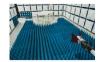


# PCTEST

18855 Adams Court, Morgan Hill, CA 95037 USA Tel. 410.290.6652 / Fax 410.290.6654 http://www.pctest.com



# MEASUREMENT REPORT FCC PART 15.407 / ISED RSS-247 DFS

<b>Applicant Name:</b> Apple Inc. One Apple Park Way	Date of Testing: 05/01/2020-07/22/2020 Test Site/Location:				
Cupertino, CA 95014	PCTEST. Morgan Hill, CA, USA				
United States	Test Report Serial No.:				
	1C2004270033-08.BCG				
FCC ID:	BCGA2428				
IC:	579C-A2428				
APPLICANT:	Apple Inc.				
Application Type:	Certification				
Mode/HVIN:	A2428				
EUT Type:	Client Only Device, No Radar Detection Capability				
Max. RF Output Power:	96.828 mW (19.86 dBm) Conducted				
	(802.11n UNII Band 2A)				
	109.396 mW (20.39 dBm) Conducted				
	(802.11n UNII Band 2C)				
Frequency Range:	5250 – 5350 MHz (UNII-2A Band)				
	5470 – 5725 MHz (UNII-2C Band)				
FCC Classification:	Unlicensed National Information Infrastructure (UNII)				
FCC Rule Part(s):	Part 15 Subpart E (15.407)				
ISED Specification:	RSS-247 Issue 2				
Test Procedure(s):	KDB 905462 D02 v02				

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 905462 D02 v02 Compliance Measurement Procedures for Unlicensed-National Information Infrastructure Devices Operating in the 5.25 - 5.35 GHz and 5.47 - 5.725 GHz Bands Incorporating Dynamic Frequency Selection. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Randy Ortanez President



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# 1.0 INTRODUCTION

## 1.1 Scope

This report has been prepared to demonstrate compliance with the requirements for Dynamic Frequency Selection (DFS) as stated in KDB 905462 D02 v02. As of July 20, 2007, all devices operating in the 5250 – 5350 MHz and/or the 5470 – 5725 MHz bands (excluding 5600-5650MHz for ISED Canada) must comply with the DFS requirements.

## 1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST facility located at 18855 Adams Court, Morgan Hill, CA 95037. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014 and KDB 414788 D01 v01r01.

## **1.3 Test Facility / Accreditations**

Measurements were performed at PCTEST located in Morgan Hill, CA 95037, U.S.A.

- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.02 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).
- PCTEST facility is a registered (22831) test laboratory with the site description on file with ISED.

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# 2.0 **PRODUCT INFORMATION**

## 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Apple Tablet Device FCC ID: BCGA2428**. The test data contained in this report pertains only to the emissions due to the EUT's UNII transmitter. As the EUT does not have radar detection capability it was evaluated as a Client Only Device. All test results reported herein are applicable to the sample selected for testing.

#### Mode of Operation:

Master Device	
Client Device (No radar detection)	$\square$
Client Device with Radar Detection	

Test Device Serial No.: F9FCN075Q7KN

## 2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n WLAN, 802.11a/n/ac UNII, Bluetooth (1x, EDR, LE)

	Band 1			Band 2A			Band 2C		Band 3	
Ch.	Frequency (MHz)		Ch.	Frequency (MHz)		Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	
36	5180		52	5260		100	5500	149	5745	
:	:		:			:	:	:	:	
42	5210		56	5280		116	5580	157	5785	
:	:		:			:	:	:	:	
48	5240		64	5320		144	5720	165	5825	

Table 2-1. 802.11a / 802.11n / 802.11ac (20MHz) Frequency / Channel Operations

	Band 1		Band 2A		Band 2C		Band 3
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
38	5190	54	5270	102	5510	151	5755
:	:	:	:	:	:	:	:
46	5230	62	5310	110	5550	159	5795
•		<u> </u>			:		

 142
 5710

 Table 2-2. 802.11n / 802.11ac (40MHz BW) Frequency / Channel Operations

_	Band 1	Band 2A			Band 2C		Band 3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)		Ch.	Frequency (MHz)
42	5210	58	5290	106	5530		155	5775
				:	:			
				138	5690			

## Table 2-3. 802.11ac (80MHz BW) Frequency / Channel Operations

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Following antenna was used for the testing.

	Antenna Gain (dBi)				
Frequency [GHz]	Antenna A	Antenna B			
5.150 - 5.250	1.27	2.64			
5.260 - 5.350	2.24	2.77			
5.470 – 5.725	3.39	3.17			
5.745 – 5.850	3.54	3.21			

Table 2-4. Highest Antenna Gain

# 2.4 Test Support Equipment

The following equipment was used in support of the DFS testing.

Device	Manufacturer	Model	Description	S/N:	FCC ID:
Master	Apple	A1521	Access Point	C86L3BA8FJ1R	BCGA1521
	Apple	MacBook Air	Controller	C02P41RZG086	QDS-BRCM1072
Client	Apple	Apple TV	Controller	C0754033HHFP	BCGA1625
		MacBook Air	Controller	C02P41RZG086	QDS-BRCM1072
		Kanzi	Lightning Cable	2092FC	N/A
	Dell	U24177HJ	Monitor Display	0RXP1N-74261- 71Q-0APL-A01	N/A

Table 2-5. Test Support Equipment List

# 2.5 Master Parameters

Parameters of Master:		
Minimum Antenna Gain	1.4 dBi	
EIRP Level:	>23 dBm	
Access Point Software Version	7.7.9	

Table 2-6. Parameters of Master

## 2.6 Software and Firmware

The test was done with firmware version 18A325 installed on the EUT.

# 2.7 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

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# 3.0 DESCRIPTION OF TESTS

## 3.1 Evaluation Procedure

The measurement procedures described in KDB 905462 D02 v02 were used in the measurement of the EUT. Radiated test methodology was used for the DFS evaluation procedure of the EUT. No deviations to the test procedure and test methods occurred during the evaluation of the EUT.

Deviation from measurement procedure.....None

## 3.2 Environmental Conditions

The temperature is controlled within range of 15°C to 35°C. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

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# 4.0 ANTENNA REQUIREMENTS

#### Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antennas of the EUT are permanently attached.
- There are no provisions for connection to an external antenna.

#### **Conclusion:**

The EUT complies with the requirement of §15.203.

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# 5.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the  $U_{CISPR}$  measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty
Time	± 0.02%

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# 6.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal. Date	Cal. Interval	Cal. Due Date	Serial No.
Aeroflex	3025C	PXI RF Synthesizer	07/25/2018	Biennial	07/25/2020	302570726
Aeroflex	3035C	PXI RF Digitizer	07/25/2018	Biennial	07/25/2020	303570427
ETS-Lindgren	3117	Double Ridged Guide Antenna	04/21/2020	Annual	04/21/2021	205956
Agilent Technologies	N9030A	3 Hz-44GHz PXA Signal Analyzer	03/04/2020	Annual	03/04/2021	MY49430244
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Antenna	11/14/2019	Annual	11/14/2020	101057

Table 6-1. Test Equipment List

#### Note:

For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

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# 7.0 DESCRIPTION OF DYNAMIC FREQUENCY SELECTION TEST

# 7.1 Applicability

The following table from KDB 905462 D02 v02 lists the applicable requirements for the DFS testing. The device evaluated in this report is considered a client device without radar detection capability.

