FCC DFS Test Report

Equipment	: WiFi Range Extender
Brand Name	: NETGEAR
Model No.	: EX6100, EX6000
FCC ID	: PY313200231
Standard	: 47 CFR FCC Part 15.407
Frequency Range	: 5250 MHz – 5350 MHz 5470 MHz – 5725 MHz
Applicant	: NETGEAR, Inc. 350 East Plumeria Drive, San Jose, California 95134, USA
Operate Mode	: Master Client without radar detection

The product sample received on Oct. 14, 2013 and completely tested on Apr. 09, 2015. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in FCC 06-96 Appendix & FCC KDB 905462 D02 UNII DFS Compliance Procedures New Rules v01r01 and shown compliance with the applicable technical standards. The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Sam Chen
SPORTON INTERNATIONAL INC.

Testing Laboratory
1190

Table of Contents

1 GENERAL DESCRIPTION 5

1.1 Information 5
1.2 Accessories 10
1.3 Support Equipment 10
1.4 Testing Applied Standards 10
1.5 Testing Location Information 10

2 TEST CONFIGURATION OF EUT 11

2.1 Test Channel Frequencies Configuration 11
2.2 The Worst Case Measurement Configuration 11

3 DYNAMIC FREQUENCY SELECTION (DFS) TEST RESULT 12

3.1 General DFS Information 12
3.2 Radar Test Waveform Calibration 15
3.3 UNII Detection Bandwidth 37
3.4 Channel Availability Check (CAC) 40
3.5 In-service Monitoring 44
3.6 Statistical Performance Check 54

4 TEST EQUIPMENT AND CALIBRATION DATA 73

5 MEASUREMENT UNCERTAINTY 74

APPENDIX A. TEST PHOTOS ..... .A1 ~ A3

Summary of Test Result

Conformance Test Specifications (FCC 06-96 Appendix)				
Report Clause	**Ref. Std. Clause**	**Description**	**Limit**	**Result**
3.3	7.8.1	DFS: UNII Detection Bandwidth Measurement	100% of the 99% BW	Complied
3.4	7.8.2.1	DFS: Initial Channel Availability Check Time	CAC ≥ 60 sec	Complied
3.4	7.8.2.2	DFS: Radar Burst at the Beginning of the Channel Availability Check Time	Detection Threshold: -63 dBm	Complied
3.4	7.8.2.3	DFS: Radar Burst at the End of the Channel Availability Check Time	Detection Threshold: -63 dBm	Complied
3.5	7.8.3	DFS: In-Service Monitoring for Channel Move Time (CMT)	CMT ≤ 10sec	Complied
3.5	7.8.3	DFS: In-Service Monitoring for Channel Closing Transmission Time (CCTT)	CCTT ≤ 60 ms starting at CMT 200ms	Complied
3.5	7.8.3	DFS: In-Service Monitoring for Non-Occupancy Period (NOP)	NOP ≥ 30 min	Complied
3.6	7.8.4	DFS: Statistical Performance Check	Table 5 - 7 (KDB 905462)	Complied
3.1.4	5.8.1	DFS: Uniform Spreading	Uniform Spreading for DFS Band	Complied
3.1.5	8.1	User Access Restrictions	DFS controls	Complied

Note: For Client without radar detection: Since the product is client without radar detection function, only Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period are required to be performed.

Revision History

Report No.	Version	Description	Issued Date
FZ3O1622-01	Rev. 01	Initial issue of report	Apr. 27, 2015

1 General Description

1.1 Information

1.1.1 RF General Information

Specification Items	Description	
Product Type	WLAN (1TX, 1RX)	
Radio Type	Intentional Transceiver	
Power Type	From internal power supply	
Modulation	see the below table for 802.11n/ac OFDM (BPSK / QPSK / 16QAM / 64QAM) for IEEE 802.11a	
Data Rate (Mbps)	see the below table for 802.11n/ac OFDM (6/9/12/18/24/36/48/54) for IEEE 802.11a	
Channel Bandwidth	20/40/80 MHz operating channel bandwidth	
Operating Mode	☒ Master	
	☐ Client with radar detection	
	☒ Client without radar detection	
Communication Mode	☒ IP Based (Load Based)	☐ Frame Based
TPC Function	☒ With TPC	☐ Without TPC
Weather Band (5600~5650MHz)	☐ With 5600~5650MHz	☒ Without 5600~5650MHz
Max. Con. Power (DFS band)	Band 2: IEEE 802.11a: 23.84 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 23.98 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 23.87 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 15.09 dBm Band 3: IEEE 802.11a: 23.81 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 23.81 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 23.81 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 16.22 dBm	

Min. Con. Power (DFS band)	Band 2: IEEE 802.11a: 17.84 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 17.98 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 17.87 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 9.09 dBm Band 3: IEEE 802.11a: 17.81 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 17.81 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 17.81 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 10.22 dBm
Max. EIRP Power (DFS band)	Band 2: IEEE 802.11a: 27.84 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 27.68 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 27.57 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 19.09 dBm Band 3: IEEE 802.11a: 26.81 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 26.71 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 27.41 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 19.82 dBm
Min. EIRP Power (DFS band)	Band 2: IEEE 802.11a: 21.84 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 21.68 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 21.57 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 13.09 dBm Band 3: IEEE 802.11a: 20.81 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 20.71 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 21.41 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 13.82 dBm
Power-on cycle	For Master: 80MHz: Requires 38.9 seconds to complete its power-on cycle. For Client without radar detection: NA (No Channel Availability Check Function)
Software / Firmware Version	v1.0.0.33_1.0.111
Note: EUT employ a TPC mechanism and TPC have the capability to operate at least 6 dB below highest RF output power.	

Antenna & Band width

Antenna	Single (TX)		
Band width Mode	20 MHz	40 MHz	80 MHz
IEEE 802.11a	V	X	X
IEEE 802.11n	V	V	X
IEEE 802.11ac	V	V	V

IEEE 11n/ac Spec.

Protocol	Number of Transmit Chains (NTX)	Data Rate / MCS
802.11n (HT20)	1	MCS0-7
802.11n (HT40)	1	MCS0-7
802.11ac (VHT20)	1	MCS 0-9/Nss1
802.11ac (VHT40)	1	MCS 0-9/Nss1
802.11ac (VHT80)	1	MCS 0-9/Nss1

Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput). Then EUT support HT20 and HT40.
Note 2: IEEE Std. 802.11ac modulation consists of VHT20, VHT40, VHT80 and VHT160 (VHT: Very High Throughput). Then EUT support VHT20, VHT40 and VHT80.
Note 3: Modulation modes consist of below configuration:
11a: IEEE 802.11a, HT20/HT40: IEEE 802.11n, VHT20/VHT40/VHT80: IEEE 802.11ac

1.1.2 Antenna Information

Ant.	Brand	Model No.	Type	Connector	Gain (dBi)		Remark
					2.4GHz	5GHz Band 1, Band 4	
1	Master Wave	X6100-98242	Dipole	I-PEX	3.31	-	External
2	Foxconn	FX01H74-0G-EF	PCB	I-PEX	3.66	-	Internal
3	Master Wave	X6100-98242	Dipole	I-PEX	-	5	External

Ant.	5GHz Band 2~Band 3			
	Frequency	Gain (dBi)	Frequency	Gain (dBi)
3	5260 MHz	3.7	5510 MHz	3.4
	5270 MHz	3.7	5530 MHz	3.6
	5290 MHz	4.0	5550 MHz	3.6
	5300 MHz	4.0	5580 MHz	2.9
	5310 MHz	4.1	5670 MHz	3.3
	5320 MHz	4.1	5700 MHz	3.5
	5500 MHz	3.2	-	-

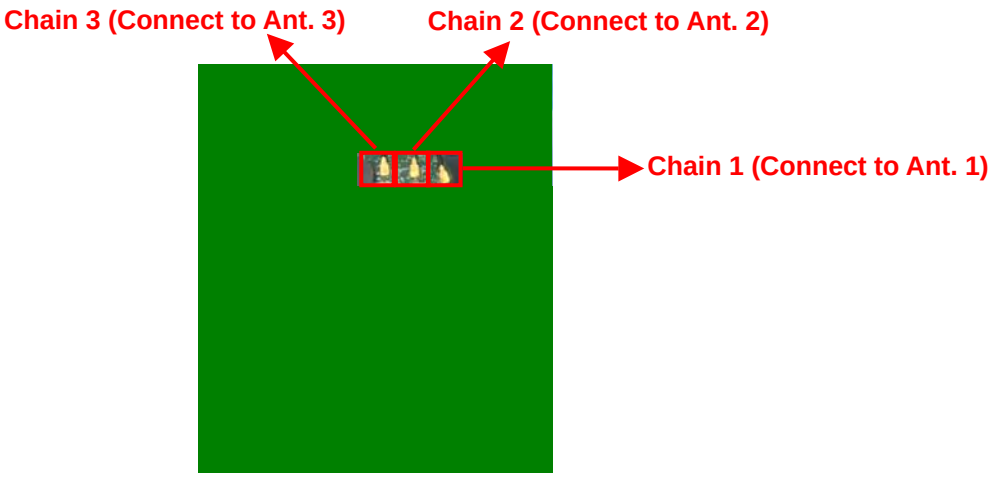
Note: There are three antennas provided to this EUT and all of them can be used as transmitting and receiving antenna

For 2.4GHz Band (2TX/2RX):

Chain 1 and Chain 2 could transmit/receive simultaneously.

For 5GHz Band (1TX/1RX):

Only Chain 3 can be used as transmitting/receiving antenna.



1.1.3 DFS Band Carrier Frequencies

There are three bandwidth systems.

For 20MHz bandwidth systems, use Channel 52, 56, 60, 64, 100, 104, 108, 112, 116, 132, 136, 140.

For 40MHz bandwidth systems, use Channel 54, 62, 102, 110, 134.

For 80MHz bandwidth systems, use Channel 58, 106.

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
5250~5350 MHz Band 2	52	5260 MHz	60	5300 MHz
	54	5270 MHz	62	5310 MHz
	56	5280 MHz	64	5320 MHz
	58	5290 MHz	-	-
5470~5725 MHz Band 3	100	5500 MHz	112	5560 MHz
	102	5510 MHz	116	5580 MHz
	104	5520 MHz	132	5660 MHz
	106	5530 MHz	134	5670 MHz
	108	5540 MHz	136	5680 MHz
	110	5550 MHz	140	5700 MHz

1.1.4 Table for Multiple Listing

The model numbers in the following table are all refer to the identical product.

Model No.	Description
EX6100	The models are identical except for the housing colors as marketing strategy.
EX6000	

1.1.5 Table for Class II Change

This product is an extension of original one reported under Sporton project number: 3O1622

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
1. Adding Band 2 and Band 3 (5250~5350 MHz, 5470~5725 MHz) for this device. 2. Adding a new model number “EX6000”, and it shares the same PCBA as original model number “EX6100”. It only changes housing color for different marketing strategy.	DFS test.

1.2 Accessories

Accessories
RJ-45 cable*1: Non-shielded, 1.5m

1.3 Support Equipment

For Master:

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	Notebook	DELL	E4300	DoC
2	Notebook	DELL	D400	E2K24GBRL
3	WLAN ac Dongle	abocom	AU5200	Q87-AE600

For Client without radar detection:

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	Notebook	DELL	E4300	DoC
2	Notebook	DELL	D400	E2K24GBRL
3	Wireless AP	D-Link	DIR-860L	RRK-2012070022

1.4 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC 06-96 Appendix
- FCC KDB 905462 D02 UNII DFS Compliance Procedures New Rules v01r01
- FCC KDB 443999 D01 Approval of DFS UNII Devices v01r03

1.5 Testing Location Information

Testing Location					
☐	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.			
		TEL : 886-3-327-3456 FAX : 886-3-327-0973			
☒	JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C.			
		TEL : 886-3-656-9065 FAX : 886-3-656-9085			
Test Condition		**Test Site No.**	**Test Engineer**	**Test Environment**	**Test Date**
DFS Site		DF01-CB	Jim Huang	19°C / 60%	01-Apr-15 ~ 09-Apr-15

2 Test Configuration of EUT

2.1 Test Channel Frequencies Configuration

Test Channel Frequencies Configuration	
IEEE Std.	**Test Channel Freq. (MHz)**
802.11ac (VHT20)	5500 MHz
802.11ac (VHT40)	5510 MHz
802.11ac (VHT80)	5530 MHz

2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	Dynamic Frequency Selection (DFS)
Test Condition	Radiated measurement The EUT shall be configured to operate at the highest transmitter output power setting. If more than one antenna assembly is intended for this power setting, the gain of the antenna assembly with the lowest gain shall be used. The DFS radar test signals have been aligned to the direction corresponding to the EUT's maximum antenna gain.
Modulation Mode	802.11ac (VHT20), 802.11ac (VHT40), 802.11ac (VHT80)

3 Dynamic Frequency Selection (DFS) Test Result

3.1 General DFS Information

3.1.1 DFS Parameters

Table D.1: DFS requirement values	
Parameter	**Value**
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds (Note 1).
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second periods. (Notes 1 and 2).
U-NII Detection Bandwidth	Minimum 100% of the 99% power bandwidth (Note 3).
Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. 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 Channel changes (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%. Measurements are performed with no data traffic.	

Table D.2: Interference threshold values	
Maximum Transmit Power	**Value (see note)**
EIRP ≥ 200 mW	-64 dBm
EIRP < 200 mW and PSD < 10dBm/MHz	-62 dBm
EIRP < 200 mW and PSD >= 10dBm/MHz	-64 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. Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911D01.	

3.1.2 Applicability of DFS Requirements Prior to Use of a Channel

Requirement	DFS 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

3.1.3 Applicability of DFS Requirements during Normal Operation

Requirement	DFS Operational mode		
	Master	Client without radar detection	Client with radar detection
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

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.		

3.1.4 Uniform Spreading

Manufacturer Declare the Uniform Spreading
☒ For the 5250-5350 MHz and 5470-5725 MHz bands, the Master device provides, on aggregate, uniform loading of the spectrum across all devices by selecting an operating channel among the available channels using a Gaussian random algorithm.

3.1.5 User Access Restrictions

User Access Restrictions
☒ DFS controls (hardware or software) related to radar detection are NOT accessible to the user. Manufacturer statement confirming that information regarding the parameters of the detected Radar Waveforms is not available to the end user.

3.1.6 Channel Loading/Data Streaming

☒	IP Based (Load Based) - stream the test file from the Master to the Client.
	☐ The data file (MPEG-4) has been transmitting in a streaming mode.
	☐ Software to ping the client is permitted to simulate data transfer with random ping intervals.
	☒ Minimum channel loading of approximately 17%.
	☐ Unicast protocol has been used.
☐	Frame Based - stream the test file from the Master to the Client.
	☐ fixed talk/listen ratio, set the ratio to 45%/55%

3.2 Radar Test Waveform Calibration

3.2.1 Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (µsec)	PRI (µsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Trials
0	1	1428	18	See Note 1	See Note 1
1A	1	15 unique PRI in KDB 905462 D02 Table 5a	$Roundup\left\{\left(\frac{1}{360}\right)\times\left(\frac{19\times10^6}{PRI}\right)\right\}$	60%	15
1B	1	15 unique PRI within 518-3066, Excluding 1A PRI		60%	15
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

Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.

A minimum of 30 unique waveforms are required for each of the short pulse radar types 2 through 4. For short pulse radar type 1, the same waveform is used a minimum of 30 times. If more than 30 waveforms are used for short pulse radar types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. The aggregate is the average of the percentage of successful detections of short pulse radar types 1-4.

3.2.2 Long Pulse Radar Test Waveform

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

Each waveform is defined as follows:

- The transmission period for the Long Pulse Radar test signal is 12 seconds.
- 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.
- 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.
- 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.
- Each pulse has a linear FM 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.
- 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 time between the first and second pulses is chosen independently of the time between the second and third pulses.

- 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 independently.

3.2.3 Frequency Hopping Radar Test Waveform

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

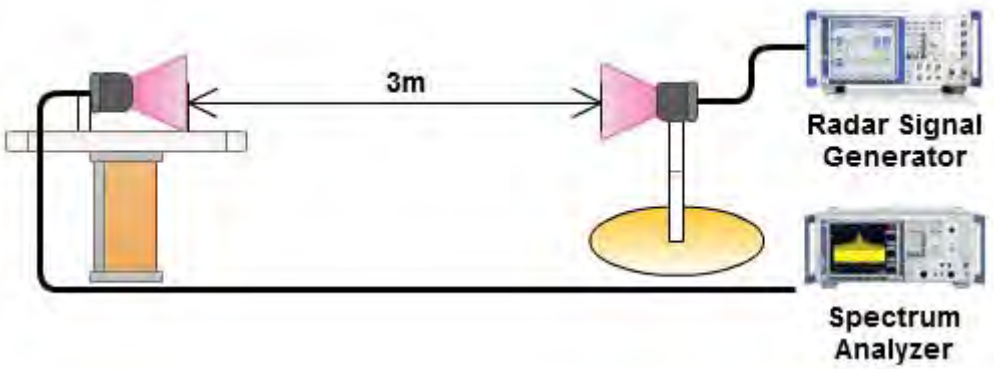
The FCC Type 6 waveform uses a static waveform with 100 bursts in the instruments ARB. In addition, the RF list mode is operated with a list containing 100 frequencies from a randomly generated list and it had be ensured that at least one of the random frequencies falls into the UNII Detection Bandwidth of the DUT. Each burst from the waveform file initiates a trigger pulse at the beginning that switches the RF list from one item to the next one.

