FCC PART 15.407
ISED RSS-247 ISSUE 3
DYNAMIC FREQUENCY SELECTION

TEST REPORT

For

Rajant Corporation

200 Chesterfield Pkwy
Malvern, PA 19355, USA

FCC ID: VJA-AG15250M
IC: 7382A-AG15250M

Report Type: Original Report		**Product Type:** Mobile Wireless Network Node
Prepared By	Kevin Chau RF Test Engineer	
Report Number	R2309254-DFS	
Report Date	2024-03-19	
Reviewed By	Christian McCaig RF Lead Engineer	
Bay Area Compliance Laboratories Corp. 1274 Anvilwood Ave Sunnyvale, CA 94089, USA Tel: (408) 732-9162, Fax: (408) 732 9164		

ACCREDITED
CERTIFICATE #3297.02

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* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "*" (Rev.3)

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R2309254-DFS	Original Report	2024-03-19

1 General Description

1.1 Product Description for Equipment under Test (EUT)

This test report was prepared on behalf of *Rajant Corporation.*, and their product model: AG1-5250M, FCC ID: VJA-AG15250M, IC: 7382A-AG15250M, the "EUT" as referred to in this report. The EUT is a mobile wireless network node and can operate in AP mode.

Note: 5600-5650 MHz range shall not be applicable to ISED.

1.2 Mechanical Description of EUT

Length (cm)	Width (cm)	Height (cm)	Weight (kg)	S/N
9.8	5	1.6	<0.1	AG1-5250M-109202

1.3 Objective

This report is prepared on behalf of *Rajant Corporation.* in accordance with FCC CFR47 §15.407 (h), RSS-247 Issue 3, and KDB: 905462 D02 UNII DFS Compliance Procedures New Rules v02.

The objective was to determine compliance with FCC, and ISED rules for DFS Detection Threshold, Channel Availability Check Time, Uniform Spreading U-NII Detection Bandwidth, Channel Closing Transmission Time, and Channel Move time in AP mode.

1.4 Related Submittal(s)/Grant(s)

N/A

1.5 Test Methodology

FCC CFR 47 Part2, Part15.407 (h), RSS-247 Issue 3

KDB: 905462 D02 UNII DFS Compliance Procedures New Rules v02.

COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVICES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION

1.6 Test Facility Registrations

BACLs test facilities that are used to perform Radiated and Conducted Emissions tests are currently recognized by the Federal Communications Commission as Accredited with NIST Designation Number US1129.

BACL's test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with Industry Canada under Registration Numbers: 3062A-1, 3062A-2, and 3062A-3.

BACL is a Chinese Taipei Bureau of Standards Metrology and Inspection (BSMI) validated Conformity Assessment Body (CAB), under Annex B, Phase I Procedures of the APEC Mutual Recognition Arrangement (MRA). BACL's BSMI Lab Code Number is: SL2-IN-E-1002R

BACL's test facilities that are used to perform AC Line Conducted Emissions, Telecommunications Line Conducted Emissions, Radiated Emissions from 30 MHz to 1 GHz, and Radiated Emissions from 1 GHz to 6 GHz are currently recognized as Accredited in accordance with the Voluntary Control Council for Interference [VCCI] Article 15 procedures under Registration Number A-0027.

1.7 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

A- ***An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2017 by A2LA (Test Laboratory Accreditation Certificate Number 3297.02),*** in the fields of: Electromagnetic Compatibility and Telecommunications. Unless noted by an Asterisk (*) in the Compliance Matrix (See Section 3 of this Test Report), BACL's ISO/IEC 17025:2017 Scope of Accreditation includes all of the Test Method Standards and/or the Product Family Standards detailed in this Test Report..

BACL's ISO/IEC 17025:2017 Scope of Accreditation includes a comprehensive suite of EMC Emissions, EMC Immunity, Radio, RF Exposure, Safety and wireline Telecommunications test methods applicable to a wide range of product categories. These product categories include Central Office Telecommunications Equipment [including NEBS - Network Equipment Building Systems], Unlicensed and Licensed Wireless and RF devices, Information Technology Equipment (ITE); Telecommunications Terminal Equipment (TTE); Medical Electrical Equipment; Industrial, Scientific and Medical Test Equipment; Professional Audio and Video Equipment; Industrial and Scientific Instruments and Laboratory Apparatus; Cable Distribution Systems, and Energy Efficient Lighting.

B- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3297.03)*** to certify
- For the USA (Federal Communications Commission):
    1- All Unlicensed radio frequency devices within FCC Scopes A1, A2, A3, and A4;
    2- All Licensed radio frequency devices within FCC Scopes B1, B2, B3, and B4;
    3- All Telephone Terminal Equipment within FCC Scope C.
- For the Canada (Industry Canada):
    1 All Scope 1-Licence-Exempt Radio Frequency Devices;

2 All Scope 2-Licensed Personal Mobile Radio Services;
3 All Scope 3-Licensed General Mobile & Fixed Radio Services;
4 All Scope 4-Licensed Maritime & Aviation Radio Services;
5 All Scope 5-Licensed Fixed Microwave Radio Services
6 All Broadcasting Technical Standards (BETS) in the Category I Equipment Standards List.

- For Singapore (Info-Communications Development Authority (IDA)):
  1 All Line Terminal Equipment: All Technical Specifications for Line Terminal Equipment – Table 1 of IDA MRA Recognition Scheme: 2011, Annex 2
  2. All Radio-Communication Equipment: All Technical Specifications for Radio-Communication Equipment – Table 2 of IDA MRA Recognition Scheme: 2011, Annex 2
- For the Hong Kong Special Administrative Region:
  1 All Radio Equipment, per KHCA 10XX-series Specifications;
  2 All GMDSS Marine Radio Equipment, per HKCA 12XX-series Specifications;
  3 All Fixed Network Equipment, per HKCA 20XX-series Specifications.
- For Japan:
  1 MIC Telecommunication Business Law (Terminal Equipment):
    - All Scope A1 - Terminal Equipment for the Purpose of Calls;
    - All Scope A2 - Other Terminal Equipment
  2 Radio Law (Radio Equipment):
    - All Scope B1 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 1 of the Radio Law
    - All Scope B2 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 2 of the Radio Law
    - All Scope B3 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 3 of the Radio Law

C- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3297.01)*** to certify Products to USA's EnvCobaltmental Protection Agency (EPA) ENERGY STAR Product Specifications for:

1 Electronics and Office Equipment:
- for Telephony (ver. 3.0)
- for Audio/Video (ver. 3.0)
- for Battery Charging Systems (ver. 1.1)
- for Set-top Boxes & Cable Boxes (ver. 4.1)
- for Televisions (ver. 6.1)
- for Computers (ver. 6.0)
- for Displays (ver. 6.0)
- for Imaging Equipment (ver. 2.0)
- for Computer Servers (ver. 2.0)

2 Commercial Food Service Equipment
- for Commercial Dishwashers (ver. 2.0)
- for Commercial Ice Machines (ver. 2.0)
- for Commercial Ovens (ver. 2.1)
- for Commercial Refrigerators and Freezers

3 Lighting Products
- For Decorative Light Strings (ver. 1.5)
- For Luminaires (including sub-components) and Lamps (ver. 1.2)
- For Compact Fluorescent Lamps (CFLs) (ver. 4.3)
- For Integral LED Lamps (ver. 1.4)

4 Heating, Ventilation, and AC Products
- for Residential Ceiling Fans (ver. 3.0)
- for Residential Ventilating Fans (ver. 3.2)

5 Other

- For Water Coolers (ver. 3.0)

D- ***A NIST Designated Phase-I and Phase-II Conformity Assessment Body (CAB) for the following economies and regulatory authorities under the terms of the stated MRAs/Treaties:***

- Australia: ACMA (Australian Communication and Media Authority) – APEC Tel MRA -Phase I;
- Canada: (Innovation, Science and Economic development Canada - ISEDC) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- European Union:
    - EMC Directive 2014/30/EU US-EU EMC & Telecom MRA CAB (NB)
    - Radio Equipment (RE) Directive 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)
    - Low Voltage Directive (LVD) 2014/35/EU
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority – OFTA) APEC Tel MRA -Phase I & Phase II
- Israel – US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications - Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Media Development Authority - IMDA) APEC Tel MRA -Phase I & Phase II;
- Japan: VCCI - Voluntary Control Council for Interference US-Japan Telecom Treaty VCCI Side Letter-
- USA:
    - ENERGY STAR Recognized Test Laboratory – US EPA
    - Telecommunications Certification Body (TCB) – US FCC;
    - Nationally Recognized Test Laboratory (NRTL) – US OSHA
- Vietnam: APEC Tel MRA -Phase I;

2 General Description

2.1 Justification

The EUT was configured for testing according to FCC Part 15.407(h), RSS-247 Issue 3, and KDB: 905462 D02 UNII DFS Compliance Procedures New Rules v02.

2.2 EUT Exercise Software

The test utility used was Rajant BC|Commander V11.24.0, in conjunction with software tools for RF testing provided by *Rajant Corporation.* The provided software and tools were verified *by Alexandrae Duran* to comply with the standard requirements being tested against.

The EUT firmware version:
breadcrumb_AG1_AU_CJSAP_DX2_DX4_ES1_FE1_HV1_JR3_KM3_LX4SAB_LX5_ME4_ME5_PT_SLIPSTREAM_XG_11.28.0_b11880-jenkins-f7e758d687.flash

2.3 Equipment Modifications

N/A

2.4 Local Support Equipment

Manufacturer	Description	Model	Serial Number
Lenovo	RF Client Laptop	Thinkpad	PF274C83
Dell	RF Laptop	Latitude E7440	H43SH12
LinkSys	Router	E5350	30K10M23E00976
Dell	Laptop	Latitude E6410	FFXR4Q1
ASUS	RF Client Laptop	TUF GAMING FX504GE_FX80GE	J6NRCX037440249
Netgear	Network Switch	GS305Pv2	6FJ118DU55B93

2.5 Remote Support Equipment

Manufacturer	Description	Model	Serial Number
HP	Rajant Laptop	HP ProBook 640 G2	5CG7511CZM
Tycon Systems	POE	TP-POE-24G	210200733 DRC07

2.6 Interface Ports and Cables

Cable Description	Length	To	From
Ethernet cable	2 m	PoE	EUT
Ethernet cable	2 m	PoE	Router/Network Switch
Ethernet cable	1 m	Router/Network Switch	RF Laptop
Ethernet cable	2 m	Rajant Laptop	Router/Network Switch

3 Summary of Test Results

The following result table represents the list of measurements required under the FCC CFR47 §15.407 (h), RSS-247 Issue 3, and KDB: 905462 D02 UNII DFS Compliance Procedures New Rules v02.

Items	Description of Test	Results
Detection Bandwidth	UNII Detection Bandwidth	Compliant
Performance Requirements 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	Compliant
Radar Detection	Statistical Performance Check	Compliant

Disclaimer: *BACL is responsible for all the information provided in this report, except when information is provided by the customer as identified in this report. Information provided by the customer, e.g., antenna gain, can affect the validity of results.*

4 Applicable Standards

4.1 DFS Requirement

FCC CFR47 §15.407 (h), RSS-247 Issue 3, and KDB: 905462 D02 UNII DFS Compliance Procedures New Rules v02.

Table 1: Applicability of DFS requirements prior to use of a channel

Requirement	Operational Mode		
	Master	Client (Without radar detection)	Client (With radar detection)
Non-Occupancy Period	Yes	Not Required	Yes
DFS Detection Threshold	Yes	Not Required	Yes
Channel Availability Check Time	Yes	Not Required	Not Required
U-NII Detection Bandwidth	Yes	Not Required	Yes

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
DFS Detection Threshold	Yes	Not Required
Channel Closing Transmission Time	Yes	Yes
Channel Move Time	Yes	Yes
U-NII Detection Bandwidth	Yes	Not Required

Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar Detection	Client Without Radar Detection
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required
Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.		

Table 3: Interference Threshold for Master and Client with Radar Detection

Maximum Transmit Power	Value (See Notes 1, 2 and 3)
EIRP≥ 200 milliwatt	-64 dBm
EIRP< 200 milliwatt and power spectral density < 10dBm/MHz	-62 dBm
EIRP< 200 milliwatt that do not meet the power spectral density requirement	-64 dBm

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna.
Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.
Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.

Table 4: DFS Response Requirement Values

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds ***See Note 1***.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. ***See Notes 1 and 2***.
U-NII Detection Bandwidth	Minimum 100% of the UNII 99% transmission power bandwidth. ***See Note 3***.

Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.

Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Note 3: During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

Table 5: Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (Microseconds)	PRI (Microseconds)	Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a Test B: 15 unique PRI values randomly selected within the range of 518-3066 µsec, with a minimum increment of 1 µsec, excluding PRI values selected in Test A	$\text{Roundup}\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{PRI_{\mu sec}}\right)\right\}$	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120
Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.					

Table 6: Long Pulse Radar Test Signal

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

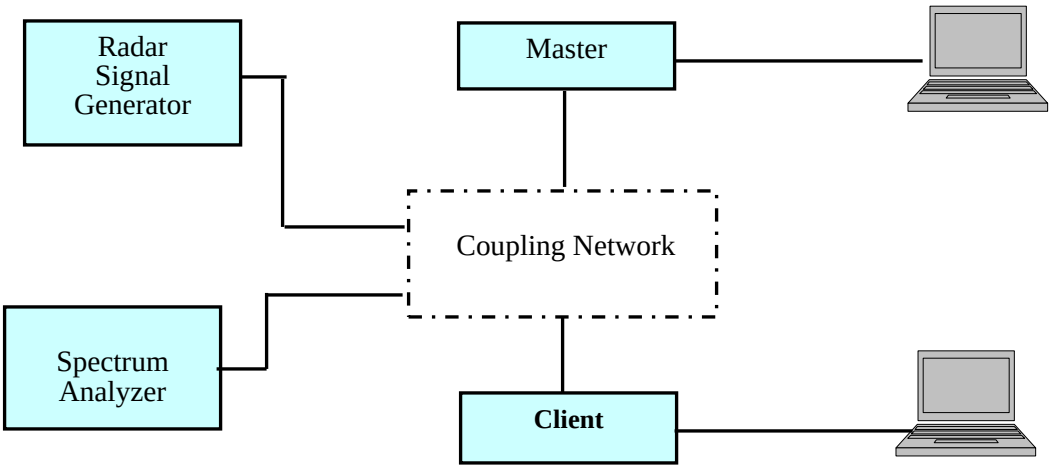
Table 7: Frequency Hopping Radar Test Signal

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

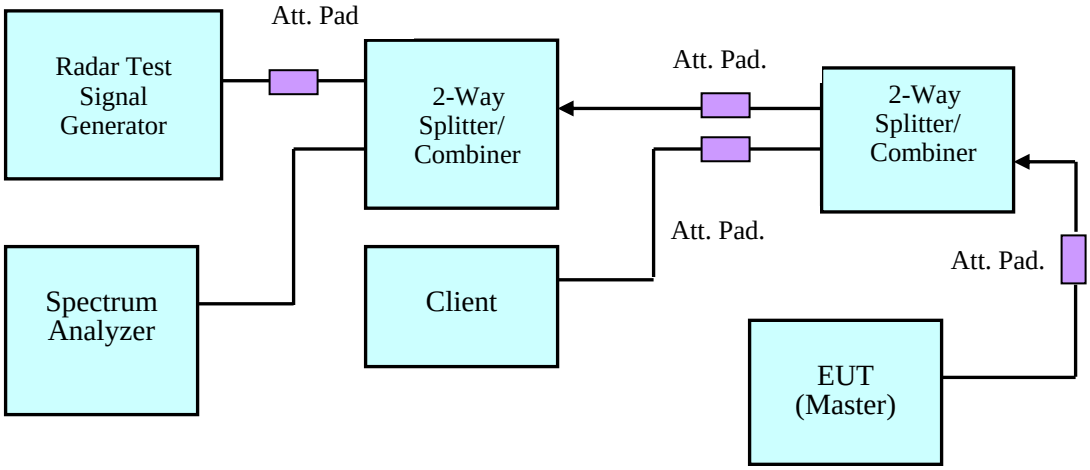
4.2 DFS Measurement System

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

4.3 System Block Diagram



4.4 Conducted Method



Setup for Conducted Method for Master Mode

4.5 Test Procedure

A spectrum analyzer is used as a monitor that verifies the EUT's status, which includes the Channel Closing Transmission Time and the Channel Move Time. The Spectrum analyzer is used to monitor the equipment under test (EUT) does not transmit on the same channel during the Non-Occupied Period after the radar detection. It is also used to monitor EUT transmissions during the Channel Availability Check Time.

5 Test Results

5.1 Description of EUT

The EUT operates in 5250-5350 MHz and 5470-5725 MHz range in Master Mode.

The EUT was configured to channel 100 and 52 for testing in 20 MHz bandwidth mode, configured to channel 102 and 62 for testing in 40 MHz bandwidth mode, and configured to channel 106, 122, and 58 for testing in 80 MHz bandwidth mode.

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

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP ≥ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna. **Note 2:** Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response. **Note3:** EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.	

The rated output power of EUT is ≥ 200 mW (EIRP), therefore the required interference threshold level is -64 dBm. The required conducted threshold at the antenna port is -64 dBm + 4 dBi = -60 dBm.

The calibrated conducted DFS detection threshold level is set to -60 dBm due the the antenna gain is 4 dBi. The antenna with the lowest gain was used for testing.

WLAN traffic is generated by running iperf3.

5.2 Antenna Description

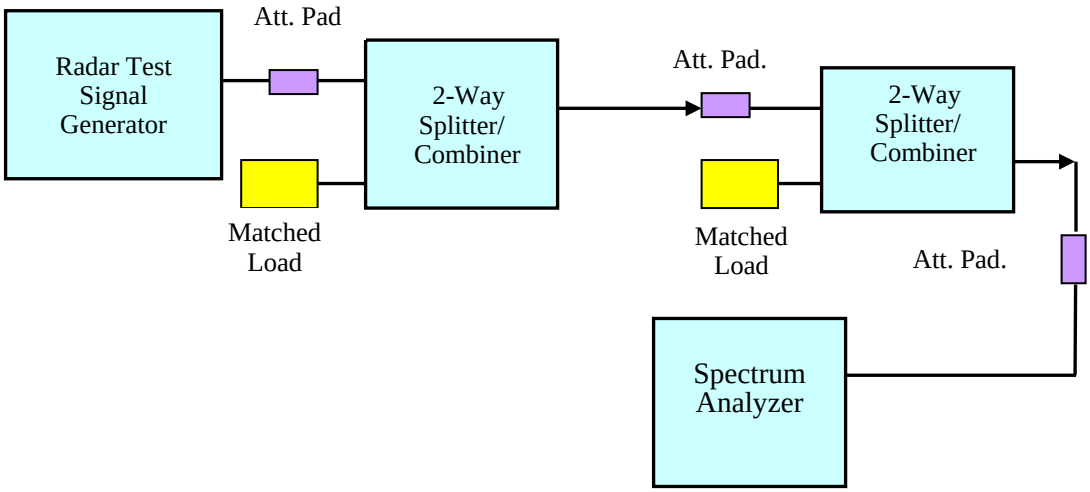
Antenna Model	External/ Internal/ Integral	Part Number	Antenna Type	Frequency Range (MHz)	Maximum Antenna Gain (dBi)
KMA-5550-6-NM	External	75-100139-055	Omni-directional	5350-5750 MHz	6
KMA-5250-7-NM	External	75-100139-052	Omni-directional	5150-5350 MHz	7
PUCK-12-V1-01	External	6009880915248	Omni-directional	5150-5750 MHz	>4, <6

5.3 Test Equipment List and Details

BACL No.	Manufacturer	Equipment Description	Model	S/N	Calibration Date	Calibration Interval
547	National Instruments	NI PXI-1042 8-Slot chassis	PXI-1042	V08X01EE1	N/A	N/A
547	National Instruments	Arbitrary Waveform Generator	PXI-5421	N/A	N/A	N/A
547	National Instruments	RF Upconverter	PXI-5610	N/A	N/A	N/A
547	ASCOR	Upconverter	AS-7206	N/A	N/A	N/A
624	Agilent	Analyzer, Spectrum	E4446A	MY48250238	2023-05-12	1 year
1128	Agilent	EXA Signal Analyzer	N9010A	MY48030852	2023-04-25	1 year
688	Keysight Technologies	Vector Signal Generator	N5182B	MY51350070	2023-10-09	1 year
-	Mini-Circuits	Power Splitter	ZN4PD1-63-S+	S F263501223	Each Time[1]	Each Time[1]
-	Mini-Circuits	Power Splitter	ZN2PD-9G-S+	S F038700723	Each Time[1]	Each Time[1]
-	Mini-Circuits	Power Splitter	ZFSC-2-10G	0 0349	Each Time[1]	Each Time[1]
-	-	Attenuator	-	-	Each Time[1]	Each Time[1]
-	-	RF Cable	-	-	Each Time[1]	Each Time[1]

Note[1]: cables, power splitters, and attenuators included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

5.4 Radar Waveform Calibration



Conducted Calibration Setup Block Diagram

5.5 Test Environmental Conditions

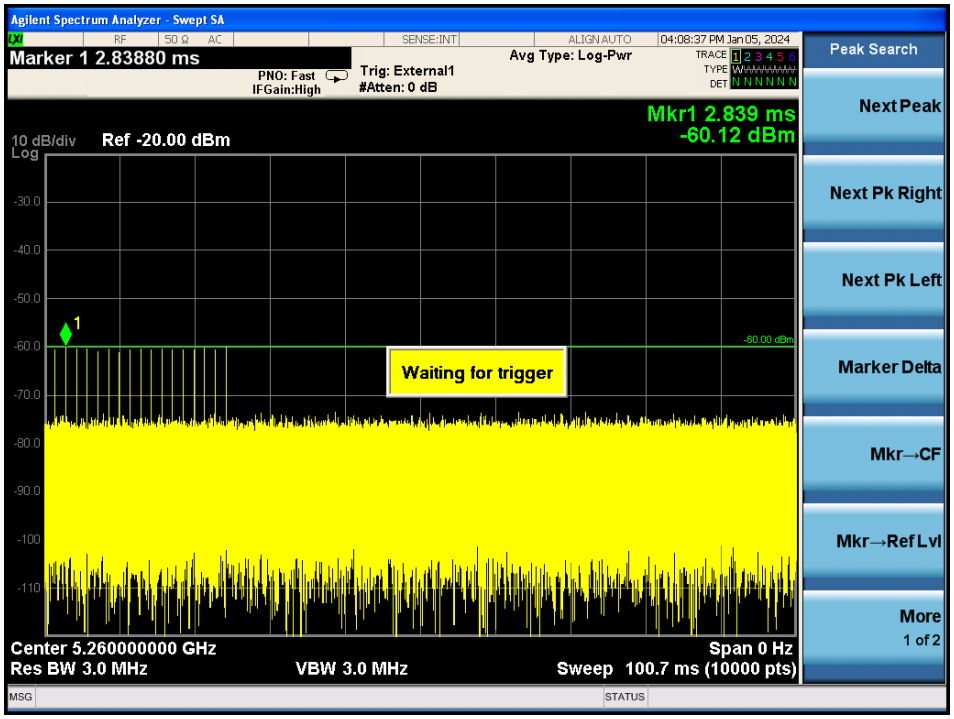
Temperature:	16.5-22.6° C
Relative Humidity:	30-58 %
ATM Pressure:	101.0-101.9 kPa

Testing was performed by Kevin Chau on 2023-11-21 to 2024-02-22 at the DFS testing site.

