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Report On

FCC DFS Testing of the
Juniper Systems, Inc.
MS2 Ultra-Rugged Handheld Computer

FCC Part 15 Subpart E §15.407
IC RSS-247 Issue 1 May 2015
IC RSS-Gen Issue 4, November 2014

Report No. BT72111801-1115A Rev.1 **January 2016**

REPORT ON	DFS Testing of the Juniper Systems, Inc. Ultra-Rugged Handheld Computer
TEST REPORT NUMBER	BT72111801-1115A Rev.1
PREPARED FOR	Juniper Systems, Inc. 1132 W 1700 N Logan, UT 84321
CONTACT PERSON	Grant Robison Product Assurance Engineer (435) 753-1881 complianceteam@junipersys.com
PREPARED BY	Ferdinand S. Custodio **Name** Authorized Signatory Title: EMC/Senior Wireless Test Engineer
APPROVED BY	Chip R. Fleury Name Authorized Signatory Title: West Coast EMC Manager
DATED	February 17, 2015

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

Revision History

BT72111801-1115A Rev.1 Juniper Systems, Inc. MS2 Ultra-Rugged Handheld Computer					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
02/17/2016	Initial Release				Chip R. Fleury
03/18/2016	Initial Release	Rev. 1	Updated EUT frequency range information with corresponding data rates and U-NII channel bandwidths	10	Ferdinand Custodio
			Defined system architecture and unintentional radiator compliance of the EUT	11	
			Added Annex A (Manufacturer Statement regarding information available to the end-user)	30	
			Provide Noise-Floor plot for Non-Occupancy Period test	28	

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DFS Testing of the
Juniper Systems, Inc.
Ultra-Rugged Handheld Computer

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1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Juniper Systems, Inc. MS2 Ultra-Rugged Handheld Computer to the requirements of FCC Part 15 Subpart E §15.407 and IC RSS-247 Issue 1 May 2015.

Objective	To perform DFS Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Juniper Systems, Inc.
Model Number(s)	MS2
FCC ID Number	VSFMS2
IC Number	7980A-MS2
Serial Number(s)	00263-00100-00562-AAOEM (Product ID)
Number of Samples Tested	1
Test Specification/Issue/Date	• FCC Part 15 Subpart E §15.407 (October 1, 2015). • IC RSS-247 Issue 1 May 2015 Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices. • IC RSS-Gen Issue 4, November 2014 - General Requirements for Compliance of Radio Apparatus (Issue 4, November 2014). • KDB905462 D02 UNII DFS Compliance Procedures New Rules v01r02. Compliance Measurement Procedures For Unlicensed-National Information Infrastructure Devices Operating In The 5250-5350 Mhz And 5470-5725 MHz Bands Incorporating Dynamic Frequency Selection (May 15, 2015). • KDB905462 D03 Client Without DFS New Rules v01r01 (August 14, 2014)
Start of Test	January 11, 2016
Finish of Test	January 30, 2016
Name of Engineer(s)	Ferdinand Custodio
Related Document(s)	Kestrel RFQ 15Oct2015 (2).xlsx

1.2 TEST REQUIREMENTS

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
U-NII Detection Bandwidth	Yes	Not Required	Yes

Applicability of DFS Requirements During Normal Operation

Requirement	Operational Mode	
	Master Device or Client With Radar Detection	Client Without Radar Detection
DFS Detection Threshold	Yes	Not Required
Channel Closing Transmission Time	Yes	Yes
Channel Move Time	Yes	Yes
U-NII Detection Bandwidth	Yes	Not Required

Additional requirements for devices with multiple bandwidth modes	Master Device or Client With Radar Detection	Client Without Radar Detection
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not Required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not Required

Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.

1.3 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC Part 15 Subpart E §15.407 with cross-reference to the corresponding IC RSS standard is shown below.

Client Without Radar Detection					
Section	**§15.407 Spec Clause**	**RSS**	**Test Description**	**Result**	**Comments /Base Standard**
2.1	§15.407(h)(2)	RSS-247 6.3 (1)	Calibration Of Test Setup	-	
2.2	§15.407(h)(2)(iii)	RSS-247 6.3 (2)(iii) and (iv)	In-Service Monitoring	Compliant	
2.3	§15.407(h)(2)(iv)	RSS-247 6.3 (2)(v)	Non-Occupancy Period	Compliant	

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1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Juniper Systems, Inc. MS2 Ultra-Rugged Handheld Computer as shown in the photograph below. The EUT is an ultra-rugged handheld computer for field data collection. The EUT is available in 3 model configurations that use the same mainboard. The enhanced model configurations are created by including additional plug-in components not related to DFS testing (i.e GNSS, camera or cellular radio).

Equipment Under Test

1.4.2 EUT General Description

EUT Description	Ultra-Rugged Handheld Computer
Model Name	MS2
Model Number(s)	MS2
Rated Voltage	12VDC (Phihong Switching Power Supply Model: PSAA20R-120 Input: 100-240V, 50-60Hz Output: 12VDC, 1.67A)
Mode Verified	Wi-Fi 802.11a (20MHz BW)/802.11an (20/40MHz BW)
Capability	Wi-Fi 802.11a/b/g/n; Bluetooth 2.1+EDR/BT 4.0+HS and Cellular
Modulation	BPSK, QPSK, 16-QAM and 64-QAM
Primary Unit (EUT)	☐ Production ☒ Pre-Production ☐ Engineering

Band of Operation (MHz)	Mode of Operation	Ch. Range (MHz)	Number of Available Channels	Channel Spacing	MCS Index/Data Rate (Mbps)
5150 - 5250	a	5180 - 5240	4	20	6, 9, 12, 18, 24, 36, 48, 54 Mbps (BPSK,QPSK,16-QAM and 64-QAM)
5250 - 5350		5260 - 5320	4		
5470 - 5725		5500 - 5700	11		
5725 - 5850		5745 - 5825	5		
5150 - 5250	n (HT20)	5180 - 5240	4	20	MCS0 – MCS15 (BPSK,QPSK,16-QAM and 64-QAM)
5250 - 5350		5260 - 5320	4		
5470 - 5725		5500 - 5700	11		
5725 - 5850		5745 - 5825	5		
5150 - 5250	n (HT40)	5190 - 5230	2	40	
5250 - 5350		5270 - 5310	2		
5470 - 5725		5510 - 5670	5		
5725 - 5850		5755 - 5795	2		

Number of Channels	24 (20MHz BW)/11 (40MHz BW)
Channels Used	36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 149, 153, 157, 161 and 165. (20 MHz BW - Green indicates channels that requires DFS)

	38, 46, 54, 62, 102, 110, 118, 126, 134, 151 and 159. (40 MHz BW -Green indicates channels that requires DFS)
Operating Mode	Client without radar detection
EUT Power Level	14dBm ±2dBm (802.11a - from data sheet) 12dBm ±2dBm (802.11an - from data sheet)
Maximum Transmit Power (EIRP)	112.2mW (from 20.5 dBm EIRP – 802.11a) 70.8mW (from 18.5 dBm EIRP – 802.11n)
TPC Support	☐ Yes ☒ No
System Architecture	☒ IP Based ☐ Frame Based
FCC ID of Master Device (if EUT is a Client Device)	UZ7MB82
EUT Unintentional Radiator Compliance	The EUT was evaluated for unintentional emissions and was found to be compliant. Compliance for unintentional emissions was verified by Advanced Compliance Solutions, Inc., 5015 B.U. Bowman Drive, Buford, GA 30518 and is documented in Project number 15-0488.
Master Device Power-On Cycle	Approx. 3 minutes (5GHz radio is active, connection to the web based GUI is possible).

	Antenna	
	WLAN 0 (Primary, Sole BT)	**WLAN 1 (Secondary WLAN)**
Type	Custom Sheet Metal	PIFA
Manufacturer	Juniper Systems Inc.	Juniper Systems Inc.
Part Number	25249	25301
Dimensions	25mm x 5mm x 7mm	25mm x 5mm x 7mm
Max Gain 2.4GHz	2.5	2.0
Max Gain 5GHz	4.2	4.5

Test Configuration	☐ Radiated ☒ Conducted
Antenna Port Tested (if Conducted)	Primary BT/Wi-Fi antenna. Secondary BT/Wi-Fi antenna was terminated with a 50Ω load
Channel Loading Configuration	Streaming test file (http://ntiacsd.ntia.doc.gov/dfs/StreamingFiles/TestFile.mpg) from Master Device to the EUT via a support laptop.

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1.4.3 Support Equipment

Manufacturer	Equipment/Cable	Description
Lenovo	Support Laptop (T410S)	P/N 0A31972 S/N R9-92MH0 10/11
Motorola Solutions Inc.	Master Device	AP-6532 Dual Radio Access Point. S/N 15106522200048
Asus	Support Wireless Dual Band Gigabit Router	RT-AC68U S/N E1lA0H032476

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1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number 00263-00100-00562-AAOEM		
N/A		

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

1.7 TEST METHODOLOGY

All measurements contained in this report were conducted as per KDB905462 D02 UNII DFS Compliance Procedures New Rules v01r02. Compliance Measurement Procedures For Unlicensed-National Information Infrastructure Devices Operating In The 5250-5350 MHz And 5470-5725 MHz Bands Incorporating Dynamic Frequency Selection (May 15, 2015).