3.2.4 DFS Threshold Level

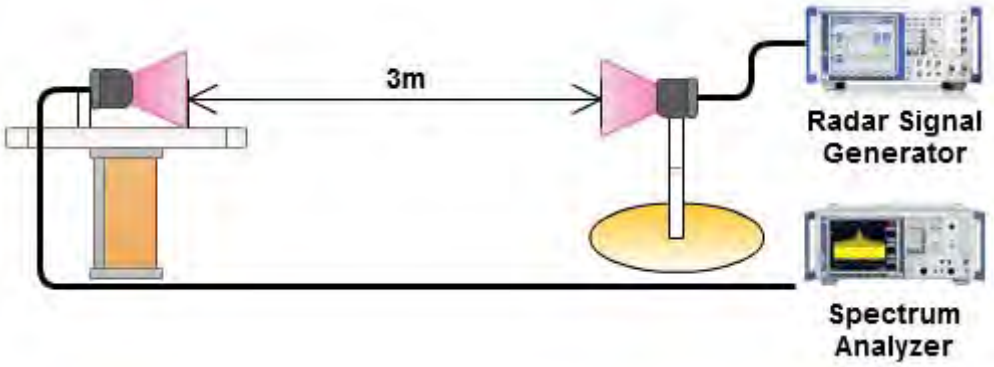
DFS Threshold Level	
DFS Threshold level: -63 dBm	☒ at the antenna connector
	☐ in front of the antenna
The Interference **Radar Detection Threshold Level** is is *-64 dBm + 0 [dBi] + 1 dB* = -63 dBm. That had been taken into account the output power range and antenna gain.	

3.2.5 Calibration Setup

Master Radiated Calibration Setup



Client Radiated Calibration Setup

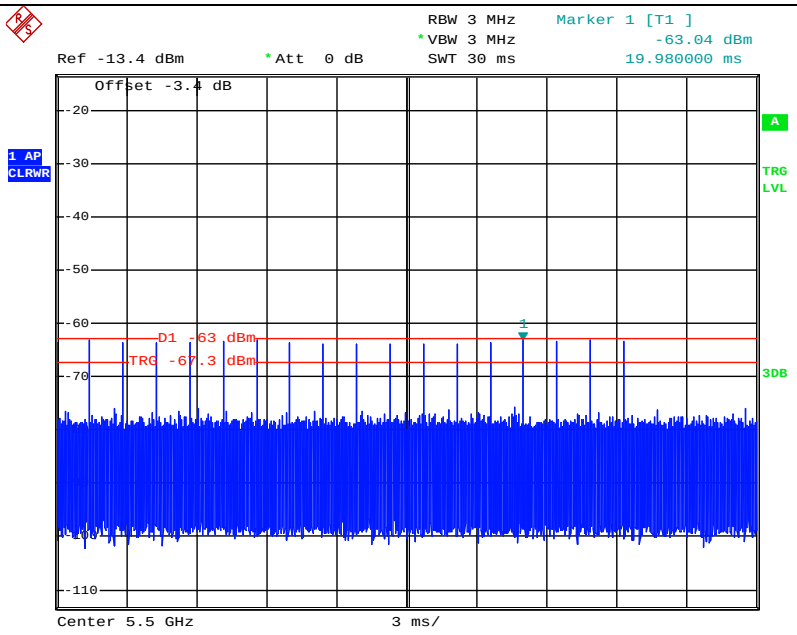


3.2.6 Radar Waveform calibration Plot

For Master:

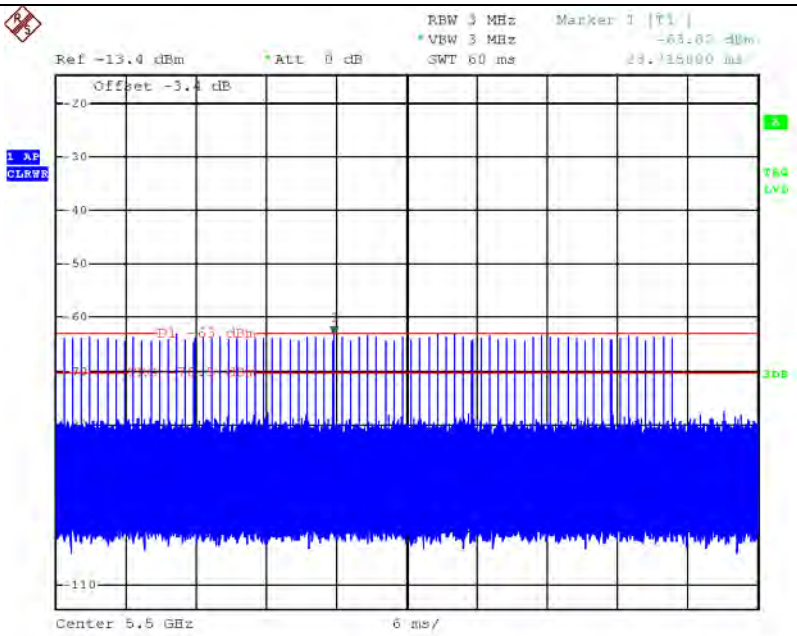
Modulation Mode: 802.11ac (VHT20)	Test Frequency: 5500 MHz

Radar #0 DFS detection threshold level



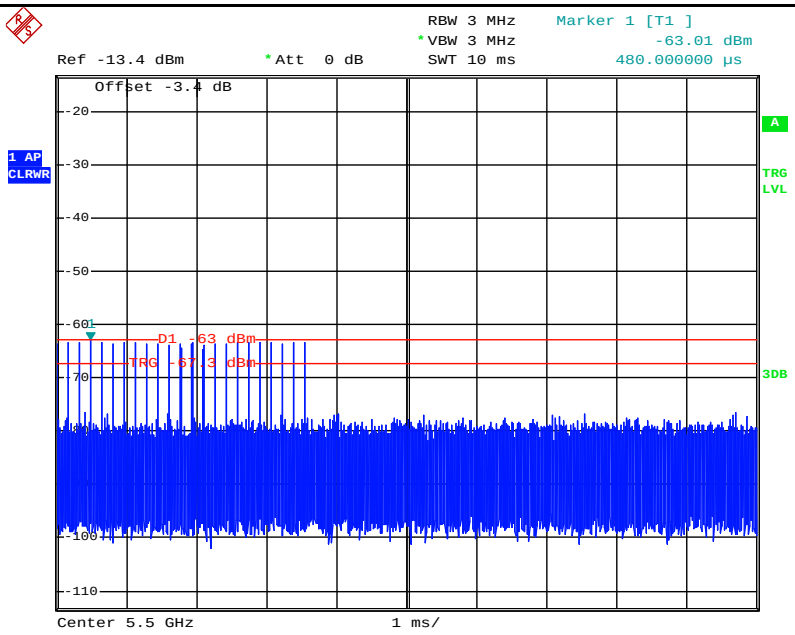
Date: 9.APR.2015 00:20:08

Radar #1 DFS detection threshold level



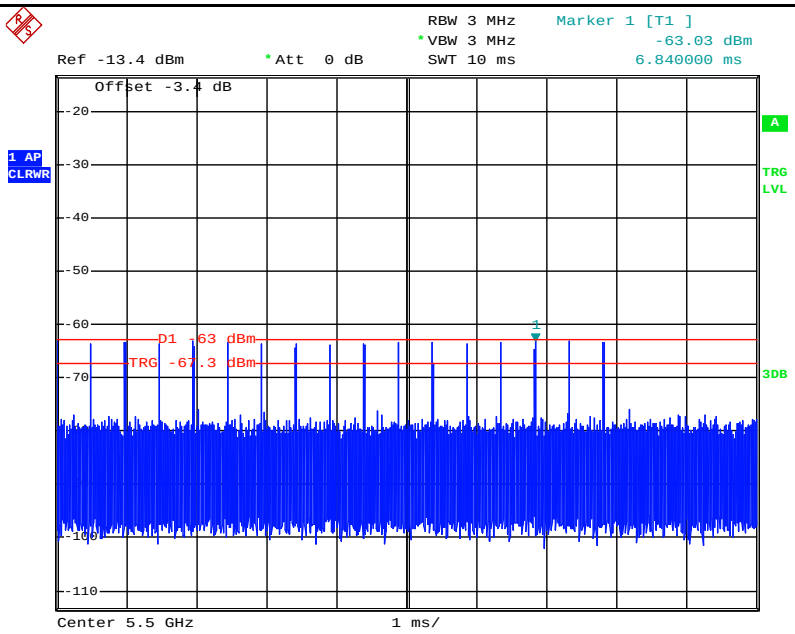
Date: 9.APR.2015 00:29:38

Radar #2 DFS detection threshold level



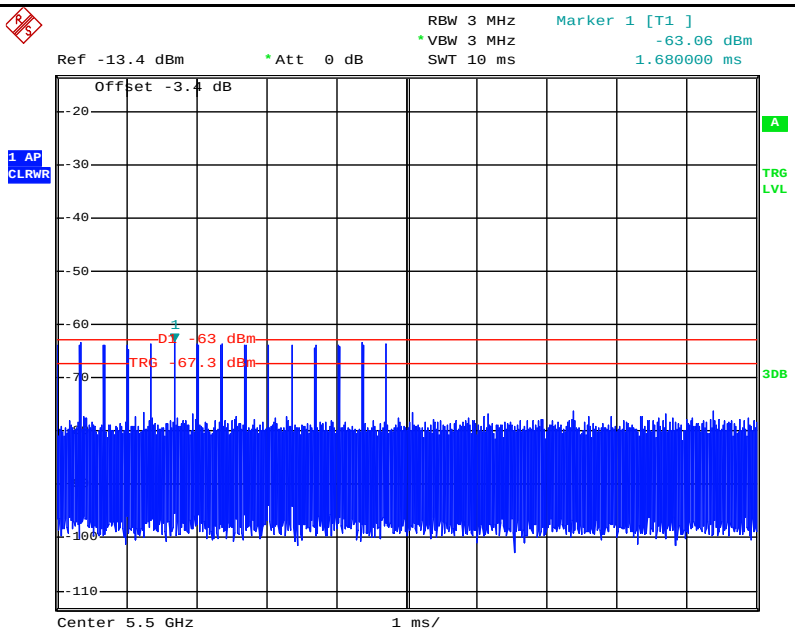
Date: 9.APR.2015 00:40:11

Radar #3 DFS detection threshold level



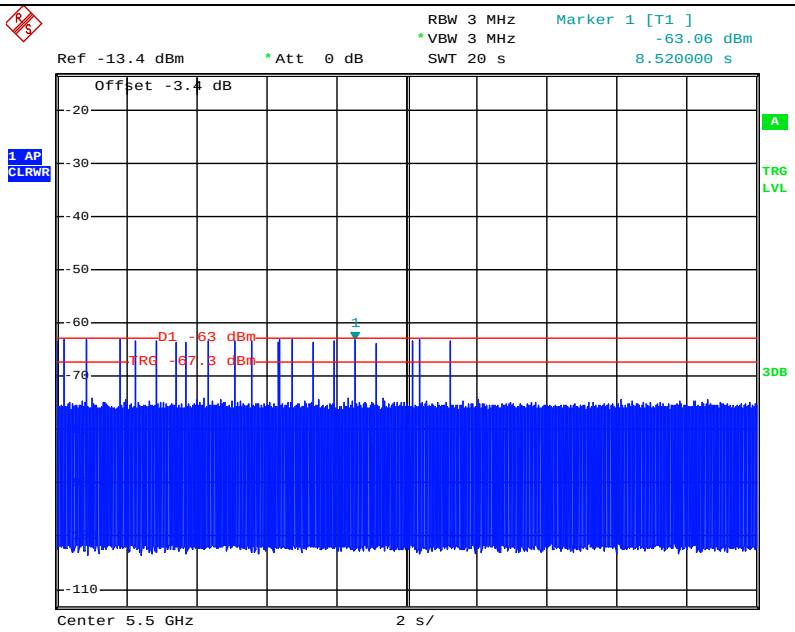
Date: 9.APR.2015 00:41:07

Radar #4 DFS detection threshold level



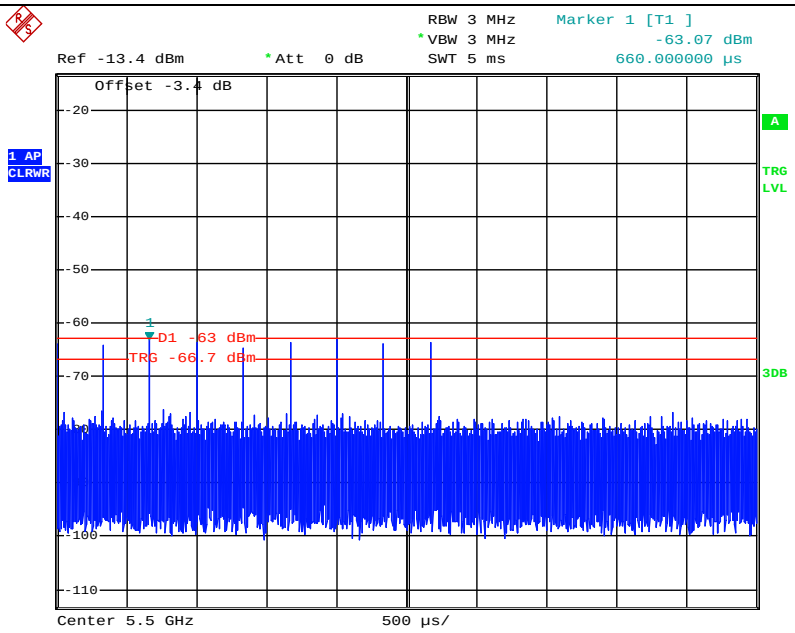
Date: 9.APR.2015 00:45:38

Radar #5 DFS detection threshold level



Date: 9.APR.2015 01:02:42

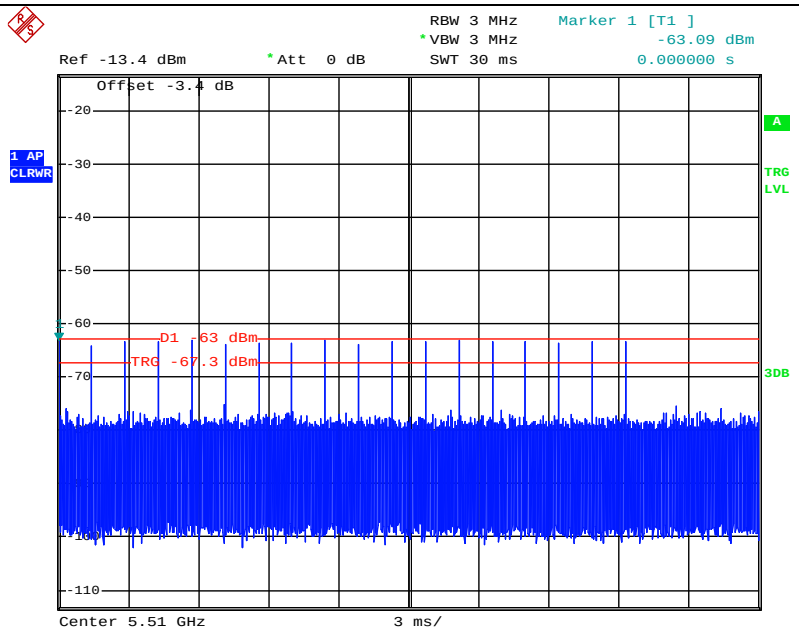
Radar #6 DFS detection threshold level



Date: 9.APR.2015 01:05:45

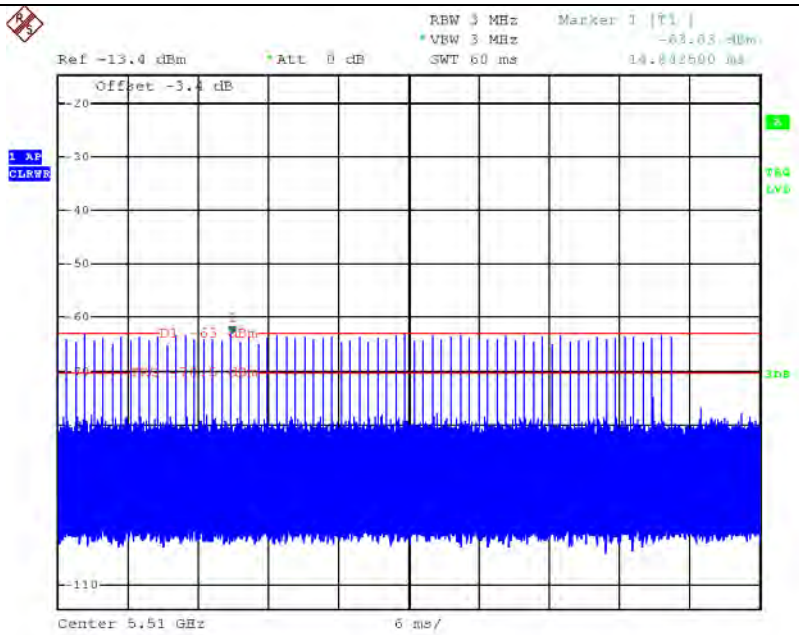
Modulation Mode: 802.11ac (VHT40)	Test Frequency: 5510 MHz