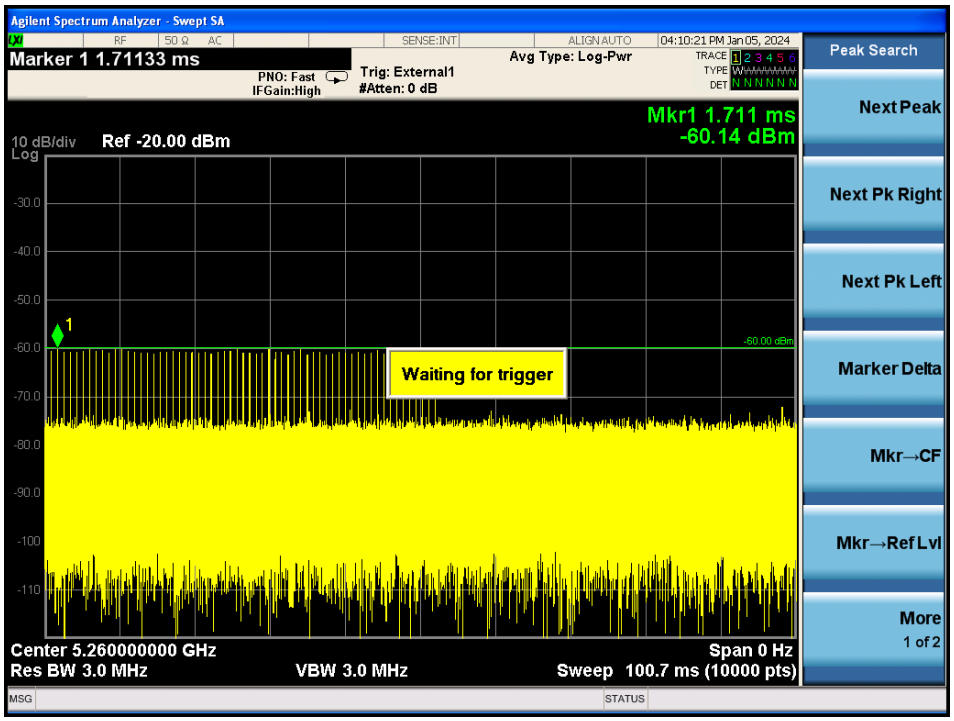
Plots of Radar Waveform

5260 MHz, 20MHz Channel Bandwidth

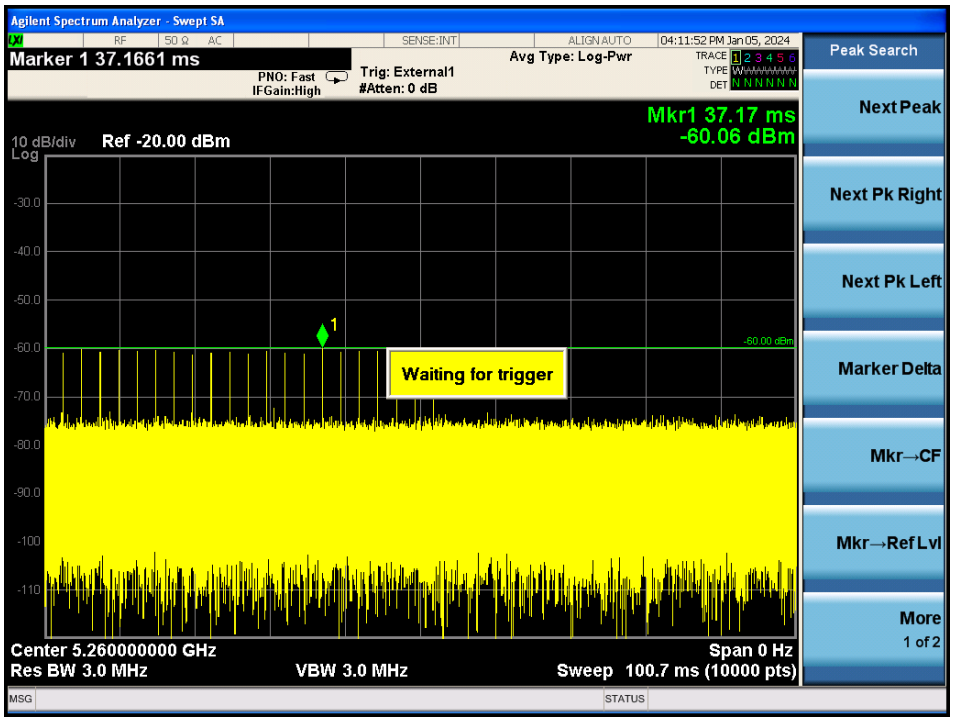
Radar Type 0



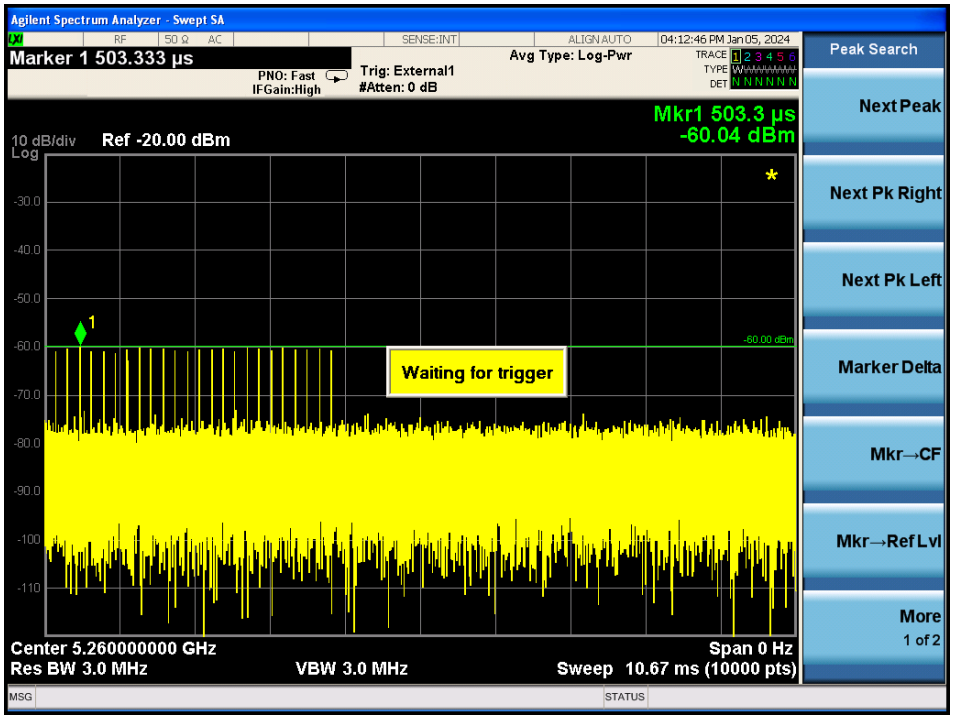
Radar Type 1A



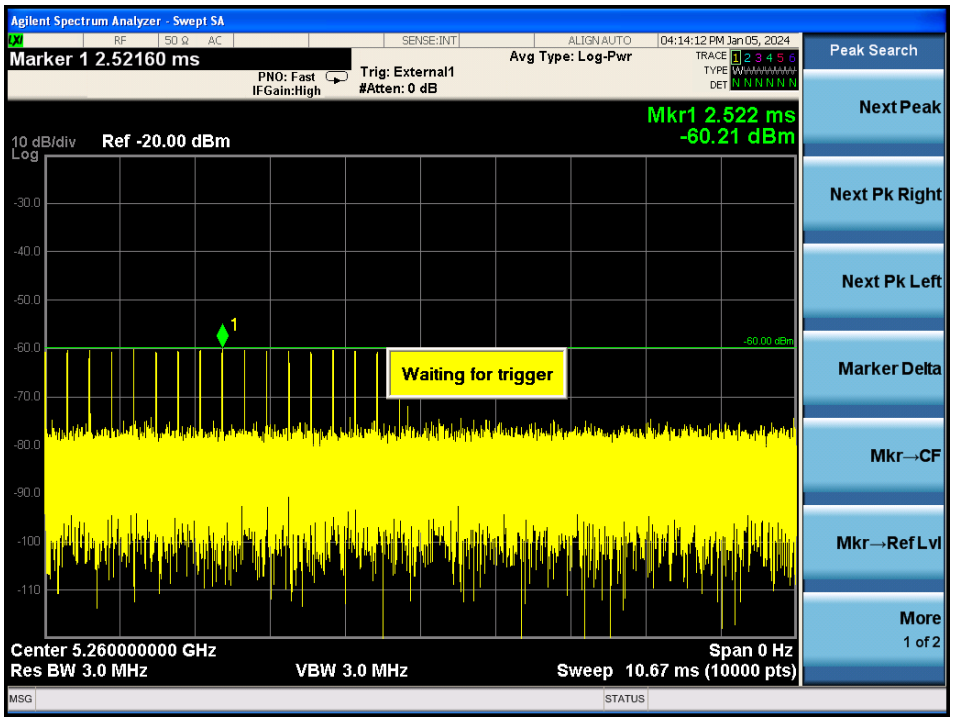
Radar Type 1B



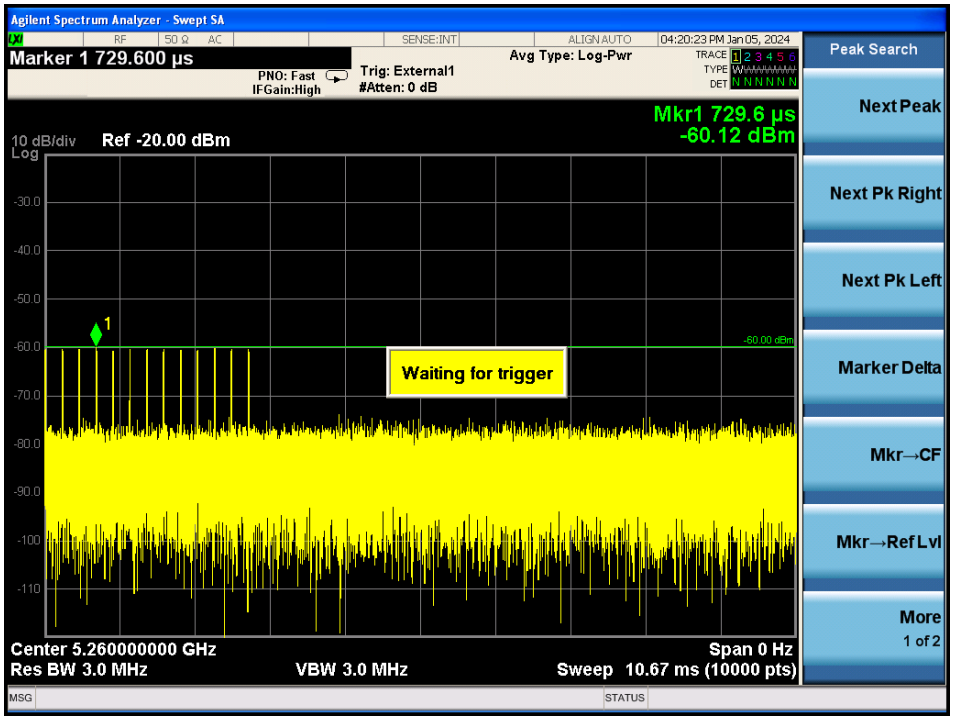
Radar Type 2



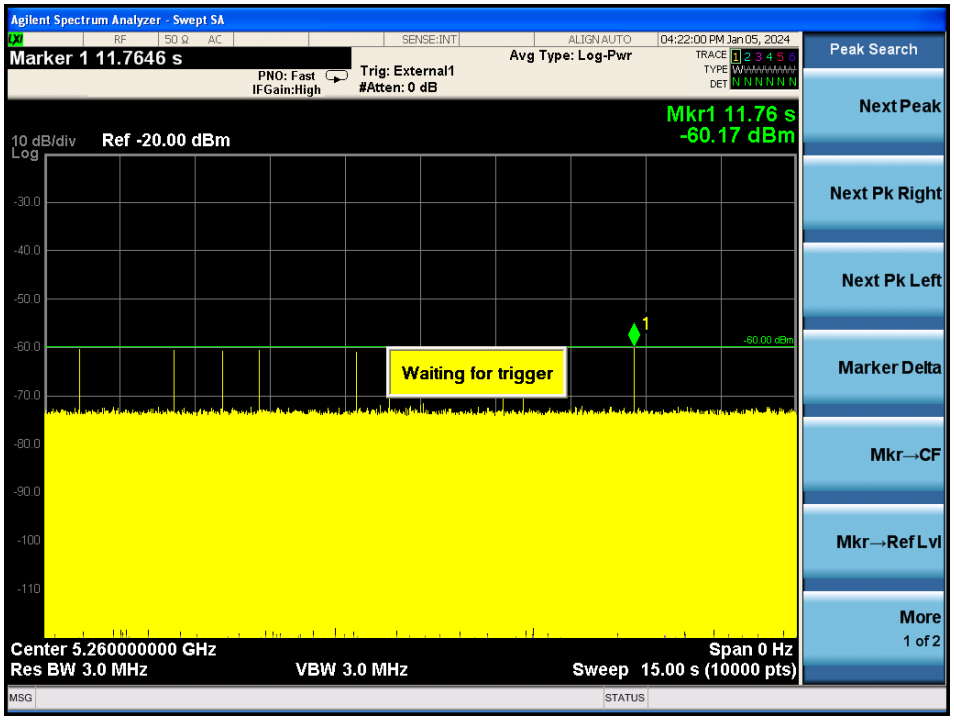
Radar Type 3



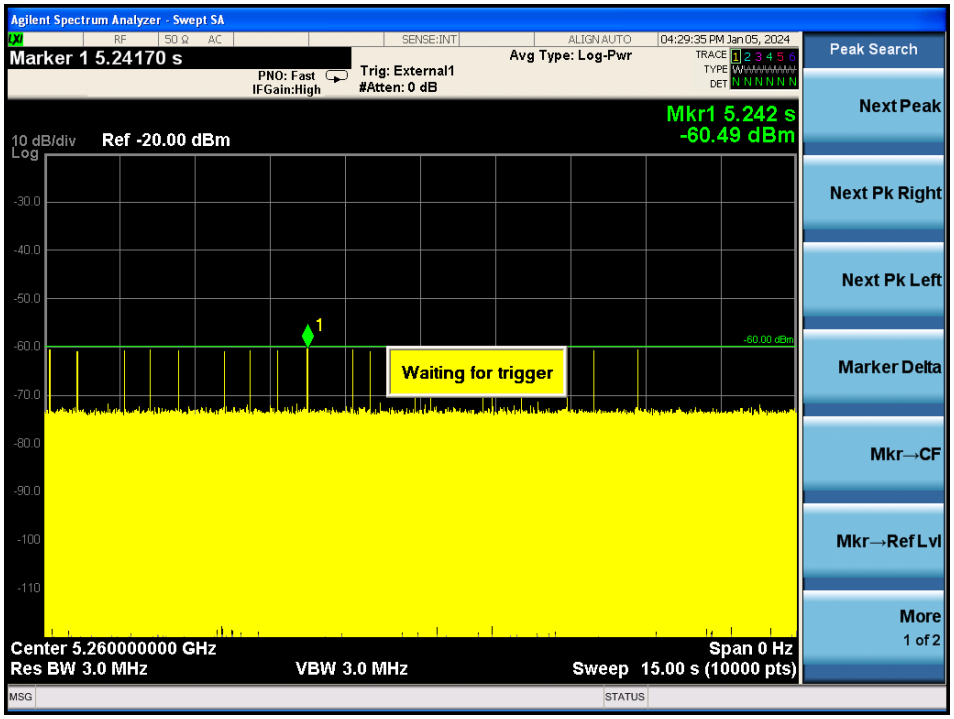
Radar Type 4



Radar Type 5 Case 1

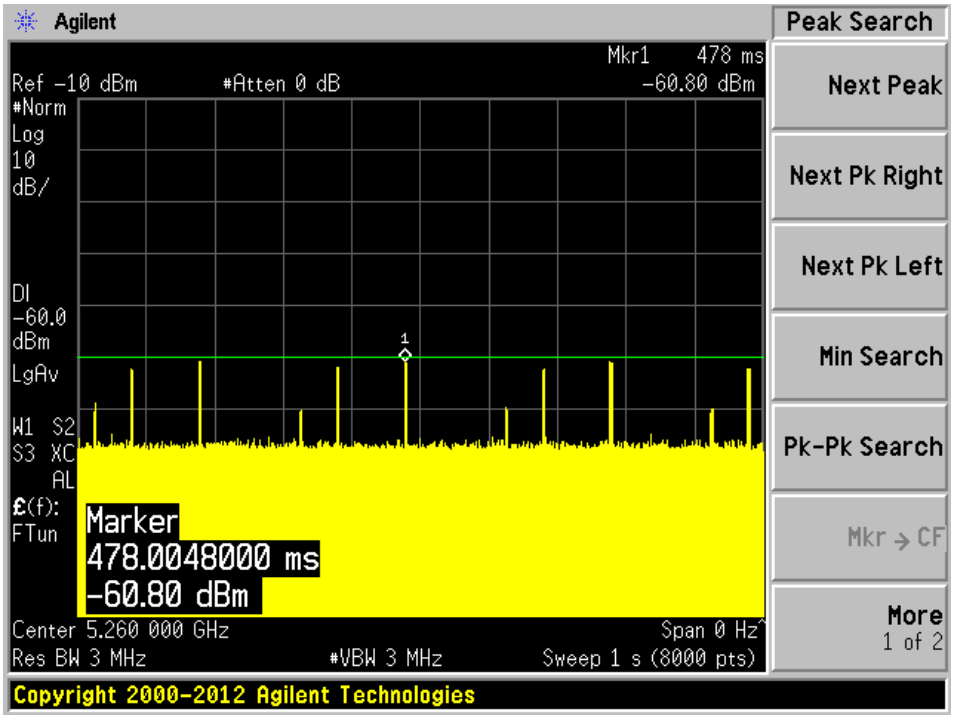


Radar Type 5 Case 2



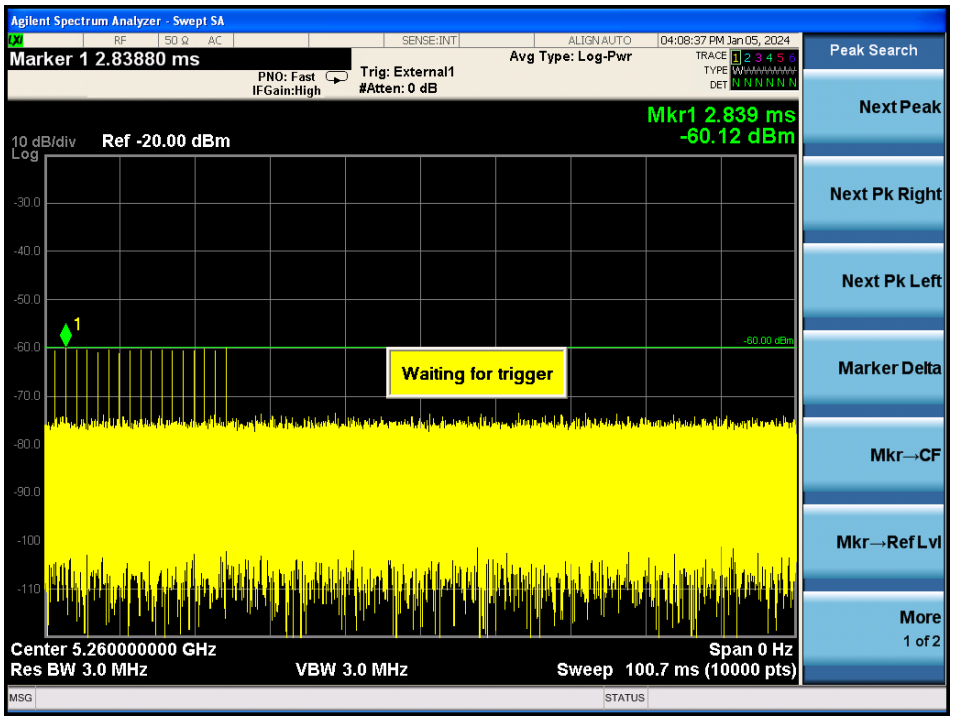
Radar Type 5 Case 3

Radar Type 6

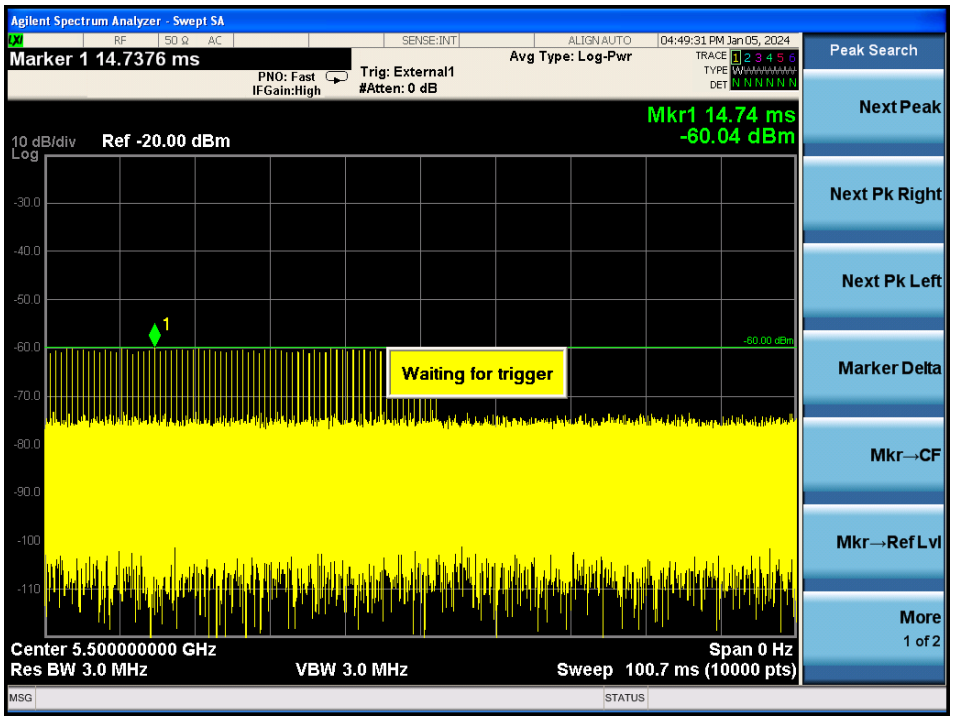


5500 MHz, 20MHz Channel Bandwidth

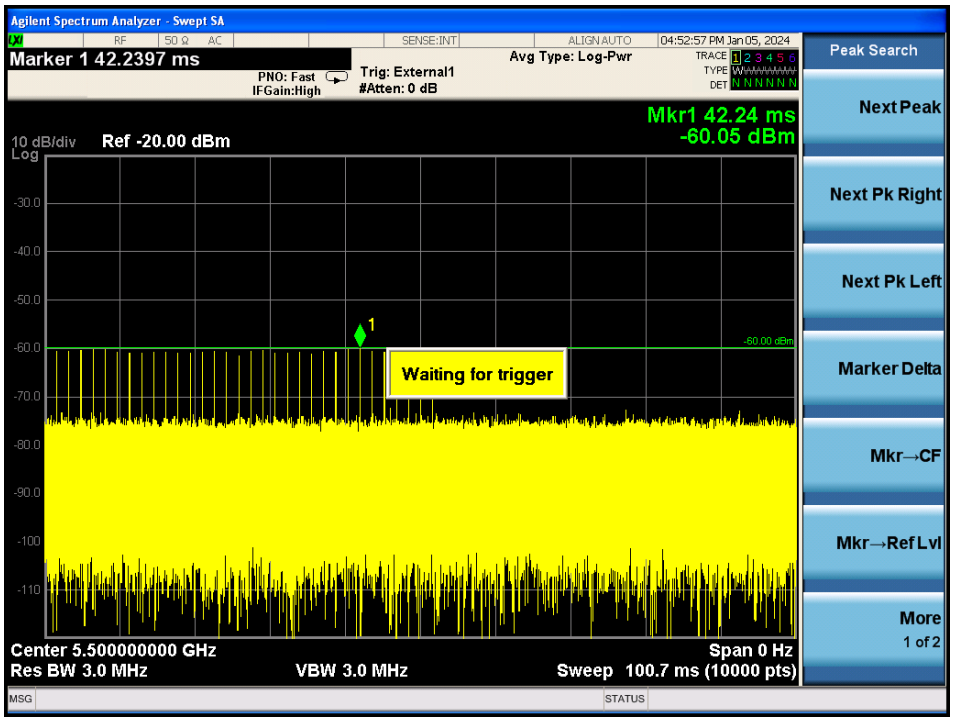
Radar Type 0



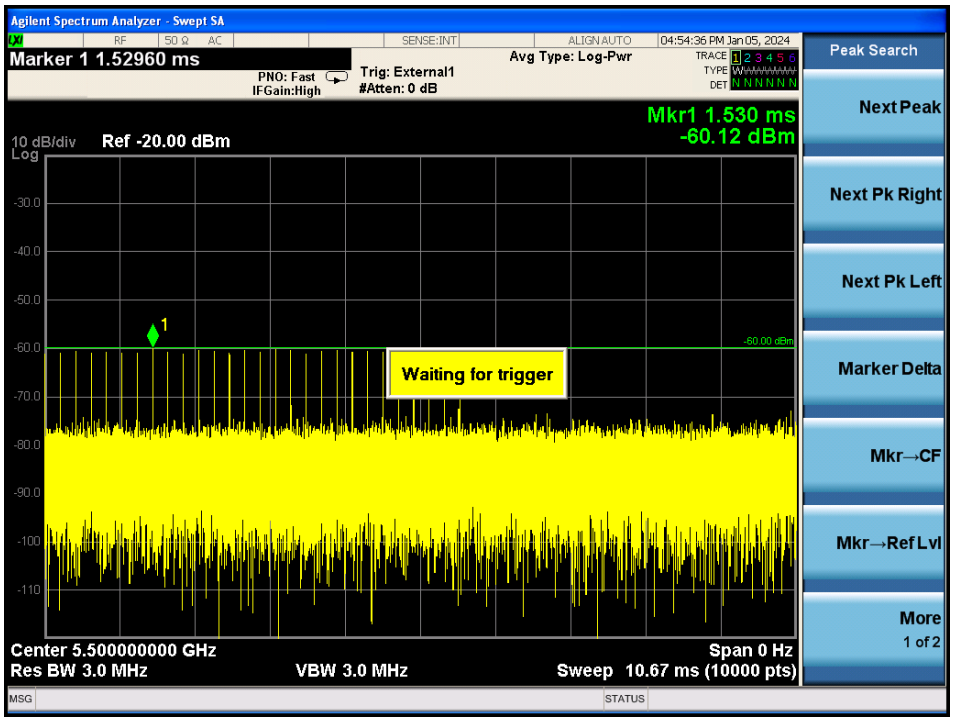
Radar Type 1A



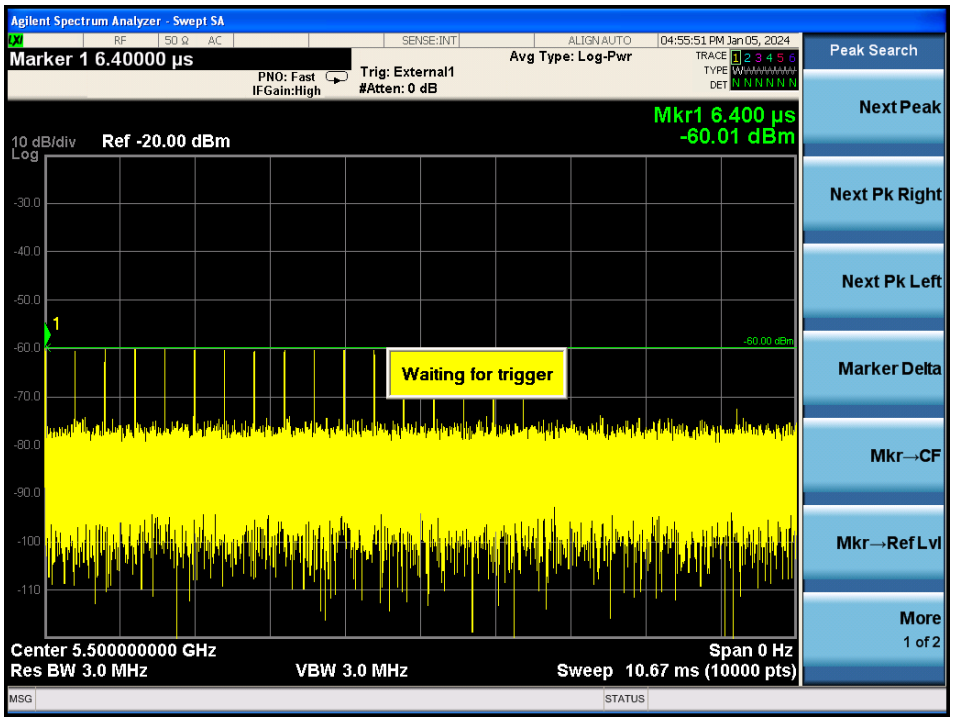
Radar Type 1B



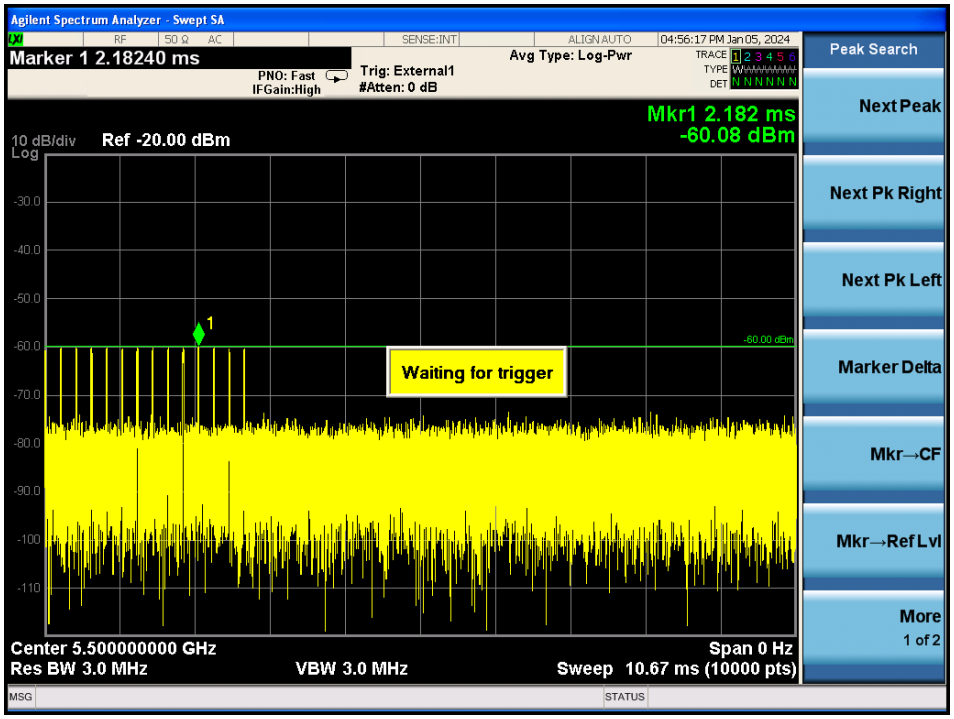
