass
	5.54GHz					
	Radar1 200mS	N/A	N/A	200	200mS	Pass
	Rader1 Aggregate	7	0.1257	200.8799	260mS	Pass
	Radar5 200mS	N/A	N/A	200	200mS	Pass
	Rader5 Aggregate	3	0.1257	200.3771	260mS	Pass

Closing Time

20MHz, 5.3GHz, Radar1 200mS						
# of Signals		**Pulse Width (mS)**		**Value (mS)**	**Limit**	**Result**
N/A		N/A		200	200mS	Pass

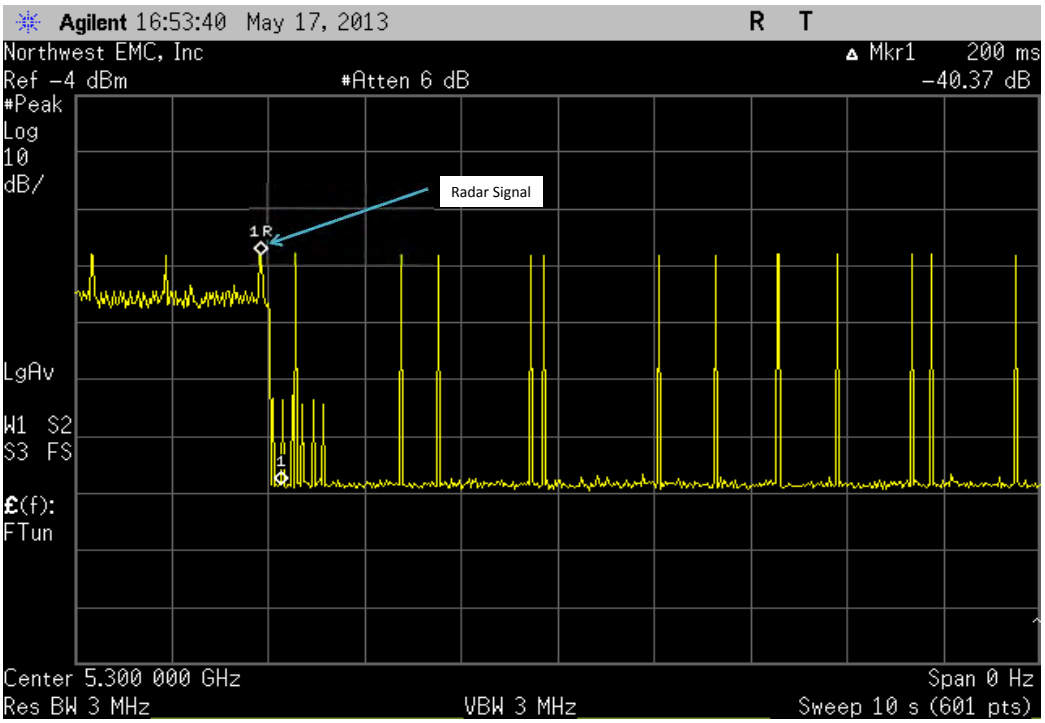


20MHz, 5.3GHz, Rader1 Aggregate						
# of Signals		**Pulse Width (mS)**		**Value (mS)**	**Limit**	**Result**
5		0.0676		200.338	260mS	Pass

