

DFS Test Report

Report No.: RJBBSE-WTW-P20120306B-4

Test Model: ZAP5220

Received Date: 2021/7/30

Test Date: 2021/9/3 ~ 2021/9/10

Issued Date: 2022/8/25

Applicant: ZPE Systems, Inc.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Hsin Chu Laboratory

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Test Location: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
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Release Control Record

Issue No.	Description	Date Issued
RJBBSE-WTW-P20120306B-4	Original release.	2022/8/25

1 Certificate of Conformity

Product: 802.11ac Wireless Access Point

Brand: ZPE Systems, Inc.

Test Model: ZAP5220

Sample Status: Engineer sample

Applicant: ZPE Systems, Inc.

Test Date: 2021/9/3 ~ 2021/9/10

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

Measurement was conducted by the temporary test method which TELEC 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

Note: This report is issued as a duplication report. The difference compared with the original report are changed brand, model name, applicant & address; there is no addition test has to be performed. All test data were copied from the original test report (Report No.: RJBSE-WTW-P20120306A-1). And all data were verified to meet the requirements.

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 EMC characteristics under the conditions specified in this report.

Prepared by : Cherry Chuo , **Date:** 2022/8/25
Cherry Chuo / Specialist

Approved by : May Chen , **Date:** 2022/8/25
May Chen / Manager

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

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 (Hz)	Pulse Width (μsec)	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	$22 \leq \text{PRF} \cdot 0.026 \leq 30$	60% or more
DFS-J1-4	200 – 1600	0.5 – 15	$22 \leq \text{PRF} \cdot 0.026 \leq 30$	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 (connection method is limited to carrier sense multiple access type) 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)

*3. Number of Pulses per Burst the $\text{PRF} \cdot 0.026$ which round up to less than 1, “22” whichever is larger or “30”, whichever is smaller.

*4. DFS-J1-3 to DFS-J1-8 Each pulse has a linear frequency modulated chirp between 0.5 and 1 MHz

W56

Radar Type	Pulse Repetition Frequency (Hz)	Pulse Width (μsec)	Number of Pulses	Radar Detection Probability
DFS-J2-1	720	0.5	18	60% or more
DFS-J2-2	700	1	18	60% or more
DFS-US-1	250	2	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. In the transmission of the 17% of maximum signal access speed, when the master station is transmitting to the slave station. *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 $P_o < 200\text{mW}$; $P_o \geq -62\text{dBm}(\text{avg.})$ (Po; 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. In the transmission of the 17% of maximum signal access speed, when the master station is transmitting to the slave station. *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 $P_o < 200\text{mW}$; $P_o \geq -62\text{dBm}(\text{avg.})$ (Po; 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. In the transmission of the 17% of maximum signal access speed, when the master station is transmitting to the slave station.</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 $P_o < 200\text{mW}$; $P_o \geq -62\text{dBm}(\text{avg.})$</p> <p>($P_o$; Max. Transmit Power (EIRP) of EUT)</p>				

2.2 Test instruments

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until	Calibration Authority	Calibration Method
Spectrum Analyzer R&S	FSV40	101516	2021/3/8	2022/3/7	ETC	(c)
ESG Vector signal generator Agilent	E4438C	MY45094468/005 506 602 UK6 UNJ	2020/11/18	2021/11/17	ETC	(c)
DFS Control Box	BV-DFS-CB	002	2020/12/1	2021/11/30	BV CPS E&E	(d)

Note: 1. The test was performed in DFS-2 room.

2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. Calibration method :

- a) : Calibration conducted by the National Institute of Information and Communications Technology (NICT) or a designated calibration agency under Article 102-18 paragraph (1).
- b) : Calibration conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992) Japan Calibration Service System.
- c) : 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).
- d) : Calibration conducted by using other equipment that listed above from a) to c).

3. Tested Date: 2021/9/3 ~ 2021/9/10

2.3 EUT Information

Operating Frequency Bands and Mode of EUT

Operational Mode	Operating Frequency Range	
	5250~5350MHz	5470~5730MHz
Master	✓	✓

EUT Software and Firmware Version

No.	Product	Model No.	Software/Firmware Version
1	802.11ac Wireless Access Point	ZAP5220	OpenWrt Chaos Calmer 15.05.1 ec1d94f+r49254 / LuCI Master (git-21.232.26194-ec1d94g)

Description of Available Antennas to the EUT

WLAN antenna Spec.							
Antenna No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range (GHz)	Antenna Type	Connector Type	Cable Length (mm)
Antenna 1	Accton	120G00000153A	4.17	2.4~2.4835	Monopole	i-pex	180
			5.83	5.15~5.85			
Antenna 2	Accton	120G00000153A	4.27	2.4~2.4835	Monopole	i-pex	160
			8.18	5.15~5.85			
Bluetooth antenna Spec.							
Brand	Model	Antenna Net Gain(dBi)	Frequency range (GHz)	Antenna Type	Connector Type	Cable Length (mm)	
Accton	120G00000153A	4.09	2.4~2.4835	PIFA	i-pex	80	

Note: 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.
1	Intel® Wi-Fi 6 AX200	Intel	AX200NGW

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

Software/Firmware information

No.	Product	Model No.	Software/Firmware Version
1	Intel® Wi-Fi 6 AX200	AX200NGW	21.80.2.1

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 UUT (master), measured the Channel Availability Check time and channel closing transmission time and channel move time and Non-Occupancy Period.

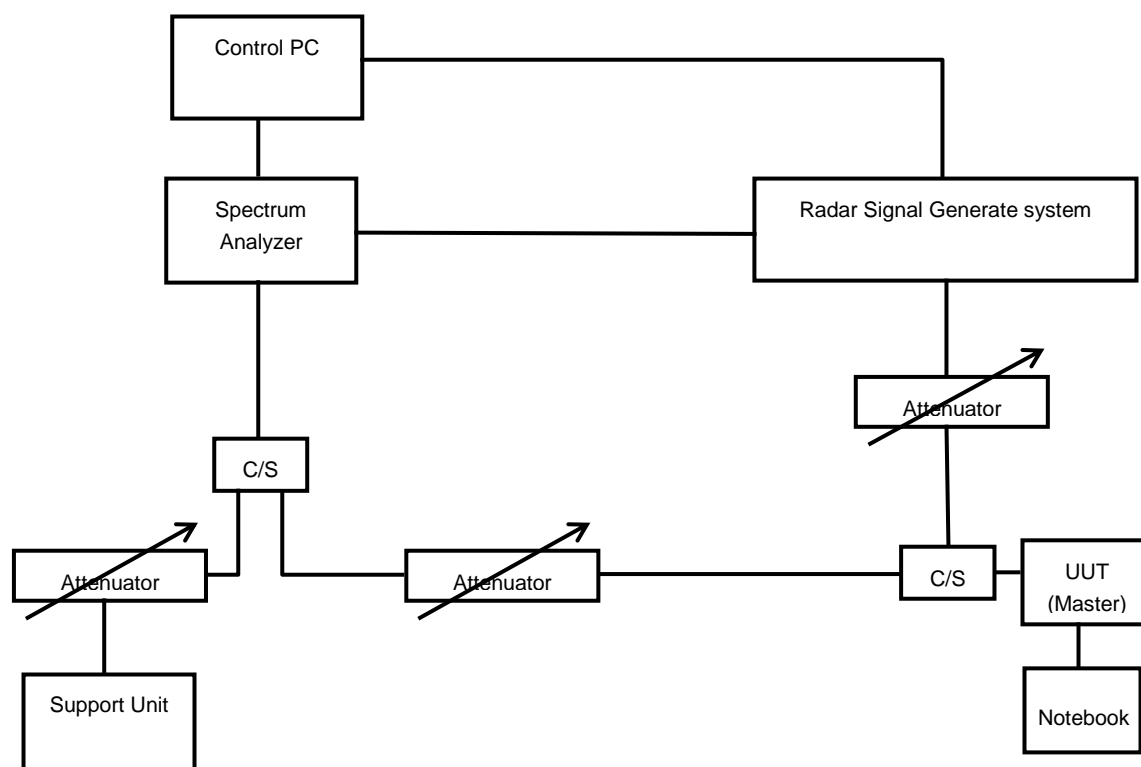
The master transmitted the test data to slave, the channel loading as below:

The channel loading in W53 band shall not be less 30% and W56 band shall not be less 17%.

2.6 Deviation form Test Standard

No deviation.

2.7 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 List of Measurements

Test Parameter	Remarks	Pass/Fail
Interference Detection Threshold	Applicable	Pass
Channel Availability Check Time	Applicable	Pass
Channel Closing Transmission Time	Applicable	Pass
Channel Move Time	Applicable	Pass
Non-Occupancy Period	Applicable	Pass

Note:

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

Test Condition:

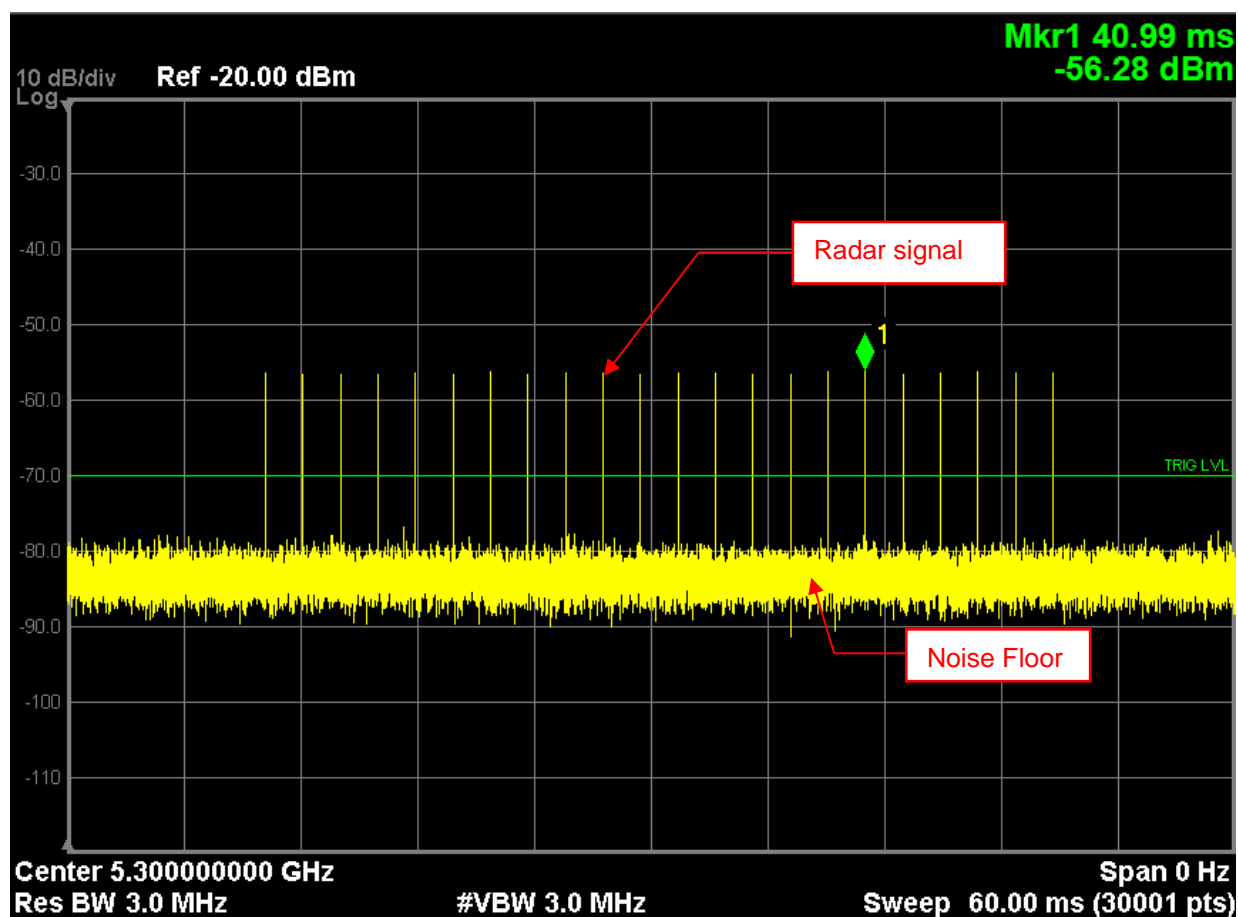
Applicable To	Environmental conditions	Voltage
Interference Detection Threshold	25deg. C, 70%RH	12Vdc
Channel Availability Check Time	25deg. C, 69%RH	12Vdc
Channel Closing Transmission Time	24deg. C, 70%RH	12Vdc
Channel Move Time	25deg. C, 71%RH	12Vdc
Non-Occupancy Period	25deg. C, 70%RH	12Vdc

2.9 Test Results

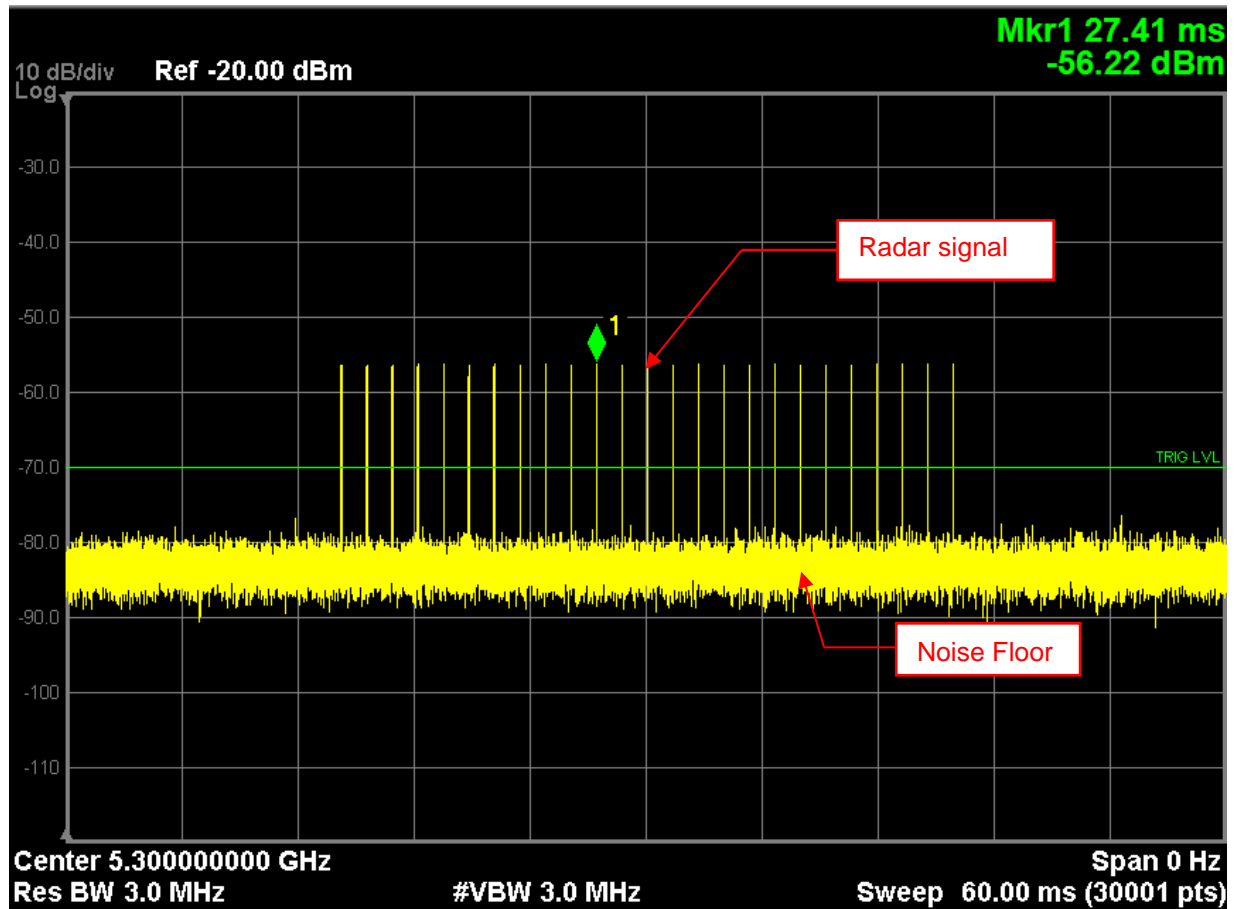
Interference Threshold Values Injected into UUT