Radar Type 2



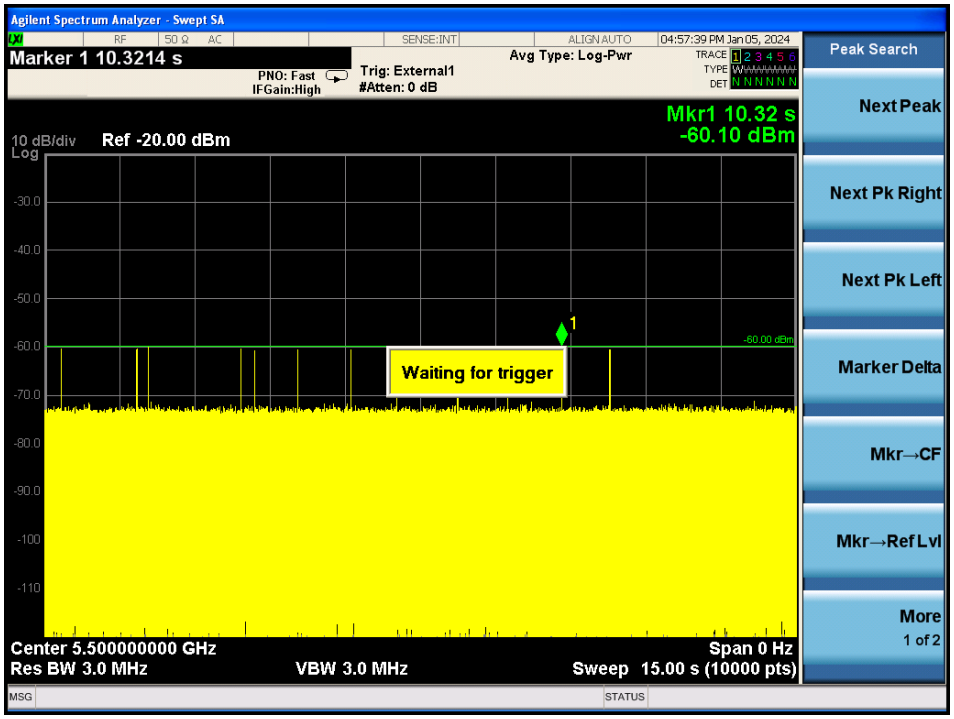
Radar Type 3



Radar Type 4

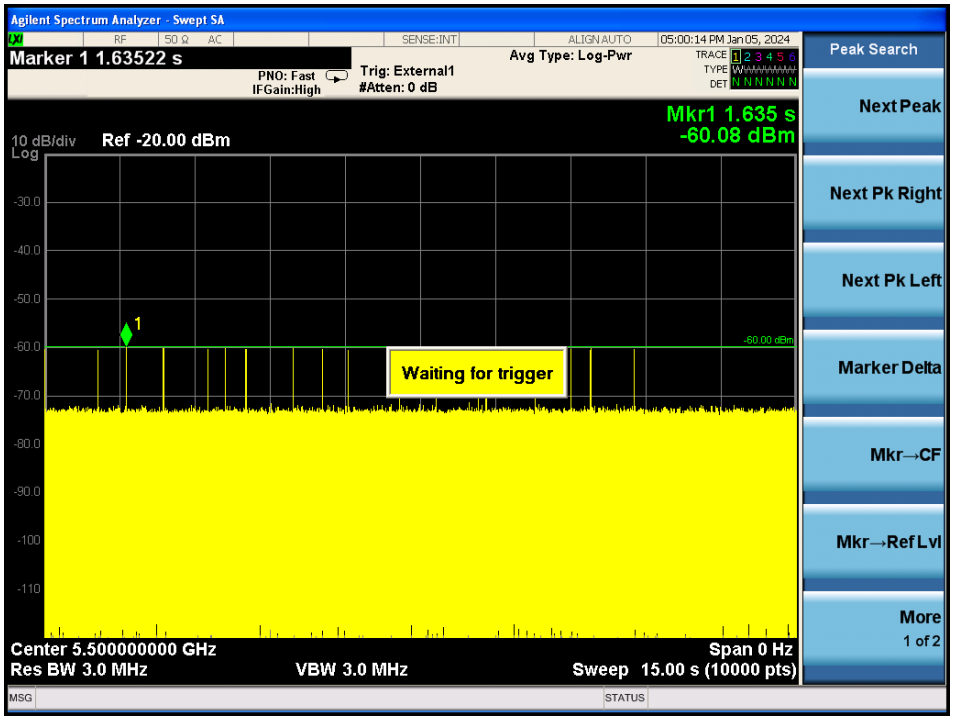


Radar Type 5 Case 1

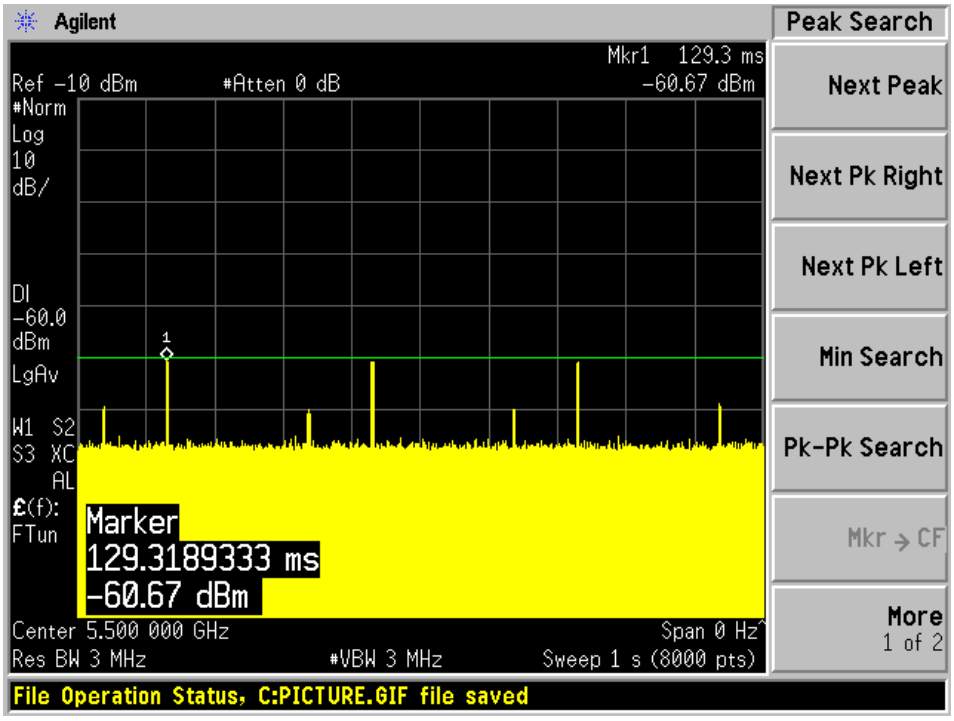


Radar Type 5 Case 2

Radar Type 5 Case 3



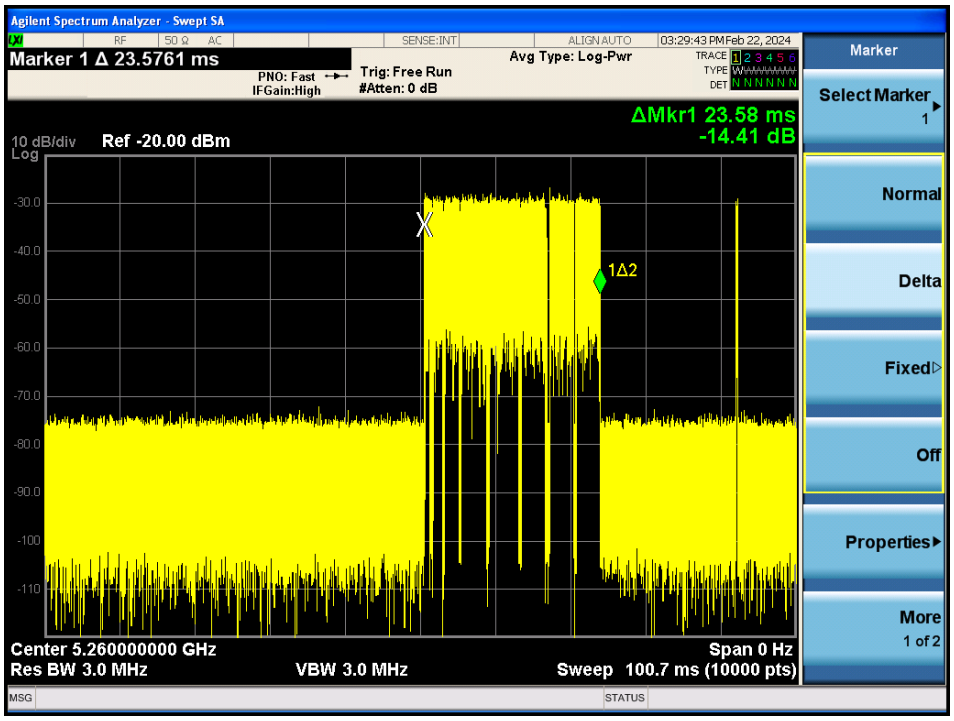
Radar Type 6



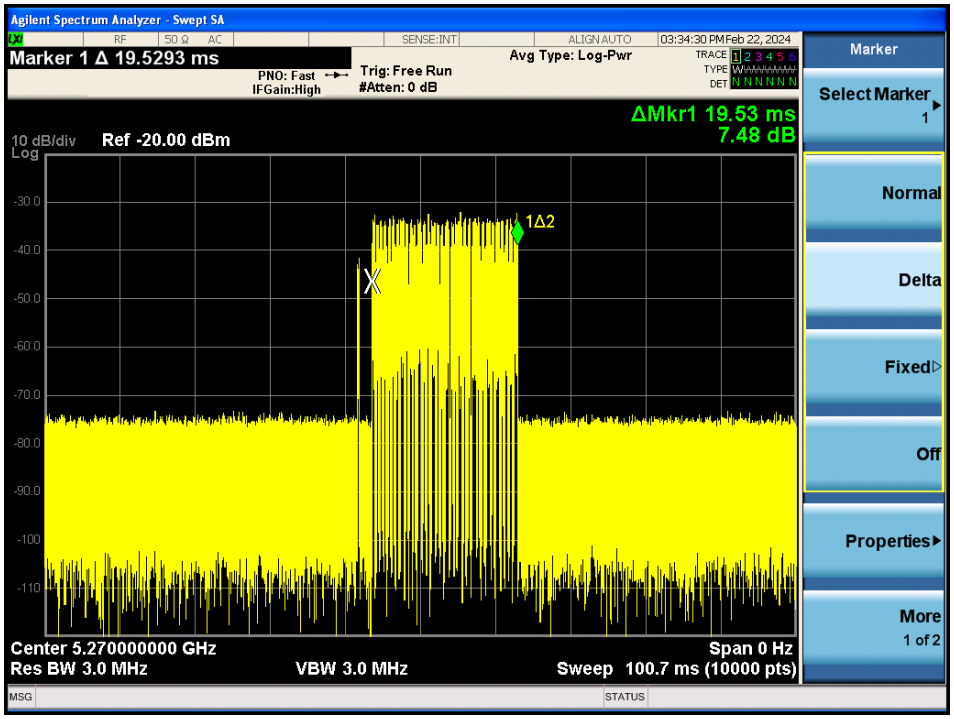
5.6 Radar Traffic Duty Cycle

Wlan0

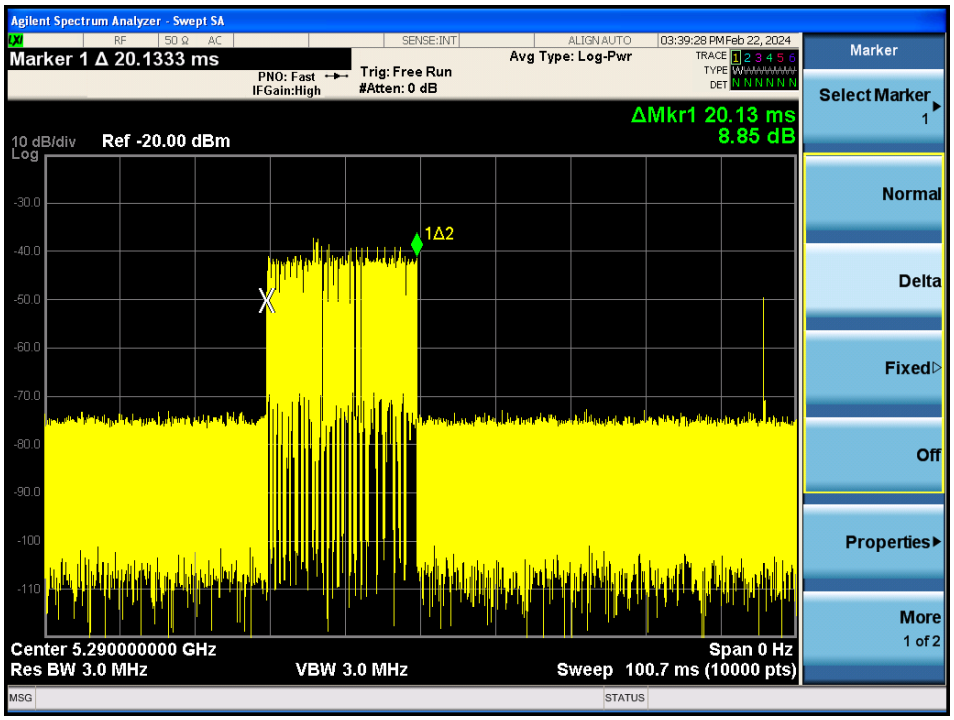
5260 MHz, 20MHz Bandwidth



5310 MHz, 40MHz Bandwidth

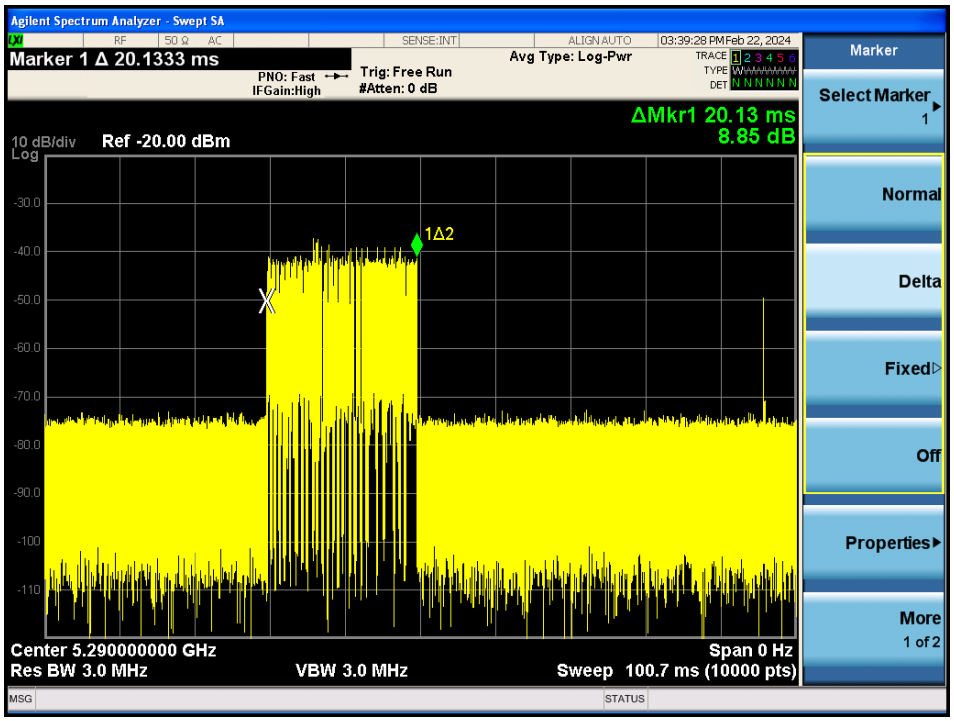


5290 MHz, 80MHz Bandwidth

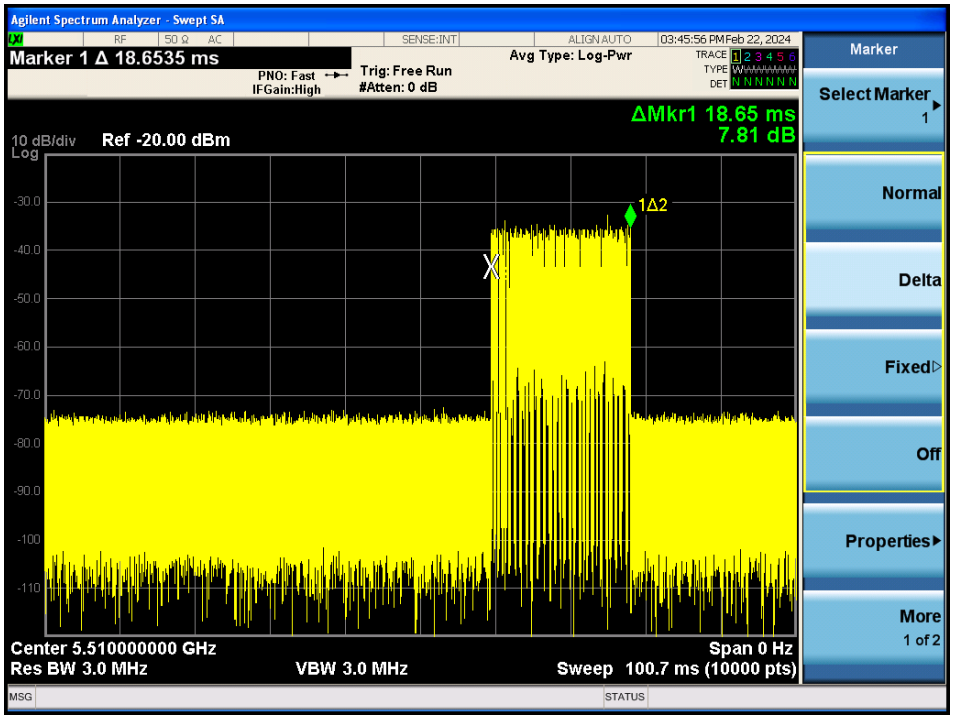


The Duty Cycle of the traffic is greater than 17%

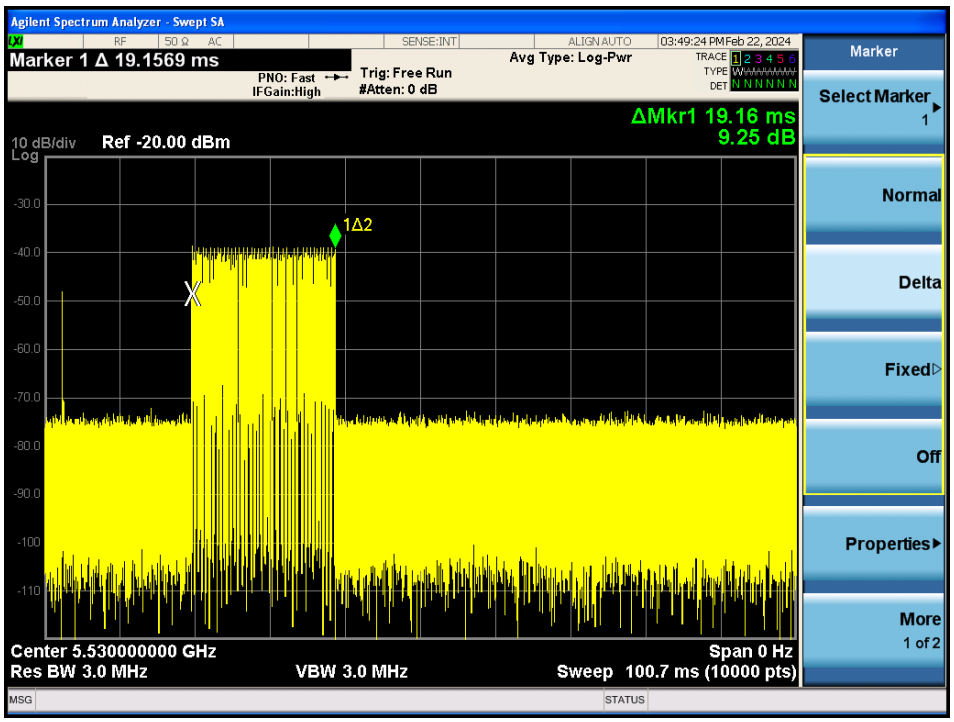
5500 MHz, 20MHz Bandwidth



5510MHz, 40MHz Bandwidth



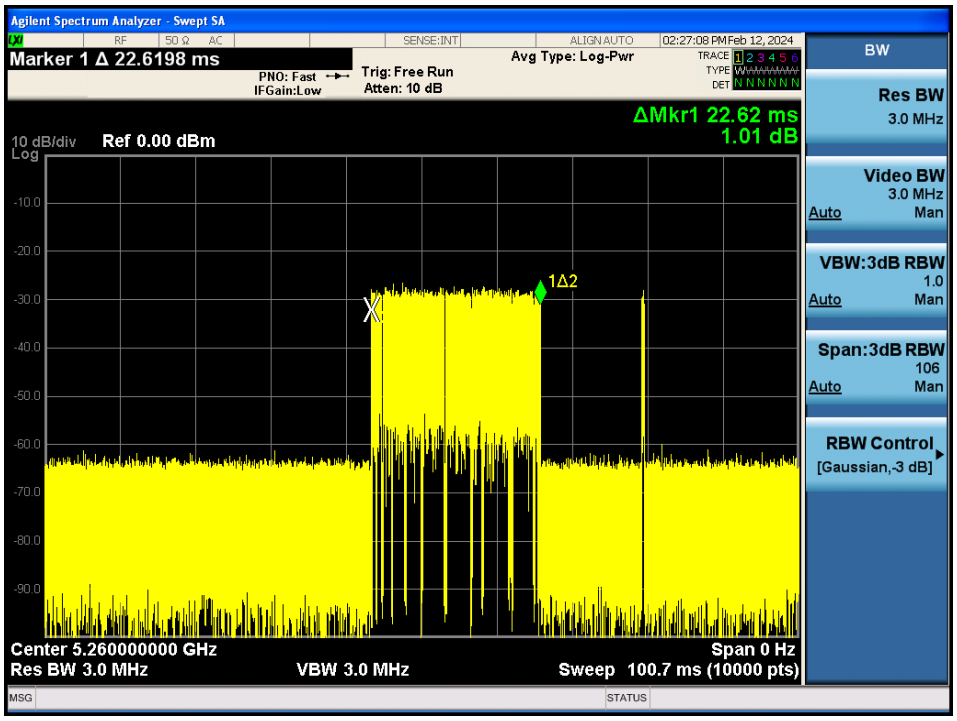
5530 MHz, 80MHz Bandwidth



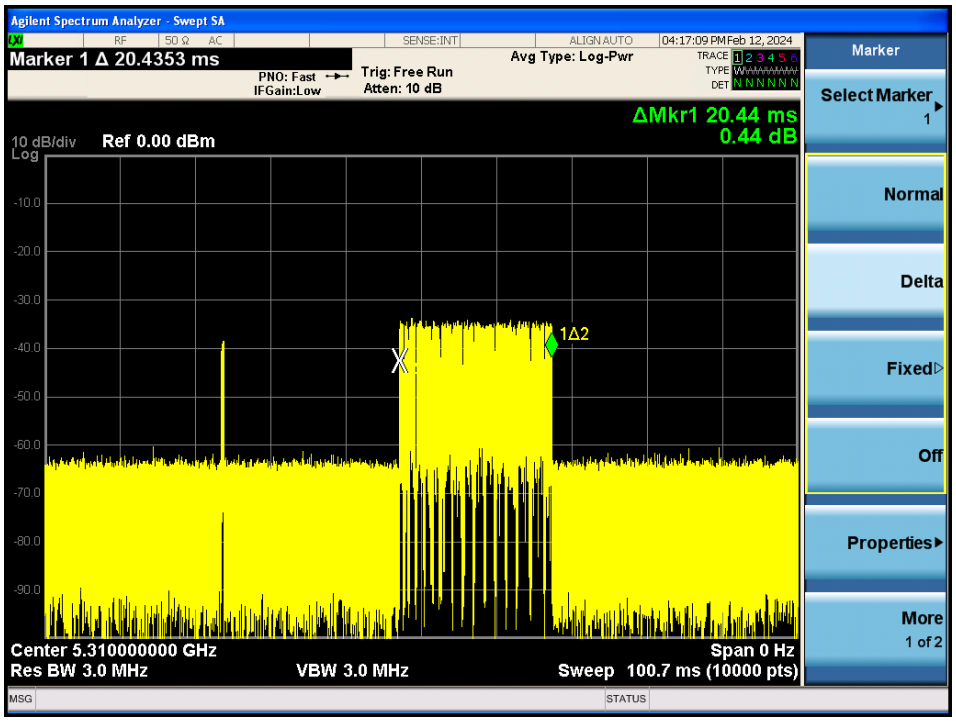
The Duty Cycle of the traffic is greater than 17%