	Operational Mode			
Requirement	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 7-1. DFS Applicability

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

Table 7-2. DFS Applicability During Normal Operation

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 7-3. Additional Requirement for Devices with Multiple Bandwidth Modes

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Per KDB 905462 D02 v02 the operational behavior and individual DFS requirements associated with these modes are as follows:

#### 7.1.1 Master Devices:

- a) The Master Device will use DFS in order to detect Radar Waveforms with received signal strength above the DFS Detection Threshold in the 5250 5350 MHz and 5470 5725 MHz bands. DFS is not required in the 5150 5250 MHz or 5725 5850 MHz bands.
- b) Before initiating a network on a Channel, the Master Device will perform a Channel Availability Check for a specified time duration (Channel Availability Check Time) to ensure that there is no radar system operating on the Channel, using DFS described under subsection a) above.
- c) The Master Device initiates a U-NII network by transmitting control signals that will enable other U-NII devices to Associate with the Master Device.
- d) During normal operation, the Master Device will monitor the Channel (In-Service Monitoring) to ensure that there is no radar system operating on the Channel, using DFS described under a).
- e) If the Master Device has detected a Radar Waveform during In-Service Monitoring as described under d), the Operating Channel of the U-NII network is no longer an Available Channel. The Master Device will instruct all associated Client Device(s) to stop transmitting on this Channel within the Channel Move Time. The transmissions during the Channel Move Time will be limited to the Channel Closing Transmission Time.
- f) Once the Master Device has detected a Radar Waveform it will not utilize the Channel for the duration of the Non-Occupancy Period.
- g) If the Master Device delegates the In-Service Monitoring to a Client Device, then the combination will be tested to the requirements described under d) through f) above.

#### 7.1.2 Client Devices:

- a) A Client Device will not transmit before having received appropriate control signals from a Master Device.
- b) A Client Device will stop all its transmissions whenever instructed by a Master Device to which it is associated and will meet the Channel Move Time and Channel Closing Transmission Time requirements. The Client Device will not resume any transmissions until it has again received control signals from a Master Device.
- c) If a Client Device is performing In-Service Monitoring and detects a Radar Waveform above the DFS Detection Threshold, it will inform the Master Device. This is equivalent to the Master Device detecting the Radar Waveform and d) through f) of section 5.1.1 apply.
- d) Irrespective of Client Device or Master Device detection the Channel Move Time and Channel Closing Transmission Time requirements remain the same.
- e) The client test frequency must be monitored to ensure no transmission of any type has occurred for 30 minutes. Note: If the client moves with the master, the device is considered compliant if nothing appears in the client nonoccupancy period test. For devices that shutdown (rather than moving channels), no beacons should appear.

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# 7.2 DFS Detection Threshold Values

The DFS detection thresholds are defined for Master devices and Client Devices with In-service monitoring. These detection thresholds are listed in the following table.

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 an	ntenna.

**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.

**Note 3:** EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.

Table 7-4: Detection Thresholds for Master Devices and Client Devices with Radar Detection

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# 7.3 DFS Response Requirements

DFS response requirements for Master and Client Devices are listed in the following table.

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note1
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Note 1 and 2.
U-NII Detection Bandwidth	Minimum 100% of the U- NII 99% transmission power bandwidth. See Note 3.
Note 1: Channel Mayo Time and the Channel Classic	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.

frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

Table 7-5: DFS Response Requirements

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# 7.5 Parameters of DFS Test Signals

As the EUT is a Client Device with no Radar Detection only one type radar pulse is required for the testing. Radar Pulse type 0 was used in the evaluation of the Client device for the purpose of measuring the Channel Move Time and the Channel Closing Transmission Time. Table 7-6 lists the parameters for the Short Pulse Radar Waveforms. A plot of the Radar Pulse Type 0 used for testing is included in Section 7.7 of this report.

Radar Type	Pulse Width (µsec)	PRI (µsec)	Number of 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,	$\operatorname{Roundup}\left\{\frac{1}{360},\frac{19.10^6}{PRI_{\mu sec}}\right\}$	60%	30
2	1-5	excluding PRI values selected in Test A 150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggrega	Aggregate (Radar Types 1-4)				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 7-6: Parameters for Short Pulse Radar Waveforms

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

Table 7-7. Parameters for Long Pulse Radar Waveforms

FCC ID: BCGA2428	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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Radar Type	Pulse Width (µsec)	PRI (µsec)	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

Table 7-8. Parameters for Frequency Hopping Radar Waveforms

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## 7.6 System Overview and Procedure

DFS Test Setup per KDB 905462 D02 V02:

Radiated DFS Test Setup	$\square$
Conducted DFS Test Setup	

KDB 905462 D02 v02 describes radiated test setup and conducted test setup. DFS testing was performed using radiated test setup, as seen in Figure 7-1 below. One channel was selected in Band UNII-2C, between 5470-5725 MHz, for testing.

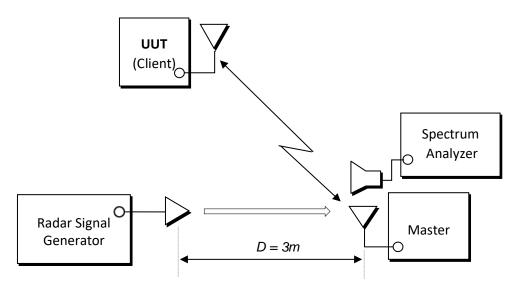


Figure 7-1. Radiated Test Setup for DFS

- 1. The "Aeroflex PXI DFS Radar Simulator and Analyzer Test Suite" is setup to provide a simulated radar pulse at the frequency that the Master and Client are operating. A Type 0 radar pulse was used.
- 2. The Client Device (EUT) is set up per the diagram in Figure 7-1 and communications between the Master device and the Client is established.
- 3. The FCC video test file is streamed from the Master to the Client to properly load the network.
- 4. The "Aeroflex PXI DFS Radar Simulator and Analyzer Test Suite" is set to record and display 12 seconds of time, starting from where the simulated radar is generated. This time domain plot captures any transmissions occurring up to and after 10 seconds. Aggregate time is computed to ensure compliance. (Note: the channel may be different since the Master and Client have changed channels due to the detection of the initial radar pulse.)
- 5. After the initial radar burst the channel is monitored for 30 minutes to ensure no transmissions or beacons occur. A second monitoring setup is used to verify that the Master and Client have both moved to different channels.

