

DFS Test Report

Report No.: RJBEBW-WTW-P21091170-2

Test Model: DBG-X1000

Received Date: Oct. 28, 2021

Test Date: Nov. 10, 2021

Issued Date: Feb. 07, 2022

Applicant: D-Link Corporation

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Release Control Record

Issue No.	Description	Date Issued
RJBEBW-WTW-P21091170-2	Original release	Feb. 07, 2022

1 Certificate of Conformity

Product: Nuclias Cloud-Managed Wireless VPN Gateway

Brand: D-Link Corporation

Test Model: DBG-X1000

Sample Status: Mass product

Applicant: D-Link Corporation

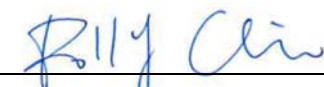
Test Date: Nov. 10, 2021

Standards: Certification Ordinance Article 2-1-19-3

Measurement was conducted by the temporary test method which Tacoyaki submitted to the Minister for Internal Affairs and Communications based on the Ordinance Concerning Technical Regulations Conformity Certification etc. of Specified Radio Equipment in Annex 1, the Ministry of Internal Affairs and Communication notification in Article 88, Paragraph 2.

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.


Prepared by :


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Date:

Feb. 07, 2022

Approved by :


Jeremy Lin / Project Engineer

Date:

Feb. 07, 2022

2 Dynamic Frequency Selection

The manufacturer shall state whether the UUT is capable of operating as a Master and/or a Slave. If the UUT is capable of operating in more than one operating mode then each operating mode shall be tested separately. See tables A and B for the applicability of DFS requirements prior to use a channel (Channel Availability Check) and during normal operation (In-Service Monitoring) for each of the operational modes.

Table A: Applicability of DFS requirements prior to use a channel

Requirement	Operational Mode
	Master
Interference Detection Threshold	✓
Channel Availability Check Time	✓
Non-Occupancy Period	✓

Table B: Applicability of DFS requirements during normal operation

Requirement	Operational Mode
	Master
Interference Detection Threshold	✓
Channel Closing Transmission Time	✓
Channel Move Time	✓
Non-Occupancy Period	✓

2.1 Test Limits and Radar Signal Parameters

Interference Threshold Values

Master Device

Maximum Transmit Power	Power Value
$\geq 200\text{mW}$ ($\geq 23\text{dBm}$)	-64dBm
$< 200\text{mW}$ ($< 23\text{dBm}$)	-62dBm
This level is only for 0dBi EUT antenna gain	

DFS Requirement Time Values

Parameter	Value
Channel Availability Check Time	60 s
Non-occupancy Period	30 minutes
Channel Move Time	10 s
Channel Closing Transmission Time	260 ms

Parameters of DFS Test Signals

W53

Radar Test Signal	Pulse Repetition Frequency (PRF)	Pulse Width (us)	Number of Pulses per Burst	Radar Detection Probability
DFS-J1-1	200-1000	0.5-5	10	60% or more
DFS-J1-2	200-1600	0.5-15	15	60% or more
DFS-J1-3	200-1000	0.5-5	22-30	60% or more
DFS-J1-4	200-1600	0.5-15	22-30	60% or more
DFS-J1-5	1114-1118	0.5-1.5	30	60% or more
DFS-J1-6	928-932	0.5-1.5	25	60% or more
DFS-J1-7	886-890	0.5-1.5	24	60% or more
DFS-J1-8	738-742	0.5-1.5	20	60% or more

*1. The detection probability is the total transmission time in any 100ms from the master station radio equipment to the slave station radio equipment. It refers to the case of performing transmission of 30ms or more.

*2. The receiving threshold level is the following. (This is the average power while receiving radar with an absolute gain 0 dBi antenna.)

The case of $P_o \geq 200\text{mW}$; $\geq -64\text{dBm}(\text{avg.})$ / The case of $P_o < 200\text{mW}$; $P_o \geq -62\text{dBm}(\text{avg.})$

(P_o ; Max. Transmit Power (EIRP) of EUT)

W56

Radar Type	Pulse Repetition Frequency (PRF)	Pulse Width (μsec)	Number of Pulses	Radar Detection Probability
DFS-J2-1	720	0.5	18	60% or more
DFS-J2-2	250	2	18	60% or more
DFS-US-1	700	1	18	60% or more
DFS-US-2	4347 – 6667	1-5	23-29	60% or more
DFS-US-3	2000 – 5000	6-10	16-18	60% or more
DFS-US-4	2000 – 5000	11-20	12-16	60% or more
Aggregate (Radar Types 1-6)				80% or more

*1. The Channel Loading is 17% of Maximum Transmission Data Rate.

*2. The aggregate is the average of the percentage of successful detections of 6 Radar Types.

*3. The receiving threshold level is the following. (This is the average power while receiving radar with an absolute gain 0 dBi antenna.)

The case of $P_o \geq 200\text{mW}$; $\geq -64\text{dBm}(\text{avg.})$ / The case of $P_o < 200\text{mW}$; $\geq -62\text{dBm}(\text{avg.})$

(P_o ; Max. Transmit Power (EIRP) of EUT)

Radar Type	Pulse Repetition Frequency (pps)	Pulse Width (μsec)	Number of Pulses per Burst	Radar Detection Probability
DFS-US-5	500-1000	50 - 100	1-3	80% or more

*1. The Channel Loading is 17% of Maximum Transferred Data Rate.

*2. The transmission period for Long Pulse Radar test signal is 12 seconds.

*3. Each pulse has a liner frequency modulated chirp between 5 and 20 MHz, with the chirp width being randomly chosen. Each pulse within a Burst will have the same chirp width. Pulse in different Bursts may have different chirp widths.

*4. There are a total of 8 to 20 Bursts in the 12 second period. The interval of Burst is the time when divided 12 seconds by the number of the bursts.

*5. In the case of being lots pulse in the Burst, each pulse is same as them.

*6. In the case of being lots pulse in the Burst, each Burst within the 12 second sequence must have a different number of pulses.

*7. The receiving threshold level is the following. (This is the average power while receiving radar with an absolute gain 0 dBi antenna.)

The case of $P_o \geq 200\text{mW}$; $\geq -64\text{dBm}(\text{avg.})$ / The case of $P_o < 200\text{mW}$; $\geq -62\text{dBm}(\text{avg.})$

(P_o ; Max. Transmit Power (EIRP) of EUT)

Radar Type	Pulse Repetition Frequency (pps)	Pulse Width (μsec)	Pulses per Hop	Radar Detection Probability
DFS-US-6	3000	1	9	70% or more
<p>*1. The Channel Loading is 17% of Maximum Transferred Data Rate.</p> <p>*2. The frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250MHz to 5724MHz.</p> <p>*3. The Switching Interval of Hopping Sequence is 3 millisecond, and the Hopping Sequence Length is 300 millisecond.</p> <p>*4. The Burst Interval is 3 millisecond.</p> <p>*5. The receiving threshold level is the following. (This is the average power while receiving radar with an absolute gain 0 dBi antenna.)</p> <p>The case of $P_o \geq 200\text{mW}$; $\geq -64\text{dBm}(\text{avg.})$ / The case of $P_o < 200\text{mW}$; $\geq -62\text{dBm}(\text{avg.})$</p> <p>($P_o$; Max. Transmit Power (EIRP) of EUT)</p>				

2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration	Calibration Authority	Cal. Method
Spectrum Analyzer / Rohde & Schwarz	ESR	101451	Mar. 26, 2021	Mar. 25, 2022	Electronics Testing Center, Taiwan	c)
Signal Generator / KEYSIGHT	N5182B	MY53052282	Dec. 21, 2020	Dec. 20, 2021	Electronics Testing Center, Taiwan	c)
RF Coaxial Cable / HUBER SUHNER	SUCOFLEX 104	CABLE-DFS-01-254644	Note 3	Note 3	BV CPS E&E	d)

Note:

1. Calibration Method

- Calibration conducted by the National Institute of Information and Communications Technology ~ NICT ~ or a designated calibration agency under Article 102-18 paragraph (1) ~ TELEC Engineering Center, Intertek Japan K.K., Keysight Technologies, Inc ~.
 - Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992) ~ Japan Calibration Service System ~
 - Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1) ~ TELEC Engineering Center, Intertek Japan K.K., Keysight Technologies, Inc ~.
 - Calibration conducted by using other equipment that listed above from a) to c)
- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 - The RF coaxial cable no evaluation calibrated, which used the digital multimeter to verify before each testing.

2.3 EUT Information

EUT Software and Firmware Version

No.	Product	Test Model No.	Software/Firmware Version
1	Nuclias Cloud-Managed Wireless VPN Gateway	DBG-X1000	Linux version 4.4.60 (mikko@Gentoo)(gcc version 5.2.0 (Openwrt GCC 5.2.0))#71 SMP PREEMPT Thu Sep 30 18:50:29 CST 2021

Description of Available Antennas to the EUT

Ant.	Antenna Type	Connector	Frequency range (MHz to MHz)	Gain (dBi)
1	Dipole	IPEX	5250-5725	4.5
2	Dipole	IPEX	5250-5725	4.5

* The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

2.4 Description of Support Units

Support Unit information

No.	Product	Brand	Model No.	Software/Firmware Version
1	Wireless module	Intel	AX200	21.80.2.1

Note: This device was functioned as a ☐ Master ☒ Slave device during the DFS test.

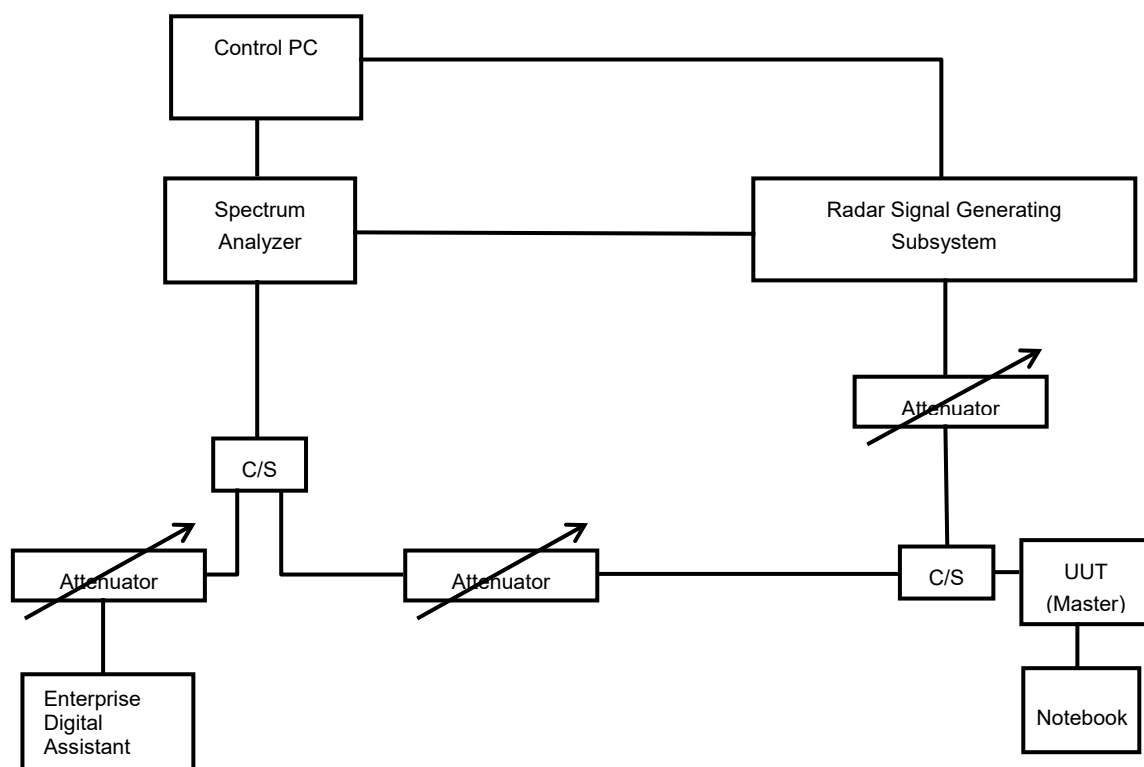
2.5 Test Procedure

The measured channels are in the W53 and W56 bands. The radar signal was the same as transmitted channels, and injected into the antenna port of AP (master) with -64dBm power level for W53 band and -64dBm power level for W56 band, measured the Channel Availability Check time and channel closing transmission time and channel move time and Non-Occupancy Period. When test W53 Band, The Channel Loading is 30% of Maximum Transmission Data Rate. When test W56 Band, The Channel Loading is 17% of Maximum Transmission Data Rate.

2.6 Deviation from Test Standard

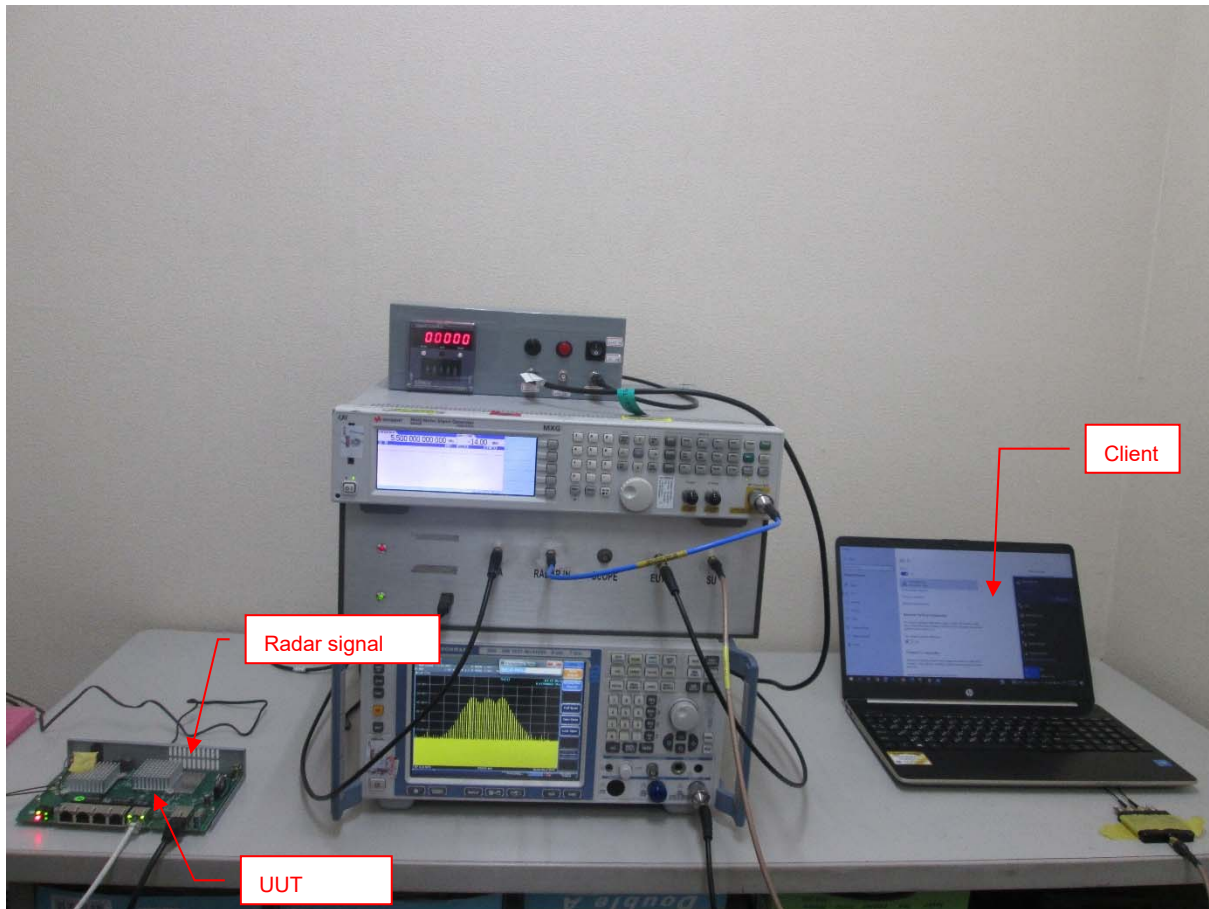
No deviation.