Wlan 1

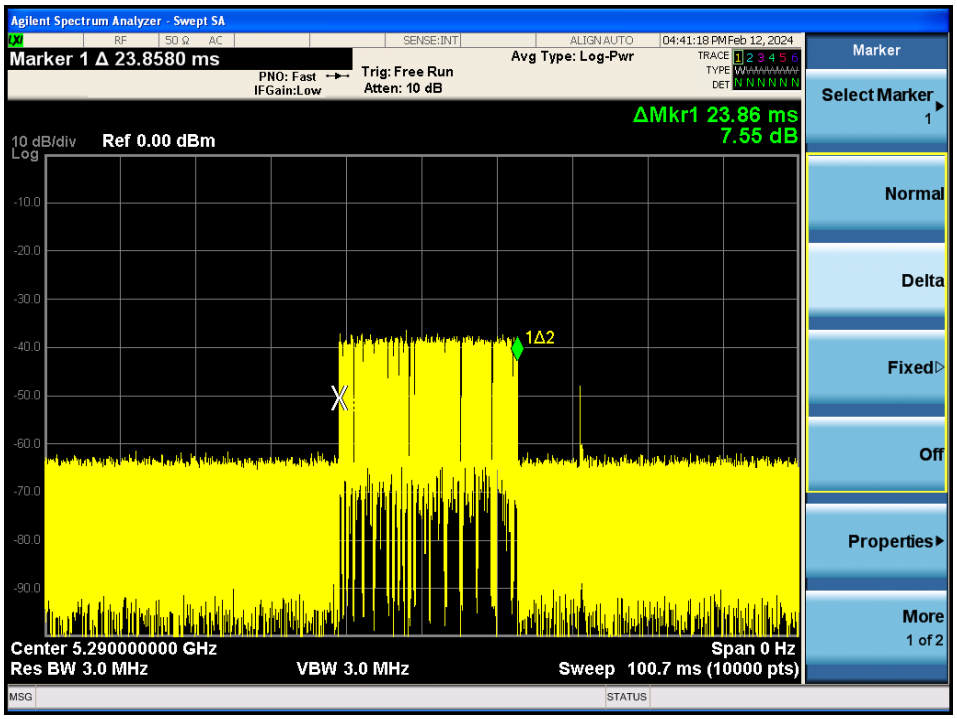
5260 MHz, 20MHz Bandwidth



5310 MHz, 40MHz Bandwidth

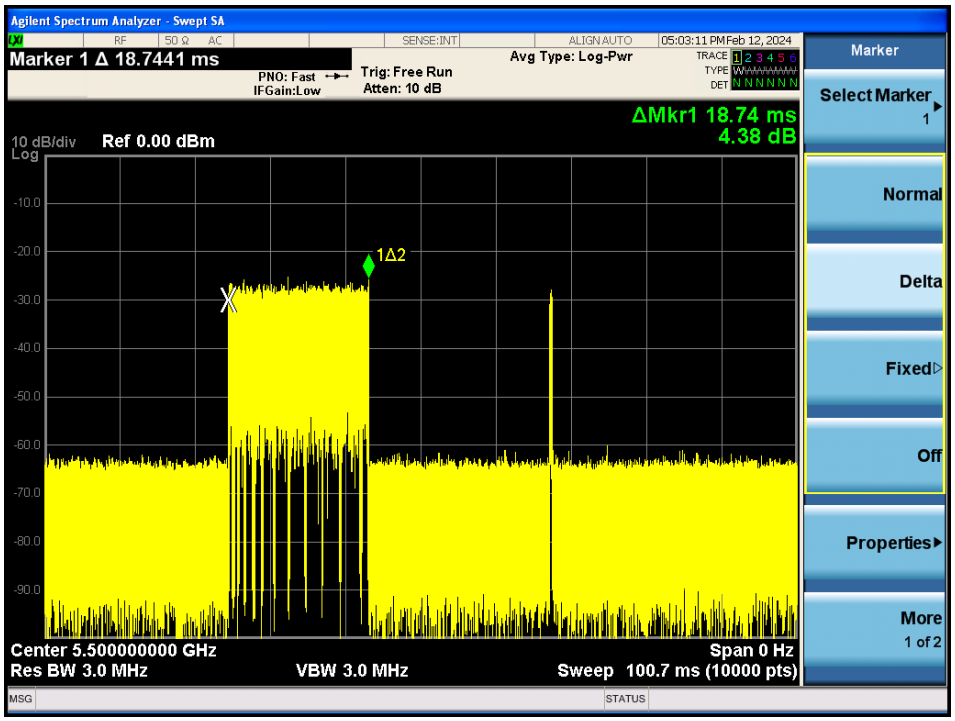


5290 MHz, 80MHz Bandwidth

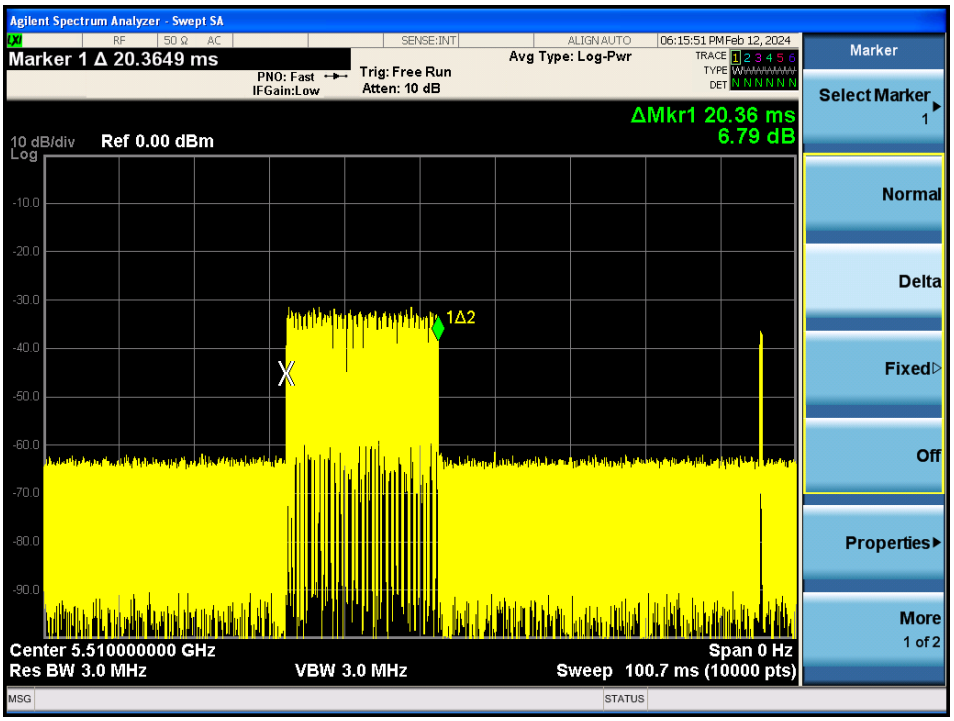


The Duty Cycle of the traffic is greater than 17%

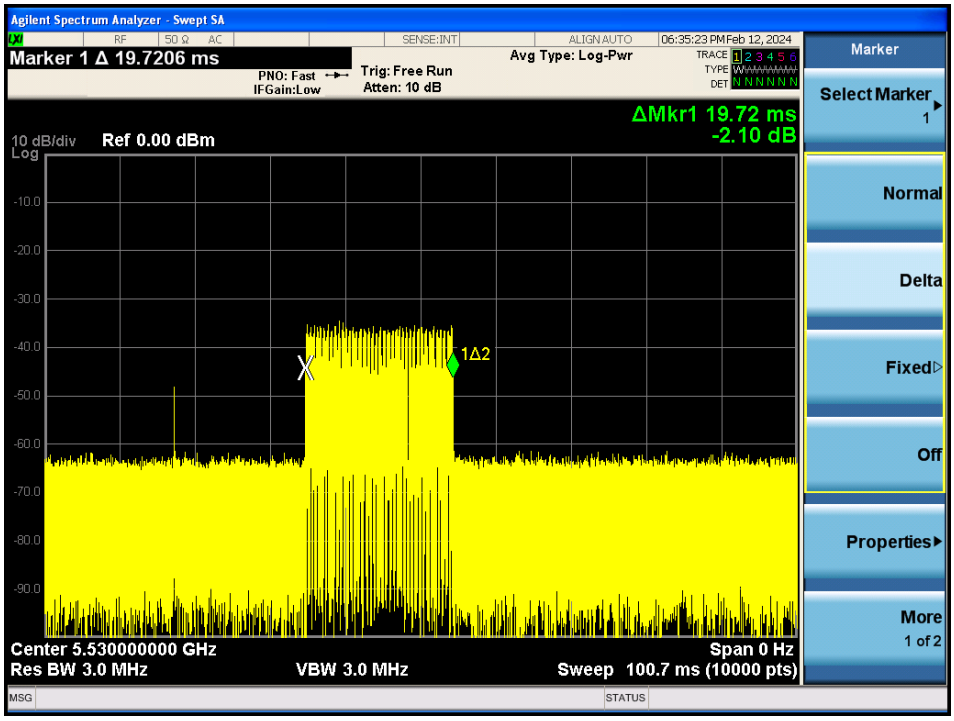
5500 MHz, 20MHz Bandwidth



5510MHz, 40MHz Bandwidth



5530 MHz, 80MHz Bandwidth



The Duty Cycle of the traffic is greater than 17%

6 Channel Availability Check Time (CAC)

6.1 Test Procedure

Master Mode procedure

1) Use the software to set channel, then reboot the EUT, meanwhile, record the power cycle time together with CAC time. Use the total time minus 60 seconds to get the power cycle time.

2) Reboot the EUT again, apply a radar signal within 0~6 seconds after power cycle time ended, monitor the transmissions on channel from the spectrum analyzer. Check no transmission for 2.5 minutes after radar detection.

3) Reboot EUT, apply a radar signal within 54~60 seconds after the power cycle time ended, and monitor the transmission on channel from the spectrum analyzer. Check no transmission for 2.5 minutes after radar detection.

6.2 Results

Wlan0 Radio Module

5290 MHz, 80MHz Channel Bandwidth

Timing of Radar Burst	Spectrum Analyzer Display	Result
No Radar Triggered	Total CAC Period 60 second	Pass
Within 6 seconds of the CAC starting	No transmission	Pass
Within the last 6 seconds of the CAC	No transmission	Pass

5530 MHz, 80MHz Channel Bandwidth

Timing of Radar Burst	Spectrum Analyzer Display	Result
No Radar Triggered	Total CAC Period 60 second	Pass
Within 6 seconds of the CAC starting	No transmission	Pass
Within the last 6 seconds of the CAC	No transmission	Pass

Wlan1 Radio Module

5290 MHz, 80MHz Channel Bandwidth

Timing of Radar Burst	Spectrum Analyzer Display	Result
No Radar Triggered	Total CAC Period 60 second	Pass
Within 6 seconds of the CAC starting	No transmission	Pass
Within the last 6 seconds of the CAC	No transmission	Pass

5530 MHz, 80MHz Channel Bandwidth

Timing of Radar Burst	Spectrum Analyzer Display	Result
No Radar Triggered	Total CAC Period 60 second	Pass
Within 6 seconds of the CAC starting	No transmission	Pass
Within the last 6 seconds of the CAC	No transmission	Pass

5610 MHz, 80MHz Channel Bandwidth

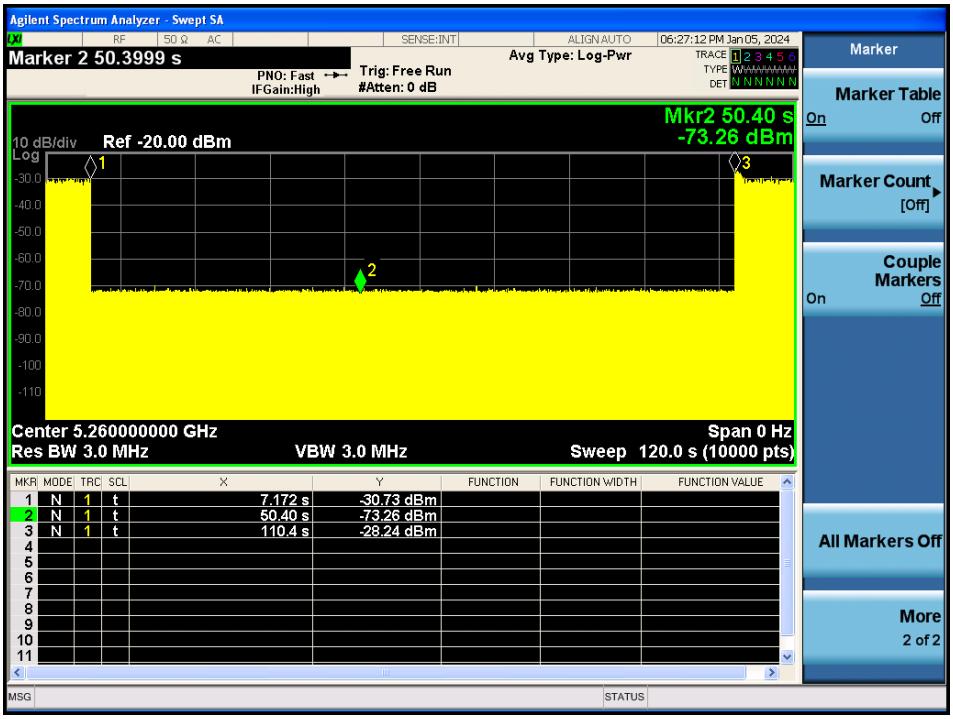
Timing of Radar Burst	Spectrum Analyzer Display	Result
No Radar Triggered	Total CAC Period 60 second	Pass
Within 6 seconds of the CAC starting	No transmission	Pass
Within the last 6 seconds of the CAC	No transmission	Pass

Please refer to the following plots.

Wlan0

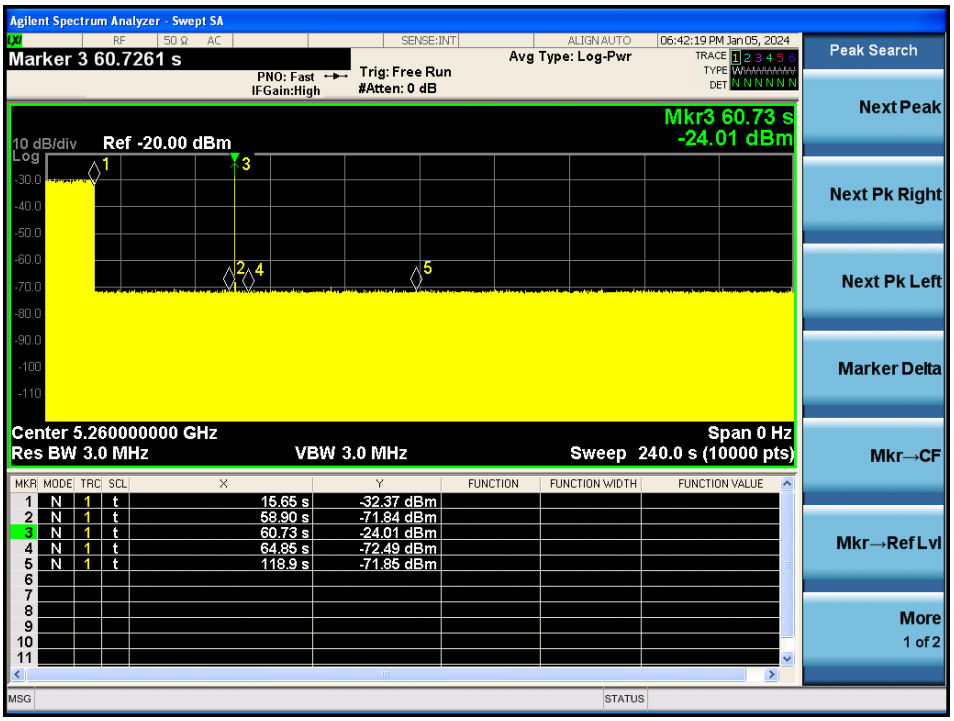
5290 MHz, 80MHz Channel Bandwidth

Plot of Power Cycle + CAC Time Period



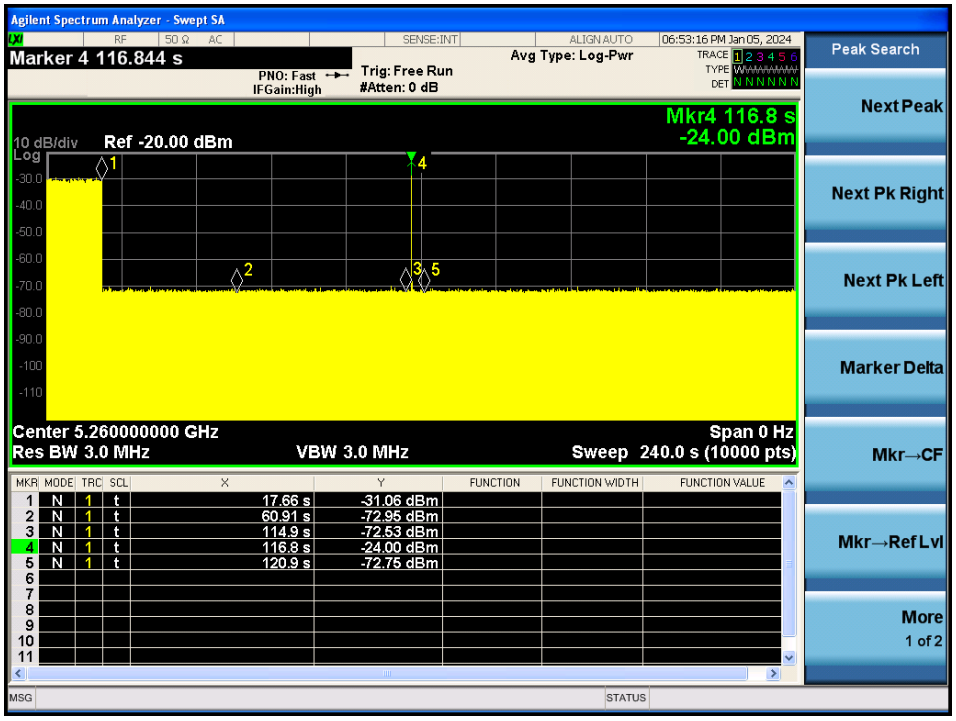
Note: Power Cycle Time was measured as 43.228 seconds.

Plot of Radar signal applied within 6 seconds of start of CAC



No transmissions found after radar signal applied.

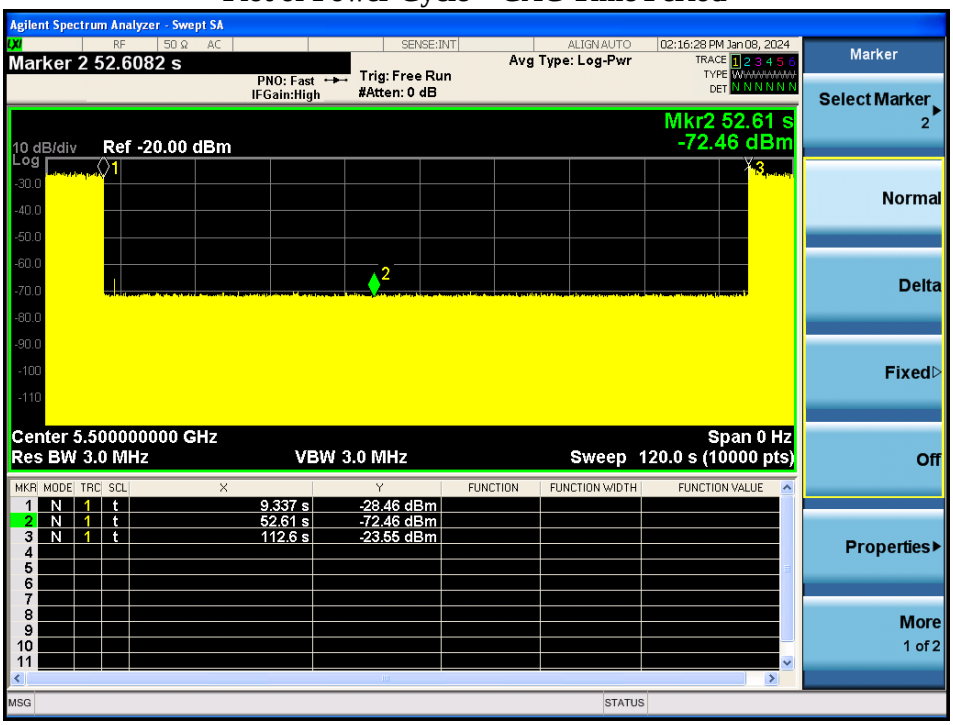
Plot of Radar signal applied at the end of 6 seconds of CAC



No transmissions found after radar signal applied.

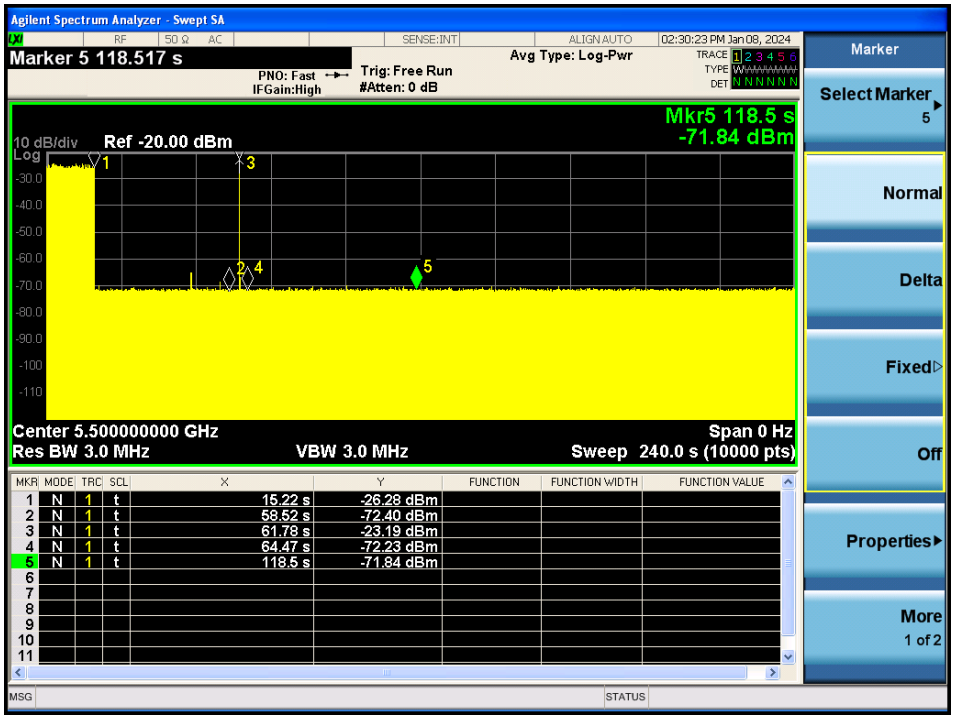
5530 MHz, 80MHz Channel Bandwidth

Plot of Power Cycle + CAC Time Period



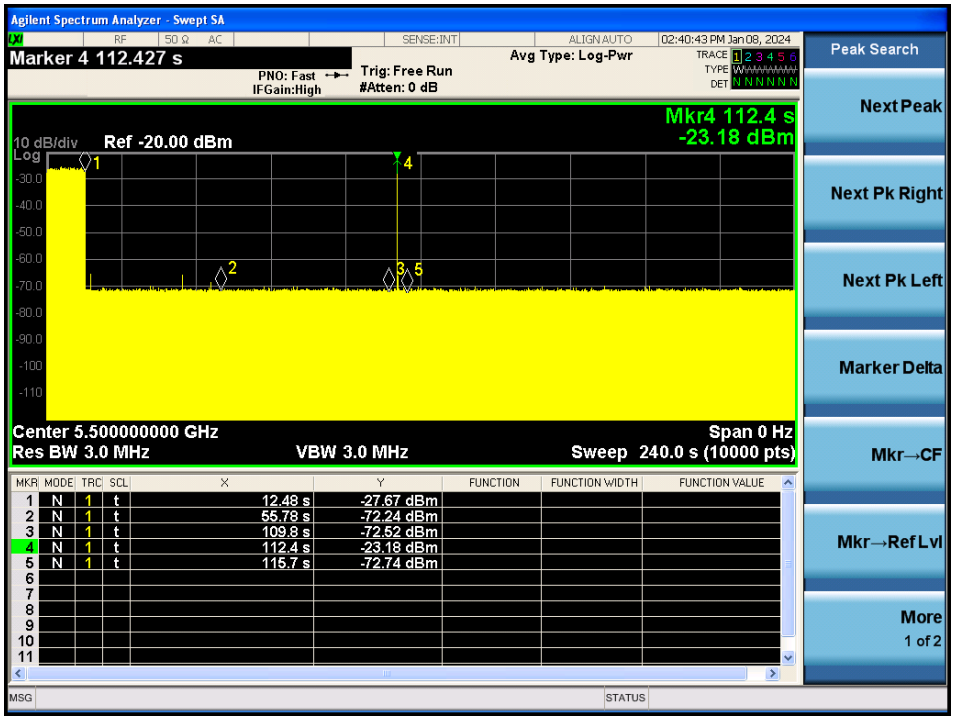
Note: Power Cycle Time was measured as 43.273 seconds.

Plot of Radar signal applied within 6 seconds of start of CAC



No transmissions found after radar signal applied.

Plot of Radar signal applied at the end of 6 seconds of CAC

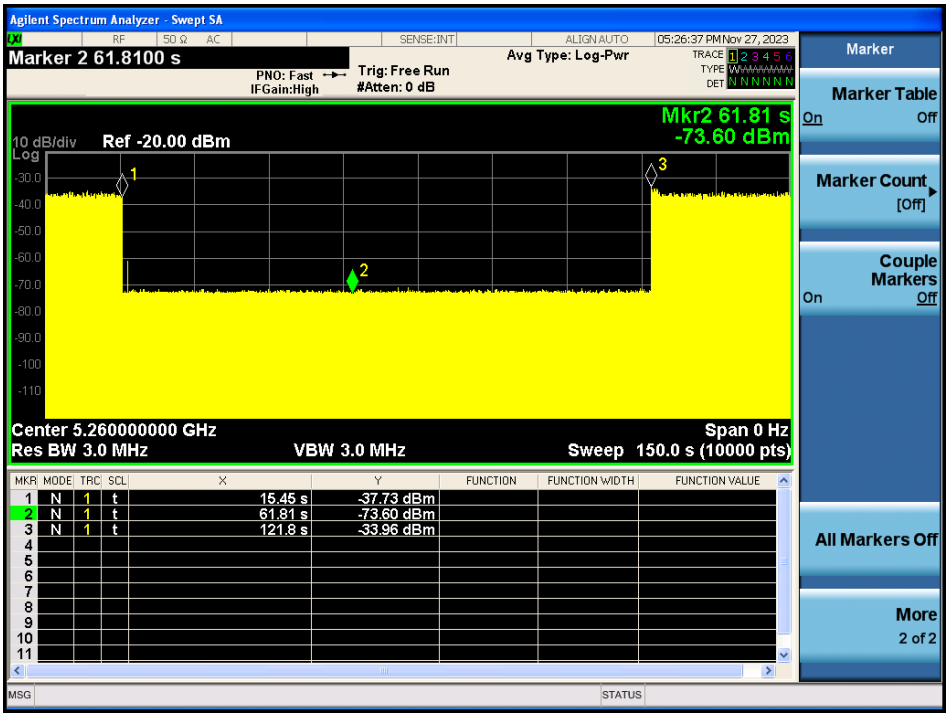


No transmissions found after radar signal applied.

Wlan1

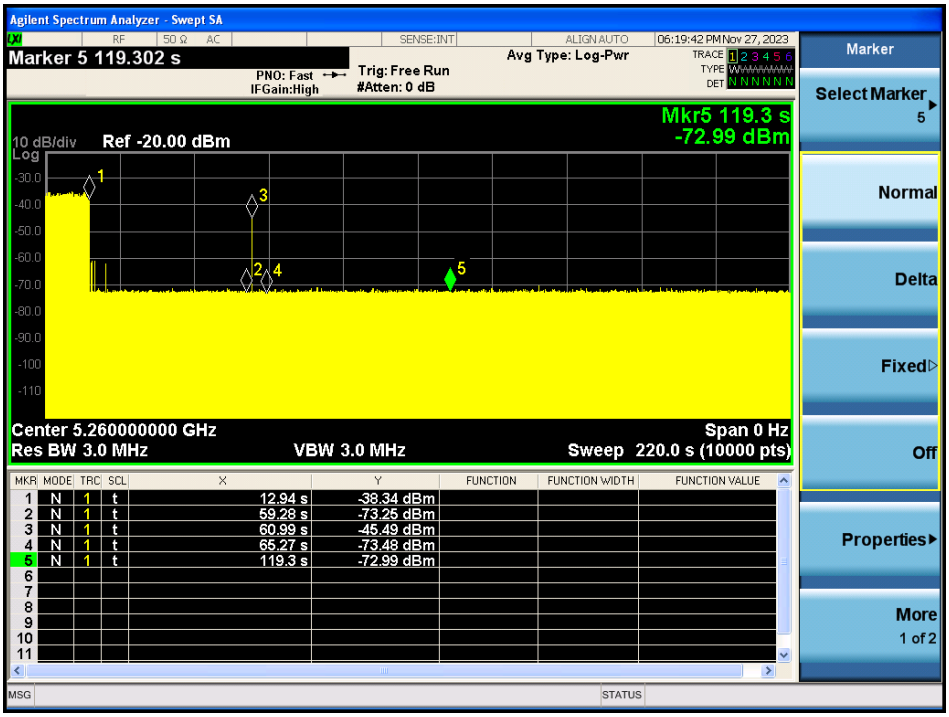
5290 MHz, 80MHz Channel Bandwidth

Plot of Power Cycle + CAC Time Period



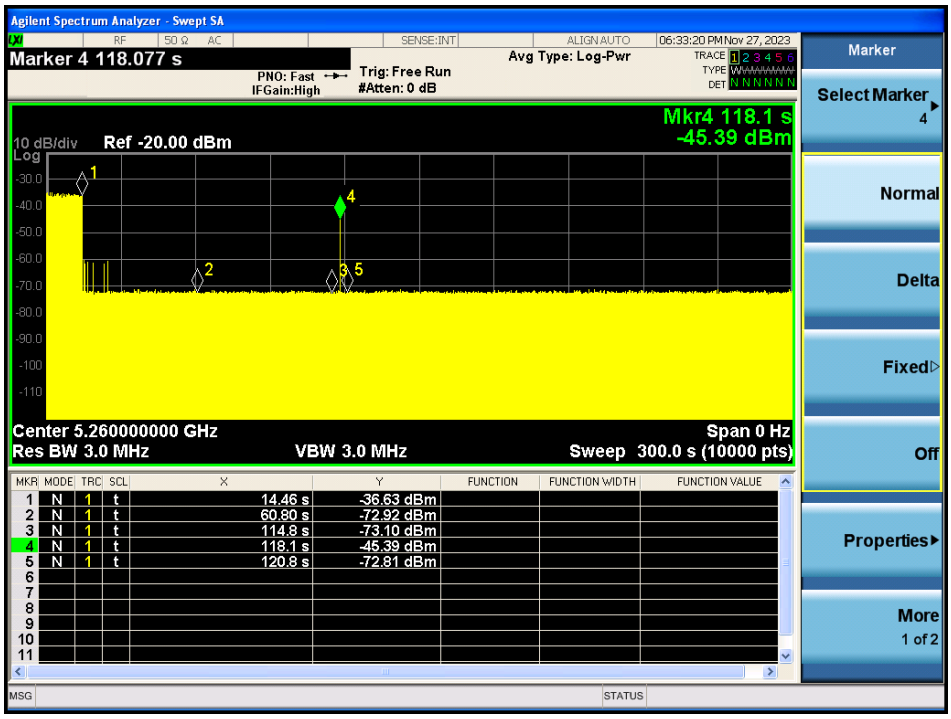
Note: Power Cycle Time was measured as 46.36 seconds.