1.8 TEST FACILITY LOCATION

1.8.1 TÜV SÜD America Inc. (Mira Mesa)

10040 Mesa Rim Road, San Diego, CA 92121-2912 (32.901268,-117.177681). Phone: 858 678 1400 FAX: 858-546 0364

1.8.2 TÜV SÜD America Inc. (Rancho Bernardo)

Sony Electronics Inc., Building #8 16530 Via Esprillo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: 858 942 5542 FAX: 858-546 0364

1.9 TEST FACILITY REGISTRATION

1.9.1 FCC – Registration No.: US1146

TUV SUD America Inc. (San Diego), is an accredited test facility with the site description report on file and has met all the requirements specified in §2.948 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Registration is US1146.

1.9.2 Industry Canada (IC) Registration No.: 3067A

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego) has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No. 3067A.

1.10 DFS TEST SYSTEM

The DFS system consists of hardware and software. The Hardware uses a PXI chassis with PXI instruments populating the chassis. The instruments used are a Vector Signal Generator, a Digitiser, Frequency References and a Dual Core PC (Windows 7 Professional). The Measurement and Analysis software runs on the PC and controls the instruments within the mainframe via commands on the PXI bus. Various markers are contained within the generated waveforms. The markers are used to trigger the measurement system at the appropriate points. An external trigger is also provided at the SMB output on the Vector Signal Generator which is employed where a Spectrum Analyzer is used in place of the Aeroflex Digitiser. These are described within the test procedure for the applicable test.

The Aeroflex DFS software generates the pulses in accordance with KDB905462.

1.10.1 Short Pulse Radar Test Waveforms (Types 0-4)

The short pulse radar simulation is a conventional amplitude pulse with varying pulse widths, pulse rate intervals (PRI) and number of pulses. General characteristics for these types and number of repetitions required by the standard are as follows:

Radar Type	Pulse Width (µsec)	PRI (µsec)	Number of Pulses
0	1	1428	18
1	1	**Test A**: 15 unique PRI values randomly selected	Roundup((1/360)x(19x10^6/ $PRI_{\mu sec}$)
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 µsec, with a minimum increment of 1 µsec, excluding PRI values selected in Test A	
2	1-5	150-230	23-29
3	6-10	200-500	16-18
4	11-20	200-500	12-16

1.10.2 Long Pulse Radar Test Waveforms (Types 5)

The long pulse radar simulation is a 12 second concatenated series of chirps, chosen randomly. The general characteristics for Type 5 and number of repetitions required by the standard are as follows:

Radar Type	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Number of Pulses
5	50-100	5-20	1000-2000	1-3

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for the Long Pulse Radar Type waveforms. If more than 30 waveforms are used for the Long Pulse Radar Type waveforms, then each additional waveform must also be unique and not repeated from the previous waveforms. Each waveform is defined as follows:

1) The transmission period for the Long Pulse Radar test signal is 12 seconds.
2) There are a total of 8 to 20 Bursts in the 12 second period, with the number of Bursts being randomly chosen. This number is Burst_Count.
3) Each Burst consists of 1 to 3 pulses, with the number of pulses being randomly chosen. Each Burst within the 12 second sequence may have a different number of pulses.
4) The pulse width is between 50 and 100 microseconds, with the pulse width being randomly chosen. Each pulse within a Burst will have the same pulse width. Pulses in different Bursts may have different pulse widths.
5) Each pulse has a linear frequency modulated chirp between 5 and 20 MHz, with the chirp width being randomly chosen. Each pulse within a Burst will have the same chirp width. Pulses in different Bursts may have different chirp widths. The chirp is centered on the pulse. For example, with a radar frequency of 5300 MHz and a 20 MHz chirped signal, the chirp starts at 5290 MHz and ends at 5310 MHz.
6) If more than one pulse is present in a Burst, the time between the pulses will be between 1000 and 2000 microseconds, with the time being randomly chosen. If three pulses are present in a Burst, the random time interval between the first and second pulses is chosen independently of the random time interval between the second and third pulses.
7) The 12 second transmission period is divided into even intervals. The number of intervals is equal to Burst_Count. Each interval is of length (12,000,000 / Burst_Count) microseconds. Each interval contains one Burst. The start time for the Burst, relative to the beginning of the interval, is between 1 and [(12,000,000 / Burst_Count) – (Total Burst Length) + (One Random PRI Interval)] microseconds, with the start time being randomly chosen. The step interval for the start time is 1 microsecond. The start time for each Burst is chosen randomly.

1.10.3 Frequency Hopping Radar Test Waveform (Types 6)

Radar Type	Pulse Width (µsec)	PRI (µsec)	Pulse per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)
6	1	333	9	5-20	300

For the Frequency Hopping Radar Type, the same Burst parameters are used for each waveform. The hopping sequence is different for each waveform and a 100-length segment is selected from the hopping sequence defined by the following algorithm:

The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250 – 5724 MHz. Next, the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.

SECTION 2

TEST DETAILS

DFS Testing of the
Juniper Systems, Inc.
Ultra-Rugged Handheld Computer

2.1 CALIBRATION OF TEST SETUP

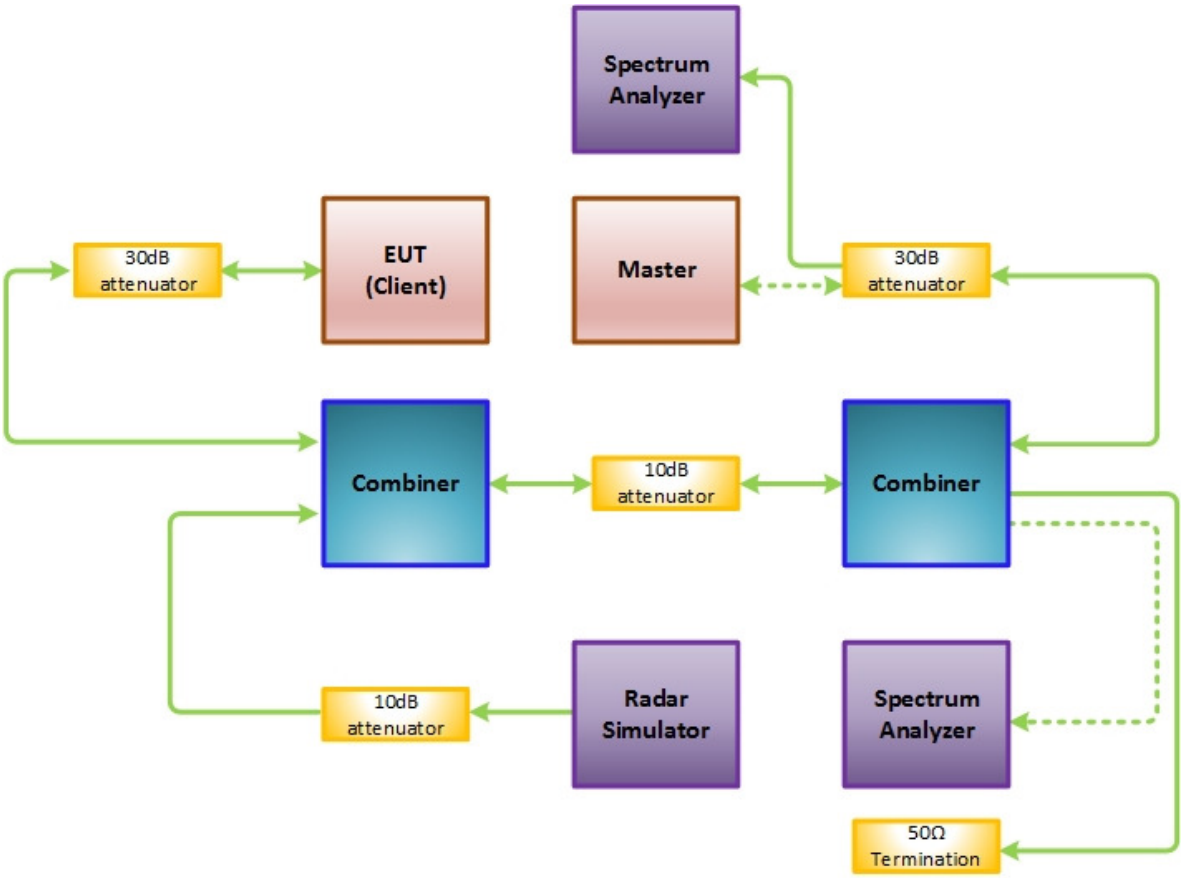
2.1.1 Specification Reference

Part 15 Subpart E §15.407(h)(2) and RSS-247 6.3 (1)