2.7 Conducted Test Setup Configuration



The UUT is capable of operating as a Master mode. The radar test signals are injected into the Master Device.

2.8 Photographs of the Test Configuration



2.8.1 List of Measurements

Quotation	Test Parameter	Remarks	Pass/Fail
OR: Article 49-20 Note: No.103 of 2019 OC: Annex 2. 3-12	Interference Detection Threshold	Applicable	Pass
OR: Article 49-20 Note: No.103 of 2019 OC: Annex 2. 3-12	Channel Availability Check Time	Applicable	Pass
OR: Article 49-20 Note: No.103 of 2019 OC: Annex 2. 3-12	Channel Closing Transmission Time	Applicable	Pass
OR: Article 49-20 Note: No.103 of 2019 OC: Annex 2. 3-12	Channel Move Time	Applicable	Pass
OR: Article 49-20 Note: No.103 of 2019 OC: Annex 2. 3-12	Non-Occupancy Period	Applicable	Pass

Note:

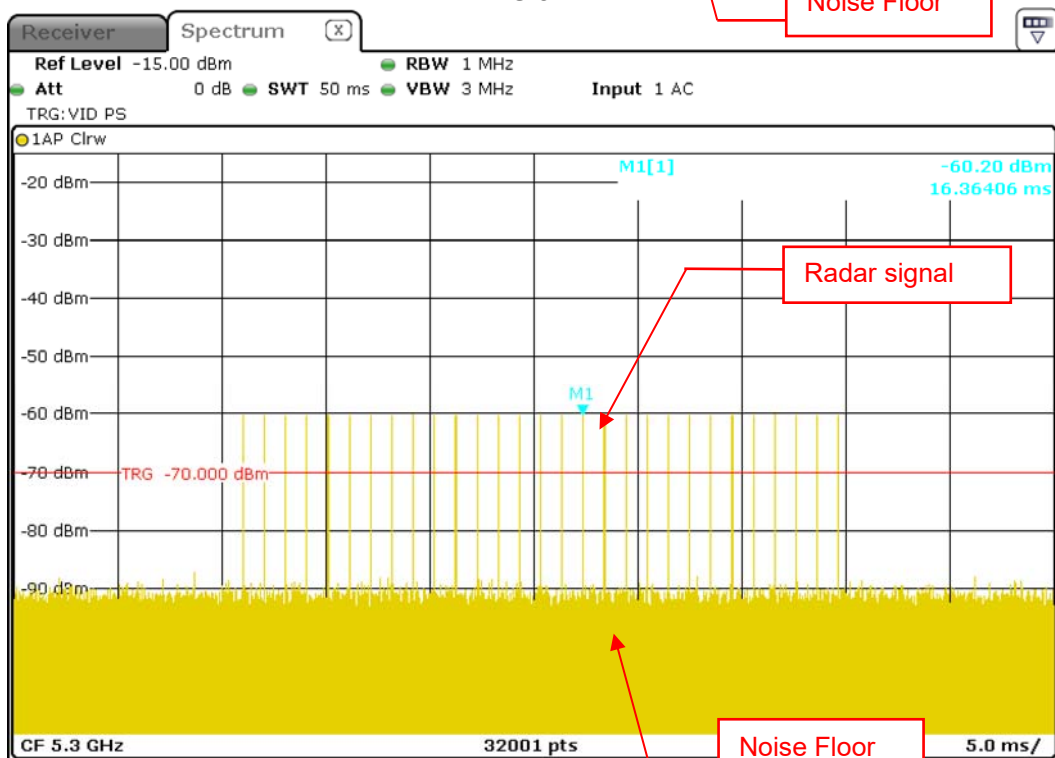
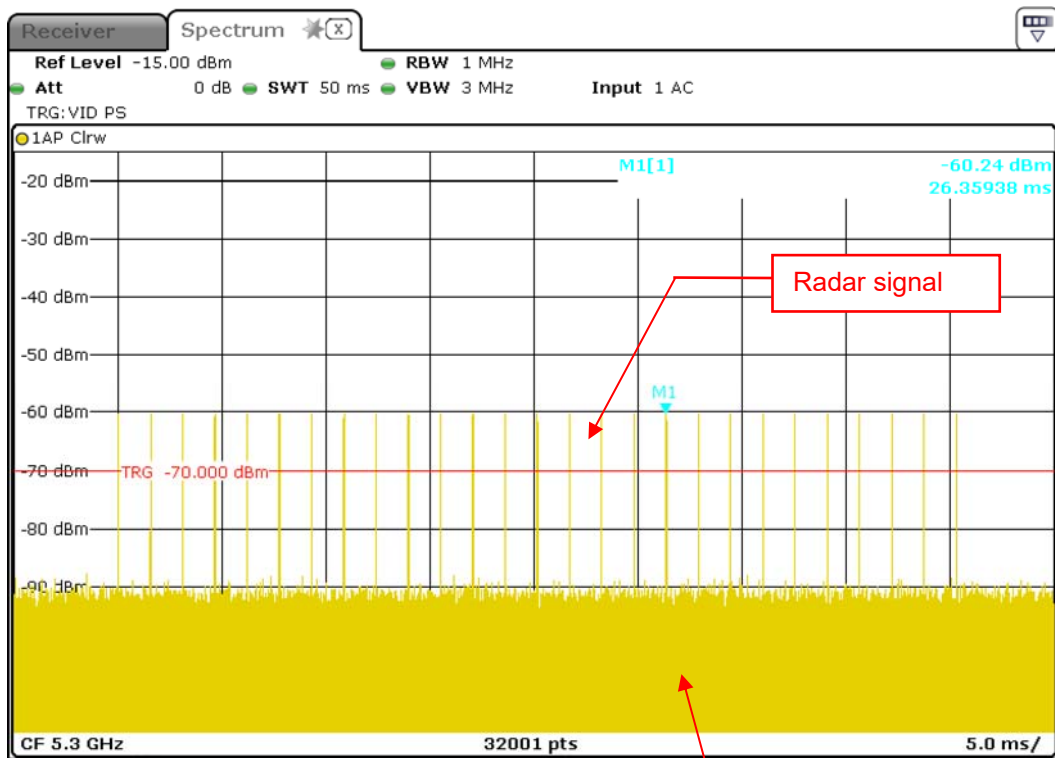
1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. This UUT is capable of operating as a master (with radar detection).

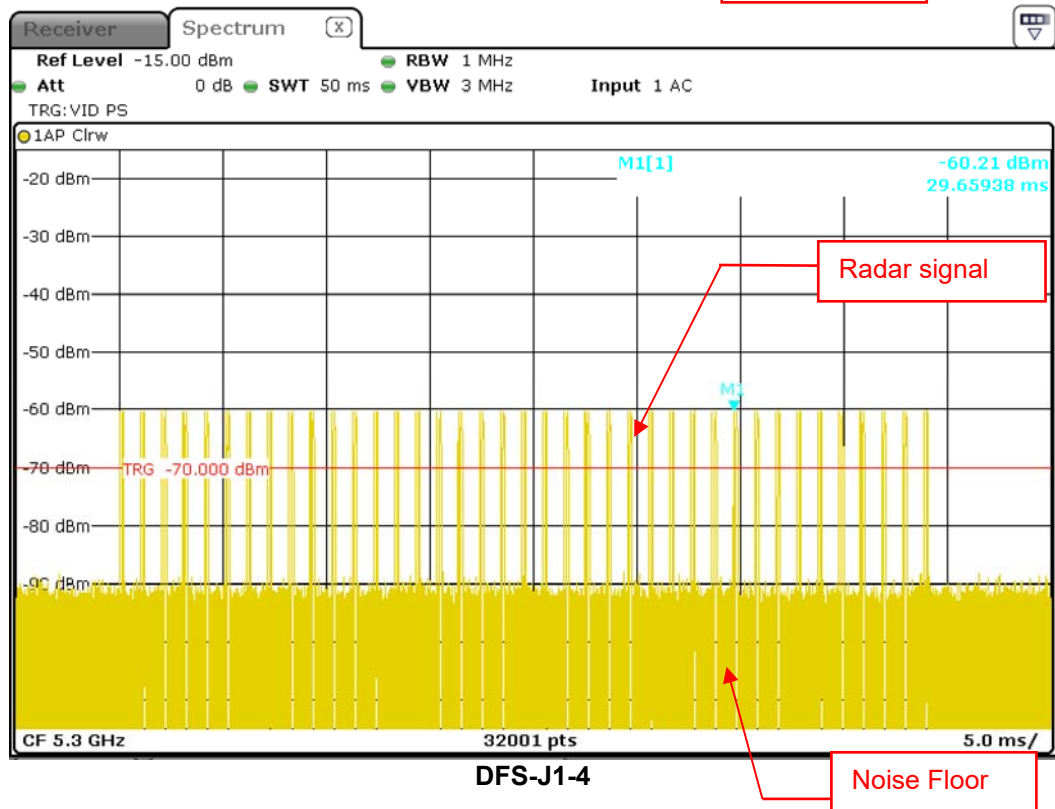
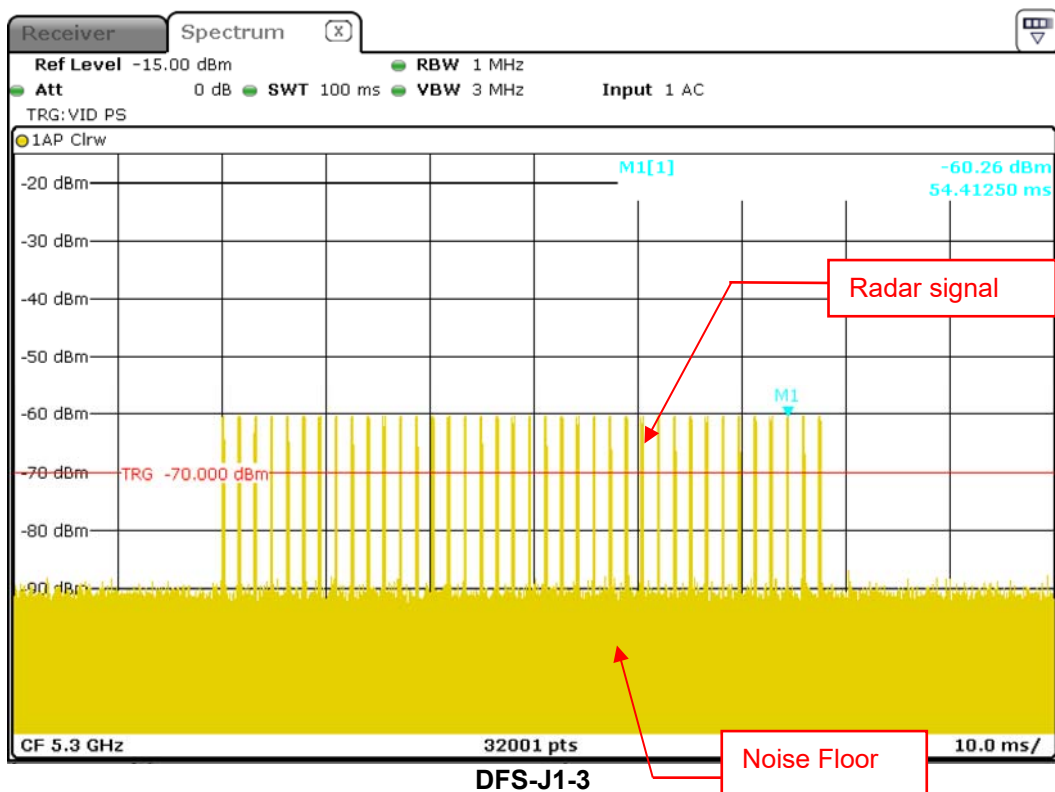
2.8.2 Test Result