Plot of Radar signal applied within 6 seconds of start of CAC



No transmissions found after radar signal applied.

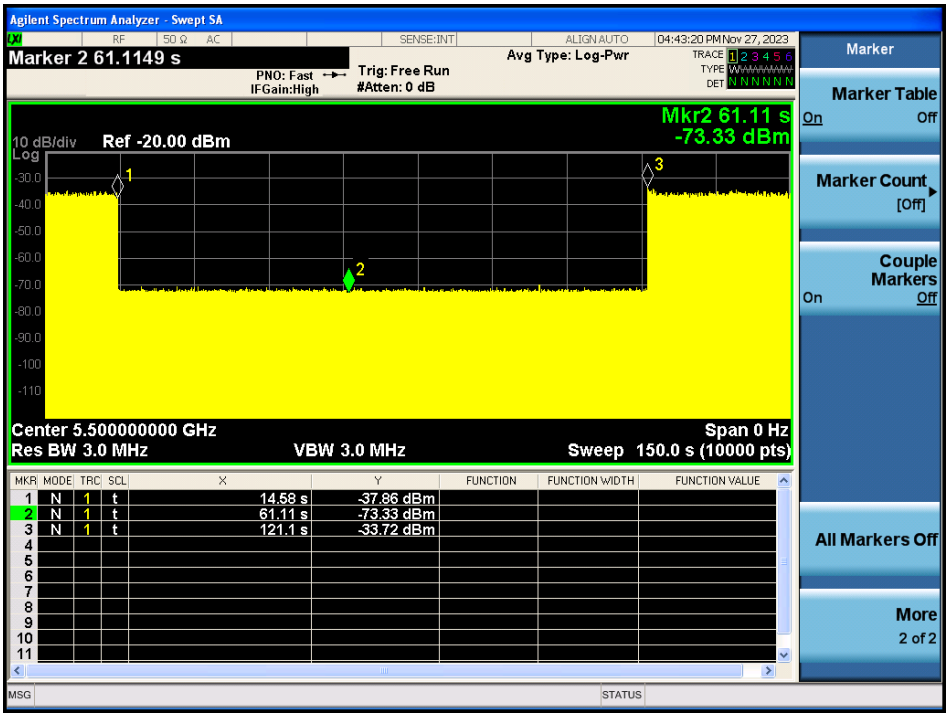
Plot of Radar signal applied at the end of 6 seconds of CAC



No transmissions found after radar signal applied.

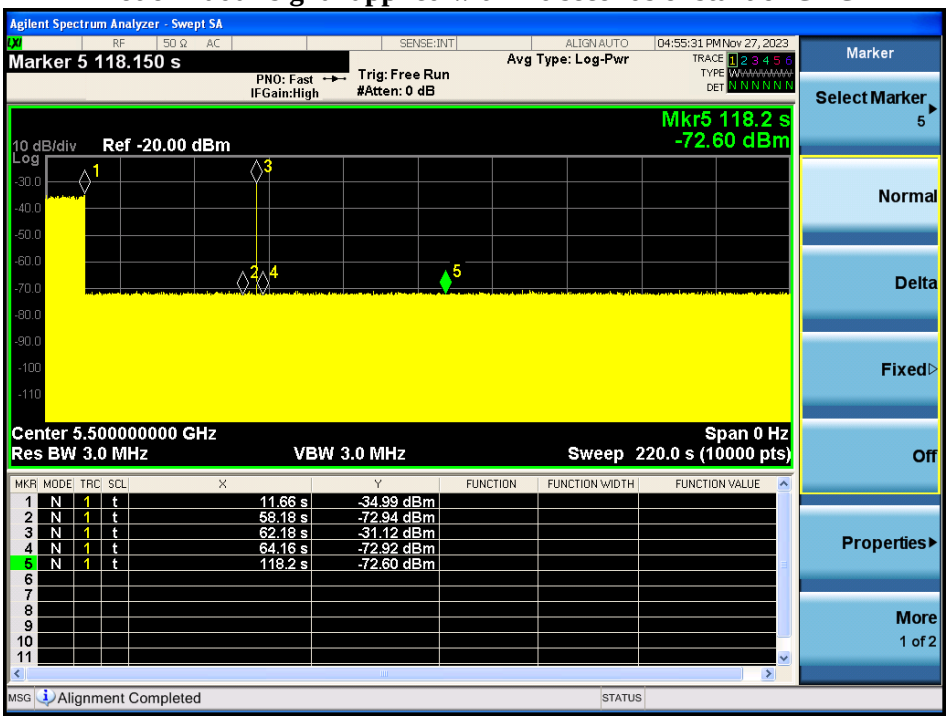
5530 MHz, 80MHz Channel Bandwidth

Plot of Power Cycle + CAC Time Period



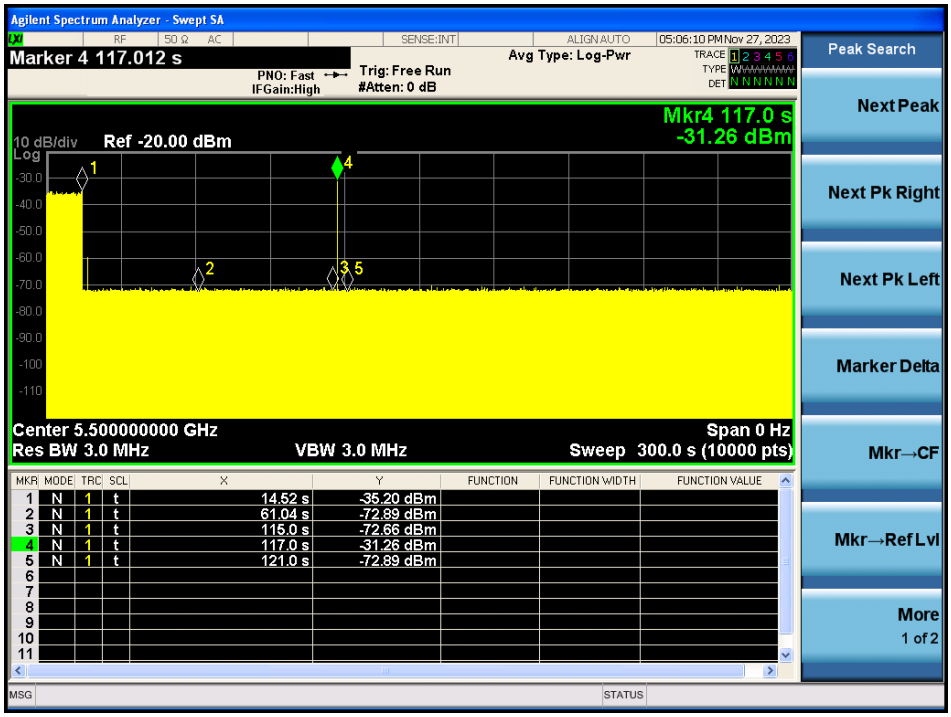
Note: Power Cycle Time was measured as 46.53 seconds.

Plot of Radar signal applied within 6 seconds of start of CAC



No transmissions found after radar signal applied.

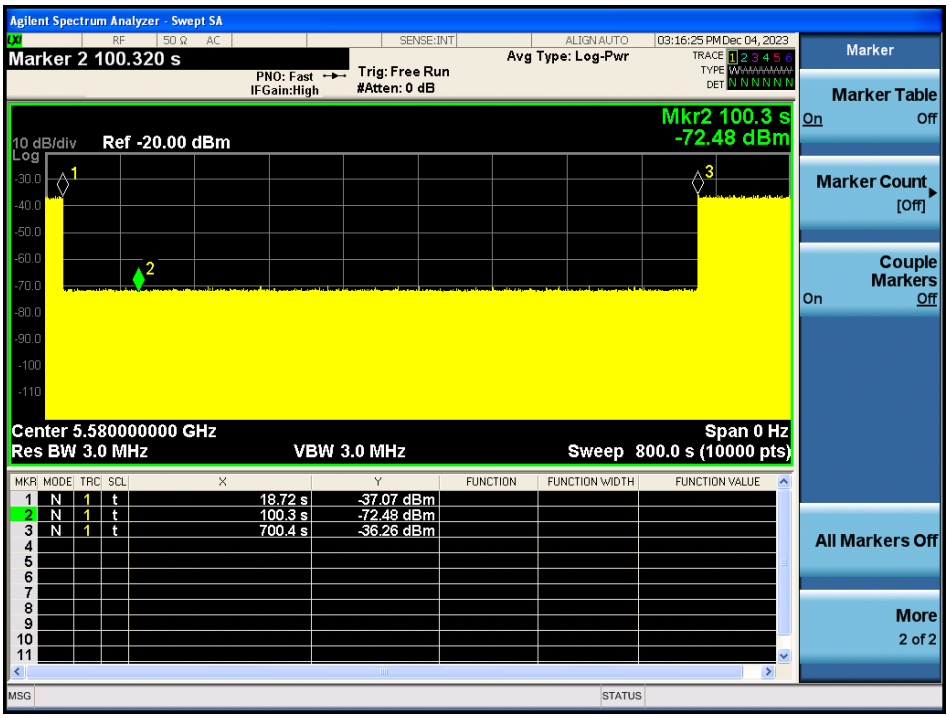
Plot of Radar signal applied at the end of 6 seconds of CAC



No transmissions found after radar signal applied.

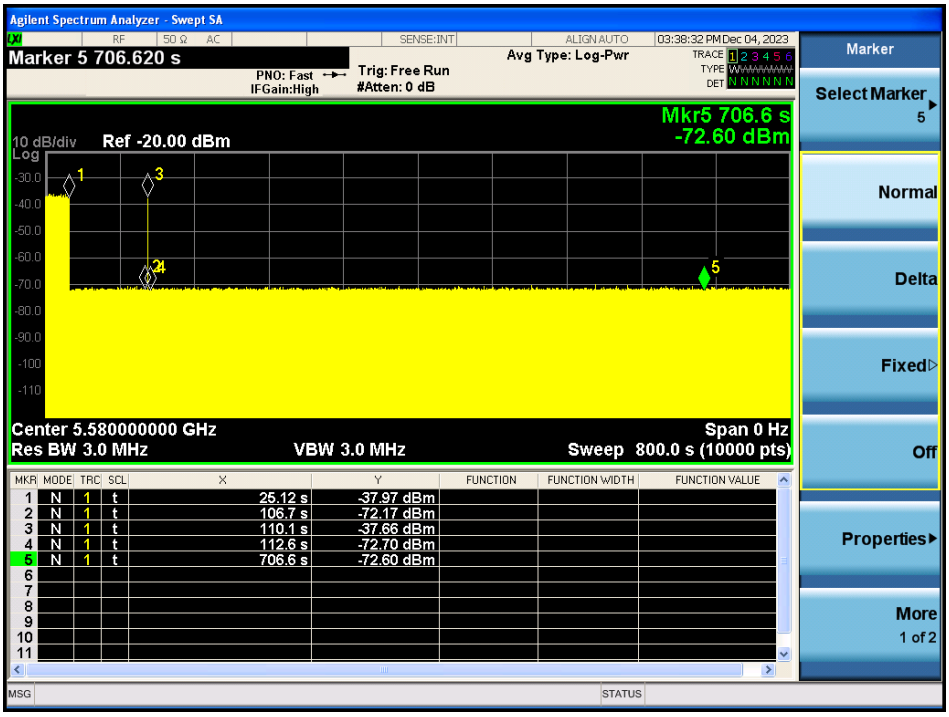
5610 MHz, 80MHz Channel Bandwidth

Plot of Power Cycle + CAC Time Period



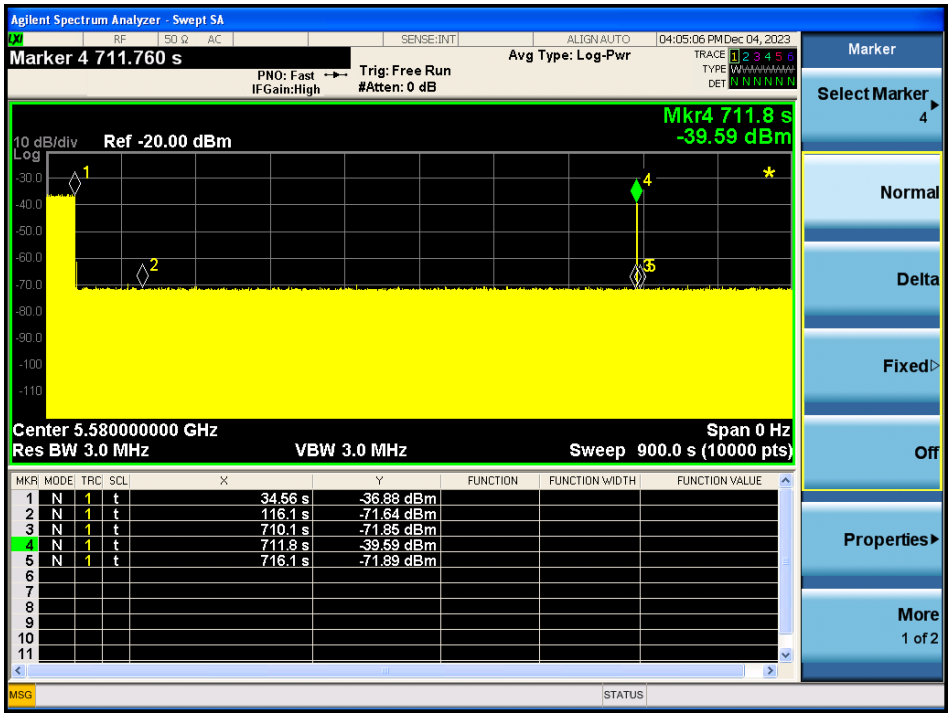
Note: Power Cycle Time was measured as 81.58 seconds.

Plot of Radar signal applied within 6 seconds of start of CAC



No transmissions found after radar signal applied.

Plot of Radar signal applied at the end of 6 seconds of CAC



No transmissions found after radar signal applied.

7 Channel Move Time and Channel Closing Transmission Time

7.1 Test Procedure

BACL used type 0 radar signal to test the channel move time and channel closing transmission time.

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)

7.2 Test Results

Test Channels:

Wlan0

Frequency (MHz)	Bandwidth (MHz)	Radar Type	Results
5290	80	Type 0	Compliant
5530	80	Type 0	Compliant

Wlan1

Frequency (MHz)	Bandwidth (MHz)	Radar Type	Results
5290	80	Type 0	Compliant
5530	80	Type 0	Compliant
5610	80	Type 0	Compliant

Please refer to the following tables and plots.

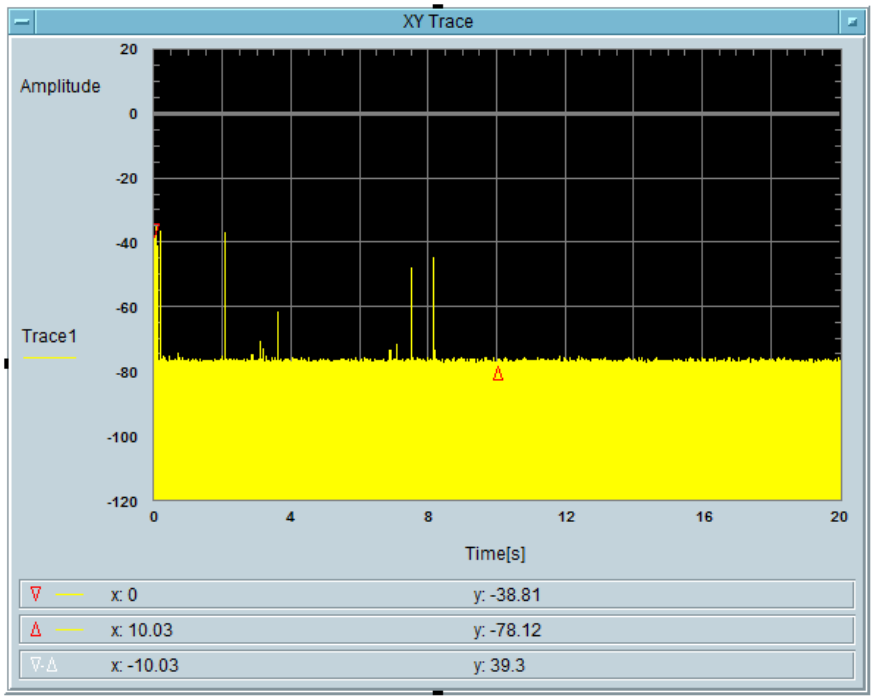
Wlan0

5290 MHz, Bandwidth 80 MHz

Type 0 radar channel move time and channel closing transmission time result:

Channel closing transmitting time (ms)	Limit (ms)	Result
43.95+14.65	200+60	Pass

Channel move time (s)	Limit (s)	Result
< 10	10	Pass

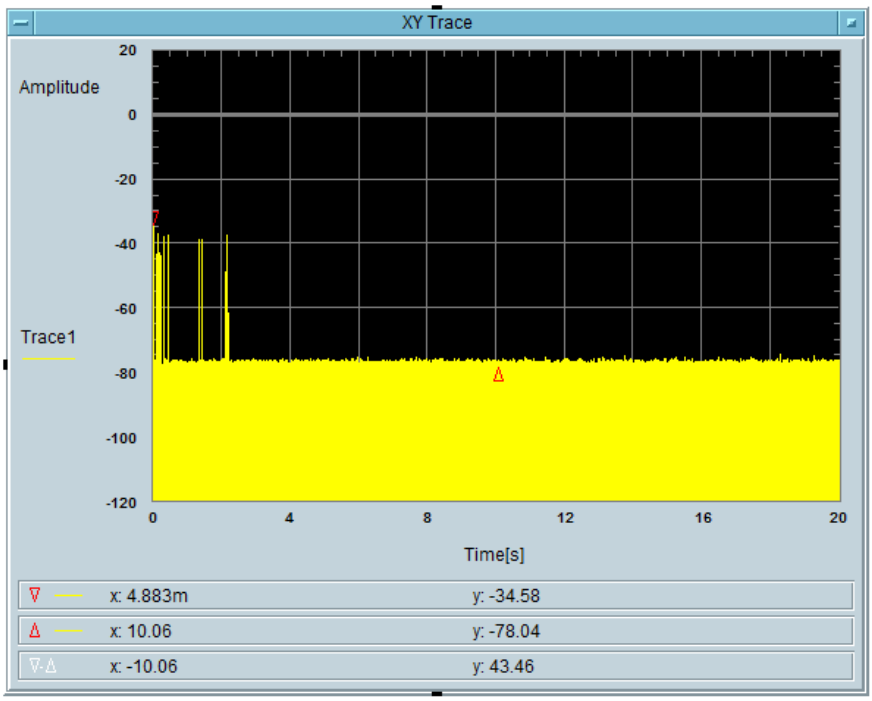


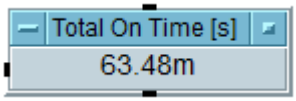
5530 MHz, Bandwidth 80 MHz

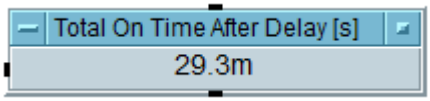
Type 0 radar channel move time and channel closing transmission time result:

Channel closing transmitting time (ms)	Limit (ms)	Result
63.48+29.3	200+60	Pass

Channel move time (s)	Limit (s)	Result
< 10	10	Pass







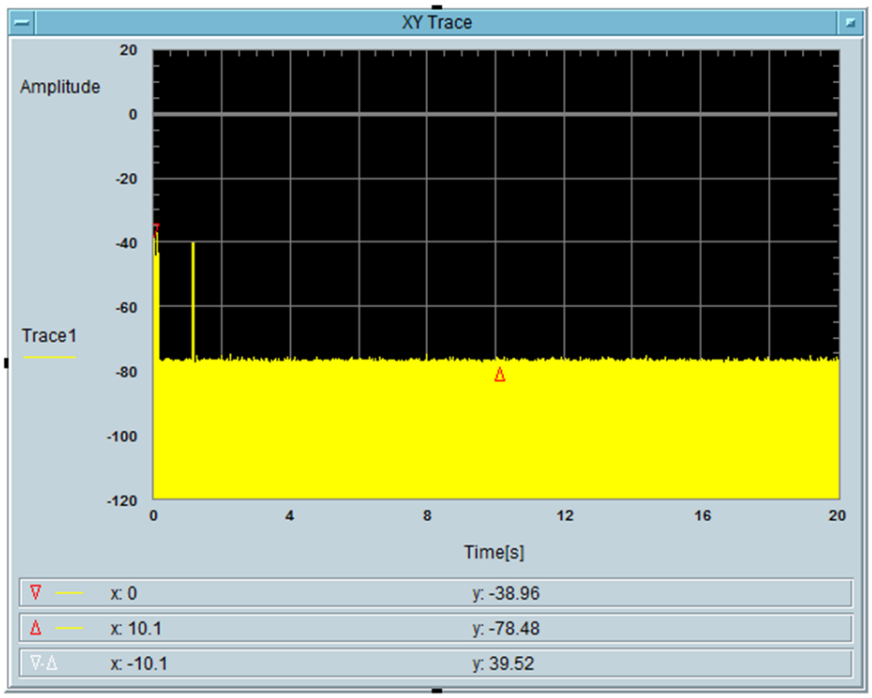
Wlan1

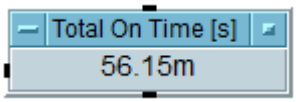
5290 MHz, Bandwidth 80 MHz

Type 0 radar channel move time and channel closing transmission time result:

Channel closing transmitting time (ms)	Limit (ms)	Result
56.15+4.883	200+60	Pass

Channel move time (s)	Limit (s)	Result
< 10	10	Pass



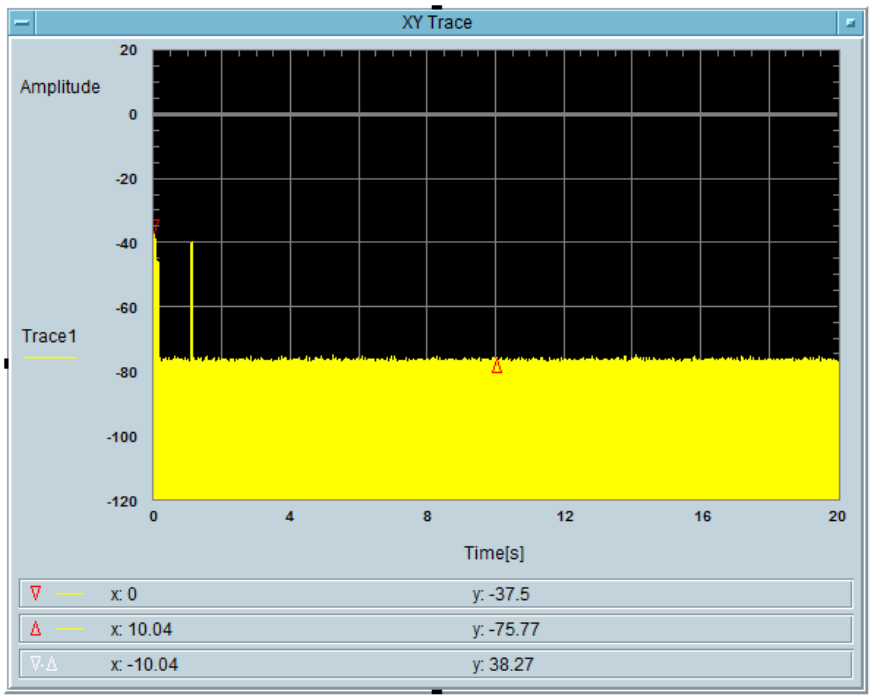


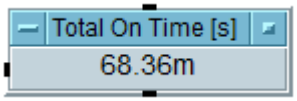
5530 MHz, Bandwidth 80 MHz

Type 0 radar channel move time and channel closing transmission time result:

Channel closing transmitting time (ms)	Limit (ms)	Result
68.36+9.766	200+60	Pass

Channel move time (s)	Limit (s)	Result
< 10	10	Pass



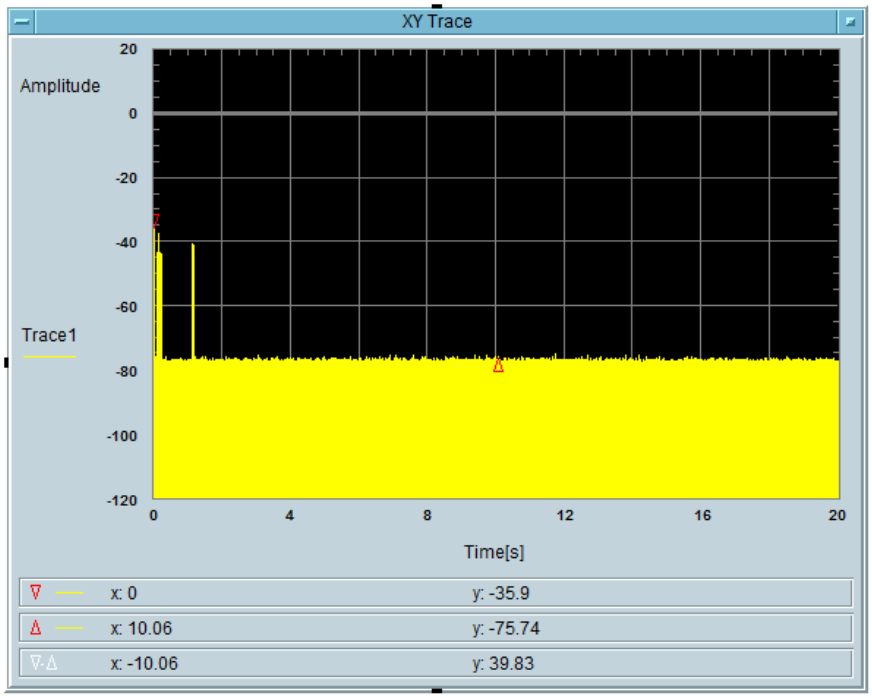


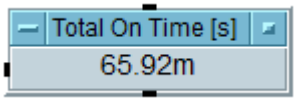
5610 MHz, Bandwidth 80 MHz

Type 0 radar channel move time and channel closing transmission time result:

Channel closing transmitting time (ms)	Limit (ms)	Result
65.92+12.21	200+60	Pass

Channel move time (s)	Limit (s)	Result
< 10	10	Pass





8 Non-Occupancy Period

8.1 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).