W53 band

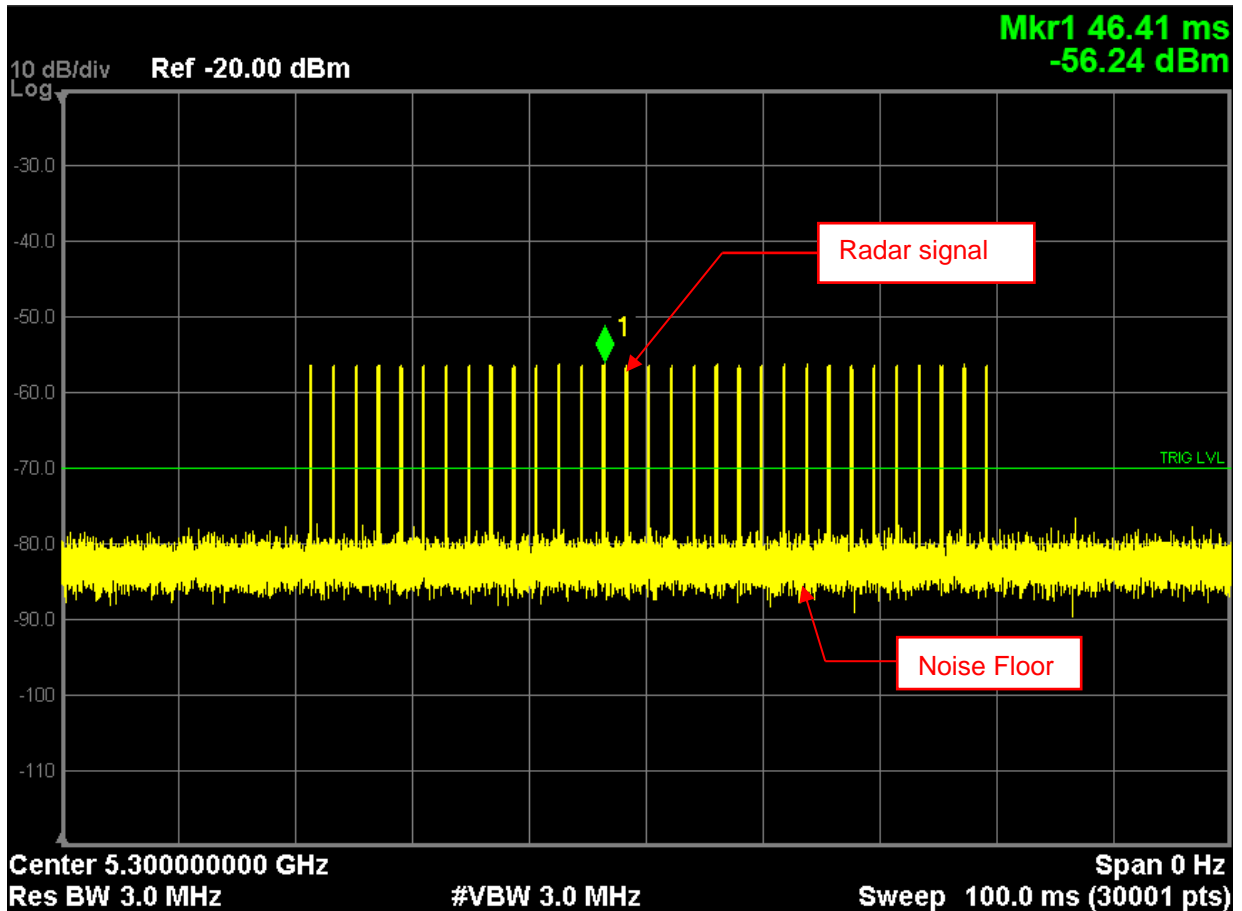
For an interference threshold level of -62dBm and the UUT antenna gain is 5.83dBi . Then the radar Burst signal level to the AP connector is lower than -56.17dBm .