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The following equipment setup was used to calibrate the Radar Waveform. A spectrum analyzer was used to establish the test signal level for each radar type. During this process, there were no transmissions by either the Master or Client Device. The spectrum analyzer was switched to the zero span (Time Domain) mode at the frequency of the Radar Waveform generator. Peak detection was utilized. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) were set to 3 MHz.

The signal generator amplitude is adjusted so that the power level measured at the spectrum analyzer is equal to the DFS detection threshold -64 dBm. The required radiated threshold at the antenna port is -64dBm + 0dBi + 1dB = -63 dBm (Section 7.2).

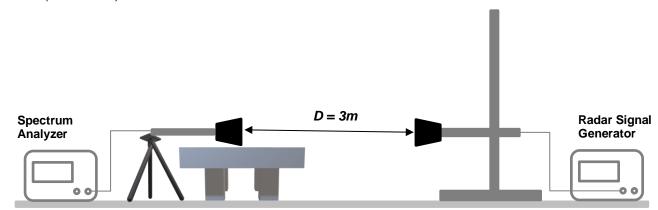


Figure 7-2. Radar Waveform Calibration

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## Radar Waveform Calibration Plot:

The radiated plots of the Radar Pulse Signals (Type 0) are given below after performing the system calibration as described in Section 7.7.

#### Short Pulse Radar Type 0:

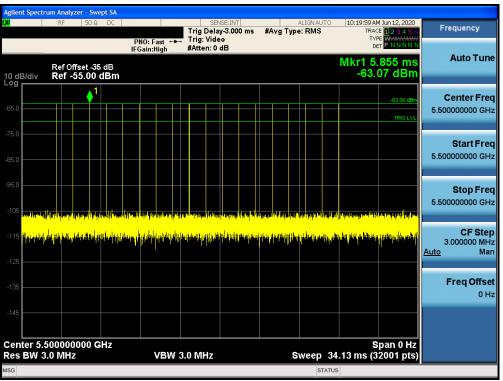


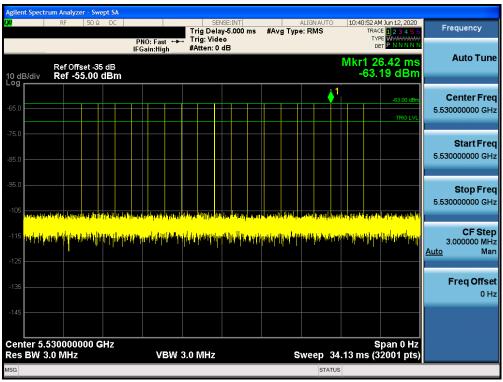
Figure 7-3. 5500MHz – Radar Pulse Type 0 (20MHz)

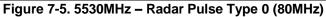
FCC ID: BCGA2428	Proud to be part of relement	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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-75.0														<b>Start Freq</b> 5.510000000 GHz
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-115 <mark>- 4444, 444</mark> -125	nela that a sur	<mark>in an shibin</mark>	<sup>ala</sup> n an	npe part	d <sub>in ma</sub> nn	The month of the second se	<mark>ilan</mark> aa a	¶ <sup>tµb</sup>	ad (e dif)	wijilij	i <mark>l kälu</mark> lia		<sup>iki</sup> r#Thui	CF Step 3.000000 MHz <u>Auto</u> Man
-135														<b>Freq Offset</b> 0 Hz
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MSG											STATUS	· · ·		

Figure 7-4. 5510MHz – Radar Pulse Type 0 (40MHz)





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# 8.0 EUT COMMUNICATION MODES

The EUT was tested in 4 different test configurations,

Mode 1: Client Mode

Mode 2: Client to Client

Mode 3: Peer to Peer (EUT)

Mode 4: Peer to Peer (Apple TV)

#### Mode 1: Client Mode

Client is connected to Master (AP) via WLAN network and plays a video test file "6 ½ Magic Hours" in a Server (Laptop). This Server is connected to the Master (AP) via ethernet cable. The Vivaldi antenna is adjusted so that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

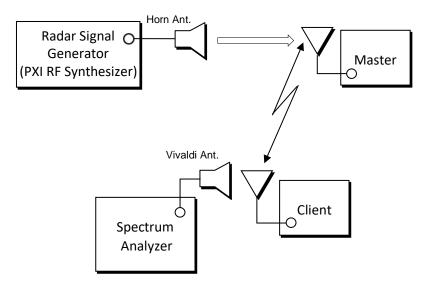


Figure 8-1. Test Setup (Mode 1)

FCC ID: BCGA2428	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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## Mode 2: Client-to-Client Communications Mode

Client plays the video test file that is streamed to generate WLAN while linked to Master and streamed the video through Apple TV to Monitor display. The Vivaldi antenna is adjusted so that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

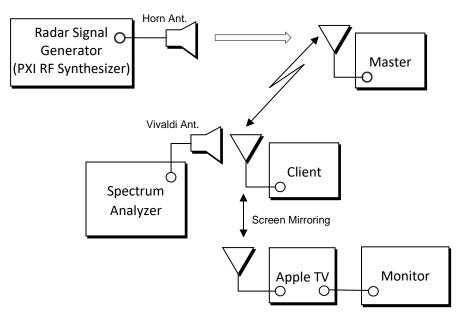


Figure 8-2. Test Setup (Mode 2)

FCC ID: BCGA2428	PCTEST <sup>®</sup> Proud to be part of <b>®</b> element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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#### Mode 3: Peer-to-Peer (EUT) Communications Mode

Generate and inject additional transmission:

- 1. Client and Apple TV must be linked to the Master.
- 2. Client plays video that is saved within its internal storage and begin mirroring screen via Apple TV.
- 3. Connect the Apple TV and Client to the support laptop and initiate additional transmission using iPerf.
- 4. After the additional transmission is injected, the Client must be disconnected to the Master.
- 5. Client stops and re-start mirroring screen.

Client plays video that is saved within its internal storage and streamed through Apple TV to the Monitor display. The receive antenna/ monitoring antenna is placed near the EUT. Additional data traffic was sent from the EUT (Client) to Apple TV (Server) using iPerf. The Vivaldi antenna is adjusted so that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

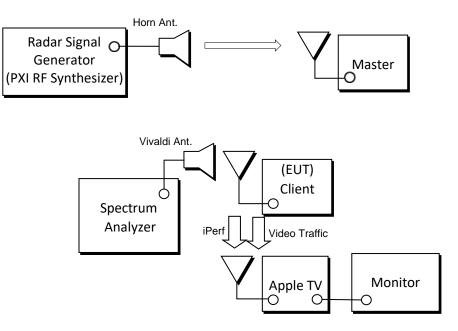


Figure 8-3. Test Setup (Mode 3)

FCC ID: BCGA2428	Proud to be part of relement	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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#### Mode 4: Peer-to-Peer (Apple TV) Communications Mode

Generate and inject additional transmission:

- 1. Client and Apple TV must be linked to the Master.
- 2. Client plays video that is saved within its internal storage and begin mirroring screen via Apple TV.
- 3. Connect the Apple TV and Client to the support laptop and initiate additional transmission using iPerf.
- 4. After the additional transmission is injected, the Client must be disconnected to the Master.
- 5. Client stops and re-start mirroring screen.

