

ETSI EN 301 893 V2.1.1 (2017-05)
DYNAMIC FREQUENCY SELECTION
TEST REPORT

For

SHENZHEN TENDA TECHNOLOGY CO.,LTD

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Tested Model: OS3

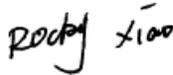
Report Type: Original Report	Product Type: 5GHz 11ac 867Mbps 12dBi Outdoor CPE
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Report Date:	2022-05-11
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product Name:		5GHz 11ac 867Mbps 12dBi Outdoor CPE
EUT Model:		OS3
Rated Input Voltage:		DC 12V from adapter or 12V from POE
Adapter Information:	Model:	BN073-A12012E
	Input:	100-240Vac 50/60Hz 0.4A
	Output:	DC 12V 1A
Serial Number:		DG2220302-06777E-RF-S1
EUT Received Date:		2022.03.05
EUT Received Status:		Good

Technical Specification

Operation Frequency Range (MHz):		5470~5725MHz
RF Output Power (EIRP) (dBm):		26.82
Number of Chains	Transmit:	2
	Receive:	2
Antenna Gain (dBi)[▲]:		12
Beamforming Gain(dBi)[▲]:		3
Modulation Type:		OFDM

Objective

The following type approved report of radio equipment is prepared on behalf of **SHENZHEN TENDA TECHNOLOGY CO.,LTD** in accordance with ETSI EN 301 893 V2.1.1 (2017-05), Broadband Radio Access Networks (BRAN); 5 GHz high performance RLAN; Harmonized EN covering the essential requirements of article 3.2 of Directive 2014/53/EU.

The objective of the manufacturer is to determine compliance with ETSI EN 301 893 V2.1.1 (2017-05) for the following tests:

Dynamic Frequency Selection (DFS)

In order to determine compliance, the manufacturer or a contracted laboratory makes measurements and takes the necessary steps to ensure that the equipment complies with the appropriate technical standards.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in lowering the immunity should be checked to ensure that compliance has been maintained (i.e., harnessing and/or I/O cable change, etc.).

Related Submittal(s)/Grchain (s)

No Related Submittals.

Test Methodology

All measurement contained in this report were conducted in accordance with EN 301 893 V2.1.1 (2017-05) §4.2.6.

Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '▲'. Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

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SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing according to EN 301 893.

EUT Exercise Software

N/A

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Lenovo	Laptop	21H2	M70958ZR
Apple	Smartphone	A1524	FK1R96VYG5QT

External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
RJ45	No	No	1.2	Laptop	EUT

SUMMARY OF TEST RESULTS

The following result table represents the list of measurements required under the EN 301 893 V2.1.1 (2017-05).

Items	Description of Test	Result
Channel Available Check	Initial Channel Availability Check Time (CAC)	Compliant
	Radar Burst at the Beginning of the CAC	Compliant
	Radar Burst at the End of the CAC	Compliant
In-Service Monitoring	Channel Move Time	Compliant
	Channel Closing Transmission Time	Compliant
Non-Occupancy Period	Statistical Performance Check	Compliant
Uniform Spreading	Probability and Availability of the Usable Channels	Compliant*

Note: EUT is a master device.

Compliant*: It's declared by manufacturer.

APPLICABLE STANDARDS

DFS Requirement

EN 301 893 V2.1.1 §4.2.6; Annex D

Table 1: Applicability of DFS Requirements

Requirement	DFS Operational mode		
	Master	Slave without radar detection (see table D.2, note 2)	Slave with radar detection (see table D.2, note 2)
Channel Availability Check	✓	Not required	✓ (see note 2)
Off-Channel CAC (see note 1)	✓	Not required	✓ (see note 2)
In-Service Monitoring	✓	Not required	✓
Channel Shutdown	✓	✓	✓
Non-Occupancy Period	✓	Not required	✓
Uniform Spreading	✓	Not required	Not required

NOTE 1: Where implemented by the manufacturer.
 NOTE 2: A slave with radar detection is not required to perform a CAC or *Off-Channel CAC* at initial use of the channel but only after the slave has detected a radar signal on the *Operating Channel* by *In-Service Monitoring*.

Table 2: DFS Requirement values

Parameter	Value
Channel Availability Check Time	60 s (see note 1)
Minimum Off-Channel CAC Time	6 minutes (see note 2)
Maximum Off-Channel CAC Time	4 hours (see note 2)
Channel Move Time	10 s
Channel Closing Transmission Time	1 s
Non-Occupancy Period	30 minutes

NOTE 1: For channels whose nominal bandwidth falls completely or partly within the band 5 600 MHz to 5 650 MHz, the *Channel Availability Check Time* shall be 10 minutes.
 NOTE 2: For channels whose nominal bandwidth falls completely or partly within the band 5 600 MHz to 5 650 MHz, the *Off-Channel CAC Time* shall be within the range 1 to 24 hours.

Table 3: Interference Threshold values, Master

e.i.r.p. Spectral Density (dBm/MHz)	Value (see note 1 and note 2)
10	-62 dBm
<p>NOTE 1: This is the level at the input of the receiver of an RLAN device with a maximum e.i.r.p. density of 10 dBm/MHz and assuming a 0 dBi receive antenna. For devices employing different e.i.r.p. spectral density and/or a different receive antenna gain G (dBi) the Radar Detection Threshold Level at the receiver input follows the following relationship: DFS Detection Threshold (dBm) = -62 + 10 - e.i.r.p. Spectral Density (dBm/MHz) + G (dBi); however the Radar Detection Threshold Level shall not be less than -64 dBm assuming a 0 dBi receive antenna gain.</p> <p>NOTE 2: Slave devices with a maximum e.i.r.p. of less than 23 dBm do not have to implement radar detection unless these devices are used in fixed outdoor point to point or fixed outdoor point to multipoint applications (see clause 4.2.6.1.3).</p>	

Table 4: Interference Threshold values, Master

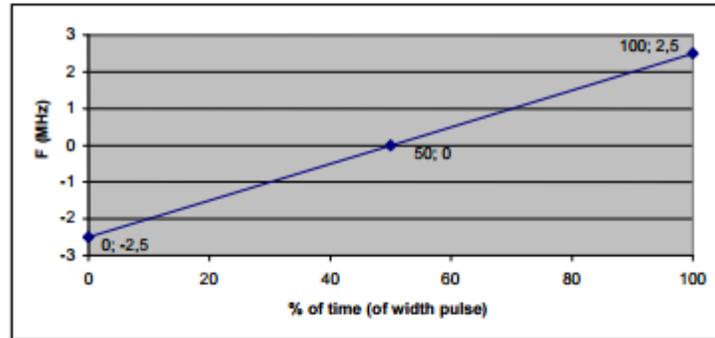
Pulse width W (µs)	Pulse repetition frequency PRF (PPS)	Pulses per burst (PPB)
1	700	18

Table 5: Parameters of DSF Test Signals

Radar test signal # (see note 1 to note 3)	Pulse width W (µs)		Pulse repetition frequency PRF (PPS)		Number of different PRFs	Pulses per burst for each PRF (PPB) (see note 5)
	Min	Max	Min	Max		
1	0,5	5	200	1 000	1	10 (see note 6)
2	0,5	15	200	1 600	1	15 (see note 6)
3	0,5	15	2 300	4 000	1	25
4	20	30	2 000	4 000	1	20
5	0,5	2	300	400	2/3	10 (see note 6)
6	0,5	2	400	1 200	2/3	15 (see note 6)

NOTE 1: Radar test signals #1 to #4 are constant PRF based signals. See figure D.1. These radar test signals are intended to simulate also radars using a packet based Staggered PRF. See figure D.2.

NOTE 2: Radar test signal #4 is a modulated radar test signal. The modulation to be used is a chirp modulation with a ±2,5 MHz frequency deviation which is described below.



NOTE 3: Radar test signals #5 and #6 are single pulse based Staggered PRF radar test signals using 2 or 3 different PRF values. For radar test signal #5, the difference between the PRF values chosen shall be between 20 PPS and 50 PPS. For radar test signal #6, the difference between the PRF values chosen shall be between 80 PPS and 400 PPS. See figure D.3.

NOTE 4: Apart for the Off-Channel CAC testing, the radar test signals above shall only contain a single burst of pulses. See figure D.1, figure D.3 and figure D.4. For the Off-Channel CAC testing, repetitive bursts shall be used for the total duration of the test. See figure D.2 and figure D.5. See also clause 4.2.6.2.3, clause 5.4.8.2.1.4.2 and clause 5.4.8.2.1.4.3.

NOTE 5: The total number of pulses in a burst is equal to the number of pulses for a single PRF multiplied by the number of different PRFs used.

NOTE 6: For the CAC and Off-Channel CAC requirements, the minimum number of pulses (for each PRF) for any of the radar test signals to be detected in the band 5 600 MHz to 5 650 MHz shall be 18.

Table 6: Detection probability

Parameter	Detection Probability (P_d)	
	Channels whose nominal bandwidth falls partly or completely within the 5 600 MHz to 5 650 MHz band	Other channels
CAC, Off-Channel CAC	99,99 %	60 %
In-Service Monitoring	60 %	60 %

NOTE: P_d gives the probability of detection per simulated radar burst and represents a minimum level of detection performance under defined conditions. Therefore P_d does not represent the overall detection probability for any particular radar under real life conditions.

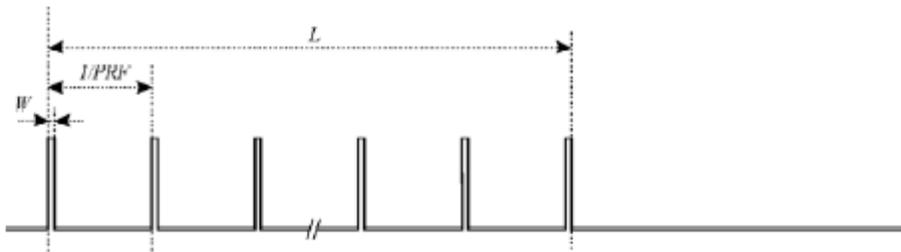


Figure D.1: General structure of a single burst/constant PRF based radar test signal

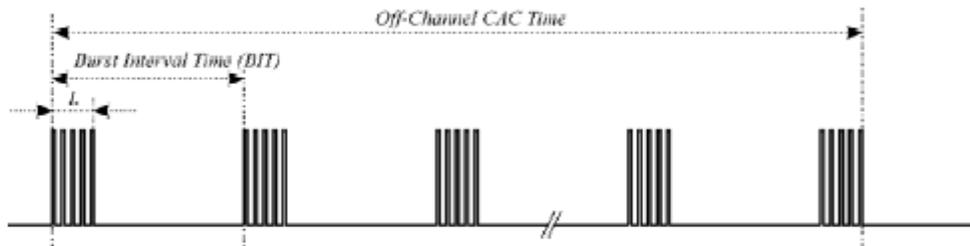


Figure D.2: General structure of a multiple burst/constant PRF based radar test signal

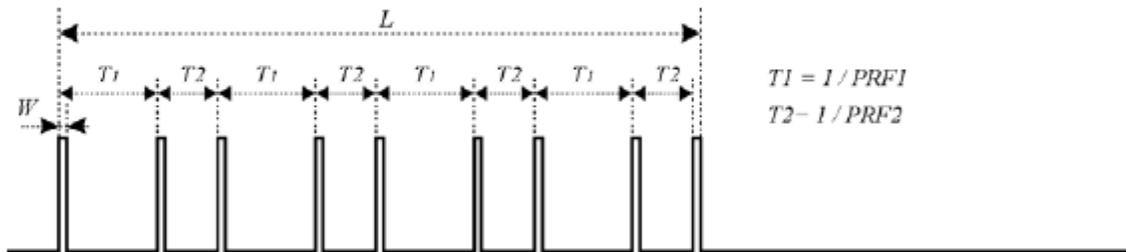


Figure D.3: General structure of a single burst/single pulse based staggered PRF radar test signal

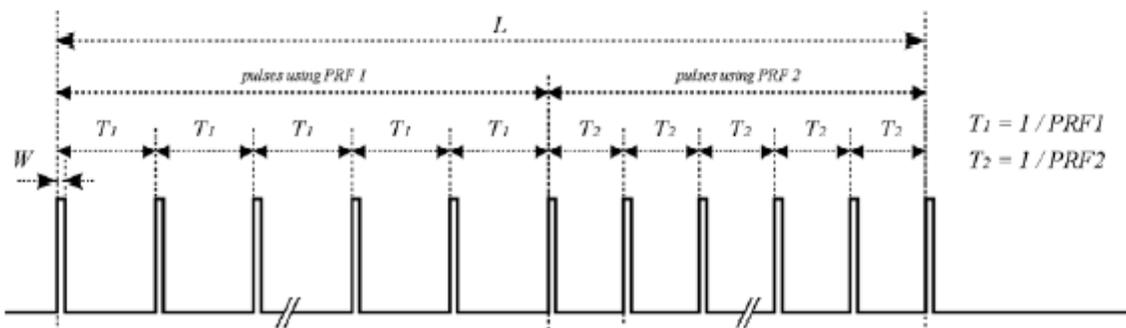


Figure D.4: General structure of a single burst/packet based staggered PRF radar test signal

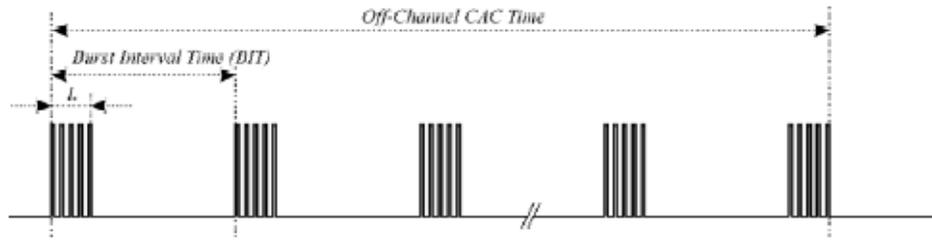


Figure D.5: General structure of a multiple burst/packet based staggered PRF based radar test signal

DFS Definition

Channel Available Check: The Channel Availability Check is defined as the mechanism by which an RLAN device checks a channel for the presence of radar signals.

Off-Channel CAC: The Off-Channel CAC is defined as a mechanism by which a RLAN monitors channel(s), different from the Operating Channel, for the presence of radar signals.

In-Service Monitoring: The In-Service Monitoring is defined as the process by which an RLAN monitors the Operating Channel for the presence of radar signals.

Channel Shutdown: The Channel Shutdown is defined as the process initiated by the RLAN device immediately after a radar signal has been detected on an Operating Channel.

Channel Move Time: The time to cease all transmissions on the current Channel upon detection of a Radar Waveform above the DFS Detection Threshold.

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

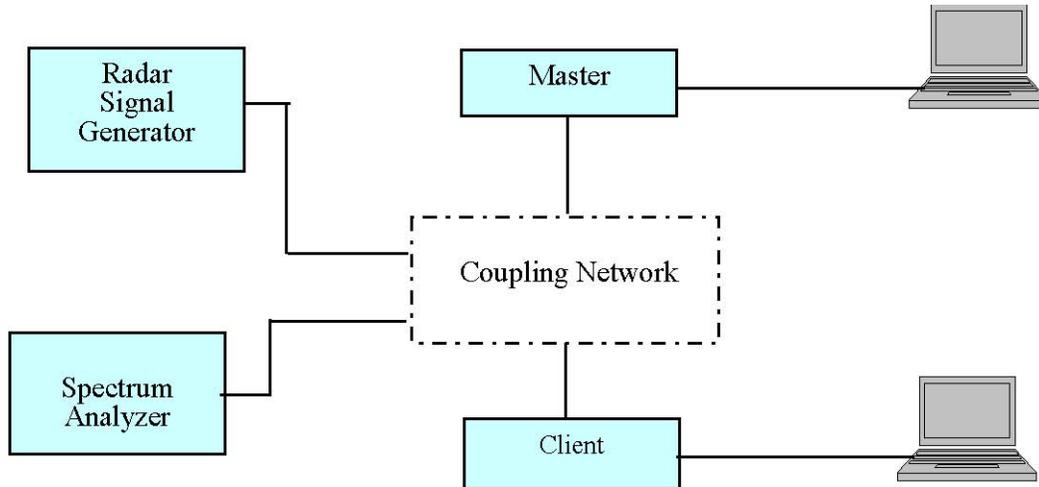
Non-Occupancy Period: The Non-Occupancy Period is defined as the time during which the RLAN device shall not make any transmissions on a channel after a radar signal was detected on that channel by either the Channel Availability Check or the In-Service Monitoring.

Detection Threshold: Received signal level, above which the device must be able to detect radar.