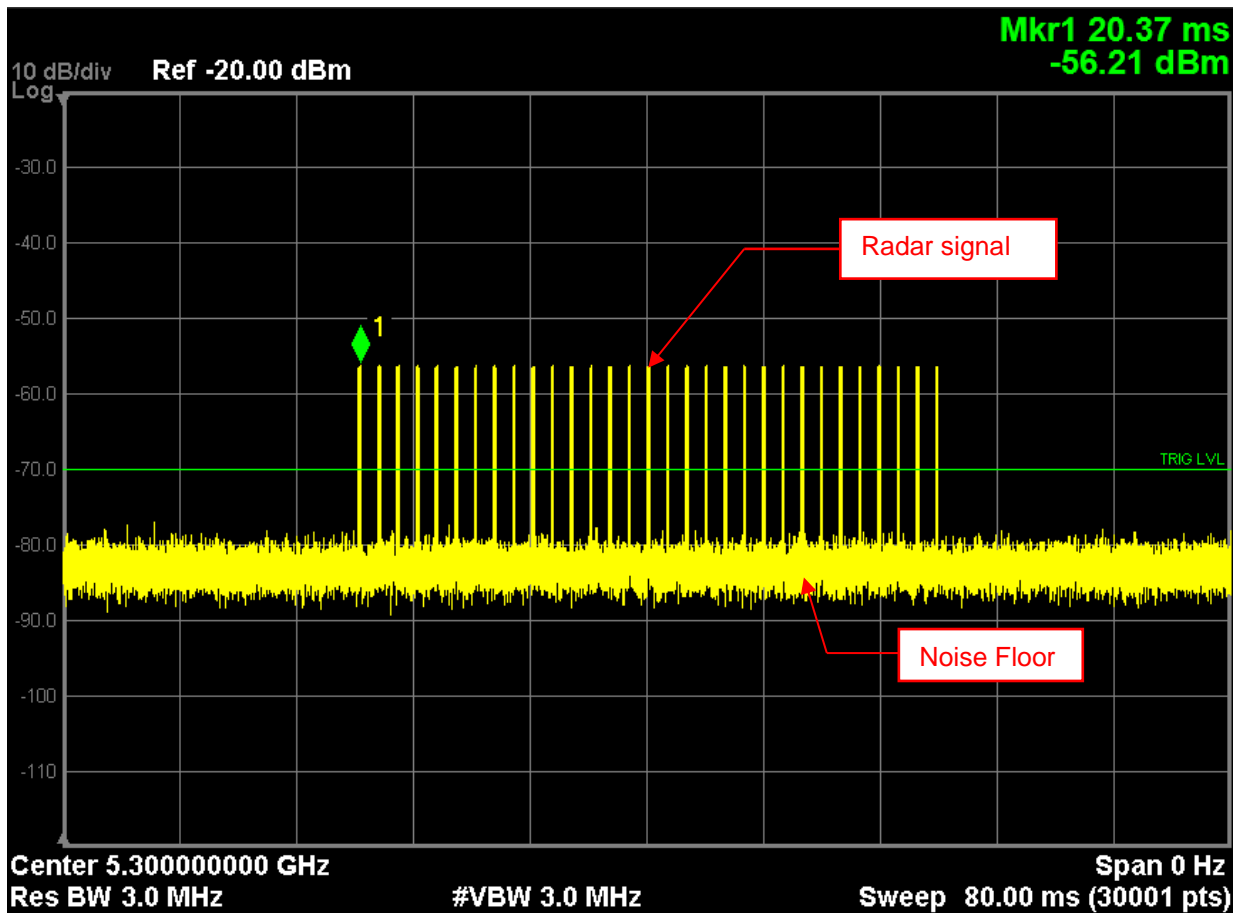
DFS-J1-1



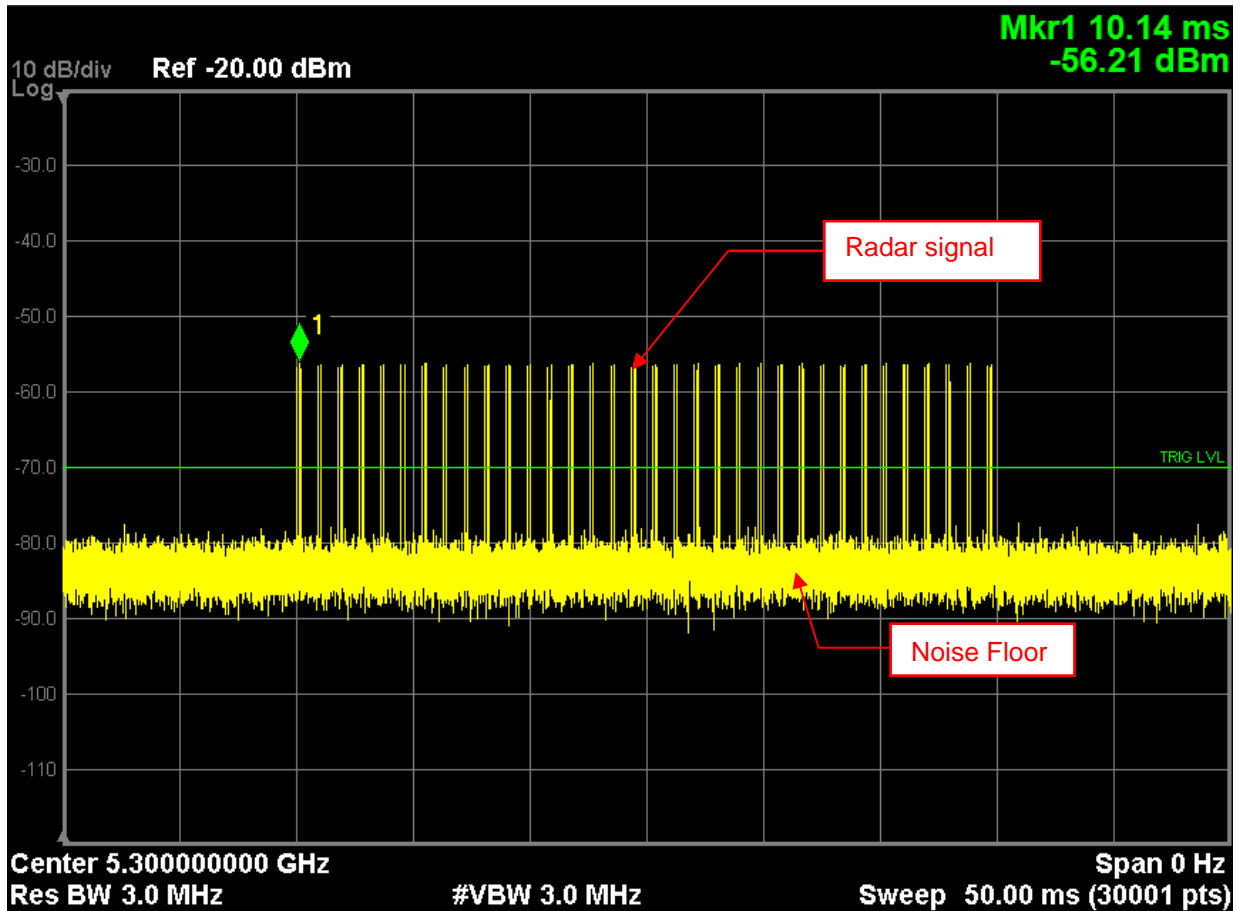
DFS-J1-2



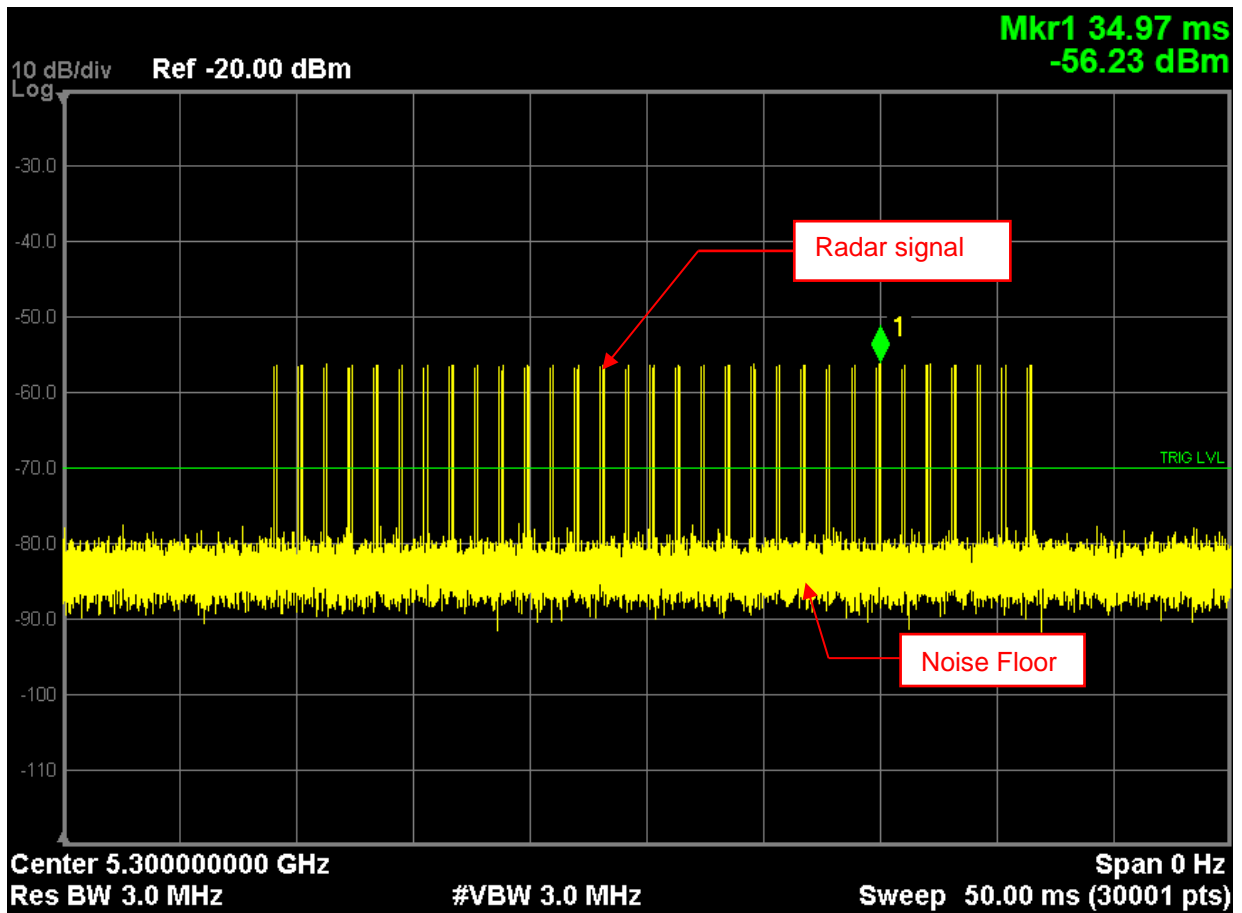
DFS-J1-3



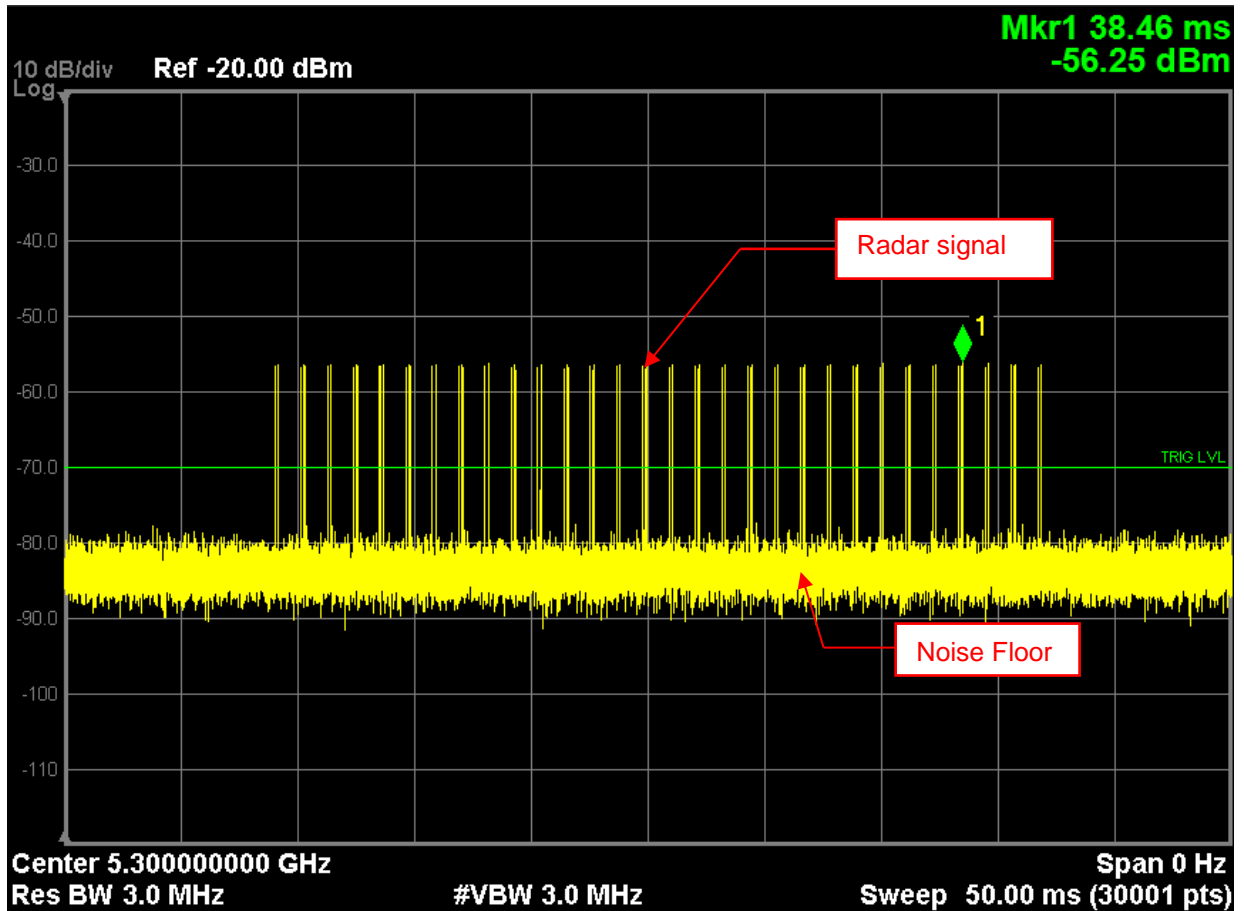
DFS-J1-4



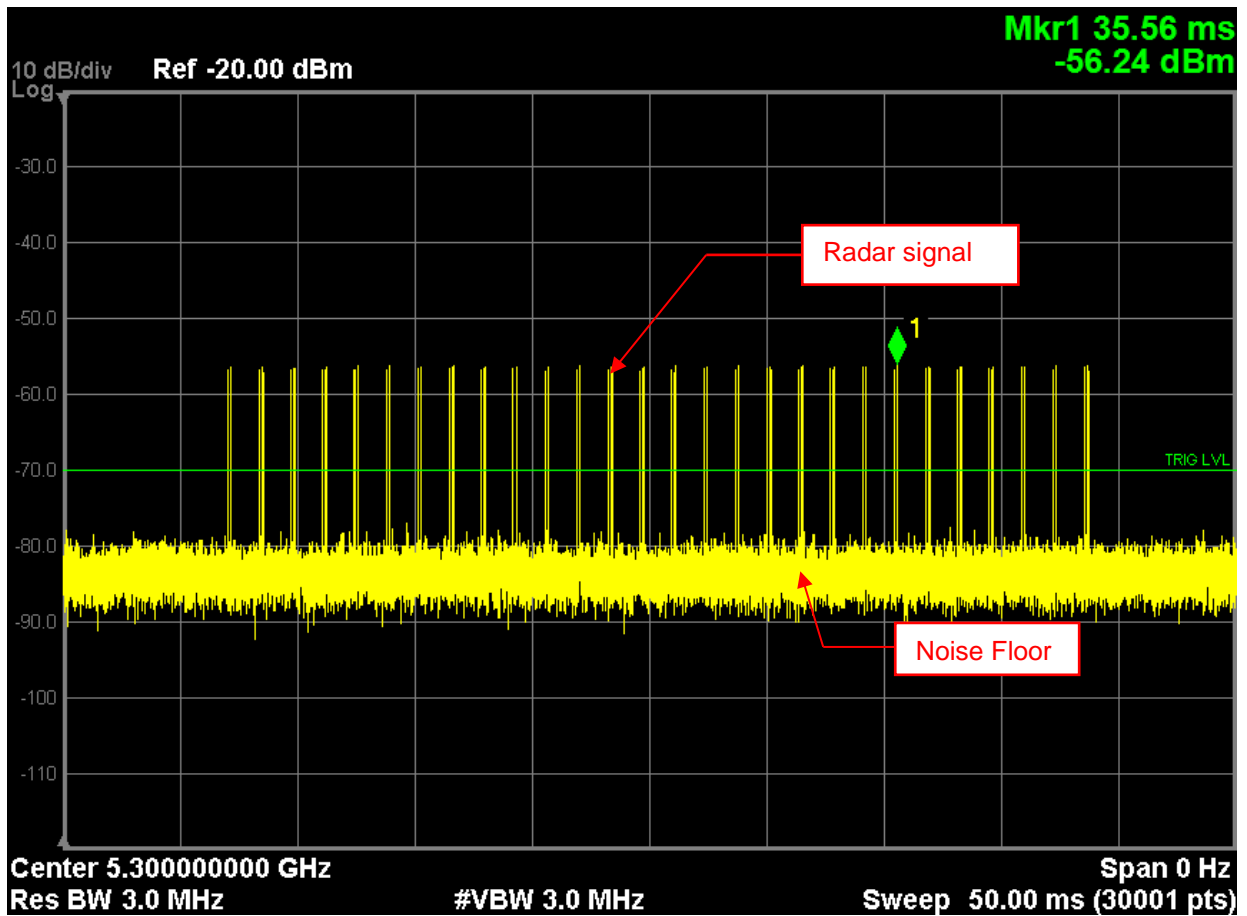
DFS-J1-5



DFS-J1-6



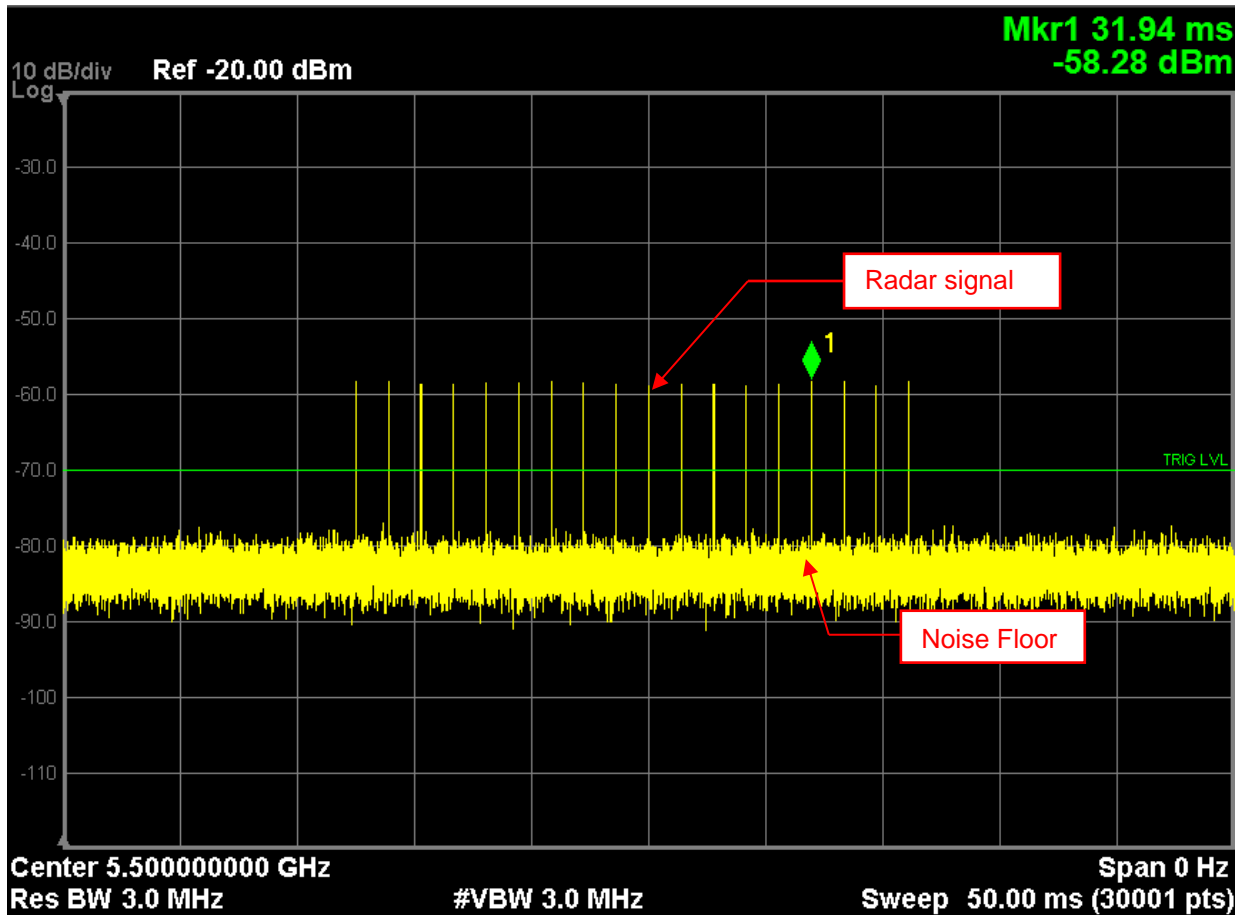
DFS-J1-7



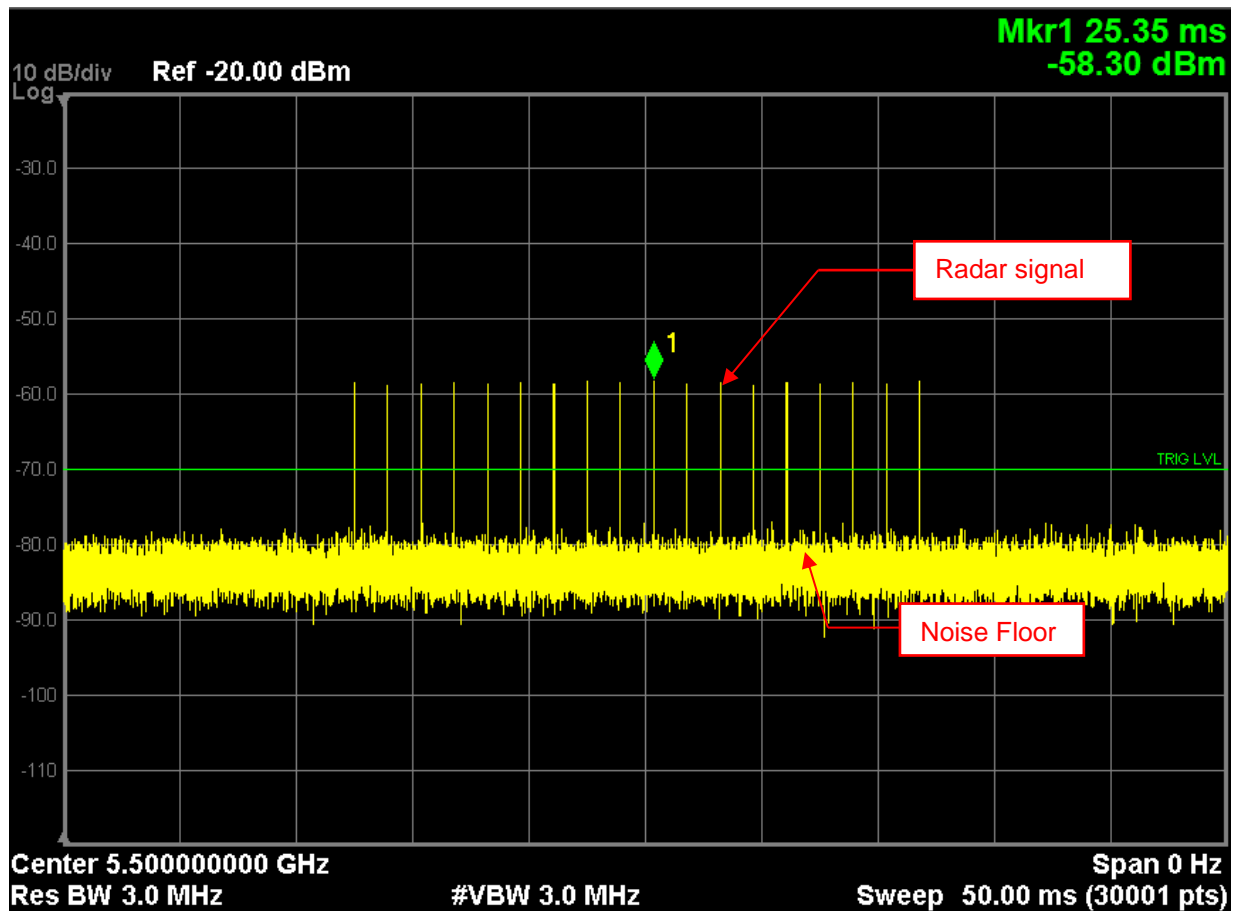
DFS-J1-8

W56 band

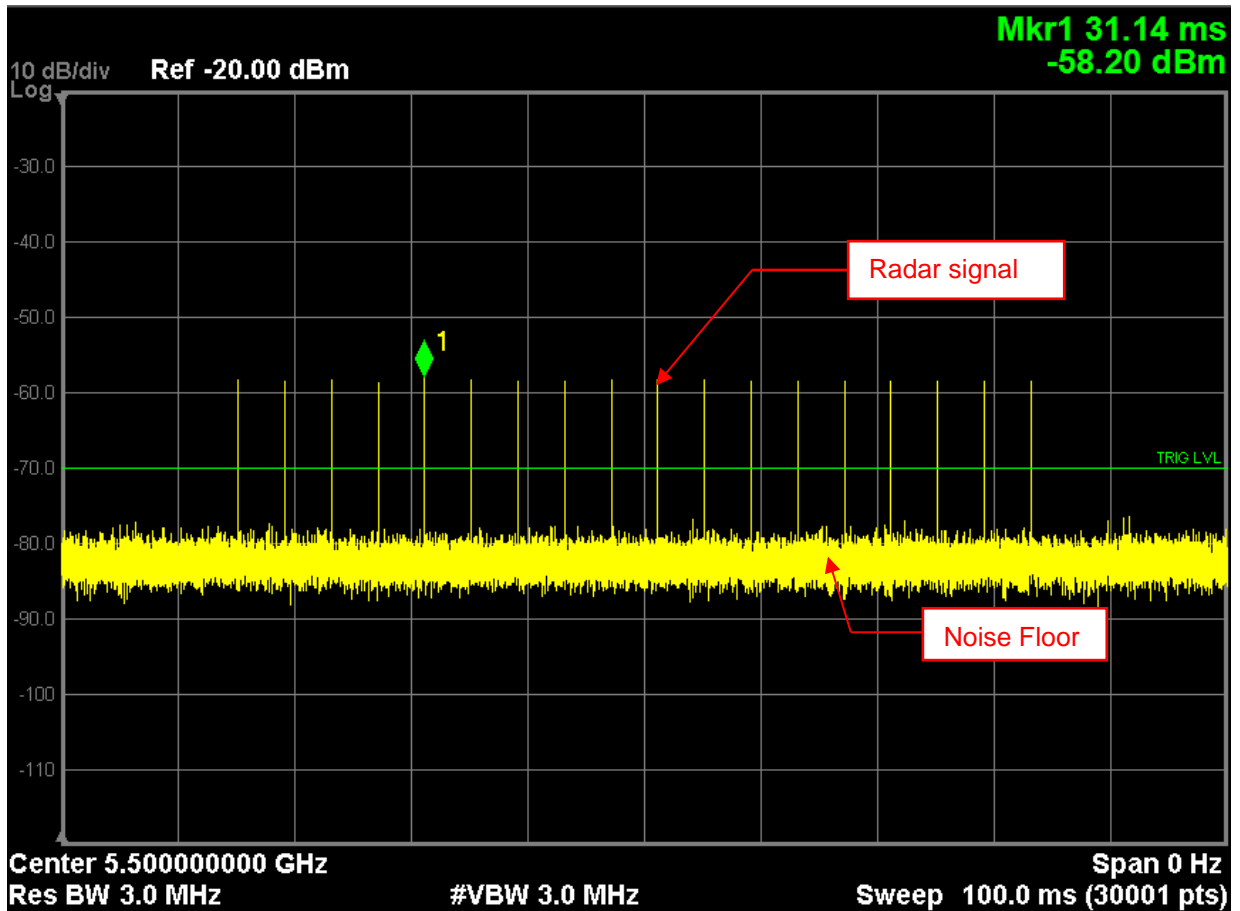
For an interference threshold level of -64dBm and the UUT antenna gain is 5.83dBi . Then the radar Burst signal level to the AP connector is lower than -58.17dBm .