8.2 Test Results

Test Channels:

Wlan0

Frequency (MHz)	Bandwidth (MHz)	Spectrum Analyzer Display
5290	80	No transmission within 30 minutes
5530	80	No transmission within 30 minutes

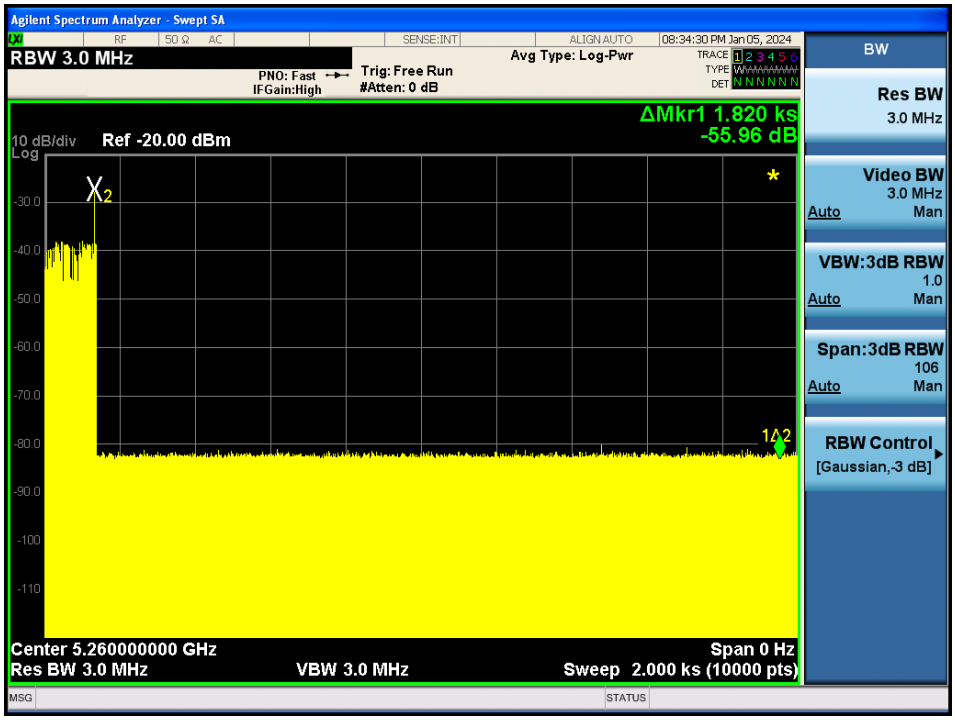
Wlan1

Frequency (MHz)	Bandwidth (MHz)	Spectrum Analyzer Display
5290	80	No transmission within 30 minutes
5530	80	No transmission within 30 minutes
5610	80	No transmission within 30 minutes

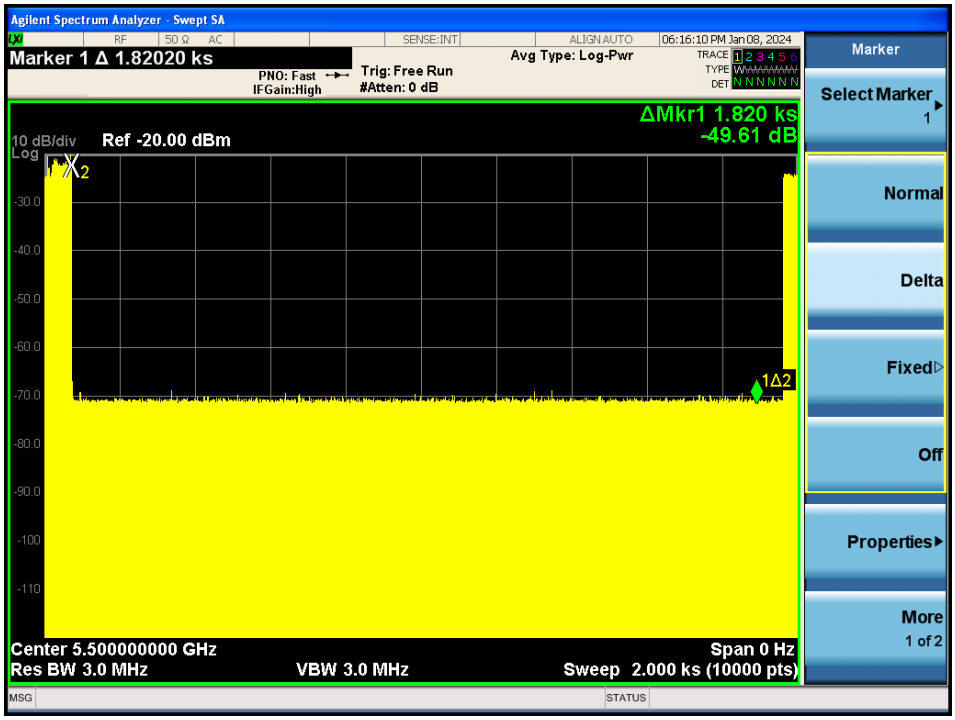
Note: The primary channels contain the control signal. Therefore, the primary channels are monitored during the test.
Please refer to the following plots.

Wlan0

5290 MHz, Bandwidth 80 MHz

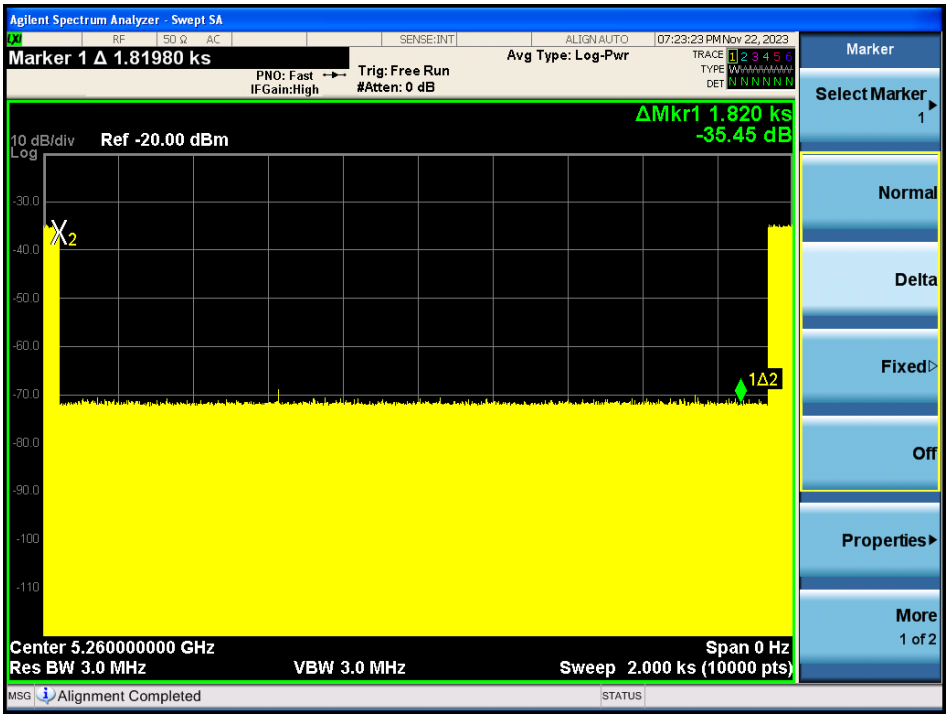


5530 MHz, Bandwidth 80 MHz

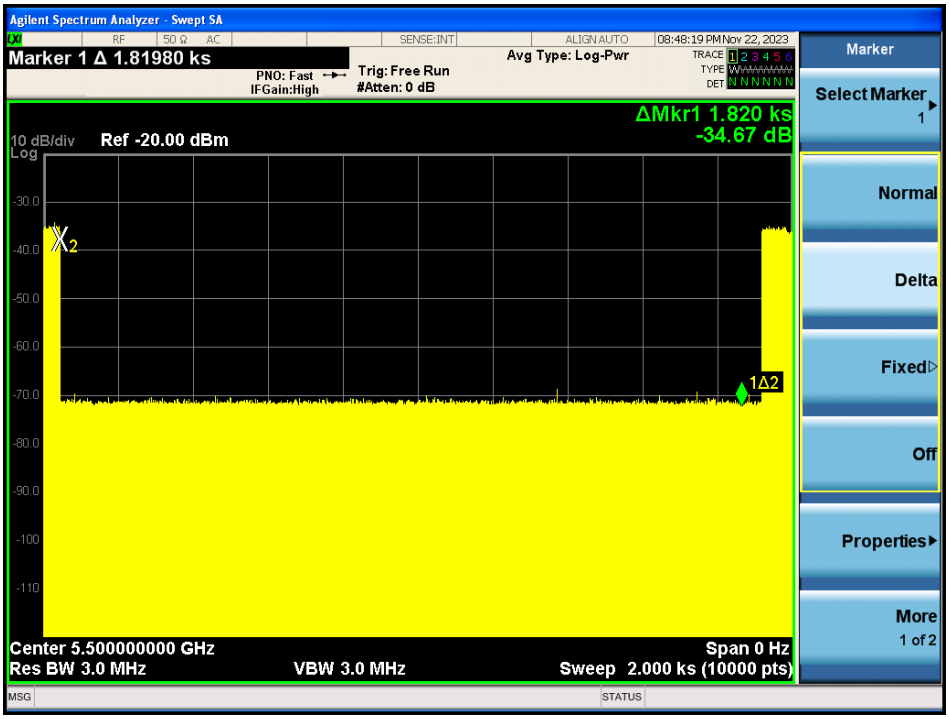


Wlan1

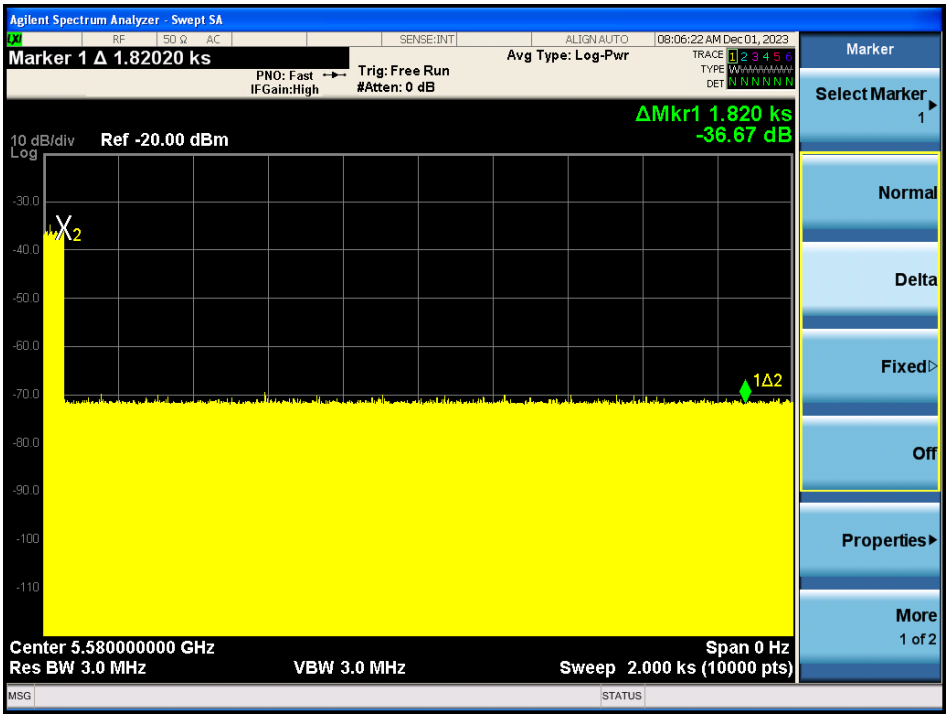
5290 MHz, Bandwidth 80 MHz



5530 MHz, Bandwidth 80 MHz



5610 MHz, Bandwidth 80 MHz



9 Radar Detection Bandwidth & Radar Detection Performance Check

9.1 Detection Bandwidth

Procedure:

Performed with any one of the short pulse radar waveforms type 0

Starting at the center frequency of the EUT operating Channel, increase the radar frequency in 5 MHz steps, repeating the above test sequence, until the detection rate falls below the U-NII Detection Bandwidth criterion specified in Table 4. Repeat this measurement in 1MHz steps at frequencies 5 MHz below where the detection rate begins to fall. Record the highest frequency (denote as FH) at which detection is greater than or equal to the U-NII Detection Bandwidth criterion. Recording the detection rate at frequencies above FH is not required to demonstrate compliance.

Starting at the center frequency of the EUT operating Channel, decrease the radar frequency in 5 MHz steps, repeating the above test sequence, until the detection rate falls below the U-NII Detection Bandwidth criterion specified in Table 4. Repeat this measurement in 1MHz steps at frequencies 5 MHz above where the detection rate begins to fall. Record the lowest frequency (denote as FL) at which detection is greater than or equal to the U-NII Detection Bandwidth criterion. Recording the detection rate at frequencies below FL is not required to demonstrate compliance.

The U-NII Detection Bandwidth is calculated as follows: U-NII Detection Bandwidth = FH – FL

Test Results

Wlan0

5.3 GHz

Frequency (MHz)	F_L (MHz)	F_H (MHz)	Detection Bandwidth (MHz)	Minimum Limit	Result
5260	5250	5270	20	100%	Compliance
5310	5290	5330	40	100%	Compliance
5290	5250	5330	80	100%	Compliance

5.6 GHz

Frequency (MHz)	F_L (MHz)	F_H (MHz)	Detection Bandwidth (MHz)	Minimum Limit	Result
5500	5490	5510	20	100%	Compliance
5510	5490	5530	40	100%	Compliance
5530	5490	5570	80	100%	Compliance

Wlan1

5.3 GHz

Frequency (MHz)	F_L (MHz)	F_H (MHz)	Detection Bandwidth (MHz)	Minimum Limit	Result
5260	5250	5270	20	100%	Compliance
5310	5290	5330	40	100%	Compliance
5290	5250	5330	80	100%	Compliance

5.6 GHz

Frequency (MHz)	F_L (MHz)	F_H (MHz)	Detection Bandwidth (MHz)	Minimum Limit	Result
5500	5490	5510	20	100%	Compliance
5510	5490	5530	40	100%	Compliance
5530	5490	5570	80	100%	Compliance
5610	5570	5650	80	100%	Compliance

Results of Detection Bandwidth:

Wlan0

EUT Frequency = 5260 MHz											
DFS Detection Trials (1 = Detected, 0 = No Detected)											
Radar Frequency (MHz)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
5250(F_L)	1	1	1	1	1	1	1	1	1	1	100 %
5255	1	1	1	1	1	1	1	1	1	1	100 %
5260(Fc)	1	1	1	1	1	1	1	1	1	1	100 %
5265	1	1	1	1	1	1	1	1	1	1	100 %
5270(F_H)	1	1	1	1	1	1	1	1	1	1	100 %
Detection Bandwidth = F_H – F_L=5270-5250=20 MHz											
EUT 99% OBW =17.7 MHz; x 100% = 17.7 MHz **Result:** Pass											

EUT Frequency = 5310 MHz											
DFS Detection Trials (1 = Detected, 0 = No Detected)											
Radar Frequency (MHz)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
5290(F_L)	1	1	1	1	1	1	1	1	1	1	100 %
5295	1	1	1	1	1	1	1	1	1	1	100 %
5300	1	1	1	1	1	1	1	1	1	1	100 %
5305	1	1	1	1	1	1	1	1	1	1	100 %
5310(Fc)	1	1	1	1	1	1	1	1	1	1	100 %
5315	1	1	1	1	1	1	1	1	1	1	100 %
5320	1	1	1	1	1	1	1	1	1	1	100 %
5325	1	1	1	1	1	1	1	1	1	1	100 %
5330(F_H)	1	1	1	1	1	1	1	1	1	1	100 %
Detection Bandwidth = F_H – F_L=5330-5290=40 MHz											
EUT 99% OBW =37.9 MHz; x 100% =37.9 MHz **Result:** Pass											

EUT Frequency = 5290 MHz											
DFS Detection Trials (1 = Detected, 0 = No Detected)											
Radar Frequency (MHz)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
5250(F_L)	1	1	1	1	1	1	1	1	1	1	100 %
5255	1	1	1	1	1	1	1	1	1	1	100 %
5260	1	1	1	1	1	1	1	1	1	1	100 %
5265	1	1	1	1	1	1	1	1	1	1	100 %
5270	1	1	1	1	1	1	1	1	1	1	100 %
5275	1	1	1	1	1	1	1	1	1	1	100 %
5280	1	1	1	1	1	1	1	1	1	1	100 %
5285	1	1	1	1	1	1	1	1	1	1	100 %
5290(F_C)	1	1	1	1	1	1	1	1	1	1	100 %
5295	1	1	1	1	1	1	1	1	1	1	100 %
5300	1	1	1	1	1	1	1	1	1	1	100 %
5305	1	1	1	1	1	1	1	1	1	1	100 %
5310	1	1	1	1	1	1	1	1	1	1	100 %
5315	1	1	1	1	1	1	1	1	1	1	100 %
5320	1	1	1	1	1	1	1	1	1	1	100 %
5325	1	1	1	1	1	1	1	1	1	1	100 %
5330(F_H)	1	1	1	1	1	1	1	1	1	1	100 %
Detection Bandwidth = F_H – F_L=5330-5250=80 MHz											
EUT 99% OBW = 76 MHz; x 100% = 76 MHz **Result:** Pass											

EUT Frequency = 5500 MHz											
DFS Detection Trials (1 = Detected, 0 = No Detected)											
Radar Frequency (MHz)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
5490(F_L)	1	1	1	1	1	1	1	1	1	1	100 %
5495	1	1	1	1	1	1	1	1	1	1	100 %
5500(Fc)	1	1	1	1	1	1	1	1	1	1	100 %
5505	1	1	1	1	1	1	1	1	1	1	100 %
5510(F_H)	1	1	1	1	1	1	1	1	1	1	100 %
Detection Bandwidth = F_H – F_L=5510-5490=20 MHz											
EUT 99% OBW = 17.8 MHz; x 100% = 17.8 MHz **Result:** Pass											

EUT Frequency = 5510 MHz											
DFS Detection Trials (1 = Detected, 0 = No Detected)											
Radar Frequency (MHz)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
5490(F_L)	1	1	1	1	1	1	1	1	1	1	100 %
5495	1	1	1	1	1	1	1	1	1	1	100 %
5500	1	1	1	1	1	1	1	1	1	1	100 %
5505	1	1	1	1	1	1	1	1	1	1	100 %
5510(Fc)	1	1	1	1	1	1	1	1	1	1	100 %
5515	1	1	1	1	1	1	1	1	1	1	100 %
5520	1	1	1	1	1	1	1	1	1	1	100 %
5525	1	1	1	1	1	1	1	1	1	1	100 %
5530(F_H)	1	1	1	1	1	1	1	1	1	1	100 %
Detection Bandwidth = F_H – F_L=5530-5490=40 MHz											
EUT 99% OBW =37.2 MHz; x 100% =37.2 MHz **Result:** Pass											

EUT Frequency = 5530 MHz											
DFS Detection Trials (1 = Detected, 0 = No Detected)											
Radar Frequency (MHz)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
5490(F_L)	1	1	1	1	1	1	1	1	1	1	100 %
5495	1	1	1	1	1	1	1	1	1	1	100 %
5500	1	1	1	1	1	1	1	1	1	1	100 %
5505	1	1	1	1	1	1	1	1	1	1	100 %
5510	1	1	1	1	1	1	1	1	1	1	100 %
5515	1	1	1	1	1	1	1	1	1	1	100 %
5520	1	1	1	1	1	1	1	1	1	1	100 %
5525	1	1	1	1	1	1	1	1	1	1	100 %
5530(F_C)	1	1	1	1	1	1	1	1	1	1	100 %
5535	1	1	1	1	1	1	1	1	1	1	100 %
5540	1	1	1	1	1	1	1	1	1	1	100 %
5545	1	1	1	1	1	1	1	1	1	1	100 %
5550	1	1	1	1	1	1	1	1	1	1	100 %
5555	1	1	1	1	1	1	1	1	1	1	100 %
5560	1	1	1	1	1	1	1	1	1	1	100 %
5565	1	1	1	1	1	1	1	1	1	1	100 %
5570(F_H)	1	1	1	1	1	1	1	1	1	1	100 %
Detection Bandwidth = F_H – F_L=5570-5490=80 MHz											
EUT 99% OBW =76.6 MHz; x 100% =76.6 MHz **Result:** Pass											

Wlan1

EUT Frequency = 5260 MHz											
DFS Detection Trials (1 = Detected, 0 = No Detected)											
Radar Frequency (MHz)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
5250(F_L)	1	1	1	1	1	1	1	1	1	1	100 %
5255	1	1	1	1	1	1	1	1	1	1	100 %
5260(Fc)	1	1	1	1	1	1	1	1	1	1	100 %
5265	1	1	1	1	1	1	1	1	1	1	100 %
5270(F_H)	1	1	1	1	1	1	1	1	1	1	100 %
Detection Bandwidth = F_H – F_L=5270-5250=20 MHz											
EUT 99% OBW =18.1 MHz; x 100% = 18.1 MHz **Result:** Pass											

EUT Frequency = 5310 MHz											
DFS Detection Trials (1 = Detected, 0 = No Detected)											
Radar Frequency (MHz)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
5290(F_L)	1	1	1	1	1	1	1	1	1	1	100 %
5295	1	1	1	1	1	1	1	1	1	1	100 %
5300	1	1	1	1	1	1	1	1	1	1	100 %
5305	1	1	1	1	1	1	1	1	1	1	100 %
5310(Fc)	1	1	1	1	1	1	1	1	1	1	100 %
5315	1	1	1	1	1	1	1	1	1	1	100 %
5320	1	1	1	1	1	1	1	1	1	1	100 %
5325	1	1	1	1	1	1	1	1	1	1	100 %
5330(F_H)	1	1	1	1	1	1	1	1	1	1	100 %
Detection Bandwidth = F_H – F_L=5330-5290=40 MHz											
EUT 99% OBW =36.7 MHz; x 100% =36.7 MHz **Result:** Pass											

EUT Frequency = 5290 MHz											
DFS Detection Trials (1 = Detected, 0 = No Detected)											
Radar Frequency (MHz)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
5250(F_L)	1	1	1	1	1	1	1	1	1	1	100 %
5255	1	1	1	1	1	1	1	1	1	1	100 %
5260	1	1	1	1	1	1	1	1	1	1	100 %
5265	1	1	1	1	1	1	1	1	1	1	100 %
5270	1	1	1	1	1	1	1	1	1	1	100 %
5275	1	1	1	1	1	1	1	1	1	1	100 %
5280	1	1	1	1	1	1	1	1	1	1	100 %
5285	1	1	1	1	1	1	1	1	1	1	100 %
5290(F_C)	1	1	1	1	1	1	1	1	1	1	100 %
5295	1	1	1	1	1	1	1	1	1	1	100 %
5300	1	1	1	1	1	1	1	1	1	1	100 %
5305	1	1	1	1	1	1	1	1	1	1	100 %
5310	1	1	1	1	1	1	1	1	1	1	100 %
5315	1	1	1	1	1	1	1	1	1	1	100 %
5320	1	1	1	1	1	1	1	1	1	1	100 %
5325	1	1	1	1	1	1	1	1	1	1	100 %
5330(F_H)	1	1	1	1	1	1	1	1	1	1	100 %
Detection Bandwidth = F_H – F_L=5330-5250=80 MHz											
EUT 99% OBW = 76.9 MHz; x 100% = 76.9 MHz **Result:** Pass											

EUT Frequency = 5500 MHz											
DFS Detection Trials (1 = Detected, 0 = No Detected)											
Radar Frequency (MHz)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
5490(F_L)	1	1	1	1	1	1	1	1	1	1	100 %
5495	1	1	1	1	1	1	1	1	1	1	100 %
5500(Fc)	1	1	1	1	1	1	1	1	1	1	100 %
5505	1	1	1	1	1	1	1	1	1	1	100 %
5510(F_H)	1	1	1	1	1	1	1	1	1	1	100 %
Detection Bandwidth = F_H – F_L=5510-5490=20 MHz											
EUT 99% OBW = 18.0 MHz; x 100% = 18.0 MHz **Result:** Pass											

EUT Frequency = 5510 MHz											
DFS Detection Trials (1 = Detected, 0 = No Detected)											
Radar Frequency (MHz)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
5490(F_L)	1	1	1	1	1	1	1	1	1	1	100 %
5495	1	1	1	1	1	1	1	1	1	1	100 %
5500	1	1	1	1	1	1	1	1	1	1	100 %
5505	1	1	1	1	1	1	1	1	1	1	100 %
5510(Fc)	1	1	1	1	1	1	1	1	1	1	100 %
5515	1	1	1	1	1	1	1	1	1	1	100 %
5520	1	1	1	1	1	1	1	1	1	1	100 %
5525	1	1	1	1	1	1	1	1	1	1	100 %
5530(F_H)	1	1	1	1	1	1	1	1	1	1	100 %
Detection Bandwidth = F_H – F_L=5530-5490=40 MHz											
EUT 99% OBW =37.2 MHz; x 100% =37.2 MHz **Result:** Pass											

EUT Frequency = 5530 MHz											
DFS Detection Trials (1 = Detected, 0 = No Detected)											
Radar Frequency (MHz)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
5490(F_L)	1	1	1	1	1	1	1	1	1	1	100 %
5495	1	1	1	1	1	1	1	1	1	1	100 %
5500	1	1	1	1	1	1	1	1	1	1	100 %
5505	1	1	1	1	1	1	1	1	1	1	100 %
5510	1	1	1	1	1	1	1	1	1	1	100 %
5515	1	1	1	1	1	1	1	1	1	1	100 %
5520	1	1	1	1	1	1	1	1	1	1	100 %
5525	1	1	1	1	1	1	1	1	1	1	100 %
5530(F_C)	1	1	1	1	1	1	1	1	1	1	100 %
5535	1	1	1	1	1	1	1	1	1	1	100 %
5540	1	1	1	1	1	1	1	1	1	1	100 %
5545	1	1	1	1	1	1	1	1	1	1	100 %
5550	1	1	1	1	1	1	1	1	1	1	100 %
5555	1	1	1	1	1	1	1	1	1	1	100 %
5560	1	1	1	1	1	1	1	1	1	1	100 %
5565	1	1	1	1	1	1	1	1	1	1	100 %
5570(F_H)	1	1	1	1	1	1	1	1	1	1	100 %
Detection Bandwidth = F_H – F_L=5570-5490=80 MHz											
EUT 99% OBW =76.9 MHz; x 100% =76.9 MHz **Result:** Pass											

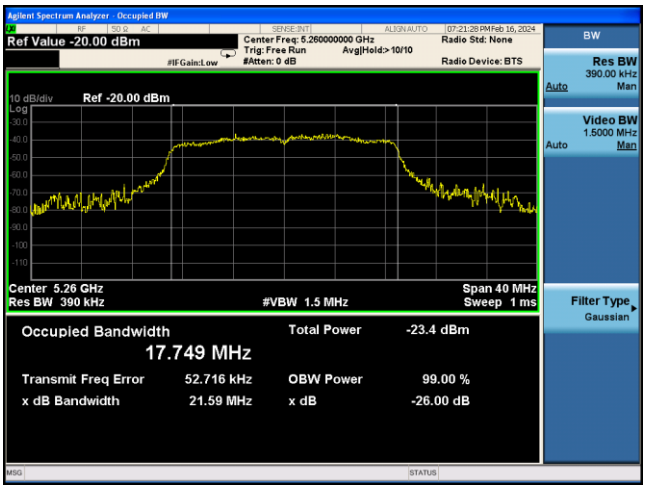
EUT Frequency = 5610 MHz											
DFS Detection Trials (1 = Detected, 0 = No Detected)											
Radar Frequency (MHz)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
5570(F_L)	1	1	1	1	1	1	1	1	1	1	100 %
5575	1	1	1	1	1	1	1	1	1	1	100 %
5580	1	1	1	1	1	1	1	1	1	1	100 %
5585	1	1	1	1	1	1	1	1	1	1	100 %
5590	1	1	1	1	1	1	1	1	1	1	100 %
5595	1	1	1	1	1	1	1	1	1	1	100 %
5600	1	1	1	1	1	1	1	1	1	1	100 %
5605	1	1	1	1	1	1	1	1	1	1	100 %
5610(F_C)	1	1	1	1	1	1	1	1	1	1	100 %
5615	1	1	1	1	1	1	1	1	1	1	100 %
5620	1	1	1	1	1	1	1	1	1	1	100 %
5625	1	1	1	1	1	1	1	1	1	1	100 %
5630	1	1	1	1	1	1	1	1	1	1	100 %
5635	1	1	1	1	1	1	1	1	1	1	100 %
5640	1	1	1	1	1	1	1	1	1	1	100 %
5645	1	1	1	1	1	1	1	1	1	1	100 %
5650(F_H)	1	1	1	1	1	1	1	1	1	1	100 %
Detection Bandwidth = F_H – F_L=5650-5570=80 MHz											
EUT 99% OBW =76.65 MHz; x 100% =76.65 MHz **Result:** Pass											