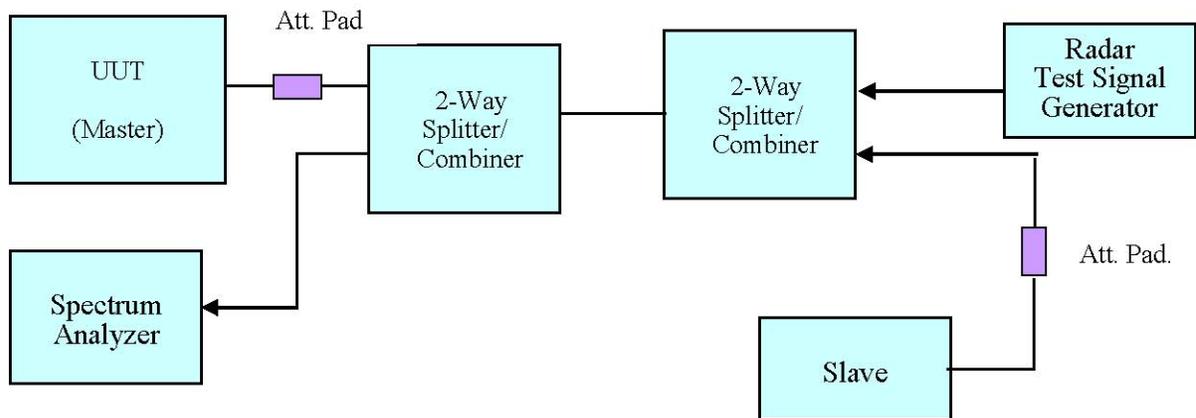
DFS MEASUREMENT SYSTEM

BACL DFS measurement system consists of two subsystems: (1) The radar signal generating subsystem and (2) the traffic monitoring subsystem.

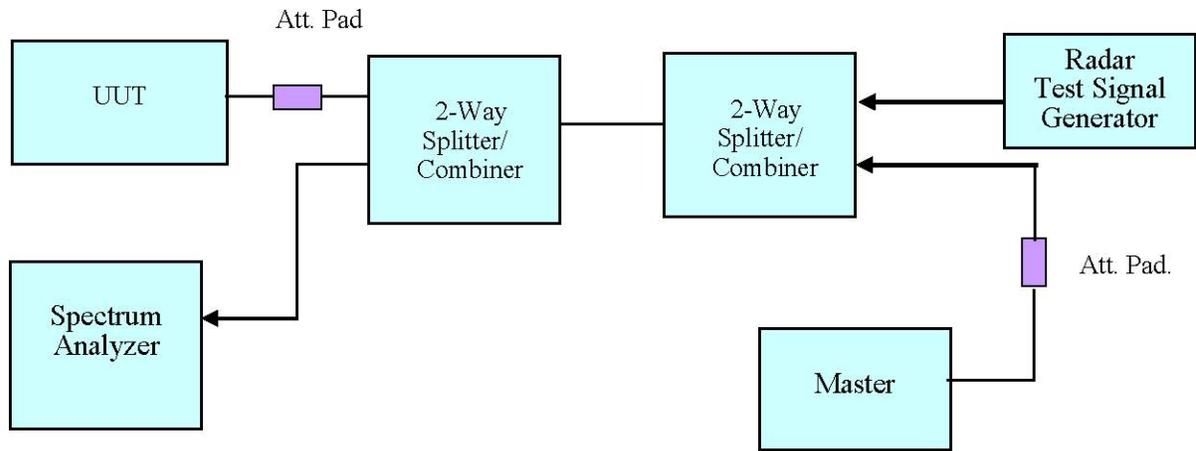
System Block Diagram



Conducted Method

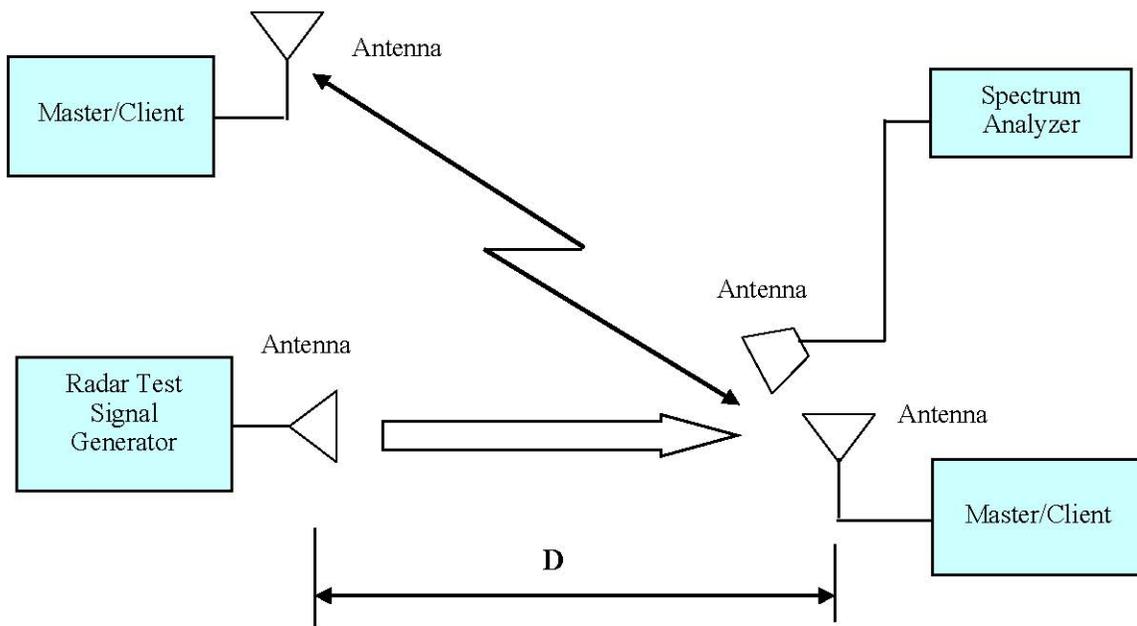


Setup for Master with injection at the Master



Setup for Client with injection at the Master

Radiated Method



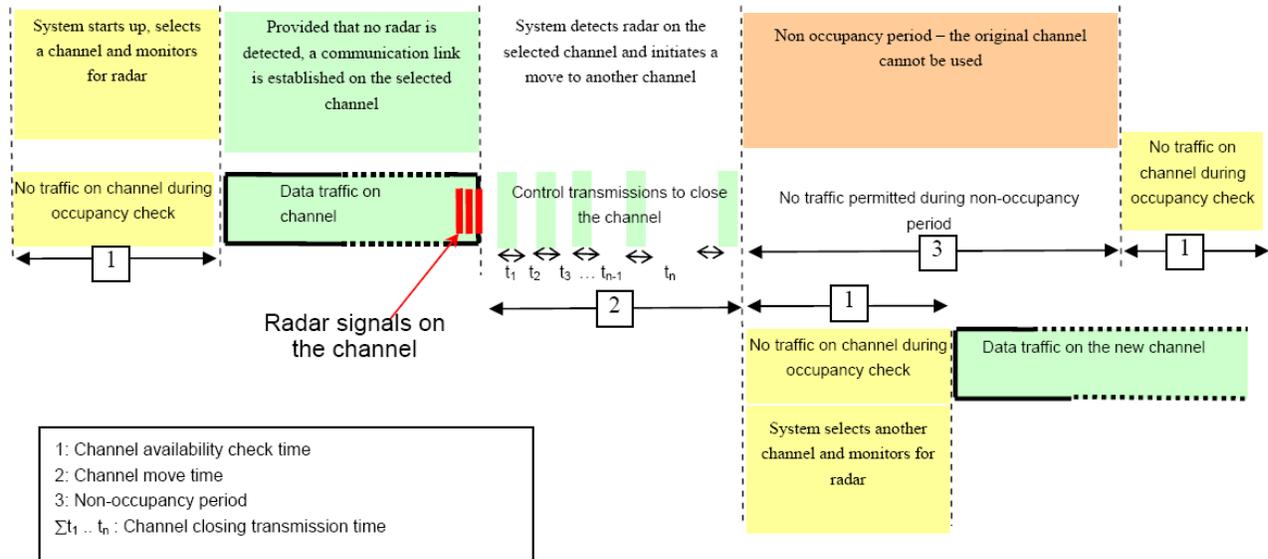
Setup for Radiated Method

Test Procedure

A spectrum analyzer is used as a monitor verifies that the EUT status including 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. It is also used to monitor EUT transmissions during the Channel Availability Check Time.

DFS Implementation

Please refer to the block diagram:



TEST RESULTS

Description of EUT

The EUT operates in 5470-5725 MHz (without 5600-5650MHz) range when performing DFS testing.

The calibrated radiated DFS detection threshold level is set following ETSI EN 301 893 V2.1.1 (2017 -05) Annex D for this band.

WLAN traffic is generated by streaming the video file “Test File.mpg”, this file is used by IP and Frame based systems for loading the test channel during the In-service compliance testing of the U-NII device. The file is streamed from the Access Point to the Client in full motion video mode using the media player with the V2.61 Codec package.

Test Equipment List and Details

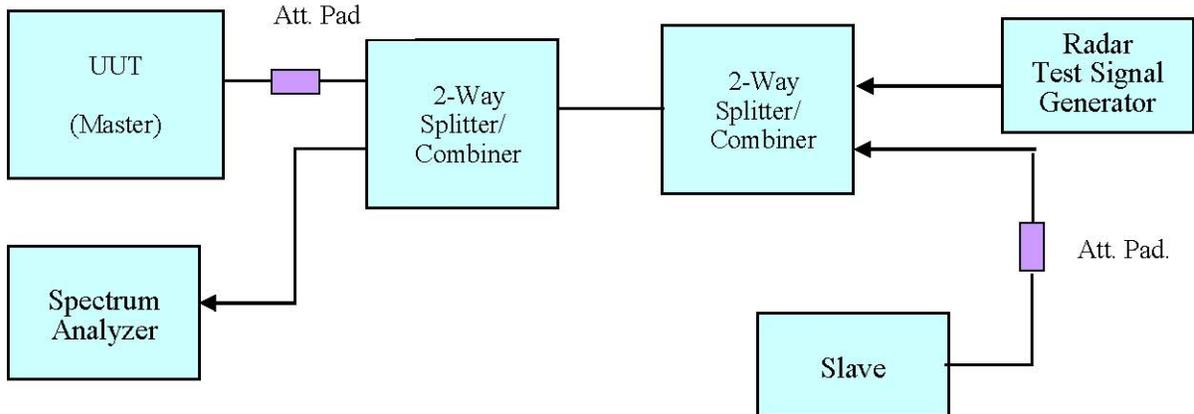
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Keysight	MXA Signal Analyzer	N9020	MY48490106	2021.10.26	2022.10.25
Agilent	MXG Analog Signal Generator	N5181A	MY48480126	2021.10.26	2022.10.25
Agilent	MXG Vector Signal Generator	N5182A	MY49060291	2021.10.26	2022.10.25
Tonscend	RF Control Unit	JS0806-2	19G8060182	2021.10.26	2022.10.25

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Environmental Conditions

Temperature:	18.6~24.9°C
Relative Humidity:	55~65%
ATM Pressure:	100.7~101.8kPa
Tester:	Ivy Tang
Test Date:	2022-04-12~2022-05-09

Radar Waveform Calibration



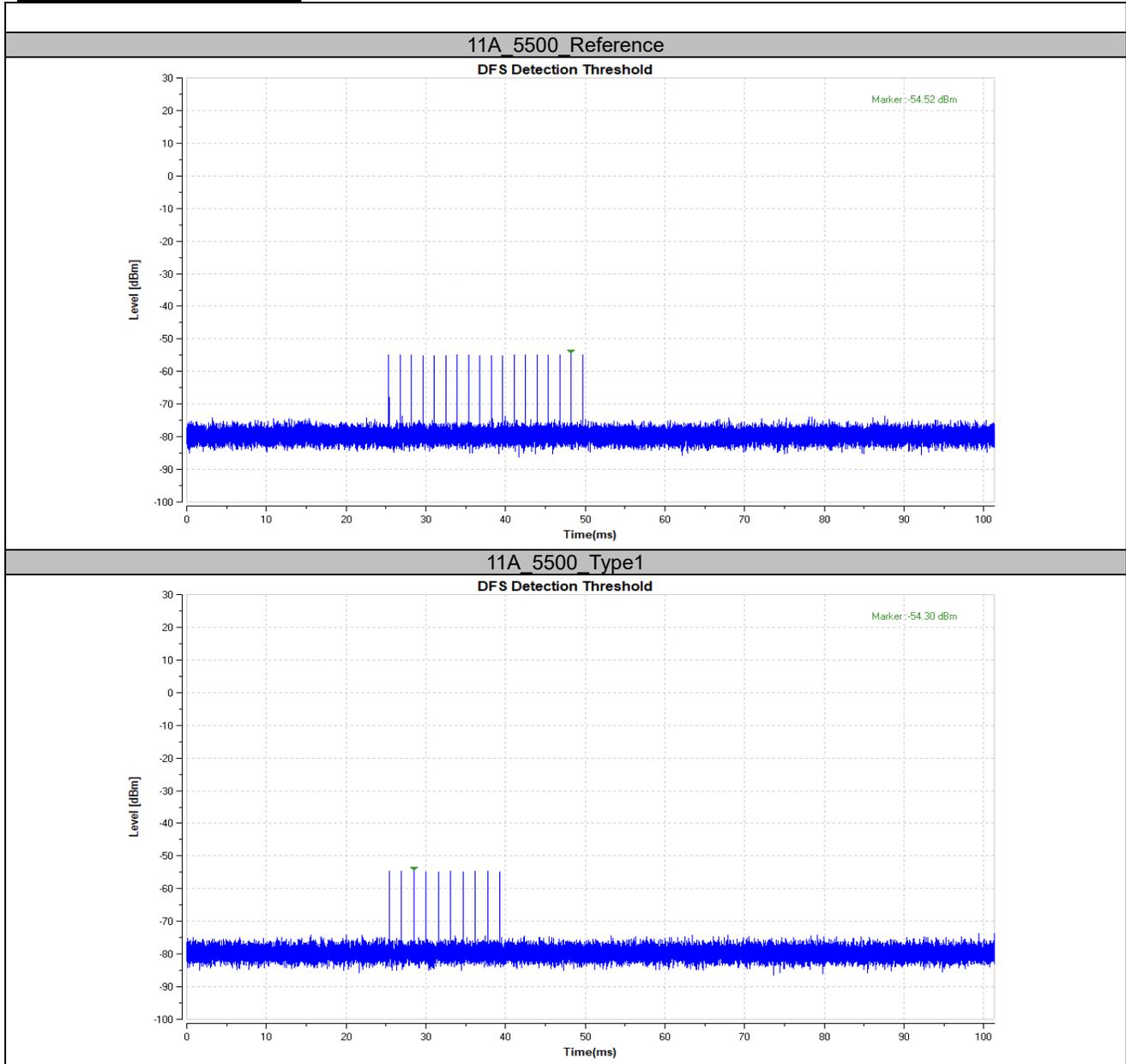
DFS Detection Threshold (dBm) = -62 + 10 - e.i.r.p. Spectral Density (dBm/MHz) + G (dBi)

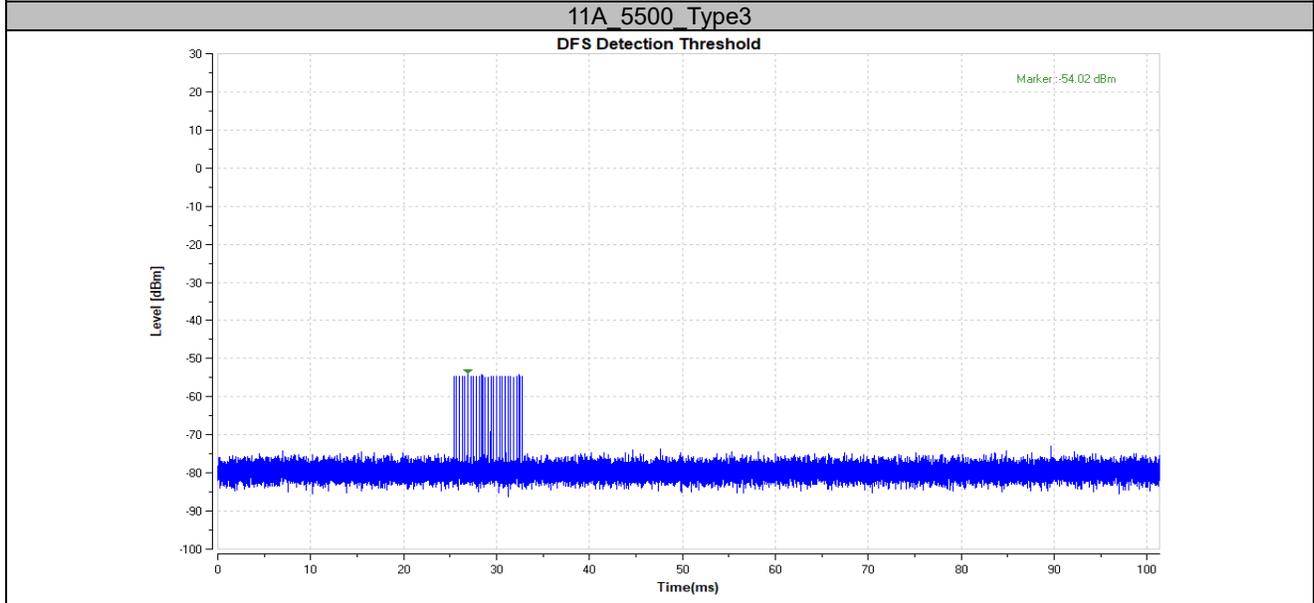
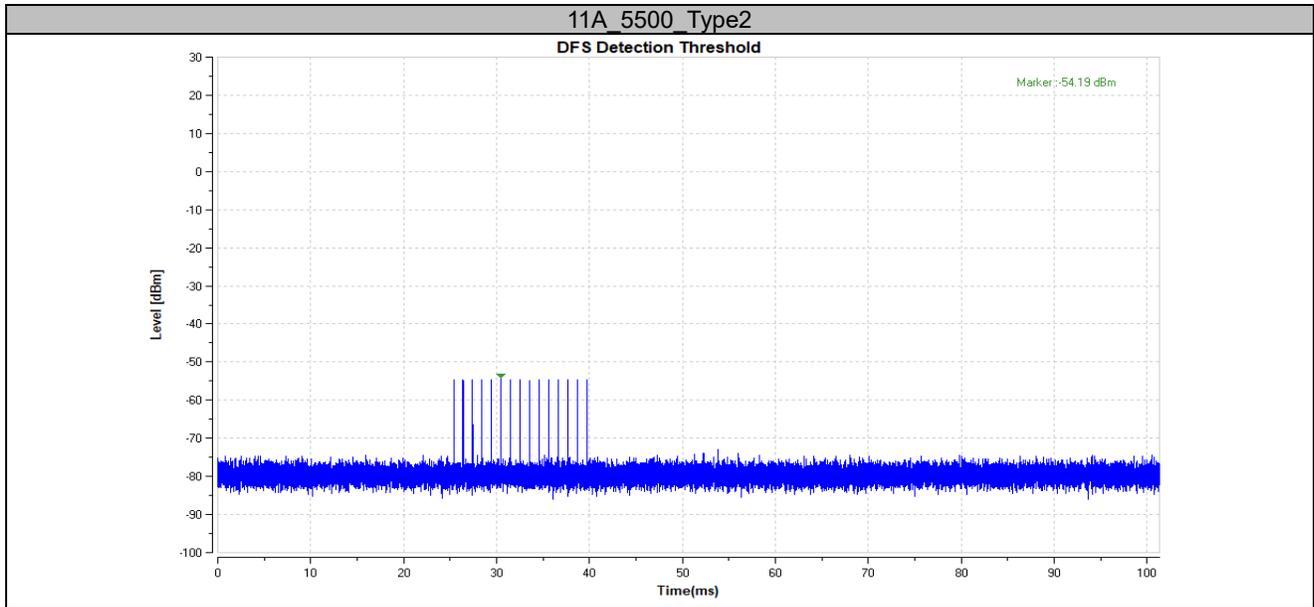
Where,
 e.i.r.p. Spectral Density (dBm/MHz) is 13.97dBm/MHz;
 G (dBi) is 12dBi.