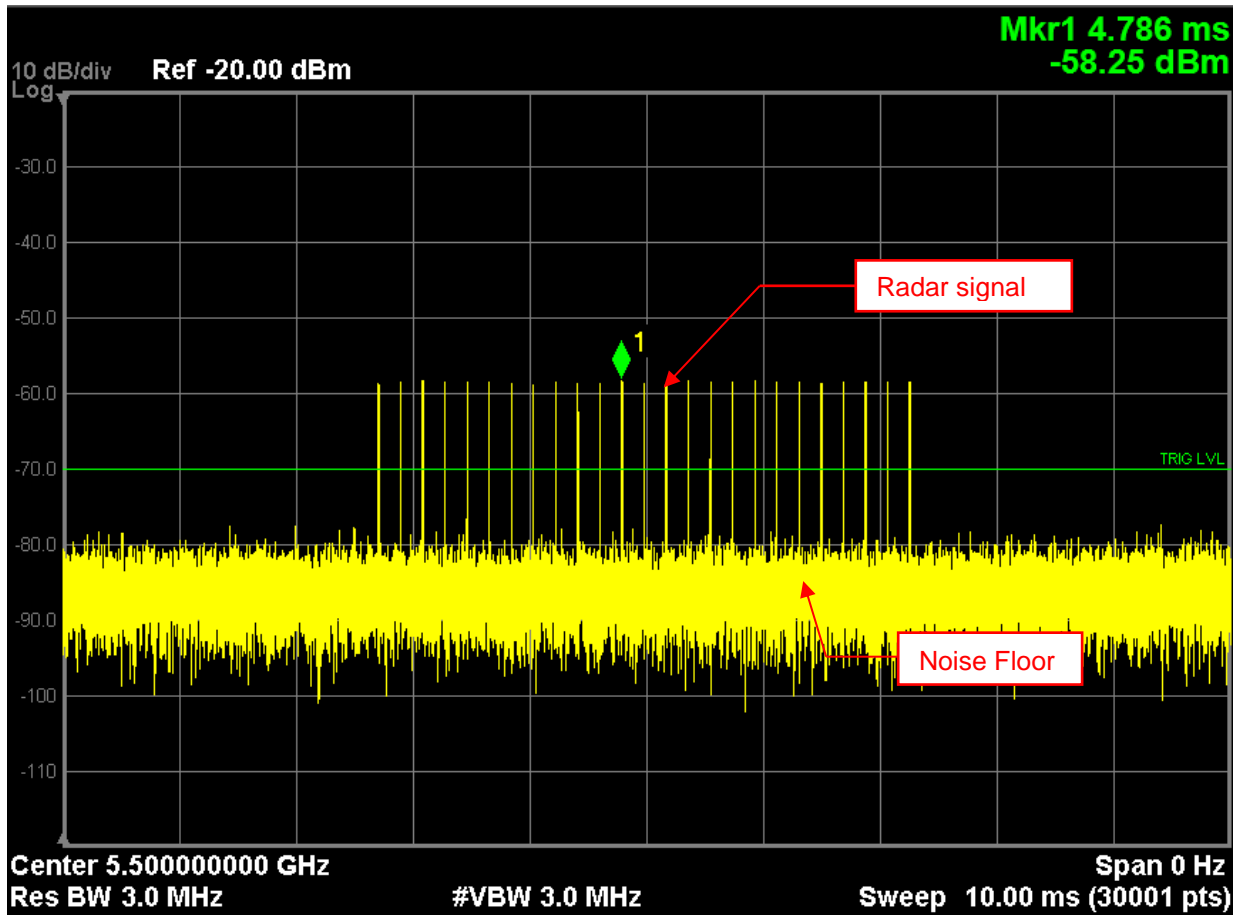
DFS-J2-1



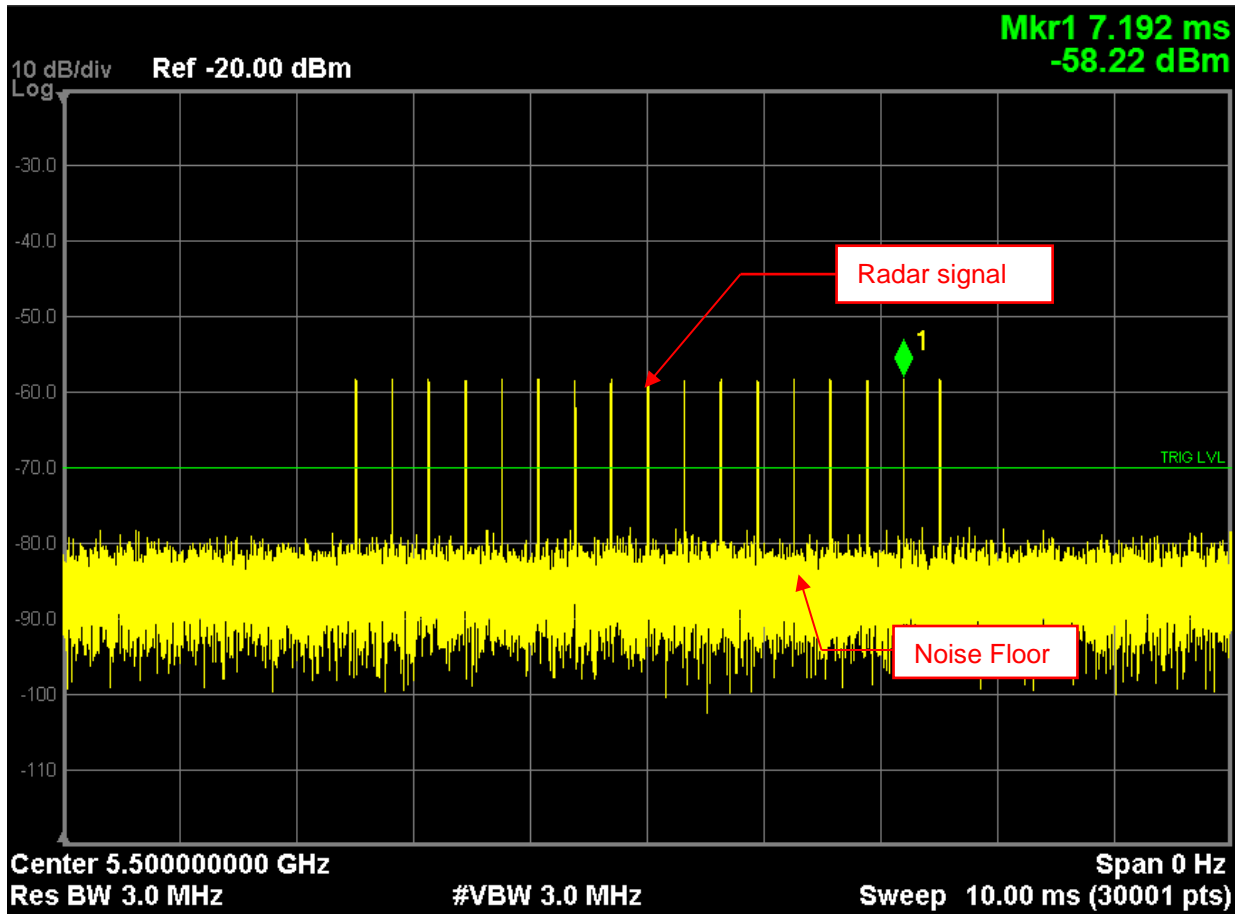
DFS-J2-2



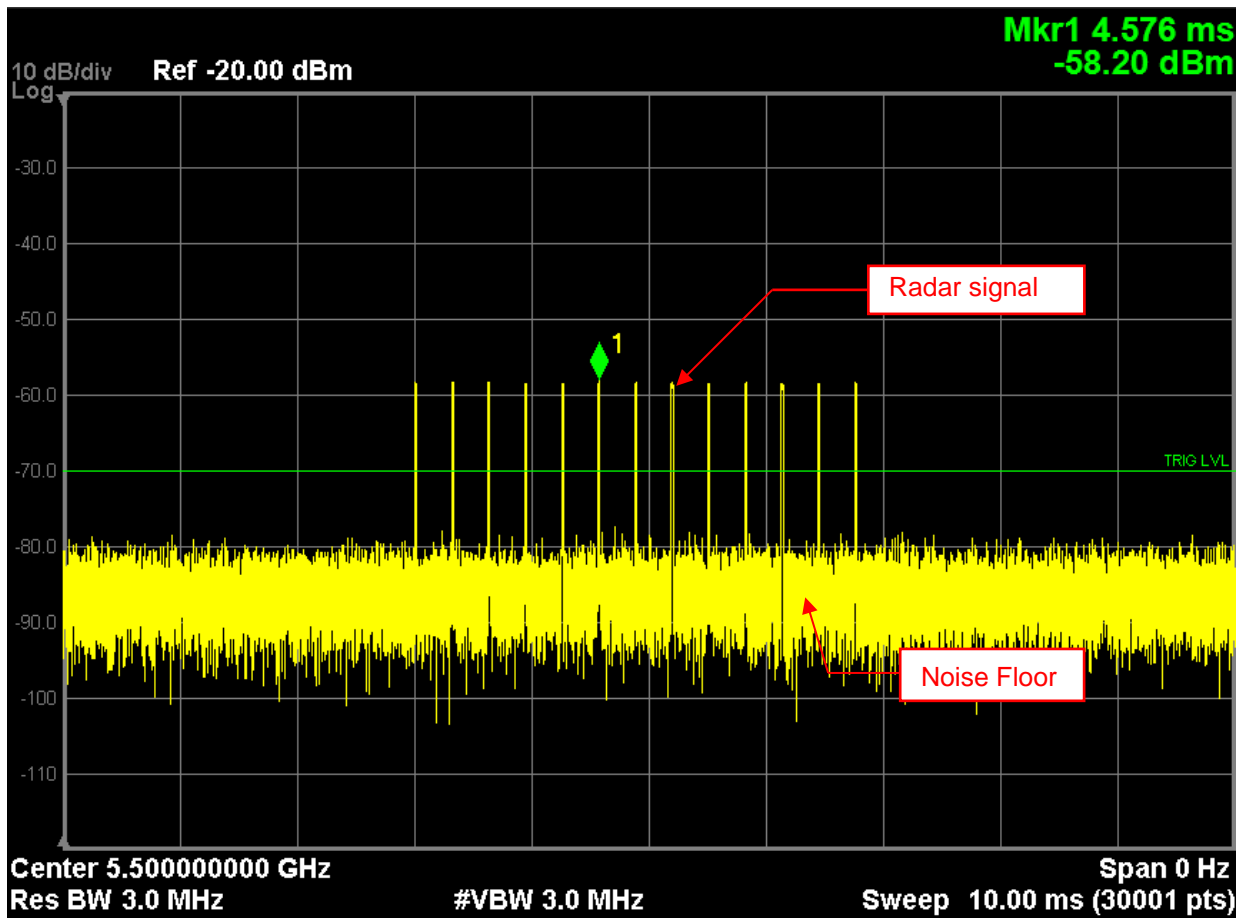
DFS-US-1



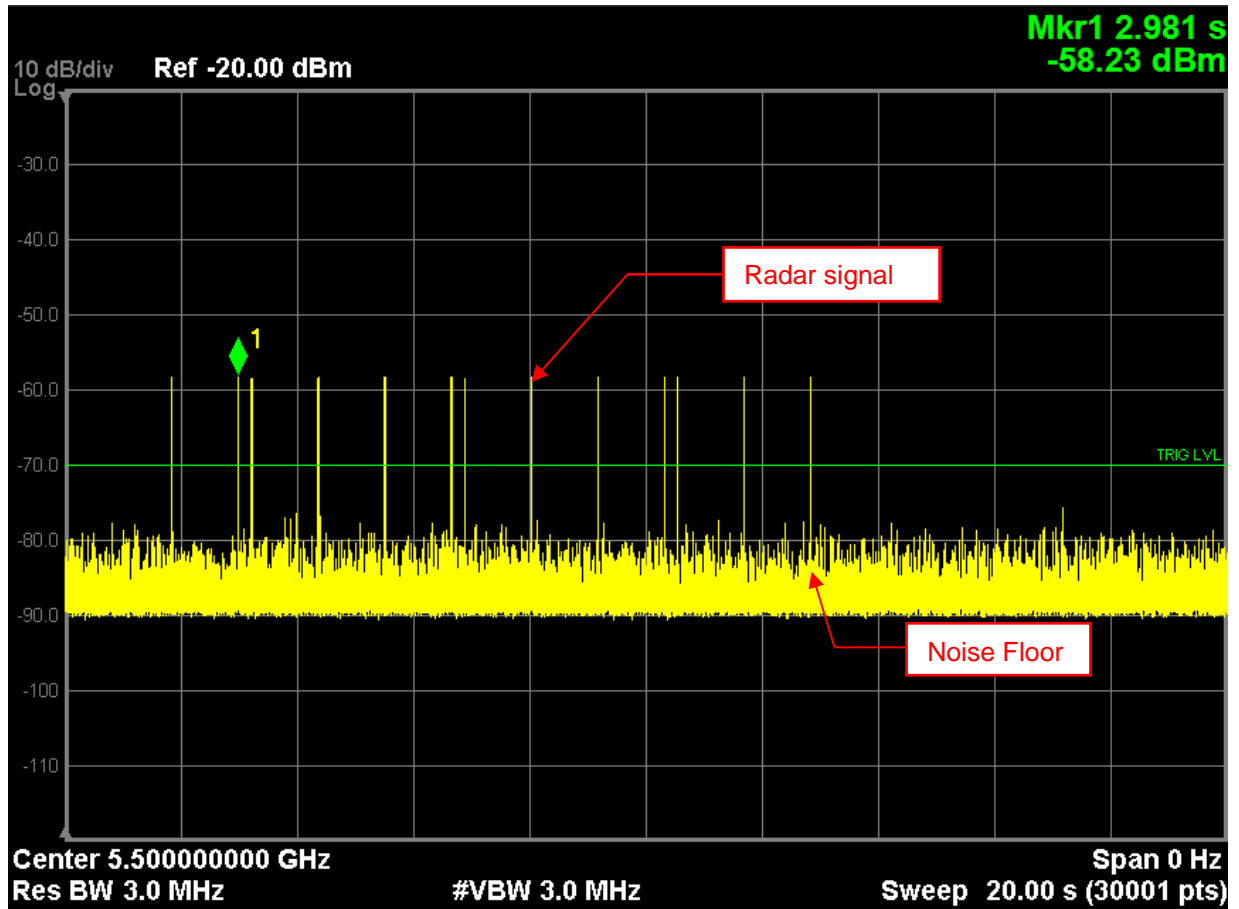
DFS-US-2



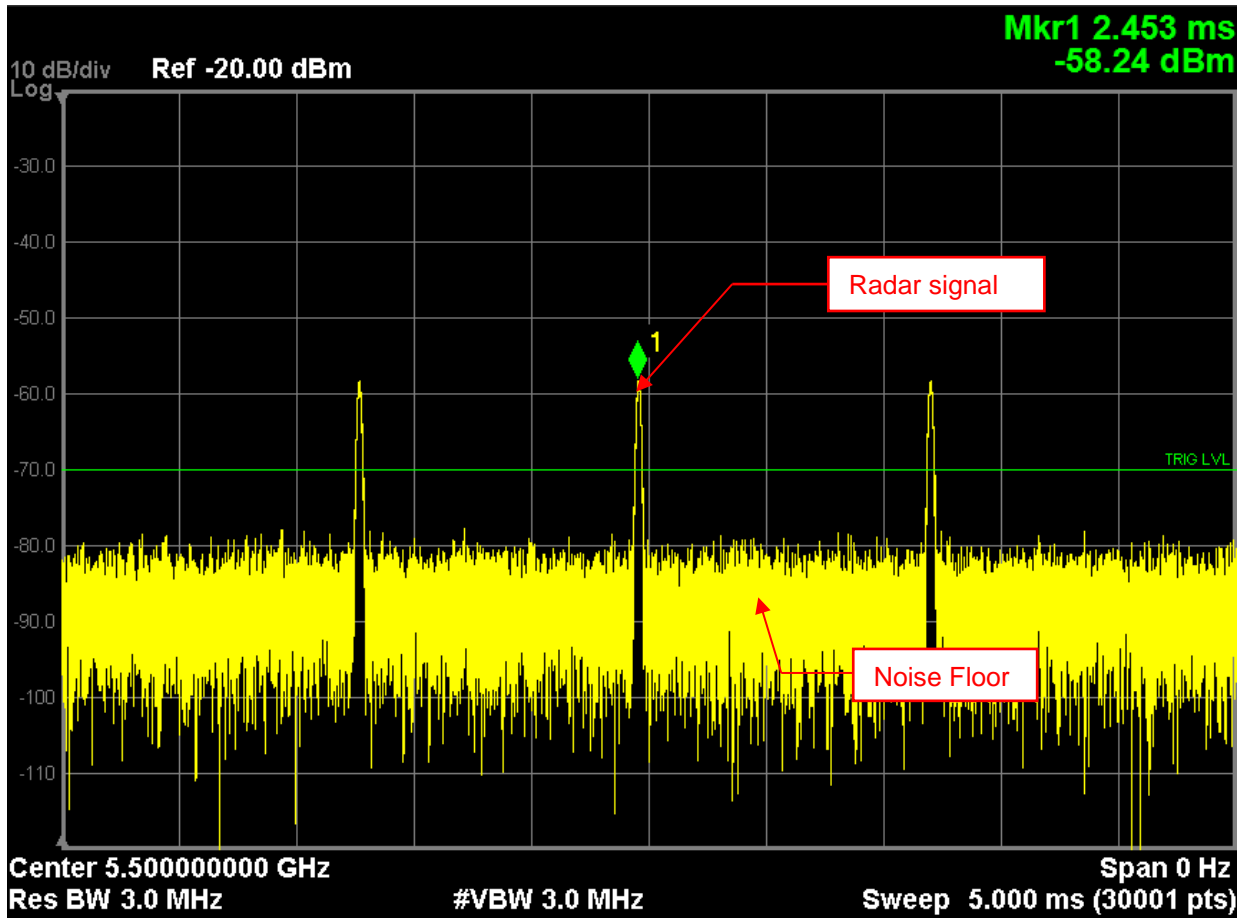
DFS-US-3



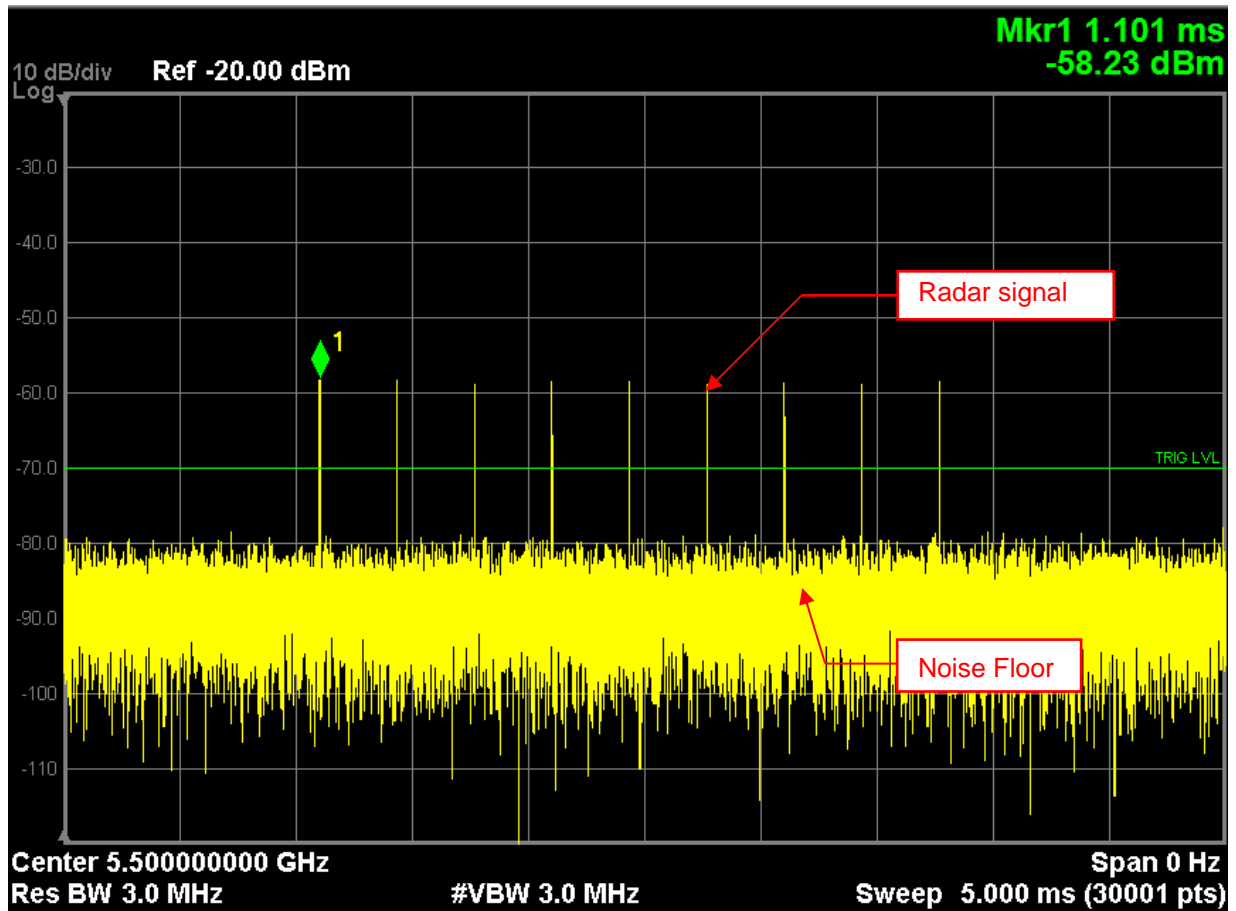
DFS-US-4



DFS-US-5
Long Pulse Radar



DFS-US-5
Long Pulse Radar Signal



DFS-US-6
Frequency Hopping Radar Signal

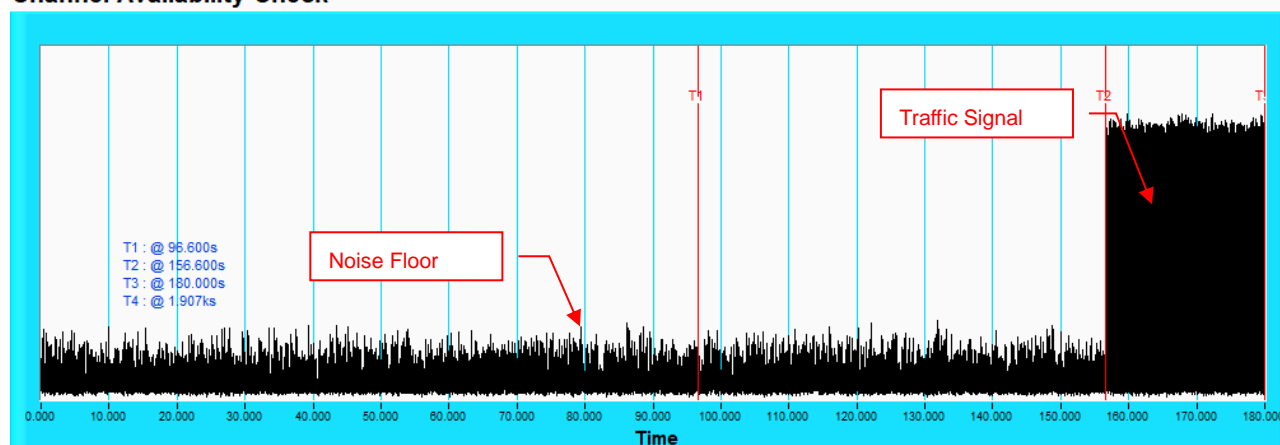
Channel Availability Check Time

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

Initial Channel Availability Check Time

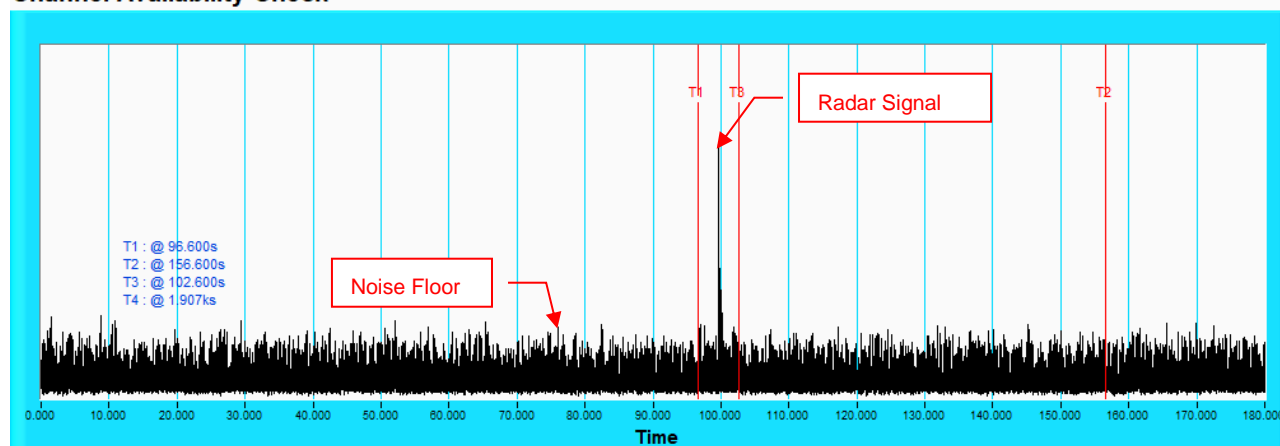
Channel Availability Check



NOTE: T1 denotes the end of power-up time period and is 96.6th second. T2 denotes the end of Channel Availability Check time and is 156.6th second. Channel Availability Check time is equal to (T3 – T1) 60 seconds.

Radar Burst at the Beginning of the Channel Availability Check Time