Radar #0 DFS detection threshold level



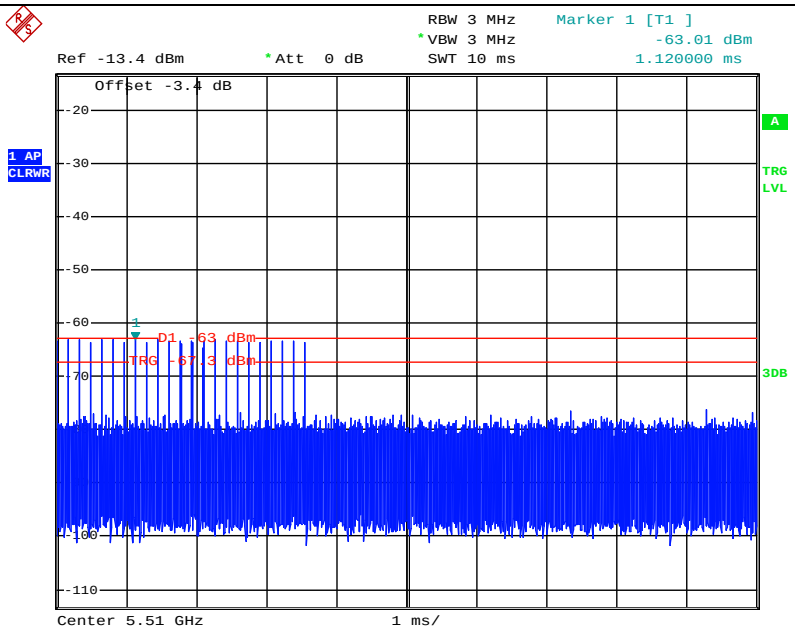
Date: 9.APR.2015 00:21:34

Radar #1 DFS detection threshold level



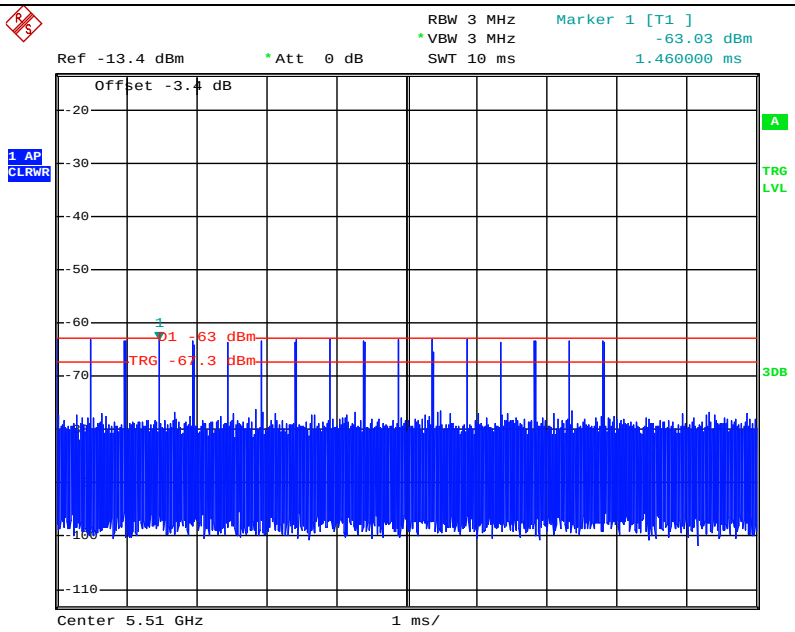
Date: 9.APR.2015 00:28:40

Radar #2 DFS detection threshold level



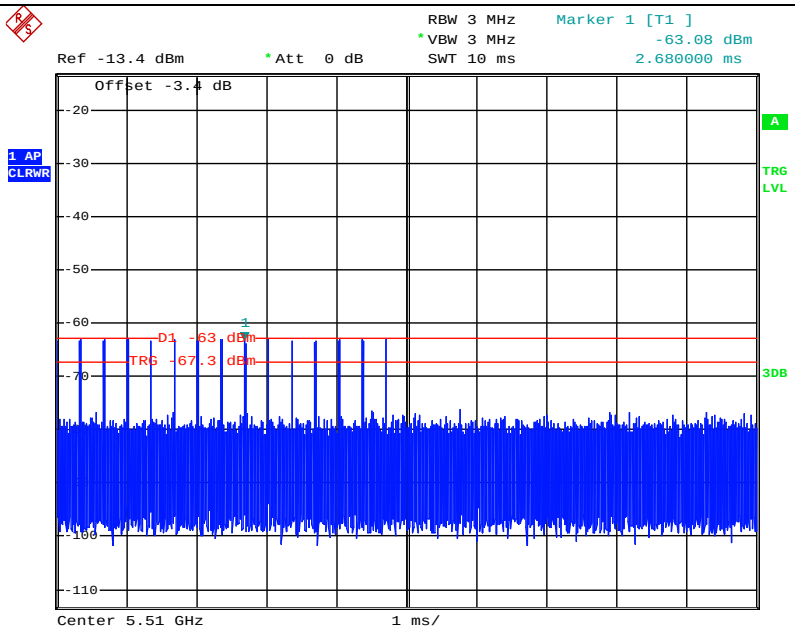
Date: 9.APR.2015 00:39:37

Radar #3 DFS detection threshold level



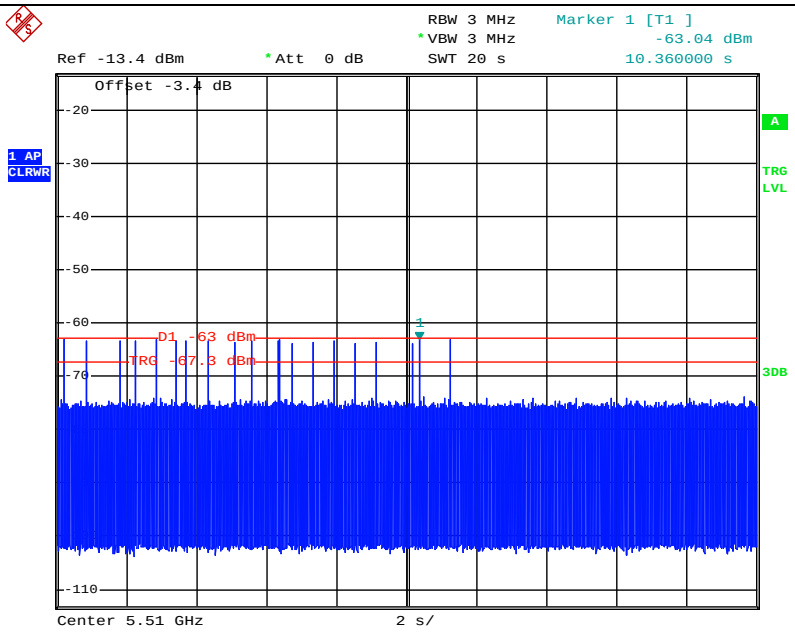
Date: 9.APR.2015 00:42:10

Radar #4 DFS detection threshold level



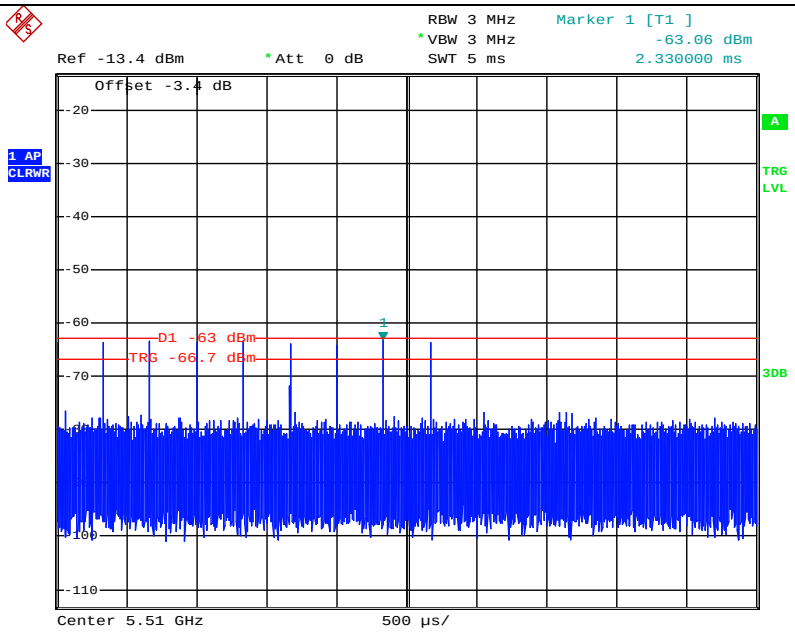
Date: 9.APR.2015 00:44:45

Radar #5 DFS detection threshold level



Date: 9.APR.2015 00:55:52

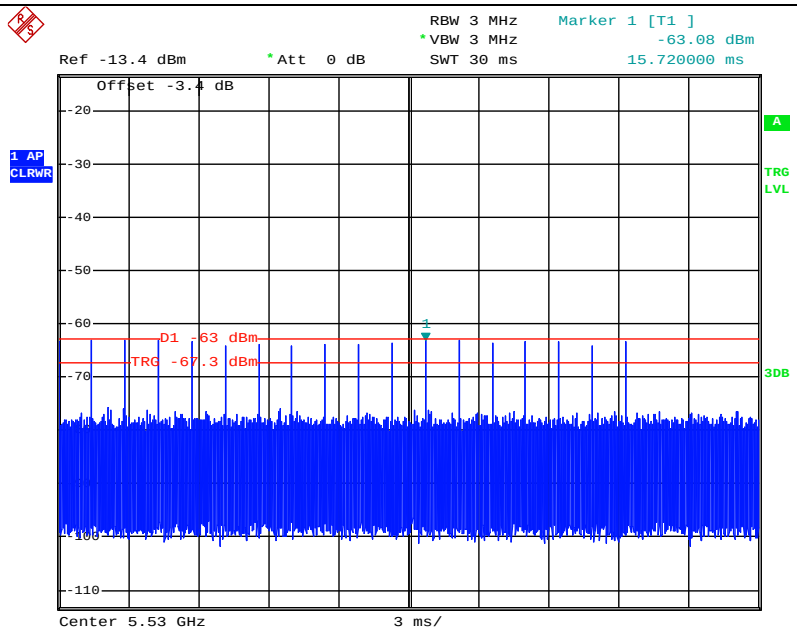
Radar #6 DFS detection threshold level



Date: 9.APR.2015 01:14:03

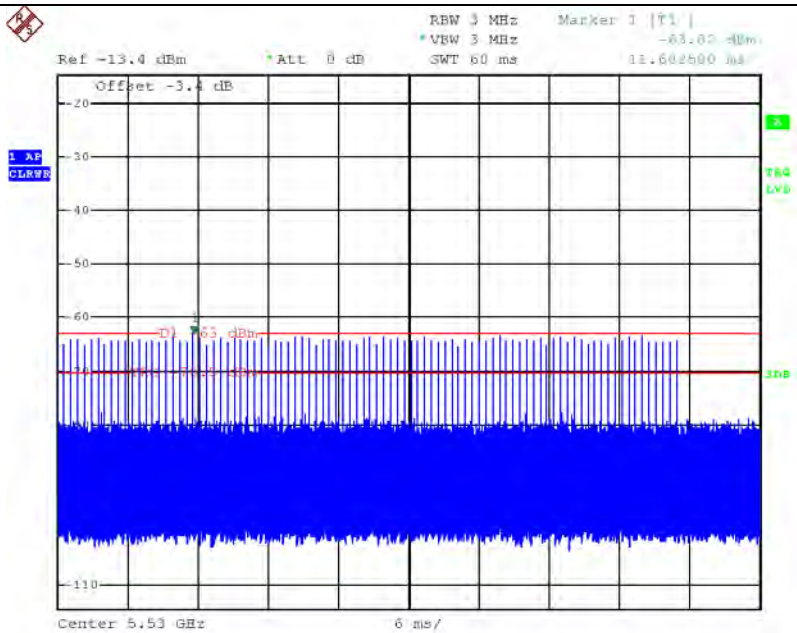
Modulation Mode: 802.11ac (VHT80)	Test Frequency: 5530 MHz