OBW Measurement

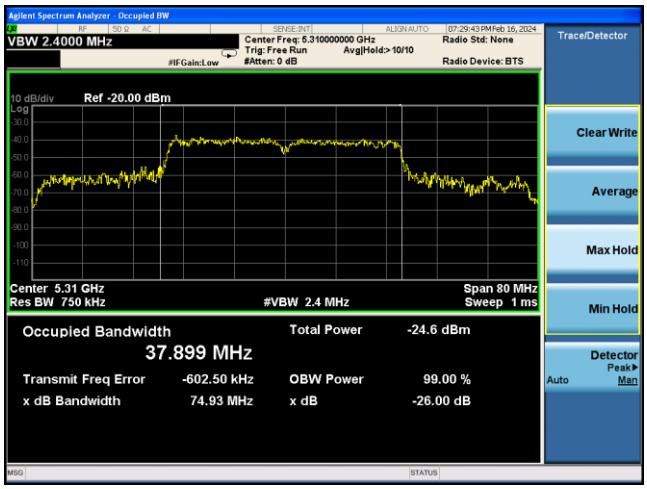
Wlan0

5.3 GHz

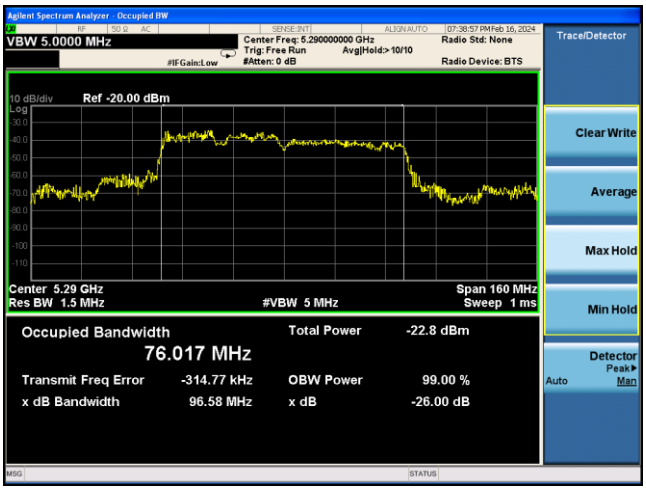
20 MHz



40 MHz

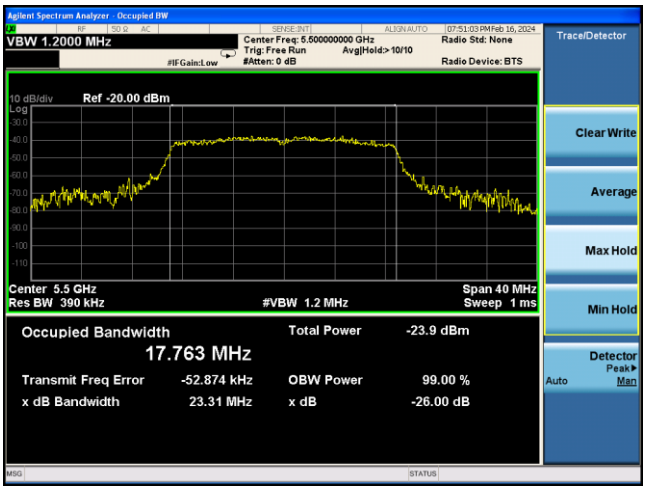


80 MHz

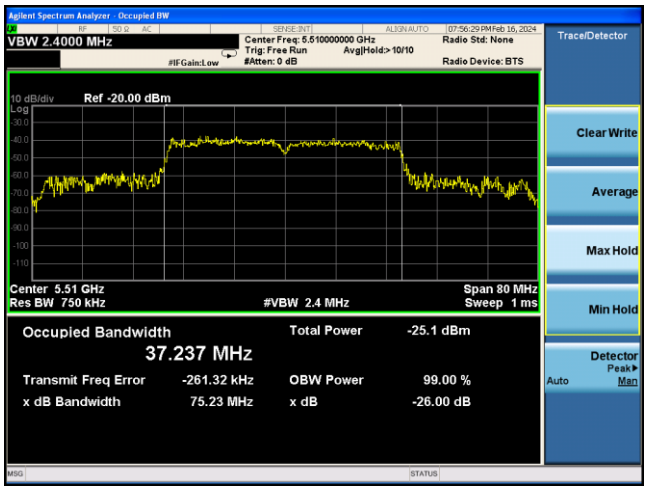


5.6 GHz

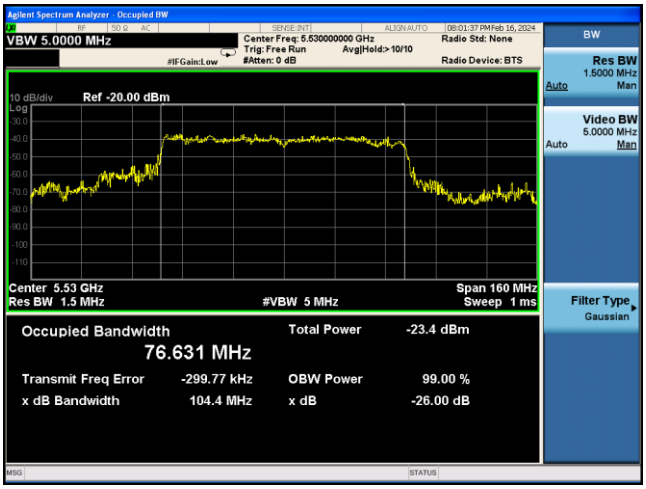
20 MHz



40 MHz



80 MHz



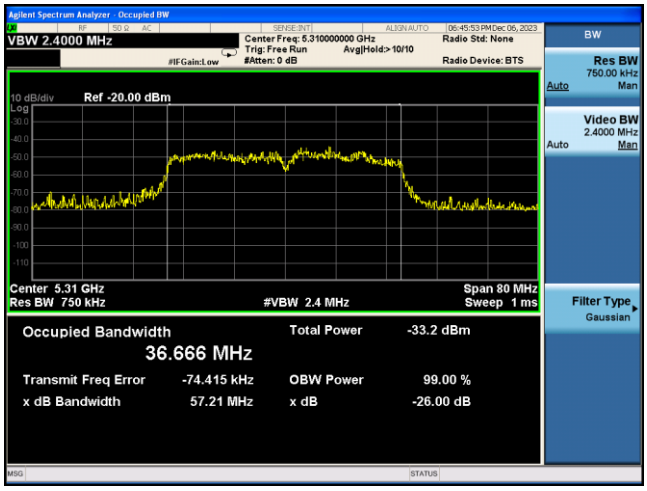
OBW Measurement

Wlan1

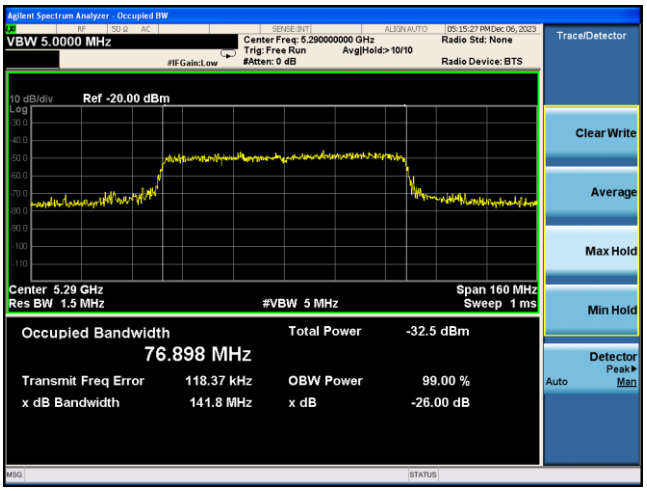
5.3 GHz

20 MHz

40 MHz

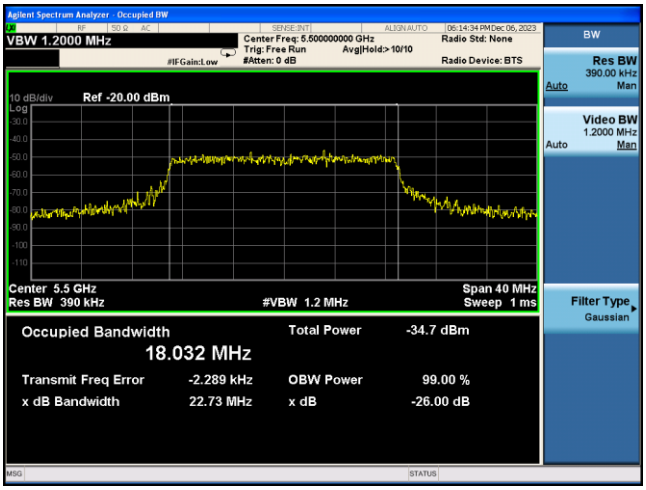


80 MHz

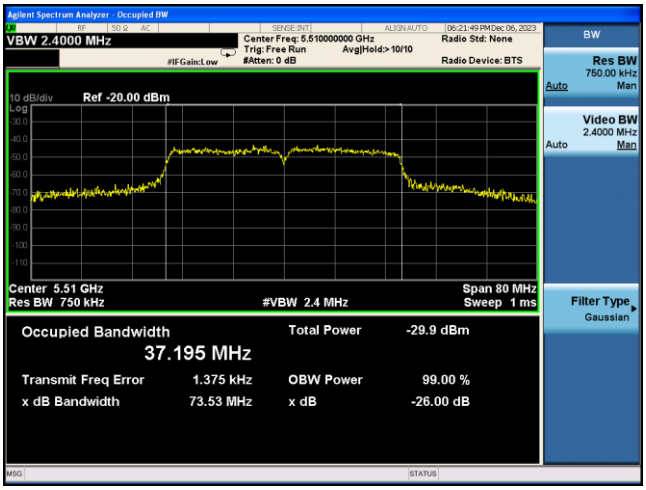


5.6 GHz

20 MHz



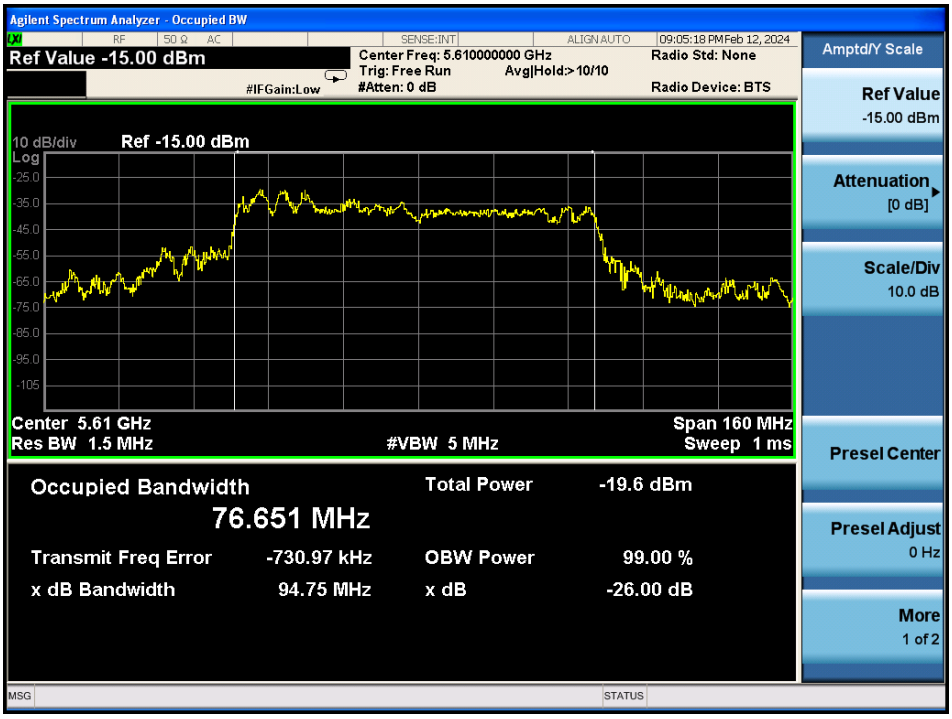
40 MHz



80 MHz

5610 MHz

80 MHz



9.2 Radar Detection Performance Check

Procedure:

Start iperf traffic from master device to client device.
Generate radar waveform
Record whether or not the waveform was detected
At least 30 trials are applied for each radar type
For radar types with randomized parameters, each trial uses a unique waveform
Perform with each of the radar types 1-6

Confirm that the detection rate for each radar type meets the minimum requirement
Type 1A&1B, 2, 3, 4: 60% each
Type 5: 80%
Type 6: 70%
Confirm that the mean of the rates for radar types 1 through 4 meets the requirement of 80%

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

Test Results:

Wlan0

5260 MHz, 20 MHz Bandwidth

Radar Signal Type	Waveform/Trial Number	Detection (%)	Limit (%)	Pass/Fail
Type 1A/1B	30	100 %	60%	Pass
Type 2	30	70 %	60%	Pass
Type 3	30	83.3 %	60%	Pass
Type 4	30	66.7 %	60%	Pass
Aggregate (Type1 to 4)	120	80 %	80%	Pass
Type 5	30	100 %	80%	Pass
Type 6	30	83.3 %	70%	Pass

Table-1A/1B Radar Type 1A/1B Statistical Performance

Trial #	Pulse/Burst	Pulse Width (µS)	PRI (µs)	Detection (1:yes; 0:no)
1	74	1.0	718	1
2	92	1.0	578	1
3	95	1.0	558	1
4	61	1.0	878	1
5	89	1.0	598	1
6	83	1.0	638	1
7	68	1.0	778	1
8	70	1.0	758	1
9	65	1.0	818	1
10	81	1.0	658	1
11	99	1.0	538	1
12	62	1.0	858	1
13	86	1.0	618	1
14	58	1.0	918	1
15	102	1.0	518	1
16	28	1.0	1894	1
17	18	1.0	3041	1
18	22	1.0	2432	1
19	45	1.0	1181	1
20	18	1.0	2975	1
21	31	1.0	1737	1
22	25	1.0	2162	1
23	24	1.0	2228	1
24	41	1.0	1301	1
25	19	1.0	2879	1
26	39	1.0	1359	1
27	23	1.0	2389	1
28	50	1.0	1056	1
29	32	1.0	1699	1
30	27	1.0	1986	1
Detection Percentage: 100 % (>60%)				

Table-2 Radar Type 2 Statistical Performance

Trial #	Pulse/Burst	Pulse Width (µS)	PRI (µs)	Detection (1:yes; 0:no)
1	28	1.6	227	1
2	23	5.0	158	1
3	25	3.3	159	1
4	29	4.9	190	1
5	23	2.8	214	0
6	29	1.8	207	1
7	28	4.0	221	1
8	26	2.6	189	0
9	29	2.5	184	1
10	27	2.9	184	1
11	28	2.4	189	1
12	25	2.0	156	0
13	25	3.3	215	1
14	25	4.6	188	1
15	29	1.8	183	1
16	25	4.1	164	1
17	24	3.3	163	0
18	26	3.3	152	0
19	27	2.4	221	1
20	27	4.9	162	0
21	28	2.2	223	1
22	29	2.0	165	1
23	23	2.3	188	0
24	29	4.9	174	1
25	25	3.8	176	1
26	27	4.1	185	1
27	27	3.4	222	1
28	25	4.2	191	0
29	26	3.5	195	1
30	24	2.7	171	0
Detection Percentage: 70.0 % (>60%)				

Table-3 Radar Type 3 Statistical Performance

Trial #	Pulse/Burst	Pulse Width (µS)	PRI (µs)	Detection (1:yes; 0:no)
1	16	7.6	462	1
2	18	8.2	455	1
3	18	9.8	490	0
4	16	9.2	469	1
5	17	8.4	323	1
6	16	7.7	359	1
7	17	8.6	375	1
8	18	6.8	467	1
9	18	9.9	380	1
10	18	9.0	347	1
11	18	9.4	217	0
12	16	9.2	268	1
13	17	8.8	277	1
14	16	8.9	204	0
15	17	6.0	430	0
16	18	8.0	400	1
17	16	6.7	446	1
18	18	6.1	308	1
19	16	6.2	311	0
20	17	6.8	309	1
21	17	9.2	306	1
22	18	6.8	498	1
23	17	8.8	260	1
24	16	9.2	293	1
25	17	6.0	417	1
26	17	7.9	237	1
27	17	7.6	478	1
28	18	9.6	392	1
29	16	9.0	353	1
30	18	8.8	320	1
Detection Percentage: 83.3 % (>60%)				

Table-4 Radar Type 4 Statistical Performance

Trial #	Pulse/Burst	Pulse Width (µS)	PRI (µs)	Detection (1:yes; 0:no)
1	13	11.5	362	1
2	15	14.6	305	1
3	16	18.9	257	1
4	13	18.1	248	0
5	15	13.4	452	1
6	15	15.4	405	1
7	12	12.4	245	0
8	16	20.0	401	1
9	16	16.6	236	0
10	15	11.2	251	1
11	12	11.4	412	0
12	15	15.8	385	1
13	15	17.2	421	1
14	14	12.7	268	1
15	13	19.0	346	1
16	16	19.5	213	0
17	13	15.6	342	1
18	13	14.7	496	1
19	14	15.2	368	1
20	14	19.5	461	0
21	15	19.1	320	1
22	12	11.0	488	0
23	14	19.6	350	1
24	14	13.4	273	1
25	14	13.8	331	0
26	15	11.3	282	0
27	14	14.5	440	1
28	14	17.0	424	1
29	12	13.7	213	0
30	15	14.5	483	1
Detection Percentage: 66.7 % (>60%)				

Table-5 Radar Type 5 Statistical Performance

Trial #	Fc (GHz)	Detection (1:yes; 0:no)
1	5.26	1
2	5.26	1
3	5.26	1
4	5.26	1
5	5.26	1
6	5.26	1
7	5.26	1
8	5.26	1
9	5.26	1
10	5.26	1
11	5.255	1
12	5.255	1
13	5.253	1
14	5.258	1
15	5.253	1
16	5.253	1
17	5.253	1
18	5.254	1
19	5.257	1
20	5.258	1
21	5.268	1
22	5.265	1
23	5.265	1
24	5.262	1
25	5.263	1
26	5.263	1
27	5.262	1
28	5.264	1
29	5.265	1
30	5.266	1
Detection Percentage: 100 % (>80%)		

Bin5 Statistics 1

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	1	7	96.2	1009	-	-	486477	1
1	1	7	82.5	1425	-	-	750526	1
2	2	7	93.2	1950	1915	-	1012487	1
3	3	7	70.6	1337	1926	1520	188925	1
4	2	7	52.1	1813	1292	-	453044	1
5	2	7	93.9	1822	1134	-	716969	1
6	2	7	63	1400	1334	-	981032	1
7	3	7	53.2	1080	1762	1962	156475	1
8	1	7	62.4	1557	-	-	421145	1
9	2	7	92.2	1624	1450	-	684393	1
10	1	7	96.3	1884	-	-	949265	1

Bin5 Statistics 2

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	1	9	85.1	1955	-	-	152037	1
1	1	9	96.5	1435	-	-	475124	1
2	3	9	52.4	1075	1650	1938	796217	1
3	3	9	94.1	1952	1537	1336	1118325	1
4	2	9	85.5	1878	1661	-	112130	1
5	1	9	60.2	1384	-	-	435351	1
6	2	9	85.6	1012	1917	-	757511	1
7	3	9	93.3	1603	1021	1458	1079240	1
8	3	9	56.9	1044	1694	1385	72371	1

Bin5 Statistics 3

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	3	20	95.3	1408	1637	1305	253261	1
1	1	20	88.5	1641	-	-	461552	1
2	1	20	99.9	1843	-	-	668880	1
3	2	20	58	1140	1312	-	21002	1
4	3	20	52.6	1706	1275	1303	227802	1
5	1	20	56.5	1545	-	-	436043	1
6	3	20	73.4	1696	1510	1219	641386	1
7	1	20	63.9	1202	-	-	851403	1
8	3	20	53.3	1251	1829	1350	202289	1
9	3	20	73.6	1553	1230	1387	409223	1
10	2	20	55.8	1642	1437	-	616884	1
11	3	20	50.2	1188	1886	1438	822639	1
12	3	20	80.4	1122	1738	1986	176728	1
13	1	20	67.8	1918	-	-	384754	1

Bin5 Statistics 4

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	3	11	93.5	1116	1239	1042	459260	1
1	3	11	72.7	1500	1796	1487	618828	1
2	3	11	53.8	1626	1246	1262	117587	1
3	1	11	69.1	1286	-	-	279468	1
4	2	11	82.6	1333	1967	-	439510	1
5	2	11	53.4	1127	1795	-	600739	1
6	1	11	51.6	1968	-	-	98114	1
7	3	11	67.2	1352	1447	1108	258568	1
8	3	11	77.5	1746	1464	1019	419104	1
9	2	11	61.3	1200	1370	-	581218	1
10	2	11	59.4	1008	1405	-	78204	1
11	3	11	58.3	1018	1722	1216	238751	1
12	3	11	70.1	1748	1882	1833	398571	1
13	2	11	52.5	1271	1430	-	561268	1
14	1	11	94.8	1704	-	-	58422	1
15	2	11	91.4	1033	1043	-	219574	1
16	2	11	53.3	1606	1394	-	380229	1
17	1	11	74.3	1380	-	-	542510	1

Bin5 Statistics 5

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	2	13	85.7	1404	1857	-	43299	1
1	3	13	93.3	1921	1564	1582	223864	1
2	2	13	80.5	1023	1887	-	405705	1
3	1	13	57.6	1867	-	-	587717	1
4	3	13	82.7	1702	1172	1654	20955	1
5	1	13	85.1	1241	-	-	202645	1
6	3	13	68	1276	1300	1533	382771	1
7	2	13	95.6	1788	1082	-	564609	1
8	2	13	70.4	1492	1050	-	746139	1
9	1	13	99.1	1526	-	-	180208	1
10	1	13	100	1299	-	-	361846	1
11	1	13	88.8	1540	-	-	543254	1
12	1	13	86.3	1858	-	-	724471	1
13	1	13	96.1	1618	-	-	157828	1
14	2	13	54.7	1264	1751	-	338701	1
15	1	13	78.6	1414	-	-	520982	1

Bin5 Statistics 6

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	3	10	58.9	1245	1703	1860	861783	1
1	3	10	71.3	1859	1049	1515	166293	1
2	3	10	81.6	1089	1691	1057	389343	1
3	1	10	91.2	1088	-	-	614119	1
4	1	10	52.9	1351	-	-	837491	1
5	1	10	89.9	1046	-	-	139359	1
6	2	10	55.2	1710	1432	-	362155	1
7	3	10	78	1030	1154	1657	584824	1
8	2	10	61	1323	1247	-	808884	1
9	3	10	88.6	1287	1806	1809	111346	1
10	3	10	98.7	1870	1866	1787	333807	1
11	1	10	94.3	1961	-	-	558502	1
12	2	10	86.4	1966	1761	-	780403	1

Bin5 Statistics 7

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	1	6	70.9	1136	-	-	91291	1
1	1	6	69.2	1453	-	-	333441	1
2	2	6	61.9	1724	1054	-	574857	1
3	2	6	70.2	1995	1747	-	815924	1
4	2	6	81.5	1249	1957	-	61323	1
5	2	6	64.5	1828	1717	-	302974	1
6	1	6	87.1	1609	-	-	545704	1
7	2	6	87.4	1428	1167	-	787067	1
8	3	6	85.8	1211	1150	1051	31538	1
9	3	6	90.1	1242	1560	1185	273084	1
10	3	6	68.7	1364	1304	1135	514744	1
11	1	6	51	1727	-	-	757929	1

Bin5 Statistics 8

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	1	5	87	1298	-	-	1061	1
1	3	5	83	1954	1900	1591	145252	1
2	1	5	52.5	1638	-	-	291304	1
3	3	5	67.3	1901	1519	1406	434100	1
4	2	5	88.7	1550	1752	-	579930	1
5	1	5	75	1067	-	-	128429	1
6	1	5	63.3	1386	-	-	273543	1
7	1	5	53.6	1372	-	-	418736	1
8	2	5	91.5	1155	1832	-	562400	1
9	2	5	93.6	1133	1502	-	110247	1
10	2	5	73.4	1152	1539	-	255103	1
11	2	5	59.8	1574	1745	-	399548	1
12	1	5	62.2	1395	-	-	546017	1
13	1	5	71.4	1330	-	-	92603	1
14	1	5	95.9	1066	-	-	237904	1
15	1	5	88	1909	-	-	382625	1
16	2	5	52.4	1648	1106	-	526935	1
17	3	5	96.7	1329	1739	1156	74357	1
18	1	5	94.2	1263	-	-	219939	1
19	1	5	86.5	1572	-	-	364963	1

Bin5 Statistics 9

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	3	8	73.8	1180	1198	1203	1133482	1
1	3	8	59.2	1376	1619	1165	126180	1
2	1	8	99.5	1237	-	-	449533	1
3	3	8	79.9	1063	1174	1209	771328	1
4	2	8	88	1474	1002	-	1094665	1
5	3	8	68.5	1478	1146	1244	86491	1
6	3	8	54.8	1614	1092	1667	408773	1
7	3	8	81.5	1895	1506	1442	730829	1
8	2	8	67.6	1593	1651	-	1054298	1

Bin5 Statistics 10

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	3	16	91.3	1942	1676	1119	26221	1
1	1	16	73.2	1695	-	-	207815	1
2	1	16	81.3	1589	-	-	389358	1
3	1	16	62.9	1469	-	-	570963	1
4	1	16	90.1	1145	-	-	3976	1
5	1	16	65.9	1513	-	-	185505	1
6	1	16	56.8	1206	-	-	367187	1
7	1	16	52.6	1951	-	-	548247	1
8	1	16	60.6	1587	-	-	730028	1
9	3	16	72.3	1922	1508	1585	162381	1
10	2	16	63.5	1253	1700	-	344013	1
11	3	16	85.3	1357	1104	1804	524273	1
12	3	16	90.7	1495	1064	1598	705239	1
13	1	16	94.9	1679	-	-	140753	1
14	3	16	77.4	1865	1980	1225	320784	1
15	3	16	95.8	1979	1371	1840	501372	1

Bin5 Statistics 11

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	3	13	52.1	1852	1317	1214	1369516	1
1	1	13	58	1912	-	-	237023	1
2	1	13	60.1	1947	-	-	600343	1
3	1	13	68.7	1760	-	-	963788	1
4	3	13	99.2	1640	1340	1953	1324347	1
5	1	13	84.9	1234	-	-	192356	1
6	1	13	89.2	1838	-	-	555630	1
7	3	13	96	1825	1570	1151	917320	1

Bin5 Statistics 12

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	2	12	82.2	1549	1087	-	931494	1
1	1	12	77.3	1532	-	-	107269	1
2	1	12	77.8	1548	-	-	371472	1
3	2	12	83.5	1086	1862	-	634860	1
4	1	12	72.7	1362	-	-	900035	1
5	1	12	79.4	1197	-	-	74748	1
6	2	12	70.1	1390	1215	-	338599	1
7	2	12	70.1	1571	1403	-	602343	1
8	1	12	81.9	1636	-	-	867267	1
9	2	12	86	1308	1183	-	42143	1
10	3	12	50.2	1354	1559	1105	305690	1

Bin5 Statistics 13

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	1	8	70.4	1725	-	-	522879	1
1	2	8	92.2	1525	1280	-	764165	1
2	2	8	96.9	1483	1407	-	8820	1
3	1	8	72.1	1803	-	-	250924	1
4	3	8	55.4	1919	1770	1772	491211	1
5	3	8	89.1	1628	1742	1398	732928	1
6	1	8	85.3	1250	-	-	977747	1
7	2	8	91.9	1212	1970	-	220798	1
8	3	8	74.3	1939	1274	1783	461716	1
9	3	8	80.6	1848	1697	1797	702792	1
10	1	8	51.1	1076	-	-	948076	1
11	3	8	83.2	1816	1835	1977	190550	1