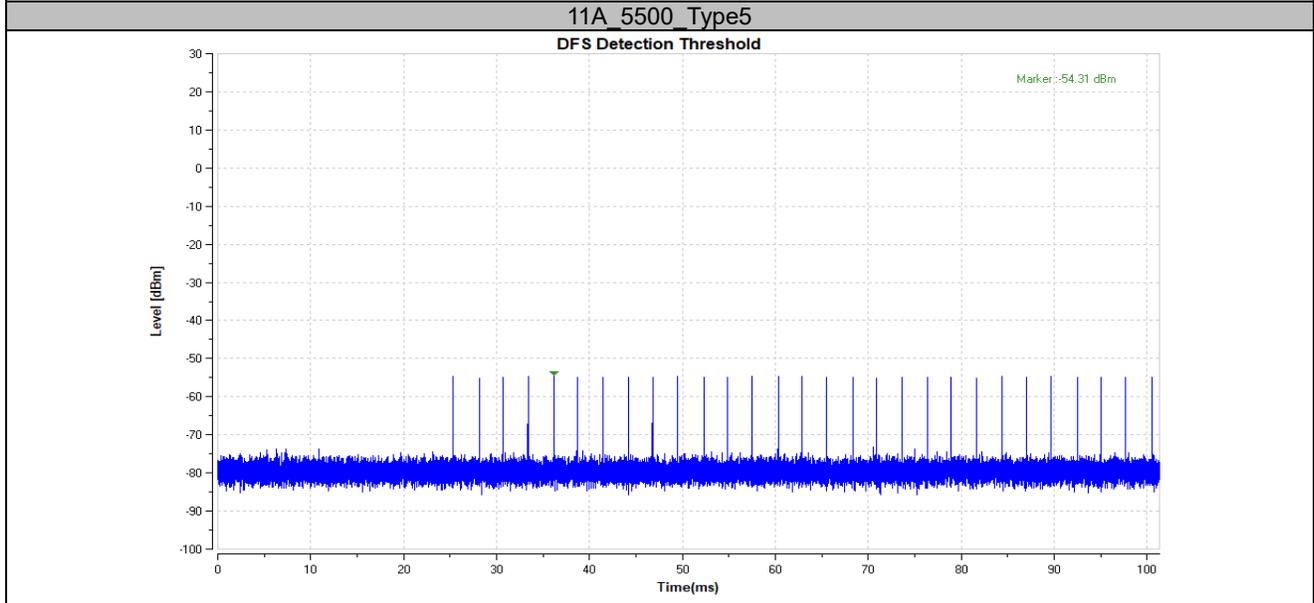
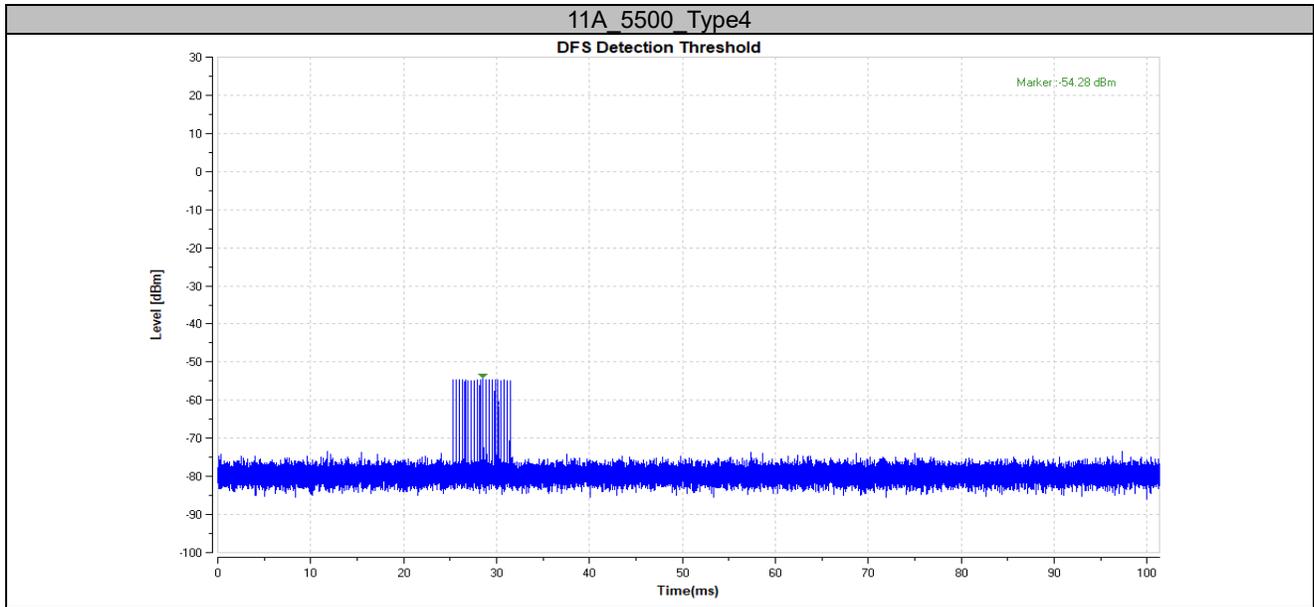
So,
 DFS Detection Threshold (dBm) = -62 + 10 - e.i.r.p. Spectral Density (dBm/MHz) + G (dBi) = -53.97 dBm/MHz
 ≈ -54dBm/MHz

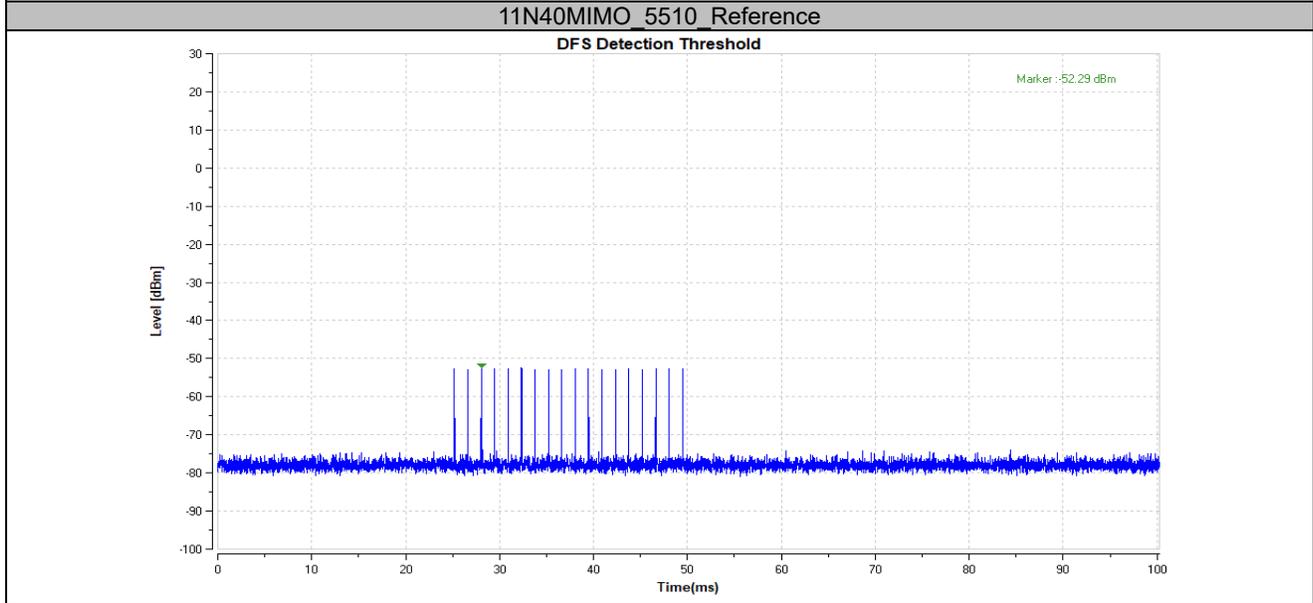
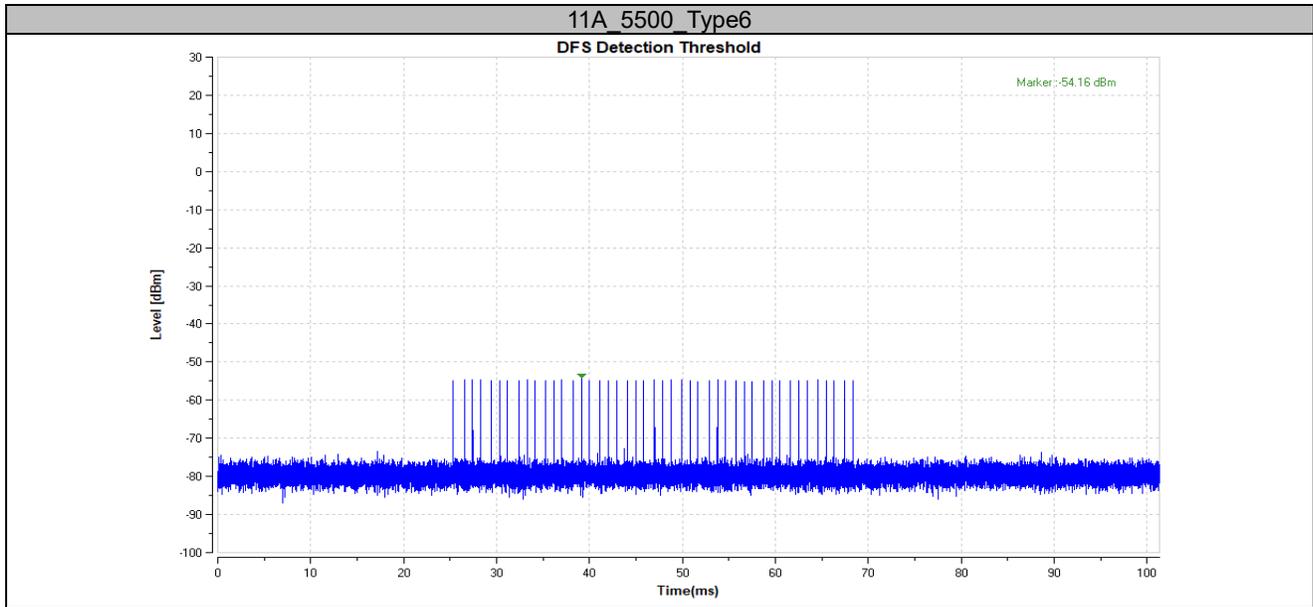
TestMode	Frequency[MHz]	Radar Type	Result
11A	5500	Reference	-54.52
		Type1	-54.30
		Type2	-54.19
		Type3	-54.02
		Type4	-54.28
		Type5	-54.31
		Type6	-54.16
11N40MIMO	5510	Reference	-52.29
		Type1	-52.27
		Type2	-52.15
		Type3	-52.14
		Type4	-52.21
		Type5	-52.29
		Type6	-52.22
11AC80MIMO	5530	Reference	-48.33
		Type1	-48.26
		Type2	-48.27
		Type3	-48.19
		Type4	-48.26
		Type5	-48.22
		Type6	-48.31

