

Dynamic Frequency Selection (DFS) Test Report (FULL COMPLIANT)

Report Number: 102966681BOX-001

Project Number: G102966681

Report Issue Date: 06/27/2017

Model(s) Tested: MTW100

Model(s) Partially Tested: None

Model(s) Not Tested but declared equivalent by the client: None

Standards: FCC Part 15 Subpart E: 2017

RSS 247 Issue 2: 02/2017

Tested by:
Intertek Testing Services NA, Inc.
70 Codman Hill Road
Boxborough, MA 01719
USA

Client:
Owl Labs
33-1/2 Union Square
Somerville, MA 02143
USA

Report prepared by Naga Suryadevara



Naga Suryadevara/EMC Engineer

Report reviewed by Kouma Sinn



Kouma Sinn/EMC Staff Engineer

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Table of Contents

1 Introduction and Conclusion 3

2 Test Summary 3

3 Client Information 4

4 Description of Equipment Under Test and Variant Models 4

5 System Setup and Method 5

6 DFS Channel Loading, Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period..... 7

7 Revision History..... 14

1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

2 Test Summary

Section	Test full name	Result
3	Client Information	--
4	Description of Equipment Under Test and Variant Models	--
5	System Setup and Method	--
6	DFS Channel Loading, Channel Move Time, Channel Closing Transmission Time, Non Occupancy Period (FCC Part 15 Subpart E: 2017 RSS 247 Issue 2: 02/2017)	Compliant
7	Revision History	--

3 Client Information**This EUT was tested at the request of:**

Client: Owl Labs
33-1/2 Union Square
Somerville, MA 02143
USA

Contact: Amy DeDeo
Telephone: 508-454-1900
Fax: 508-454-1900
Email: amy@owllabs.com

4 Description of Equipment Under Test and Variant Models

Manufacturer: Nanning Fugui Precision Industrial Co., Ltd.
B Factories Area, Foxconn Nanning Sci-Tech Park, No.51, Tongle Avenue
Nanning, Guangxi 530000
China

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
Video Conferencing Device	Foxconn	MTW100	ATL1704121031-001 Option A – Conducted Sample

Receive Date:	04/06/2017
Received Condition:	Good
Type:	Production

Description of Equipment Under Test (provided by client)
Video Conferencing device

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
100 – 240 VAC	1.7 A	50/60 Hz	1

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	Transmit mode with Communication with master @ channel loading > 17%

Software used by the EUT:

No.	Descriptions of EUT Exercising
1	Qualcomm Radio Tool Kit QRTC3

Variant Models:

The following variant models were not tested as part of this evaluation, but have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

None

5 System Setup and Method

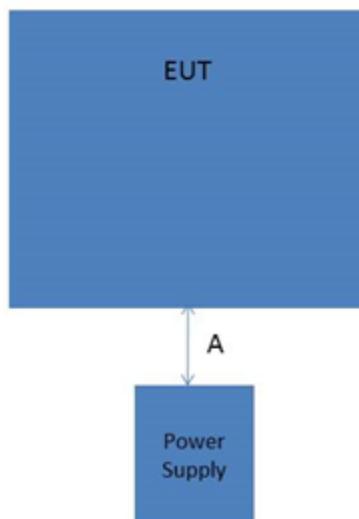
Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination
A	AC Adapter	2.5	No	No	AC Mains

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
Wireless Router	Linksys	WRT3200ACM	19810608601805

5.1 Method:

Configuration as required by FCC Part 15 Subpart E: 2017, RSS 247 Issue 2: 02/2017 and KDB 905462: 04/2016.

5.2 EUT Block Diagram:



5.3 Radio Receiver Characteristics:

Radio/Receiver Characteristics	
Frequency Band(s)	5180-5250 MHz 5250-5320 MHz 5500-5720 MHz 5745-5825 MHz
Device Type	Client without radar detection
Maximum Output Power of Client Device (EUT)	5180-5250 MHz, 0.01270 W 5250-5320 MHz, 0.02393 W 5500-5720 MHz, 0.00895 W 5745-5825 MHz, 0.01177 W
Client Device Antenna Gain	3 dBi @ 4.9GHz to 4dBi @ 6GHz.
Client Device Channel Loading	17% (approximately)
Master Device model and FCC ID	Model: WRT3200ACM FCC ID: Q87-WRT3200ACM
Master Device Antenna Gain	3.81 dBi
Test Frequency and Operating BW	5270 MHz 40 MHz BW

6 DFS Channel Loading, Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period.

6.1 Method

Tests are performed in accordance with FCC Part 15 Subpart E, RSS 247 and KDB 905462.