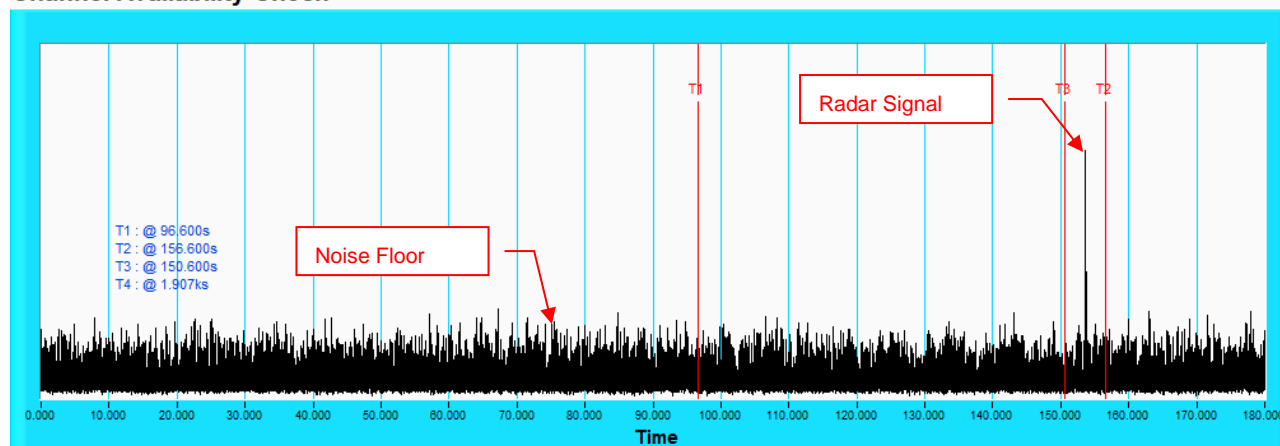
Channel Availability Check



NOTE: T1 denotes the end of power up time period and is 96.6th second. The radar burst was commenced within a 6 second window starting from the end of power-up sequence. T3 denotes the 156.6th second.

Radar Burst at the End of the Channel Availability Check Time

Channel Availability Check



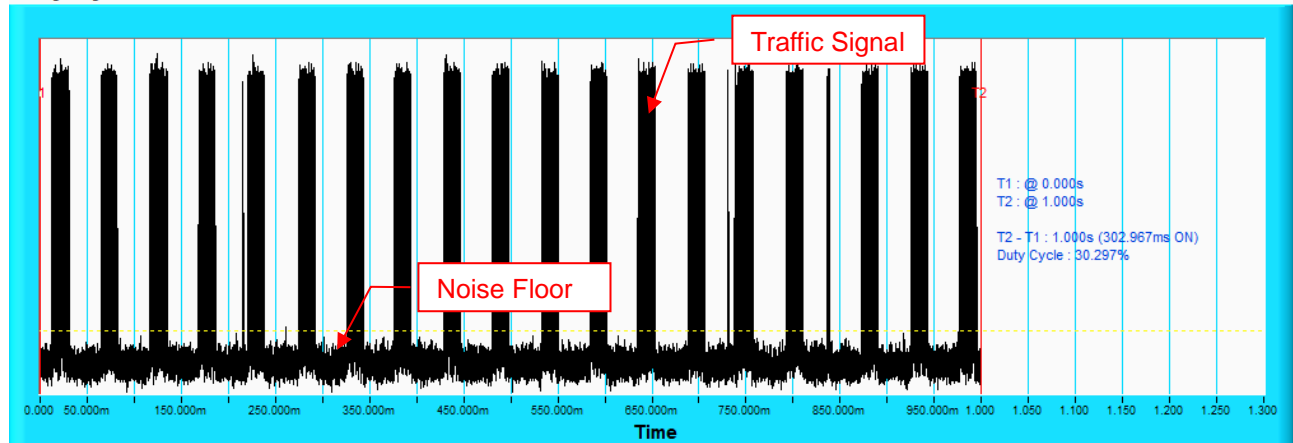
NOTE: T1 denotes the end of power up time period and is 96.6th second. T2 denotes 156.6th second and T3 denotes the 150.6th second. The radar burst was commenced within 54th second to 60th second window starting from the end of power-up sequence.

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 Signal

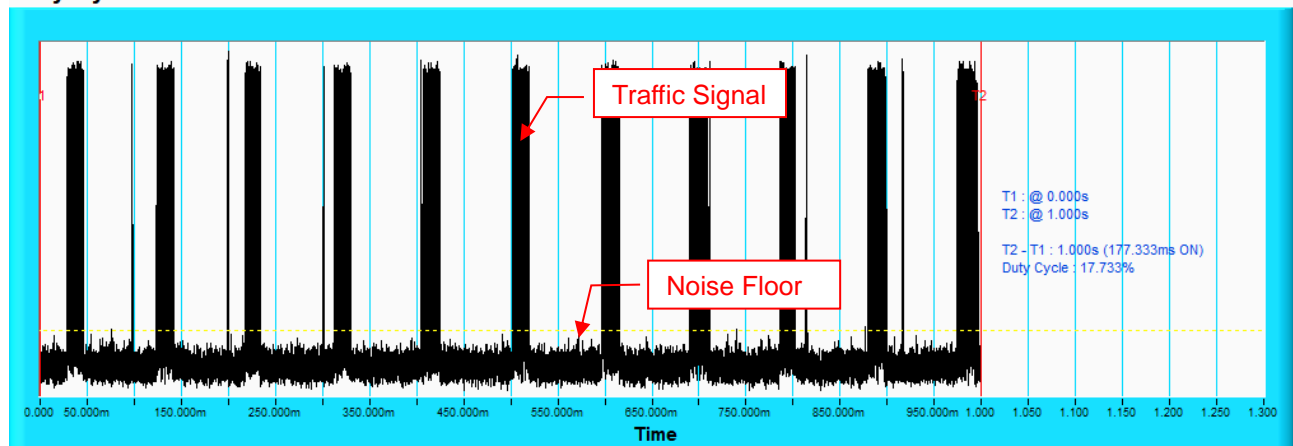
Duty Cycle



Note: T1 denotes the start of duty cycle period and is 0 second. T2 denotes the end of duty cycle period and is 1st second. T2 – T1= 1 seconds. Duty Cycle = 30.297%.