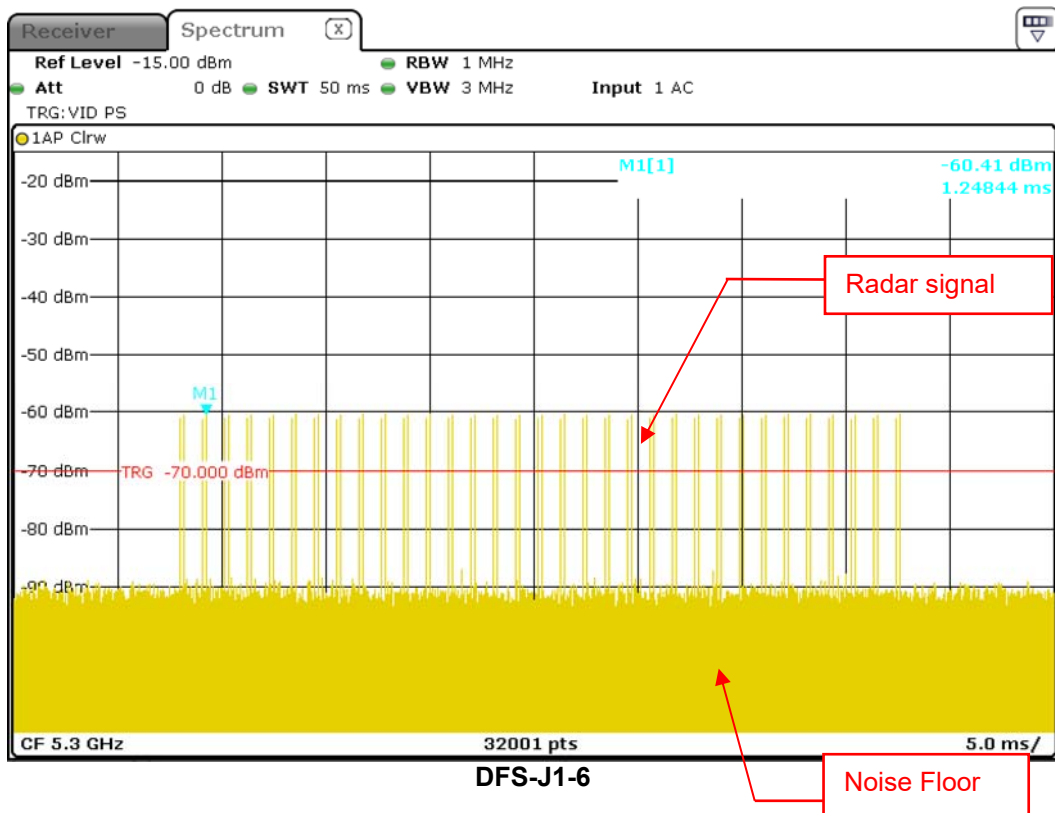
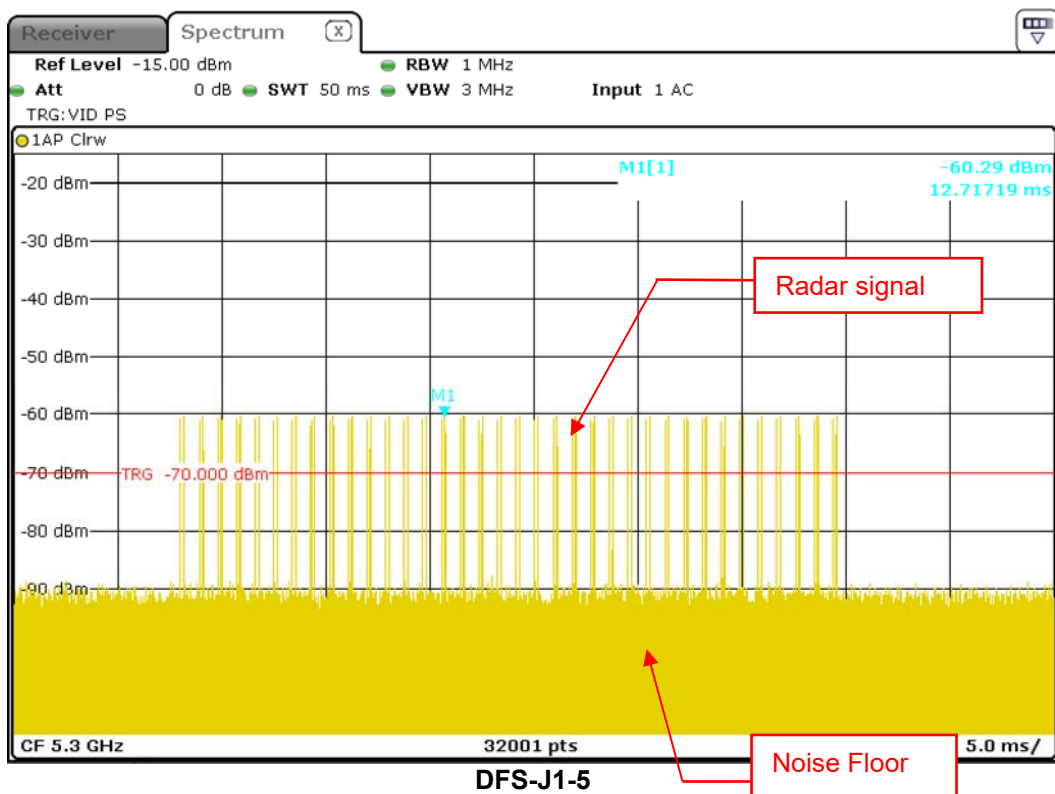
INTERFERENCE THRESHOLD VALUES INJECTED INTO AP

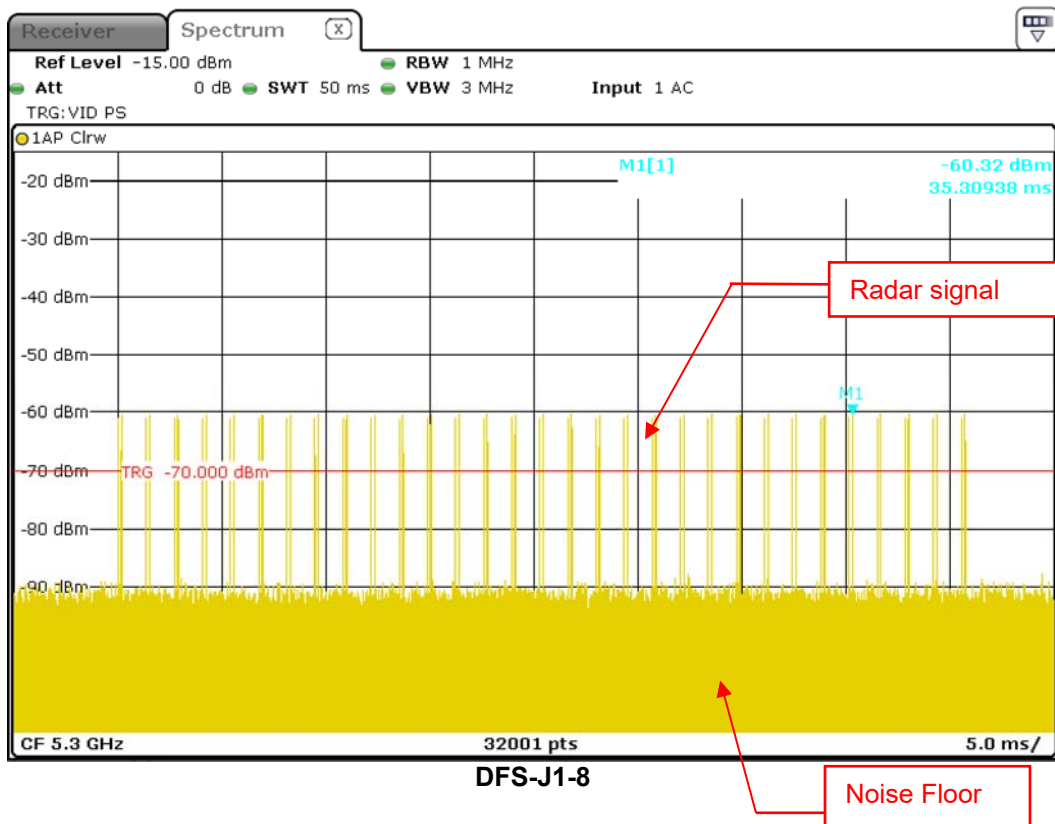
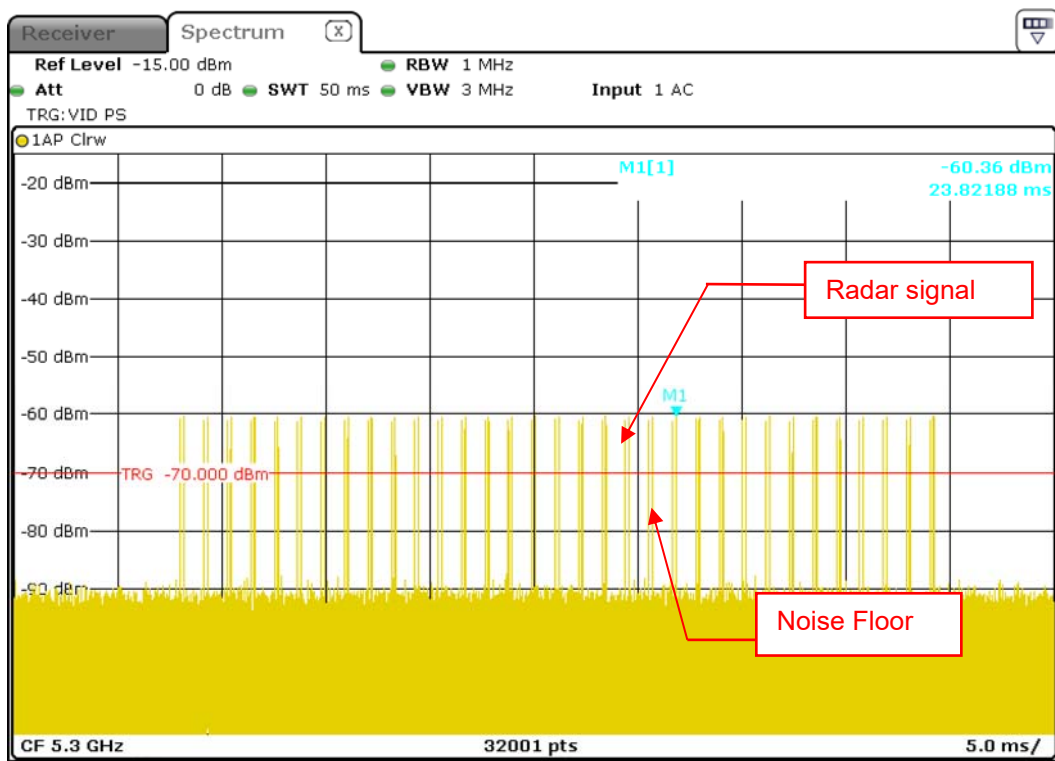
W53

For an interference threshold level of -64 Bm and the AP antenna gain is 4.5 dBi. Then the radar Burst signal level to the AP connector is -59.5 dBm.



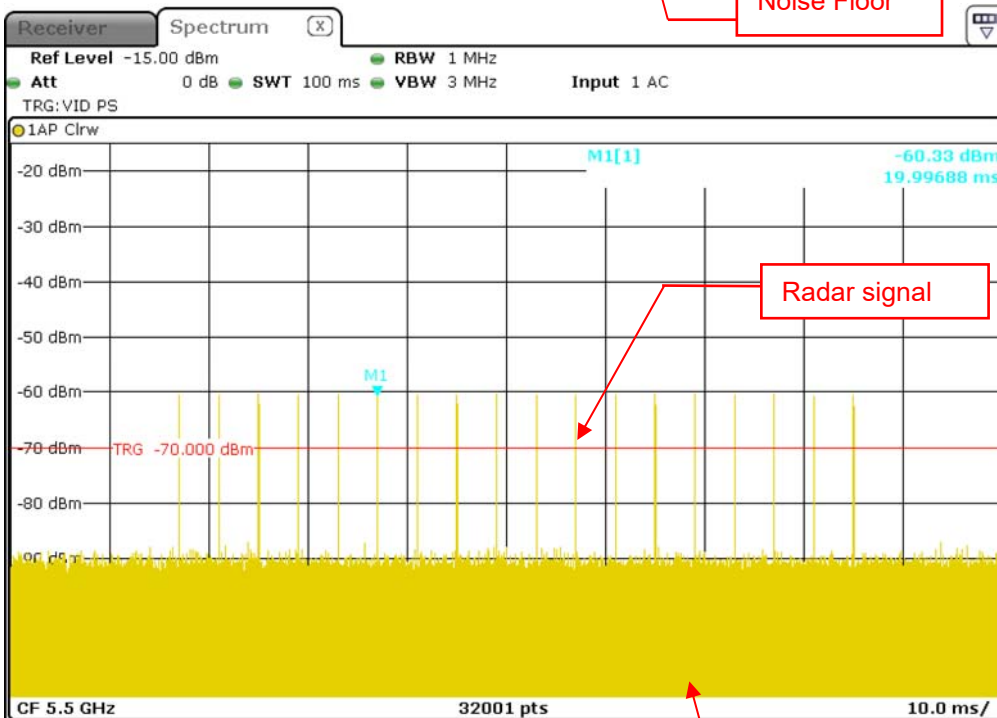
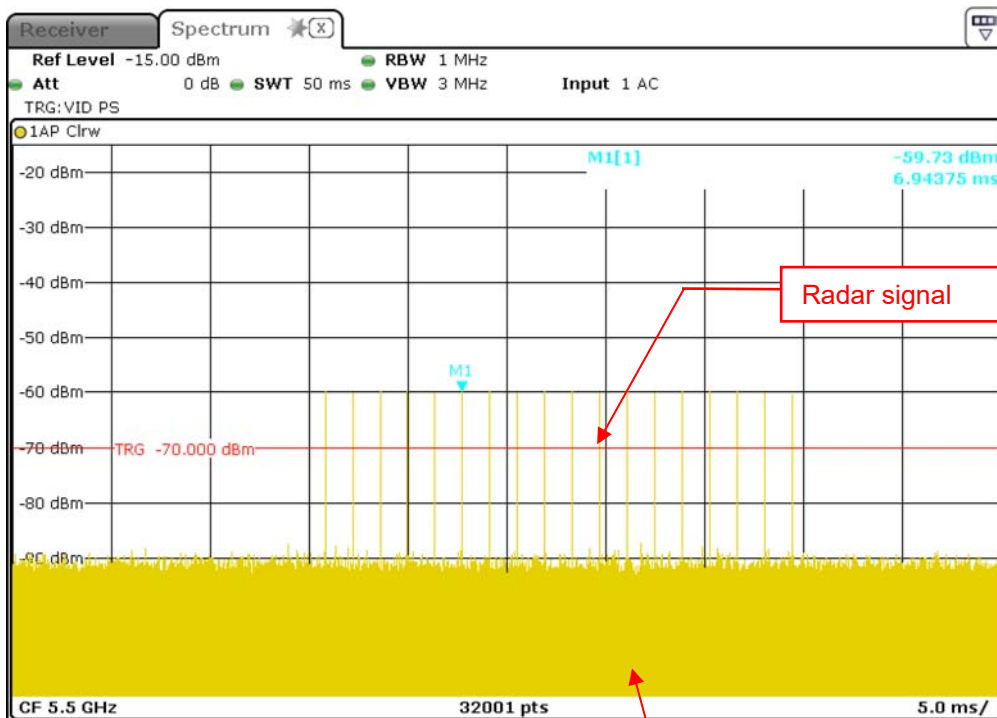