Plots of Radar Waveforms

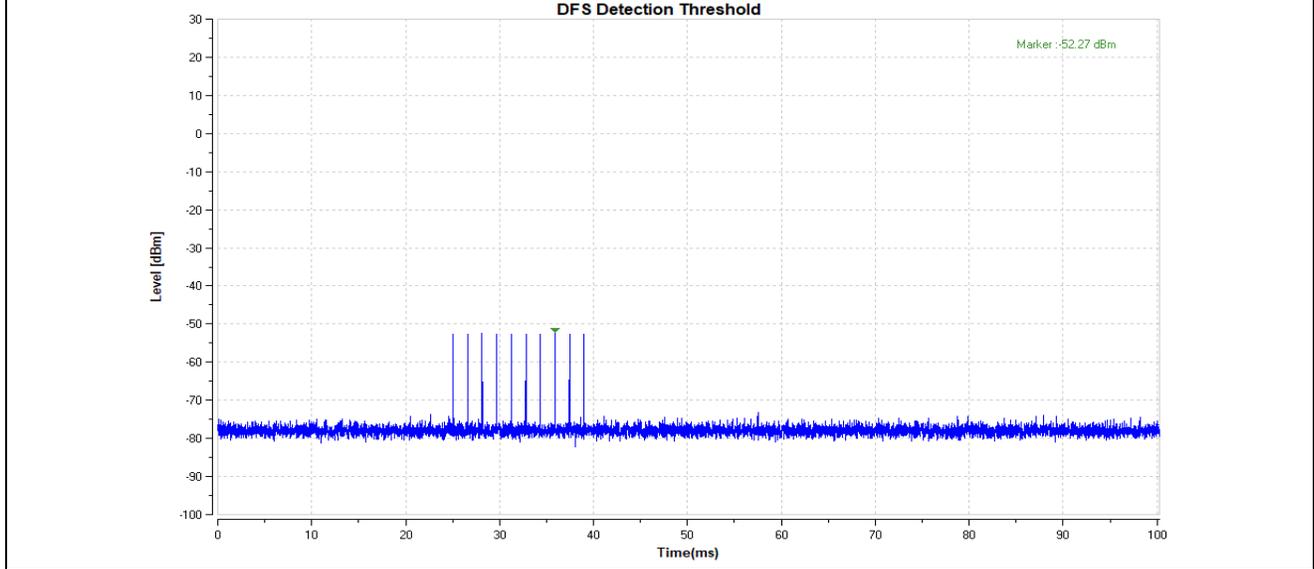




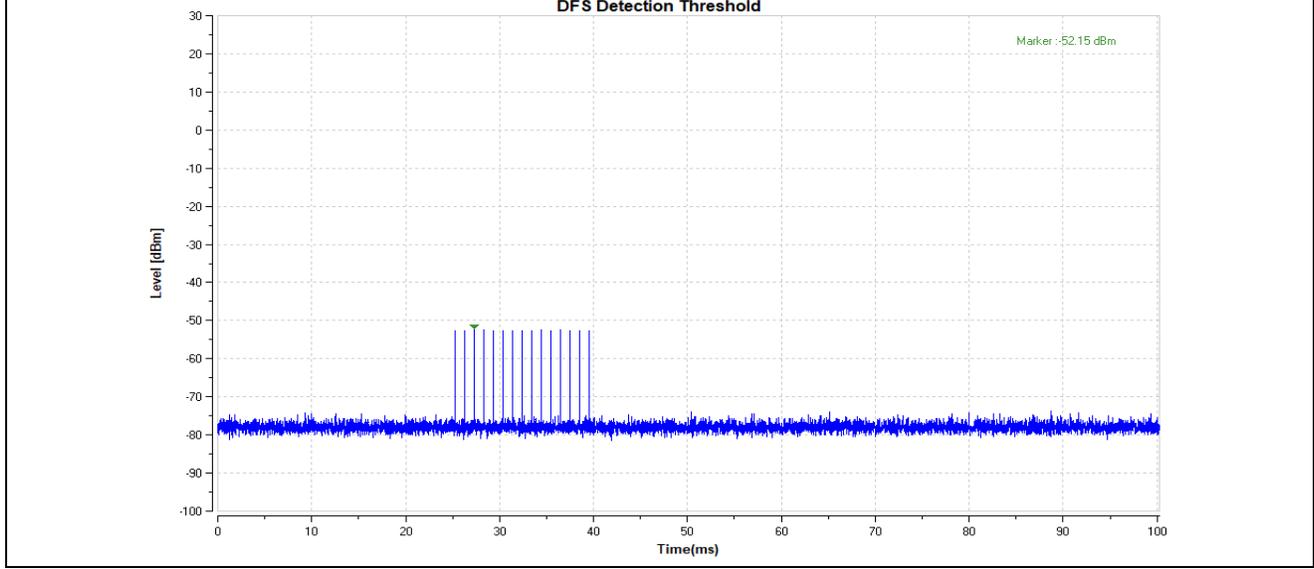




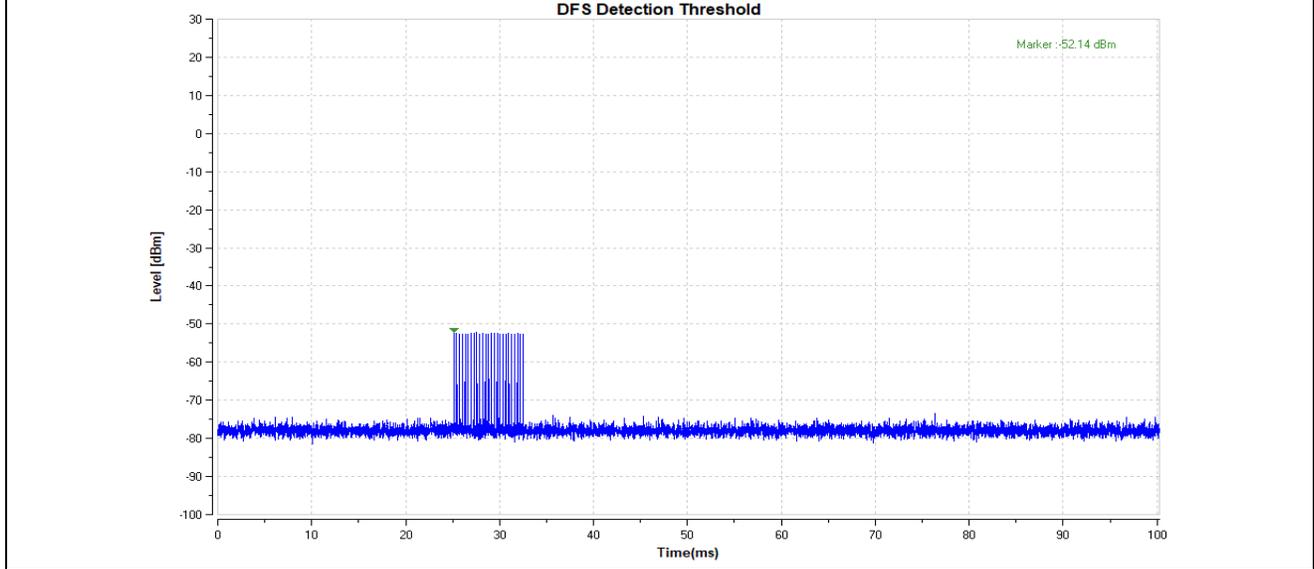
11N40MIMO_5510_Type1



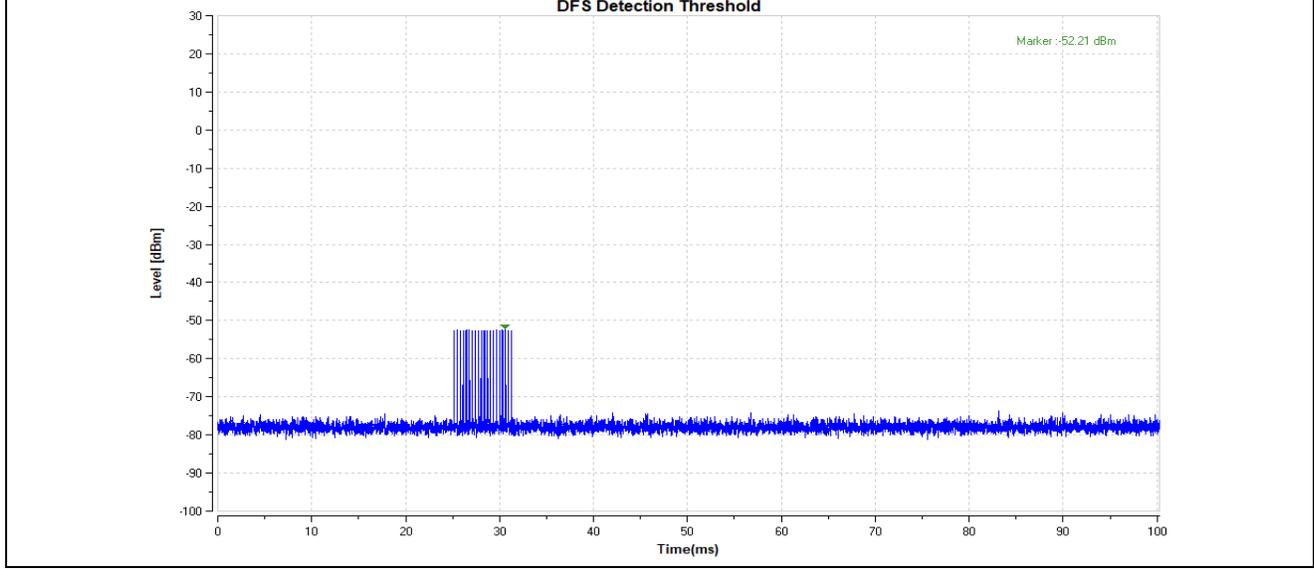
11N40MIMO_5510_Type2



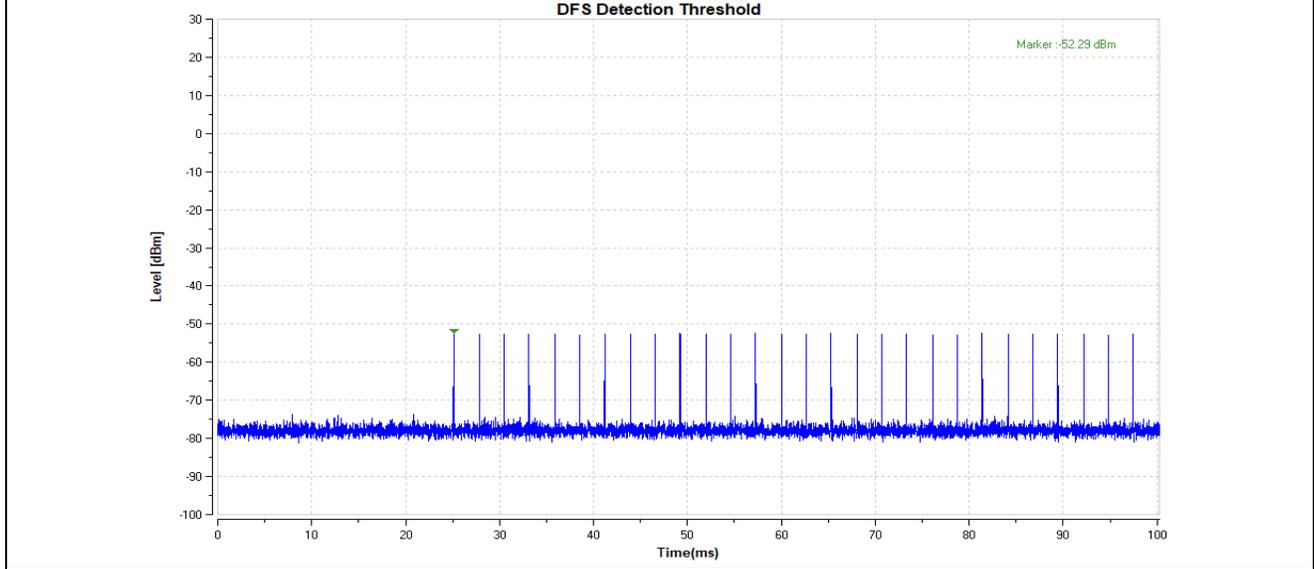
11N40MIMO_5510_Type3



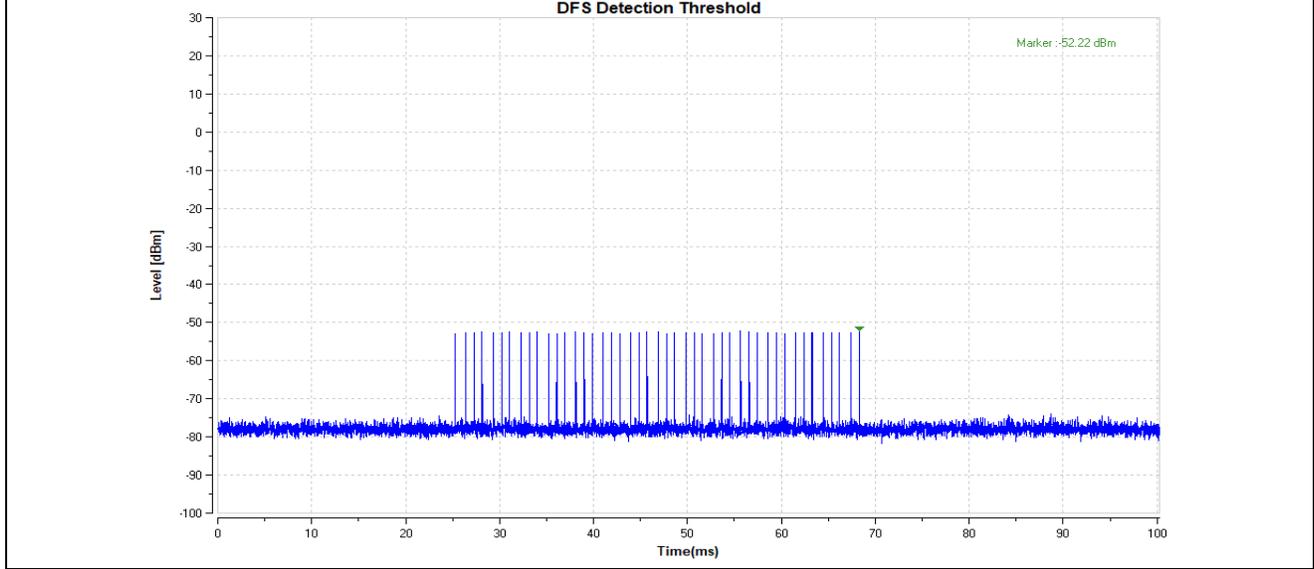
11N40MIMO_5510_Type4



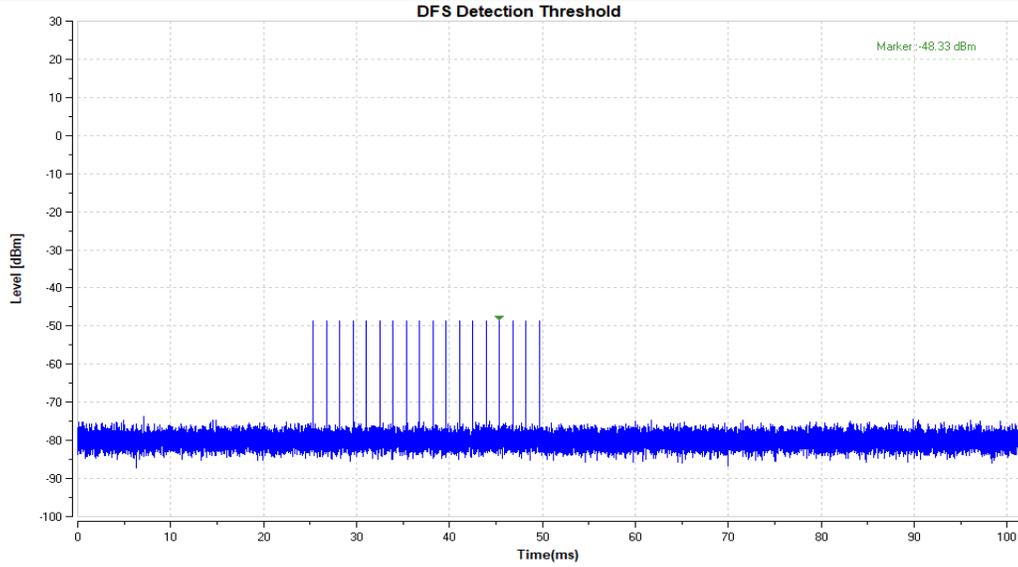
11N40MIMO_5510_Type5



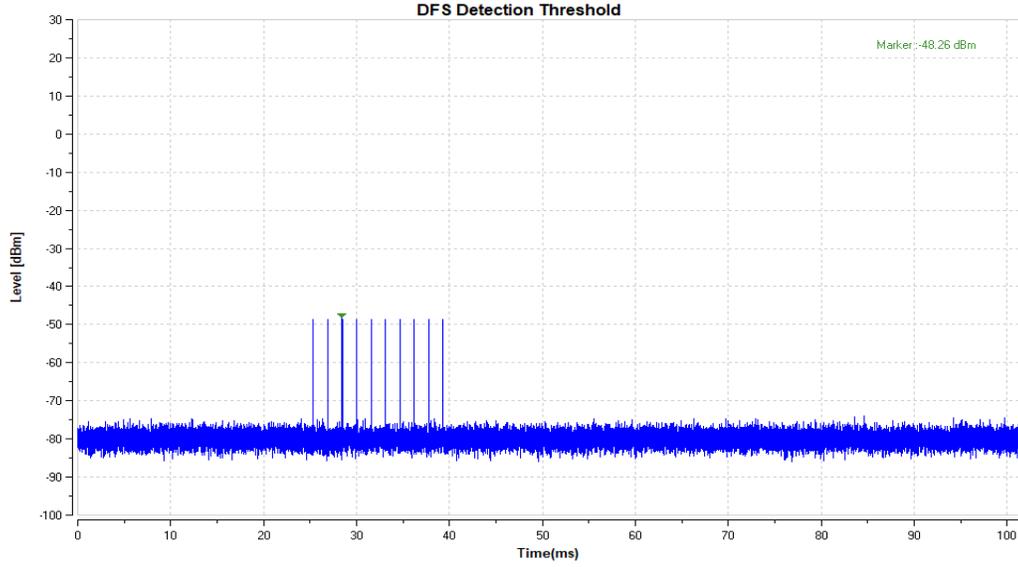
11N40MIMO_5510_Type6



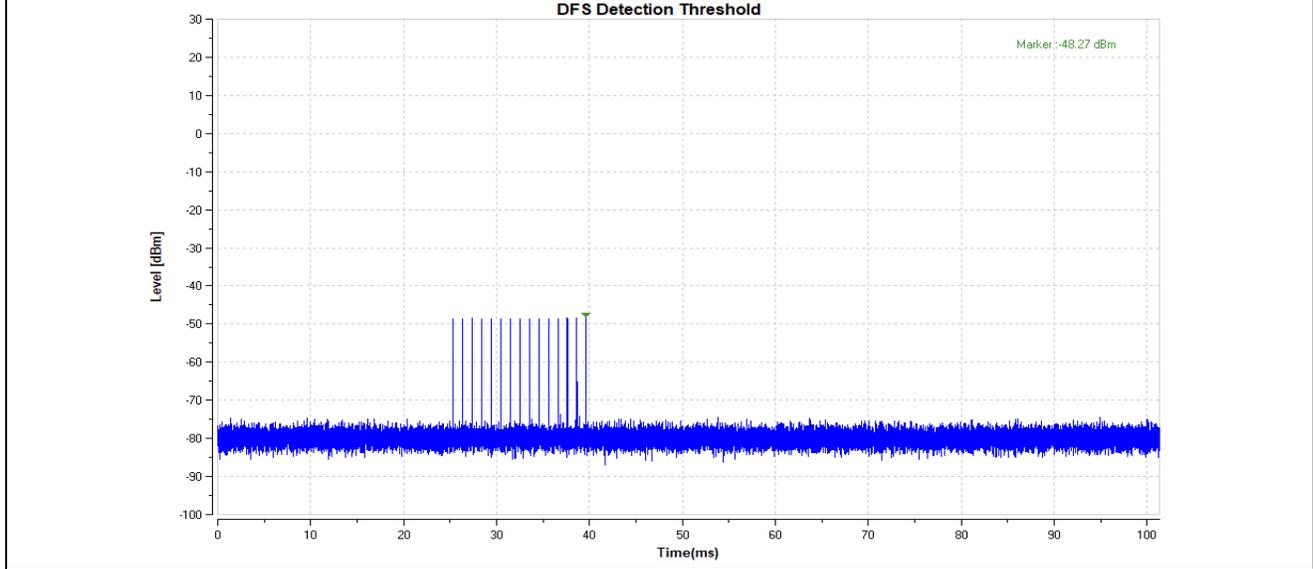
11AC80MIMO_5530_Reference



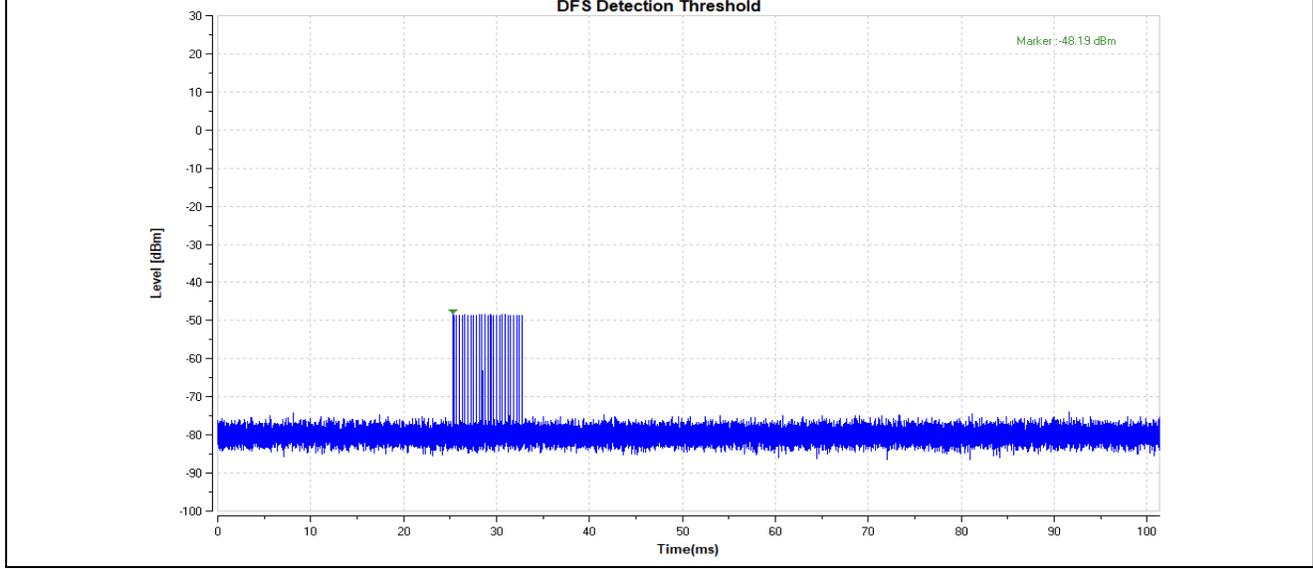
11AC80MIMO_5530_Type1

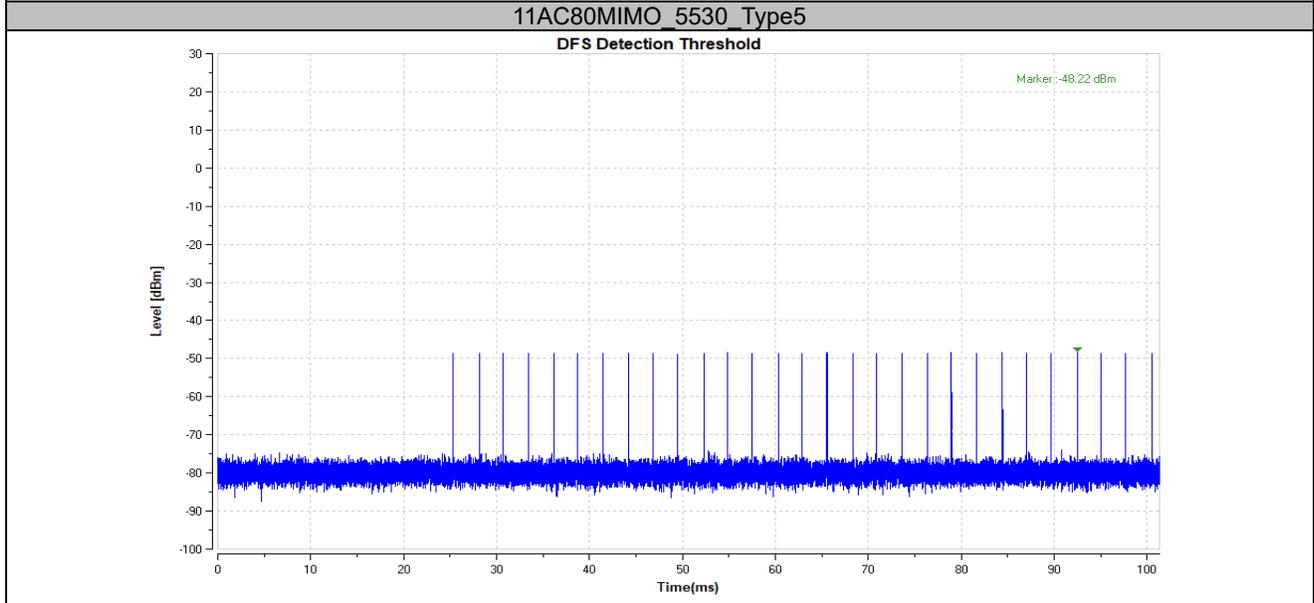
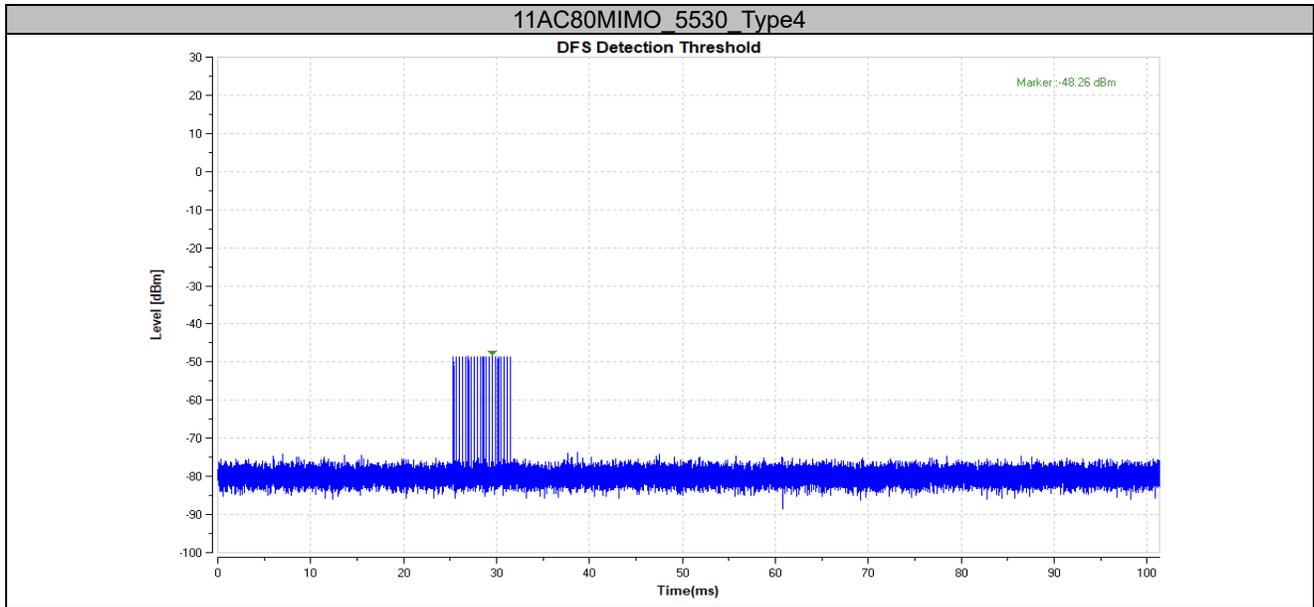


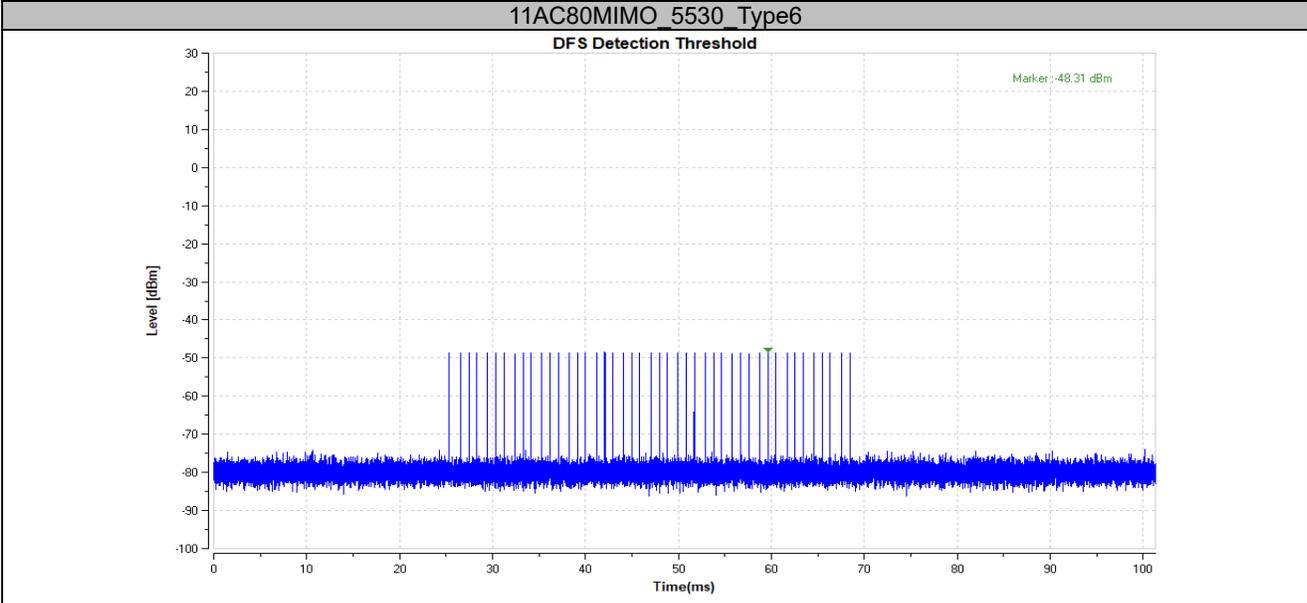
11AC80MIMO_5530_Type2



11AC80MIMO_5530_Type3







Channel Availability Check Time (CAC)

Test Procedure:

- 1) Measure the initial power-up time of EUT.
- 2) With link established on channel, apply a radar signal within 0~2 seconds after the initial power-up period; monitor the transmissions on channel from the spectrum analyzer.