W56 WLAN Traffic Signal

Duty Cycle



Note: T1 denotes the start of duty cycle period and is 0 second. T2 denotes the end of duty cycle period and is 1st second. T2 – T1= 1 seconds. Duty Cycle = 17.733%.

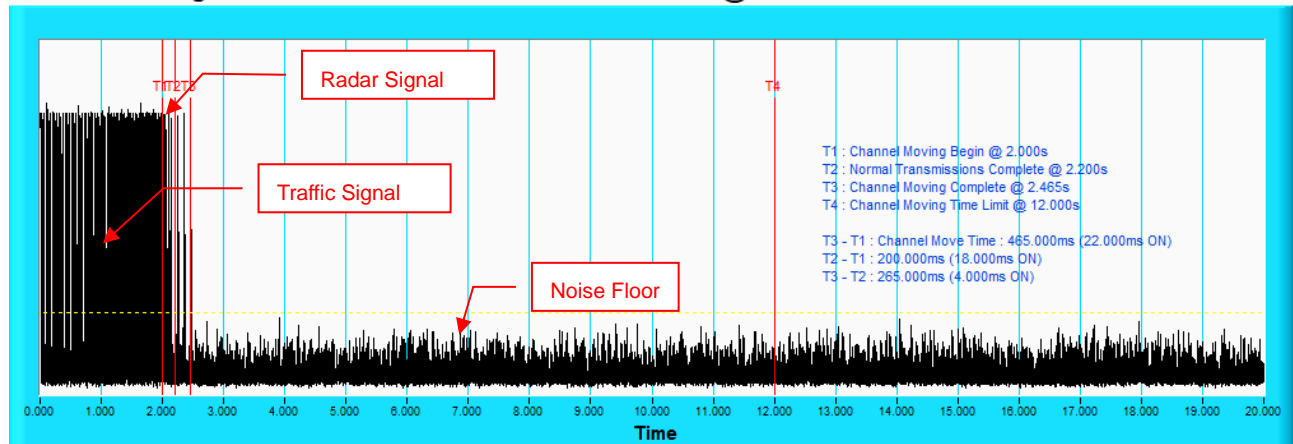
W53 802.11a

Radar Test Signal	Pulse Repetition Frequency (Hz)	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	85
DFS-J1-2	200 – 1600	0.5 – 15	15	60	82.5
DFS-J1-3	200 – 1000	0.5 – 5	$22 \leq \text{PRF} \cdot 0.026 \leq 30$	60	85
DFS-J1-4	200 – 1600	0.5 – 15	$22 \leq \text{PRF} \cdot 0.026 \leq 30$	60	87.5
DFS-J1-5	1114 – 1118	0.5 – 1.5	30	60	87.5
DFS-J1-6	928 – 932	0.5 – 1.5	25	60	85
DFS-J1-7	886 – 890	0.5 – 1.5	24	60	87.5
DFS-J1-8	738 – 742	0.5 – 1.5	20	60	92.5

W53

DFS-J1-1

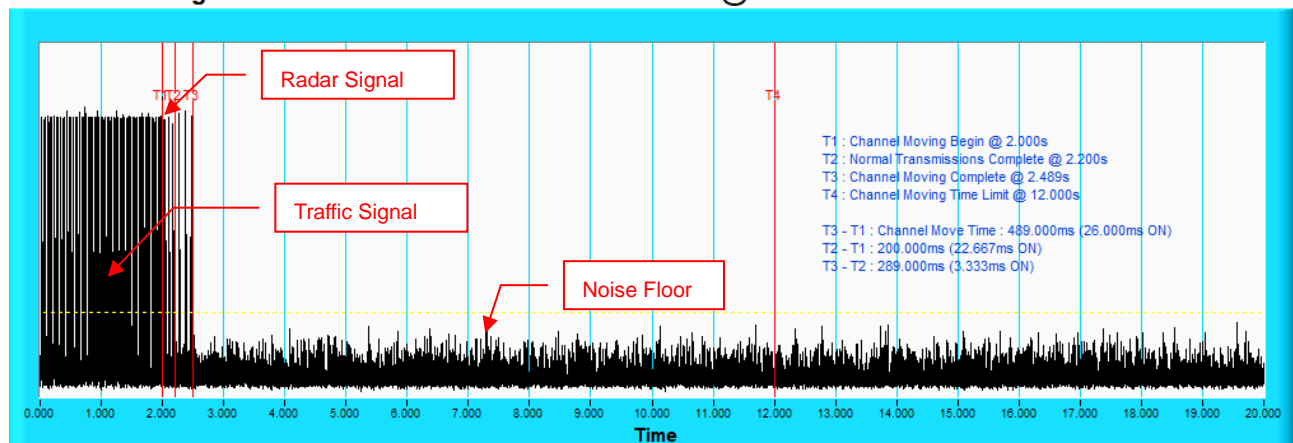
Channel Closing Transmission Time & Channel Move Time @ CH60 - 5300MHz



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

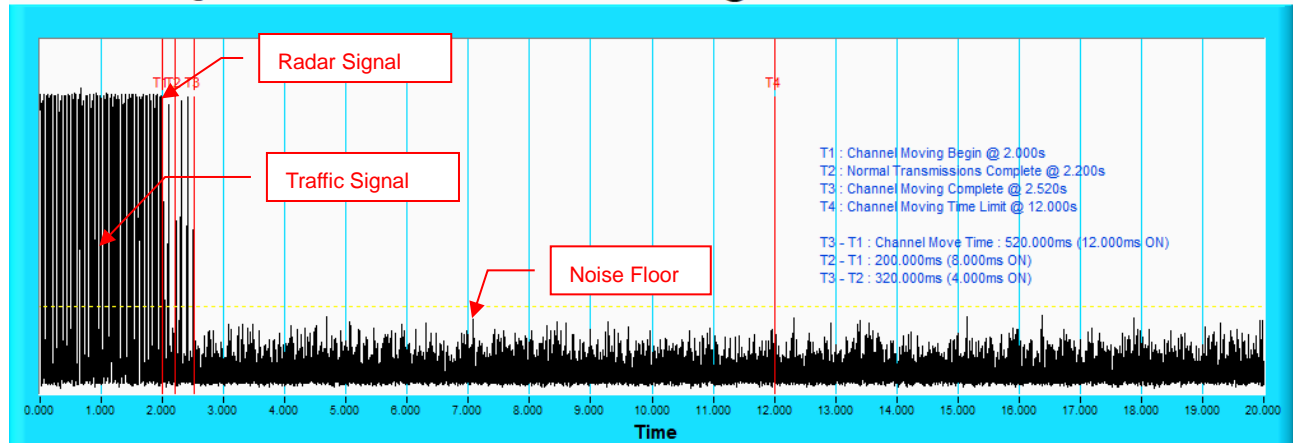
Channel Closing Transmission Time & Channel Move Time @ CH60 - 5300MHz



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

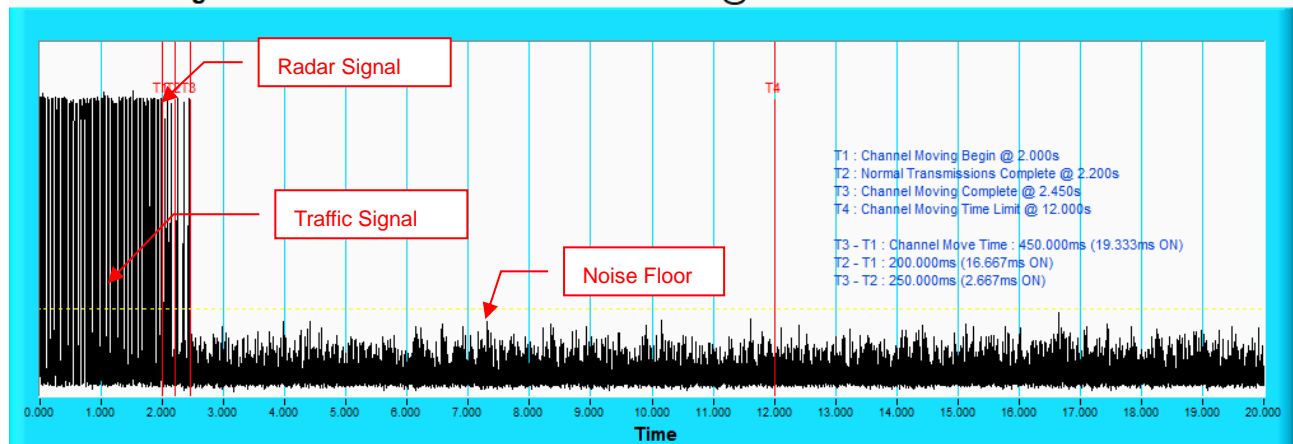
Channel Closing Transmission Time & Channel Move Time @ CH60 - 5300MHz



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

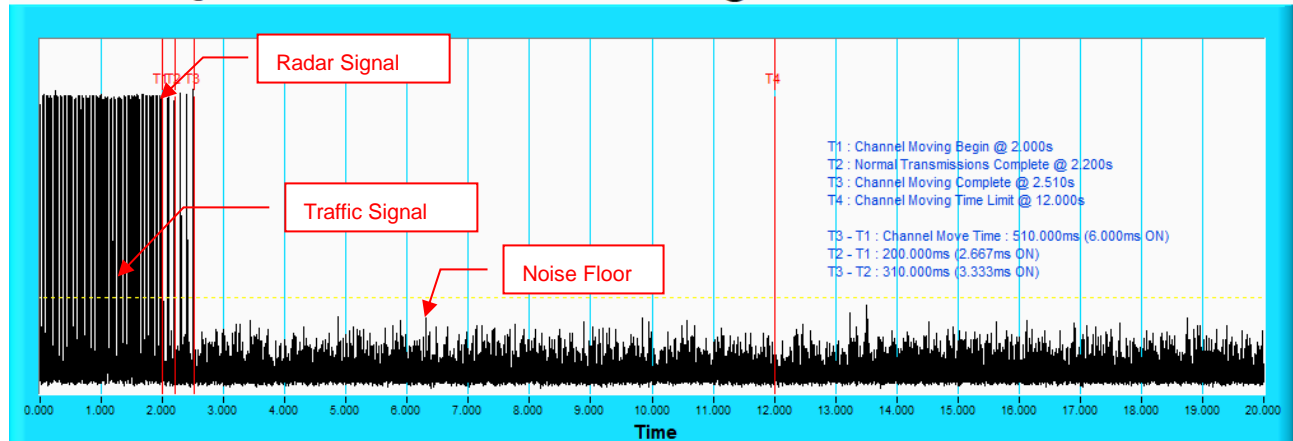
Channel Closing Transmission Time & Channel Move Time @ CH60 - 5300MHz



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

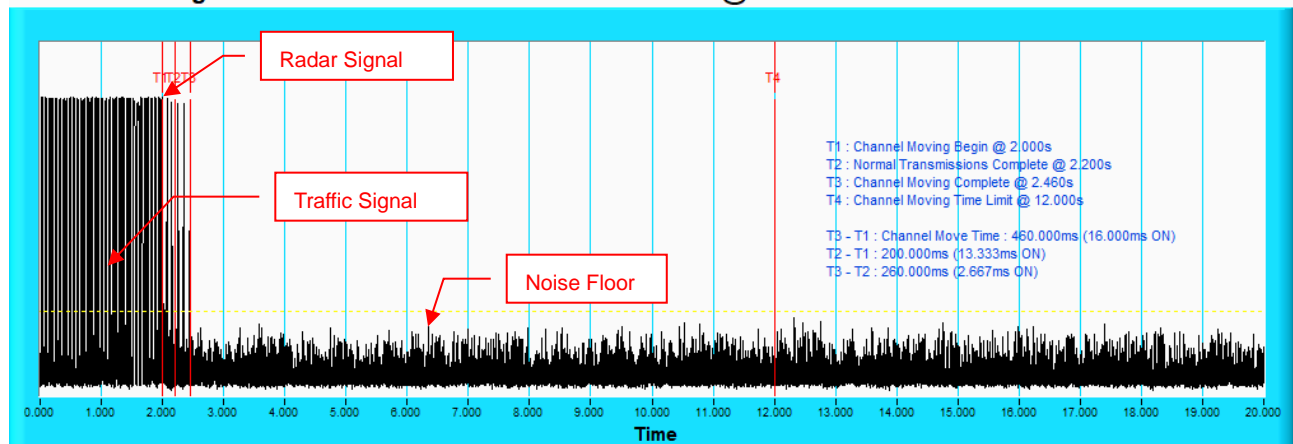
Channel Closing Transmission Time & Channel Move Time @ CH60 - 5300MHz



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

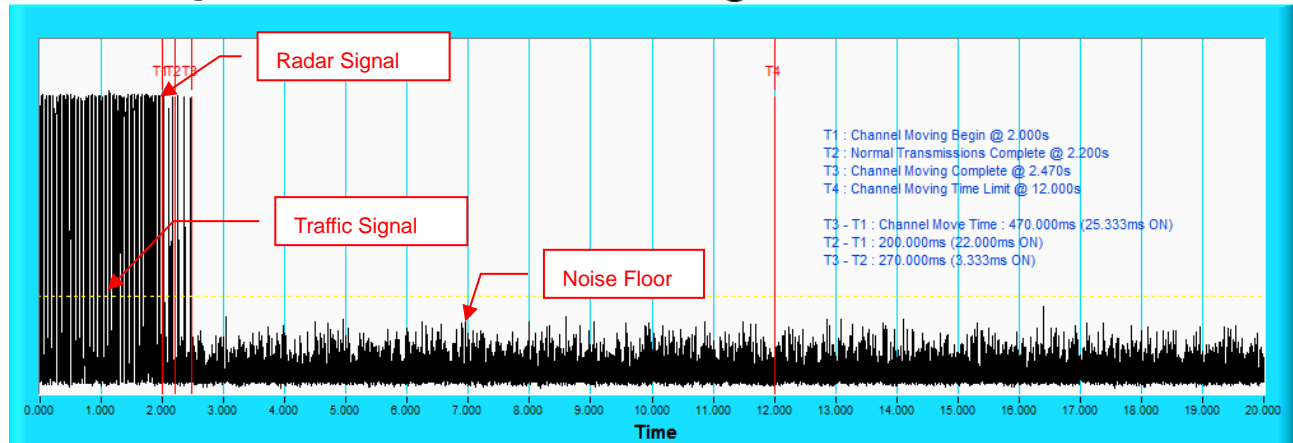
Channel Closing Transmission Time & Channel Move Time @ CH60 - 5300MHz



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

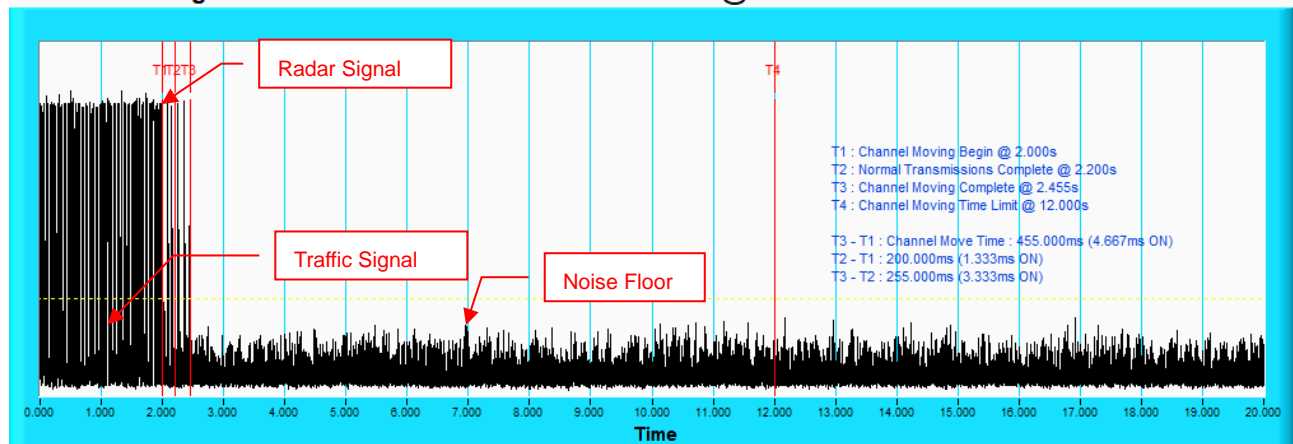
Channel Closing Transmission Time & Channel Move Time @ CH60 - 5300MHz