Client plays video that is saved within its internal storage and streamed through Apple TV to the Monitor display. The receive antenna/ monitoring antenna is placed near the Apple TV. Additional data traffic was sent from the Apple TV (Client) to the EUT (Server) using iPerf. The Vivaldi antenna is adjusted so that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

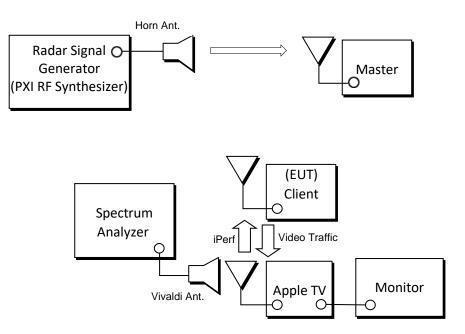


Figure 8-4. Test Setup (Mode 4)

In summary, for Modes 1 and Mode 2, Client is linked to the Master, and for Modes 3 and Mode 4, Client is not linked to the Master.

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#### **TEST RESULTS** 9.0

#### Summary 9.1

Company Name: FCC ID:

Apple Inc.

**BCGA2428** 

FCC Classification:

Unlicensed National Information Infrastructure (UNII)

				Measured			
	Mode	Parameter	20MHz Bandwidth	40MHz Bandwidth	80MHz Bandwidth	Limit	Result
		Channel Move Time	4.137 s	4.096 s	0.145 s	10 seconds	Pass
	1 Client Mode	Channel Closing Transmission Time	< 200ms + 17.902 ms (aggregate)	< 200ms + 15.868 ms (aggregate)	< 200ms + 0.0 ms (aggregate)	200 ms + aggregate of 60ms over remaining 10 second period	Pass
la)		Non- Occupancy Period	Monitored for 30 minutes with no client transmission	Monitored for 30 minutes with no client transmission	Monitored for 30 minutes with no client transmission	30 Minutes	Pass
anad		Channel Move Time	4.107 s	4.140 s	2.835 s	10 seconds	Pass
z ISED C	6xcluding 5600-5725 MHz for ISED Canada) (excluding 5600-5650MHz for ISED Canada) UNII – 2C Band Client to tuend to tuend Client	Channel Closing Transmission Time	< 200ms + 17.443 ms (aggregate)	< 200ms + 0.034 ms (aggregate)	< 200ms + 0.244 ms (aggregate)	200 ms + aggregate of 60ms over remaining 10 second period	Pass
5725 MH 0MHz for 2C Banc		Non- Occupancy Period	Monitored for 30 minutes with no client transmission	Monitored for 30 minutes with no client transmission	Monitored for 30 minutes with no client transmission	30 Minutes	Pass
0 – 5 5650 III – 2		Channel Move Time	4.160 s	4.678 s	1.287 s	10 seconds	Pass
5470 - g 5600-56 UNII	3 Peer to Peer	Channel Closing Transmission Time	< 200ms 17.926 ms (aggregate)	< 200ms + 12.075 ms (aggregate)	< 200ms + 0.0 ms (aggregate)	200 ms + aggregate of 60ms over remaining 10 second period	Pass
xcludin	(EUT)	Non- Occupancy Period	Monitored for 30 minutes with no client transmission	Monitored for 30 minutes with no client transmission	Monitored for 30 minutes with no client transmission	30 Minutes	Pass
e)		Channel Move Time	8.282 s	4.100 s	0.061 s	10 seconds	Pass
	<b>4</b> Peer to Peer	Channel Closing Transmission Time	< 200ms + 17.974 ms (aggregate)	< 200ms + 17.979 ms (aggregate)	< 200ms + 0.0 ms (aggregate)	200 ms + aggregate of 60ms over remaining 10 second period	Pass
	(Apple TV)	Non- Occupancy Period	Monitored for 30 minutes with no client transmission	Monitored for 30 minutes with no client transmission	Monitored for 30 minutes with no client transmission	30 Minutes	Pass

Table 9-1. Summary of Test Results

FCC ID: BCGA2428	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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- 1) The EUT was found to be compliant with the requirements for DFS as required for a Client Device per Part 15.407(h), RSS-247 and KDB 905462 D02 v02.
- 2) Automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The list is given below,
  - DFS threshold count v1.1
  - DFS Radar Simulator and Analyzer v2.8 (Aeroflex Inc.)
  - iPerf Software

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## 9.2.1 Channel Loading Mode 1:

#### **Channel Loading Notes:**

Per KDB 905462 D02 v02, timing plots are required with calculations demonstrating a minimum channel loading of approximately 17% or greater. Channel loading can be estimated by setting the spectrum analyzer for zero span and approximate the transmission time.

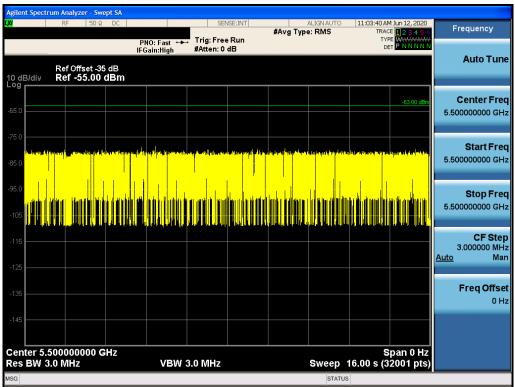
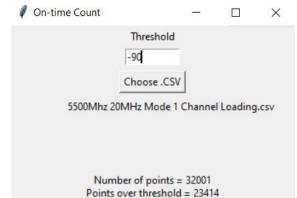
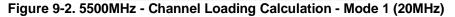


Figure 9-1. 5500MHz - Channel Loading - Mode 1 (20MHz)



Percentage = 73.17%



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	RF 50 Ω	DC		SEI	VSE:INT	#Avg Type	ALIGNAUTO e: RMS		MJun 12, 2020 E <b>1 2 3 4 5 6</b>	Frequency
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1105 <b>111</b> 1115									*#####################################	5.510000000 G CF Sto 3.000000 M
115	10000000 G			3.0 MHz					ipan 0 Hz	5.51000000 G CF Sto 3.00000 M <u>Auto</u> Freq Offs 0

Figure 9-3. 5510MHz - Channel Loading - Mode 1 (40MHz)

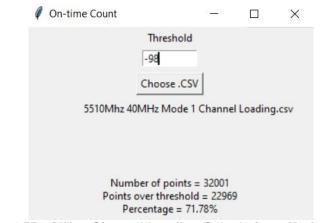


Figure 9-4 5510MHz - Channel Loading Calculation - Mode 1 (40MHz)