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

6.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV002'	Weather Station	Davis Instruments	7400	PE80519A93	06/01/2016	06/01/2017
ROS005'	ETSI Test System (FSW Spectrum Analyzer, SMBV100A Vector signal generator, SMB100 Signal generator)	Rhode & Schwartz	TS8997	N/A	09/15/2016	09/15/2017
PAS003'	Power Divider (Splitter)	Pasternack	PE2026	PAS003	VBU	Verified
PAS004'	Power Divider (Splitter)	Pasternack	PE2026	PAS004	VBU	Verified
CBLHF2012-2M-1'	2m 9kHz-40GHz Coaxial Cable - SET1	Huber & Suhner	SF102	252675001	02/08/2017	02/08/2018
MIN25'	attenuator 2watt 10dB DC-18GHz	Mini Circuits	BW-S10W2+	MIN25	05/20/2017	05/20/2018
MIN24'	2 watt 10dB attenuator DC-18GHz	Mini Circuits	BW-S10W2+	MIN24	05/20/2017	05/20/2018
MIN23'	Attenuator 2 watt 20dB DC-26GHz	Mini Circuits	BW-S20-2W263+	MIN23	05/20/2017	05/20/2018

Software Utilized:

Name	Manufacturer	Version
Pulse Sequencer	Rohde and Schwarz	V 1.4

6.3 Results and Limits:

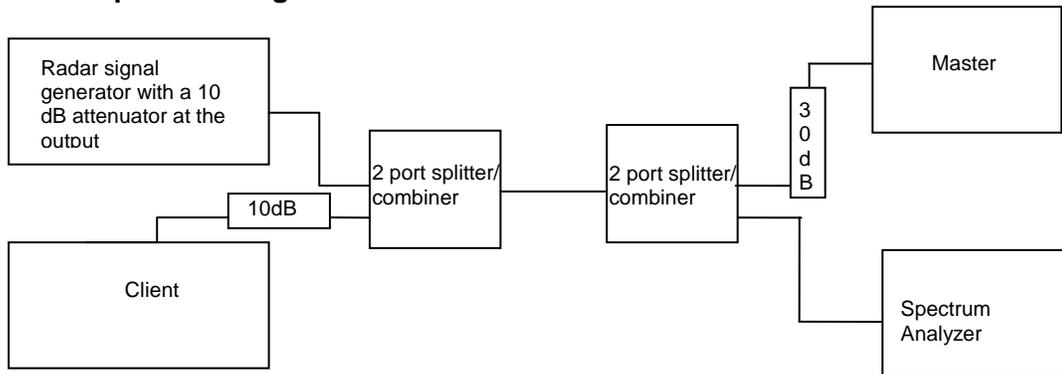
The sample tested was found to Comply. The limits are as follows.

Limit for Channel move time: 10 seconds

Limit for Channel Transmission Time : 200ms + an aggregate of 60ms over remaining 10 seconds period

Limit for Non-Occupancy Period: 30 minutes

6.4 Test Setup Block Diagram:



6.5 DFS Detection Threshold:

Table 3: DFS Detection Thresholds for Master Devices and Client Devices with Radar Detection

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP \geq 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm
<p>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. Note 3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.</p>	