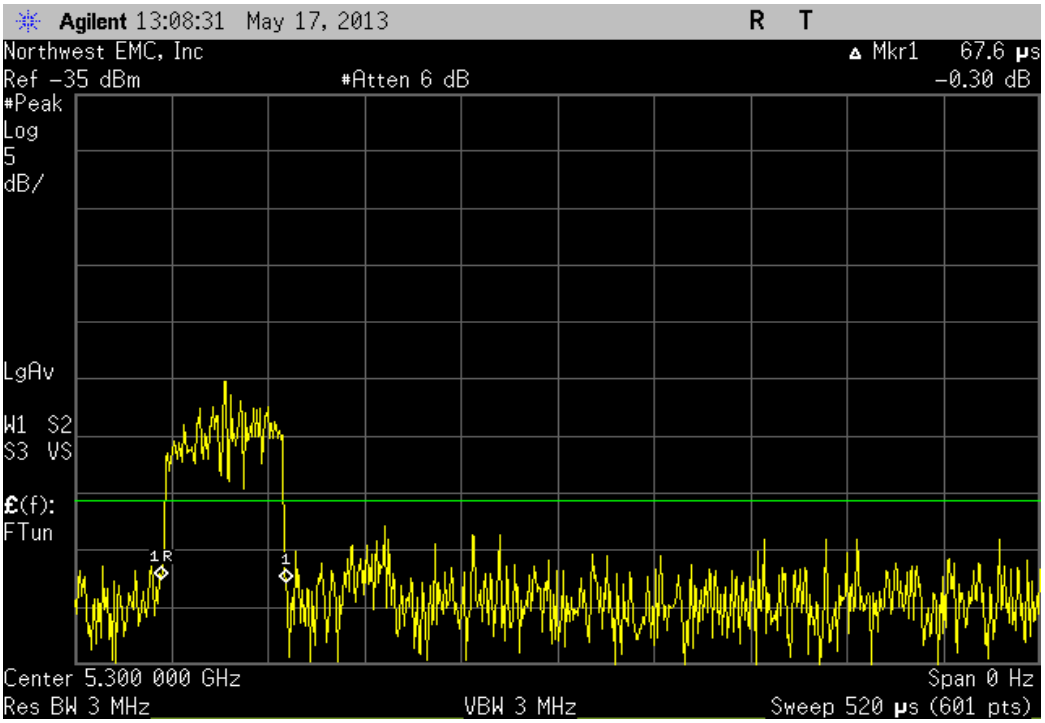


Closing Time

20MHz, 5.3GHz, Radar5 200mS						
# of Signals		**Pulse Width (mS)**		**Value (mS)**	**Limit**	**Result**
N/A		N/A		200	200mS	Pass

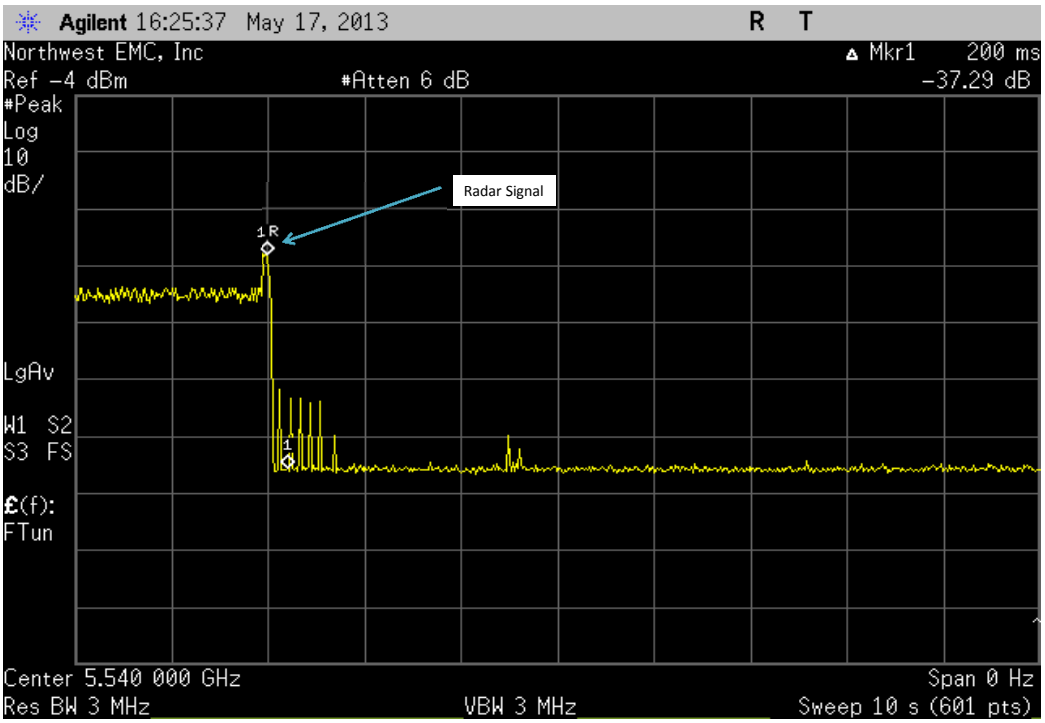


20MHz, 5.3GHz, Rader5 Aggregate						
# of Signals		**Pulse Width (mS)**		**Value (mS)**	**Limit**	**Result**
4		0.0676		200.270	260mS	Pass