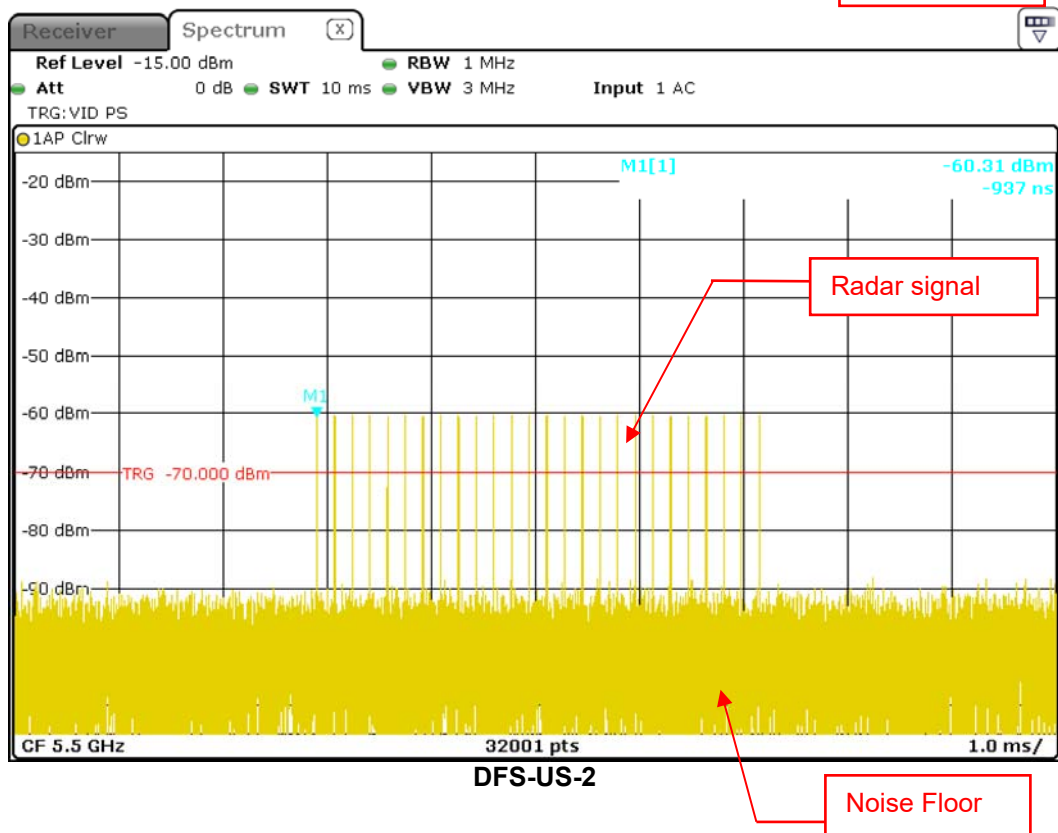
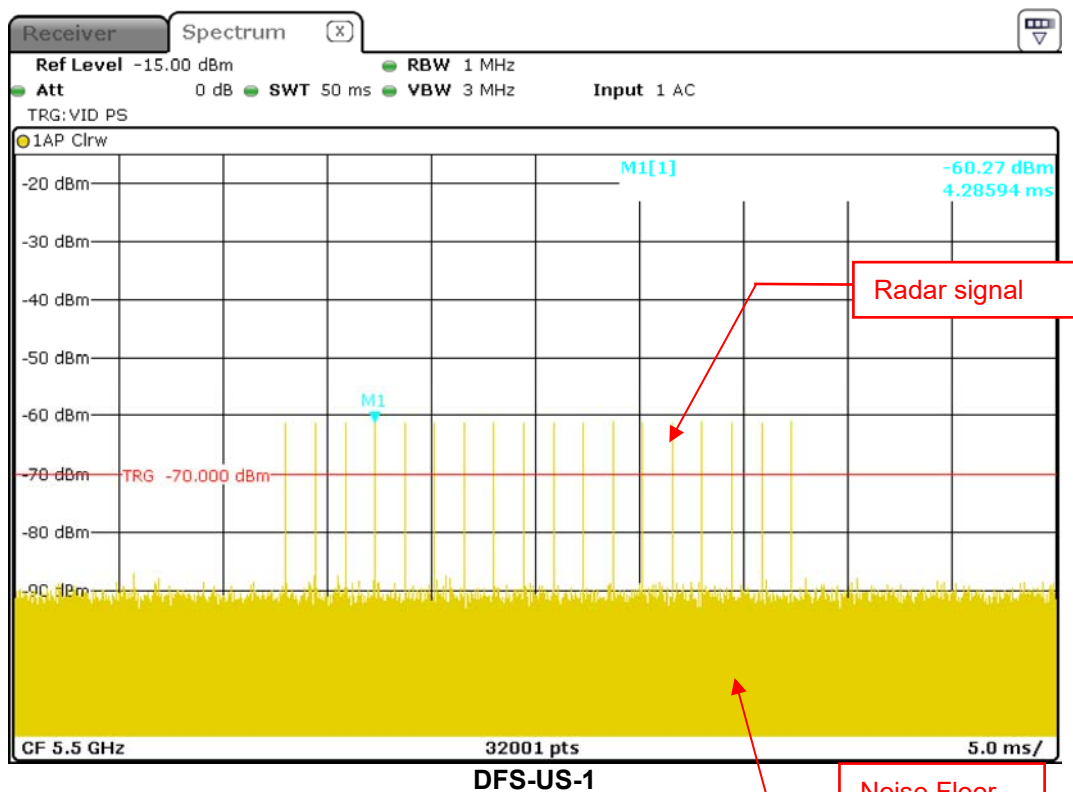


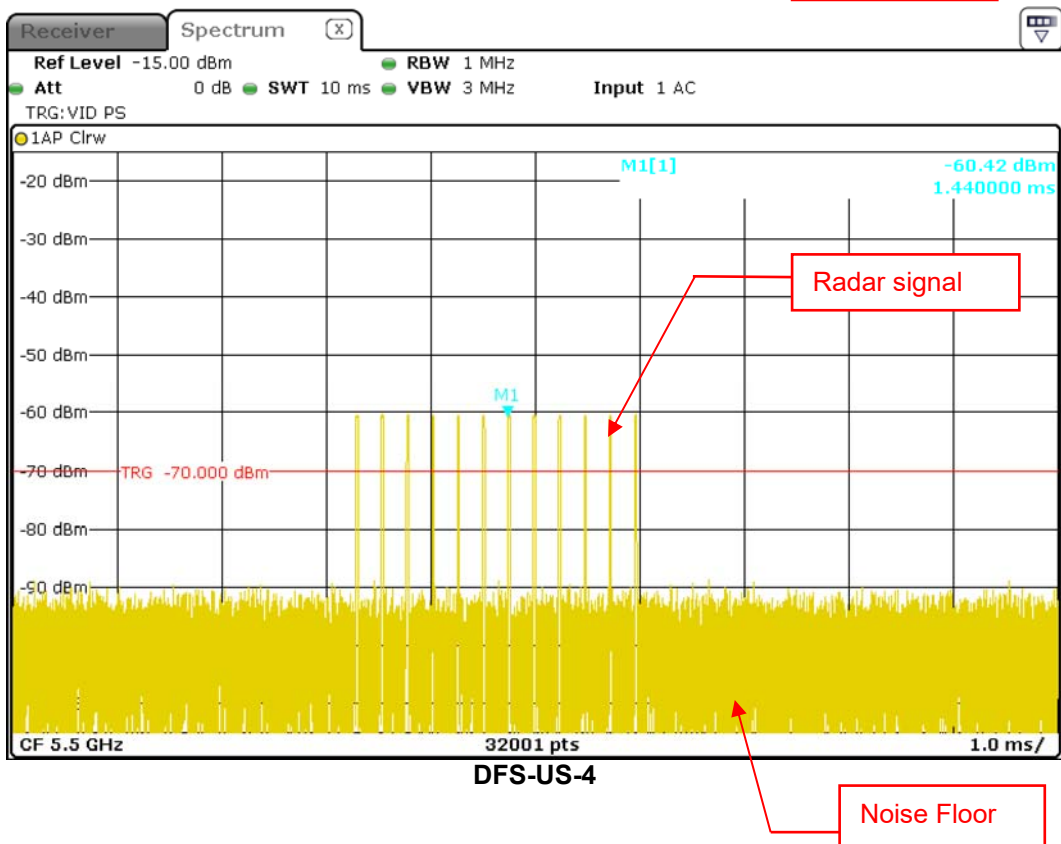
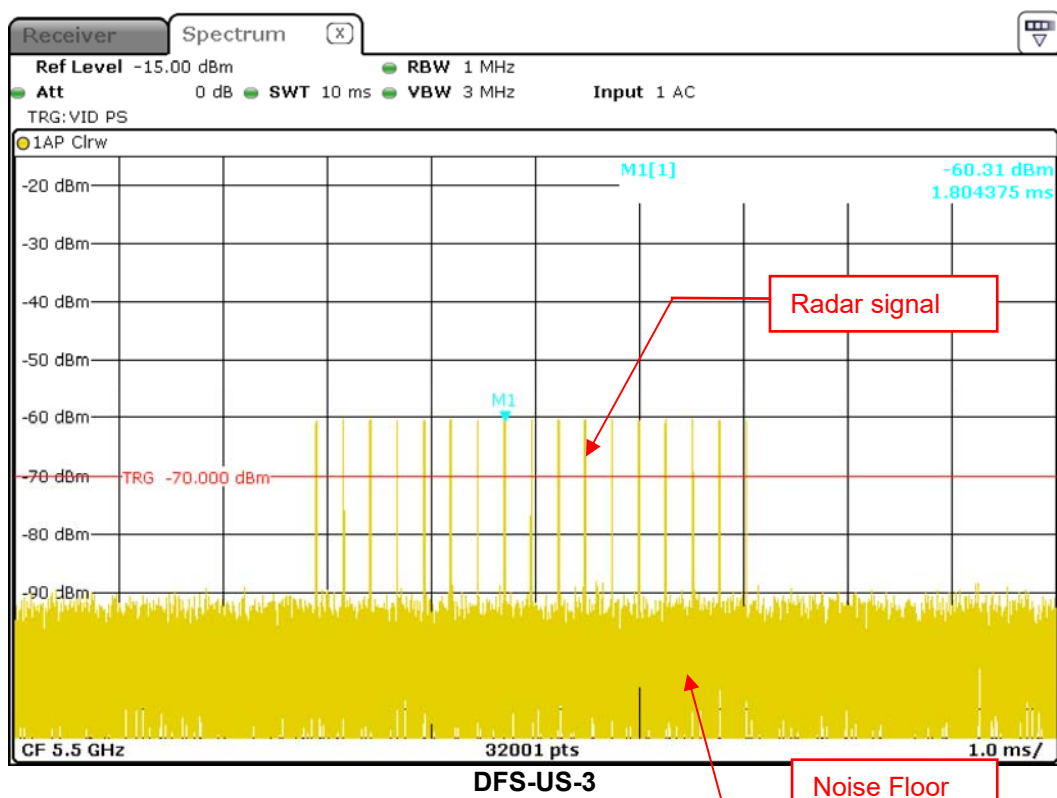


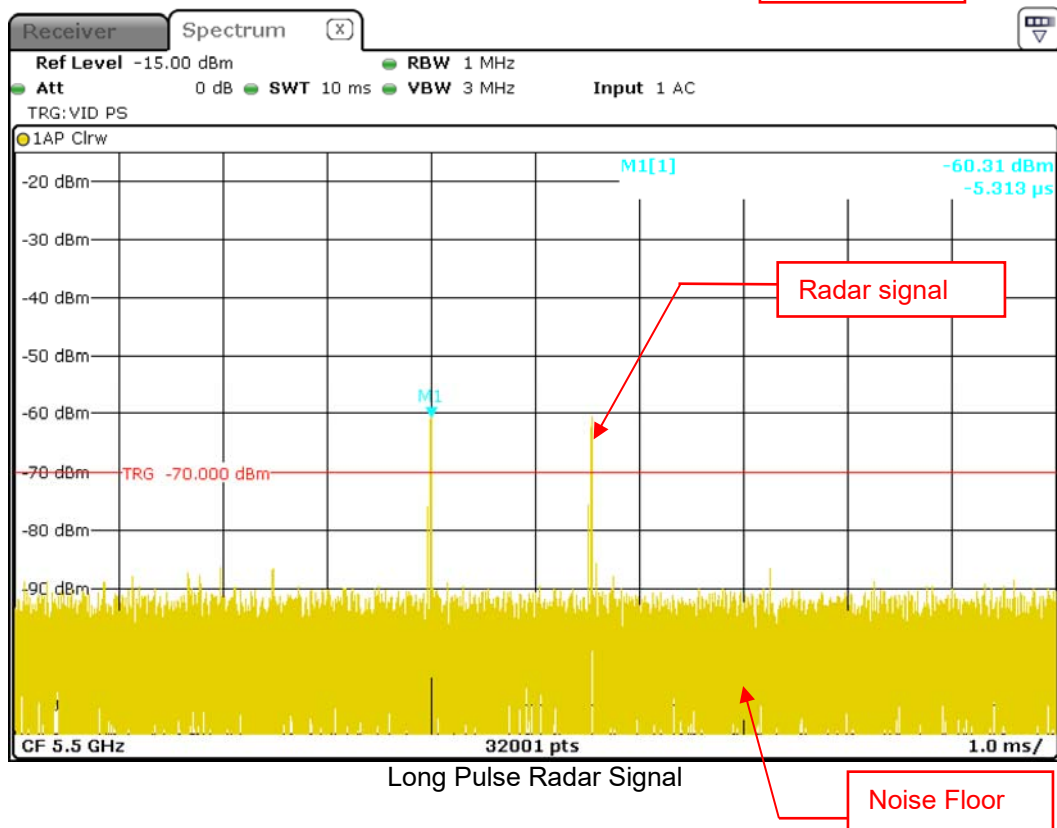
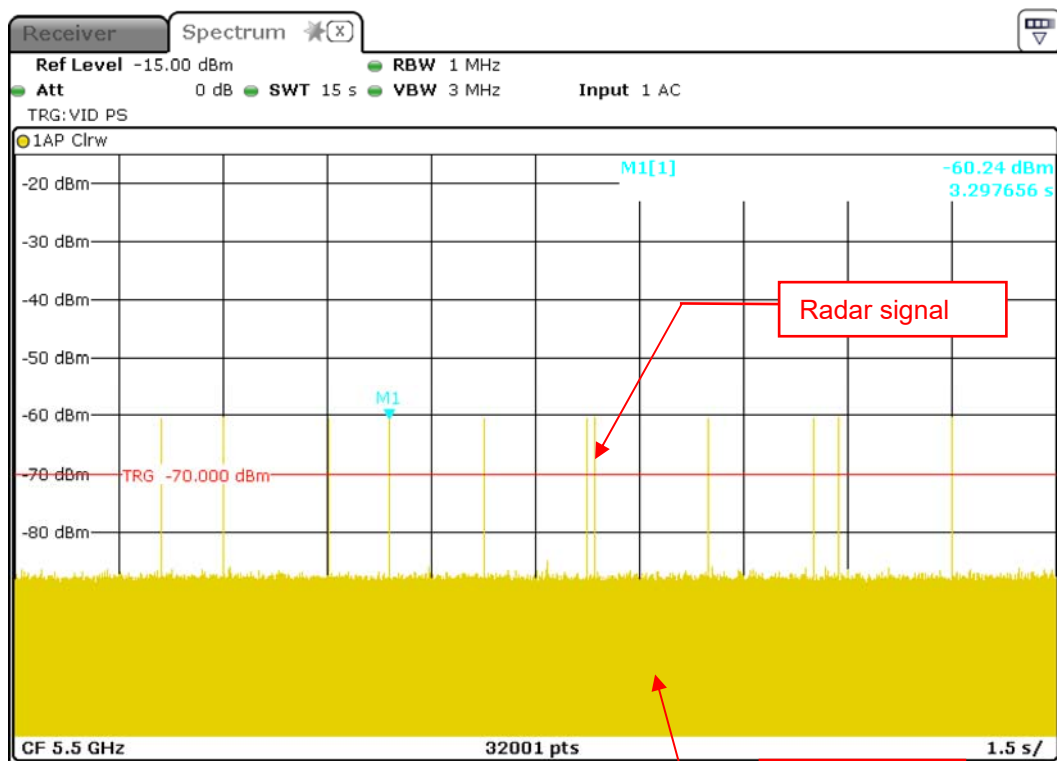
W56

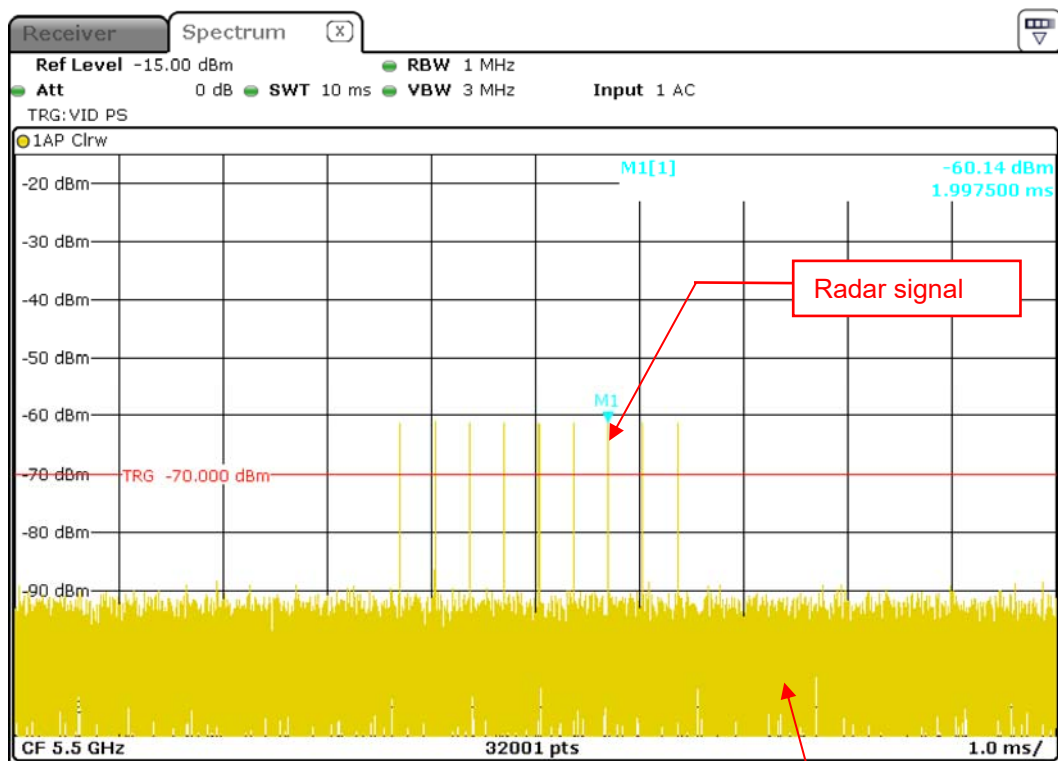
For an interference threshold level of -64 dBm and the AP antenna gain is 4.5 dBi . Then the radar Burst signal level to the AP connector is -59.5 dBm .