Radar #0 DFS detection threshold level



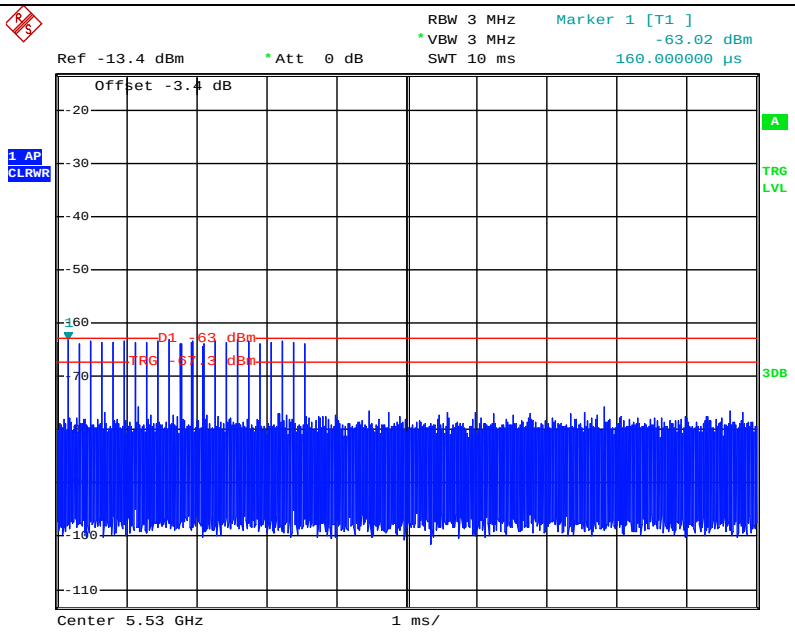
Date: 9.APR.2015 00:37:30

Radar #1 DFS detection threshold level



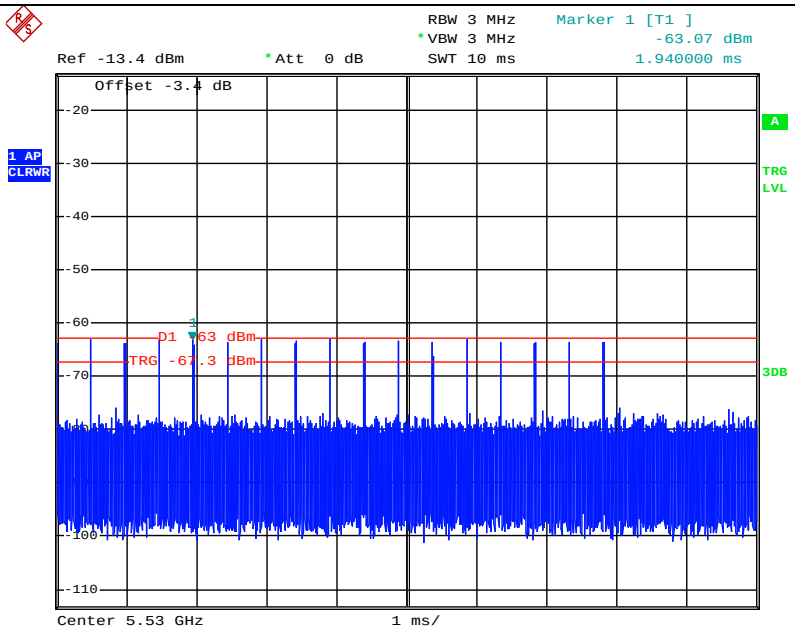
Date: 9.APR.2015 00:28:16

Radar #2 DFS detection threshold level



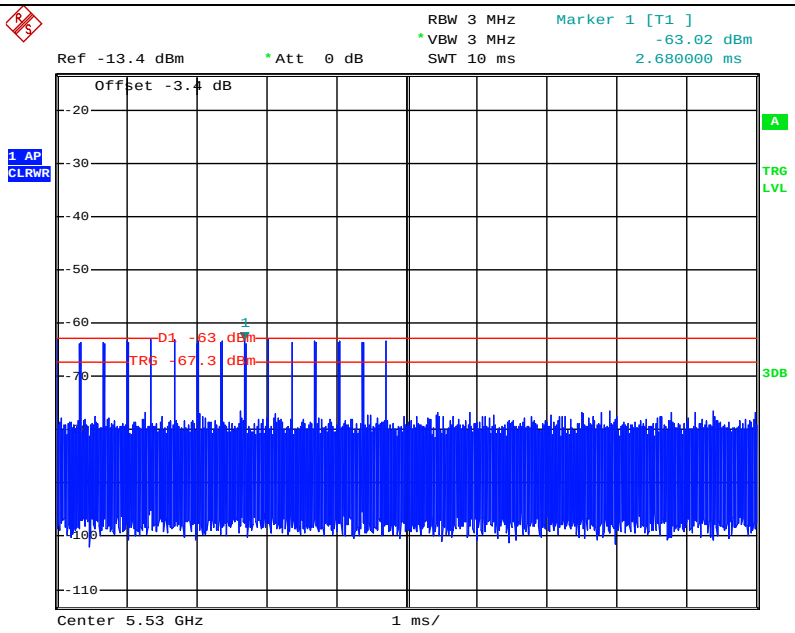
Date: 9.APR.2015 00:38:55

Radar #3 DFS detection threshold level



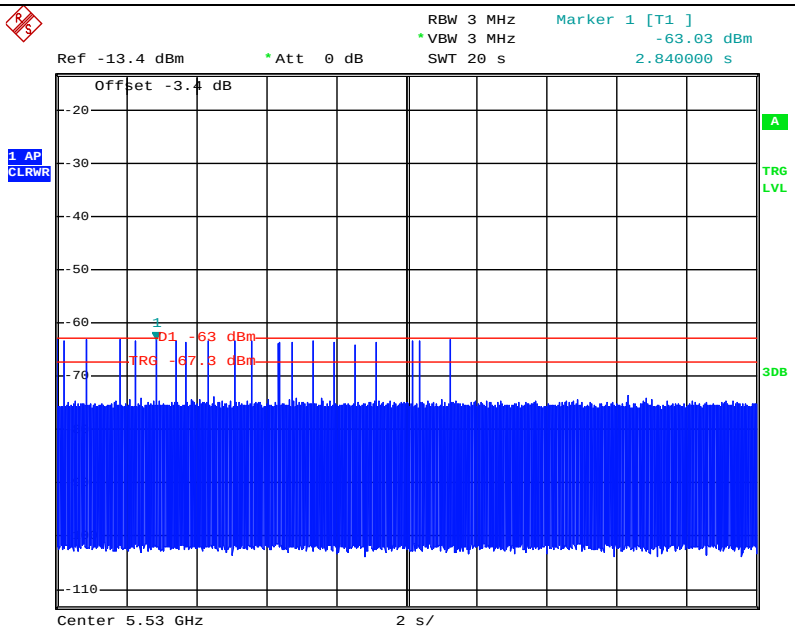
Date: 9.APR.2015 00:43:04

Radar #4 DFS detection threshold level



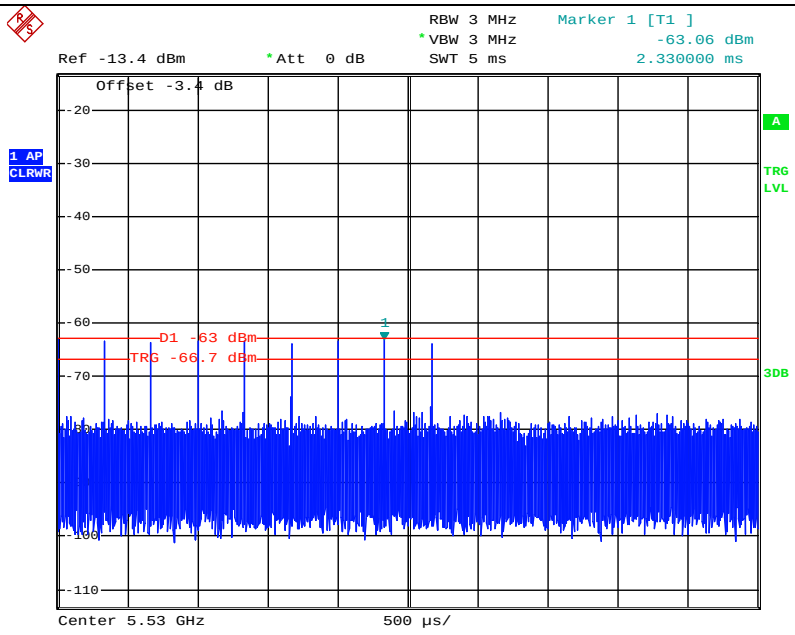
Date: 9.APR.2015 00:43:38

Radar #5 DFS detection threshold level



Date: 9.APR.2015 00:57:58

Radar #6 DFS detection threshold level

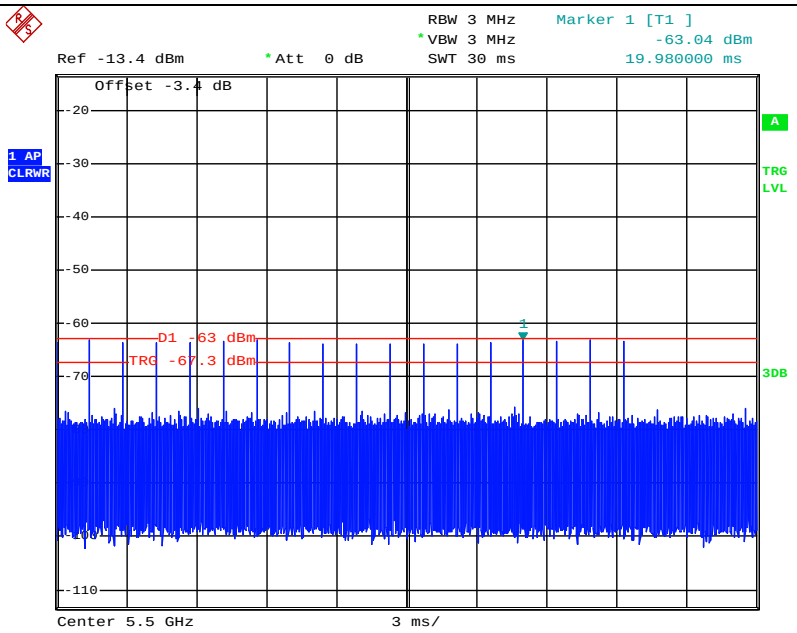


Date: 9.APR.2015 01:09:24

For Client without radar detection:

Modulation Mode: 802.11ac (VHT20)	Test Frequency: 5500 MHz

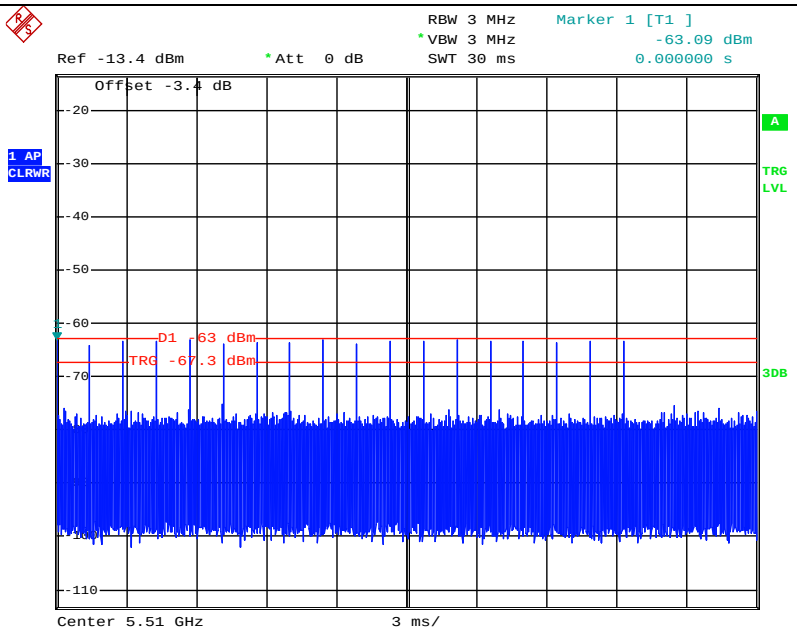
Radar #0 DFS detection threshold level



Date: 9.APR.2015 00:20:08

Modulation Mode: 802.11ac (VHT40)	Test Frequency: 5510 MHz

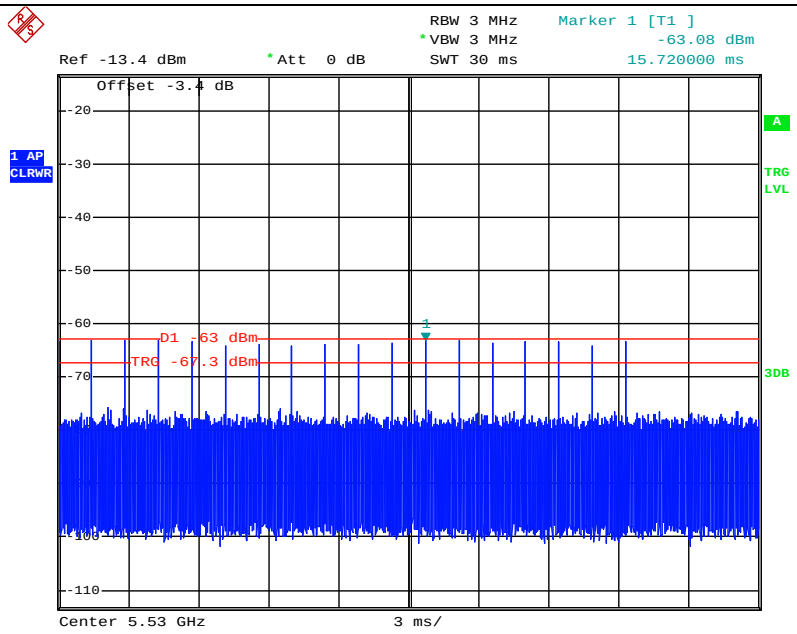
Radar #0 DFS detection threshold level



Date: 9.APR.2015 00:21:34

Modulation Mode: 802.11ac (VHT80)	Test Frequency: 5530 MHz

Radar #0 DFS detection threshold level

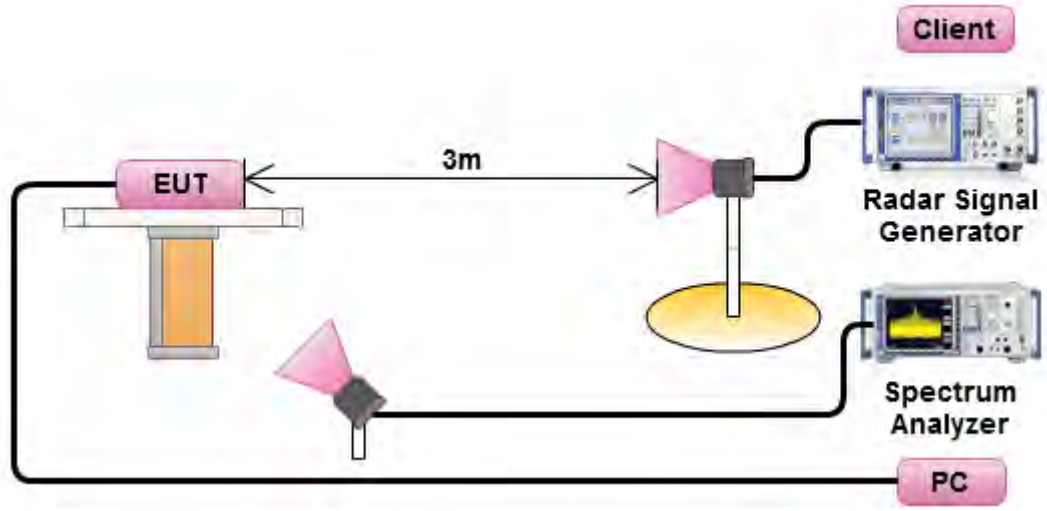


Date: 9.APR.2015 00:37:30

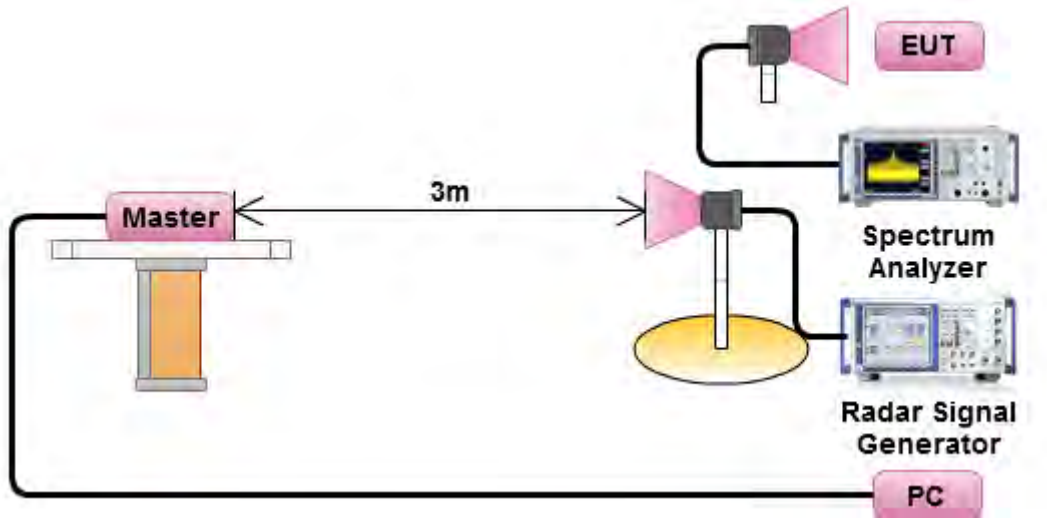
3.2.7 Test Setup

A spectrum analyzer is used as a monitor to verify that the EUT has vacated the Channel within the (Channel Closing Transmission Time and Channel Move Time, and does not transmit on a Channel during the Non-Occupancy Period after the detection and Channel move.

Master Radiated Measurement



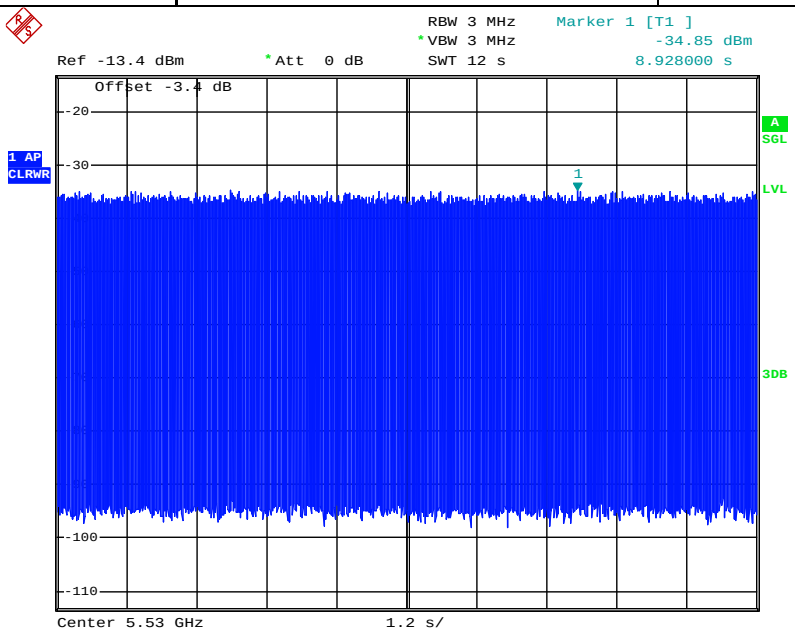
Client without Radar Detect Radiated Measurement



3.2.8 Data traffic Plot

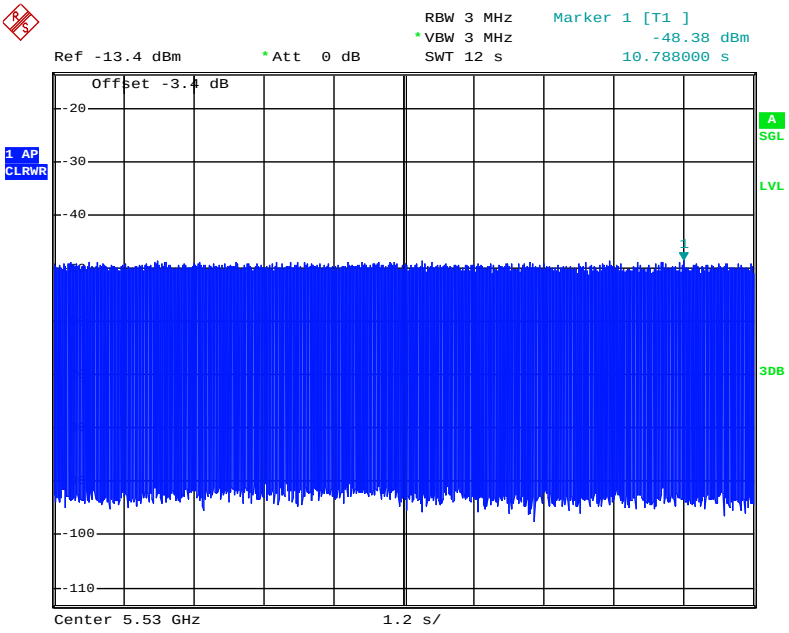
For Master:

EUT Data traffic Plot	Modulation Mode: 802.11ac (VHT80)	Test Frequency: 5530 MHz



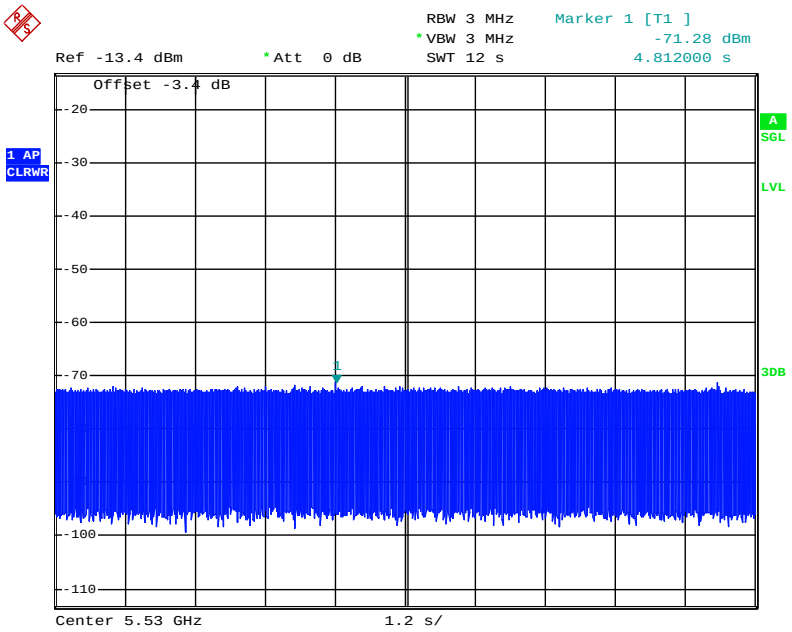
Date: 6.APR.2015 18:05:37

Client Data Traffic Plot	Modulation Mode: 802.11ac (VHT80)	Test Frequency: 5530 MHz



Date: 6.APR.2015 18:06:55

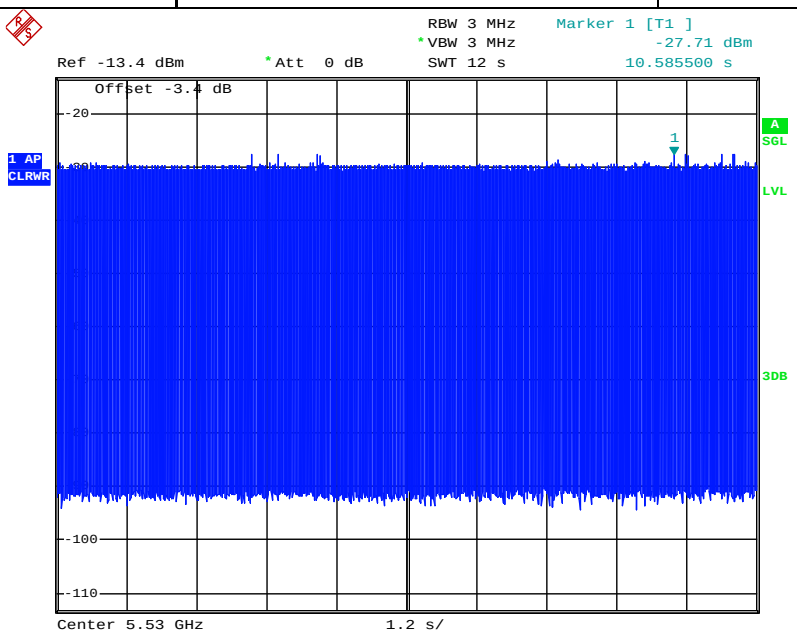
Without Data Traffic Plot	Modulation Mode: 802.11ac (VHT80)	Test Frequency: 5530 MHz



Date: 6.APR.2015 18:36:06

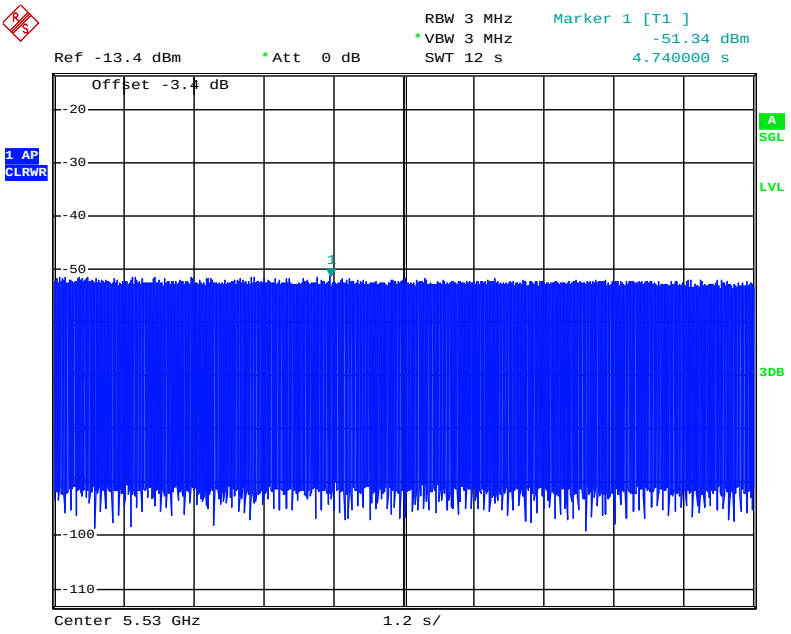
For Client without radar detection:

EUT Data traffic Plot	Modulation Mode: 802.11ac (VHT80)	Test Frequency: 5530 MHz



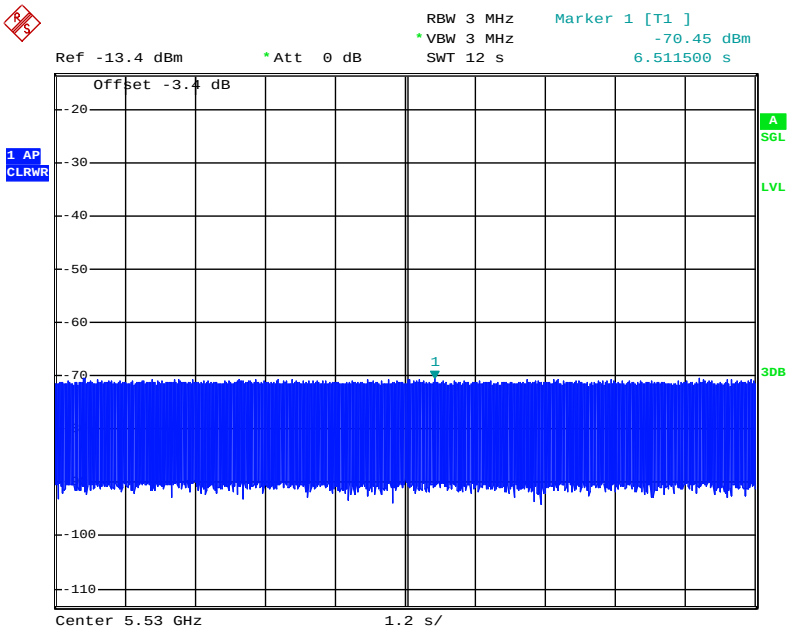
Date: 8.APR.2015 16:52:56

Master Data Traffic Plot	Modulation Mode: 802.11ac (VHT80)	Test Frequency: 5530 MHz



Date: 8.APR.2015 16:54:23

Without Data Traffic Plot	Modulation Mode: 802.11ac (VHT80)	Test Frequency: 5530 MHz



3.3 UNII Detection Bandwidth

3.3.1 UNII Detection Bandwidth Limit

Channel Bandwidth (MHz)	99% Power Bandwidth (MHz)	UNII Detection Bandwidth (MHz)
20	17.76	18
40	35.4	36
80	75.2	76
UNII Detection Bandwidth is minimum 100% of the 99% power bandwidth. A single radar Burst is generated for a minimum of 10 trials, and the response of the UUT is noted. The UUT must detect the Radar Waveform 90% or more of the time.		

3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

Test Method
☒ Refer as FCC 06-96 Appendix,clause 7.8.1 for UNII Detection Bandwidth test. 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. The EUT is set up as a standalone device (no associated Client and no traffic). The radar frequency is increased in 1 MHz steps, repeating the above test sequence, until the detection rate falls below 90%. The highest frequency at which detection is greater than or equal to 90% is denoted as F_H. The radar frequency is decreased in 1 MHz steps, repeating the above test sequence, until the detection rate falls below 90%. The lowest frequency at which detection is greater than or equal to 90% is denoted as F_L. UNII Detection Bandwidth = F_H - F_L.

3.3.4 Test Result of UNII Detection Bandwidth

For Master:

EUT Frequency=5500 MHz											
Radar Type	**0**										
Channel Bandwidth (MHz)	**20**										
Radar Frequency (MHz)	**DFS Detection Trials (1=Detection, 0= No Detection)**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
5488	0	0	0	0	0	0	0	0	0	0	0
5489	1	1	1	1	1	0	1	1	0	0	70
5490	1	1	0	1	0	1	1	0	1	1	70
5491(FL)	1	1	1	1	1	1	1	1	1	1	100
5495	1	1	1	1	1	1	1	1	1	1	100
5500	1	1	1	1	1	1	1	1	1	1	100
5505	1	1	1	1	1	1	1	1	1	1	100
5510(FH)	1	1	1	1	1	1	1	1	1	1	100
5511	1	1	1	0	1	0	1	0	1	1	70
5512	0	0	0	0	0	0	0	0	0	0	0
Detection Bandwidth (MHz) = (FH-FL) = (5510MHz-5491MHz)=											19
Limit (MHz)											18
Test Result											**Complied**

EUT Frequency=5510 MHz											
Radar Type	**0**										
Channel Bandwidth (MHz)	**40**										
Radar Frequency (MHz)	**DFS Detection Trials (1=Detection, 0= No Detection)**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
5488	0	0	0	0	0	0	0	0	0	0	0
5489	1	0	1	1	0	0	0	0	1	1	50
5490	1	1	0	0	1	0	0	1	1	1	60
5491(FL)	1	1	1	1	1	1	1	1	1	1	100
5495	1	1	1	1	1	1	1	1	1	1	100
5500	1	1	1	1	1	1	1	1	1	1	100
5505	1	1	1	1	1	1	1	1	1	1	100
5510	1	1	1	1	1	1	1	1	1	1	100
5515	1	1	1	1	1	1	1	1	1	1	100
5520	1	1	1	1	1	1	1	1	1	1	100
5525	1	1	1	1	1	1	1	1	1	1	100
5530(FH)	1	1	1	1	1	1	1	1	1	1	100
5531	1	0	1	0	0	0	0	1	1	1	50
5532	0	0	0	0	0	0	0	0	0	0	0
Detection Bandwidth (MHz) = (FH-FL)= (5530MHz-5491MHz)=											39
Limit (MHz)											36
Test Result											**Complied**

EUT Frequency=5530 MHz											
Radar Type	**0**										
Channel Bandwidth (MHz)	**80**										
Radar Frequency (MHz)	**DFS Detection Trials (1=Detection, 0= No Detection)**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
5488	0	0	0	0	0	0	0	0	0	0	0
5489	1	1	1	1	0	0	0	0	0	1	50
5490(FL)	1	1	1	1	1	1	1	1	1	1	100
5495	1	1	1	1	1	1	1	1	1	1	100
5500	1	1	1	1	1	1	1	1	1	1	100
5505	1	1	1	1	1	1	1	1	1	1	100
5510	1	1	1	1	1	1	1	1	1	1	100
5515	1	1	1	1	1	1	1	1	1	1	100
5520	1	1	1	1	1	1	1	1	1	1	100
5525	1	1	1	1	1	1	1	1	1	1	100
5530	1	1	1	1	1	1	1	1	1	1	100
5535	1	1	1	1	1	1	1	1	1	1	100
5540	1	1	1	1	1	1	1	1	1	1	100
5545	1	1	1	1	1	1	1	1	1	1	100
5550	1	1	1	1	1	1	1	1	1	1	100
5555	1	1	1	1	1	1	1	1	1	1	100
5560	1	1	1	1	1	1	1	1	1	1	100
5565	1	1	1	1	1	1	1	1	1	1	100
5568	1	1	1	1	1	1	1	1	1	1	100
5569	1	1	1	1	1	1	1	1	1	1	100
5570(FH)	1	1	1	1	1	1	1	1	1	1	100
5571	0	0	0	0	0	0	0	0	0	0	0
Detection Bandwidth (MHz) = (FH-FL)=(5570MHz-5490MHz)=											80
Limit (MHz)											76
Test Result											**Complied**

3.4 Channel Availability Check (CAC)

3.4.1 Channel Availability Check Limit

Channel Availability Check Limit	
☒	The EUT shall perform a Channel Availability Check to ensure that there is no radar operating on the channel. After power-up sequence, receive at least 1 minute (60 sec) on the intended operating frequency.

3.4.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

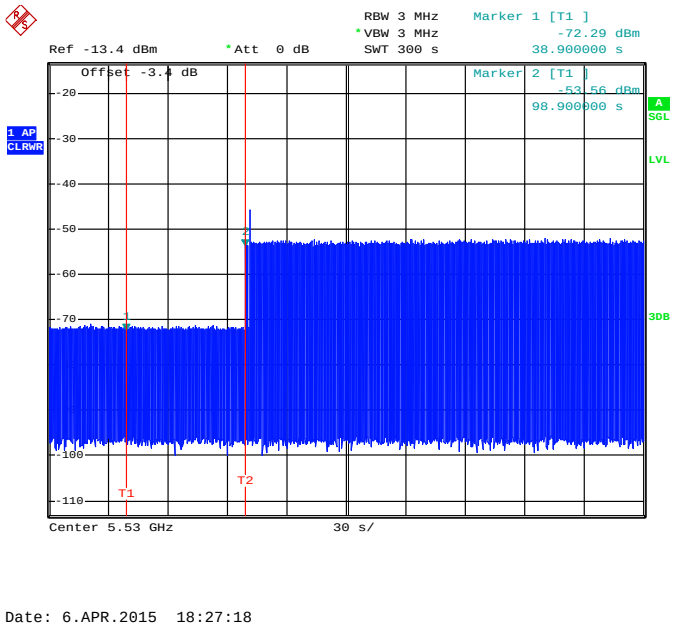
Test Method	
☒	Refer as FCC 06-96 Appendix, clause 7.8.2.1 for Initial Channel Availability Check Time. The EUT does not emit beacon, control, or data signals on the test Channel until the power-up sequence has been completed and the UNII device checks for Radar Waveforms for one minute on the test Channel. This test does not use any Radar Waveforms.
☒	Refer as FCC 06-96 Appendix, clause 7.8.2.2 for Radar Burst at the Beginning of the Channel Availability Check Time. To verify successful radar detection on the selected Channel during a period equal to the Beginning of the Channel Availability Check Time.
☒	Refer as FCC 06-96 Appendix, clause 7.8.2.3 for Radar Burst at the End of the Channel Availability Check Time. To verify successful radar detection on the selected Channel during a period equal to the End of the Channel Availability Check Time.

3.4.4 Test Result of Initial Channel Availability Check Time

For Master:

Modulation Mode	Freq.	Radar Test Signal
802.11ac (VHT80)	5530 MHz	N/A

The EUT does not transmit any beacon or data transmissions until at least 1 minute after the completion of the power-on cycle (38.9 sec). The initial power up time of the EUT is indicated by marker 1 (38.9 sec). Initial beacons/data transmissions are indicated by marker 2 (98.9 sec).



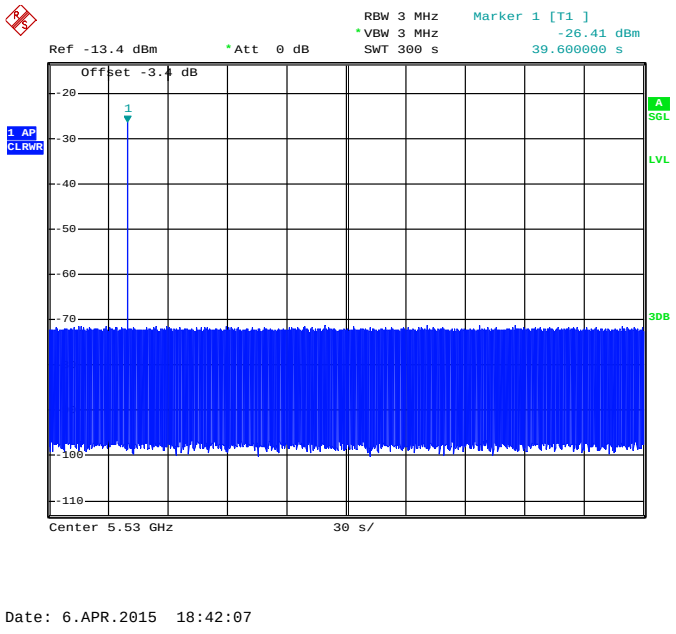
Test Result	Complied

3.4.5 Test Result of Radar Burst at the Beginning of the Channel Availability Check Time

For Master:

Modulation Mode	Freq. (MHz)	Radar Type Signal
802.11ac (VHT80)	5530 MHz	0

Visual indication on the EUT of successful detection of the radar Burst will be recorded and reported. Observation of emissions will continue for 260.4 seconds after the radar Burst has been generated. Verify that during the 300 seconds measurement window no EUT transmissions occurred.