6.6 Applicable Tests:

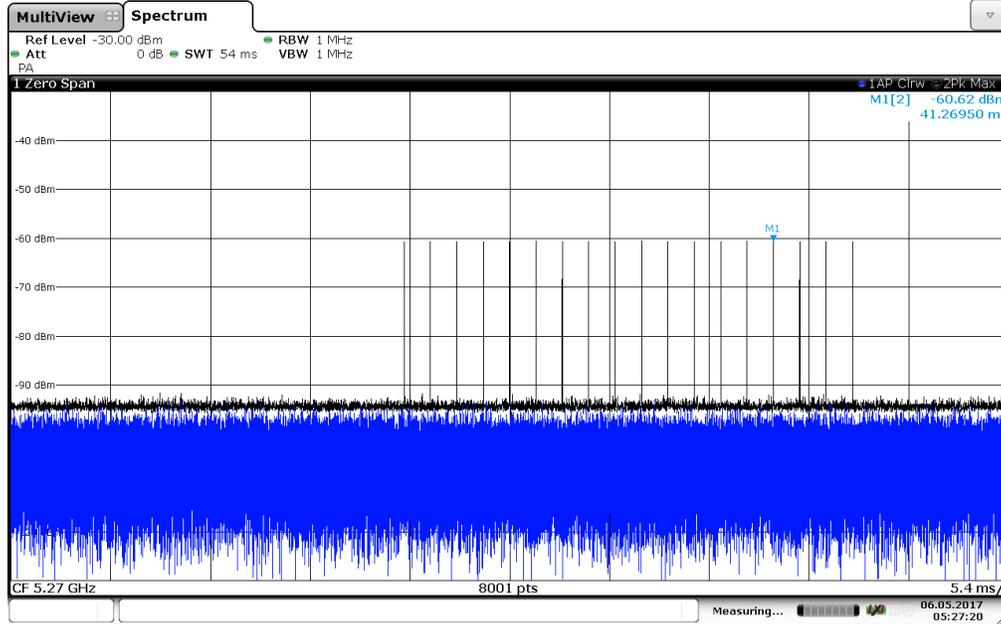
Table 2: Applicability of DFS requirements during normal operation

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
<p>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.</p>		

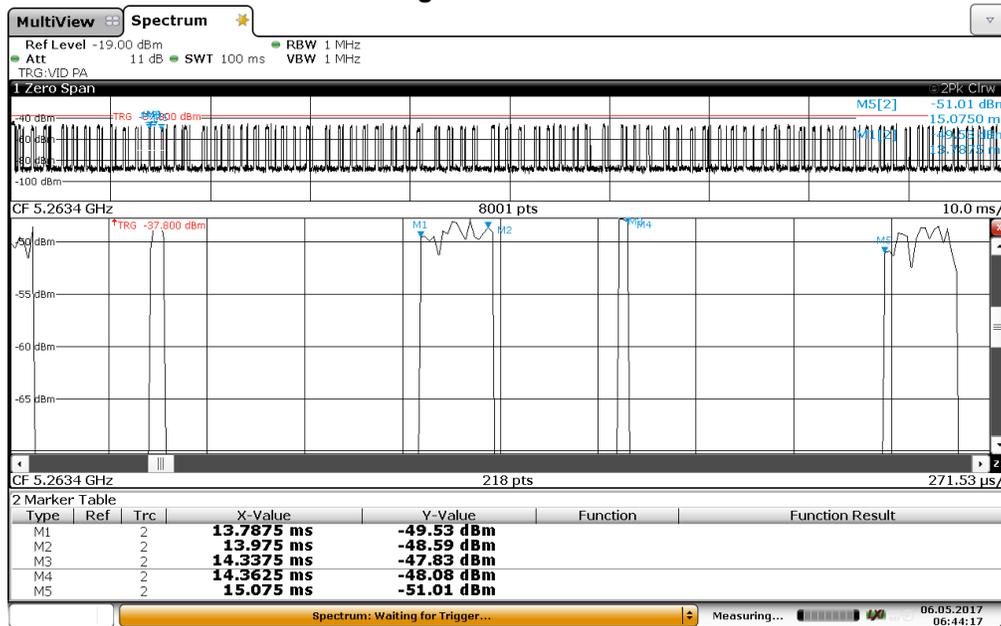
6.7 Plots/Data:

Radar Pulse Verification (radar type 0) – Test level of - 64 dBm was used. Since test is performed conductively, antenna gain of the master (3.81 dBi) and a measurement uncertainty factor of 1dB are added to -64dBm.