FCC ID: BCGA2428	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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agilent Spectrum Analyzer - Swept SA	CORREC SENSE:I	NT ALIGN AUTO	05:22:17 PM Jun 13, 2020	
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	IFGain:High #Atten: 0 dB		DET PNNNN	Auto Tune
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100				0 H
-145				
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Res BW 3.0 MHz	VBW 3.0 MHz		16.00 s (32001 pts)	

Figure 9-5. 5530MHz - Channel Loading - Mode 1 (80MHz)

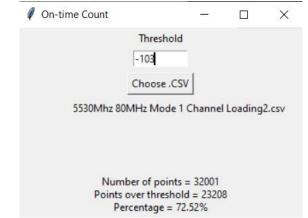


Figure 9-6. 5530MHz - Channel Loading Calculation - Mode 1 (80MHz)

FCC ID: BCGA2428	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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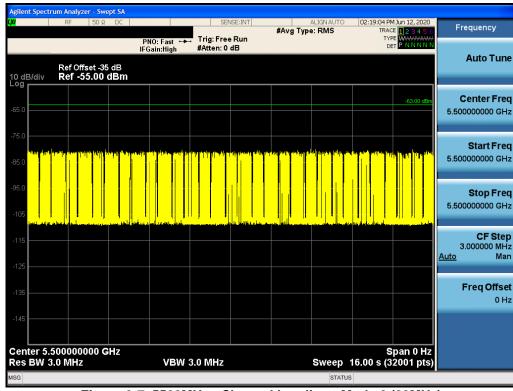


Figure 9-7. 5500MHz - Channel Loading - Mode 2 (20MHz)

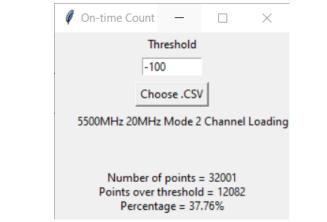


Figure 9-8. 5500MHz - Channel Loading Calculation - Mode 2 (20MHz)

FCC ID: BCGA2428	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager	
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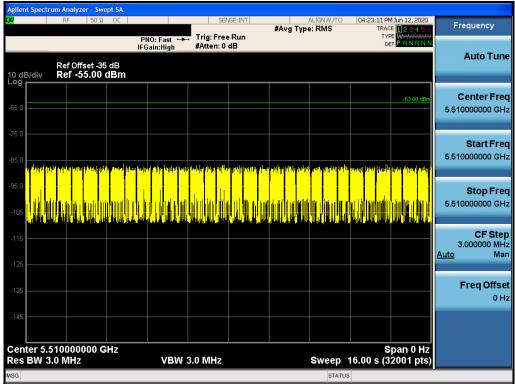


Figure 9-9. 5510MHz - Channel Loading - Mode 2 (40MHz)

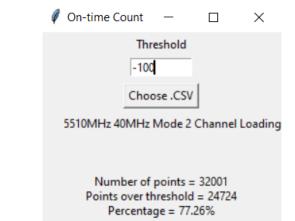


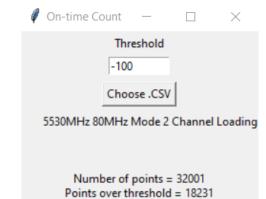
Figure 9-10 5510MHz - Channel Loading Calculation - Mode 2 (40MHz)

FCC ID: BCGA2428	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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1	RF 50	Ω DC		SEI	VSE:INT		ALIGN AUTO	05:18:52 PM	1 Jun 12, 2020	_
			PNO: Fast 🔸	Trig: Free		#Avg Typ	e: RMS	TYP	E 123456 E WWWWWWW T P N N N N N	Frequency
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95.0			Tiba Berdala paritika Kilon Derbar						epplemententen sistemilledet	<b>Stop Fre</b> 5.530000000 GH
.115										<b>CF Ste</b> 3.000000 MI <u>Auto</u> M
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C3 DW 0.									,	

Figure 9-11. 5530MHz - Channel Loading - Mode 2 (80MHz)



Percentage = 56.97%

Figure 9-12. 5530MHz - Channel Loading Calculation - Mode 2 (80MHz)

FCC ID: BCGA2428	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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## 9.2.3 Channel Loading Mode 3:

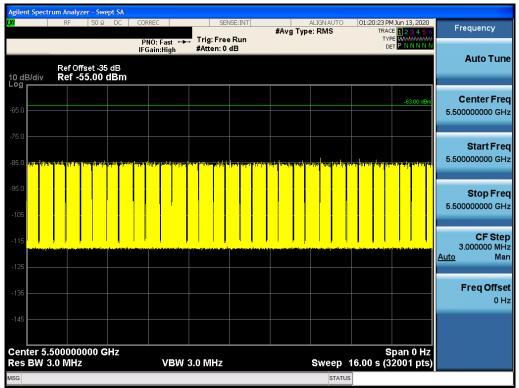


Figure 9-13. 5500MHz - Channel Loading - Mode 3 (20MHz)

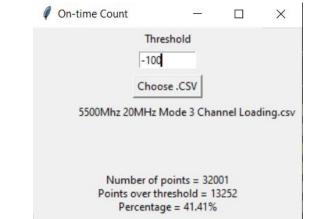


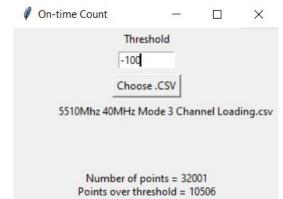
Figure 9-14. 5500MHz - Channel Loading Calculation - Mode 3 (20MHz)

FCC ID: BCGA2428	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager	
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-65.0																-63.00 dBm	5	Center Freq
-75.0																		
-85.0																	5	Start Freq 510000000 GHz
-95.0	i tilito de	6 44000	erine skolari	dha t	nın Ane	(1) (h)		WI W		ali tele listi	ri njike	a a la	e della sellata	11 in 1	udolla a ha khin	t ole bere dab		Stop Freq
-105											ļ						5	.510000000 GHz
-115								ļ						ļ				<b>CF Step</b> 3.000000 MHz
-125																	<u>Aut</u>	
-135																		Freq Offset 0 Hz
-145																		
Cen	ter 5.5	1000	0000	GH	7											Span 0 Hz		
	BW 3.			-Ori/			VBV	13.	0 MHz				Sweep	p 1	6.00 s (:	32001 pts)		
MSG													STA	TUS				

Figure 9-15. 5510MHz - Channel Loading - Mode 3 (40MHz)



Percentage = 32.83%

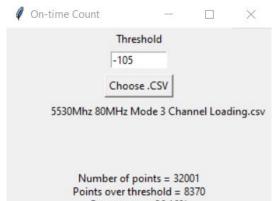
Figure 9-16 5510MHz - Channel Loading Calculation - Mode 3 (40MHz)