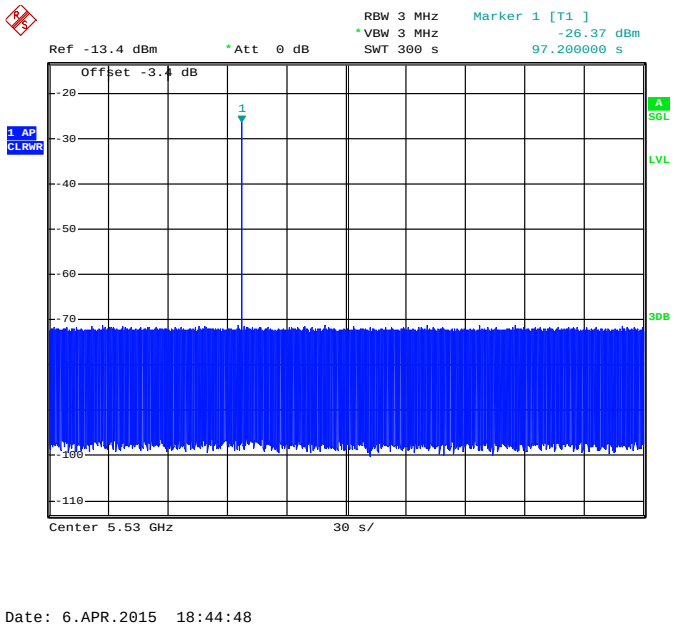
Test Result	Complied

3.4.6 Test Result of Radar Burst at the End of the Channel Availability Check Time

For Master:

Modulation Mode	Freq. (MHz)	Radar Type Signal
802.11ac (VHT80)	5530 MHz	0

Visual indication on the EUT of successful detection of the radar Burst will be recorded and reported. Observation of emissions will continue for 202.8 seconds after the radar Burst has been generated. Verify that during the 300 seconds measurement window no EUT transmissions occurred.



Test Result	Complied

3.5 In-service Monitoring

3.5.1 In-service Monitoring Limit

In-service Monitoring Limit	
Channel Move Time	10 sec
Channel Closing Transmission Time	200 ms + an aggregate of 60 ms over remaining 10 sec periods.
Non-occupancy period	Minimum 30 minutes

3.5.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.5.3 Test Procedures

Test Method	
☒	Refer as FCC 06-96 Appendix, clause 7.8.3 verified during In-Service Monitoring; Channel Closing Transmission Time, Channel Move Time. Client Device will associate with the EUT. Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds. Measure and record the transmissions from the EUT during the observation time (Channel Move Time). Compare the Channel Move Time and Channel Closing Transmission Time limits.
☒	Refer as FCC 06-96 Appendix, clause 8.3 verified during In-Service Monitoring; Channel Closing Transmission Time, Channel Move Time. One 12 sec plot needs to be reported for the Short Pulse Radar Types 0 and one for the Long Pulse Radar Type in a 22 sec plot. And zoom-in a 600 ms plot verified channel closing time for the aggregate transmission time starting from 200ms after the end of the radar signal to the completion of the channel move.
☒	Refer as FCC 06-96 Appendix, clause 7.8.3 verified during In-Service Monitoring; Non-Occupancy Period. Client Device will associate with the EUT. Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds. Measure and record the transmissions from the EUT during the observation time (Non-Occupancy Period). Compare the Non-Occupancy Period limits.

3.5.4 Test Result of In-service Monitoring

For Master:

Modulation Mode: 802.11ac (VHT80)

Parameter	Test Result		Limit
	Type 0	Type 5	
Test Channel (MHz)	5530 MHz	5530 MHz	-
Channel Move Time (sec.)	0.72	0	< 10s
Channel Closing Transmission Time (ms) (Note)	9	0	< 60ms
Non-Occupancy Period (min.)	≧30	-	≧ 30 min

Note: 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 seconds period. The aggregate duration of control signals will not count quiet periods in between transmissions.

For Client without radar detection:

Modulation Mode: 802.11ac (VHT80)

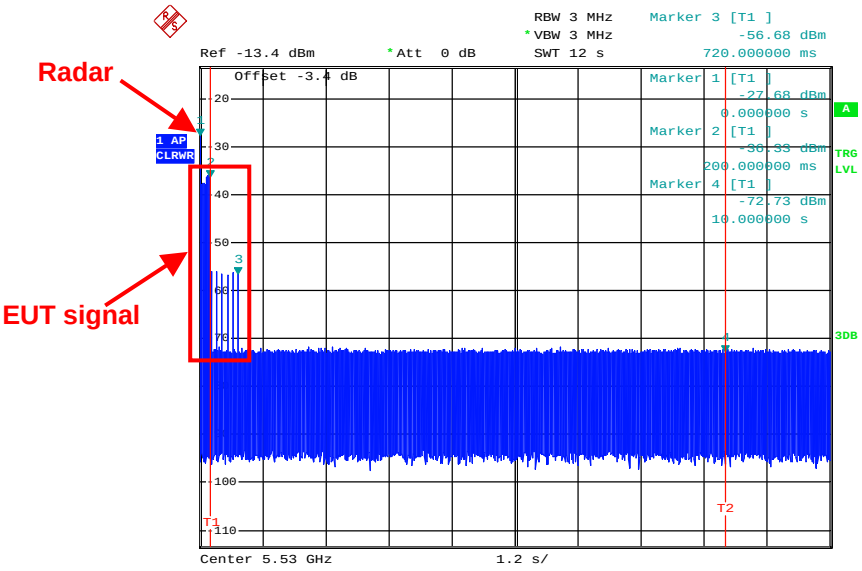
Parameter	Test Result	Limit
	Type 0	
Test Channel (MHz)	5530 MHz	-
Channel Move Time (sec.)	4.0125	< 10s
Channel Closing Transmission Time (ms) (Note)	48	< 60ms
Non-Occupancy Period (min.)	≧30	≧ 30 min

Note: 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 seconds period. The aggregate duration of control signals will not count quiet periods in between transmissions.

3.5.5 Test Plot of In-Service Monitoring for Channel Move Time

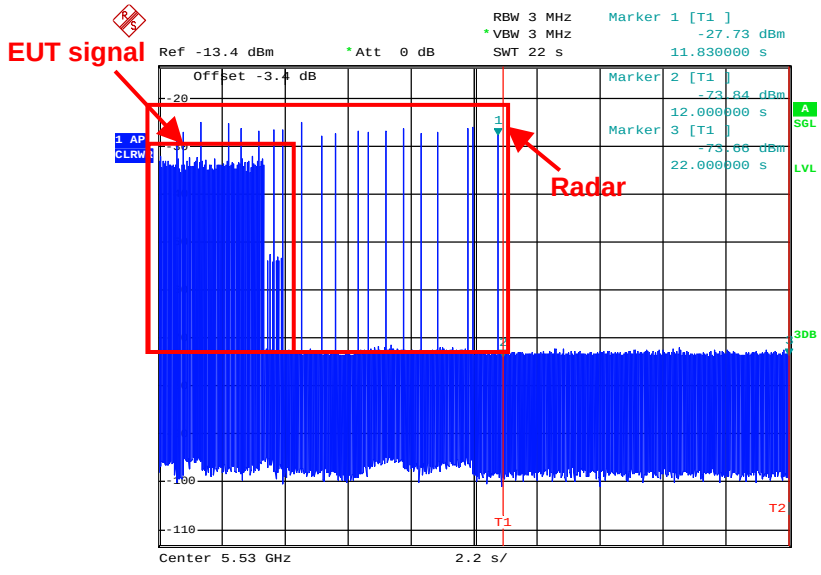
For Master:

Modulation Mode	Freq.	Radar Type
802.11ac (VHT80)	5530 MHz	0



Date: 7.APR.2015 00:57:02

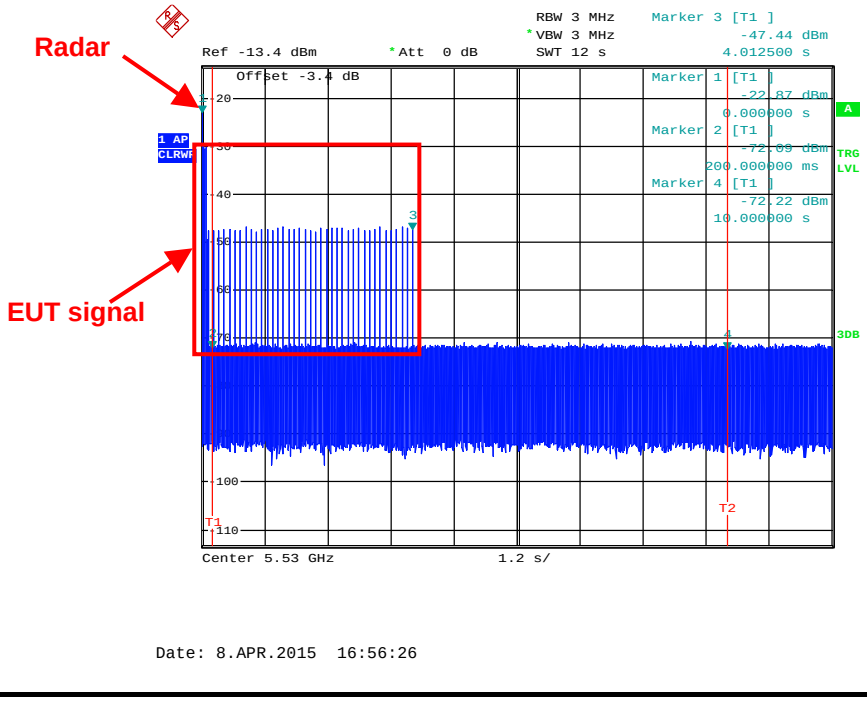
Modulation Mode	Freq.	Radar Type
802.11ac (VHT80)	5530 MHz	5



Date: 6.APR.2015 18:50:04

For Client without radar detection:

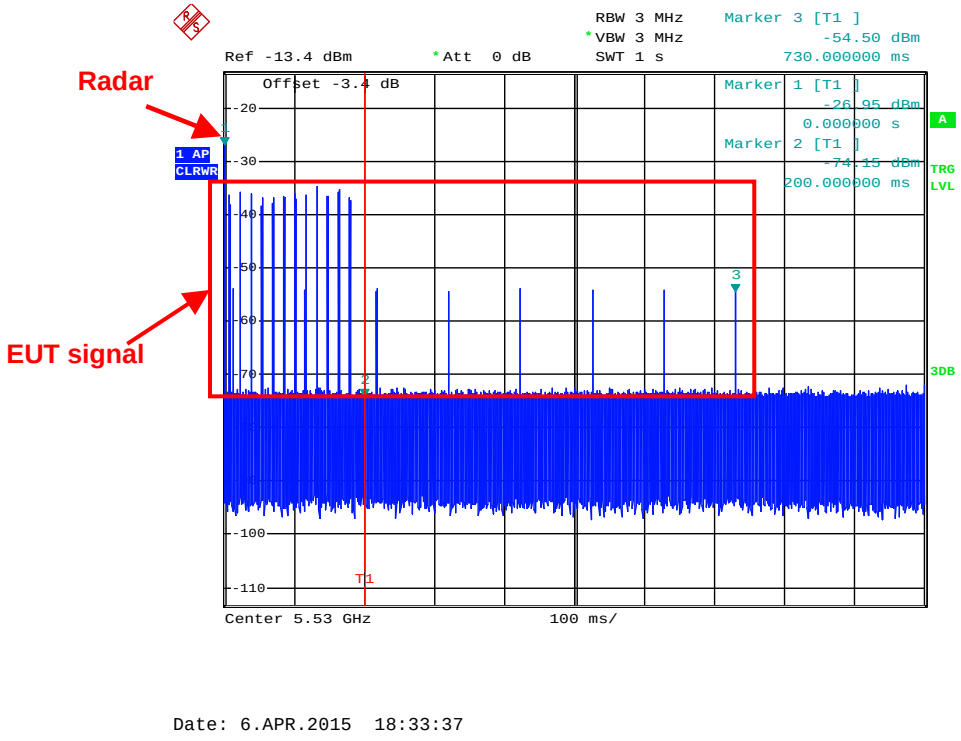
Modulation Mode	Freq.	Radar Type
802.11ac (VHT80)	5530 MHz	0



3.5.6 Test Plot of In-Service Monitoring for Channel Closing Transmission Time

For Master:

Modulation Mode	Freq.	Radar Type
802.11ac (VHT80)	5530 MHz	0
Channel Closing Transmission Time is comprised of 200 ms starting at the beginning of the Channel Move Time plus 60ms additional intermittent control signals		



Dwell is the dwell time per spectrum analyzer sampling bin.

S is the sweep time

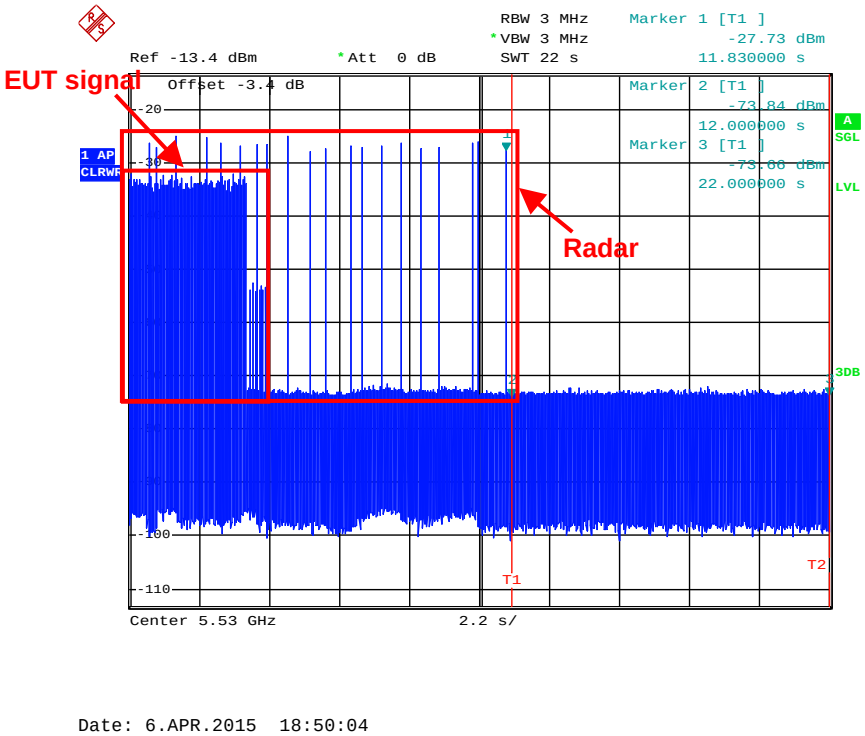
B is the number of spectrum analyzer sampling bins

C is the intermittent control signals of Channel Closing Transmission Time

N is the number of spectrum analyzer sampling bins (intermittent control signals) showing a U-NII transmission

Dwell (1 ms)= S (1000 ms) / B (1000)
C (9 ms) = N (9) X Dwell (1 ms)

Modulation Mode	Freq.	Radar Type
802.11ac (VHT80)	5530 MHz	5
Channel Closing Transmission Time is comprised of 200 ms starting at the beginning of the Channel Move Time plus 60ms additional intermittent control signals		



Dwell is the dwell time per spectrum analyzer sampling bin.