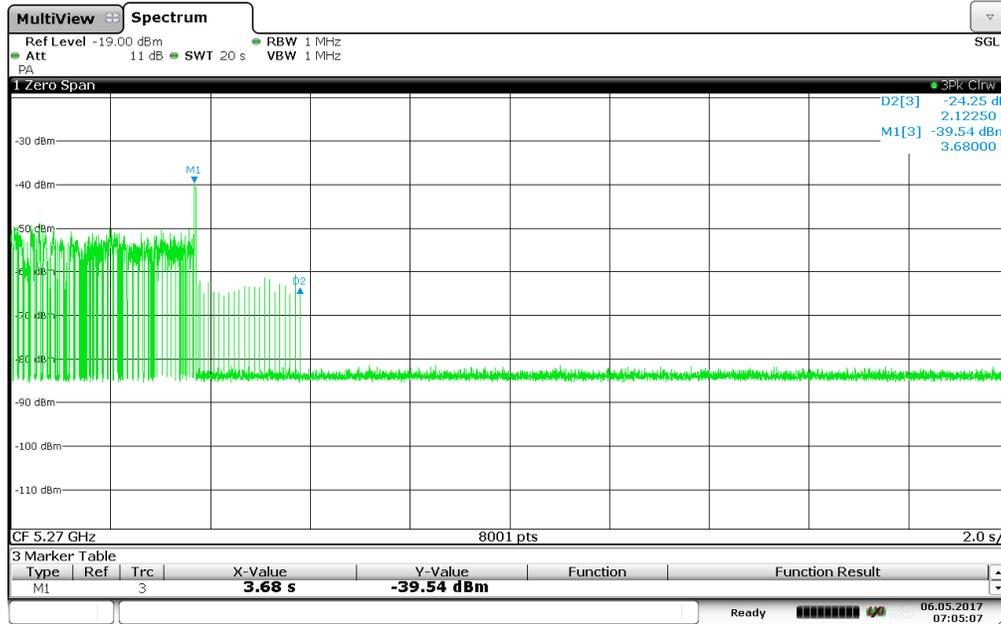
Date: 6 MAY 2017 05:27:20

Channel Loading was approximately 17% - Data traffic was generated with the client device downloading data file from the server.