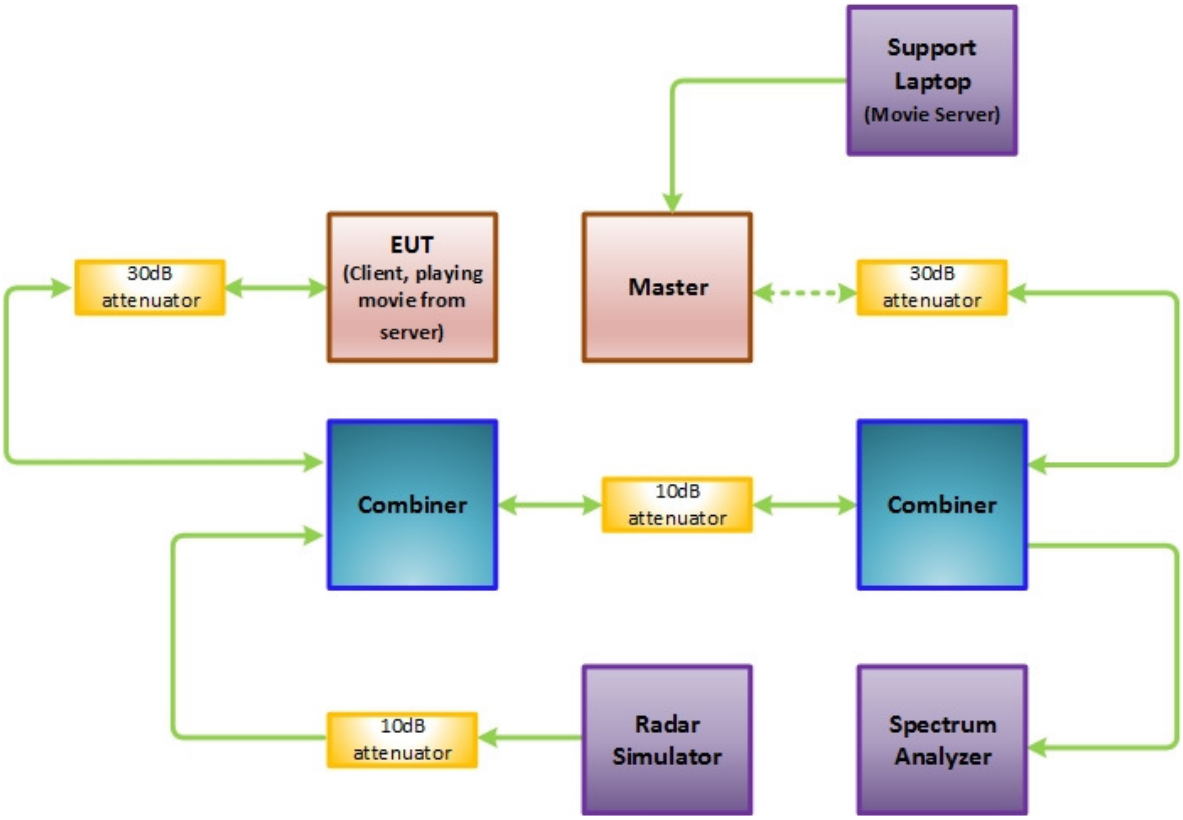
2.1.2 Standard Applicable

Radar Detection Function of Dynamic Frequency Selection (DFS). U-NII devices operating with any part of its 26 dB emission bandwidth in the 5.25-5.35 GHz and 5.47-5.725 GHz bands shall employ a DFS radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems. Operators shall only use equipment with a DFS mechanism that is turned on when operating in these bands. The device must sense for radar signals at 100 percent of its emission bandwidth. The minimum DFS detection threshold for devices with a maximum e.i.r.p. of 200 mW to 1 W is −64 dBm. For devices that operate with less than 200 mW e.i.r.p. and a power spectral density of less than 10 dBm in a 1 MHz band, the minimum detection threshold is −62 dBm. The detection threshold is the received power averaged over 1 microsecond referenced to a 0 dBi antenna. For the initial channel setting, the manufacturers shall be permitted to provide for either random channel selection or manual channel selection.

2.1.3 Test Equipment Setup (Calibration)



2.1.4 Test Equipment Setup (Channel Loading)



2.1.5 Date of Verification/Initial of test personnel who performed the verification

January 11, 2016/FSC

2.1.6 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.7 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	21.6 °C
Relative Humidity	47.9 %
ATM Pressure	99.5 kPa

2.1.8 Additional Observations

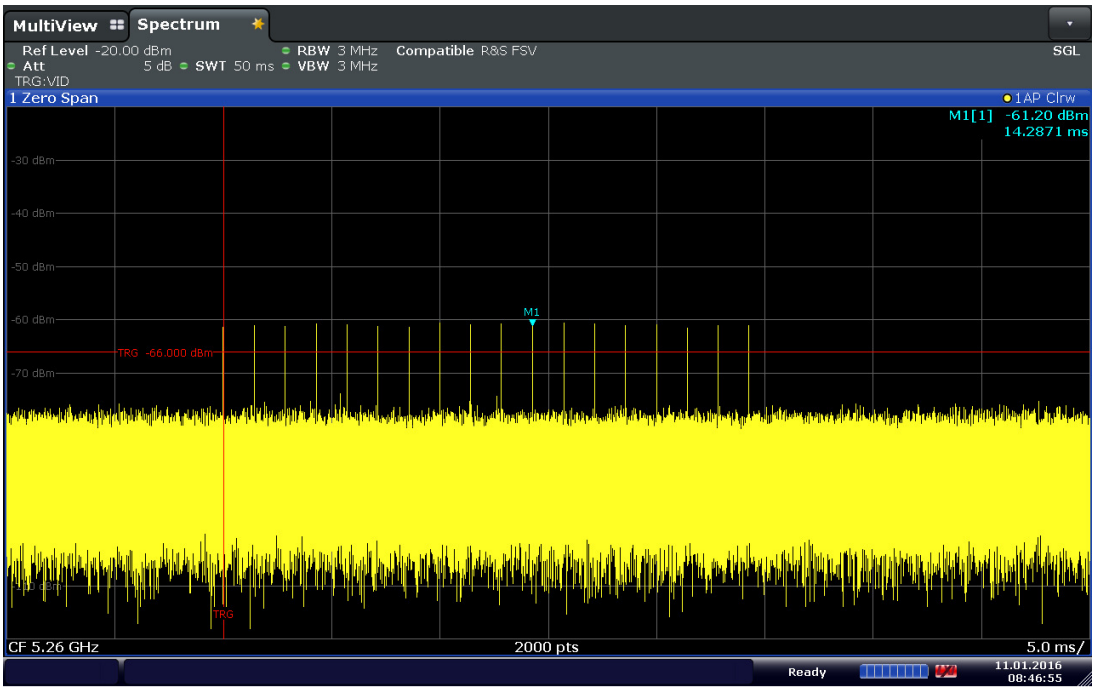
- Test setup is per Section 7.2.2 of KDB905462 D02 UNII DFS Compliance Procedures New Rules v01r02 (Setup for Client with injection at the Master) with the exception of the Master being replaced by an Spectrum Analyzer and the Spectrum Analyzer branch replaced by a 50Ω termination.
- DFS detection threshold is -61 dBm for Master Devices and Client Devices with Radar Detection having an EIRP ≥ 200 milliwatt (-62 dBm + 1dB).
- Short Pulse Radar Type 0 was used as per Note 1 of Table 5 of KDB905462 D02 UNII DFS Compliance Procedures New Rules v01r02.
- Spectrum Analyzer was set to zero span.
- RBW/VBW set to 3MHz.
- Sweep time set to encompass the entire burst and triggered on the Radar burst.
- For Channel Loading, a streaming video from the Master was played on the EUT. Requirement is ≥ 17% loading which was estimated using the formula:

$$\frac{Time\ On}{(Time\ On + Off\ Time)}$$

2.1.9 Radar Pulse Type

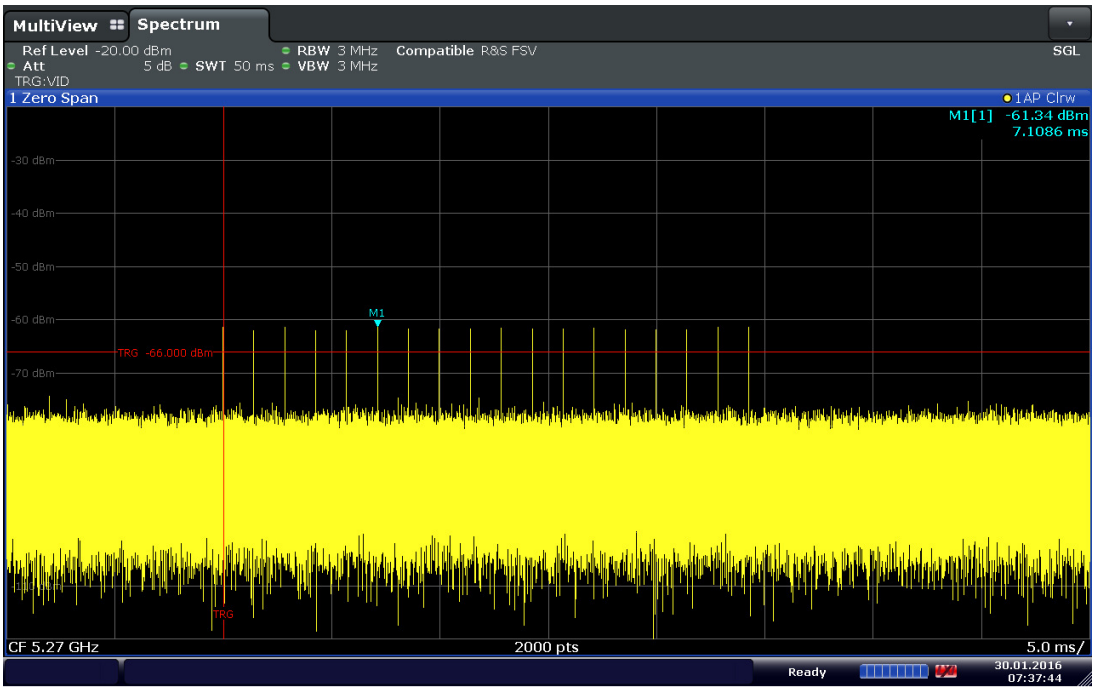
Radar Type	Pulse Width (µsec)	PRI (µsec)	Number of Pulses
0	1	1428	18