Bin5 Statistics 14

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	3	20	64.3	1975	1842	1868	258028	1
1	2	20	72.1	1538	1810	-	403749	1
2	1	20	84.2	1243	-	-	550391	1
3	3	20	85.8	1257	1558	1295	96388	1
4	3	20	60.4	1543	1588	1965	240511	1
5	2	20	94.8	1861	1767	-	385744	1
6	3	20	62.8	1302	1535	1601	529662	1
7	3	20	68.5	1326	1552	1470	78555	1
8	2	20	56.3	1759	1410	-	223460	1
9	1	20	84	1916	-	-	368984	1
10	2	20	85.4	1339	1983	-	512829	1
11	2	20	80.7	1085	1226	-	60968	1
12	3	20	62.8	1687	1139	1755	205144	1
13	1	20	88.1	1489	-	-	351367	1
14	3	20	73.3	1321	1228	1872	494092	1
15	3	20	80	1114	1531	1255	42997	1
16	3	20	81.2	1349	1610	1258	187471	1
17	1	20	52.2	1318	-	-	333582	1
18	3	20	93.4	1991	1052	1671	476065	1
19	2	20	53.4	1261	1869	-	25222	1

Bin5 Statistics 15

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	2	7	54.6	1682	1473	-	212693	1
1	2	7	94.7	1132	1187	-	394267	1
2	2	7	57	1083	1484	-	575412	1
3	2	7	53.5	1853	2000	-	9239	1
4	2	7	55.3	1311	1920	-	190362	1
5	3	7	86	1992	1162	1444	370797	1
6	1	7	54.6	1449	-	-	553910	1
7	1	7	79.7	1017	-	-	735882	1
8	3	7	63.8	1164	1698	1121	167883	1
9	3	7	93.1	1652	1611	1851	348287	1
10	1	7	64.9	1896	-	-	531230	1
11	3	7	65.4	1778	1608	1420	709897	1
12	1	7	81	1027	-	-	146173	1
13	2	7	94.2	1120	1720	-	327029	1
14	1	7	63.5	1933	-	-	508856	1
15	1	7	61.4	1826	-	-	690385	1

Bin5 Statistics 16

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	3	8	88.5	1479	1934	1579	123143	1
1	2	8	93.7	1673	1855	-	304428	1
2	3	8	59.7	1081	1456	1221	485321	1
3	1	8	75.4	1471	-	-	668350	1
4	2	8	69.1	1353	1964	-	101113	1
5	3	8	67.5	1899	1750	1632	281465	1
6	1	8	94	1514	-	-	464420	1
7	1	8	86.4	1142	-	-	646273	1
8	1	8	56.8	1522	-	-	78996	1
9	1	8	66.1	1932	-	-	260383	1
10	1	8	59.2	1556	-	-	442035	1
11	3	8	67.4	1024	1906	1306	621323	1
12	1	8	65.7	1666	-	-	56625	1
13	1	8	55.3	1644	-	-	238126	1
14	2	8	60.6	1647	1512	-	418777	1
15	2	8	72.1	1927	1575	-	599634	1

Bin5 Statistics 17

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	3	8	87.2	1711	1944	1731	49710	1
1	3	8	97.8	1218	1665	1808	313184	1
2	2	8	78.5	1769	1417	-	577425	1
3	2	8	69.6	1157	1090	-	841959	1
4	3	8	65	1573	1505	1367	17296	1
5	3	8	80.6	1322	1985	1383	280734	1
6	2	8	80.4	1701	1273	-	545036	1
7	3	8	74.5	1707	1301	1315	807892	1
8	1	8	90.1	1074	-	-	1074627	1
9	2	8	83.1	1424	1818	-	248615	1
10	1	8	54.7	1834	-	-	513072	1

Bin5 Statistics 18

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	3	10	63.2	1716	1313	1418	567739	1
1	3	10	69.1	1025	1391	1649	761051	1
2	2	10	70	1830	1173	-	158365	1
3	1	10	99.8	1885	-	-	352155	1
4	2	10	68.7	1392	1493	-	545039	1
5	3	10	74.6	1764	1668	1555	736419	1
6	2	10	61.8	1490	1269	-	134597	1
7	1	10	91.5	1959	-	-	328281	1
8	2	10	87.6	1683	1935	-	520747	1
9	2	10	92.5	1177	1864	-	714412	1
10	2	10	68	1789	1409	-	110718	1
11	1	10	84.4	1328	-	-	304681	1
12	2	10	87.2	1268	1754	-	497328	1
13	1	10	50.7	1160	-	-	692233	1
14	1	10	70.6	1068	-	-	87147	1

Bin5 Statistics 19

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	2	17	96.8	1984	1881	-	246837	1
1	1	17	89.2	1551	-	-	418473	1
2	2	17	76.7	1517	1397	-	588155	1
3	2	17	87.3	1497	1718	-	55655	1
4	1	17	63.9	1771	-	-	226538	1
5	2	17	58.4	1358	1732	-	396563	1
6	1	17	82.5	1102	-	-	568617	1
7	3	17	92.8	1071	1170	1316	34646	1
8	1	17	78.2	1153	-	-	205684	1
9	2	17	83.3	1634	1989	-	375283	1
10	3	17	65.6	1396	1331	1375	545231	1
11	3	17	93.9	1166	1320	1463	13657	1
12	1	17	96.4	1741	-	-	184476	1
13	1	17	57.9	1035	-	-	355609	1
14	1	17	63.2	1309	-	-	526352	1
15	3	17	85.2	1118	1946	1098	694410	1
16	1	17	85.4	1065	-	-	163598	1

Bin5 Statistics 20

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	1	19	86	1101	-	-	334521	1
1	3	19	62.8	1565	1726	1943	502489	1
2	2	19	80.7	1877	1763	-	673948	1
3	2	19	67.3	1602	1176	-	142195	1
4	2	19	86.8	1138	1839	-	312632	1
5	1	19	66.4	1723	-	-	483970	1
6	3	19	90.6	1149	1782	1821	651935	1
7	1	19	92.8	1379	-	-	121432	1
8	2	19	53.8	1889	1007	-	291667	1
9	1	19	63.8	1633	-	-	462993	1
10	1	19	73	1461	-	-	633951	1
11	1	19	79.6	1599	-	-	100354	1
12	1	19	69.2	1231	-	-	271306	1
13	2	19	63.4	1455	1849	-	440906	1
14	3	19	91.4	1117	1799	1898	609989	1
15	1	19	68.9	1454	-	-	79330	1

16	2	19	94.5	1675	1472	-	249575	1

Bin5 Statistics 21

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	2	6	83.8	1048	1186	-	357272	1
1	1	6	91.3	1279	-	-	503052	1
2	1	6	97.9	1931	-	-	49485	1
3	3	6	52.8	1488	1265	1411	193809	1
4	1	6	69.1	1344	-	-	339920	1
5	2	6	96.3	1460	1452	-	483842	1
6	2	6	80.7	1077	1976	-	31559	1
7	1	6	76.3	1113	-	-	176911	1
8	1	6	91.8	1423	-	-	321993	1
9	2	6	66.5	1281	1737	-	465922	1
10	2	6	53	1260	1248	-	13738	1
11	1	6	80.8	1217	-	-	158992	1
12	2	6	65.4	1272	1844	-	303250	1
13	1	6	83.6	1480	-	-	449242	1
14	1	6	74.4	1335	-	-	594545	1
15	2	6	57.3	1814	1837	-	140530	1
16	2	6	82.6	1343	1820	-	285396	1
17	1	6	98.5	1646	-	-	431242	1
18	3	6	74.4	1347	1072	1527	574146	1
19	3	6	70	1359	1158	1715	122595	1

Bin5 Statistics 22

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	3	13	53.3	1434	1753	1005	595863	1
1	3	13	60	1421	1719	1807	917701	1
2	1	13	72.8	1567	-	-	1243031	1
3	3	13	86.2	1749	1282	1031	233820	1
4	1	13	94.5	1940	-	-	557099	1
5	2	13	60	1037	1623	-	879528	1
6	2	13	94.7	1871	1655	-	1201475	1
7	1	13	59.4	1529	-	-	194479	1
8	3	13	63.2	1059	1674	1129	516577	1

Bin5 Statistics 23

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	3	12	59	1903	1314	1175	754536	1
1	1	12	69.8	1112	-	-	1047374	1
2	1	12	74.3	1267	-	-	139236	1
3	2	12	74.9	1581	1220	-	429416	1
4	2	12	51.9	1238	1802	-	719631	1
5	2	12	74.1	1097	1190	-	1010567	1
6	3	12	72	1972	1429	1235	103134	1
7	2	12	87.4	1130	1890	-	393579	1
8	2	12	82.5	1016	1504	-	684169	1
9	3	12	66.8	1534	1004	1904	973032	1

Bin5 Statistics 24

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	1	20	66.5	1845	-	-	56300	1
1	1	20	100	1327	-	-	298539	1
2	1	20	91	1913	-	-	540431	1
3	2	20	95.1	1841	1125	-	781673	1
4	3	20	100	1670	1178	1073	26426	1
5	1	20	87.5	1712	-	-	268600	1
6	3	20	62	1091	1451	1393	509579	1
7	1	20	88.5	1457	-	-	753025	1
8	1	20	80.2	1283	-	-	995377	1
9	3	20	98.7	1672	1034	1974	238067	1
10	2	20	72.2	1498	1590	-	480231	1
11	3	20	86.6	1798	1481	1547	720754	1

Bin5 Statistics 25

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	1	18	65	1324	-	-	643241	1
1	3	18	67	1431	1445	1875	138547	1
2	2	18	99	1592	1524	-	299822	1
3	3	18	91.1	1293	1348	1658	459932	1
4	3	18	73.8	1194	1743	1161	620765	1
5	3	18	68.4	1096	1689	1284	118895	1
6	2	18	61.7	1126	1256	-	280308	1
7	2	18	58.3	1990	1006	-	441010	1
8	2	18	59.1	1733	1595	-	601670	1
9	1	18	51.6	1790	-	-	99442	1
10	1	18	71.3	1709	-	-	260727	1
11	2	18	63	1356	1277	-	421414	1
12	1	18	82.8	1605	-	-	583365	1
13	1	18	96.7	1100	-	-	79661	1
14	2	18	78.8	1144	1883	-	240384	1
15	2	18	55.8	1191	1020	-	401831	1
16	3	18	63.5	1465	1960	1377	560788	1
17	2	18	59.5	1740	1003	-	59631	1

Bin5 Statistics 26

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	1	18	52.3	1617	-	-	398278	1
1	1	18	70	1734	-	-	688857	1
2	1	18	50.1	1319	-	-	979813	1
3	2	18	81.6	1713	1084	-	71761	1
4	3	18	57.8	1684	1629	1382	361547	1
5	2	18	70	1111	1963	-	652329	1
6	2	18	62.3	1692	1823	-	942275	1
7	1	18	64.9	1389	-	-	36038	1
8	2	18	72.9	1193	1224	-	326459	1
9	2	18	98.7	1656	1236	-	616666	1

Bin5 Statistics 27

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	2	19	82.5	1863	1169	-	502810	1
1	2	19	71.6	1530	1669	-	128	1
2	2	19	64.4	1805	1171	-	161094	1
3	2	19	60.7	1969	1079	-	322025	1
4	1	19	91	1554	-	-	484060	1
5	1	19	72.5	1850	-	-	645084	1
6	3	19	54.8	1892	1677	1093	140907	1
7	1	19	57.2	1941	-	-	302704	1
8	1	19	76	1060	-	-	464535	1
9	3	19	60.8	1584	1578	1110	622945	1
10	2	19	50.2	1422	1360	-	121474	1
11	3	19	53.5	1415	1094	1516	281959	1
12	1	19	75.7	1998	-	-	444024	1
13	1	19	74.2	1443	-	-	605733	1
14	1	19	57.7	1124	-	-	101895	1
15	1	19	64.9	1278	-	-	263249	1
16	3	19	78.7	1270	1109	1635	422881	1
17	3	19	77.9	1496	1022	1561	583538	1

Bin5 Statistics 28

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	1	15	62.3	1613	-	-	134230	1
1	2	15	53.2	1981	1996	-	397554	1
2	3	15	58.6	1338	1227	1562	661078	1
3	1	15	56.1	1777	-	-	926657	1
4	1	15	75	1195	-	-	101727	1
5	2	15	70.7	1836	1010	-	365463	1
6	2	15	96.3	1476	1765	-	629124	1
7	2	15	52.2	1128	1141	-	893716	1
8	3	15	86.5	1095	1730	1147	68996	1
9	3	15	83.4	1699	1879	1685	332218	1
10	1	15	59.1	1681	-	-	597486	1

Bin5 Statistics 29

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	3	12	78.9	1355	1812	1499	523691	1
1	1	12	78.7	1381	-	-	22356	1
2	3	12	58.8	1290	1436	1542	182911	1
3	2	12	95.6	1846	1792	-	343891	1
4	3	12	63	1107	1501	1569	504286	1
5	3	12	75.9	1115	1028	1210	2474	1
6	3	12	87.5	1388	2000	1297	163020	1
7	2	12	87.2	1930	1607	-	324133	1
8	3	12	60.5	1721	1923	1342	483903	1
9	1	12	72.1	1784	-	-	647500	1
10	3	12	60.3	1779	1462	1040	143331	1
11	1	12	91.8	1485	-	-	305264	1
12	1	12	71.6	1662	-	-	466467	1
13	2	12	79.8	1208	1233	-	627016	1
14	1	12	52.6	1893	-	-	123988	1
15	1	12	59.2	1069	-	-	285570	1
16	1	12	98.9	1259	-	-	446871	1
17	3	12	94.4	1289	1486	1791	605231	1

Bin5 Statistics 30

Trial #	Pulse	Chirp (MHz)	Pulse Width (µS)	PRF-1 (µS)	PRF-2 (µS)	PRF-3 (µS)	Pulse Start(µS)	Detection (1:yes; 0:no)
0	3	11	75.9	1594	1728	1621	98155	1
1	1	11	73.9	1252	-	-	251607	1
2	2	11	93	1055	1026	-	403949	1
3	2	11	91.4	1856	1653	-	555360	1
4	2	11	84.5	1307	1523	-	79702	1
5	1	11	52.6	1735	-	-	232598	1
6	3	11	69.6	1254	1536	1189	383982	1
7	3	11	90	1416	1521	1604	535715	1
8	1	11	76.3	1780	-	-	61021	1
9	2	11	96.7	1163	1888	-	213335	1
10	3	11	93.8	1038	1467	1205	365390	1
11	3	11	64.4	1204	1773	1880	516722	1
12	3	11	88.8	1412	1039	1332	42072	1
13	2	11	86	1440	1597	-	194563	1

14	3	11	71.5	1207	1929	1776	345969	1
15	1	11	98.1	1000	-	-	501064	1
16	2	11	97.2	1600	1378	-	23346	1
17	2	11	82.2	1482	1831	-	175708	1
18	3	11	91.4	1099	1232	1999	327551	1

Table-6 Radar Type 6 Statistical Performance

Trial #	Fc (MHz)	Pulse /Burst	Pulse Width (µS)	PRI (µs)	Detection (1:yes; 0:no)	Hopping Sequence
1	5260.0	9	1.0	333	1	5525.0, 5294.0, 5454.0, 5623.0, 5561.0, 5372.0, 5398.0, 5387.0, 5600.0, 5359.0, 5481.0, 5532.0, 5433.0, 5644.0, 5346.0, 5626.0, 5584.0, 5311.0, 5459.0, 5627.0, 5380.0, 5264.0, 5499.0, 5278.0, 5633.0, 5463.0, 5523.0, 5651.0, 5717.0, 5485.0, 5645.0, 5469.0, 5480.0, 5443.0, 5479.0, 5568.0, 5334.0, 5290.0, 5435.0, 5395.0, 5488.0, 5344.0, 5472.0, 5598.0, 5513.0, 5508.0, 5457.0, 5701.0, 5575.0, 5594.0, 5657.0, 5604.0, 5577.0, 5601.0, 5573.0, 5426.0, 5350.0, 5611.0, 5419.0, 5666.0, 5708.0, 5279.0, 5406.0, 5663.0, 5363.0, 5565.0, 5669.0, 5309.0, 5673.0, 5400.0, 5648.0, 5358.0, 5620.0, 5707.0, 5304.0, 5377.0, 5325.0, 5632.0, 5586.0, 5672.0, 5520.0, 5285.0, 5410.0, 5528.0, 5407.0, 5338.0, 5637.0, 5616.0, 5453.0, 5274.0, 5695.0, 5261.0, 5376.0, 5587.0, 5621.0, 5331.0, 5544.0, 5348.0, 5656.0, 5526.0
2	5260.0	9	1.0	333	1	5680.0, 5375.0, 5276.0, 5635.0, 5660.0, 5252.0, 5285.0, 5398.0, 5348.0, 5699.0, 5439.0, 5264.0, 5301.0, 5259.0, 5565.0, 5677.0, 5520.0, 5369.0, 5522.0, 5269.0, 5329.0, 5560.0, 5445.0, 5293.0, 5470.0, 5324.0, 5395.0, 5646.0, 5511.0, 5453.0, 5480.0, 5572.0, 5666.0, 5457.0, 5516.0, 5600.0, 5624.0, 5310.0, 5723.0, 5651.0, 5370.0, 5361.0, 5625.0, 5571.0, 5582.0, 5648.0, 5272.0, 5327.0, 5512.0, 5562.0, 5314.0, 5539.0, 5287.0, 5622.0, 5407.0, 5617.0, 5253.0, 5577.0, 5708.0, 5612.0, 5673.0, 5459.0, 5389.0, 5508.0, 5481.0, 5342.0, 5548.0, 5482.0, 5298.0, 5277.0, 5388.0, 5302.0, 5307.0, 5507.0, 5462.0, 5451.0, 5672.0, 5355.0, 5254.0, 5669.0, 5332.0, 5426.0, 5538.0, 5596.0, 5611.0, 5496.0, 5343.0, 5379.0, 5435.0, 5290.0, 5579.0, 5693.0, 5606.0, 5474.0, 5256.0, 5675.0, 5592.0, 5304.0, 5615.0, 5382.0
3	5260.0	9	1.0	333	1	5367.0, 5474.0, 5695.0, 5429.0, 5574.0, 5369.0, 5518.0, 5280.0, 5604.0, 5326.0, 5628.0, 5283.0, 5461.0, 5544.0, 5300.0, 5404.0, 5299.0, 5582.0, 5361.0, 5652.0, 5541.0, 5384.0, 5509.0, 5309.0, 5683.0, 5685.0, 5409.0, 5278.0, 5292.0, 5427.0, 5549.0, 5508.0, 5444.0, 5436.0, 5529.0, 5635.0, 5551.0, 5388.0, 5314.0, 5401.0, 5270.0, 5716.0, 5643.0, 5279.0, 5397.0, 5363.0, 5533.0, 5627.0, 5615.0, 5462.0, 5331.0, 5522.0, 5590.0, 5338.0, 5599.0, 5472.0, 5359.0, 5488.0, 5521.0, 5348.0,

						5304.0, 5251.0, 5260.0, 5494.0, 5645.0, 5470.0, 5478.0, 5598.0, 5351.0, 5611.0, 5424.0, 5265.0, 5512.0, 5687.0, 5483.0, 5569.0, 5526.0, 5416.0, 5653.0, 5681.0, 5312.0, 5261.0, 5666.0, 5349.0, 5432.0, 5319.0, 5475.0, 5536.0, 5255.0, 5715.0, 5393.0, 5288.0, 5489.0, 5360.0, 5490.0, 5458.0, 5614.0, 5655.0, 5601.0, 5493.0
4	5260.0	9	1.0	333	1	5303.0, 5599.0, 5663.0, 5270.0, 5515.0, 5478.0, 5475.0, 5335.0, 5356.0, 5678.0, 5565.0, 5266.0, 5560.0, 5367.0, 5546.0, 5620.0, 5418.0, 5447.0, 5406.0, 5438.0, 5273.0, 5488.0, 5535.0, 5268.0, 5526.0, 5457.0, 5645.0, 5642.0, 5412.0, 5653.0, 5269.0, 5360.0, 5464.0, 5316.0, 5586.0, 5603.0, 5487.0, 5510.0, 5598.0, 5340.0, 5344.0, 5252.0, 5671.0, 5523.0, 5341.0, 5322.0, 5496.0, 5377.0, 5516.0, 5601.0, 5338.0, 5339.0, 5389.0, 5298.0, 5525.0, 5493.0, 5582.0, 5382.0, 5501.0, 5702.0, 5568.0, 5278.0, 5517.0, 5545.0, 5616.0, 5644.0, 5306.0, 5456.0, 5357.0, 5407.0, 5643.0, 5435.0, 5618.0, 5253.0, 5293.0, 5600.0, 5547.0, 5524.0, 5520.0, 5687.0, 5541.0, 5420.0, 5279.0, 5596.0, 5610.0, 5386.0, 5669.0, 5531.0, 5694.0, 5434.0, 5415.0, 5327.0, 5408.0, 5609.0, 5715.0, 5454.0, 5569.0, 5660.0, 5428.0, 5677.0
5	5260.0	9	1.0	333	1	5309.0, 5377.0, 5641.0, 5408.0, 5464.0, 5566.0, 5528.0, 5419.0, 5343.0, 5507.0, 5656.0, 5454.0, 5460.0, 5703.0, 5631.0, 5712.0, 5258.0, 5710.0, 5251.0, 5681.0, 5287.0, 5635.0, 5514.0, 5457.0, 5333.0, 5720.0, 5378.0, 5559.0, 5268.0, 5701.0, 5719.0, 5692.0, 5621.0, 5512.0, 5552.0, 5498.0, 5640.0, 5425.0, 5371.0, 5650.0, 5435.0, 5576.0, 5607.0, 5316.0, 5445.0, 5319.0, 5687.0, 5649.0, 5584.0, 5274.0, 5412.0, 5356.0, 5662.0, 5515.0, 5652.0, 5493.0, 5286.0, 5423.0, 5478.0, 5390.0, 5690.0, 5382.0, 5354.0, 5341.0, 5439.0, 5540.0, 5291.0, 5442.0, 5380.0, 5284.0, 5302.0, 5562.0, 5453.0, 5643.0, 5705.0, 5699.0, 5679.0, 5458.0, 5368.0, 5353.0, 5683.0, 5657.0, 5295.0, 5680.0, 5569.0, 5447.0, 5360.0, 5622.0, 5555.0, 5440.0, 5321.0, 5303.0, 5630.0, 5335.0, 5495.0, 5462.0, 5604.0, 5281.0, 5300.0, 5544.0
6	5260.0	9	1.0	333	0	-
7	5260.0	9	1.0	333	1	5479.0, 5719.0, 5587.0, 5444.0, 5307.0, 5435.0, 5585.0, 5474.0, 5498.0, 5581.0, 5662.0, 5251.0, 5513.0, 5385.0, 5488.0, 5430.0, 5442.0, 5351.0, 5291.0, 5712.0, 5292.0, 5533.0, 5387.0, 5268.0, 5499.0, 5463.0, 5280.0, 5630.0, 5336.0, 5382.0, 5481.0, 5340.0, 5391.0, 5370.0, 5605.0, 5507.0, 5569.0, 5354.0, 5398.0, 5576.0, 5486.0, 5288.0, 5664.0, 5403.0, 5623.0, 5546.0, 5296.0, 5260.0, 5456.0, 5636.0,

						5349.0, 5689.0, 5596.0, 5713.0, 5475.0, 5700.0, 5509.0, 5299.0, 5467.0, 5570.0, 5396.0, 5363.0, 5493.0, 5660.0, 5458.0, 5434.0, 5701.0, 5353.0, 5265.0, 5480.0, 5527.0, 5404.0, 5525.0, 5617.0, 5306.0, 5539.0, 5604.0, 5648.0, 5522.0, 5594.0, 5514.0, 5410.0, 5622.0, 5645.0, 5717.0, 5449.0, 5674.0, 5502.0, 5277.0, 5547.0, 5294.0, 5399.0, 5656.0, 5492.0, 5568.0, 5583.0, 5598.0, 5615.0, 5450.0, 5345.0
8	5260.0	9	1.0	333	1	5717.0, 5332.0, 5451.0, 5508.0, 5399.0, 5308.0, 5607.0, 5497.0, 5265.0, 5284.0, 5632.0, 5453.0, 5657.0, 5665.0, 5620.0, 5563.0, 5338.0, 5403.0, 5591.0, 5337.0, 5650.0, 5686.0, 5368.0, 5466.0, 5353.0, 5289.0, 5262.0, 5564.0, 5404.0, 5348.0, 5316.0, 5347.0, 5633.0, 5341.0, 5484.0, 5291.0, 5505.0, 5315.0, 5714.0, 5263.0, 5383.0, 5273.0, 5592.0, 5333.0, 5528.0, 5516.0, 5380.0, 5479.0, 5352.0, 5590.0, 5695.0, 5474.0, 5386.0, 5514.0, 5664.0, 5519.0, 5555.0, 5296.0, 5549.0, 5493.0, 5697.0, 5596.0, 5297.0, 5325.0, 5501.0, 5365.0, 5457.0, 5342.0, 5359.0, 5610.0, 5539.0, 5448.0, 5310.0, 5689.0, 5660.0, 5666.0, 5557.0, 5260.0, 5443.0, 5646.0, 5456.0, 5377.0, 5432.0, 5531.0, 5685.0, 5649.0, 5370.0, 5522.0, 5387.0, 5651.0, 5680.0, 5616.0, 5382.0, 5375.0, 5286.0, 5599.0, 5679.0, 5578.0, 5705.0, 5639.0
9	5260.0	9	1.0	333	0	-
10	5260.0	9	1.0	333	0	-
11	5260.0	9	1.0	333	1	5698.0, 5631.0, 5461.0, 5601.0, 5718.0, 5528.0, 5648.0, 5513.0, 5348.0, 5650.0, 5622.0, 5462.0, 5539.0, 5540.0, 5662.0, 5416.0, 5420.0, 5529.0, 5520.0, 5485.0, 5523.0, 5585.0, 5713.0, 5576.0, 5634.0, 5586.0, 5433.0, 5488.0, 5358.0, 5579.0, 5307.0, 5275.0, 5505.0, 5406.0, 5492.0, 5382.0, 5550.0, 5268.0, 5707.0, 5625.0, 5425.0, 5370.0, 5424.0, 5419.0, 5680.0, 5670.0, 5687.0, 5468.0, 5339.0, 5325.0, 5548.0, 5517.0, 5449.0, 5440.0, 5465.0, 5652.0, 5551.0, 5435.0, 5609.0, 5667.0, 5545.0, 5297.0, 5251.0, 5685.0, 5589.0, 5288.0, 5581.0, 5642.0, 5542.0, 5421.0, 5535.0, 5533.0, 5457.0, 5355.0, 5430.0, 5615.0, 5337.0, 5287.0, 5500.0, 5514.0, 5311.0, 5463.0, 5378.0, 5575.0, 5452.0, 5657.0, 5299.0, 5345.0, 5654.0, 5665.0, 5269.0, 5501.0, 5690.0, 5592.0, 5359.0, 5330.0, 5640.0, 5593.0, 5289.0, 5284.0
12	5260.0	9	1.0	333	1	5330.0, 5342.0, 5566.0, 5649.0, 5394.0, 5540.0, 5531.0, 5317.0, 5584.0, 5355.0, 5666.0, 5498.0, 5573.0, 5701.0, 5525.0, 5646.0, 5432.0, 5316.0, 5612.0, 5705.0, 5491.0, 5465.0, 5704.0, 5520.0, 5694.0, 5647.0, 5346.0, 5386.0, 5563.0, 5710.0, 5416.0, 5392.0, 5280.0, 5283.0, 5286.0,