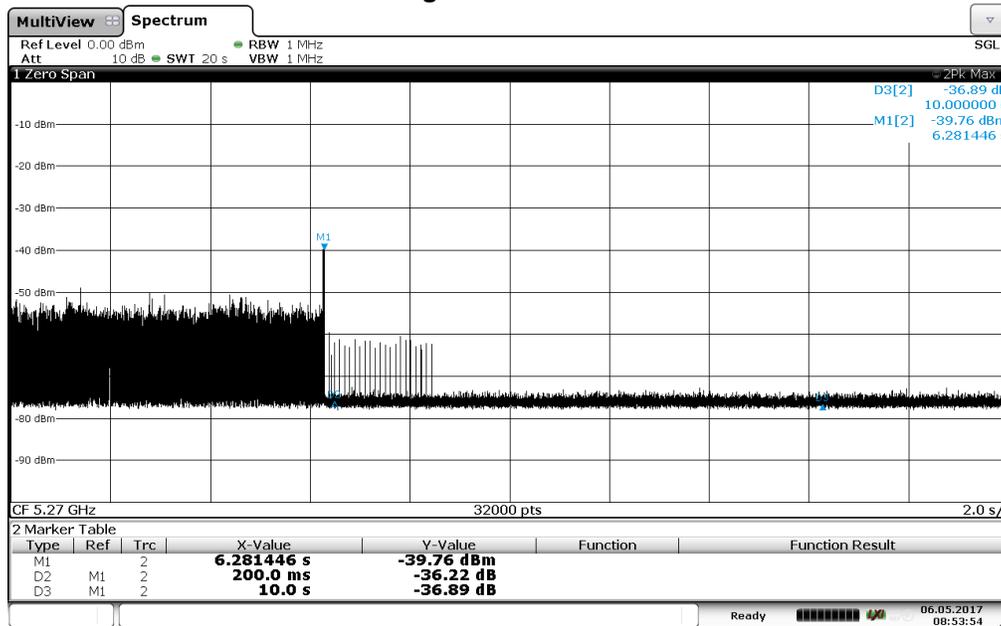
Date: 6 MAY 2017 06:44:17

Channel Move Time = 3.68 seconds



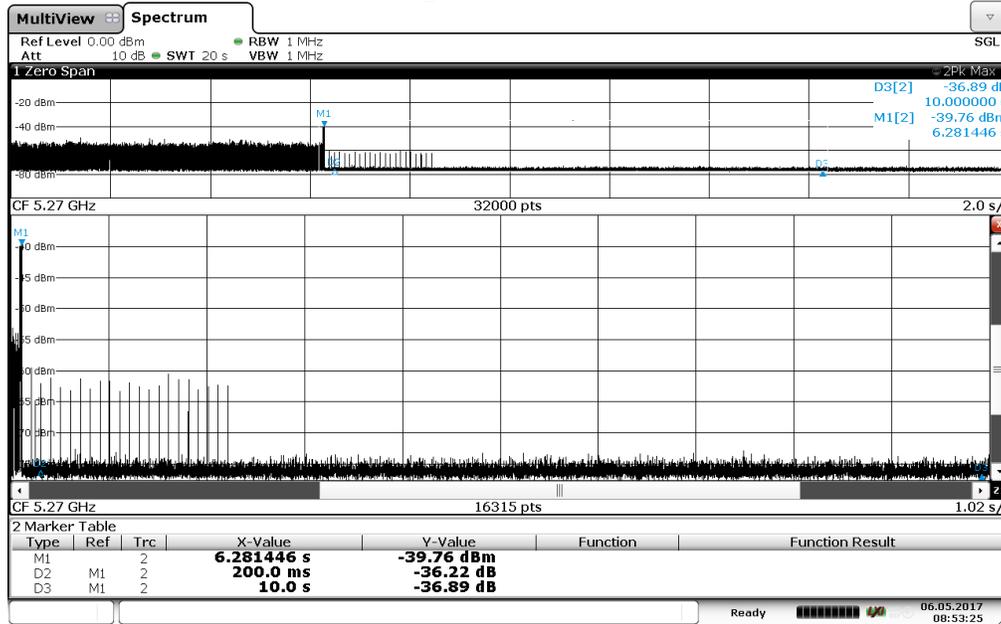
Date: 6 MAY 2017 07:05:07

Channel Closing Transmission Time – Plot 1



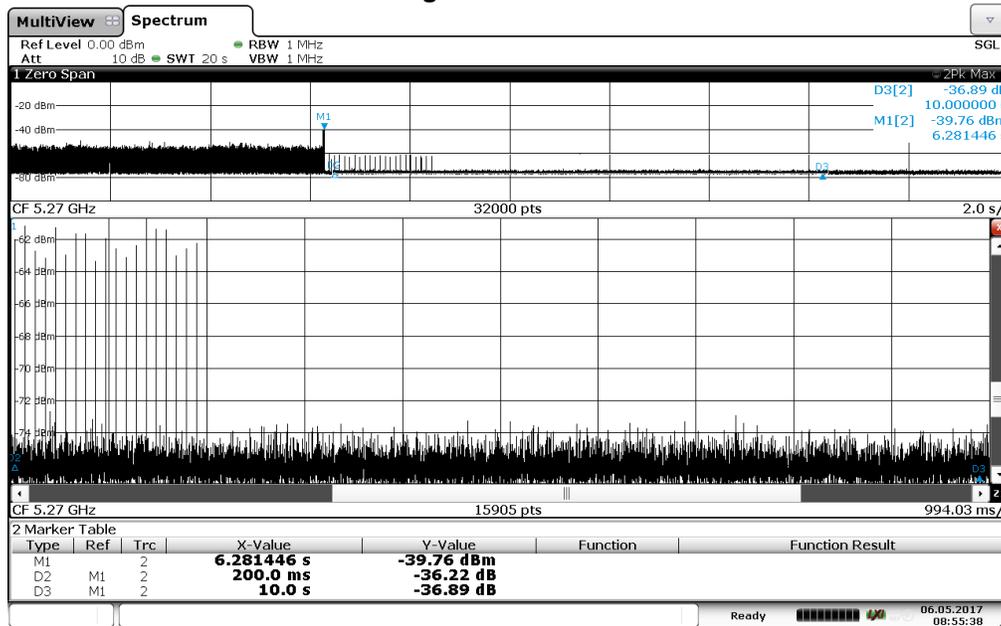
Date: 6 MAY 2017 08:53:54

Channel Closing Transmission Time – Plot 2



Date: 6 MAY 2017 08:53:25

Channel Closing Transmission Time – Plot 3



Date: 6 MAY 2017 08:55:38

Channel Closing Transmission Time – Plot 4

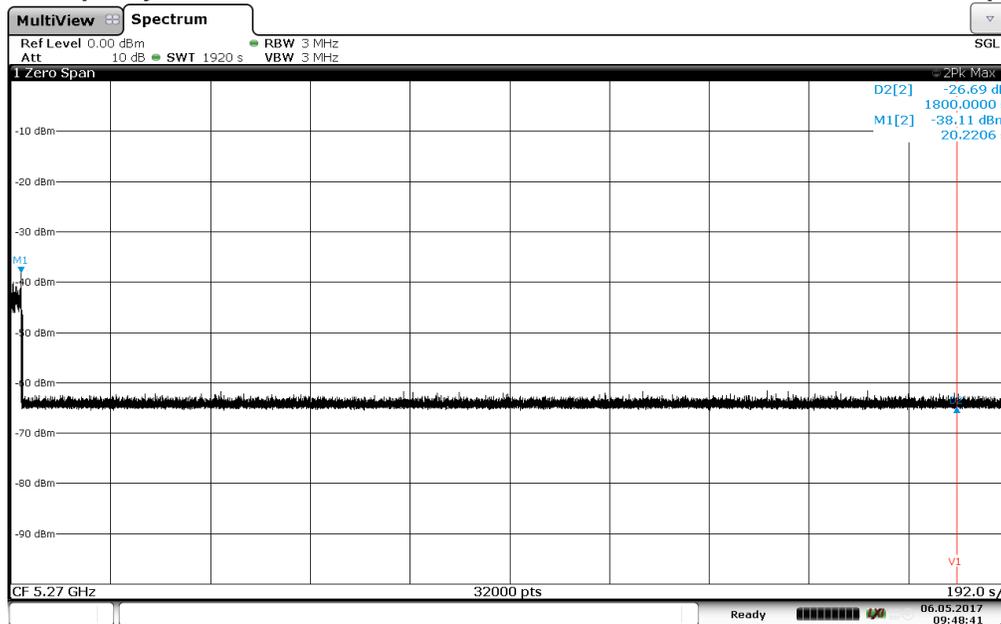


Date: 6 MAY 2017 08:56:42

Dwell time per bin = Sweep time/Number of bins = 20000ms/32000 = 0.625ms/bin
 Channel Closing Transmission Time from end of radar burst to 200ms = number of bins showing transmission * number of transmissions*dwell time per bin = 4*2*0.625ms = 5ms

Channel Closing Transmission Time from 200 ms to 10 seconds = number of bins showing transmission * number of transmissions*dwell time per bin = 19*2*0.625ms = 23.75ms

Non-Occupancy Period – No transmissions found for 30min from the end of radar pulse.



Date: 6 MAY 2017 09:48:41

Note: All the testing was performed on channel with widest BW setting (40 MHz)

Test Personnel: Naga Suryadevara N-5
Supervising/Reviewing
Engineer:
(Where Applicable) N/A
Product Standard: FCC Part 15 Subpart E
RSS 247
Input Voltage: 120VAC 60Hz

Pretest Verification: N/A

Test Date: 05/06/2017

Limit Applied: See Section 6.3

Ambient Temperature: 22°C
Relative Humidity: 33 %
Atmospheric Pressure: 1008 mbars

Deviations, Additions, or Exclusions: None

7 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	06/18/2017	102966681BOX-001	N5	KPS <i>KPS</i>	Original Issue
1	06/27/2017	102966681BOX-001	N5	KPS <i>KPS</i>	Updated Section 4.0, 5.2, 6.3, 6.4 and 6.5.