2.1.10 Radar Pulse Type 0 Plot (Test Setup Verification for 802.11a 20MHz BW)



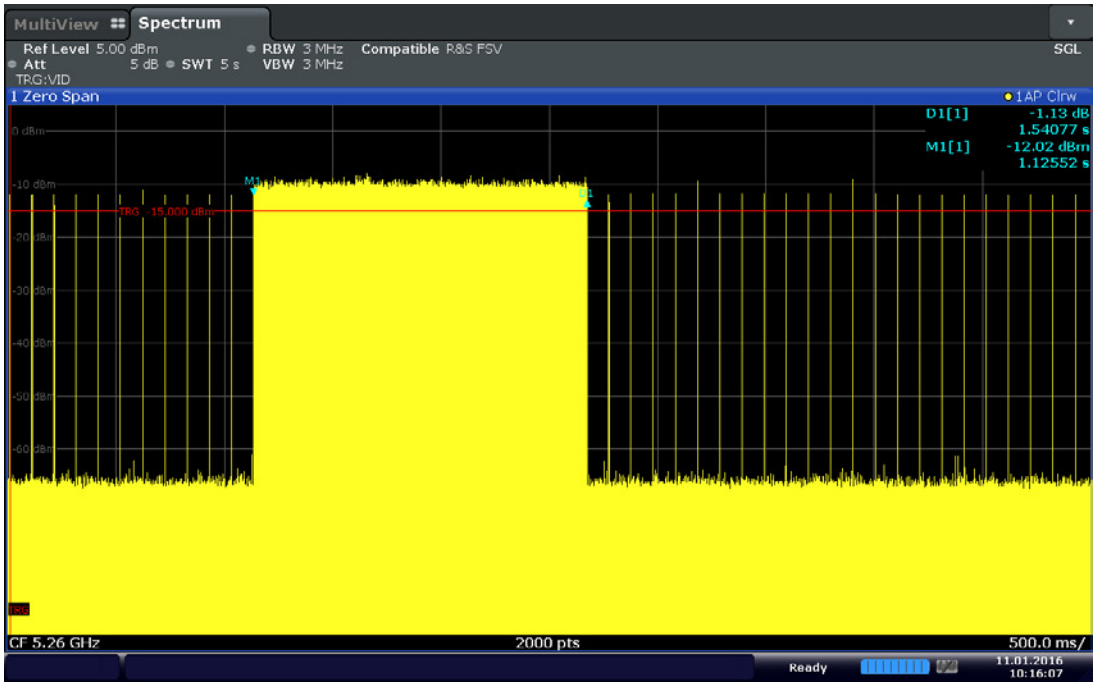
Date: 11.JAN.2016 08:46:55

2.1.11 Radar Pulse Type 0 Plot (Test Setup Verification for 802.11n 40MHz BW)



Date: 30.JAN.2016 07:37:44

2.1.12 Channel Loading (802.11a 20MHz BW @ Channel 52)



Date: 11.JAN.2016 10:16:08

Calculated Channel Loading = >31.13% (Complies with >17% requirement)

Channel Loading calculation:

$$\frac{Time\ On}{(Time\ On + Off\ Time)}$$

Where:

Time On = (1 x 1.5477 seconds) + (33 x 0.00026 second)
= 1.55628 seconds

Off Time = 5 seconds – 1.55628 seconds
= 3.44372 seconds

Therefore:

$$\frac{1.55628\ seconds}{(1.55628\ seconds + 3.44372\ \text{seconds})}$$

Calculated Channel Loading = **31.13%**

2.1.13 Test Setup Photo

2.2 IN-SERVICE MONITORING

2.2.1 Specification Reference

Part 15 Subpart E §15.407(h)(2)(iii) / RSS-247 6.3 (2)(iii) and (iv)

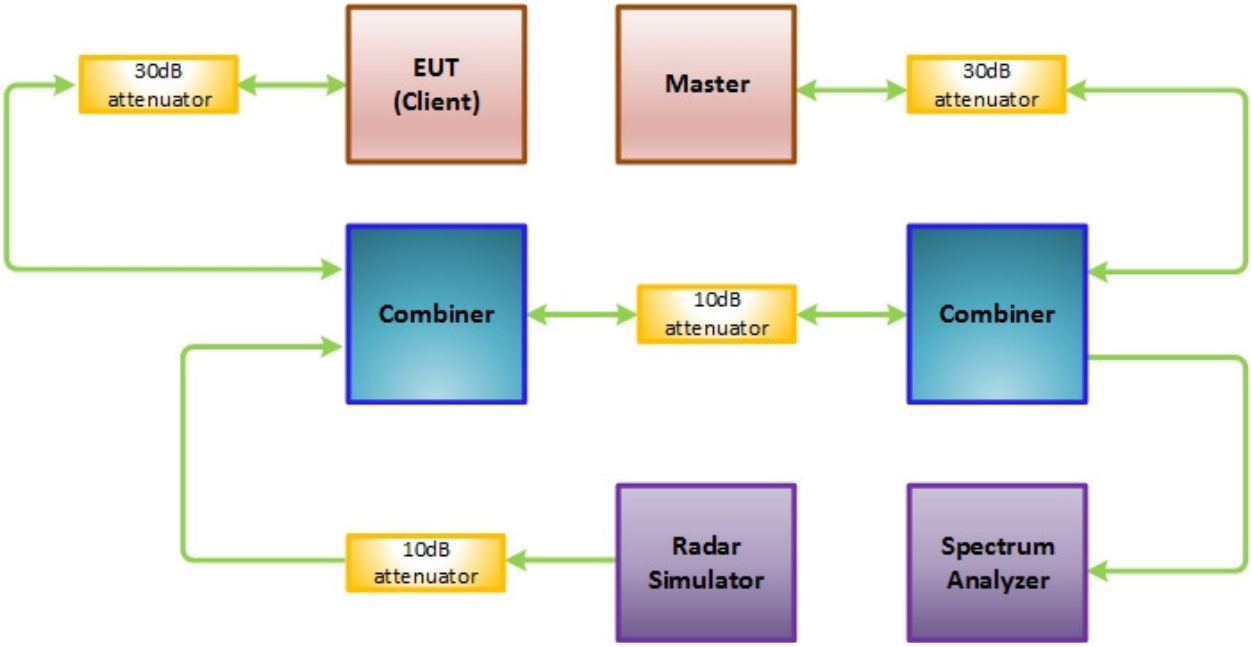
2.2.2 Standard Applicable

(iii) Channel Move Time. After a radar's presence is detected, all transmissions shall cease on the operating channel within 10 seconds. Transmissions during this period shall consist of normal traffic for a maximum of 200 ms after detection of the radar signal. In addition, intermittent management and control signals can be sent during the remaining time to facilitate vacating the operating channel.

2.2.3 Limits

Channel Closing Transmission Time	200 ms
Channel Move Time	within 10 seconds

2.2.4 Test Equipment Setup



2.2.5 Equipment Under Test and Modification State

Serial No: 00263-00100-00562-AAOEM /EUT playing Test Movie File from a support laptop on the same network connected to the Master device.

2.2.6 Date of Test/Initial of test personnel who performed the test

January 21 and 30, 2015/FSC

2.2.7 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.8 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	21.7 - 25.7 °C
Relative Humidity	37.7 - 55.2 %
ATM Pressure	99.3 - 99.5 kPa

2.2.9 Additional Observations

- Test procedure is per Section 7.8.3 of KDB905462 D02 UNII DFS Compliance Procedures New Rules v01r02.
- All requirements from Section 2.1 of this test report were met (Radar burst calibration and Channel loading).
- Using the Aeroflex DFS test system signal generator, a radar type 0 test signal was injected into the Master device antenna port on the operating channel. The Aeroflex DFS test system signal analyser measurement sweep was triggered upon the radar injection to the Master device and the resultant data from the Master device and EUT was collected (response to radar burst injection).
- A level detection threshold was set on the Aeroflex DFS test system signal analyzer, such that all signals from the EUT were assessed using the Aeroflex DFS test system and both the channel closing transmission time and channel move time were measured and recorded.
- The markers on the captured trace data correspond to the following time periods:

Red - End of the injected radar burst: Time T1
Purple - End of the Channel Closing Transmission Time: Time T1 + 200 ms
Yellow - End of the Channel Move Time: T1 + 10 seconds