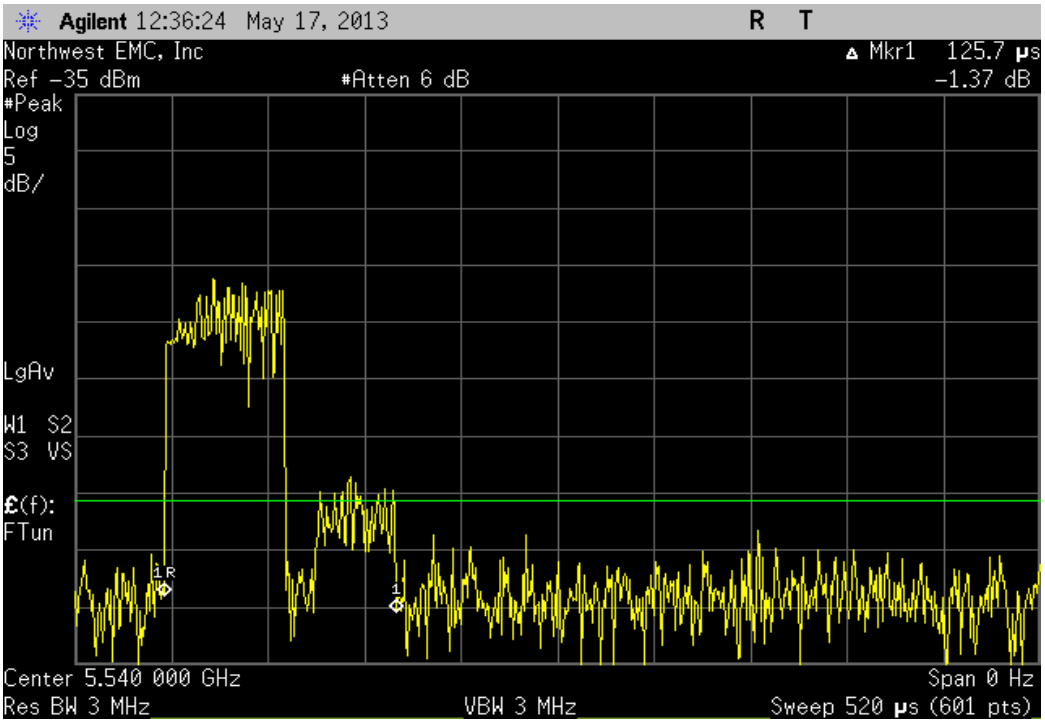


Closing Time

20MHz, 5.54GHz, Radar1 200mS						
# of Signals		Pulse Width (mS)		Value (mS)	Limit	Result
N/A		N/A		200	200mS	Pass