- 3) Reboot EUT, with a link established on channel, except for 5600-5650MHz, apply a radar signal within 58~60 seconds after the initial power-up period, and monitor the transmission on channel from the spectrum analyzer. For 5600-5650 apply a radar signal within 598~600 seconds after the initial power-up period, and monitor the transmission on channel from the spectrum analyzer.

EUT Initial power-up Cycle Time

Frequency Bands (MHz)	Nominal Channel Bandwidth (MHz)	Test Frequency (MHz)	Time when RLAN on (S)	EUT initial Power-up cycle (S)
5470-5725 (Except 5600-5650MHz)	20	5500	95	35
	40	5510	95	35
	80	5530	95	35

Note: The device doesn't support 5600~5650MHz.

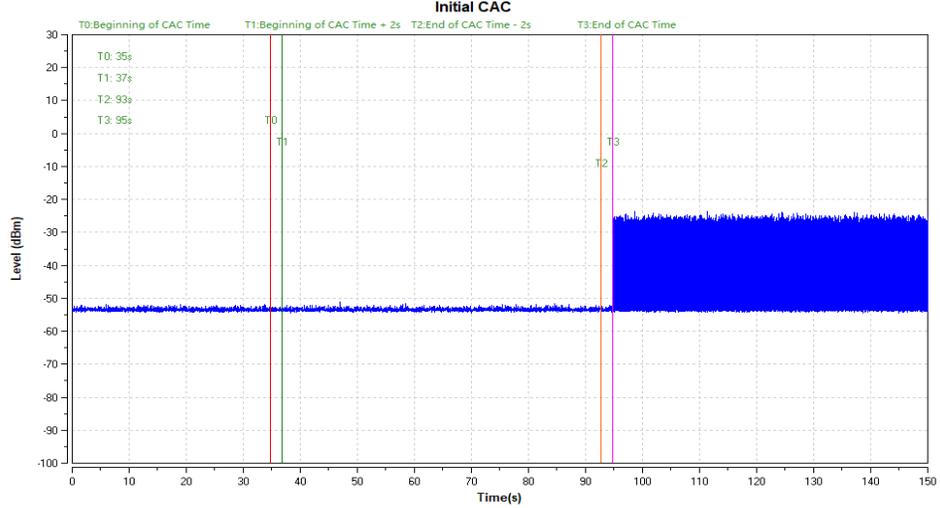
Results:

Timing of Radar Burst	Spectrum Analyzer Display
No Radar Triggered	Transmission begin after power-up cycle +60 seconds (except 10minute for 5600-5650MHz) CAC
Within 2 seconds of the CAC starting	No transmission
Within 2 seconds of the CAC end	No transmission

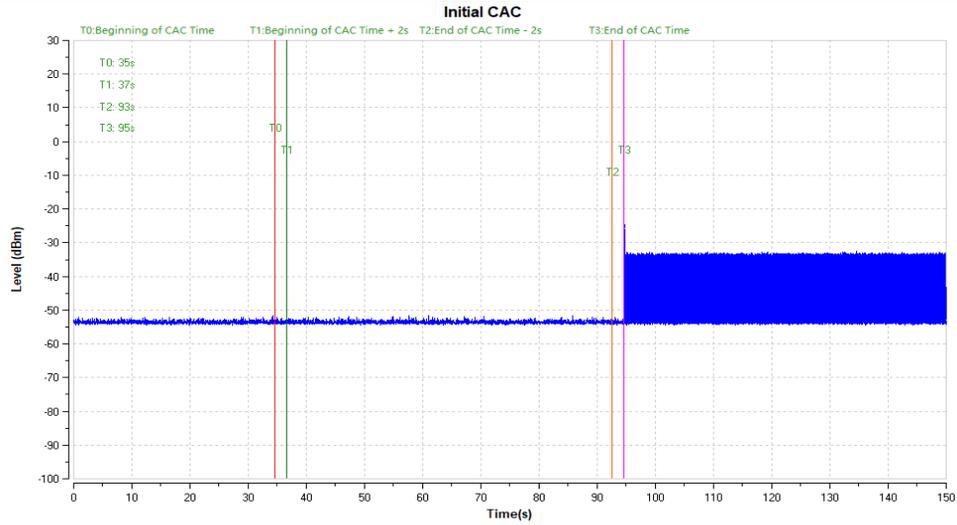
Please refer to the following plots.