S is the sweep time

B is the number of spectrum analyzer sampling bins

C is the intermittent control signals of Channel Closing Transmission Time

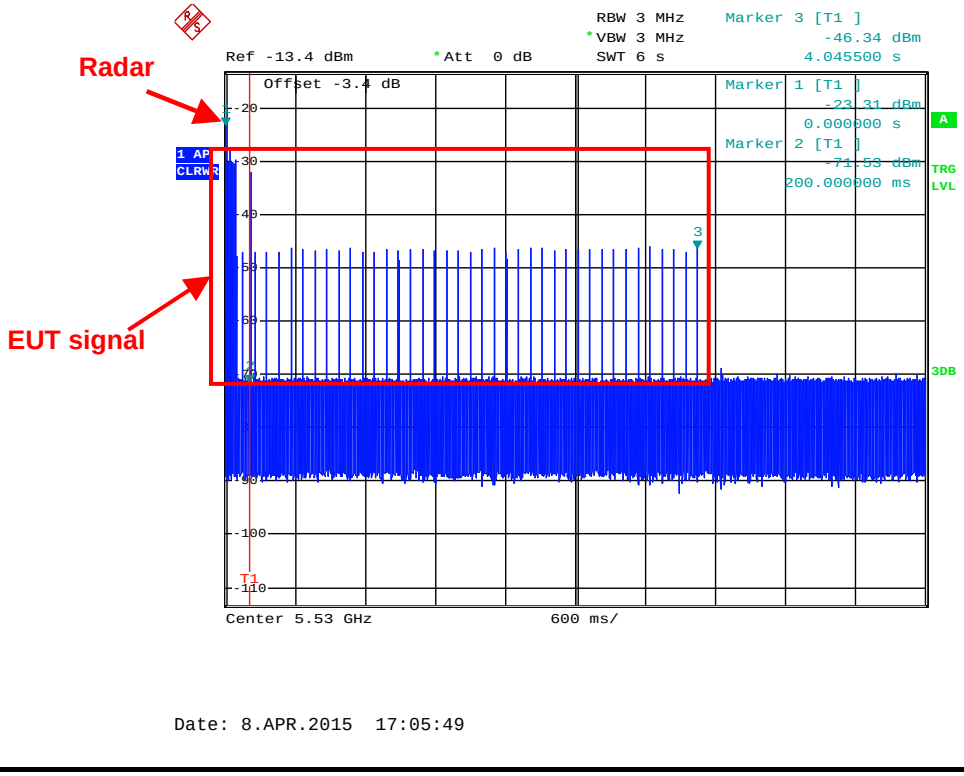
N is the number of spectrum analyzer sampling bins (intermittent control signals) showing a U-NII transmission

Dwell (22 ms)= S (22000 ms) / B (1000)
C (0 ms) = N (0) X Dwell (22 ms)

For Client without radar detection:

Modulation Mode	Freq.	Radar Type
802.11ac (VHT80)	5530 MHz	0

Channel Closing Transmission Time is comprised of 200 ms starting at the beginning of the Channel Move Time plus 60ms additional intermittent control signals



Dwell is the dwell time per spectrum analyzer sampling bin.

S is the sweep time

B is the number of spectrum analyzer sampling bins

C is the intermittent control signals of Channel Closing Transmission Time

N is the number of spectrum analyzer sampling bins (intermittent control signals) showing a U-NII transmission

Dwell (0.75 ms)= S (6000 ms) / B (8000)

C (48 ms) = N (64) X Dwell (0.75 ms)

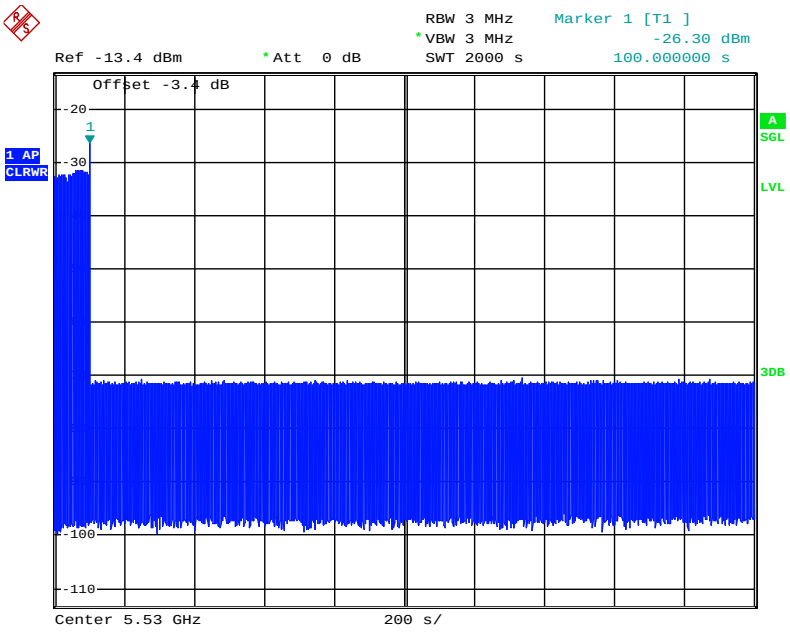
3.5.7 Test Plot of In-Service Monitoring for Non-Occupancy Period

For Master:

Modulation Mode	Freq.
802.11ac (VHT80)	5530 MHz

Non-Occupancy Period

During the 30 minutes observation time, UUT did not make any transmissions on a channel after a radar signal was detected on that channel by either the Channel Availability Check or the In-Service Monitoring.



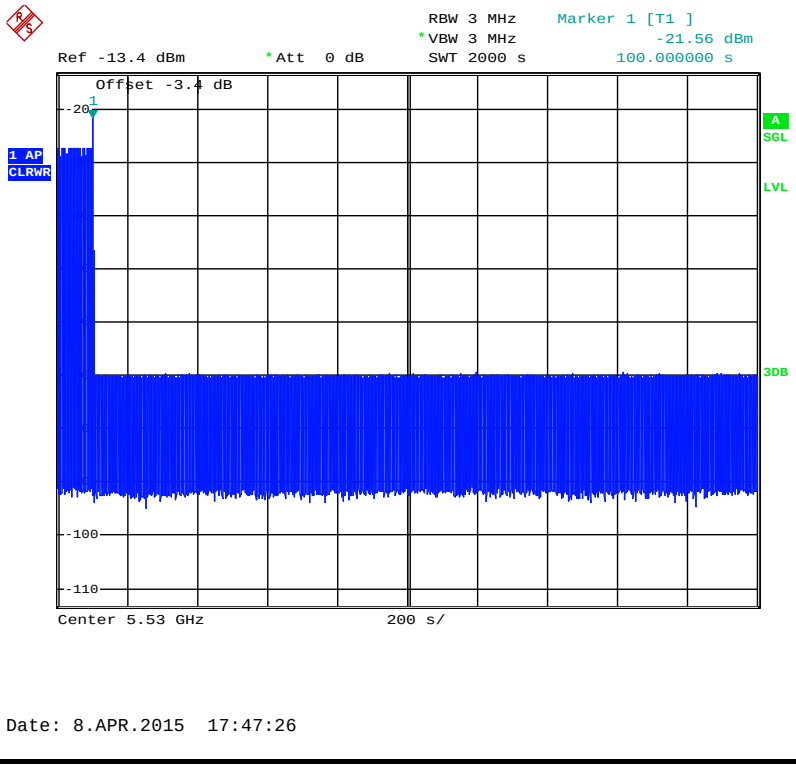
Date: 6.APR.2015 20:58:20

For Client without radar detection:

Modulation Mode	Freq.
802.11ac (VHT80)	5530 MHz

Non-Occupancy Period

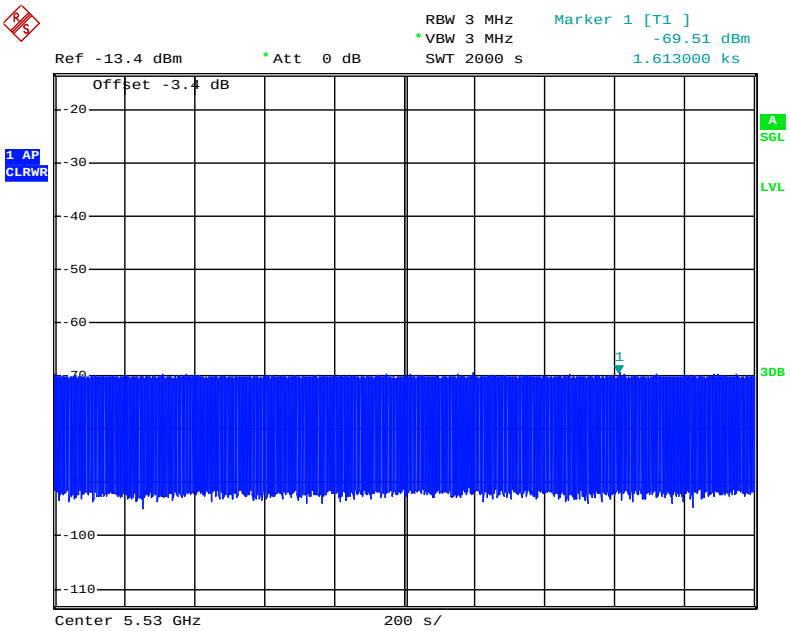
During the 30 minutes observation time, UUT did not make any transmissions on a channel after a radar signal was detected on that channel by either the Channel Availability Check or the In-Service Monitoring.



Non-associated test

Master was off.

During the 30 minutes observation time, The UUT did not make any transmissions in the DFS band after UUT power up.



Date: 8.APR.2015 17:49:41

3.6 Statistical Performance Check

3.6.1 Statistical Performance Check Limit

Radar Type	Minimum Percentage of Successful Detection (Pd)	Minimum Trials
1	60%	30
2	60%	30
3	60%	30
4	60%	30
Aggregate (Radar Types 1-4)	80%	120
5	80%	30
6	70%	30

The percentage of successful detection is calculated by:

$$\frac{TotalWaveformDetections}{TotalWaveformTrails} \times 100 = \text{Probability of Detection Radar Waveform}$$

In addition an aggregate minimum percentage of successful detection across all Short Pulse Radar Types 1-4 is required and is calculated as follows:

$$\frac{Pd1 + Pd2 + Pd3 + Pd4}{4}$$

3.6.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.6.3 Test Procedures

Test Method
☒ Refer as FCC 06-96 Appendix, clause 7.8.4 for Statistical Performance Check test. Stream the MPEG test file from the Master Device to the Client Device on the test Channel for the entire period of the test. Observe the transmissions of the UUT at the end of the Burst on the Operating Channel for duration greater than 10 seconds for Short Pulse Radar Types 1-4 and 6 to ensure detection occurs. Then Observe the transmissions of the UUT at the end of the Burst on the Operating Channel for duration greater than 22 seconds for Long Pulse Radar Type 5 to ensure detection occurs. The device can utilize a test mode to demonstrate when detection occurs to prevent the need to reset the device between trial runs.

3.6.4 Test Result of Statistical Performance Check

For Master:

Modulation Mode: 802.11ac (VHT20)

Type 1 Radar Statistical Performance

Trail #	Test Freq. (MHz)	Pulse Width (us)	PRI (us)	Pulses / Burst	1=Detection 0=No Detection
1	5496	1	1930.5	518	1
2	5497	23	326.2	3066	1
3	5498	19	1139.0	878	1
4	5499	12	1355.0	738	1
5	5500	4	1730.1	578	1
6	5501	8	1519.8	658	1
7	5502	15	1253.1	798	0
8	5503	6	1618.1	618	1
9	5504	14	1285.3	778	1
10	5505	3	1792.1	558	1
11	5506	13	1319.3	758	1
12	5507	9	1474.9	678	1
13	5508	7	1567.4	638	1
14	5509	17	1193.3	838	1
15	5510	10	1432.7	698	1
16	5511	1	1692.0	591	1
17	5512	2	328.1	3048	1
18	5513	3	373.4	2678	1
19	5514	4	574.4	1741	1
20	5515	5	1216.5	822	1
21	5516	6	801.3	1248	1
22	5517	7	488.5	2047	1
23	5518	8	956.0	1046	1
24	5519	9	517.6	1932	1
25	5520	10	1422.5	703	1
26	5521	11	542.0	1845	1
27	5522	12	741.3	1349	1
28	5523	13	881.8	1134	1
29	5524	14	427.4	2340	1
30	5525	15	628.9	1590	1
Detection Percentage (%)					96.67

Type 2 Radar Statistical Performance

Trail #	Test Freq. (MHz)	Pulse Width (us)	PRI (us)	Pulses / Burst	1=Detection 0=No Detection
1	5493	2.6	221	23	1
2	5494	4.6	198	27	1
3	5495	1.1	184	29	1
4	5496	4.8	203	24	1
5	5497	2.4	162	25	1
6	5498	3.4	204	28	1
7	5499	2.3	170	27	1
8	5500	3.5	184	23	1
9	5501	4.9	150	27	1
10	5502	4.6	211	29	1
11	5503	2.9	158	23	1
12	5504	2.6	226	27	1
13	5505	1.6	204	26	1
14	5506	3.9	181	25	0
15	5507	4.6	202	24	1
16	5506	4.1	194	27	1
17	5505	2.3	193	28	1
18	5504	3.9	173	29	1
19	5503	4.3	188	23	1
20	5502	1.5	215	26	1
21	5501	4.9	227	27	1
22	5500	1.1	199	23	1
23	5499	4.5	155	29	1
24	5498	4.0	190	27	1
25	5497	2.4	151	23	1
26	5496	2.5	180	28	1
27	5495	2.5	228	23	1
28	5494	2.5	203	25	1
29	5493	1.5	188	25	1
30	5494	1.9	217	24	1
Detection Percentage (%)					96.67

Type 3 Radar Statistical Performance

Trail #	Test Freq. (MHz)	Pulse Width (us)	PRI (us)	Pulses / Burst	1=Detection ; 0=No Detection
1	5493	8.0	205	16	0
2	5494	6.7	382	18	1
3	5495	8.6	418	16	1
4	5496	9.4	351	17	0
5	5497	7.4	383	18	1
6	5498	9.8	232	16	1
7	5499	9.1	377	17	1
8	5500	9.6	457	16	1
9	5501	8.0	471	18	1
10	5502	9.0	304	18	1
11	5503	8.0	316	17	1
12	5504	9.8	325	16	1
13	5505	8.0	409	17	1
14	5506	9.9	200	17	1
15	5507	8.8	458	16	1
16	5506	8.0	232	18	1
17	5505	8.3	250	16	1
18	5504	8.7	270	16	1
19	5503	7.7	350	17	1
20	5502	7.1	230	16	0
21	5501	7.3	416	18	1
22	5500	7.6	498	18	1
23	5499	7.3	286	17	1
24	5498	7.3	287	16	1
25	5497	7.5	462	17	1
26	5496	6.2	300	17	1
27	5495	6.4	323	18	1
28	5494	7.1	420	16	1
29	5493	7.2	395	18	0
30	5494	8.4	377	16	1
Detection Percentage (%)					86.67

Type 4 Radar Statistical Performance

Trail #	*Test Freq. (MHz)*	*Pulse Width (us)*	*PRI (us)*	*Pulses / Burst*	*1=Detection 0=No Detection*
1	5493	18.0	242	15	1
2	5494	19.9	279	12	1
3	5495	12.9	487	14	1
4	5496	15.0	452	13	1
5	5497	16.3	230	12	1
6	5498	19.8	238	13	0
7	5499	18.2	420	16	1
8	5500	16.3	452	15	1
9	5501	14.2	495	12	1
10	5502	17.8	228	16	1
11	5503	19.1	211	16	1
12	5504	18.4	283	15	1
13	5505	11.8	411	12	0
14	5506	14.2	284	13	1
15	5507	13.9	202	12	1
16	5506	17.8	340	14	1
17	5505	15.6	290	16	0
18	5504	14.6	250	16	1
19	5503	14.4	484	15	1
20	5502	18.9	387	13	1
21	5501	11.1	348	15	1
22	5500	13.8	291	16	1
23	5499	14.3	295	12	1
24	5498	12.5	300	12	0
25	5497	12.5	322	14	1
26	5496	12.5	383	13	1
27	5495	15.7	322	16	1
28	5494	19.8	469	13	0
29	5493	18.6	406	15	1
30	5494	15.9	238	14	1
Detection Percentage (%)					83.33

Total Type 1~4 Radar Statistical Performance

Radar Type #	Detection Percentage (%)
1	96.67
2	96.67
3	86.67
4	83.33
Total 1~4	90.83

Type 5 Radar Statistical Performance

Trail #	1=Detection 0=No Detection	Trail #	1=Detection 0=No Detection	Trail #	1=Detection 0=No Detection
1	1	11	1	21	1
2	1	12	1	22	1
3	0	13	1	23	0
4	1	14	1	24	1
5	1	15	1	25	1
6	1	16	0	26	1
7	1	17	1	27	0
8	1	18	1	28	1
9	1	19	0	29	1
10	1	20	1	30	1
Detection Percentage (%)					83.33

Type 6 Radar Statistical Performance

Trail #	Test Freq. (MHz)	Pulses / Hop	Pulse Width (us)	PRI (us)	1=Detection 0=No Detection
1	5500	9	1	333	1
2	5500	9	1	333	1
3	5500	9	1	333	1
4	5500	9	1	333	1
5	5500	9	1	333	1
6	5500	9	1	333	1
7	5500	9	1	333	1
8	5500	9	1	333	1
9	5500	9	1	333	1
10	5500	9	1	333	1
11	5500	9	1	333	1
12	5500	9	1	333	1
13	5500	9	1	333	1
14	5500	9	1	333	1
15	5500	9	1	333	1
16	5500	9	1	333	0
17	5500	9	1	333	1
18	5500	9	1	333	1
19	5500	9	1	333	1
20	5500	9	1	333	1
21	5500	9	1	333	1
22	5500	9	1	333	1
23	5500	9	1	333	1
24	5500	9	1	333	1
25	5500	9	1	333	1
26	5500	9	1	333	1
27	5500	9	1	333	1
28	5500	9	1	333	1
29	5500	9	1	333	1
30	5500	9	1	333	1
Detection Percentage (%)					96.67