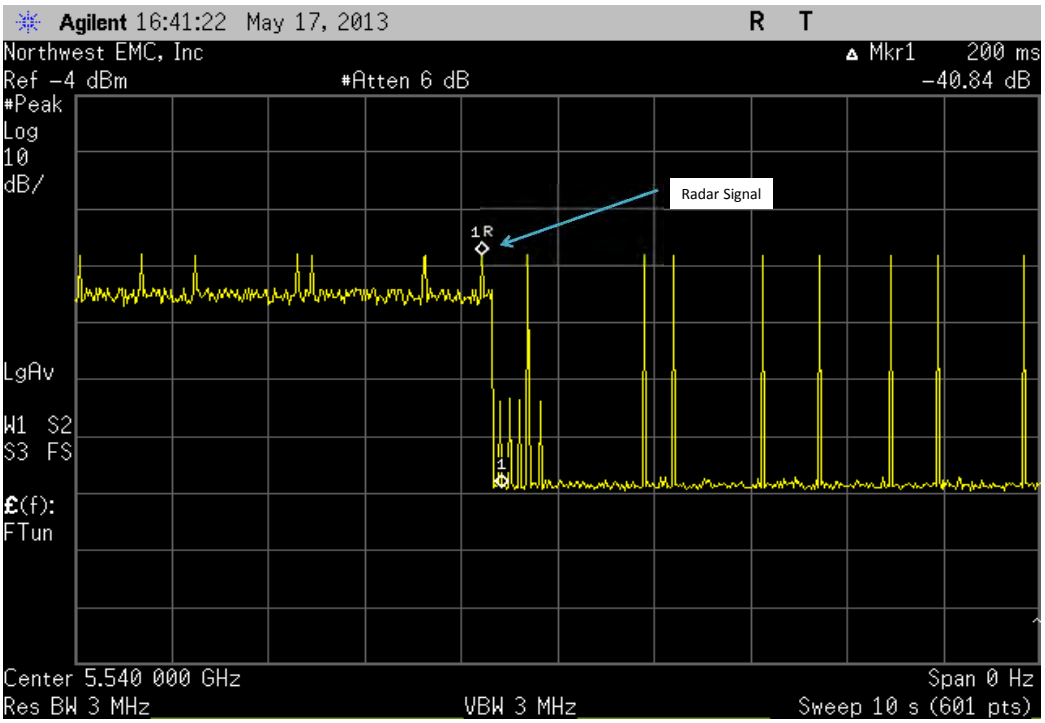


20MHz, 5.54GHz, Rader1 Aggregate						
# of Signals		Pulse Width (mS)		Value (mS)	Limit	Result
7		0.1257		200.880	260mS	Pass

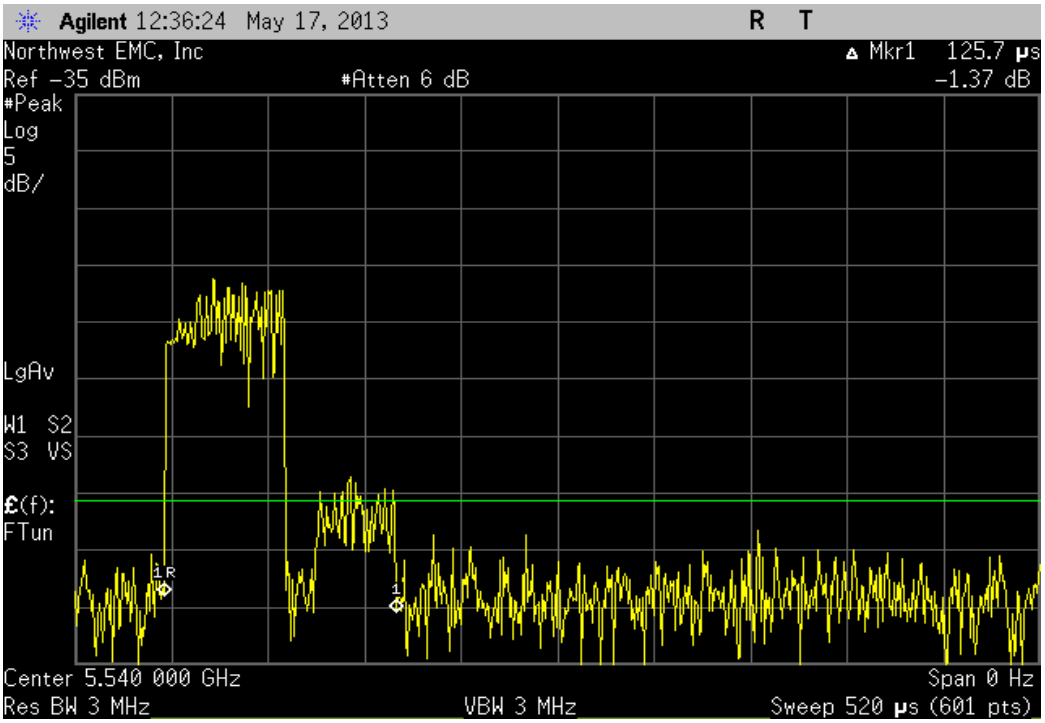


Closing Time

20MHz, 5.54GHz, Radar5 200mS						
# of Signals		Pulse Width (mS)		Value (mS)	Limit	Result
N/A		N/A		200	200mS	Pass