Initial Channel Availability Check Time

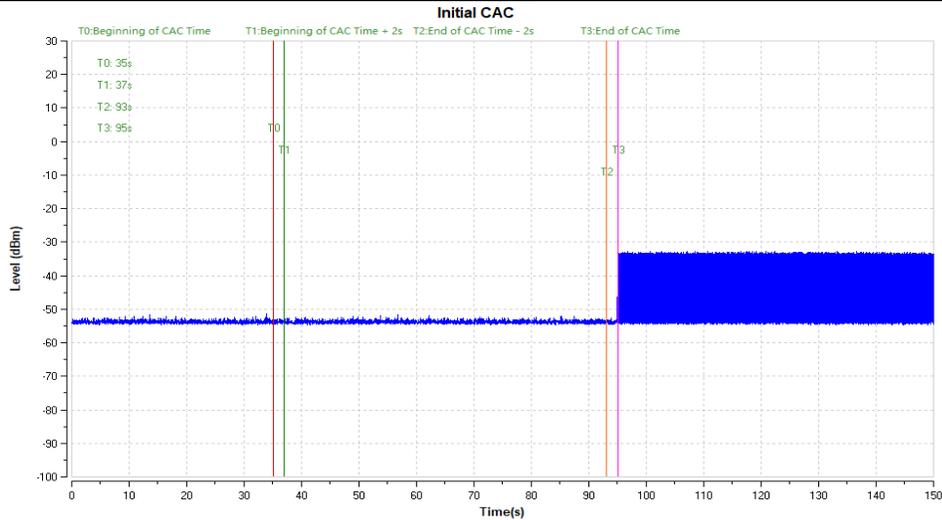
11A_5500



11N40MIMO_5510

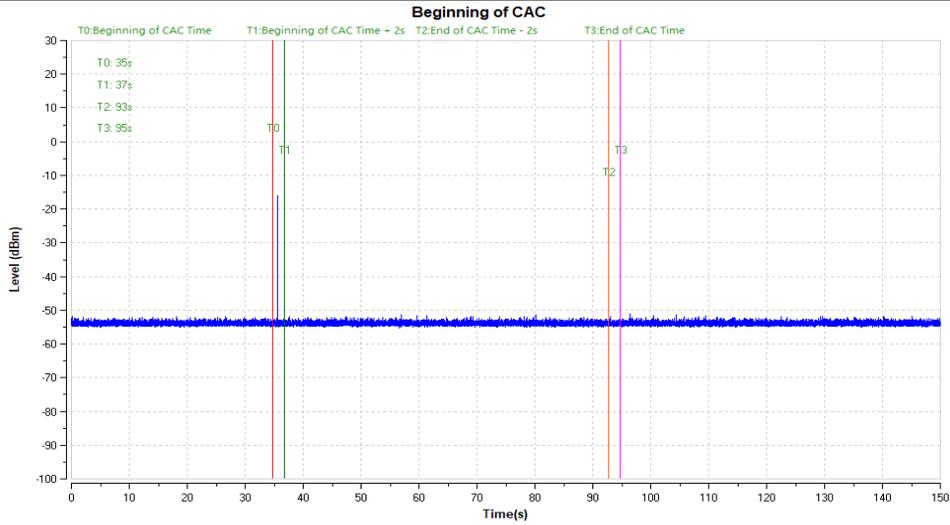


11AC80MIMO_5530

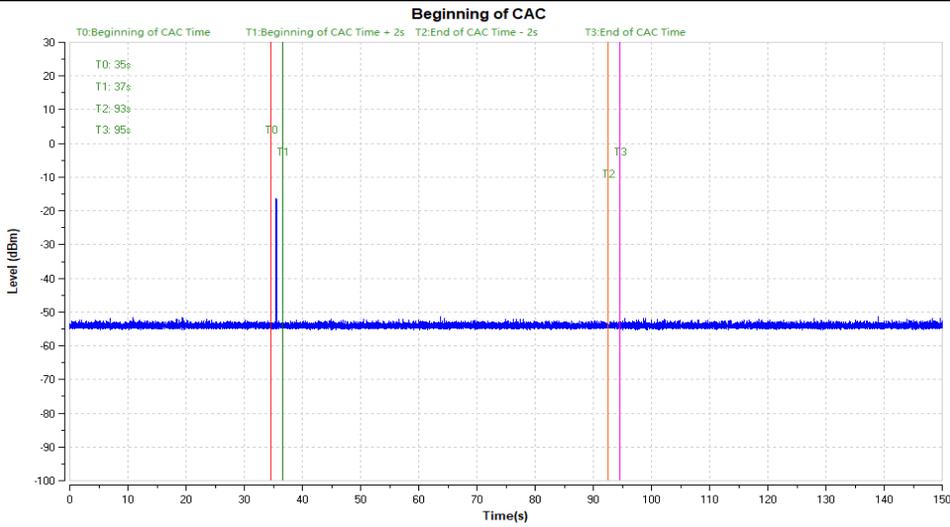


Beginning of Channel Availability Check Time

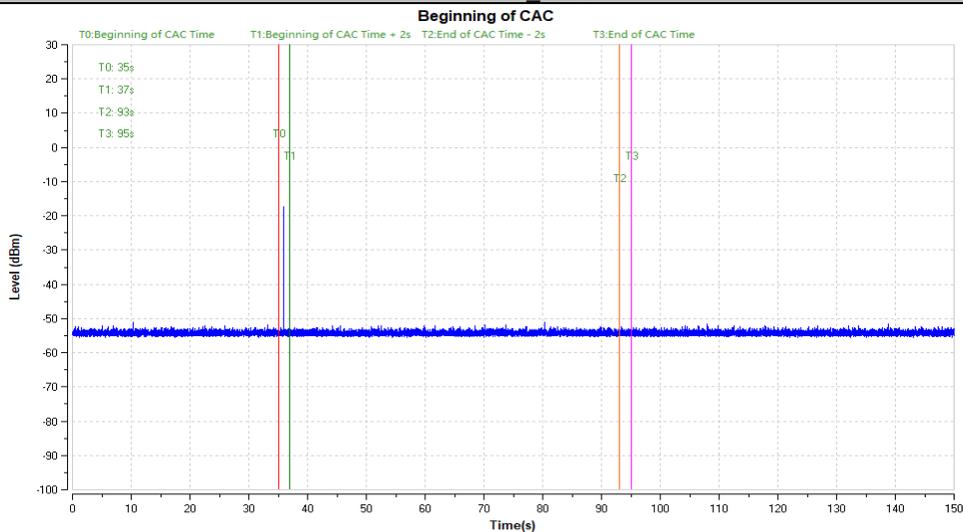
11A_5500



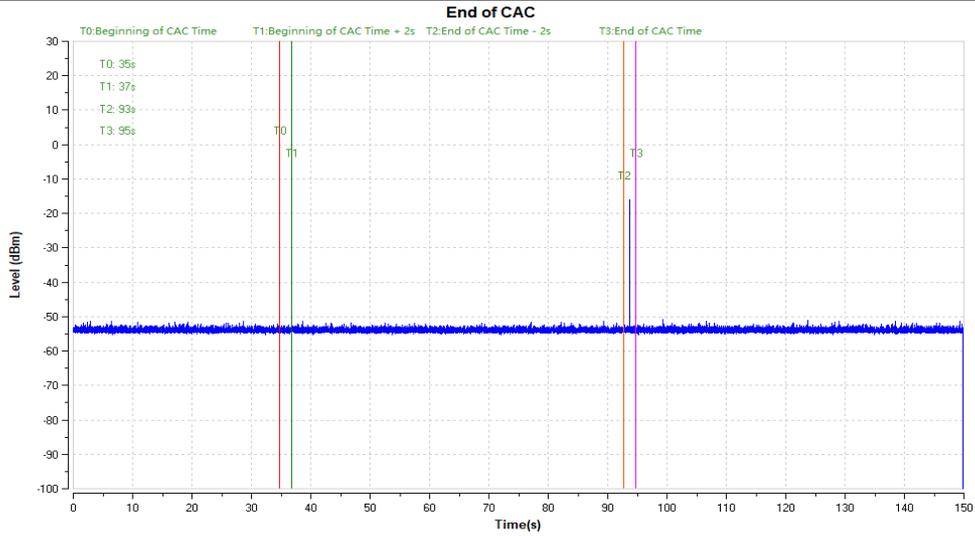
11N40MIMO_5510



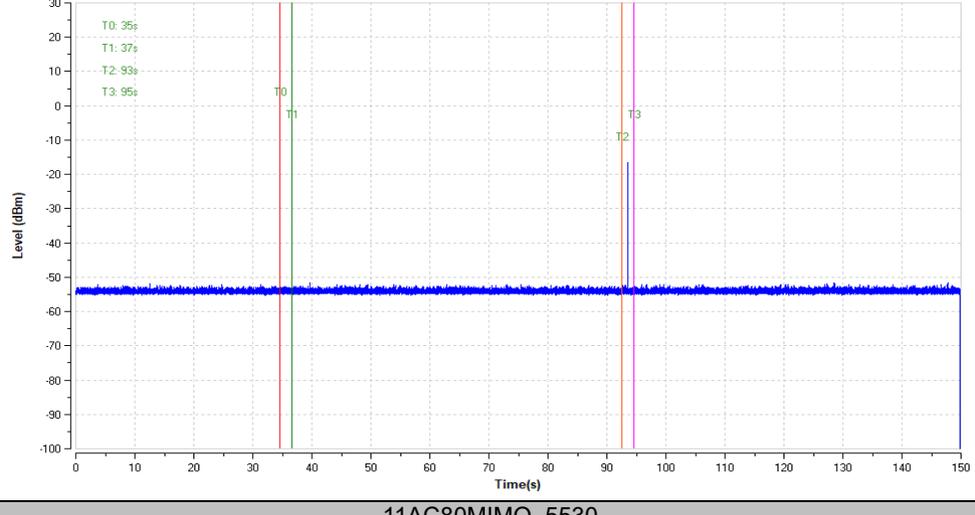
11AC80MIMO_5530



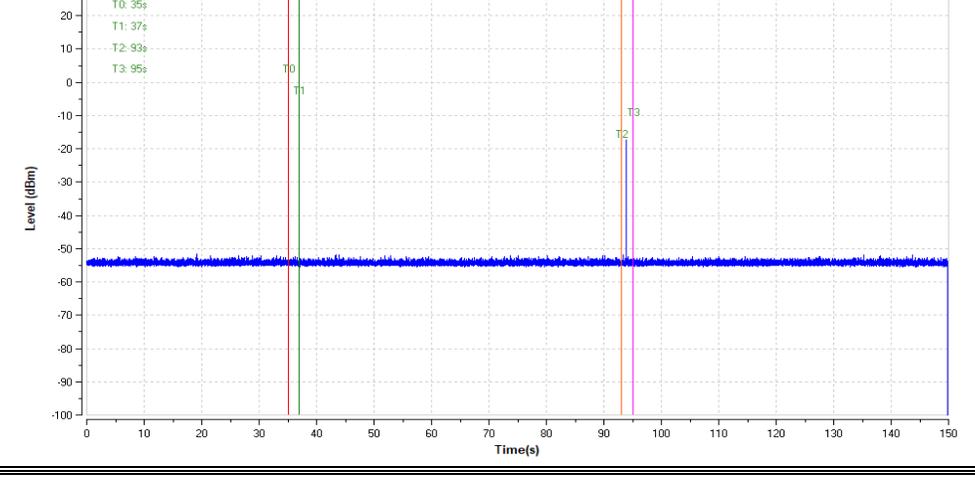
End of Channel Availability Check Time
11A_5500



11N40MIMO_5510



11AC80MIMO_5530



Channel Move Time and Channel Closing Transmission Time

Test Procedure:

Perform radar at a level of 10 dB above the level defined in clause 5.3.8.2.1 on the selected channel.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time = N * Dwell Time

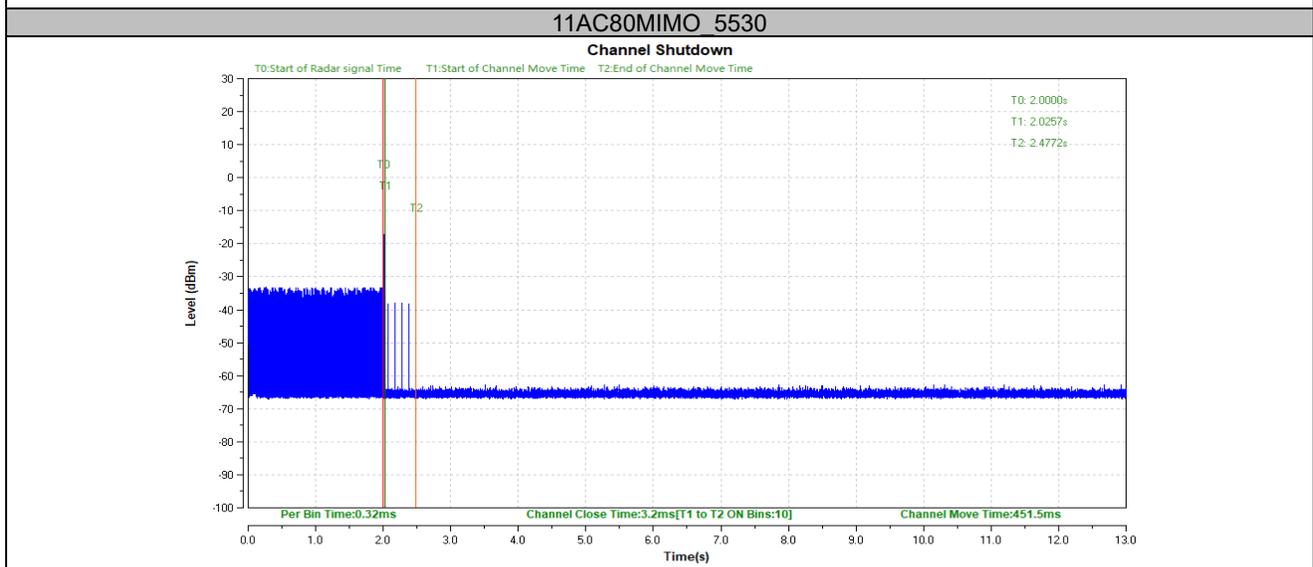
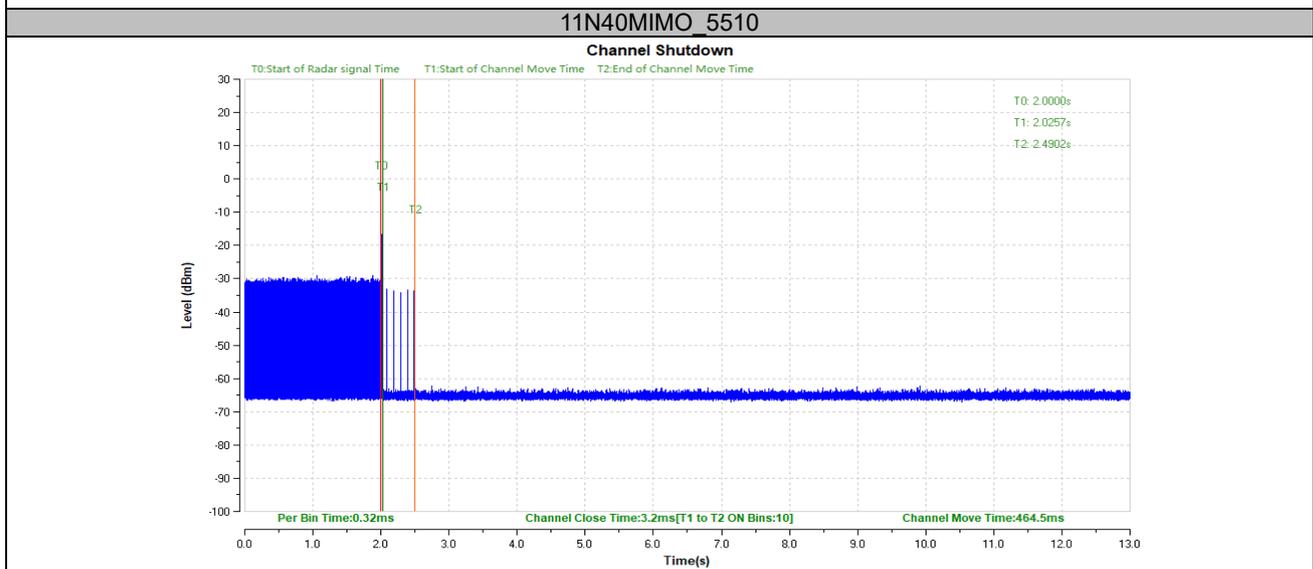
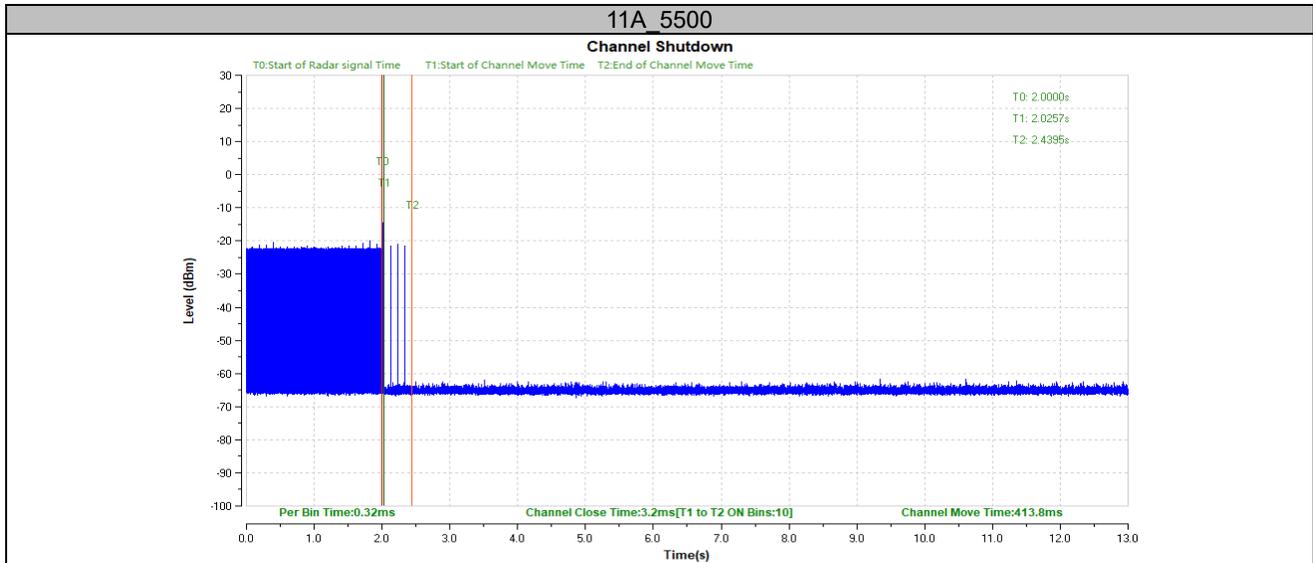
N is the number of spectrum analyzer bins showing a device transmission

Dwell Time is the dwell time per bin (i.e. Dwell Time = S/B, S is the sweep time and B is the number of bin, i.e. 8192)

Results:

TestMode	Frequency[MHz]	CCTT[ms]	Limit[ms]	CMT[ms]	Limit[ms]	Verdict
11A	5500	3.2	1000	413.8	10000	PASS
11N40MIMO	5510	3.2	1000	464.5	10000	PASS
11AC80MIMO	5530	3.2	1000	451.5	10000	PASS

Please refer to the following tables and plots.