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 @ CH60 - 5300MHz



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	5320	Yes
2	5280	Yes
3	5280	Yes
4	5320	Yes
5	5320	Yes
6	5320	Yes
7	5320	No
8	5260	Yes
9	5320	Yes
10	5320	Yes
11	5320	Yes
12	5300	Yes
13	5320	No
14	5300	No
15	5260	Yes
16	5320	Yes
17	5260	Yes
18	5280	Yes
19	5320	Yes
20	5280	Yes
21	5320	Yes
22	5320	Yes
23	5320	Yes
24	5320	Yes
25	5300	Yes
26	5320	Yes
27	5280	Yes
28	5320	Yes
29	5320	No
30	5320	Yes
31	5320	No
32	5300	Yes
33	5320	Yes
34	5320	Yes
35	5320	Yes
36	5320	Yes
37	5320	No
38	5320	Yes
39	5320	Yes
40	5320	Yes
Detection Rate		85%
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	5320	Yes
3	5320	Yes
4	5300	Yes
5	5320	Yes
6	5320	Yes
7	5320	Yes
8	5320	Yes
9	5320	No
10	5320	Yes
11	5320	Yes
12	5300	Yes
13	5300	Yes
14	5320	Yes
15	5320	Yes
16	5320	Yes
17	5320	Yes
18	5320	Yes
19	5320	Yes
20	5320	No
21	5320	No
22	5320	Yes
23	5320	Yes
24	5320	Yes
25	5320	No
26	5320	Yes
27	5320	No
28	5320	No
29	5320	Yes
30	5300	Yes
31	5320	Yes
32	5320	Yes
33	5320	Yes
34	5320	Yes
35	5320	No
36	5320	Yes
37	5320	Yes
38	5280	Yes
39	5320	Yes
40	5260	Yes
Detection Rate		82.5%
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	5320	No
2	5320	Yes
3	5260	Yes
4	5320	Yes
5	5280	Yes
6	5280	Yes
7	5260	No
8	5320	Yes
9	5300	Yes
10	5320	Yes
11	5260	No
12	5320	Yes
13	5320	Yes
14	5320	No
15	5320	Yes
16	5320	Yes
17	5320	Yes
18	5320	Yes
19	5260	Yes
20	5280	Yes
21	5320	Yes
22	5320	Yes
23	5320	Yes
24	5320	Yes
25	5320	Yes
26	5320	Yes
27	5320	No
28	5320	Yes
29	5320	Yes
30	5320	No
31	5260	Yes
32	5320	Yes
33	5320	Yes
34	5320	Yes
35	5320	Yes
36	5300	Yes
37	5320	Yes
38	5320	Yes
39	5320	Yes
40	5320	Yes
Detection Rate		85%
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	5320	No
2	5320	Yes
3	5320	Yes
4	5300	Yes
5	5320	Yes
6	5280	Yes
7	5320	Yes
8	5320	Yes
9	5320	Yes
10	5320	Yes
11	5260	Yes
12	5320	Yes
13	5320	Yes
14	5280	Yes
15	5320	Yes
16	5320	Yes
17	5320	Yes
18	5320	Yes
19	5320	Yes
20	5300	Yes
21	5280	Yes
22	5320	Yes
23	5320	Yes
24	5280	No
25	5320	Yes
26	5280	Yes
27	5320	Yes
28	5320	Yes
29	5320	Yes
30	5300	Yes
31	5320	Yes
32	5320	Yes
33	5320	No
34	5320	No
35	5320	Yes
36	5320	Yes
37	5260	Yes
38	5320	Yes
39	5320	No
40	5320	Yes
Detection Rate		87.5%
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	5320	No
2	5320	Yes
3	5320	Yes
4	5320	Yes
5	5320	Yes
6	5320	Yes
7	5320	Yes
8	5320	Yes
9	5320	Yes
10	5280	Yes
11	5320	Yes
12	5320	Yes
13	5320	No
14	5260	Yes
15	5320	Yes
16	5280	Yes
17	5320	Yes
18	5320	Yes
19	5300	Yes
20	5320	Yes
21	5320	Yes
22	5320	Yes
23	5320	Yes
24	5320	No
25	5320	Yes
26	5320	Yes
27	5320	No
28	5320	Yes
29	5320	Yes
30	5320	Yes
31	5320	Yes
32	5320	Yes
33	5300	Yes
34	5320	Yes
35	5320	Yes
36	5320	Yes
37	5320	Yes
38	5320	No
39	5280	Yes
40	5320	Yes
Detection Rate		87.5%
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	5320	No
3	5320	Yes
4	5320	Yes
5	5280	Yes
6	5320	Yes
7	5320	Yes
8	5320	Yes
9	5320	Yes
10	5280	Yes
11	5320	Yes
12	5280	No
13	5320	Yes
14	5320	No
15	5320	No
16	5300	Yes
17	5320	Yes
18	5320	Yes
19	5260	Yes
20	5320	Yes
21	5320	Yes
22	5300	Yes
23	5320	Yes
24	5320	Yes
25	5300	Yes
26	5320	Yes
27	5320	No
28	5320	Yes
29	5320	Yes
30	5320	Yes
31	5320	No
32	5320	Yes
33	5300	Yes
34	5320	Yes
35	5260	Yes
36	5300	Yes
37	5280	Yes
38	5320	Yes
39	5320	Yes
40	5320	Yes
Detection Rate		85%
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	5320	Yes
2	5320	Yes
3	5320	Yes
4	5320	Yes
5	5320	Yes
6	5280	Yes
7	5320	Yes
8	5320	Yes
9	5320	Yes
10	5320	Yes
11	5300	Yes
12	5320	Yes
13	5300	Yes
14	5260	Yes
15	5320	Yes
16	5320	No
17	5320	Yes
18	5280	Yes
19	5320	Yes
20	5320	Yes
21	5280	No
22	5320	Yes
23	5320	No
24	5320	Yes
25	5320	Yes
26	5280	Yes
27	5320	No
28	5320	Yes
29	5320	Yes
30	5320	Yes
31	5320	Yes
32	5320	No
33	5320	Yes
34	5260	Yes
35	5320	Yes
36	5320	Yes
37	5280	Yes
38	5300	Yes
39	5320	Yes
40	5320	Yes
Detection Rate		87.5%
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	5320	Yes
3	5320	Yes
4	5320	Yes
5	5320	Yes
6	5320	Yes
7	5320	Yes
8	5320	Yes
9	5320	Yes
10	5320	Yes
11	5320	Yes
12	5320	Yes
13	5320	No
14	5320	Yes
15	5320	No
16	5320	Yes
17	5320	Yes
18	5280	Yes
19	5320	Yes
20	5320	Yes
21	5320	Yes
22	5320	Yes
23	5320	Yes
24	5320	Yes
25	5300	Yes
26	5320	Yes
27	5320	Yes
28	5320	Yes
29	5320	Yes
30	5320	Yes
31	5320	Yes
32	5260	Yes
33	5320	Yes
34	5320	Yes
35	5320	Yes
36	5320	Yes
37	5260	Yes
38	5320	No
39	5320	Yes
40	5320	Yes
Detection Rate		92.5%
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%	95
DFS-J2-2	700	1	18	60%	95
DFS-US-1	250	2	18	60%	92.5
DFS-US-2	4347 – 6667	1-5	23-29	60%	95
DFS-US-3	2000 – 5000	6-10	16-18	60%	82.5
DFS-US-4	2000 - 5000	11-20	12-16	60%	82.5
Aggregate (Radar Types 1-6)				80%	90.4

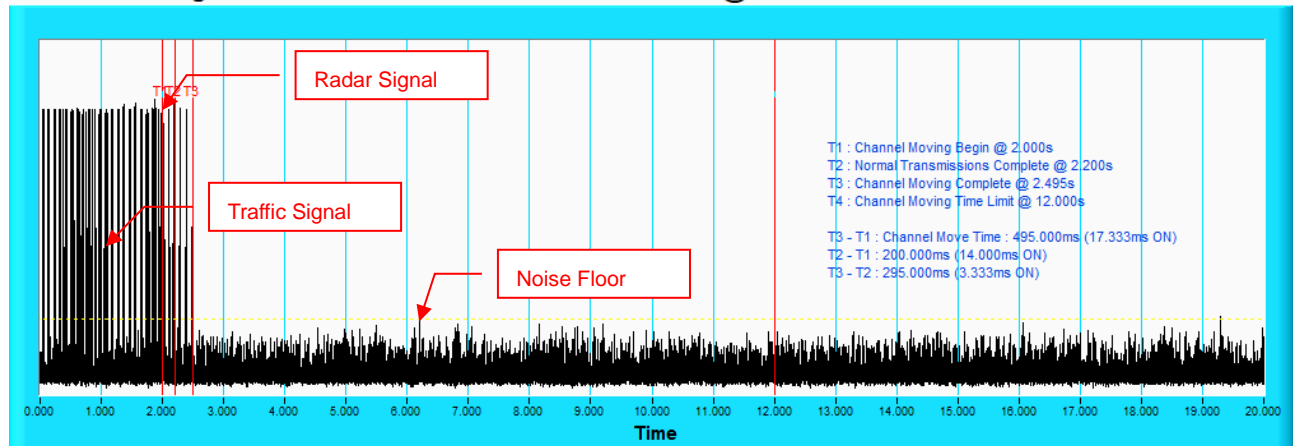
Radar Type	Pulse Repetition Frequency (pps)	Pulse Width (μsec)	Number of Pulses per Burst	Minimum Percentage of Successful Detection	Percentage of Successful Detection (%)
DFS-US-5	500-1000	50 - 100	1-3	80%	95

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%	92.5

W56

DFS-J2-1

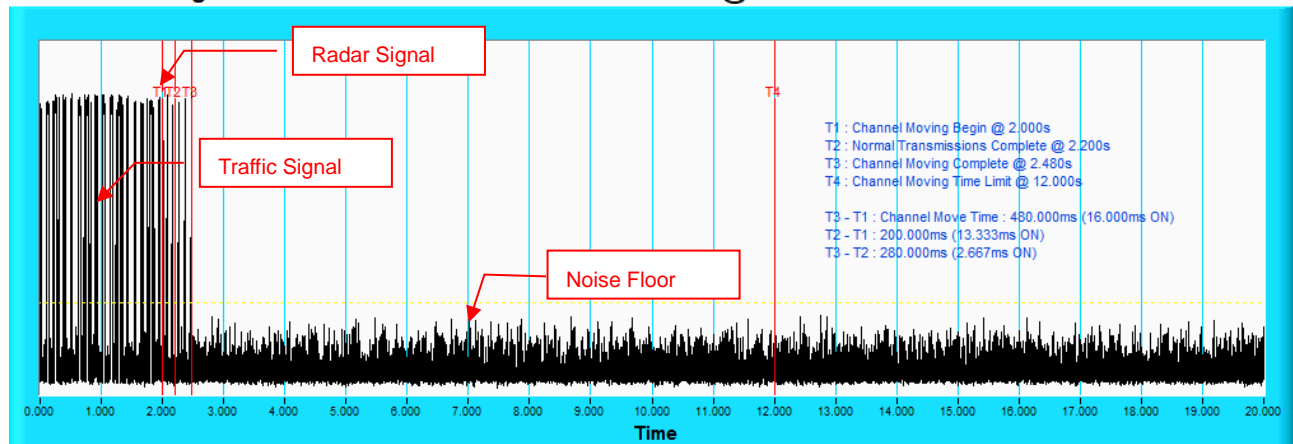
Channel Closing Transmission Time & Channel Move Time @ CH100 - 5500MHz



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

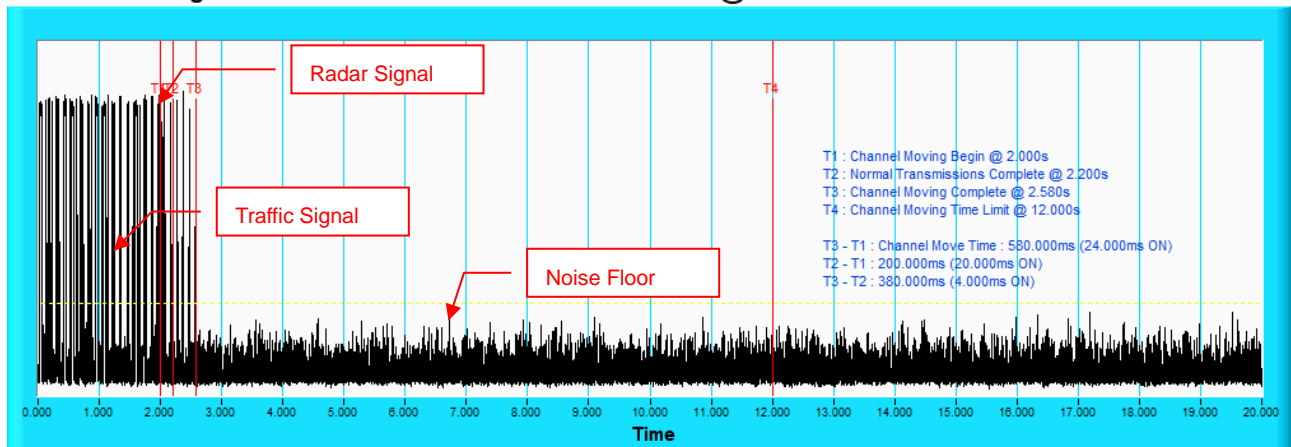
Channel Closing Transmission Time & Channel Move Time @ CH100 - 5500MHz



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

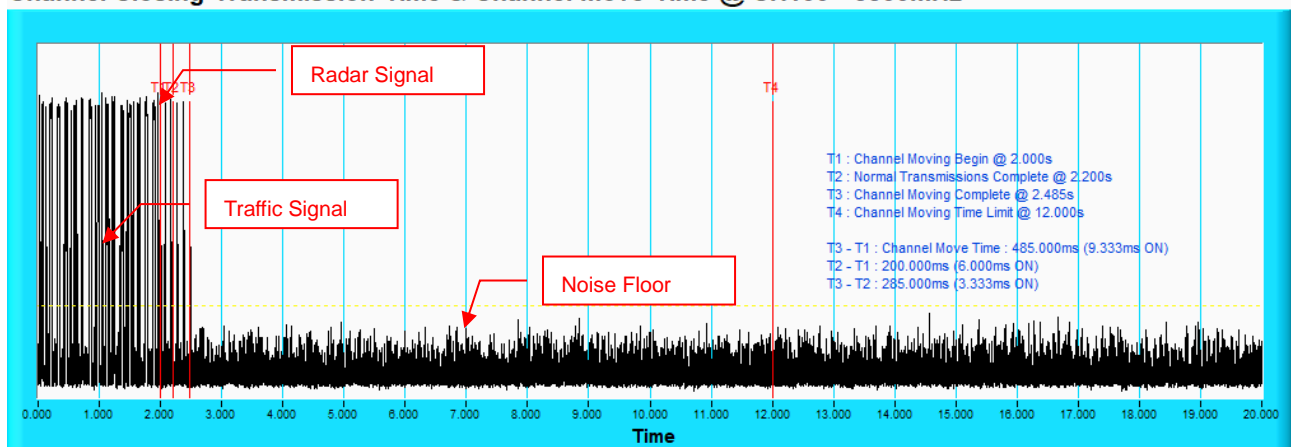
Channel Closing Transmission Time & Channel Move Time @ CH100 - 5500MHz