2.2.10 Test Results

802.11a (20MHz BW) Complies	
Channel Move Time	2.300419 second
Channel Closing Time (Aggregate Time During 200ms)	1.161 ms
Channel Closing Time (Aggregate Time +200ms to 10s)	6.164 ms
Channel Closing Time (Aggregate Time During 10s)	7.325 ms
802.11n (40MHz BW) Complies	
Channel Move Time	1.96698 seconds
Channel Closing Time (Aggregate Time During 200ms)	0.236 ms
Channel Closing Time (Aggregate Time +200ms to 10s)	3.694 ms
Channel Closing Time (Aggregate Time During 10s)	3.930 ms

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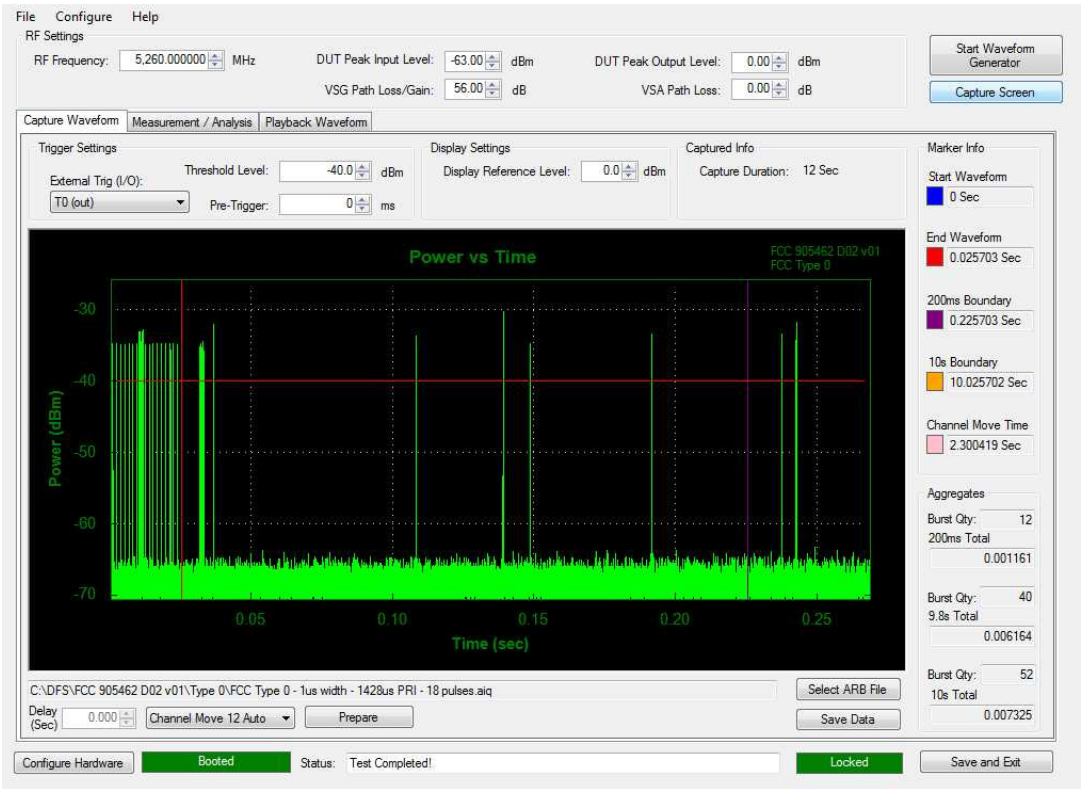
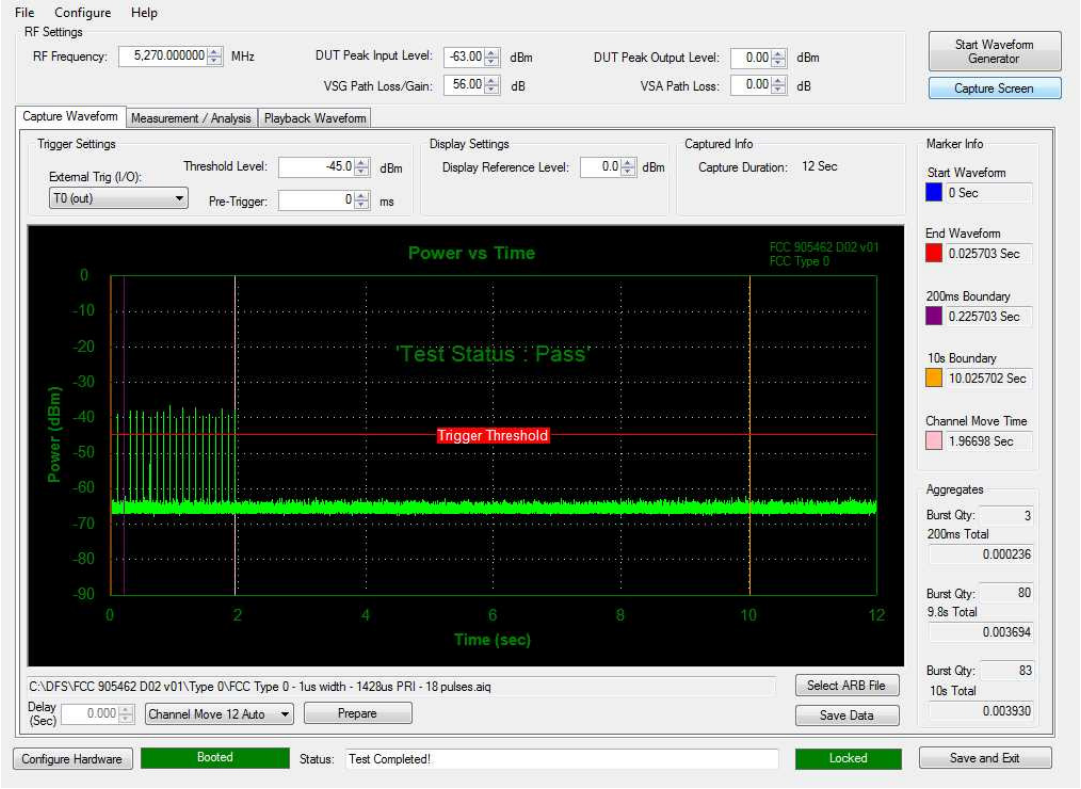
2.2.11 Overall Power vs Time Display, showing channel closing and move time (802.11a)

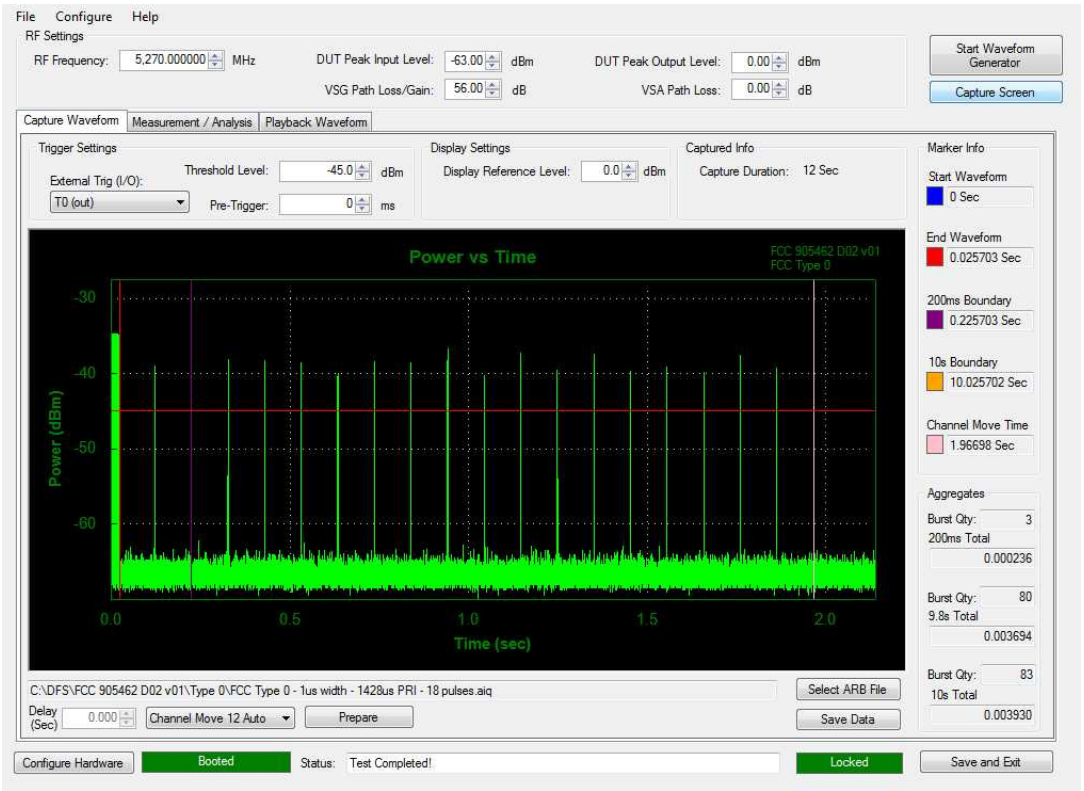
2.2.12 200ms Boundary, Radar burst, Master device and EUT signalling (802.11a)