Non-Occupancy Period

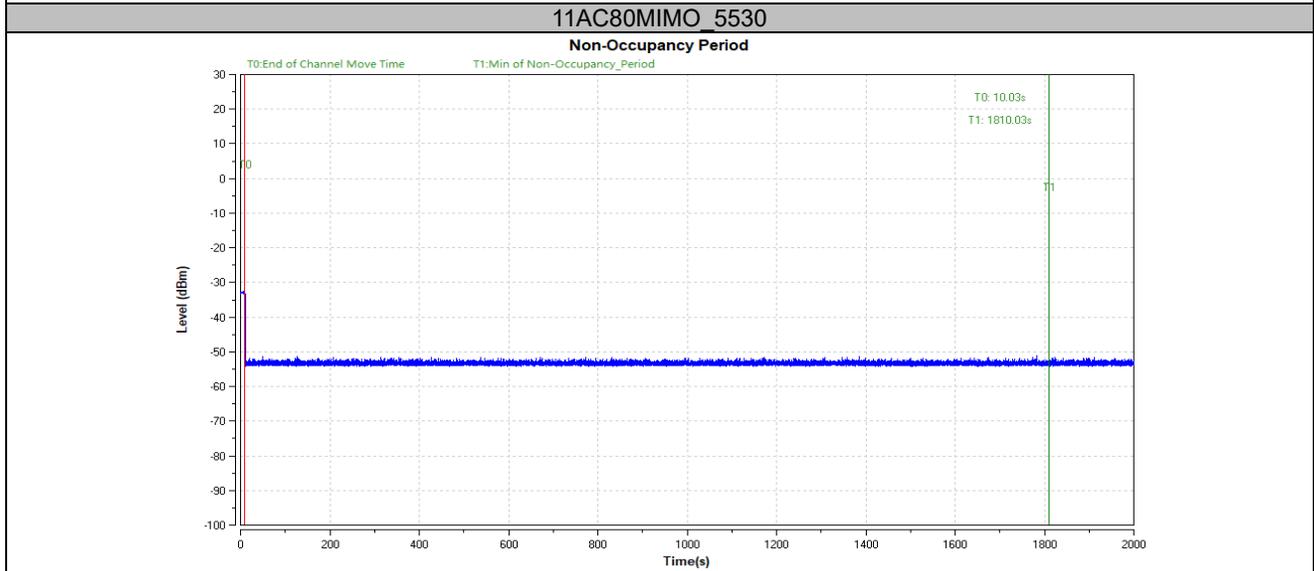
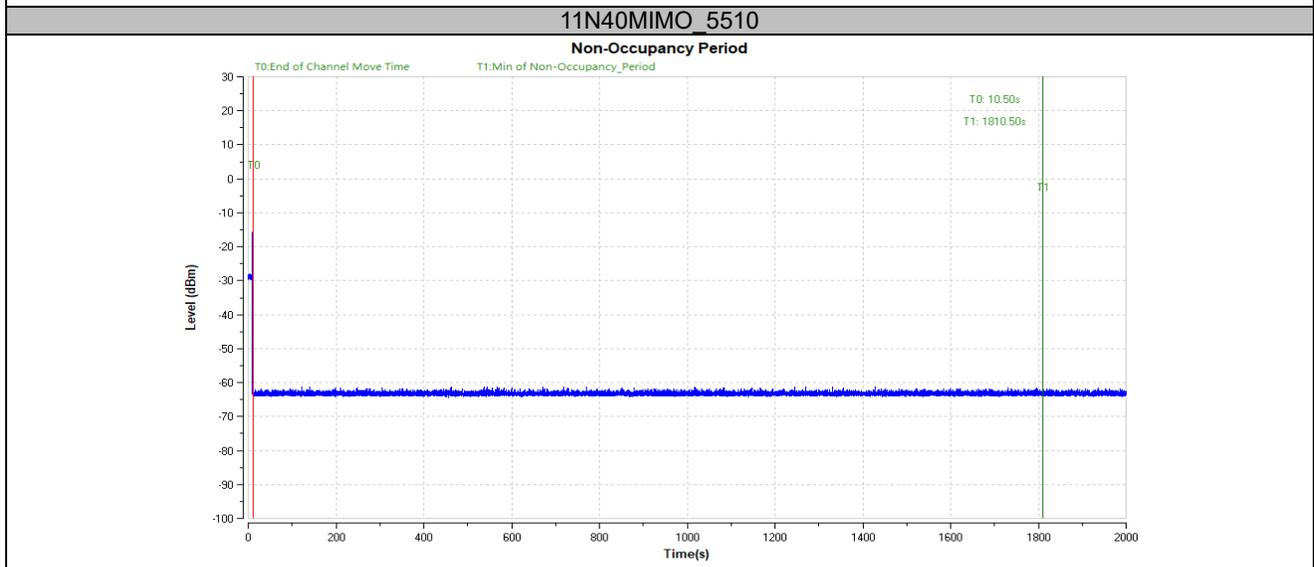
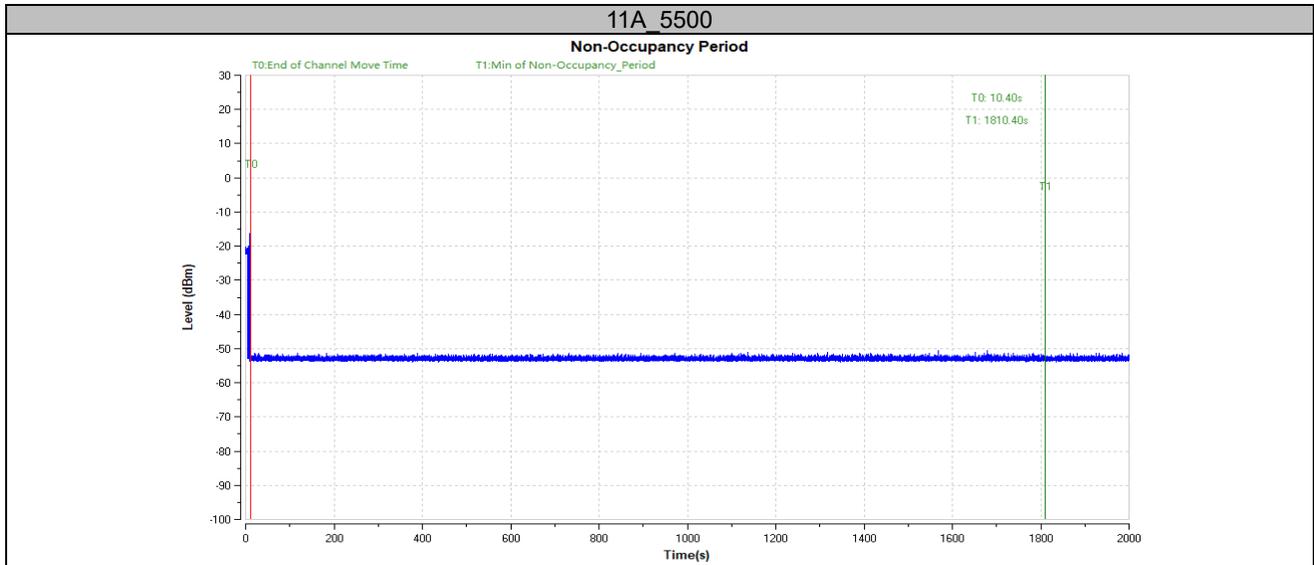
Test Procedure

Measure the EUT for more than 30 minutes following the channel close/move time to verify that the EUT does not resume any transmissions on this channel. Provide one plot to demonstrate no transmission on the channel for the non-occupancy period (30 minutes observation time)

Results:

Frequency (MHz)	Bandwidth (MHz)	Spectrum Analyzer Display
5500	20	No transmission within 30 minutes
5510	40	No transmission within 30 minutes
5530	80	No transmission within 30 minutes

Please refer to the following plots.



Interference Detection Threshold

Procedure:

The different steps below define the procedure to verify the Interference Detection Threshold during the Channel Availability Check Time.

- a) The signal generator and UUT are connected using Set-up A described in clause 5.3.8.1.2.1. The power of the UUT is switched off.
- b) The UUT is powered on at T0. T1 denotes the instant when the UUT has completed its power-up sequence (T_{power_up}) and is ready to start the radar detection. The channel Availability Check is expected to commence on Chr at instant T1 and is expected to end no sooner than T1+T_{ch_avail_check} unless radar is detected sooner.

NOTE 1: Additional verification may be needed to define T1 in case it is not exactly known or indicated by the UUT.

- c) A single burst radar test signal is generated on Chr using any of the radar test signals defined in table D.4 at a level defined in clause 5.3.8.2.1. This single-burst radar test signal may commence at any time within the applicable Channel Availability Check Time.

NOTE 2: For the purpose of reducing test time, it is recommended that the single-burst test signal starts approximately 10 s after T1.

- d) It shall be recorded if the radar test signal was detected.
- e) The steps c) to d) shall be performed 20 times and each time a different radar test signal shall be generated from options provided in table D.4. The radar test signal shall be detected at least 12 times out of the 20 trials in order to comply with the detection probability specified for this frequency range in table D.5.

Where the declared channel plan includes channels whose nominal bandwidth falls completely or partly within the 5600 MHz to 5650 MHz band, additional testing as described in the steps below shall be performed on a channel within this band.

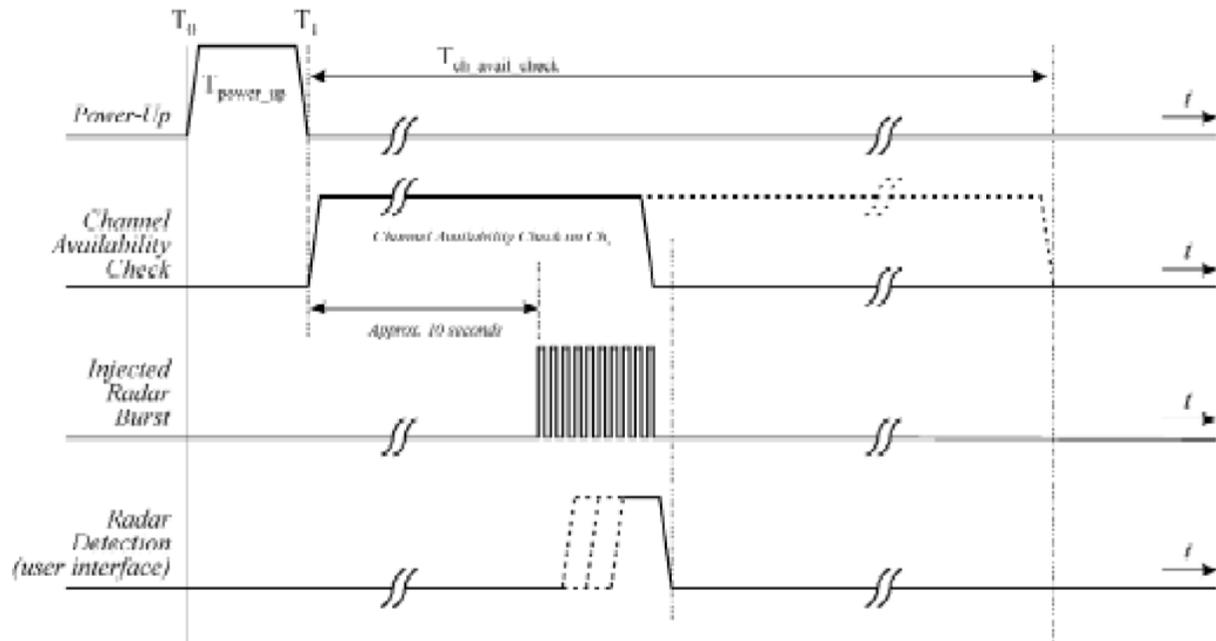
- f) A single burst radar test signal is generated on Chr using any of the radar test signals defined in table D.4 (except signals #3 and #4) at a level of 10 dB above the level defined in clause 5.3.8.2.1. This single burst radar test signal may commence at any time within the applicable Channel Availability Check Time.

NOTE 3: For the purpose of reducing test time, it is recommended that the single burst radar test signal starts approximately 10 s after T1.

- g) Step f) shall be performed 20 times, each time a different radar test signal shall be generated from options provided in table D.4 (except signals #3 and #4). The radar test signal shall be detected during each of these trials and this shall be recorded.

$$\text{Detection Ratio} = \frac{\text{Total Waveform Detections}}{\text{Total Waveform Trials}} \times 100$$

Example of timing for radar testing during the Channel Availability Check



Result:

TestMode	Frequency[MHz]	Radar Type	Pass Times	Fail Times	Probability (%)	Limit (%)	Verdict
11A	5500	Type1~Type6	20	0	100.00	60	PASS
11N40MIMO	5510	Type1~Type6	20	0	100.00	60	PASS
11AC80MIMO	5530	Type1~Type6	20	0	100.00	60	PASS

In-Service Monitoring

Procedure:

The steps below define the procedure to verify the In-Service Monitoring and Interference Detection Threshold during the In-Service Monitoring.

a) When the UUT is a master device, a slave device will be used that associates with the UUT. The signal generator and the UUT are connected using Set-up A described in clause 5.3.8.1.2.1.

When the UUT is a slave device with a Radar Interference Detection function, the UUT shall associate with a master device. The signal generator and the UUT are connected using Set-up C described in clause 3.8.1.2.3.

b) The UUT shall transmit a test transmission sequence in accordance with clause 5.1.2.2 on the selected channel Chr.

c) At a certain time T_0 , a single burst radar test signal is generated on Chr using radar test signal #1 defined in table D.4 and at a level defined in clause 5.3.8.2.1. T_1 denotes the end of the radar burst.

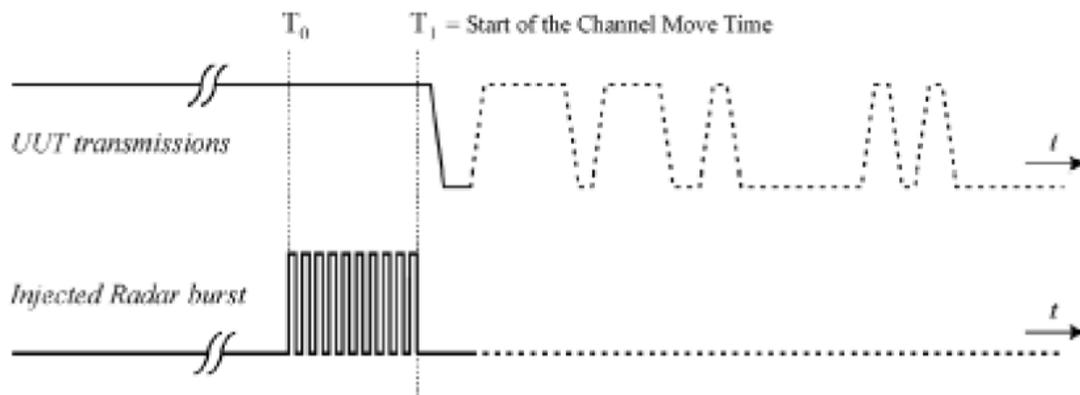
d) It shall be recorded if the radar test signal was detected.

e) The steps b) to d) shall be performed 20 times. The radar test signal shall be detected at least 12 times out of the 20 trials in order to comply with the detection probability specified in table D.5.

f) Step b) to e) shall be repeated for each of the radar test signals defined in table D.4 and as described in clause 5.3.8.1.1.

$$\text{Detection Ratio} = \frac{\text{Total Waveform Detections}}{\text{Total Waveform Trials}} \times 100$$

Figure: Example of timing for radar testing during In-Service Monitoring



Test Result

TestMode	Frequency[MHz]	Radar Type	Pass Times	Fail Times	Probability (%)	Limit (%)	Verdict
11A	5500	Type1	20	0	100.00	60	PASS
		Type2	20	0	100.00	60	PASS
		Type3	19	1	95.00	60	PASS
		Type4	17	3	85.00	60	PASS
		Type5	20	0	100.00	60	PASS
		Type6	20	0	100.00	60	PASS
11N40MIMO	5510	Type1	20	0	100.00	60	PASS
		Type2	20	0	100.00	60	PASS
		Type3	20	0	100.00	60	PASS
		Type4	18	2	90.00	60	PASS
		Type5	17	3	85.00	60	PASS
		Type6	20	0	100.00	60	PASS
11AC80MIMO	5530	Type1	20	0	100.00	60	PASS
		Type2	20	0	100.00	60	PASS
		Type3	20	0	100.00	60	PASS
		Type4	20	0	100.00	60	PASS
		Type5	20	0	100.00	60	PASS
		Type6	20	0	100.00	60	PASS

TestMode	Frequency[MHz]	Radar Type	Trial ID	Pulse width(μs)	PRI(μs)	Pulses per Burst	Detection (1: Yes; 0: No)
11A	5500	Type1	0	3.0	1550.4	10	1
		Type1	1	0.6	4347.8	10	1
		Type1	2	1.7	2375.3	10	1
		Type1	3	4.7	1058.2	10	1
		Type1	4	3.7	1292.0	10	1
		Type1	5	2.6	1724.1	10	1
		Type1	6	2.9	1574.8	10	1
		Type1	7	2.1	2024.3	10	1
		Type1	8	2.9	1594.9	10	1
		Type1	9	0.7	3984.1	10	1
		Type1	10	3.7	1295.3	10	1
		Type1	11	4.5	1100.1	10	1
		Type1	12	3.0	1560.1	10	1
		Type1	13	1.9	2217.3	10	1
		Type1	14	4.4	1116.1	10	1
		Type1	15	2.7	1669.4	10	1
		Type1	16	5.0	1011.1	10	1
		Type1	17	2.1	2092.1	10	1
		Type1	18	2.6	1730.1	10	1
		Type1	19	1.9	2202.6	10	1
		Type2	0	8.6	1022.5	15	1
		Type2	1	1.0	3952.6	15	1
		Type2	2	4.5	1706.5	15	1
		Type2	3	14.0	665.3	15	1
		Type2	4	10.9	830.6	15	1
		Type2	5	7.4	1157.4	15	1
		Type2	6	8.4	1040.6	15	1
		Type2	7	5.8	1400.6	15	1
		Type2	8	8.2	1054.9	15	1
		Type2	9	1.4	3448.3	15	1