FCC ID: BCGA2428	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 33 of 54
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<mark>Swept SA</mark> ວດ DC CO	DRREC	SENSE:INT	ALIGNAUTO	01:29:54 PM Jun 13, 2020	Frequency
		Trig: Free Run #Atten: 0 dB	#Avg Type: RMS	TRACE 123456 TYPE WWWWWWW DET P N N N N N	
-35 dB 10 dBm					Auto Tun
				-63.00 dBm	Center Fre
					5.530000000 GH
					Start Fre 5.53000000 GH
					5.55000000 GP
na di Alimi Sandi d	the electric children in the	(An India Dep Men Difference	linne), einer verkeitigen eine vere	n Mener Alexandi Alika Mahala Alika Alika Alika.	Stop Fre 5.53000000 GH
					CF Ste 3.000000 MH Auto Ma
					Freq Offs 0 ⊦
GHz				Span 0 Hz	
	VBW 3.	0 MHz	Sweep	16.00 s (32001 pts)	
	32 DC   CC   F   F   F   F   F   F   F   F   F 	32       DC       CORREC         PN0: Fast IFGain:High       →         -35 dB       00 dBm         00 dBm       -         -37 dB       -         00 dBm       -         -38 dB       -         00 dBm       -         -38 dB       -         00 dBm       -         -38 dB       -         -39 dB       -         -39 dBm       -         -39 dB       -         -3	32 DC     CORREC     SENSE:INT       PNO: East IFGain:High     Trig: Free Run #Atten: 0 dB       -35 dB 00 dBm	32 DC     CORREC     SENSE:INT     ALIGNAUTO       PNO:     Fast     Trig:     Free Run       Job dBm     #Atten: 0 dB	0.2 DC     CORREC     SENSE.INT     ALIGN AUTO     D1:29:54 PM Jun 13, 2020       PN0: Fast     Trig: Free Run #Atten: 0 dB     #Avg Type: RMS     Trace     12.3 4 5 6       35 dB     Trig: Free Run #Atten: 0 dB

Figure 9-17. 5530MHz - Channel Loading - Mode 3 (80MHz)



Percentage = 26.16%

Figure 9-18. 5530MHz - Channel Loading Calculation - Mode 3 (80MHz)

FCC ID: BCGA2428	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:	Baga 24 of 54	
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## 9.2.4 Channel Loading Mode 4:

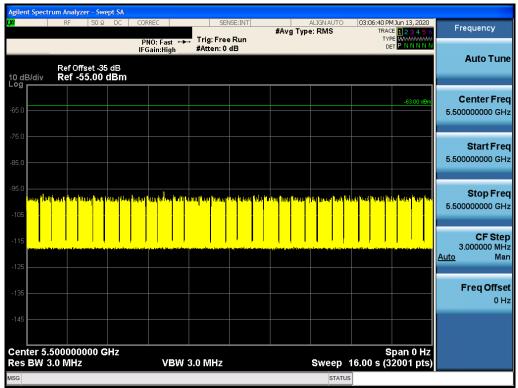


Figure 9-19. 5500 MHz - Channel Loading - Mode 4 (20MHz)

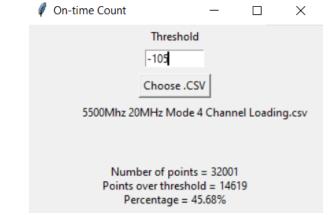


Figure 9-20. 5500MHz - Channel Loading Calculation - Mode 4 (20MHz)

FCC ID: BCGA2428	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:	Page 35 of 54	
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Agilent Spect	rum An RF		ept SA DC	CORR	EC	SE	VSE:INT		ALIGN AUTO	03:56:59 Pt	M Jun 13, 2020	
	T.	00 1	DC	PN	0:Fast ↔		e Run	#Avg Tyj		TRAC	CE 1 2 3 4 5 6 PE WWWWWW ET P N N N N	Frequency
10 dB/div	Ref <b>R</b> ef	Offset -38 f -55.00	5 dB dBm		g							Auto Tune
-65.0											-63.00 dBm	Center Freq 5.510000000 GHz
-75.0												Start Fred 5.510000000 GHz
-95.0	n <mark>101,</mark> 00 o.	ude prop. (AIMAM)	alda Bilda	r 141,41 94.9	dd wald platte	nte Neter Den e	elah, aberta sertinte		tuduo visik filles i	had wordte de la par	ine this fait land	<b>Stop Fred</b> 5.510000000 GHz
-115												CF Step 3.000000 MHz <u>Auto</u> Mar
-135												Freq Offse 0 Hz
Center 5.	.5100 3.0 M	00000 Q	€Hz		VBW	3.0 MHz			Sweep	S 16.00 s.(3	pan 0 Hz 2001 pts)	
ISG									STATUS			

Figure 9-21. 5510MHz - Channel Loading - Mode 4 (40MHz)

🖉 On-time Count	_		$\times$				
Thre -105	shold						
Choose .CSV 5510Mhz 40MHz Mode 4 Channel Loading.csv							
Number of points = 32001 Points over threshold = 6941 Percentage = 21.69%							

Figure 9-22. 5510MHz - Channel Loading Calculation - Mode 4 (40MHz)

FCC ID: BCGA2428	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:	Page 36 of 54	
1C2004270033-08.BCG	05/01/2020-07/22/2020	Tablet Device	Fage 30 01 54	
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l I	RF	<mark>yzer - Swe</mark> 50 Ω		CORRE	EC		SE	NSE:INT	#A T.		GNAUTO		PM Jun 13, 2020	Frequency
	-				): Fast in:High	•••	Trig: Fre #Atten: 0		#Avg T	уре:н	RMS	TR.	ACE 123456 TYPE WWWWWW DET PNNNNN	
0 dB/div	Ref O <b>Ref ·</b>	ffset -35 • <b>55.00</b> (	dB dBm											Auto Tun
													-63.00 dBm	Center Fre
55.0														5.530000000 GH
75.0														Start Fre 5.53000000 GH
35.0														5.530000000 GF
95.0	e. dk.01 1.53	at studies.	a that d	du con c	if		haddiae dd a'r aw	a tale a tal	o ti ba bata dati	ر		at Mattal Kakita	tend of the world is not	Stop Fre 5.53000000 GH
105	dinii aaabaa		and a second second	ana la Indi			ana inaiti	en anti-chan						
115				j National de la companya		, , 								CF Ste 3.000000 MH Auto Ma
125														
135														Freq Offs 0 H
145														
enter 5. tes BW 3			Hz		VB)	M 3	0 MHz				ween	16 00 s (	Span 0 Hz (32001 pts)	
GS DW	0.0.19111	-			0.00	- 0.	0 WII 12				STATU	<u> </u>	(ozori pis)	

Figure 9-23. 5530MHz - Channel Loading - Mode 4 (80MHz)