Frequency Hopping Radar Signal

Noise Floor

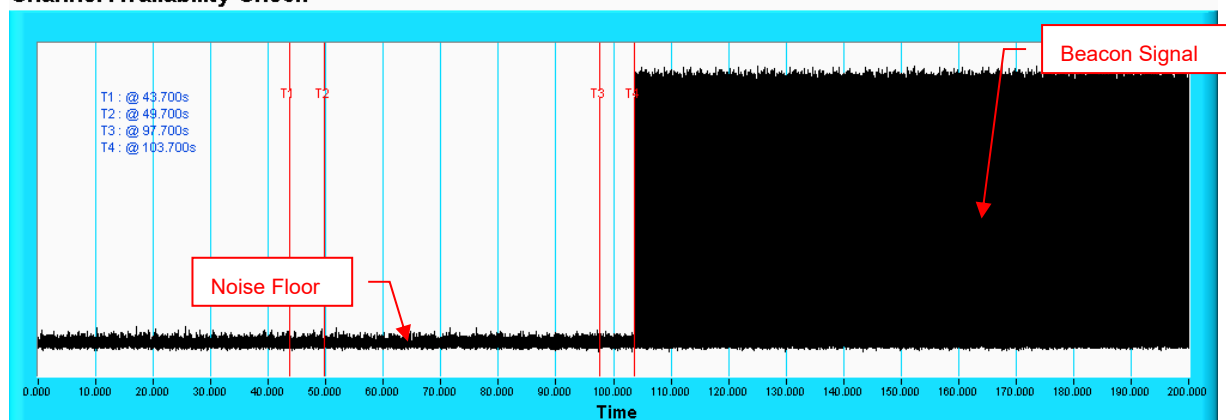
2.8.2.1 Channel Availability Check Time

If the UUT successfully detected the radar burst, it should be observed as the UUT has no transmissions occurred until the UUT starts transmitting on another channel.

Timing of Radar Signal	Observation	
	UUT	Spectrum Analyzer
Within 1 to 6 second	Detected	No transmissions
Within 54 to 60 second	Detected	No transmissions

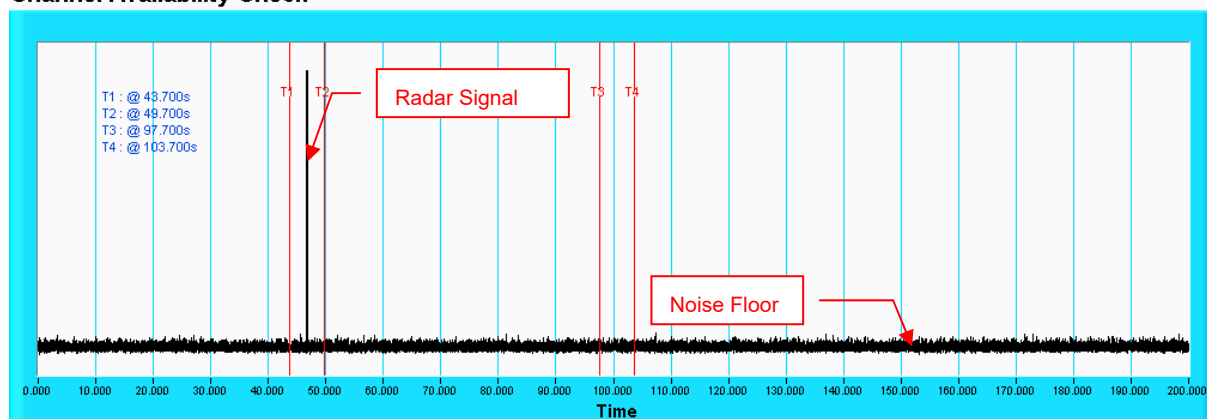
Note: Worst case channel for final "Channel Availability Check" test.

Initial Channel Availability Check Time W53 Channel Availability Check



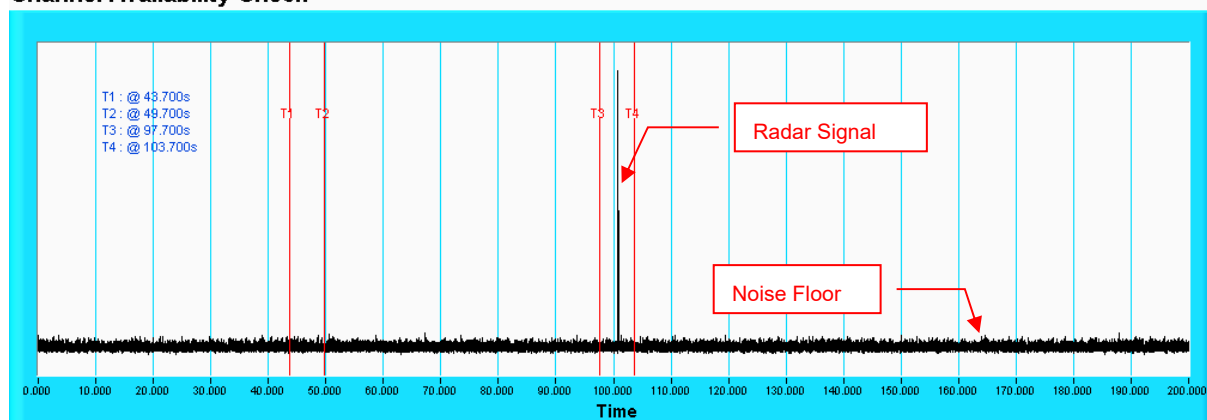
Note: T1 denotes the end of power-up time period is 43.7th second. T4 denotes the end of Channel Availability Check time is 103.7th second. Channel Availability Check time is equal to (T4 – T1) 60 seconds.

Radar Burst at the Beginning of the Channel Availability Check Time Channel Availability Check



Note: T1 denotes the end of power up time period is 43.7th second. the radar burst was commenced within a 6 second window starting from the end of power-up sequence. T4 denotes the 103.7th second.

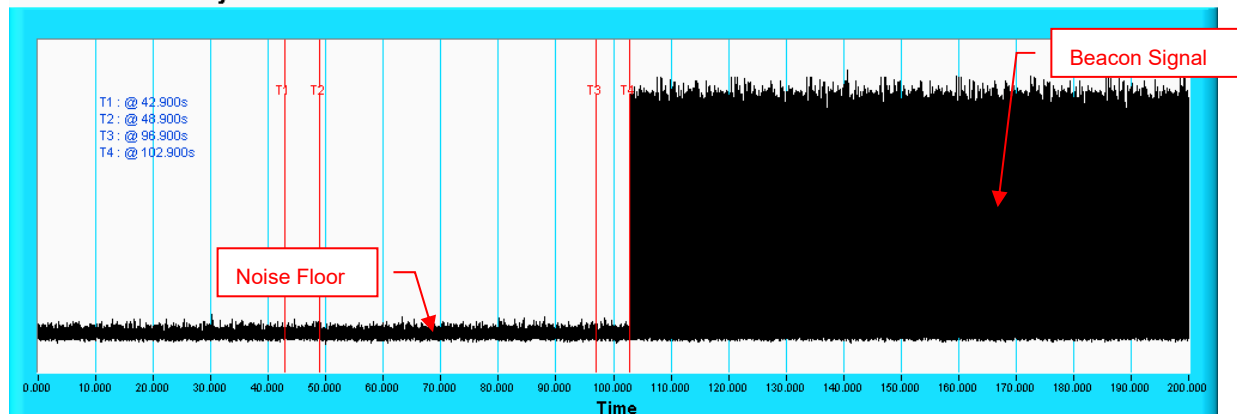
Radar Burst at the End of the Channel Availability Check Time Channel Availability Check



Note: T1 denotes the end of power up time period is 43.7th second. T3 denotes 97.7th second and T4 denotes the 103.7th second. The radar burst was commenced within 54th second to 60th second window starting from the end of power-up sequence.

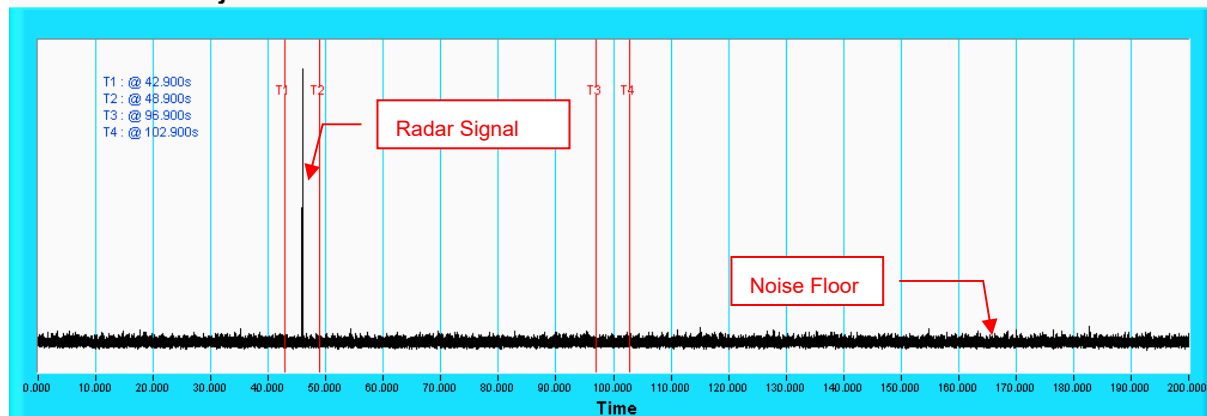
W56

Channel Availability Check



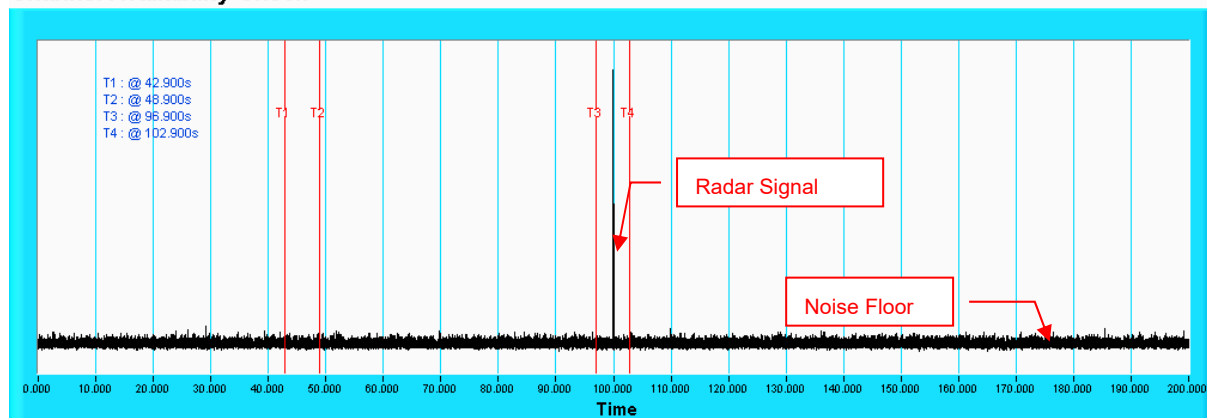
Note: T1 denotes the end of power-up time period is 42.9th second. T4 denotes the end of Channel Availability Check time is 102.9th second. Channel Availability Check time is equal to (T4 – T1) 60 seconds.

Radar Burst at the Beginning of the Channel Availability Check Time



Note: T1 denotes the end of power up time period is 42.9th second. the radar burst was commenced within a 6 second window starting from the end of power-up sequence. T4 denotes the 102.9th second.

Radar Burst at the End of the Channel Availability Check Time



Note: T1 denotes the end of power up time period is 42.9th second. T3 denotes 96.9th second and T4 denotes the 102.9th second. The radar burst was commenced within 54th second to 60th second window starting from the end of power-up sequence.

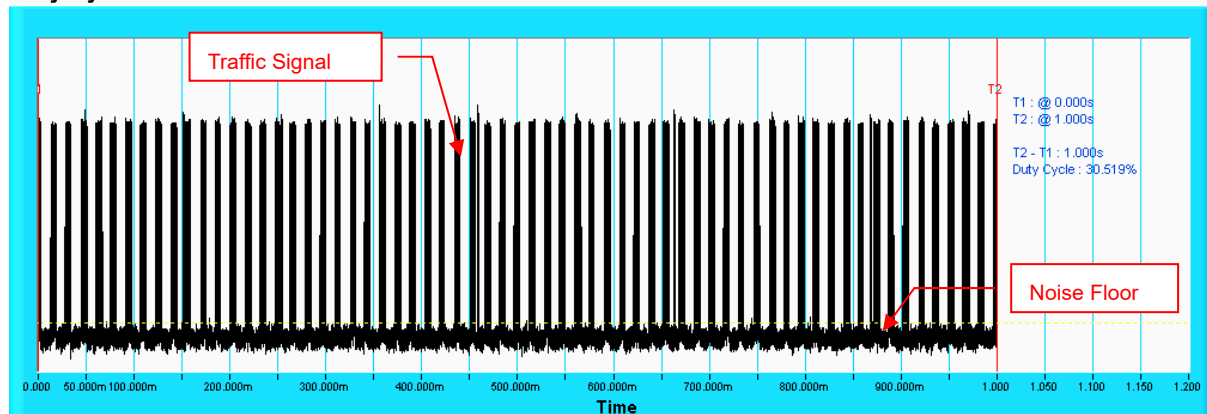
CHANNEL CLOSING TRANSMISSION TIME AND CHANNEL MOVE TIME

The channel closing time is aggregated duration of all transmissions from the UUT during the channel move time. The Aggregate duration of all transmission of the UUT does not include quiet periods in between transmissions of the UUT.