Modulation Mode: 802.11ac (VHT40)

Type 1 Radar Statistical Performance

Trail #	Test Freq. (MHz)	Pulse Width (us)	PRI (us)	Pulses / Burst	1=Detection 0=No Detection
1	5496	1	1930.5	518	1
2	5497	23	326.2	3066	1
3	5498	19	1139.0	878	1
4	5499	12	1355.0	738	1
5	5500	4	1730.1	578	1
6	5501	8	1519.8	658	1
7	5502	15	1253.1	798	1
8	5503	6	1618.1	618	1
9	5504	14	1285.3	778	1
10	5505	3	1792.1	558	1
11	5506	13	1319.3	758	1
12	5507	9	1474.9	678	1
13	5508	7	1567.4	638	1
14	5509	17	1193.3	838	1
15	5510	10	1432.7	698	1
16	5511	1	1692.0	591	1
17	5512	2	328.1	3048	1
18	5513	3	373.4	2678	1
19	5514	4	574.4	1741	1
20	5515	5	1216.5	822	0
21	5516	6	801.3	1248	1
22	5517	7	488.5	2047	1
23	5518	8	956.0	1046	1
24	5519	9	517.6	1932	1
25	5520	10	1422.5	703	1
26	5521	11	542.0	1845	1
27	5522	12	741.3	1349	1
28	5523	13	881.8	1134	1
29	5524	14	427.4	2340	1
30	5525	15	628.9	1590	1
Detection Percentage (%)					96.67

Type 2 Radar Statistical Performance

Trail #	Test Freq. (MHz)	Pulse Width (us)	PRI (us)	Pulses / Burst	1=Detection 0=No Detection
1	5496	2.6	221	23	1
2	5497	4.6	198	27	1
3	5498	1.1	184	29	1
4	5499	4.8	203	24	1
5	5500	2.4	162	25	1
6	5501	3.4	204	28	0
7	5502	2.3	170	27	1
8	5503	3.5	184	23	1
9	5504	4.9	150	27	1
10	5505	4.6	211	29	1
11	5506	2.9	158	23	1
12	5507	2.6	226	27	1
13	5508	1.6	204	26	1
14	5509	3.9	181	25	1
15	5510	4.6	202	24	1
16	5511	4.1	194	27	1
17	5512	2.3	193	28	1
18	5513	3.9	173	29	1
19	5514	4.3	188	23	1
20	5515	1.5	215	26	1
21	5516	4.9	227	27	1
22	5517	1.1	199	23	1
23	5518	4.5	155	29	1
24	5519	4.0	190	27	0
25	5520	2.4	151	23	1
26	5521	2.5	180	28	0
27	5522	2.5	228	23	1
28	5523	2.5	203	25	1
29	5524	1.5	188	25	1
30	5525	1.9	217	24	1
Detection Percentage (%)					90.00

Type 3 Radar Statistical Performance

Trail #	Test Freq. (MHz)	Pulse Width (us)	PRI (us)	Pulses / Burst	1=Detection 0=No Detection
1	5496	8.0	205	16	1
2	5497	6.7	382	18	1
3	5498	8.6	418	16	1
4	5499	9.4	351	17	1
5	5500	7.4	383	18	1
6	5501	9.8	232	16	1
7	5502	9.1	377	17	1
8	5503	9.6	457	16	1
9	5504	8.0	471	18	0
10	5505	9.0	304	18	1
11	5506	8.0	316	17	1
12	5507	9.8	325	16	1
13	5508	8.0	409	17	1
14	5509	9.9	200	17	1
15	5510	8.8	458	16	1
16	5511	8.0	232	18	1
17	5512	8.3	250	16	1
18	5529	8.7	270	16	1
19	5514	7.7	350	17	1
20	5515	7.1	230	16	1
21	5516	7.3	416	18	1
22	5517	7.6	498	18	1
23	5491	7.3	286	17	1
24	5519	7.3	287	16	0
25	5520	7.5	462	17	1
26	5521	6.2	300	17	1
27	5522	6.4	323	18	1
28	5523	7.1	420	16	0
29	5524	7.2	395	18	1
30	5525	8.4	377	16	1
Detection Percentage (%)					90.00

Type 4 Radar Statistical Performance

Trail #	*Test Freq. (MHz)*	*Pulse Width (us)*	*PRI (us)*	*Pulses / Burst*	*1=Detection 0=No Detection*
1	5496	18.0	242	15	1
2	5497	19.9	279	12	1
3	5498	12.9	487	14	1
4	5499	15.0	452	13	1
5	5500	16.3	230	12	1
6	5501	19.8	238	13	1
7	5502	18.2	420	16	1
8	5529	16.3	452	15	1
9	5504	14.2	495	12	1
10	5505	17.8	228	16	1
11	5506	19.1	211	16	1
12	5507	18.4	283	15	1
13	5508	11.8	411	12	1
14	5509	14.2	284	13	0
15	5510	13.9	202	12	0
16	5511	17.8	340	14	1
17	5512	15.6	290	16	1
18	5513	14.6	250	16	1
19	5514	14.4	484	15	1
20	5515	18.9	387	13	1
21	5516	11.1	348	15	1
22	5517	13.8	291	16	1
23	5518	14.3	295	12	1
24	5519	12.5	300	12	1
25	5520	12.5	322	14	0
26	5521	12.5	383	13	1
27	5522	15.7	322	16	1
28	5523	19.8	469	13	1
29	5524	18.6	406	15	1
30	5491	15.9	238	14	1
Detection Percentage (%)					90.00

Total Type 1~4 Radar Statistical Performance

Radar Type #	Detection Percentage (%)
1	96.67
2	90.00
3	90.00
4	90.00
Total 1~4	90.00

Type 5 Radar Statistical Performance

Trail #	1=Detection 0=No Detection	Trail #	1=Detection 0=No Detection	Trail #	1=Detection 0=No Detection
1	1	11	1	21	1
2	0	12	1	22	1
3	1	13	1	23	1
4	1	14	1	24	1
5	1	15	1	25	0
6	0	16	1	26	0
7	1	17	0	27	1
8	1	18	1	28	1
9	1	19	1	29	1
10	1	20	1	30	1
Detection Percentage (%)					83.33

Type 6 Radar Statistical Performance

Trail #	Test Freq. (MHz)	Pulses / Hop	Pulse Width (us)	PRI (us)	1=Detection 0=No Detection
1	5510	9	1	333	1
2	5510	9	1	333	1
3	5510	9	1	333	1
4	5510	9	1	333	1
5	5510	9	1	333	1
6	5510	9	1	333	1
7	5510	9	1	333	1
8	5510	9	1	333	1
9	5510	9	1	333	1
10	5510	9	1	333	1
11	5510	9	1	333	1
12	5510	9	1	333	1
13	5510	9	1	333	1
14	5510	9	1	333	1
15	5510	9	1	333	1
16	5510	9	1	333	1
17	5510	9	1	333	1
18	5510	9	1	333	1
19	5510	9	1	333	1
20	5510	9	1	333	1
21	5510	9	1	333	1
22	5510	9	1	333	0
23	5510	9	1	333	1
24	5510	9	1	333	1
25	5510	9	1	333	1
26	5510	9	1	333	1
27	5510	9	1	333	1
28	5510	9	1	333	1
29	5510	9	1	333	1
30	5510	9	1	333	1
Detection Percentage (%)					96.67

Modulation Mode: 802.11ac (VHT80)

Type 1 Radar Statistical Performance

Trail #	Test Freq. (MHz)	Pulse Width (us)	PRI (us)	Pulses / Burst	1=Detection 0=No Detection
1	5516	1	1930.5	518	1
2	5517	23	326.2	3066	1
3	5518	19	1139.0	878	1
4	5519	12	1355.0	738	1
5	5520	4	1730.1	578	1
6	5521	8	1519.8	658	1
7	5522	15	1253.1	798	1
8	5523	6	1618.1	618	1
9	5524	14	1285.3	778	1
10	5525	3	1792.1	558	1
11	5526	13	1319.3	758	1
12	5527	9	1474.9	678	1
13	5528	7	1567.4	638	0
14	5529	17	1193.3	838	1
15	5530	10	1432.7	698	1
16	5531	1	1692.0	591	1
17	5532	2	328.1	3048	1
18	5533	3	373.4	2678	1
19	5534	4	574.4	1741	0
20	5535	5	1216.5	822	1
21	5536	6	801.3	1248	1
22	5537	7	488.5	2047	1
23	5538	8	956.0	1046	1
24	5539	9	517.6	1932	1
25	5540	10	1422.5	703	1
26	5541	11	542.0	1845	1
27	5542	12	741.3	1349	1
28	5543	13	881.8	1134	1
29	5544	14	427.4	2340	1
30	5545	15	628.9	1590	1
Detection Percentage (%)					93.33

Type 2 Radar Statistical Performance

Trail #	Test Freq. (MHz)	Pulse Width (us)	PRI (us)	Pulses / Burst	1=Detection 0=No Detection
1	5516	2.6	221	23	1
2	5517	4.6	198	27	1
3	5518	1.1	184	29	1
4	5519	4.8	203	24	1
5	5520	2.4	162	25	1
6	5521	3.4	204	28	1
7	5522	2.3	170	27	1
8	5523	3.5	184	23	1
9	5524	4.9	150	27	1
10	5525	4.6	211	29	1
11	5526	2.9	158	23	1
12	5527	2.6	226	27	1
13	5528	1.6	204	26	1
14	5529	3.9	181	25	1
15	5530	4.6	202	24	1
16	5531	4.1	194	27	0
17	5532	2.3	193	28	1
18	5533	3.9	173	29	1
19	5534	4.3	188	23	1
20	5535	1.5	215	26	1
21	5536	4.9	227	27	1
22	5537	1.1	199	23	1
23	5538	4.5	155	29	1
24	5539	4.0	190	27	1
25	5540	2.4	151	23	1
26	5541	2.5	180	28	1
27	5542	2.5	228	23	1
28	5543	2.5	203	25	1
29	5544	1.5	188	25	1
30	5545	1.9	217	24	0
Detection Percentage (%)					93.33

Type 3 Radar Statistical Performance

Trail #	Test Freq. (MHz)	Pulse Width (us)	PRI (us)	Pulses / Burst	1=Detection 0=No Detection
1	5516	8.0	205	16	1
2	5517	6.7	382	18	1
3	5518	8.6	418	16	0
4	5519	9.4	351	17	1
5	5520	7.4	383	18	1
6	5521	9.8	232	16	1
7	5522	9.1	377	17	0
8	5523	9.6	457	16	1
9	5524	8.0	471	18	1
10	5525	9.0	304	18	1
11	5526	8.0	316	17	1
12	5527	9.8	325	16	1
13	5528	8.0	409	17	1
14	5529	9.9	200	17	1
15	5530	8.8	458	16	1
16	5531	8.0	232	18	1
17	5532	8.3	250	16	1
18	5533	8.7	270	16	1
19	5534	7.7	350	17	1
20	5535	7.1	230	16	1
21	5536	7.3	416	18	1
22	5537	7.6	498	18	1
23	5538	7.3	286	17	1
24	5539	7.3	287	16	1
25	5540	7.5	462	17	0
26	5541	6.2	300	17	1
27	5542	6.4	323	18	1
28	5543	7.1	420	16	1
29	5544	7.2	395	18	1
30	5545	8.4	377	16	1
Detection Percentage (%)					90.00

Type 4 Radar Statistical Performance

Trail #	*Test Freq. (MHz)*	*Pulse Width (us)*	*PRI (us)*	*Pulses / Burst*	*1=Detection 0=No Detection*
1	5516	18.0	242	15	1
2	5517	19.9	279	12	0
3	5518	12.9	487	14	1
4	5519	15.0	452	13	1
5	5520	16.3	230	12	1
6	5521	19.8	238	13	1
7	5522	18.2	420	16	1
8	5523	16.3	452	15	1
9	5524	14.2	495	12	1
10	5525	17.8	228	16	1
11	5526	19.1	211	16	1
12	5527	18.4	283	15	0
13	5528	11.8	411	12	1
14	5529	14.2	284	13	1
15	5530	13.9	202	12	1
16	5531	17.8	340	14	1
17	5532	15.6	290	16	0
18	5533	14.6	250	16	1
19	5534	14.4	484	15	1
20	5535	18.9	387	13	1
21	5536	11.1	348	15	1
22	5537	13.8	291	16	1
23	5538	14.3	295	12	1
24	5539	12.5	300	12	1
25	5540	12.5	322	14	1
26	5541	12.5	383	13	1
27	5542	15.7	322	16	1
28	5543	19.8	469	13	0
29	5544	18.6	406	15	1
30	5545	15.9	238	14	1
Detection Percentage (%)					86.67

Total Type 1~4 Radar Statistical Performance

Radar Type #	Detection Percentage (%)
1	93.33
2	93.33
3	86.67
4	86.67
Total 1~4	90.00

Type 5 Radar Statistical Performance

Trail #	1=Detection 0=No Detection	Trail #	1=Detection 0=No Detection	Trail #	1=Detection 0=No Detection
1	1	11	1	21	1
2	0	12	1	22	0
3	1	13	1	23	1
4	1	14	1	24	1
5	1	15	1	25	1
6	1	16	1	26	1
7	0	17	1	27	1
8	1	18	1	28	1
9	1	19	1	29	1
10	1	20	1	30	1
Detection Percentage (%)					90.00

Type 6 Radar Statistical Performance

Trail #	Test Freq. (MHz)	Pulses / Hop	Pulse Width (us)	PRI (us)	1=Detection 0=No Detection
1	5530	9	1	333	1
2	5530	9	1	333	1
3	5530	9	1	333	1
4	5530	9	1	333	1
5	5530	9	1	333	1
6	5530	9	1	333	1
7	5530	9	1	333	1
8	5530	9	1	333	1
9	5530	9	1	333	1
10	5530	9	1	333	1
11	5530	9	1	333	1
12	5530	9	1	333	1
13	5530	9	1	333	1
14	5530	9	1	333	1
15	5530	9	1	333	1
16	5530	9	1	333	1
17	5530	9	1	333	1
18	5530	9	1	333	1
19	5530	9	1	333	1
20	5530	9	1	333	1
21	5530	9	1	333	1
22	5530	9	1	333	1
23	5530	9	1	333	1
24	5530	9	1	333	1
25	5530	9	1	333	1
26	5530	9	1	333	1
27	5530	9	1	333	1
28	5530	9	1	333	1
29	5530	9	1	333	1
30	5530	9	1	333	1
Detection Percentage (%)					100.00

4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum analyzer	R&S	FSP40	100142	9kHz~40GHz	Oct. 15, 2014	Conducted (DF01-CB)
Signal generator	R&S	SMU200A	102782	25MHz-6GHz	Nov. 29, 2014	Conducted (DF01-CB)
RF Power Divider	ANAREN	2 Way	DFS-01-DV-02	1GHz ~ 6GHz	Jan. 10, 2015	Conducted (DF01-CB)
RF Power Divider	MTJ	2Way	DFS-01-DV-03	1GHz ~ 6GHz	Jan. 10, 2015	Conducted (DF01-CB)
RF Power Divider	ANAREN	4 Way	DFS-01-DV-01	1GHz ~ 6GHz	Jan. 10, 2015	Conducted (DF01-CB)
Horn Antenna	COM-POWER	AH-118	071187	1GHz – 18GHz	Aug. 26, 2014	Conducted (DF01-CB)
Horn Antenna	COM-POWER	AH-118	071042	1GHz – 18GHz	Dec. 03, 2014	Conducted (DF01-CB)
RF Cable-high	Woken	RG402	High Cable-53	1 GHz –18 GHz	Nov. 15, 2014	Conducted (DF01-CB)
RF Cable-high	Woken	RG402	High Cable-54	1 GHz –18 GHz	Nov. 15, 2014	Conducted (DF01-CB)
RF Cable-high	Woken	RG402	High Cable-56	1 GHz –18 GHz	Nov. 15, 2014	Conducted (DF01-CB)
RF Cable-high	Woken	RG402	High Cable-57	1 GHz –18 GHz	Nov. 15, 2014	Conducted (DF01-CB)
RF Cable-high	Woken	RG402	High Cable-58	1 GHz –18 GHz	Nov. 15, 2014	Conducted (DF01-CB)
RF Cable-high	Woken	RG402	High Cable-60	1 GHz –18 GHz	Nov. 15, 2014	Conducted (DF01-CB)
Thermometer	HTC-1	HTC-1	TP-11	-50℃~70℃	Mar. 05, 2015	Conducted (DF01-CB)

Note: Calibration Interval of instruments listed above is one year.

5 Measurement Uncertainty

Test Items	Uncertainty	Remark
Radiated Emission	2.9 dB	Confidence levels of 95%