🖉 On-time Count				$\times$
	Threshold			
	-110			
		.1		
	Choose .CS	v I		
5530Mhz 8	OMHz Mode		nel Loadir	n <mark>g.cs</mark> v
5530Mhz 80			nel Loadir	n <mark>g.csv</mark>
	0MHz Mode 4	 4 Chanr		ng.csv
Num		 4 Chanr = 3200'	1	ng.csv

Figure 9-24. 5530MHz - Channel Loading Calculation - Mode 4 (80MHz)

FCC ID: BCGA2428	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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# 9.3 Channel Move/ Closing Transmission Time

## 9.3.1 Channel Move/ Closing Transmission Time Mode 1:

### <u>Result</u>

Parameter	20MHz Bandwidth	40MHz Bandwidth	80MHz Bandwidth	Limit
Channel Move Time	4.137 s	4.096 s	0.145 s	10 seconds
Channel Closing Transmission Time	< 200ms + 17.902 ms (aggregate)	< 200ms + 15.868 ms (aggregate)	< 200ms + 0.0 ms (aggregate)	200 ms + aggregate of 60ms over remaining 10 second period

### Notes:

- 1. The pulses shown in the plots below have been determined to be from the Master AP.
- 2. Marker Info and Aggregate time results are shown on the right side of the plots below.

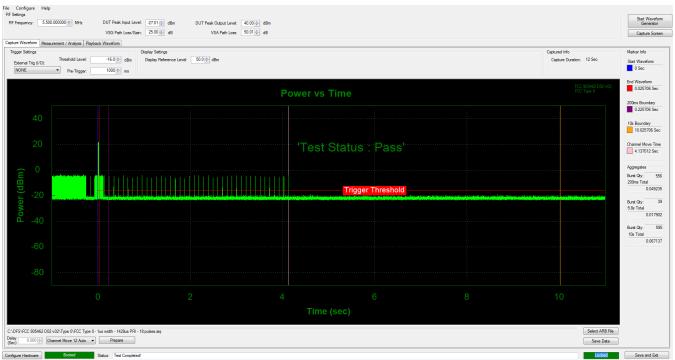


Figure 9-25. 5500MHz - Channel Move/ Closing Transmission Time - Mode 1 (20 MHz)

FCC ID: BCGA2428	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 38 of 54
1C2004270033-08.BCG	05/01/2020-07/22/2020	Tablet Device	Fage 38 01 54
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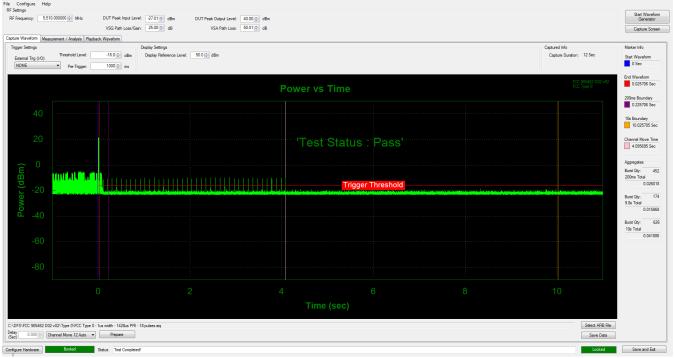


Figure 9-26. 5510MHz - Channel Move/ Closing Transmission Time - Mode 1 (40 MHz)

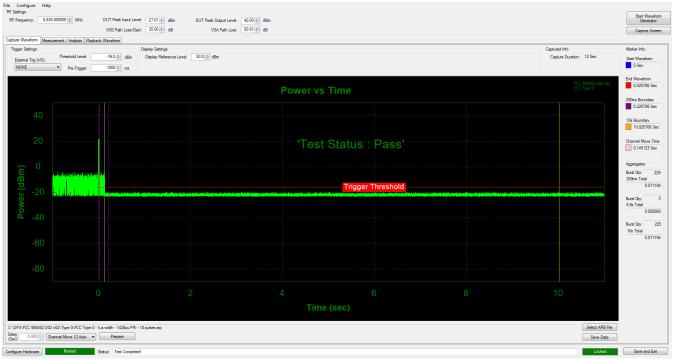


Figure 9-27. 5530MHz - Channel Move/ Closing Transmission Time - Mode 1 (80 MHz)

FCC ID: BCGA2428	PCTEST* Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 39 of 54
1C2004270033-08.BCG	05/01/2020-07/22/2020	Tablet Device	Fage 39 01 54
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## 9.3.2 Channel Move/ Closing Transmission Time Mode 2:

## Result:

Parameter	20MHz Bandwidth	40MHz Bandwidth	80MHz Bandwidth	Limit
Channel Move Time	4.107 s	4.140 s	2.835 s	10 seconds
Channel Closing Transmission Time	< 200ms + 17.443 ms (aggregate)	< 200ms + 0.034 ms (aggregate)	< 200ms + 0.244 ms (aggregate)	200 ms + aggregate of 60ms over remaining 10 second period

#### Notes:

- 1. The pulses shown in the plots below have been determined to be from the Master AP.
- 2. Marker Info and Aggregate time results are shown on the right side of the plots below.

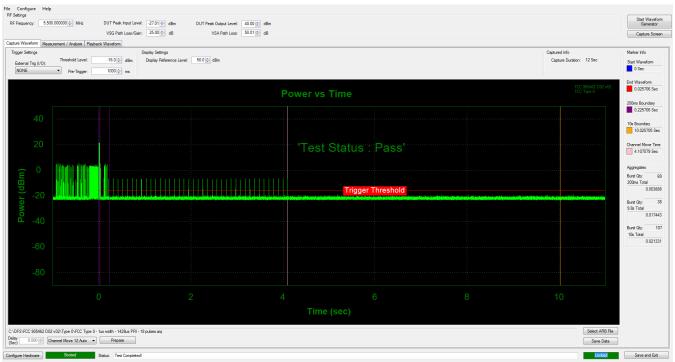


Figure 9-28. 5500MHz - Channel Move/ Closing Transmission Time - Mode 2 (20 MHz)

FCC ID: BCGA2428	PCTEST* Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 40 of 54
1C2004270033-08.BCG	05/01/2020-07/22/2020	Tablet Device	Fage 40 01 54
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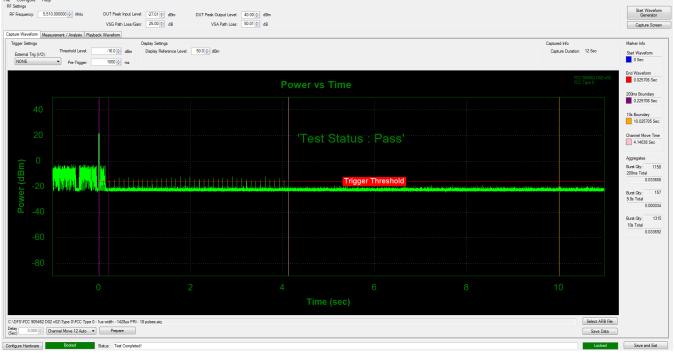