W53 WLAN TRAFFIC

802.11a

Duty Cycle

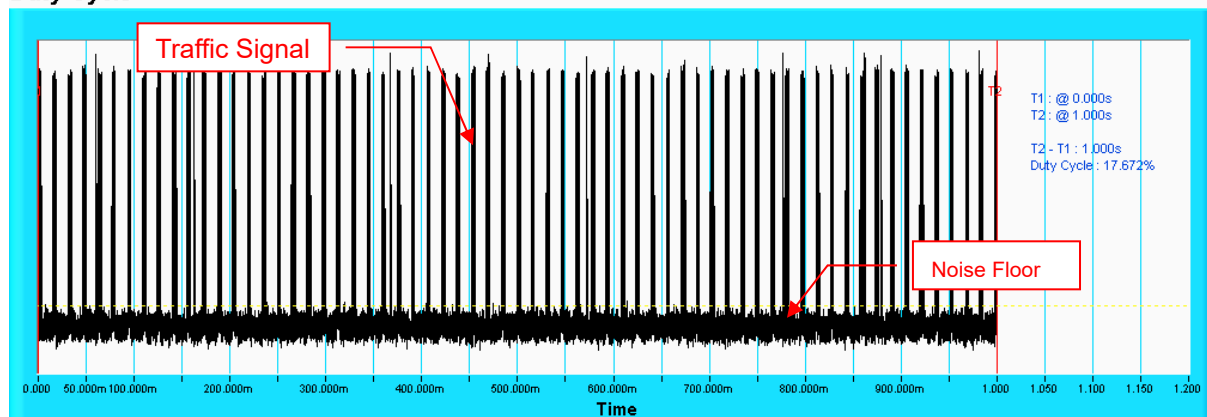


Note: T1 denotes the start of duty cycle period is 0th second. T2 denotes the end of duty cycle period is 1th second. T2 – T1= 1th seconds. Duty Cycle = 30.519%

W56 WLAN TRAFFIC

802.11a

Duty Cycle



Note: T1 denotes the start of duty cycle period is 0th second. T2 denotes the end of duty cycle period is 1th second. T2 – T1= 1th seconds. Duty Cycle = 17.672%

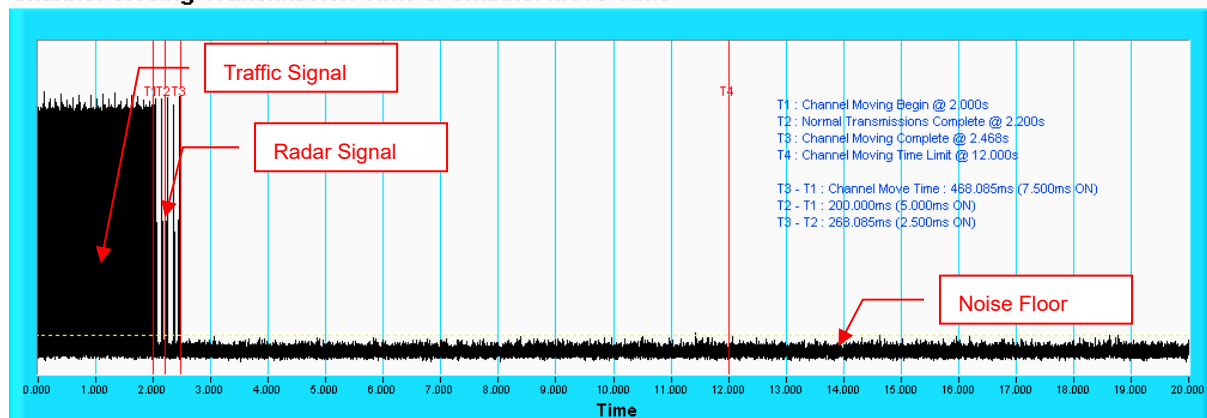
W53 802.11a

Radar Test Signal	Pulse Repetition Frequency (pps)	Pulse Width (us)	Number of Pulses per Burst	Minimum Percentage of Successful Detection	Percentage of Successful Detection (%)
DFS-J1-1	200-1000	0.5-5	10	60%	100%
DFS-J1-2	200-1600	0.5-15	15	60%	100%
DFS-J1-3	200-1000	0.5-5	22-30	60%	100%
DFS-J1-4	200-1600	0.5-15	22-30	60%	100%
DFS-J1-5	1114-1118	0.5-1.5	30	60%	100%
DFS-J1-6	928-932	0.5-1.5	25	60%	95%
DFS-J1-7	886-890	0.5-1.5	24	60%	90%
DFS-J1-8	738-742	0.5-1.5	20	60%	95%

W53

DFS-J1-1

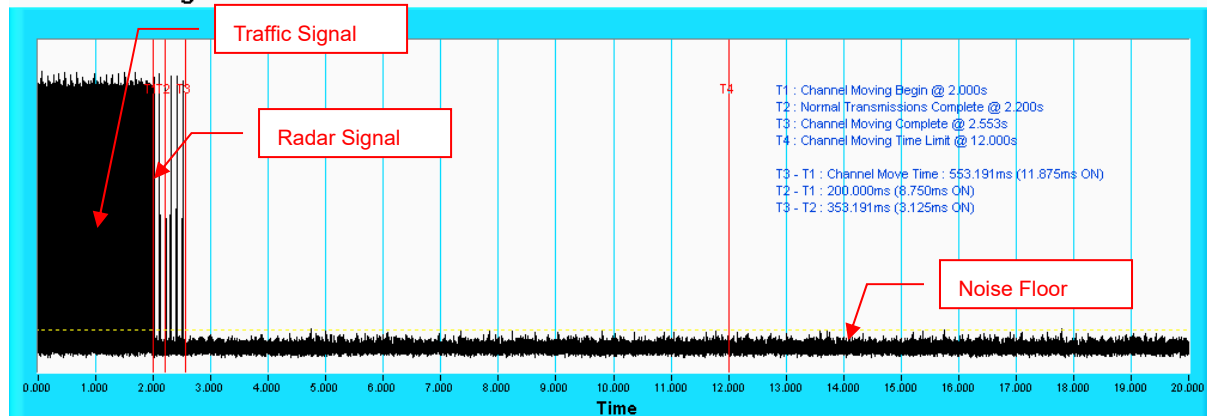
Channel Closing Transmission Time & Channel Move Time



Note: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T3 denotes the end of Channel Move Time. T4 denotes the 10 second from T1 to observe the aggregate duration of transmissions.

DFS-J1-2

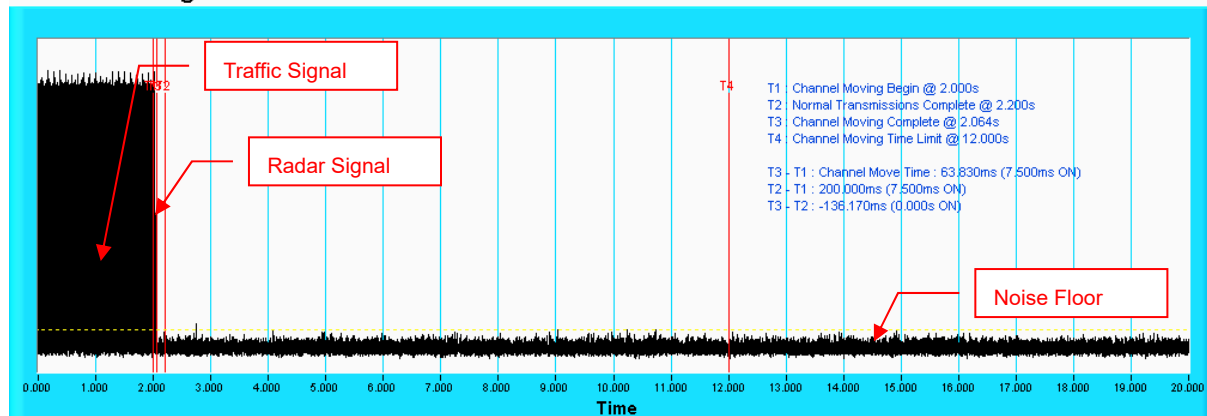
Channel Closing Transmission Time & Channel Move Time



Note: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T3 denotes the end of Channel Move Time. T4 denotes the 10 second from T1 to observe the aggregate duration of transmissions.

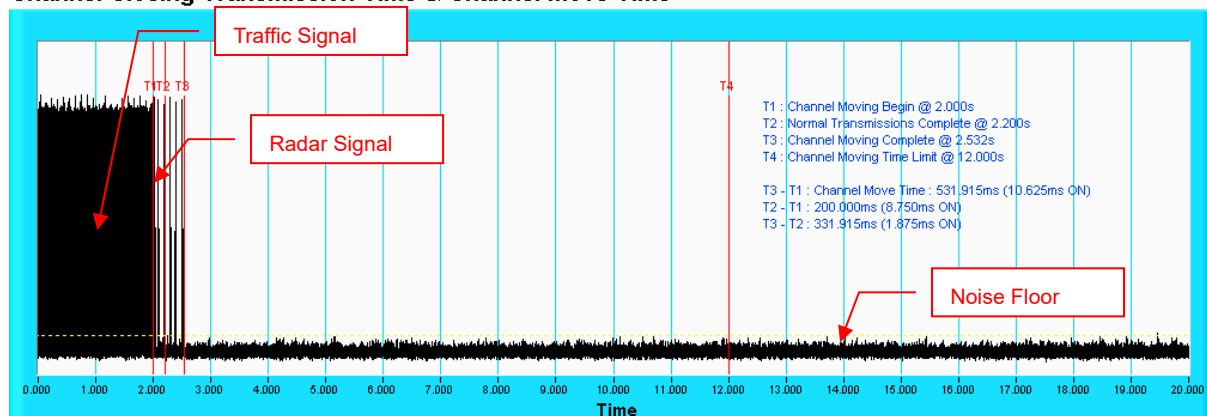
DFS-J1-3

Channel Closing Transmission Time & Channel Move Time



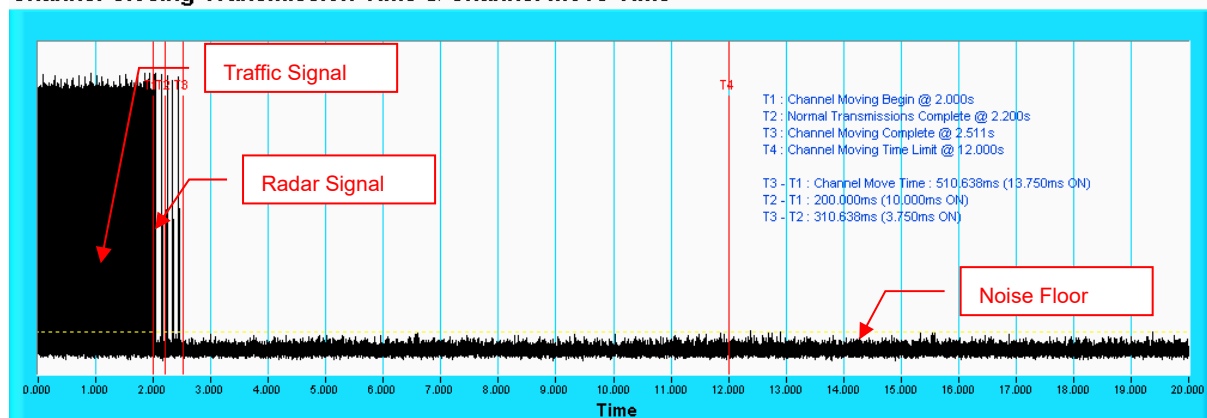
Note: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T3 denotes the end of Channel Move Time. T4 denotes the 10 second from T1 to observe the aggregate duration of transmissions.

DFS-J1-4 Channel Closing Transmission Time & Channel Move Time



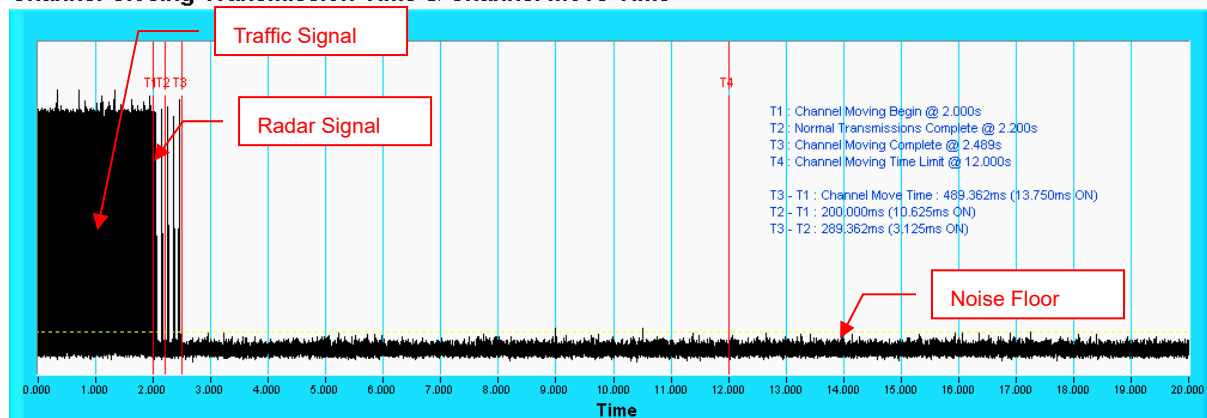
Note: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T3 denotes the end of Channel Move Time. T4 denotes the 10 second from T1 to observe the aggregate duration of transmissions.

DFS-J1-5 Channel Closing Transmission Time & Channel Move Time



Note: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T3 denotes the end of Channel Move Time. T4 denotes the 10 second from T1 to observe the aggregate duration of transmissions.

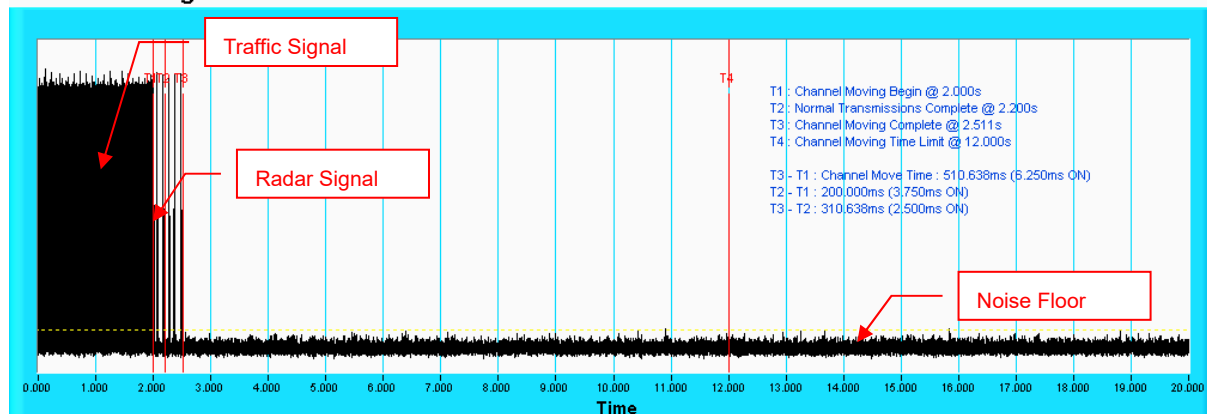
DFS-J1-6 Channel Closing Transmission Time & Channel Move Time



Note: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T3 denotes the end of Channel Move Time. T4 denotes the 10 second from T1 to observe the aggregate duration of transmissions.