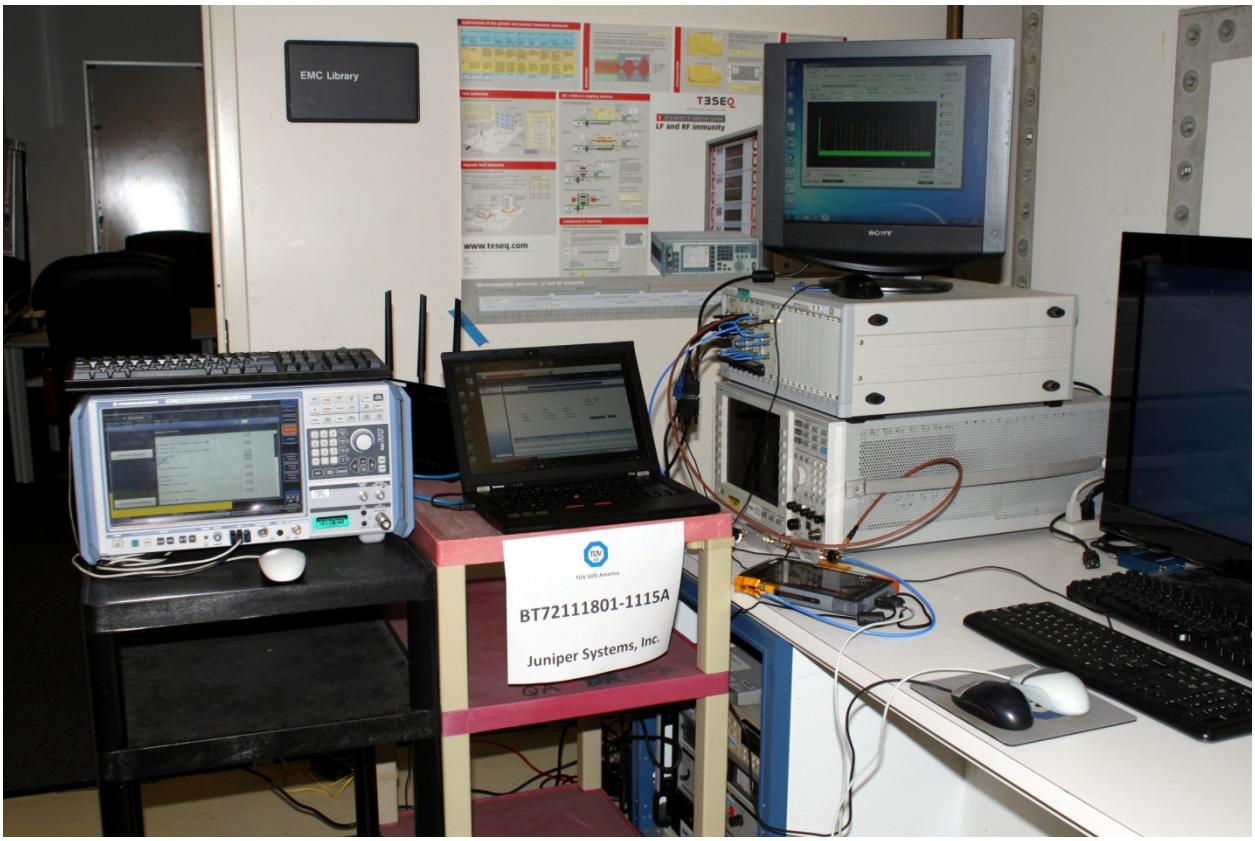
2.2.13 Overall Power vs Time Display, showing channel closing and move time (802.11n)

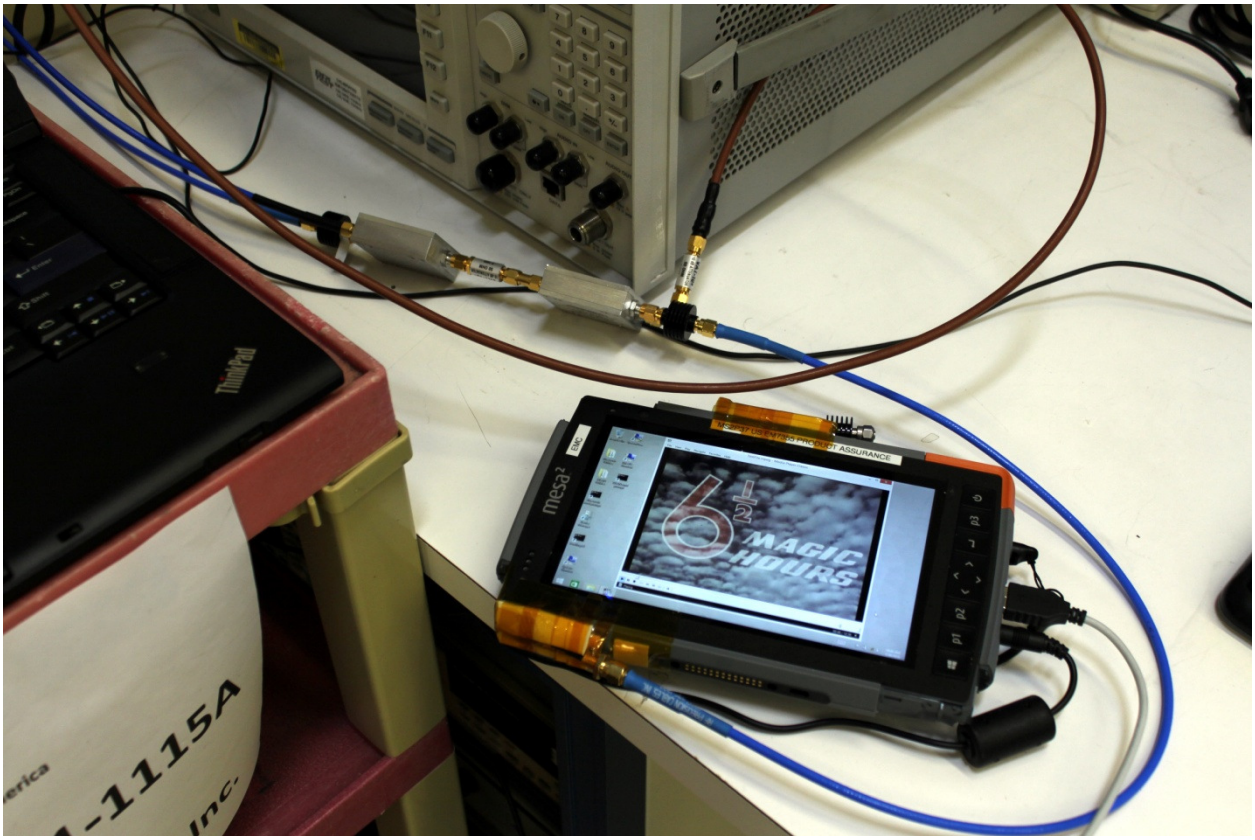


2.2.14 Channel Closing Transmission Time, Radar burst, Master device and EUT signalling (802.11n)



2.2.15 Test Setup Photo





2.3 NON-OCCUPANCY PERIOD

2.3.1 Specification Reference

Part 15 Subpart E §15.407(h)(2)(iv) / RSS-247 6.3 (2)(v)

2.3.2 Standard Applicable

(iv) Non-occupancy Period. A channel that has been flagged as containing a radar system, either by a channel availability check or in-service monitoring, is subject to a non-occupancy period of at least 30 minutes. The non-occupancy period starts at the time when the radar system is detected.

2.3.3 Equipment Under Test and Modification State

Serial No: 00263-00100-00562-AAOEM /EUT playing Test Movie File from a support laptop on the same network connected to the Master device.

2.3.4 Date of Test/Initial of test personnel who performed the test

January 30, 2015/FSC

2.3.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.6 Environmental Conditions

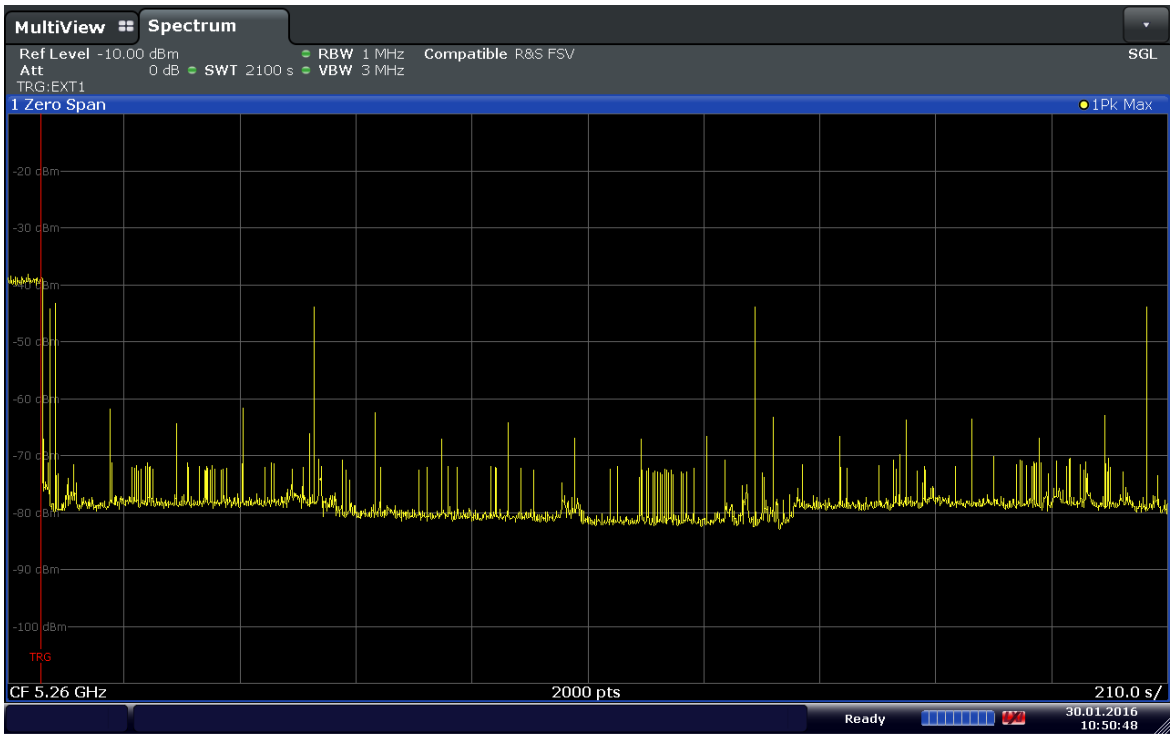
Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	19.1 °C
Relative Humidity	44.1 %
ATM Pressure	100.5 kPa