20MHz, 5.54GHz, Rader5 Aggregate						
# of Signals		Pulse Width (mS)		Value (mS)	Limit	Result
3		0.1257		200.377	260mS	Pass



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	AFA	6/15/2012	24
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
RF Vector Signal Generator	Agilent	V2920A	TIH	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 decribed 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 chanell. Configuration and status of the master and client devices were monitored and controlled through a serial/usb connection linked to a host pc. 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

EUT:	Zoll CF Card Module			**Work Order:**	LGPD0094
Serial Number:	SN0024			**Date:**	05/17/13
Customer:	Logic Product Development			**Temperature:**	23°C
Attendees:	None			**Humidity:**	40%
Project:	None			**Barometric Pres.:**	1014mb
Tested by:	Jeremiah Darden	**Power:**	110VAC/60Hz	**Job Site:**	OC11

TEST SPECIFICATIONS	Test Method
FCC 15.407:2013	ANSI C63.10:2009

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

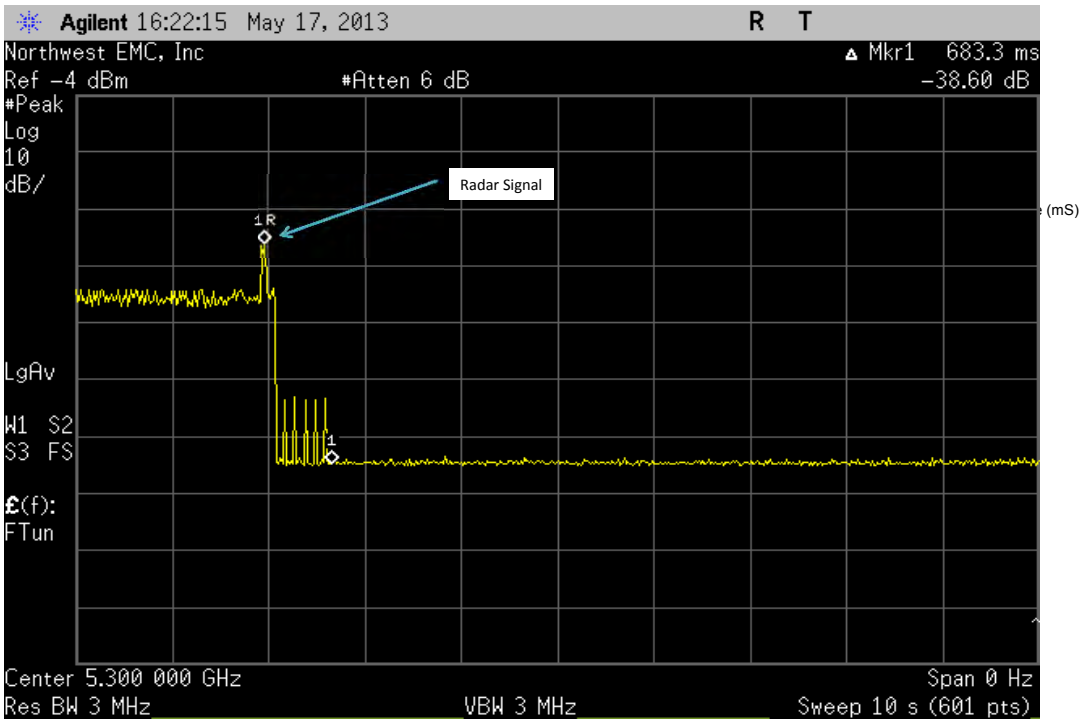
None

Configuration #	2	Signature

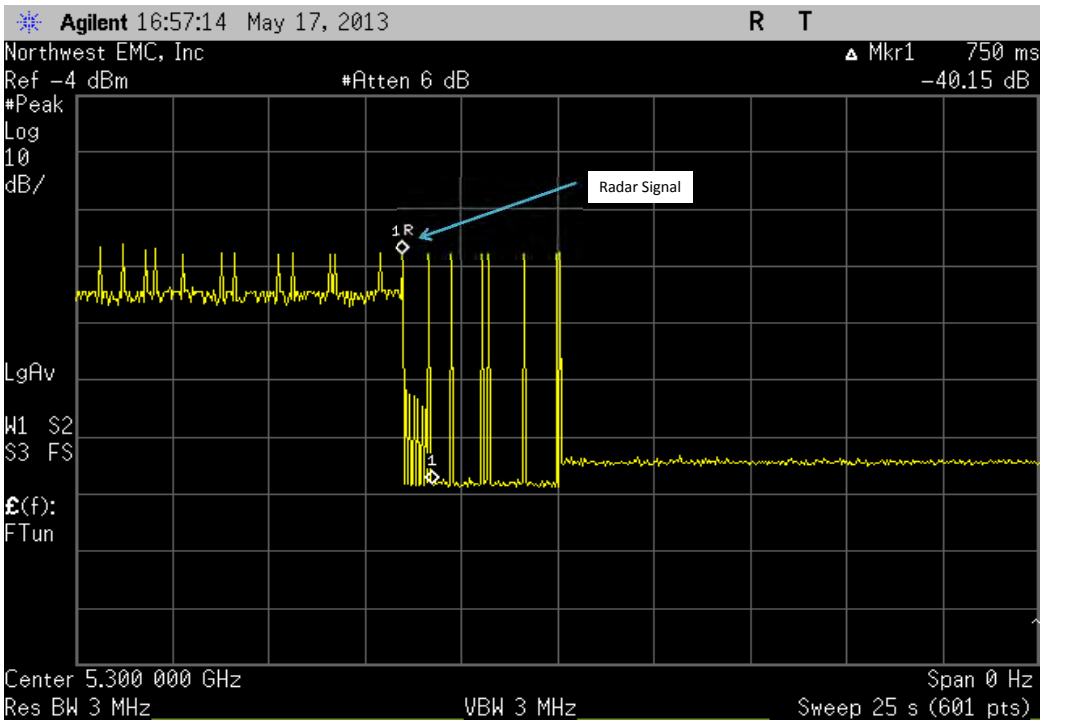
			Value (Sec)	Limit	Result
20MHz					
	5.3GHz				
		Radar1	0.683	<= 10 Sec	Pass
		Rader5	0.75	<= 10 Sec	Pass
	5.54GHz				
		Radar1	2.667	<= 10 Sec	Pass
		Rader5	0.792	<= 10 Sec	Pass

Move Time

20MHz, 5.3GHz, Radar1							
					Value (Sec)	Limit	Result
					0.683	<= 10 Sec	Pass