DFS-J1-7

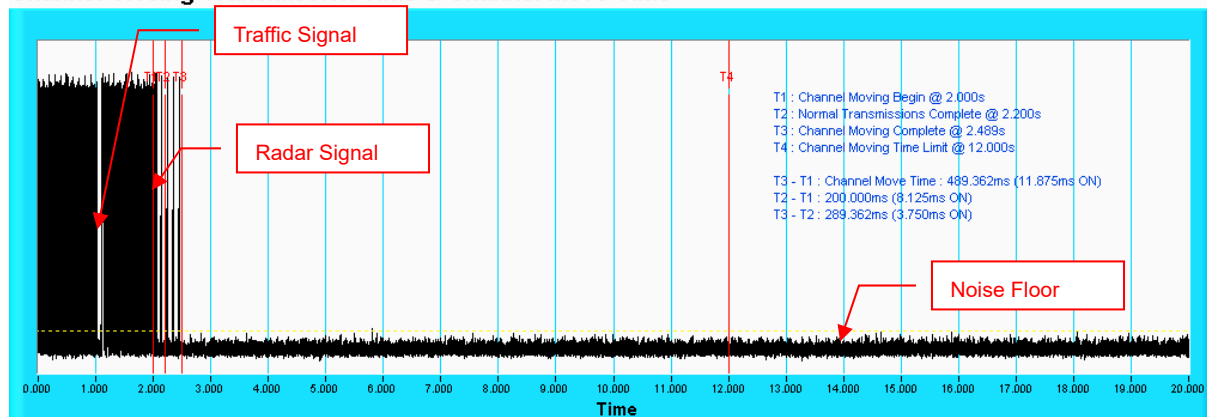
Channel Closing Transmission Time & Channel Move Time



Note: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T3 denotes the end of Channel Move Time. T4 denotes the 10 second from T1 to observe the aggregate duration of transmissions.

DFS-J1-8

Channel Closing Transmission Time & Channel Move Time



Note: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T3 denotes the end of Channel Move Time. T4 denotes the 10 second from T1 to observe the aggregate duration of transmissions.

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DFS-J1-1 Radar Statistical Performances		
Trial #	Channel (MHz)	Channel Closing Transmission Time & Channel move Time
1	5280	Yes
2	5300	Yes
3	5300	Yes
4	5280	Yes
5	5280	Yes
6	5280	Yes
7	5300	Yes
8	5320	Yes
9	5300	Yes
10	5300	Yes
11	5280	Yes
12	5300	Yes
13	5280	Yes
14	5320	Yes
15	5280	Yes
16	5320	Yes
17	5320	Yes
18	5320	Yes
19	5300	Yes
20	5280	Yes
Detection Rate		100%
Minimum Percentage of Successful Detection		60 %
Result		Pass

DFS-J1-2 Radar Statistical Performances		
Trial #	Channel (MHz)	Channel Closing Transmission Time & Channel move Time
1	5320	Yes
2	5300	Yes
3	5260	Yes
4	5300	Yes
5	5320	Yes
6	5280	Yes
7	5320	Yes
8	5280	Yes
9	5320	Yes
10	5260	Yes
11	5280	Yes
12	5320	Yes
13	5280	Yes
14	5260	Yes
15	5260	Yes
16	5320	Yes
17	5300	Yes
18	5260	Yes
19	5320	Yes
20	5320	Yes
Detection Rate		100%
Minimum Percentage of Successful Detection		60 %
Result		Pass

DFS-J1-3 Radar Statistical Performances		
Trial #	Channel (MHz)	Channel Closing Transmission Time & Channel move Time
1	5280	Yes
2	5320	Yes
3	5320	Yes
4	5280	Yes
5	5300	Yes
6	5320	Yes
7	5260	Yes
8	5320	Yes
9	5280	Yes
10	5260	Yes
11	5320	Yes
12	5260	Yes
13	5320	Yes
14	5300	Yes
15	5320	Yes
16	5300	Yes
17	5300	Yes
18	5280	Yes
19	5260	Yes
20	5320	Yes
Detection Rate		100%
Minimum Percentage of Successful Detection		60 %
Result		Pass

DFS-J1-4 Radar Statistical Performances		
Trial #	Channel (MHz)	Channel Closing Transmission Time & Channel move Time
1	5300	Yes
2	5320	Yes
3	5320	Yes
4	5260	Yes
5	5300	Yes
6	5320	Yes
7	5280	Yes
8	5300	Yes
9	5280	Yes
10	5320	Yes
11	5260	Yes
12	5320	Yes
13	5320	Yes
14	5300	Yes
15	5320	Yes
16	5320	Yes
17	5280	Yes
18	5280	Yes
19	5260	Yes
20	5280	Yes
Detection Rate		100%
Minimum Percentage of Successful Detection		60 %
Result		Pass

DFS-J1-5 Radar Statistical Performances		
Trial #	Channel (MHz)	Channel Closing Transmission Time & Channel move Time
1	5260	Yes
2	5320	Yes
3	5300	Yes
4	5320	Yes
5	5280	Yes
6	5320	Yes
7	5320	Yes
8	5300	Yes
9	5260	Yes
10	5260	Yes
11	5320	Yes
12	5260	Yes
13	5260	Yes
14	5320	Yes
15	5320	Yes
16	5300	Yes
17	5300	Yes
18	5280	Yes
19	5280	Yes
20	5260	Yes
Detection Rate		100%
Minimum Percentage of Successful Detection		60 %
Result		Pass

DFS-J1-6 Radar Statistical Performances		
Trial #	Channel (MHz)	Channel Closing Transmission Time & Channel move Time
1	5320	Yes
2	5280	Yes
3	5280	Yes
4	5280	No
5	5280	Yes
6	5320	Yes
7	5320	Yes
8	5320	Yes
9	5280	Yes
10	5320	Yes
11	5280	Yes
12	5260	Yes
13	5320	Yes
14	5260	Yes
15	5280	Yes
16	5300	Yes
17	5320	Yes
18	5260	Yes
19	5320	Yes
20	5300	Yes
Detection Rate		95%
Minimum Percentage of Successful Detection		60 %
Result		Pass

DFS-J1-7 Radar Statistical Performances		
Trial #	Channel (MHz)	Channel Closing Transmission Time & Channel move Time
1	5260	Yes
2	5320	Yes
3	5260	Yes
4	5280	Yes
5	5280	Yes
6	5300	No
7	5320	Yes
8	5280	Yes
9	5300	Yes
10	5320	No
11	5320	Yes
12	5260	Yes
13	5320	Yes
14	5280	Yes
15	5320	Yes
16	5300	Yes
17	5300	Yes
18	5260	Yes
19	5320	Yes
20	5320	Yes
Detection Rate		90%
Minimum Percentage of Successful Detection		60 %
Result		Pass

DFS-J1-8 Radar Statistical Performances		
Trial #	Channel (MHz)	Channel Closing Transmission Time & Channel move Time
1	5300	Yes
2	5260	Yes
3	5320	Yes
4	5320	Yes
5	5300	Yes
6	5280	Yes
7	5320	Yes
8	5320	Yes
9	5300	Yes
10	5320	Yes
11	5320	Yes
12	5320	Yes
13	5320	Yes
14	5300	Yes
15	5260	Yes
16	5260	Yes
17	5260	No
18	5280	Yes
19	5320	Yes
20	5320	Yes
Detection Rate		95%
Minimum Percentage of Successful Detection		60 %
Result		Pass

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Radar Type	Pulse Repetition Frequency (pps)	Pulse Width (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Percentage of Successful Detection (%)
DFS-J2-1	720	0.5	18	60%	100%
DFS-J2-2	250	2	18	60%	100%
DFS-US-1	700	1	18	60%	100%
DFS-US-2	4347 – 6667	1-5	23-29	60%	90%
DFS-US-3	2000 – 5000	6-10	16-18	60%	90%
DFS-US-4	2000 - 5000	11-20	12-16	60%	80%
Aggregate (Radar Types 1-6)				80%	93.33%

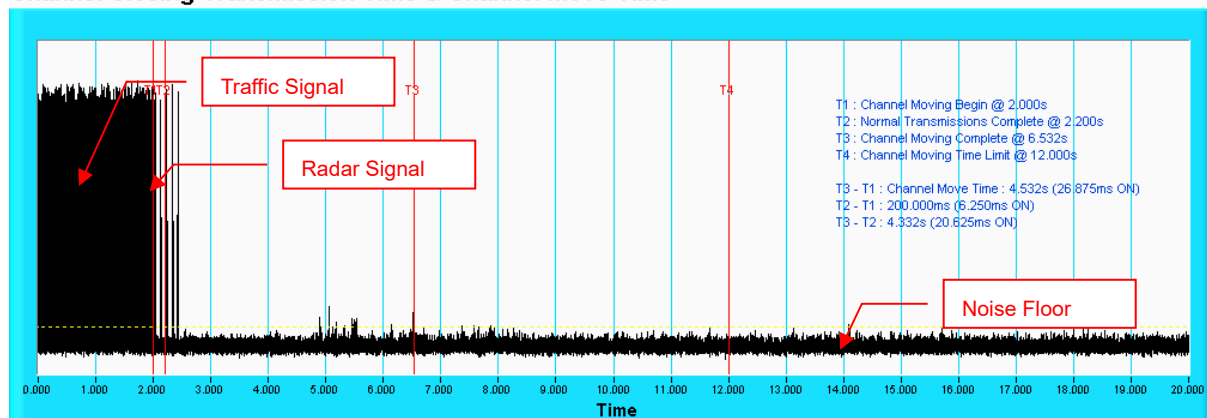
Radar Type	Pulse Repetition Frequency (pps)	Pulse Width (μsec)	Number of Pulses per Burst	Minimum Percentage of Successful Detection	Percentage of Successful Detection (%)
DFS-US-5	500-1000	50 - 100	1-3	80%	100%

Radar Type	Pulse Repetition Frequency (pps)	Pulse Width (μsec)	Pulses per Hop	Minimum Percentage of Successful Detection	Percentage of Successful Detection (%)
DFS-US-6	3000	1	9	70%	90%

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DFS-J2-1

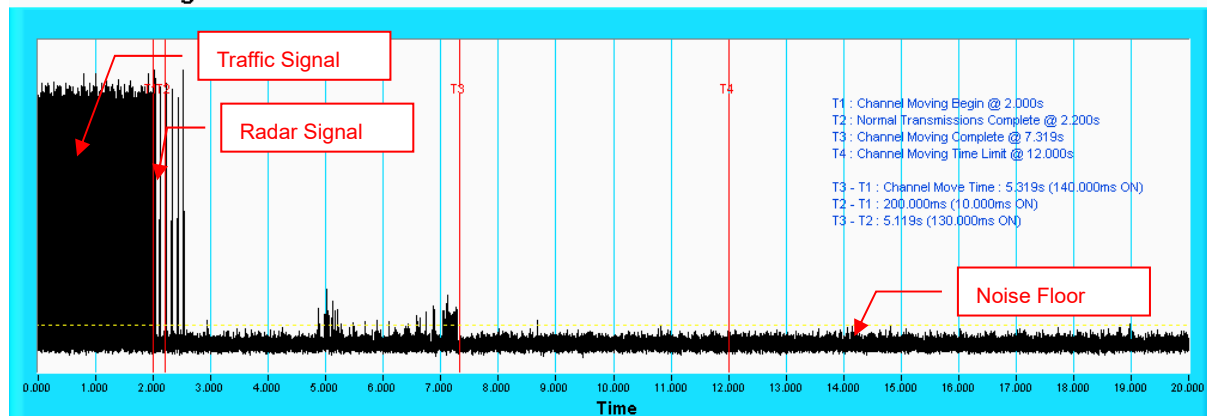
Channel Closing Transmission Time & Channel Move Time



Note: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T3 denotes the end of Channel Move Time. T4 denotes the 10 second from T1 to observe the aggregate duration of transmissions.

DFS-J2-2

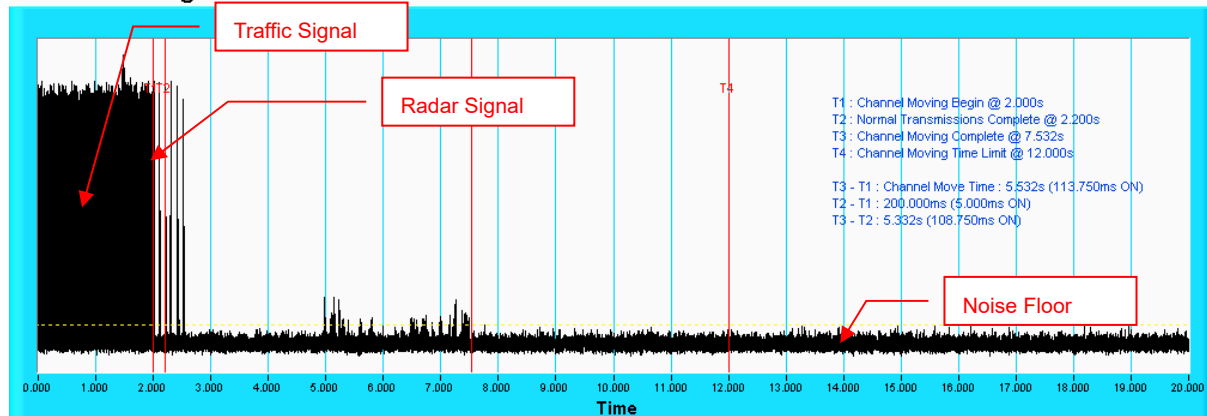
Channel Closing Transmission Time & Channel Move Time



Note: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T3 denotes the end of Channel Move Time. T4 denotes the 10 second from T1 to observe the aggregate duration of transmissions.

DFS-US-1

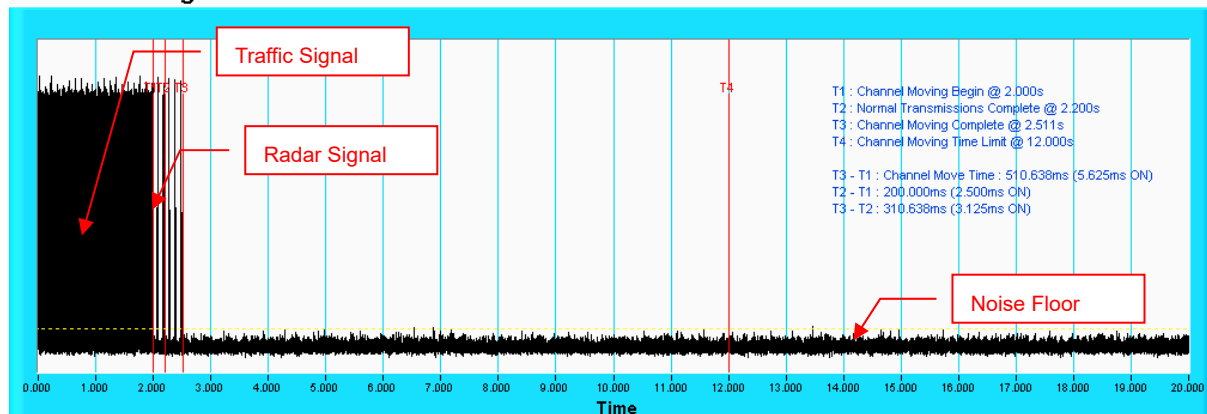
Channel Closing Transmission Time & Channel Move Time



Note: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T3 denotes the end of Channel Move Time. T4 denotes the 10 second from T1 to observe the aggregate duration of transmissions.