2.3.7 Additional Observations

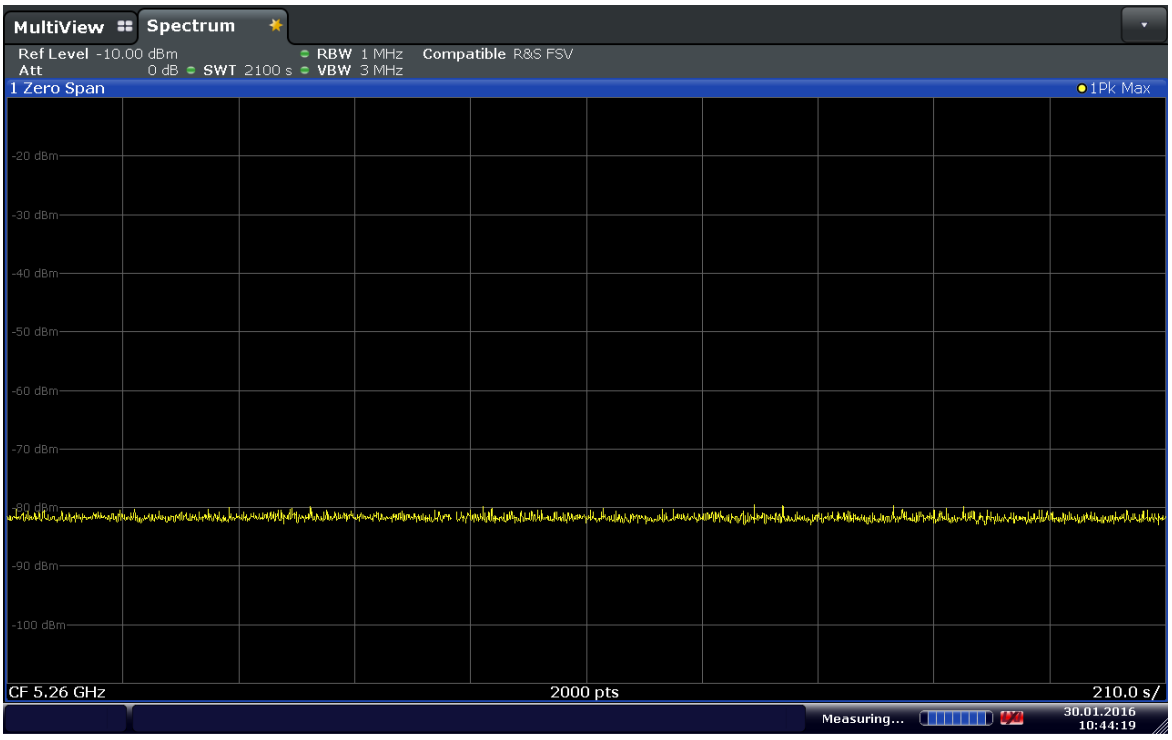
- Test procedure is per Section 5.1.2(e) of KDB905462 D02 UNII DFS Compliance Procedures New Rules v01r02.
- All requirements from Section 2.1 of this test report were met (Radar burst calibration and Channel loading).
- The input of the Wideband RF Digitizer on the Aeroflex DFS test system was replaced with a separate spectrum analyzer externally triggered by the system upon Radar burst injection. Sweep time set to >30 minutes.
- Trigger offset was set to -60 seconds to show actual level of transmission on the original channel so that transmissions from other channel/s could be distinguished after the channel was vacated.
- Since the EUT moves with the Master and no transmission was observed during the non-occupancy period test, the EUT therefore is deemed to be compliant of the requirement.