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

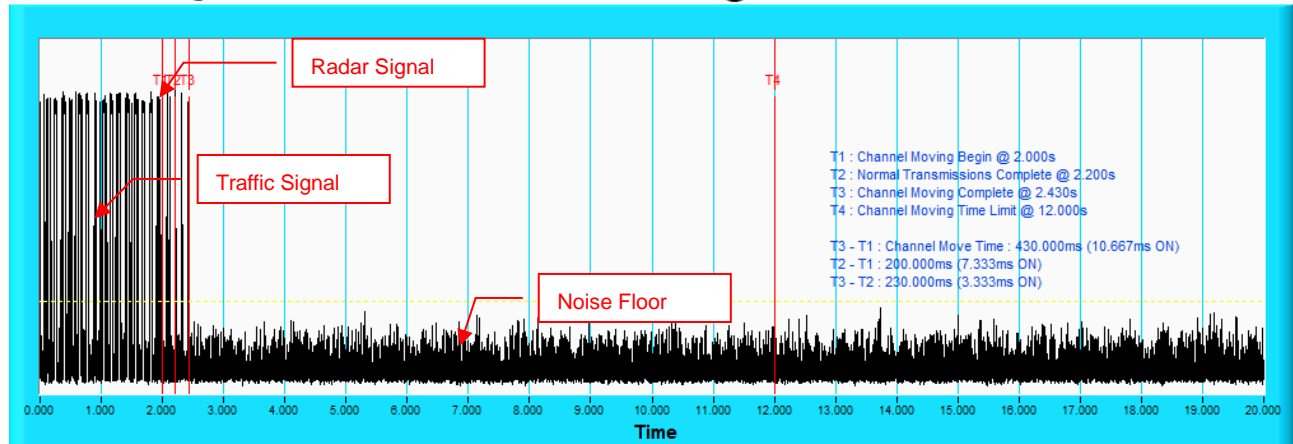
Channel Closing Transmission Time & Channel Move Time @ CH100 - 5500MHz



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

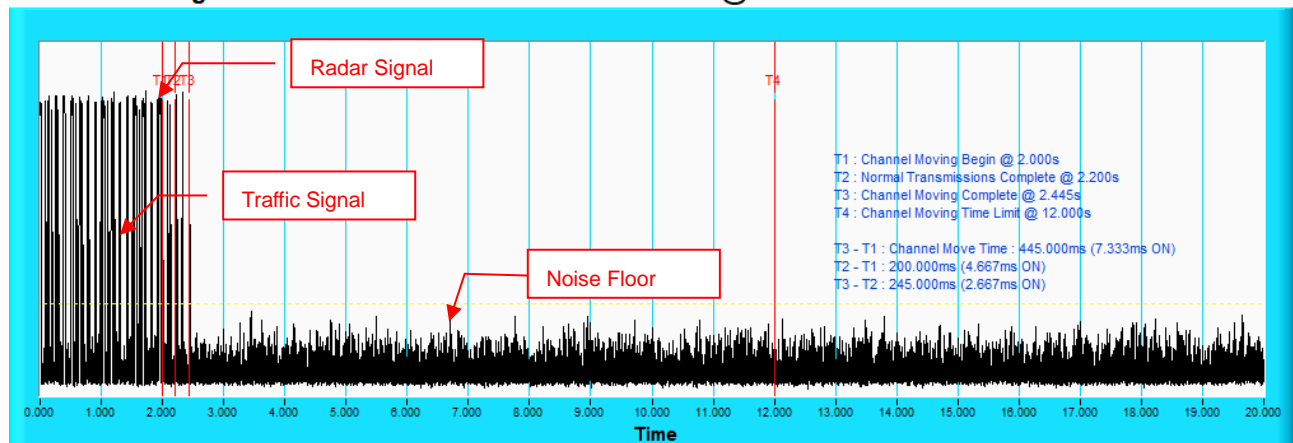
Channel Closing Transmission Time & Channel Move Time @ CH100 - 5500MHz



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

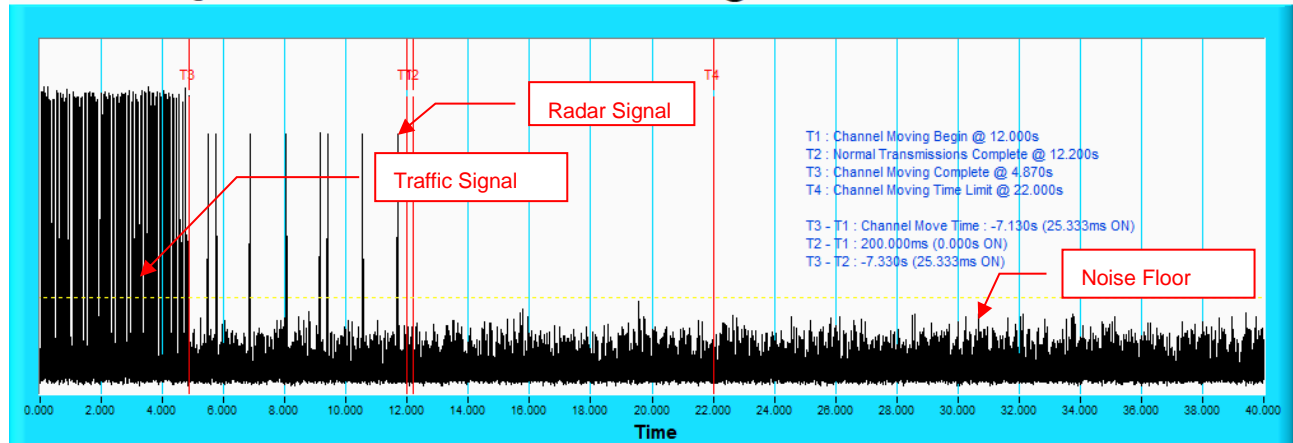
Channel Closing Transmission Time & Channel Move Time @ CH100 - 5500MHz



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-5

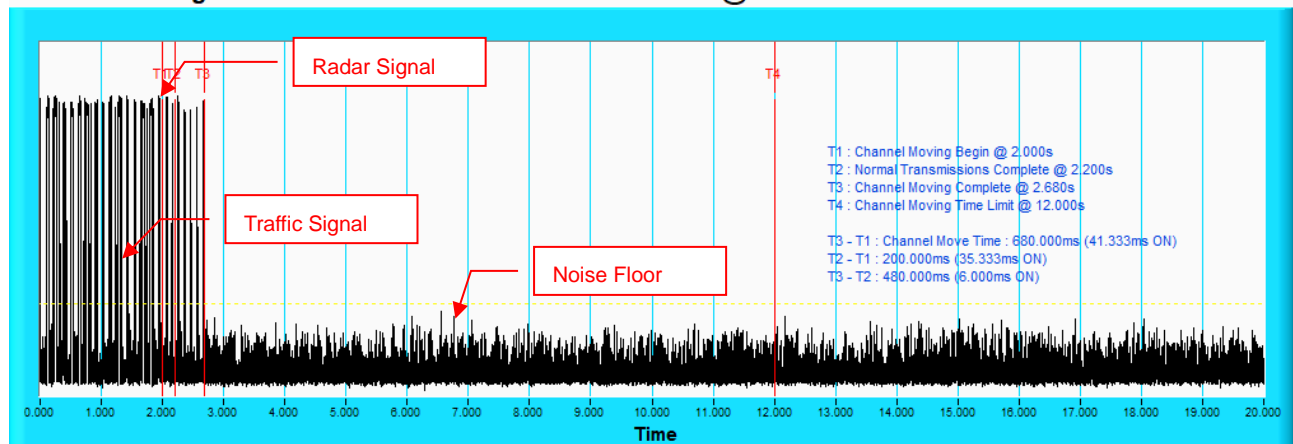
Channel Closing Transmission Time & Channel Move Time @ CH100 - 5500MHz



NOTE: T1 denotes the start of Channel Move Time. 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-6

Channel Closing Transmission Time & Channel Move Time @ CH100 - 5500MHz



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	5700	Yes
4	5700	Yes
5	5500	Yes
6	5620	Yes
7	5700	Yes
8	5600	Yes
9	5600	Yes
10	5600	Yes
11	5600	Yes
12	5680	Yes
13	5700	Yes
14	5700	Yes
15	5640	Yes
16	5500	Yes
17	5620	No
18	5540	Yes
19	5660	Yes
20	5600	Yes
21	5660	Yes
22	5580	Yes
23	5600	Yes
24	5700	Yes
25	5580	Yes
26	5640	Yes
27	5580	Yes
28	5500	Yes
29	5500	No
30	5580	Yes
31	5520	Yes
32	5500	Yes
33	5580	Yes
34	5540	Yes
35	5660	Yes
36	5660	Yes
37	5600	Yes
38	5700	Yes
39	5560	Yes
40	5600	Yes
Detection Rate		95%
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	5680	Yes
2	5660	Yes
3	5640	Yes
4	5680	Yes
5	5640	Yes
6	5500	Yes
7	5700	Yes
8	5640	Yes
9	5560	Yes
10	5660	Yes
11	5640	Yes
12	5620	Yes
13	5620	Yes
14	5520	Yes
15	5700	Yes
16	5580	Yes
17	5640	Yes
18	5600	Yes
19	5700	Yes
20	5560	Yes
21	5600	Yes
22	5500	Yes
23	5660	Yes
24	5500	Yes
25	5600	No
26	5560	Yes
27	5580	Yes
28	5600	Yes
29	5620	Yes
30	5600	Yes
31	5560	Yes
32	5540	Yes
33	5600	Yes
34	5620	Yes
35	5560	Yes
36	5500	Yes
37	5560	Yes
38	5700	No
39	5520	Yes
40	5660	Yes
Detection Rate		95%
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	5500	Yes
2	5700	Yes
3	5640	Yes
4	5520	No
5	5660	Yes
6	5500	Yes
7	5600	No
8	5520	Yes
9	5660	Yes
10	5700	Yes
11	5560	Yes
12	5640	Yes
13	5700	Yes
14	5680	Yes
15	5520	Yes
16	5560	Yes
17	5640	No
18	5660	Yes
19	5660	Yes
20	5700	Yes
21	5540	Yes
22	5700	Yes
23	5680	Yes
24	5700	Yes
25	5660	Yes
26	5640	Yes
27	5680	Yes
28	5700	Yes
29	5500	Yes
30	5680	Yes
31	5660	Yes
32	5600	Yes
33	5520	Yes
34	5520	Yes
35	5640	Yes
36	5700	Yes
37	5540	Yes
38	5620	Yes
39	5520	Yes
40	5580	Yes
Detection Rate		92.5%
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	5700	Yes
2	5700	Yes
3	5700	Yes
4	5500	Yes
5	5620	Yes
6	5600	Yes
7	5620	Yes
8	5640	Yes
9	5700	Yes
10	5640	Yes
11	5560	Yes
12	5660	Yes
13	5700	Yes
14	5500	Yes
15	5660	Yes
16	5620	No
17	5700	Yes
18	5540	Yes
19	5520	Yes
20	5700	Yes
21	5640	Yes
22	5540	Yes
23	5580	Yes
24	5640	Yes
25	5540	Yes
26	5620	Yes
27	5700	Yes
28	5560	Yes
29	5700	Yes
30	5640	Yes
31	5640	Yes
32	5600	Yes
33	5640	Yes
34	5620	Yes
35	5500	Yes
36	5660	Yes
37	5660	Yes
38	5600	No
39	5520	Yes
40	5620	Yes
Detection Rate		95%
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	5700	Yes
2	5700	Yes
3	5560	No
4	5700	Yes
5	5540	Yes
6	5560	Yes
7	5500	Yes
8	5660	Yes
9	5560	Yes
10	5700	Yes
11	5540	No
12	5500	Yes
13	5620	Yes
14	5620	Yes
15	5600	Yes
16	5700	No
17	5700	Yes
18	5600	No
19	5660	Yes
20	5600	Yes
21	5620	Yes
22	5540	Yes
23	5700	Yes
24	5520	Yes
25	5620	Yes
26	5620	Yes
27	5680	Yes
28	5560	Yes
29	5660	No
30	5560	Yes
31	5700	Yes
32	5560	Yes
33	5700	Yes
34	5520	No
35	5520	No
36	5540	Yes
37	5660	Yes
38	5540	Yes
39	5560	Yes
40	5680	Yes
Detection Rate		82.5%
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	5640	No
2	5540	Yes
3	5600	Yes
4	5640	No
5	5620	Yes
6	5700	Yes
7	5560	Yes
8	5620	Yes
9	5520	No
10	5640	Yes
11	5540	Yes
12	5540	No
13	5640	Yes
14	5620	Yes
15	5600	No
16	5500	Yes
17	5540	No
18	5640	Yes
19	5620	Yes
20	5540	Yes
21	5600	Yes
22	5700	Yes
23	5500	No
24	5500	Yes
25	5520	Yes
26	5640	Yes
27	5520	Yes
28	5620	Yes
29	5560	Yes
30	5540	Yes
31	5680	Yes
32	5560	Yes
33	5680	Yes
34	5640	Yes
35	5660	Yes
36	5500	Yes
37	5620	Yes
38	5500	Yes
39	5520	Yes
40	5500	Yes
Detection Rate		82.5%
Minimum Percentage of Successful Detection		60%
Result		PASS

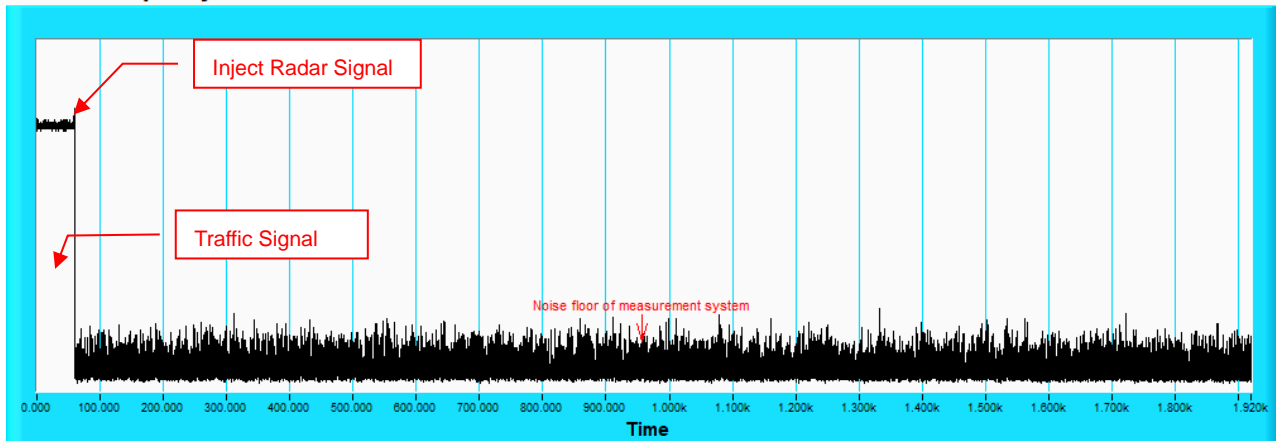
DFS-US-5 Radar Statistical Performances		
Trial #	Channel (MHz)	Channel Closing Transmission Time & Channel move Time
1	5700	Yes
2	5620	Yes
3	5700	Yes
4	5700	Yes
5	5540	Yes
6	5660	Yes
7	5680	Yes
8	5680	Yes
9	5580	Yes
10	5560	Yes
11	5500	Yes
12	5500	No
13	5600	Yes
14	5620	Yes
15	5640	Yes
16	5520	Yes
17	5660	Yes
18	5640	Yes
19	5700	Yes
20	5520	Yes
21	5500	Yes
22	5580	Yes
23	5640	No
24	5540	Yes
25	5580	Yes
26	5580	Yes
27	5520	Yes
28	5580	Yes
29	5620	Yes
30	5700	Yes
31	5640	Yes
32	5620	Yes
33	5700	Yes
34	5540	Yes
35	5580	Yes
36	5500	Yes
37	5600	Yes
38	5520	Yes
39	5640	Yes
40	5640	Yes
Detection Rate		95%
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	5520	Yes
3	5580	Yes
4	5680	Yes
5	5640	Yes
6	5540	No
7	5600	Yes
8	5620	Yes
9	5620	Yes
10	5500	Yes
11	5700	Yes
12	5600	Yes
13	5580	Yes
14	5680	Yes
15	5540	Yes
16	5540	Yes
17	5600	Yes
18	5680	Yes
19	5500	Yes
20	5600	Yes
21	5580	Yes
22	5640	Yes
23	5600	Yes
24	5600	Yes
25	5680	Yes
26	5560	Yes
27	5600	No
28	5620	Yes
29	5700	Yes
30	5700	Yes
31	5540	No
32	5500	Yes
33	5700	Yes
34	5540	Yes
35	5520	Yes
36	5520	Yes
37	5580	Yes
38	5620	Yes
39	5660	Yes
40	5660	Yes
Detection Rate		92.5%
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.

Non - Occupancy Period



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 5730MHz 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.

3 Photographs of the Test Configuration



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

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