DFS-US-2

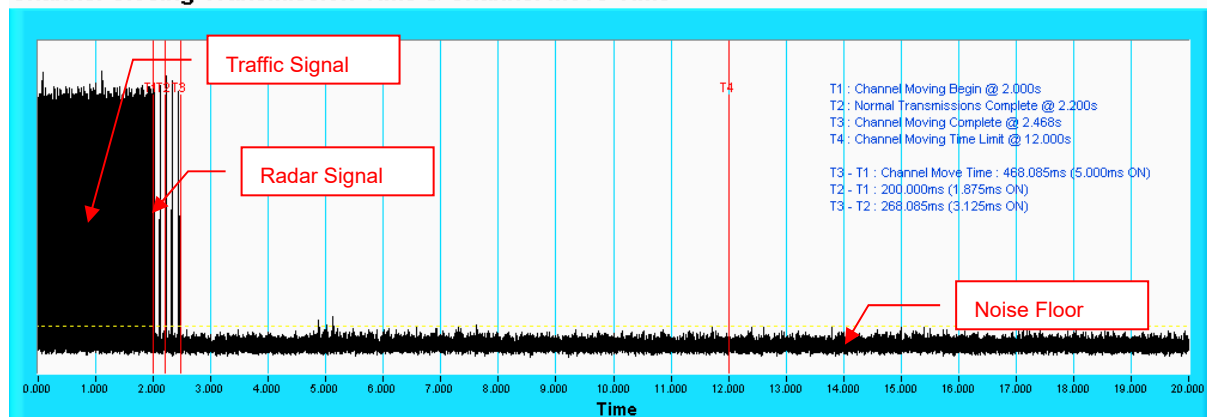
Channel Closing Transmission Time & Channel Move Time



Note: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T3 denotes the end of Channel Move Time. T4 denotes the 10 second from T1 to observe the aggregate duration of transmissions.

DFS-US-3

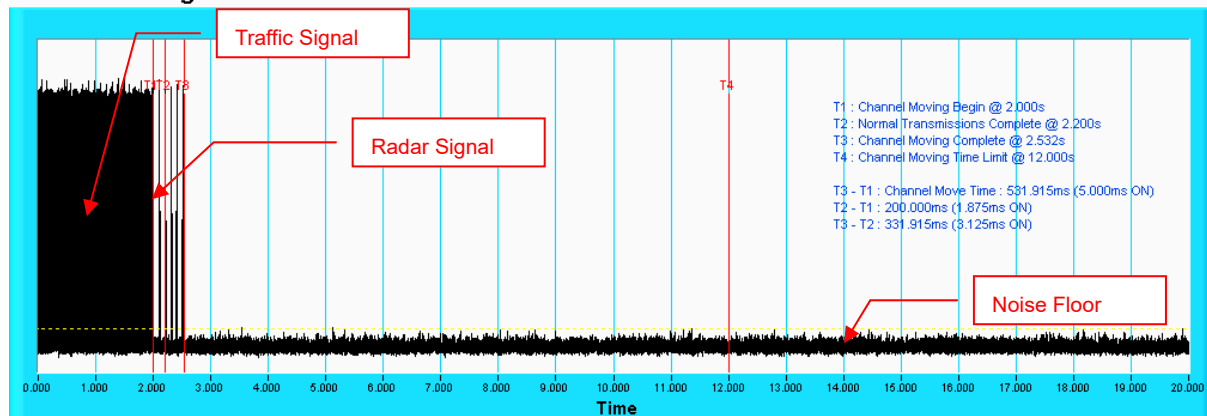
Channel Closing Transmission Time & Channel Move Time



Note: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T3 denotes the end of Channel Move Time. T4 denotes the 10 second from T1 to observe the aggregate duration of transmissions.

DFS-US-4

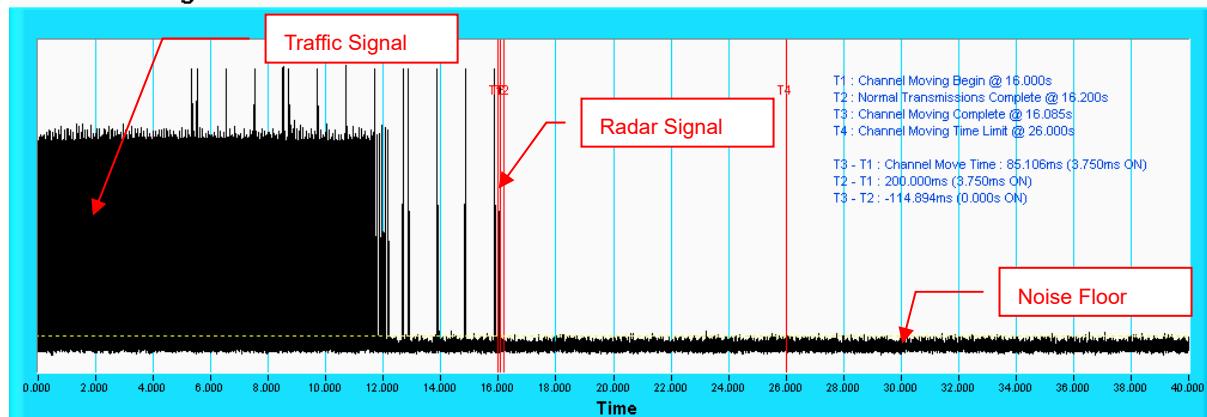
Channel Closing Transmission Time & Channel Move Time



Note: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T3 denotes the end of Channel Move Time. T4 denotes the 10 second from T1 to observe the aggregate duration of transmissions.

Long pulse radar signal

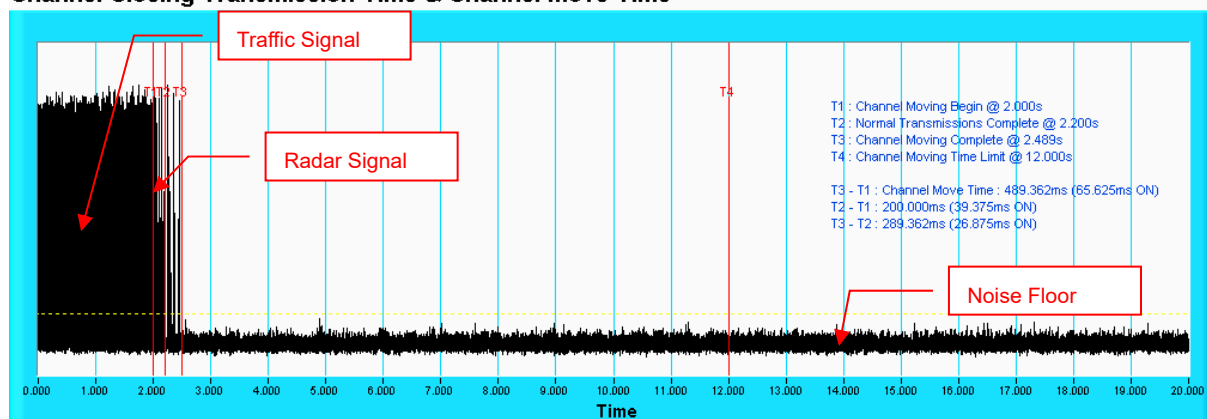
Channel Closing Transmission Time & Channel Move Time



Note: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T3 denotes the end of Channel Move Time. T4 denotes the 10 second from T1 to observe the aggregate duration of transmissions.

Frequency hopping radar signal

Channel Closing Transmission Time & Channel Move Time



Note: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T3 denotes the end of Channel Move Time. T4 denotes the 10 second from T1 to observe the aggregate duration of transmissions.

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DFS-J2-1 Radar Statistical Performances		
Trial #	Channel (MHz)	Channel Closing Transmission Time & Channel move Time
1	5620	Yes
2	5680	Yes
3	5520	Yes
4	5700	Yes
5	5680	Yes
6	5520	Yes
7	5520	Yes
8	5660	Yes
9	5580	Yes
10	5560	Yes
11	5620	Yes
12	5560	Yes
13	5540	Yes
14	5580	Yes
15	5520	Yes
16	5520	Yes
17	5500	Yes
18	5620	Yes
19	5540	Yes
20	5540	Yes
Detection Rate		100%
Minimum Percentage of Successful Detection		60 %
Result		Pass

DFS-J2-2 Radar Statistical Performances		
Trial #	Channel (MHz)	Channel Closing Transmission Time & Channel move Time
1	5540	Yes
2	5560	Yes
3	5500	Yes
4	5660	Yes
5	5700	Yes
6	5500	Yes
7	5620	Yes
8	5620	Yes
9	5540	Yes
10	5560	Yes
11	5520	Yes
12	5500	Yes
13	5620	Yes
14	5560	Yes
15	5680	Yes
16	5560	Yes
17	5640	Yes
18	5500	Yes
19	5560	Yes
20	5600	Yes
Detection Rate		100%
Minimum Percentage of Successful Detection		60 %
Result		Pass

DFS-US-1 Radar Statistical Performances		
Trial #	Channel (MHz)	Channel Closing Transmission Time & Channel move Time
1	5660	Yes
2	5680	Yes
3	5520	Yes
4	5540	Yes
5	5640	Yes
6	5660	Yes
7	5540	Yes
8	5540	Yes
9	5520	Yes
10	5600	Yes
11	5620	Yes
12	5520	Yes
13	5680	Yes
14	5540	Yes
15	5500	Yes
16	5500	Yes
17	5540	Yes
18	5600	Yes
19	5500	Yes
20	5700	Yes
Detection Rate		100%
Minimum Percentage of Successful Detection		60 %
Result		Pass

DFS-US-2 Radar Statistical Performances		
Trial #	Channel (MHz)	Channel Closing Transmission Time & Channel move Time
1	5540	Yes
2	5540	Yes
3	5540	Yes
4	5700	Yes
5	5700	Yes
6	5540	Yes
7	5700	Yes
8	5700	Yes
9	5540	Yes
10	5680	No
11	5700	Yes
12	5560	Yes
13	5500	No
14	5680	Yes
15	5640	Yes
16	5660	Yes
17	5660	Yes
18	5700	Yes
19	5700	Yes
20	5660	Yes
Detection Rate		90%
Minimum Percentage of Successful Detection		60 %
Result		Pass

DFS-US-3 Radar Statistical Performances		
Trial #	Channel (MHz)	Channel Closing Transmission Time & Channel move Time
1	5640	Yes
2	5560	Yes
3	5640	No
4	5560	Yes
5	5500	Yes
6	5500	Yes
7	5500	Yes
8	5520	Yes
9	5700	Yes
10	5540	Yes
11	5680	Yes
12	5540	Yes
13	5700	No
14	5640	Yes
15	5540	Yes
16	5680	Yes
17	5700	Yes
18	5640	Yes
19	5600	Yes
20	5500	Yes
Detection Rate		90%
Minimum Percentage of Successful Detection		60 %
Result		Pass

DFS-US-4 Radar Statistical Performances		
Trial #	Channel (MHz)	Channel Closing Transmission Time & Channel move Time
1	5520	Yes
2	5500	Yes
3	5640	Yes
4	5640	Yes
5	5540	Yes
6	5580	Yes
7	5520	No
8	5600	Yes
9	5540	No
10	5580	No
11	5560	Yes
12	5640	Yes
13	5560	Yes
14	5660	Yes
15	5500	Yes
16	5560	Yes
17	5540	No
18	5540	Yes
19	5500	Yes
20	5700	Yes
Detection Rate		80%
Minimum Percentage of Successful Detection		60 %
Result		Pass

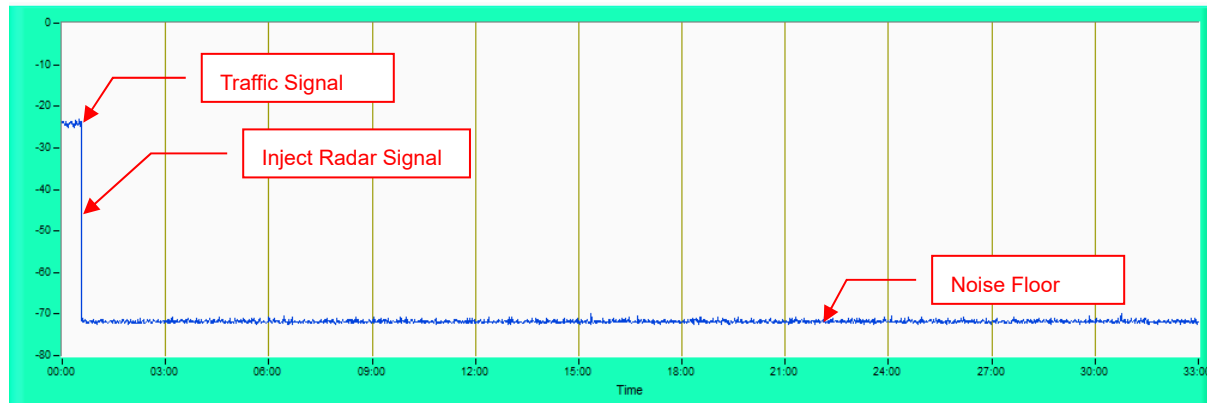
DFS-US-5 Radar Statistical Performances

Trial #	Channel (MHz)	Channel Closing Transmission Time & Channel move Time
1	5560	Yes
2	5680	Yes
3	5560	Yes
4	5560	Yes
5	5540	Yes
6	5560	Yes
7	5600	Yes
8	5620	Yes
9	5520	Yes
10	5520	Yes
11	5560	Yes
12	5700	Yes
13	5680	Yes
14	5660	Yes
15	5660	Yes
16	5660	Yes
17	5600	Yes
18	5660	Yes
19	5520	Yes
20	5620	Yes
Detection Rate		100%
Minimum Percentage of Successful Detection		80 %
Result		Pass

DFS-US-6 Radar Statistical Performances		
Trial #	Channel (MHz)	Channel Closing Transmission Time & Channel move Time
1	5620	Yes
2	5680	No
3	5560	Yes
4	5620	Yes
5	5600	No
6	5560	Yes
7	5660	Yes
8	5700	Yes
9	5620	Yes
10	5600	Yes
11	5680	Yes
12	5640	Yes
13	5520	Yes
14	5680	Yes
15	5640	Yes
16	5640	Yes
17	5640	Yes
18	5620	Yes
19	5580	Yes
20	5620	Yes
Detection Rate		90%
Minimum Percentage of Successful Detection		70 %
Result		Pass

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.



UNIFORM SPREADING

The intention of the uniform spreading is to provide, on aggregate, a uniform loading of the spectrum. The UUT using the bands 5150 to 5725MHz shall select an operating channel out of the 20 channels, so that the probability of selecting a given channel shall be the same for all channels.

The UUT will select channel by random mode and remember this channel when detect radar signal, so that will select unused channel by random mode.

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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