Type2	10	10.9	833.3	15	1
Type2	11	13.4	694.4	15	1
Type2	12	8.5	1028.8	15	1
Type2	13	5.0	1562.5	15	1
Type2	14	13.1	705.7	15	1
Type2	15	7.7	1112.3	15	1
Type2	16	14.8	632.5	15	1
Type2	17	5.5	1455.6	15	1
Type2	18	7.3	1161.4	15	1
Type2	19	5.1	1550.4	15	1
Type3	0	8.6	308.2	25	1
Type3	1	1.0	422.8	25	1
Type3	2	4.5	361.1	25	1
Type3	3	14.0	257.6	25	1
Type3	4	10.9	284.2	25	1
Type3	5	7.4	321.9	25	1
Type3	6	8.4	310.2	25	1
Type3	7	5.8	342.0	25	1
Type3	8	8.2	311.7	25	1
Type3	9	1.4	414.9	25	1
Type3	10	10.9	284.6	25	1
Type3	11	13.4	262.7	25	0
Type3	12	8.5	308.8	25	1
Type3	13	5.0	352.9	25	1
Type3	14	13.1	264.7	25	1
Type3	15	7.7	317.6	25	1
Type3	16	14.8	251.4	25	1
Type3	17	5.5	345.8	25	1
Type3	18	7.3	322.3	25	1
Type3	19	5.1	352.1	25	1
Type4	0	25.6	321.3	20	1
Type4	1	20.3	481.7	20	1
Type4	2	22.7	391.8	20	1
Type4	3	29.3	259.0	20	1
Type4	4	27.2	291.3	20	1
Type4	5	24.7	339.1	20	0
Type4	6	25.4	323.9	20	0
Type4	7	23.7	365.8	20	1
Type4	8	25.3	325.9	20	0
Type4	9	20.6	469.7	20	1
Type4	10	27.2	291.7	20	1
Type4	11	28.9	265.2	20	1
Type4	12	25.5	322.3	20	1
Type4	13	23.1	380.5	20	1
Type4	14	28.7	267.5	20	1
Type4	15	25.0	333.4	20	1
Type4	16	29.9	251.7	20	1
Type4	17	23.5	370.9	20	1
Type4	18	24.7	339.7	20	1
Type4	19	23.2	379.4	20	1
Type5	0	1.4	2809.0	30	1
Type5	1	0.5	3300.3	20	1
Type5	2	0.9	3058.1	20	1
Type5	3	2.0	2544.5	30	1
Type5	4	1.7	2688.2	30	1
Type5	5	1.3	2881.8	20	1
Type5	6	1.4	2824.9	30	1
Type5	7	1.1	2967.4	20	1

		Type5	8	1.4	2832.9	30	1
		Type5	9	0.6	3268.0	20	1
		Type5	10	1.7	2688.2	30	1
		Type5	11	2.0	2570.7	30	1
		Type5	12	1.4	2816.9	30	1
		Type5	13	1.0	3021.1	20	1
		Type5	14	1.9	2584.0	30	1
		Type5	15	1.3	2857.1	20	1
		Type5	16	2.0	2506.3	30	1
		Type5	17	1.0	2985.1	20	1
		Type5	18	1.3	2881.8	20	1
		Type5	19	1.0	3012.0	20	1
		Type6	0	1.4	1183.4	45	1
		Type6	1	0.5	2325.6	30	1
		Type6	2	0.9	1610.3	30	1
		Type6	3	2.0	873.4	45	1
		Type6	4	1.7	1026.7	45	1
		Type6	5	1.3	1282.1	30	1
		Type6	6	1.4	1197.6	45	1
		Type6	7	1.1	1440.9	30	1
		Type6	8	1.4	1209.2	45	1
		Type6	9	0.6	2217.3	30	1
		Type6	10	1.7	1028.8	45	1
		Type6	11	2.0	901.7	45	1
		Type6	12	1.4	1189.1	45	1
		Type6	13	1.0	1536.1	30	1
		Type6	14	1.9	912.4	45	1
		Type6	15	1.3	1251.6	30	1
		Type6	16	2.0	841.0	45	1
		Type6	17	1.0	1474.9	30	1
		Type6	18	1.3	1285.3	30	1
		Type6	19	1.0	1529.1	30	1
		Type1	0	3.0	1550.4	10	1
		Type1	1	0.6	4347.8	10	1
		Type1	2	1.7	2375.3	10	1
		Type1	3	4.7	1058.2	10	1
		Type1	4	3.7	1292.0	10	1
		Type1	5	2.6	1724.1	10	1
		Type1	6	2.9	1574.8	10	1
		Type1	7	2.1	2024.3	10	1
		Type1	8	2.9	1594.9	10	1
		Type1	9	0.7	3984.1	10	1
		Type1	10	3.7	1295.3	10	1
		Type1	11	4.5	1100.1	10	1
		Type1	12	3.0	1560.1	10	1
		Type1	13	1.9	2217.3	10	1
		Type1	14	4.4	1116.1	10	1
		Type1	15	2.7	1669.4	10	1
		Type1	16	5.0	1011.1	10	1
		Type1	17	2.1	2092.1	10	1
		Type1	18	2.6	1730.1	10	1
		Type1	19	1.9	2202.6	10	1
		Type2	0	8.6	1022.5	15	1
		Type2	1	1.0	3952.6	15	1
		Type2	2	4.5	1706.5	15	1
		Type2	3	14.0	665.3	15	1
		Type2	4	10.9	830.6	15	1
		Type2	5	7.4	1157.4	15	1
11N40MIMO	5510						

Type2	6	8.4	1040.6	15	1
Type2	7	5.8	1400.6	15	1
Type2	8	8.2	1054.9	15	1
Type2	9	1.4	3448.3	15	1
Type2	10	10.9	833.3	15	1
Type2	11	13.4	694.4	15	1
Type2	12	8.5	1028.8	15	1
Type2	13	5.0	1562.5	15	1
Type2	14	13.1	705.7	15	1
Type2	15	7.7	1112.3	15	1
Type2	16	14.8	632.5	15	1
Type2	17	5.5	1455.6	15	1
Type2	18	7.3	1161.4	15	1
Type2	19	5.1	1550.4	15	1
Type3	0	8.6	308.2	25	1
Type3	1	1.0	422.8	25	1
Type3	2	4.5	361.1	25	1
Type3	3	14.0	257.6	25	1
Type3	4	10.9	284.2	25	1
Type3	5	7.4	321.9	25	1
Type3	6	8.4	310.2	25	1
Type3	7	5.8	342.0	25	1
Type3	8	8.2	311.7	25	1
Type3	9	1.4	414.9	25	1
Type3	10	10.9	284.6	25	1
Type3	11	13.4	262.7	25	1
Type3	12	8.5	308.8	25	1
Type3	13	5.0	352.9	25	1
Type3	14	13.1	264.7	25	1
Type3	15	7.7	317.6	25	1
Type3	16	14.8	251.4	25	1
Type3	17	5.5	345.8	25	1
Type3	18	7.3	322.3	25	1
Type3	19	5.1	352.1	25	1
Type4	0	25.6	321.3	20	1
Type4	1	20.3	481.7	20	1
Type4	2	22.7	391.8	20	1
Type4	3	29.3	259.0	20	1
Type4	4	27.2	291.3	20	1
Type4	5	24.7	339.1	20	1
Type4	6	25.4	323.9	20	1
Type4	7	23.7	365.8	20	0
Type4	8	25.3	325.9	20	0
Type4	9	20.6	469.7	20	1
Type4	10	27.2	291.7	20	1
Type4	11	28.9	265.2	20	1
Type4	12	25.5	322.3	20	1
Type4	13	23.1	380.5	20	1
Type4	14	28.7	267.5	20	1
Type4	15	25.0	333.4	20	1
Type4	16	29.9	251.7	20	1
Type4	17	23.5	370.9	20	1
Type4	18	24.7	339.7	20	1
Type4	19	23.2	379.4	20	1
Type5	0	1.4	2809.0	30	1
Type5	1	0.5	3300.3	20	1
Type5	2	0.9	3058.1	20	1
Type5	3	2.0	2544.5	30	1

		Type5	4	1.7	2688.2	30	0
		Type5	5	1.3	2881.8	20	0
		Type5	6	1.4	2824.9	30	1
		Type5	7	1.1	2967.4	20	1
		Type5	8	1.4	2832.9	30	1
		Type5	9	0.6	3268.0	20	1
		Type5	10	1.7	2688.2	30	1
		Type5	11	2.0	2570.7	30	1
		Type5	12	1.4	2816.9	30	1
		Type5	13	1.0	3021.1	20	1
		Type5	14	1.9	2584.0	30	1
		Type5	15	1.3	2857.1	20	0
		Type5	16	2.0	2506.3	30	1
		Type5	17	1.0	2985.1	20	1
		Type5	18	1.3	2881.8	20	1
		Type5	19	1.0	3012.0	20	1
		Type6	0	1.4	1183.4	45	1
		Type6	1	0.5	2325.6	30	1
		Type6	2	0.9	1610.3	30	1
		Type6	3	2.0	873.4	45	1
		Type6	4	1.7	1026.7	45	1
		Type6	5	1.3	1282.1	30	1
		Type6	6	1.4	1197.6	45	1
		Type6	7	1.1	1440.9	30	1
		Type6	8	1.4	1209.2	45	1
		Type6	9	0.6	2217.3	30	1
		Type6	10	1.7	1028.8	45	1
		Type6	11	2.0	901.7	45	1
		Type6	12	1.4	1189.1	45	1
		Type6	13	1.0	1536.1	30	1
		Type6	14	1.9	912.4	45	1
		Type6	15	1.3	1251.6	30	1
		Type6	16	2.0	841.0	45	1
		Type6	17	1.0	1474.9	30	1
		Type6	18	1.3	1285.3	30	1
		Type6	19	1.0	1529.1	30	1
11AC80MIMO	5530	Type1	0	3.0	1550.4	10	1
		Type1	1	0.6	4347.8	10	1
		Type1	2	1.7	2375.3	10	1
		Type1	3	4.7	1058.2	10	1
		Type1	4	3.7	1292.0	10	1
		Type1	5	2.6	1724.1	10	1
		Type1	6	2.9	1574.8	10	1
		Type1	7	2.1	2024.3	10	1
		Type1	8	2.9	1594.9	10	1
		Type1	9	0.7	3984.1	10	1
		Type1	10	3.7	1295.3	10	1
		Type1	11	4.5	1100.1	10	1
		Type1	12	3.0	1560.1	10	1
		Type1	13	1.9	2217.3	10	1
		Type1	14	4.4	1116.1	10	1
		Type1	15	2.7	1669.4	10	1
		Type1	16	5.0	1011.1	10	1
		Type1	17	2.1	2092.1	10	1
		Type1	18	2.6	1730.1	10	1
		Type1	19	1.9	2202.6	10	1
		Type2	0	8.6	1022.5	15	1
		Type2	1	1.0	3952.6	15	1

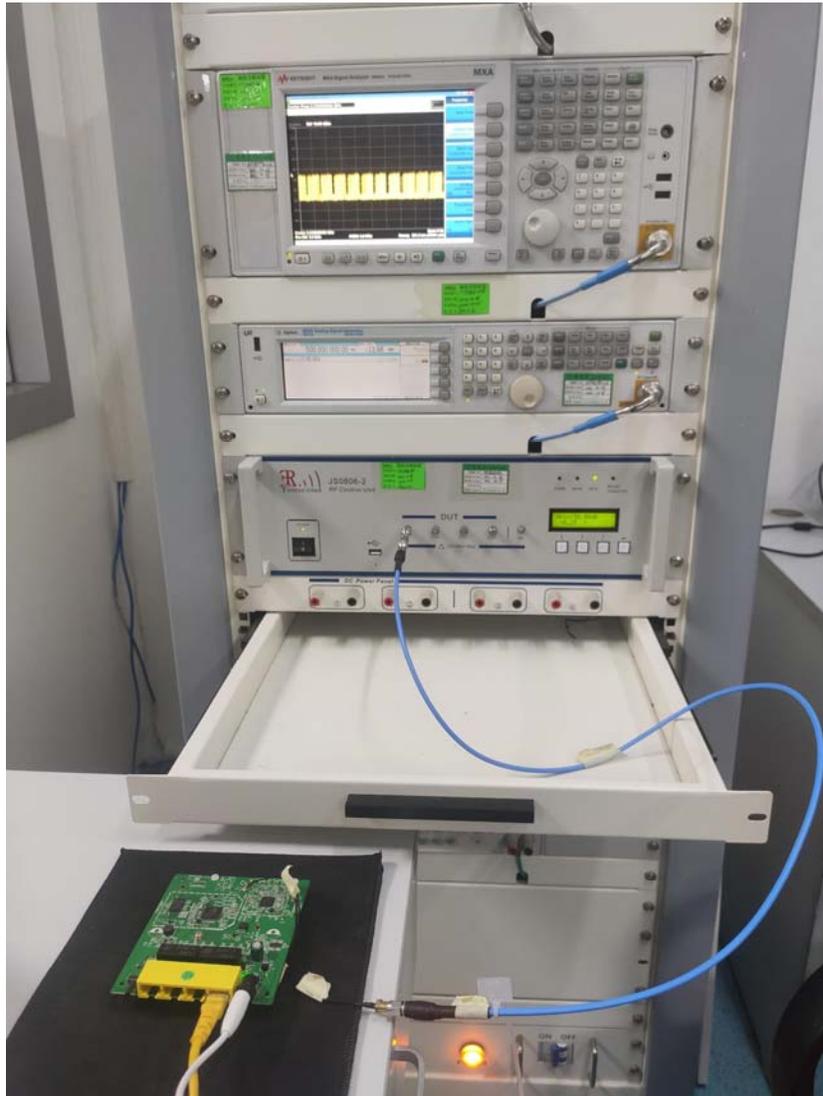
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Type2	7	5.8	1400.6	15	1
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Type2	12	8.5	1028.8	15	1
Type2	13	5.0	1562.5	15	1
Type2	14	13.1	705.7	15	1
Type2	15	7.7	1112.3	15	1
Type2	16	14.8	632.5	15	1
Type2	17	5.5	1455.6	15	1
Type2	18	7.3	1161.4	15	1
Type2	19	5.1	1550.4	15	1
Type3	0	8.6	308.2	25	1
Type3	1	1.0	422.8	25	1
Type3	2	4.5	361.1	25	1
Type3	3	14.0	257.6	25	1
Type3	4	10.9	284.2	25	1
Type3	5	7.4	321.9	25	1
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Type3	7	5.8	342.0	25	1
Type3	8	8.2	311.7	25	1
Type3	9	1.4	414.9	25	1
Type3	10	10.9	284.6	25	1
Type3	11	13.4	262.7	25	1
Type3	12	8.5	308.8	25	1
Type3	13	5.0	352.9	25	1
Type3	14	13.1	264.7	25	1
Type3	15	7.7	317.6	25	1
Type3	16	14.8	251.4	25	1
Type3	17	5.5	345.8	25	1
Type3	18	7.3	322.3	25	1
Type3	19	5.1	352.1	25	1
Type4	0	25.6	321.3	20	1
Type4	1	20.3	481.7	20	1
Type4	2	22.7	391.8	20	1
Type4	3	29.3	259.0	20	1
Type4	4	27.2	291.3	20	1
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Type4	6	25.4	323.9	20	1
Type4	7	23.7	365.8	20	1
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Type4	12	25.5	322.3	20	1
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Type4	15	25.0	333.4	20	1
Type4	16	29.9	251.7	20	1
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Type4	18	24.7	339.7	20	1
Type4	19	23.2	379.4	20	1

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Type5	1	0.5	3300.3	20	1
Type5	2	0.9	3058.1	20	1
Type5	3	2.0	2544.5	30	1
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Type5	5	1.3	2881.8	20	1
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Type5	8	1.4	2832.9	30	1
Type5	9	0.6	3268.0	20	1
Type5	10	1.7	2688.2	30	1
Type5	11	2.0	2570.7	30	1
Type5	12	1.4	2816.9	30	1
Type5	13	1.0	3021.1	20	1
Type5	14	1.9	2584.0	30	1
Type5	15	1.3	2857.1	20	1
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Type5	17	1.0	2985.1	20	1
Type5	18	1.3	2881.8	20	1
Type5	19	1.0	3012.0	20	1
Type6	0	1.4	1183.4	45	1
Type6	1	0.5	2325.6	30	1
Type6	2	0.9	1610.3	30	1
Type6	3	2.0	873.4	45	1
Type6	4	1.7	1026.7	45	1
Type6	5	1.3	1282.1	30	1
Type6	6	1.4	1197.6	45	1
Type6	7	1.1	1440.9	30	1
Type6	8	1.4	1209.2	45	1
Type6	9	0.6	2217.3	30	1
Type6	10	1.7	1028.8	45	1
Type6	11	2.0	901.7	45	1
Type6	12	1.4	1189.1	45	1
Type6	13	1.0	1536.1	30	1
Type6	14	1.9	912.4	45	1
Type6	15	1.3	1251.6	30	1
Type6	16	2.0	841.0	45	1
Type6	17	1.0	1474.9	30	1
Type6	18	1.3	1285.3	30	1
Type6	19	1.0	1529.1	30	1

EXHIBIT A - EUT PHOTOGRAPHS

For photos in this section, please refer to report No.: DG2220302-06777E-02 EXHIBIT A.

EXHIBIT B - TEST SETUP PHOTOGRAPHS



******END OF REPORT******