2.3.8 Test Results



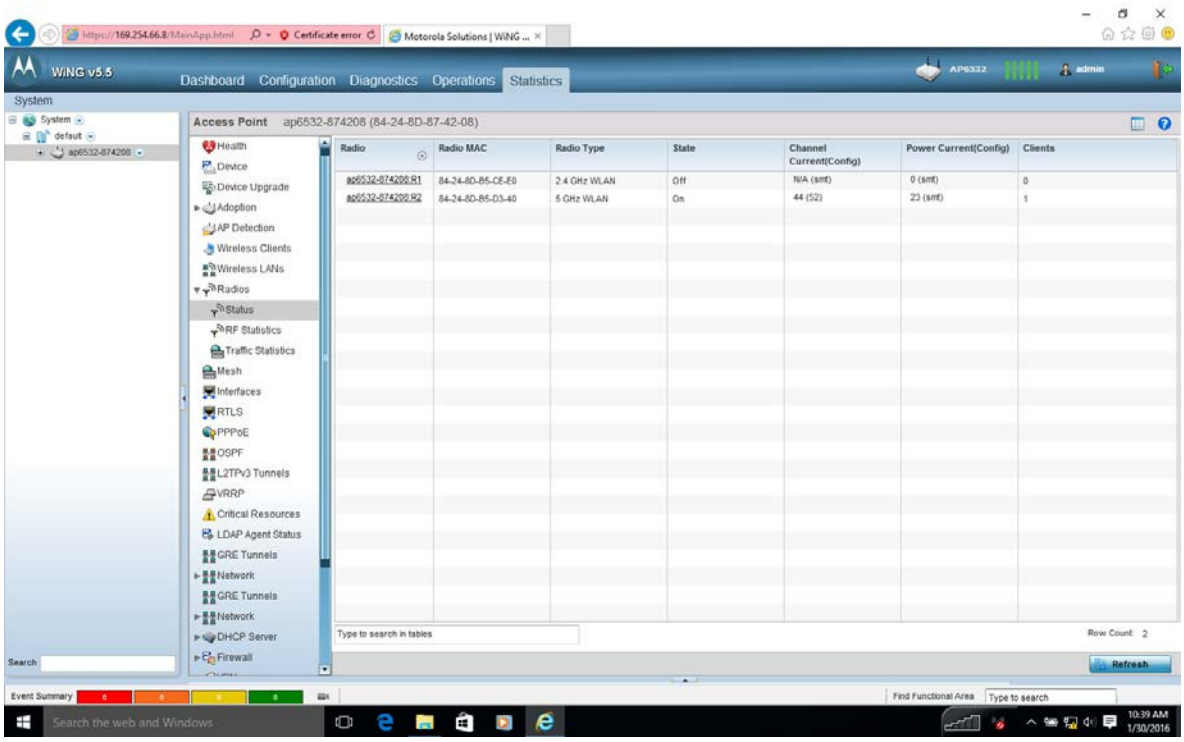
Date: 30.JAN.2016 10:50:48

>30 minutes sweep of the original channel showing no channel activity



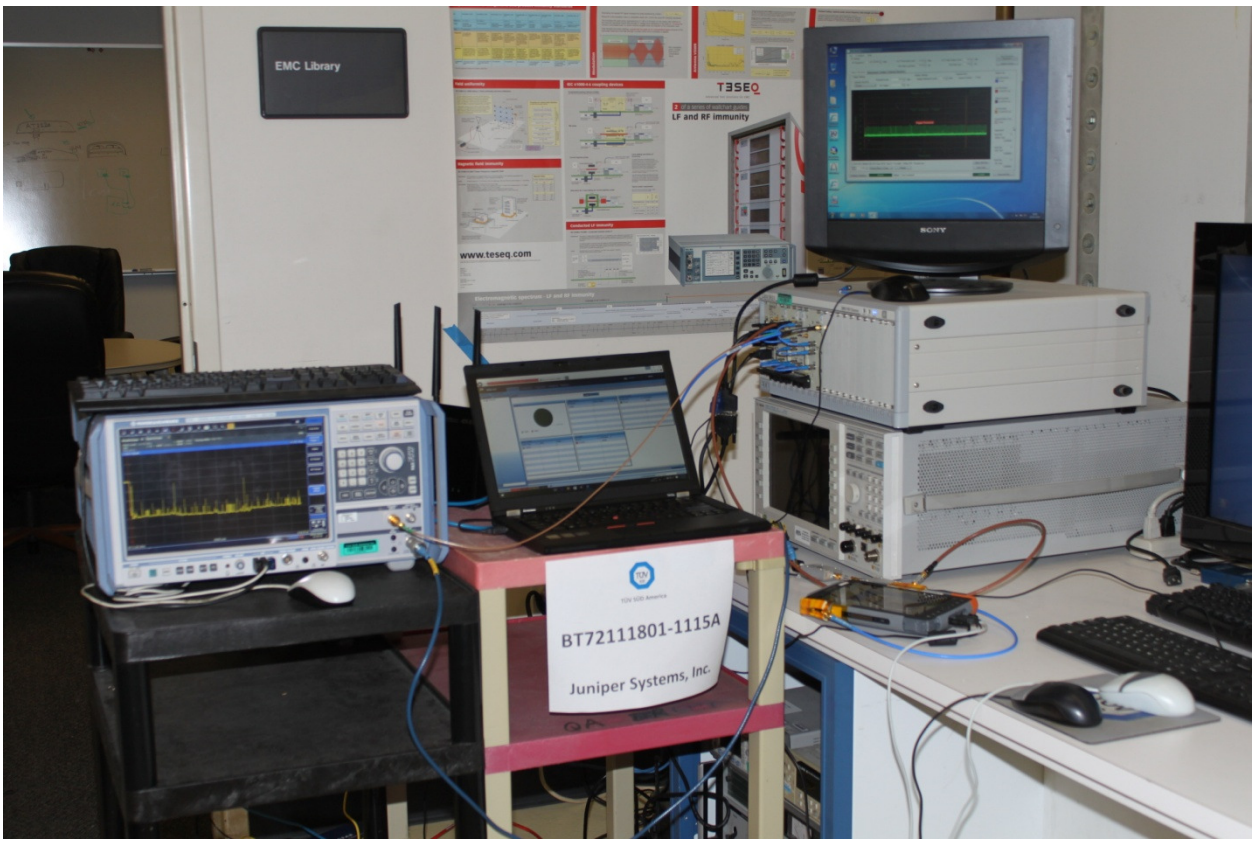
Date: 30.JAN.2016 10:44:19

Noise-Floor Plot

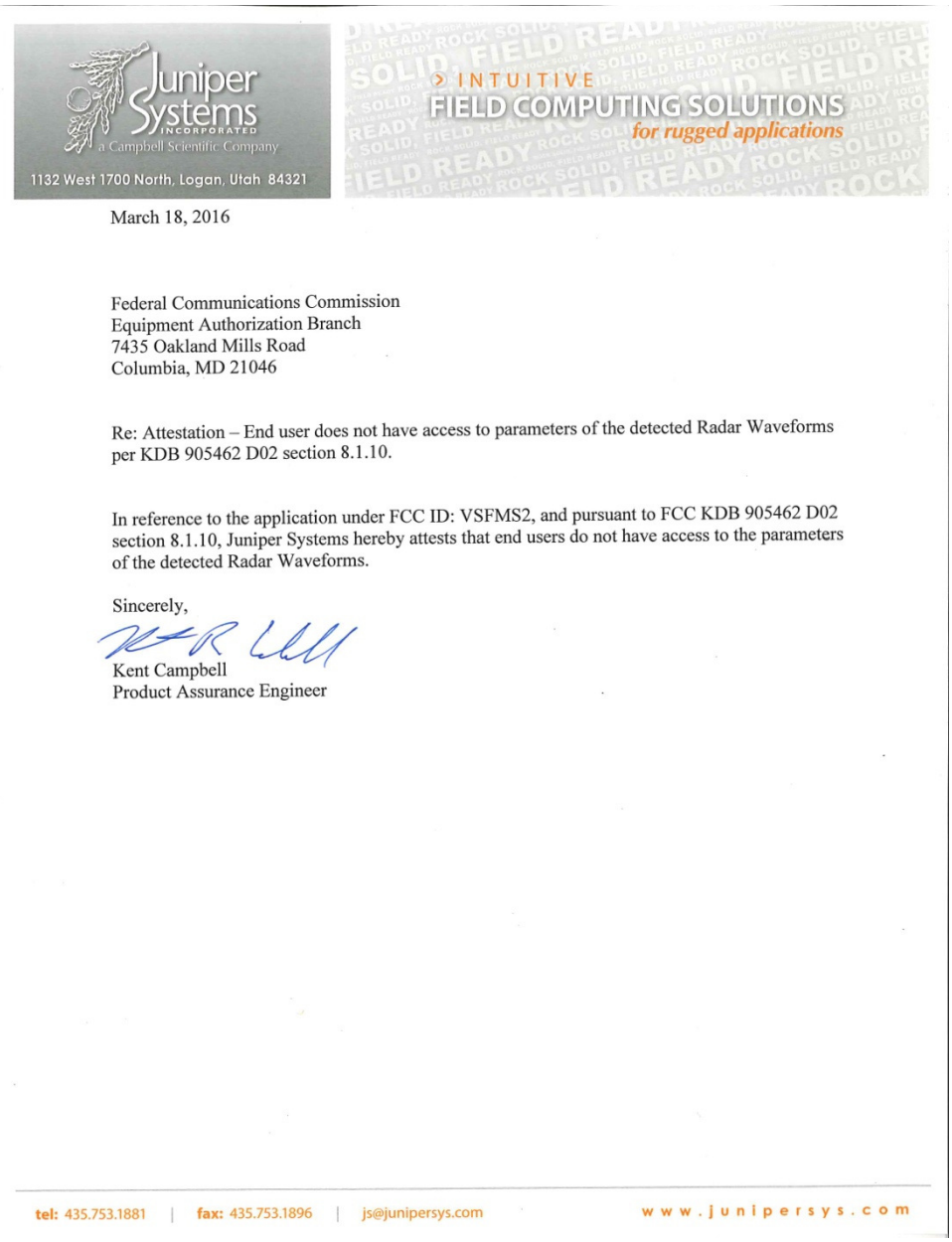


Configuration of the Master Device showing channel (44) where the AP moved after detecting the Radar. Original channel was 52 (5260 MHz)

2.3.9 Test Setup Photo



2.4 ANNEX A – MANUFACTURER STATEMENT CONFIRMING THAT INFORMATION REGARDING THE PARAMETERS OF THE DETECTED RADAR WAVEFORMS IS NOT AVAILABLE TO THE END USER



Juniper Systems INCORPORATED
a Campbell Scientific Company
1132 West 1700 North, Logan, Utah 84321

> INTUITIVE
FIELD COMPUTING SOLUTIONS
for rugged applications

March 18, 2016

Federal Communications Commission
Equipment Authorization Branch
7435 Oakland Mills Road
Columbia, MD 21046

Re: Attestation – End user does not have access to parameters of the detected Radar Waveforms per KDB 905462 D02 section 8.1.10.

In reference to the application under FCC ID: VSFMS2, and pursuant to FCC KDB 905462 D02 section 8.1.10, Juniper Systems hereby attests that end users do not have access to the parameters of the detected Radar Waveforms.

Sincerely,

Kent Campbell
Product Assurance Engineer

tel: 435.753.1881 | fax: 435.753.1896 | js@junipersys.com www.junipersys.com

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

ID Number (SDGE/SDRB)	Test Equipment	Type	Serial Number	Manufacturer	Cal Date	Cal Due Date
Radiated Test Setup						
-	Coaxial SMA Fixed Attenuator (x2)	VAT-30W2	N/A	MCL	Verified by 7608 and 7582	
-	Coaxial SMA Fixed Attenuator	VAT-10W2	N/A	MCL	Verified by 7608 and 7582	
-	Coaxial SMA Fixed Attenuator	VAT-10+	N/A	Mini-Circuits	Verified by 7608 and 7582	
-	Power Splitter (2x)	ZN2PD-63-S+	N/A	Mini-Circuits	Verified by 7608 and 7582	
-	Low loss RF cable (x2)	JX50172-24	N/A	RF Precision Cables, Inc.	Verified by 7608 and 7582	
	Low loss RF cable (x2)	70032199	N/A	Allied Electronics	Verified by 7608 and 7582	
7610	DFS Radar Simulator and Analyzer	Aeroflex 3005	30050A/09L	Aeroflex international LTD. UK	03/04/15	03/04/16
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	07/29/15	07/29/16
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	10/05/15	10/05/16
7620	EMI Test Receiver	ESU40	100399	Rhode & Schwarz	09/03/15	09/03/16
Miscellaneous						
6792	Multimeter	3478A	2911A70964	Hewlett Packard	08/14/15	08/14/16
7560	Barometer/Temperature/Humidity Transmitter	iBTHX-W	1240476	Omega	10/19/15	10/19/16
	Test Software	DFS Radar Simulator and Analyzer	V2.6.0	Cobham	N/A	

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

3.2.1 General Direct Conducted Antenna Port Measurement

	Contribution	Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.34	0.20	0.04
2	Cables	Rectangular	1.00	0.58	0.33
3	EUT Setup	Rectangular	0.50	0.29	0.08
				Combined Uncertainty (u_c):	0.67
				Coverage Factor (k):	1.96
				Expanded Uncertainty:	1.32

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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