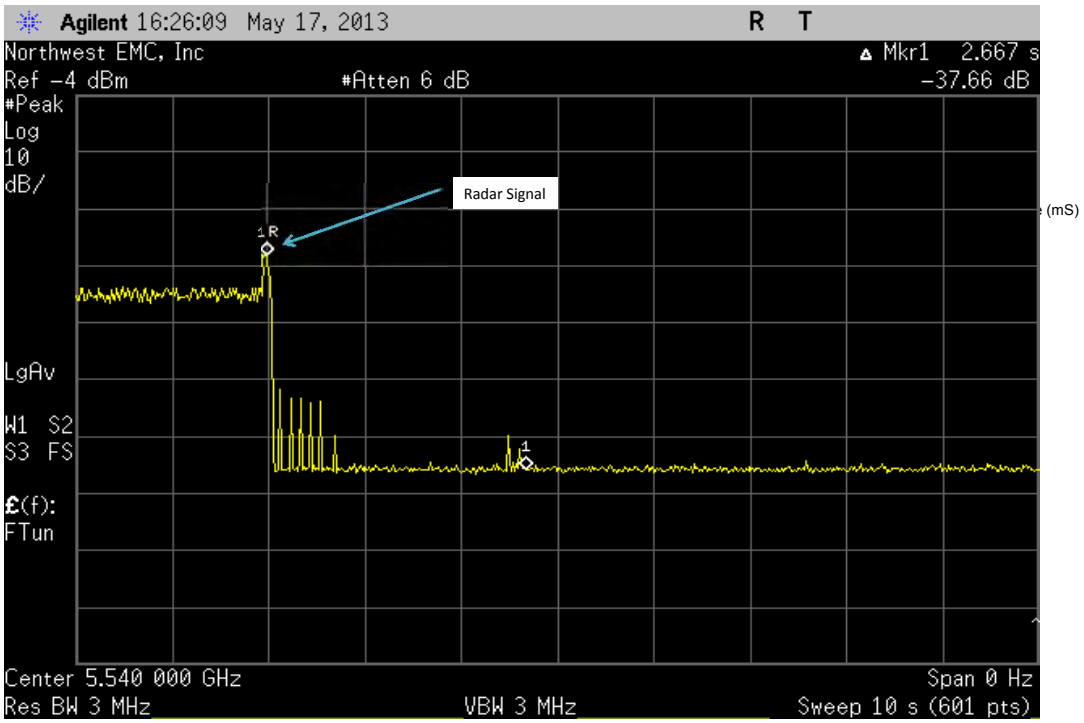
20MHz, 5.3GHz, Rader5							
					Value (Sec)	Limit	Result
					0.75	<= 10 Sec	Pass



Move Time

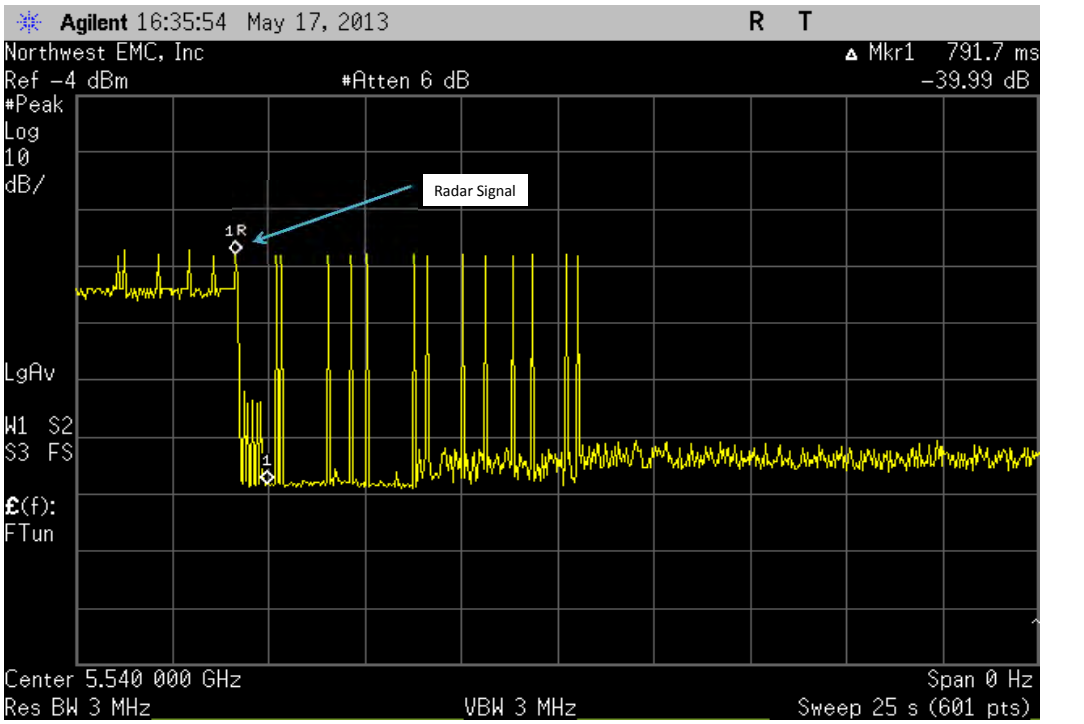
20MHz, 5.54GHz, Radar1

Value (Sec)	Limit	Result
2.667	<= 10 Sec	Pass



20MHz, 5.54GHz, Rader5

Value (Sec)	Limit	Result
0.792	<= 10 Sec	Pass



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	AFA	6/15/2012	24
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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
RF Vector Signal Generator	Agilent	V2920A	TIH	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 decribed 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 and controlled through a serial/usb connection linked to a host pc. 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

EUT:	Zoll CF Card Module			Work Order:	LGPD0094
Serial Number:	SN0024			Date:	05/17/13
Customer:	Logic Product Development			Temperature:	23°C
Attendees:	None			Humidity:	40%
Project:	None			Barometric Pres.:	1014mb
Tested by:	Jeremiah Darden	Power:	110VAC/60Hz	Job Site:	OC11

TEST SPECIFICATIONS	Test Method
FCC 15.407:2013	ANSI C63.10:2009

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

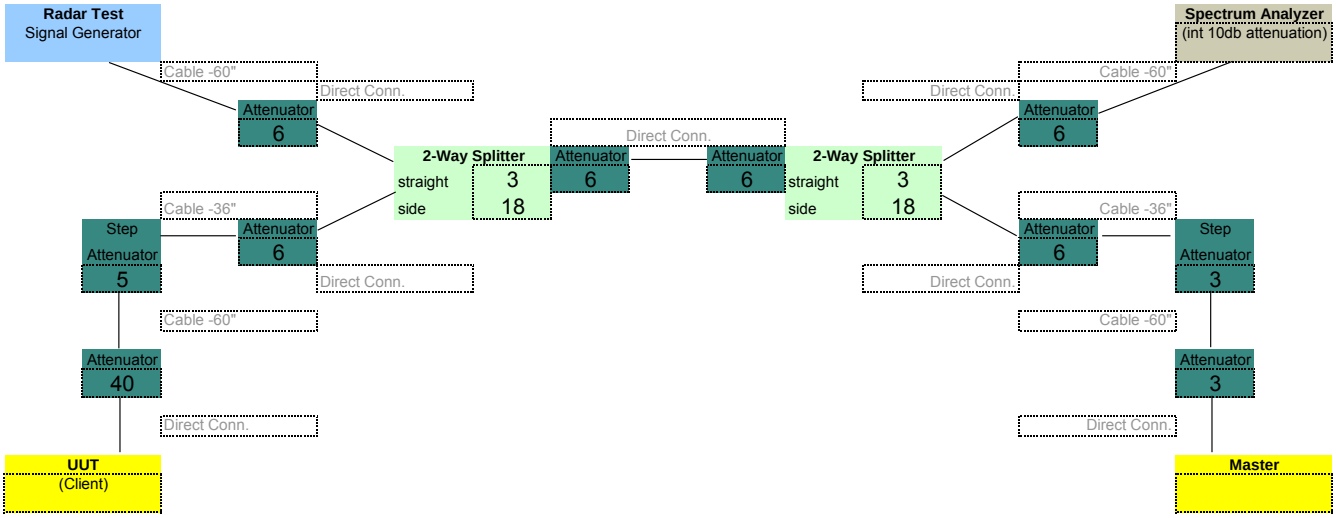
None

Configuration #	2	Signature

		Value	Limit	Result
20MHz				
	5.3GHz			
	30min Non Occupancy Period	>30.5 min	>= 30 Min	Pass

Non Occupancy Period

1/0/1900



Attenuation

Master Radar Sim	Master Spec. Anal.	Client Spec. Anal.	Client Radar Sim	Master Client	Radar Sim Spec. Anal.
3	3	40	40	3	6
3	3	5	5	3	3
6	6	6	6	6	6
3	18	3	18	3	6
6	6	6	6	6	3
6		6		6	6
3		3		3	
6		6		6	
				5	
				40	
========	========	========	========	========	========
36	36	75	75	81	30