Figure 9-29. 5510MHz - Channel Move/ Closing Transmission Time - Mode 2 (40 MHz)

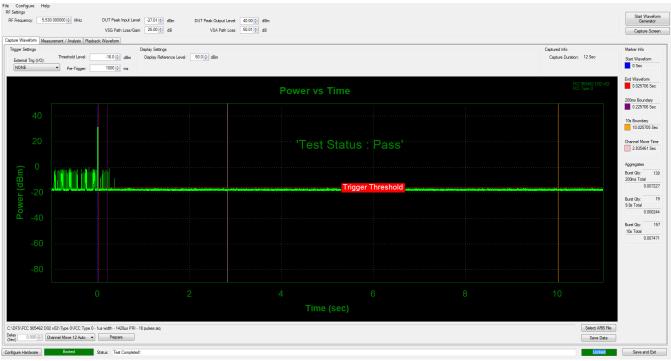


Figure 9-30. 5530MHz - Channel Move/ Closing Transmission Time - Mode 2 (80 MHz)

FCC ID: BCGA2428	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 41 of 54
1C2004270033-08.BCG	05/01/2020-07/22/2020	Tablet Device	Fage 41 01 54
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## 9.3.3 Channel Move/ Closing Transmission Time Mode 3:

### Result:

Parameter	20MHz Bandwidth	40MHz Bandwidth	80MHz Bandwidth	Limit
Channel Move Time	4.160 s	4.678 s	1.287 s	10 seconds
Channel Closing Transmission Time	< 200ms 17.926 ms (aggregate)	< 200ms + 12.075 ms (aggregate)	< 200ms + 0.0 ms (aggregate)	200 ms + aggregate of 60ms over remaining 10 second period

#### Notes:

- 1. The pulses shown in the plots below have been determined to be from the Master AP.
- 2. Marker Info and Aggregate time results are shown on the right side of the plots below.

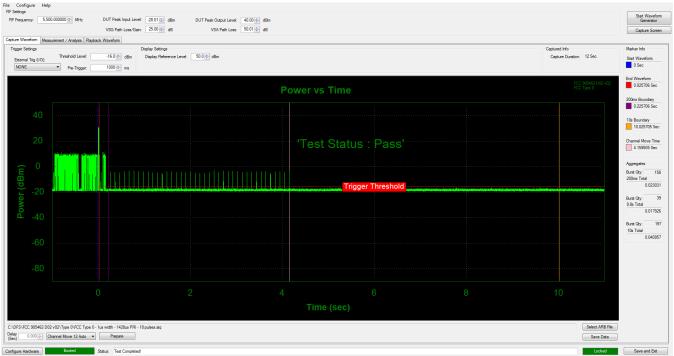


Figure 9-31. 5500MHz - Channel Move/ Closing Transmission Time - Mode 3 (20 MHz)

FCC ID: BCGA2428	PCTEST* Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 42 of 54
1C2004270033-08.BCG	05/01/2020-07/22/2020	Tablet Device	Fage 42 01 54
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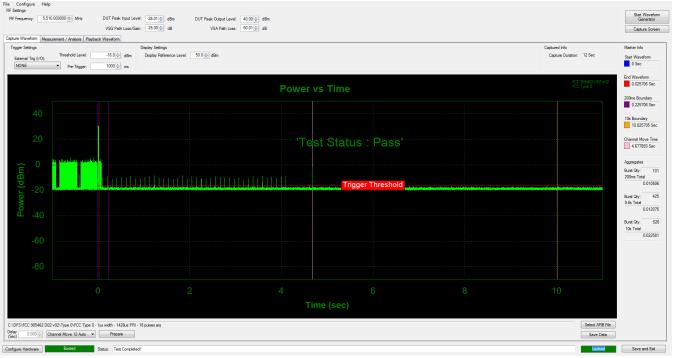


Figure 9-32. 5510MHz - Channel Move/ Closing Transmission Time - Mode 3 (40 MHz)

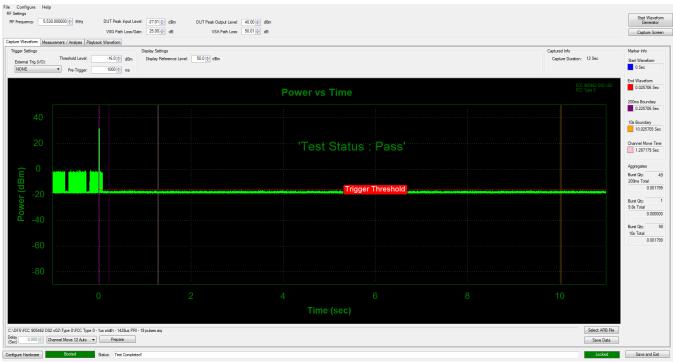


Figure 9-33. 5530MHz - Channel Move/ Closing Transmission Time - Mode 3 (80 MHz)

FCC ID: BCGA2428	PCTEST* Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 43 of 54
1C2004270033-08.BCG	05/01/2020-07/22/2020	Tablet Device	Fage 43 01 54
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## 9.3.4 Channel Move/ Closing Transmission Time Mode 4:

### Result:

		Measured						
Parameter	20MHz Bandwidth	40MHz Bandwidth	80MHz Bandwidth	Limit				
Channel Move Time	8.282 s	4.100 s	0.061 s	10 seconds				
Channel Closing Transmission Time	< 200ms + 17.974 ms (aggregate)	< 200ms + 17.979 ms (aggregate)	< 200ms + 0.0 ms (aggregate)	200 ms + aggregate of 60ms over remaining 10 second period				

#### Notes:

- 1. The pulses shown in the plots below have been determined to be from the Master AP.
- 2. Marker Info and Aggregate time results are shown on the right side of the plots below.

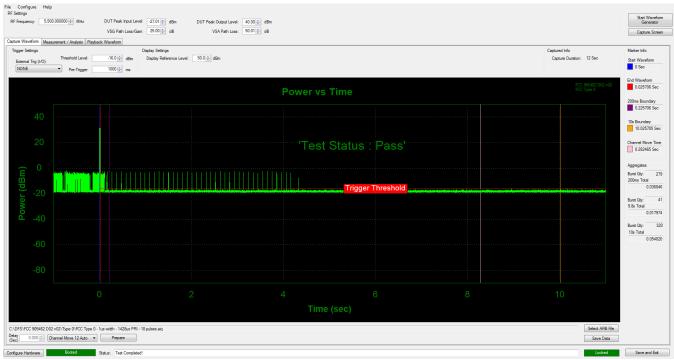


Figure 9-34. 5500MHz - Channel Move/ Closing Transmission Time - Mode 4 (20 MHz)

FCC ID: BCGA2428	PCTEST* Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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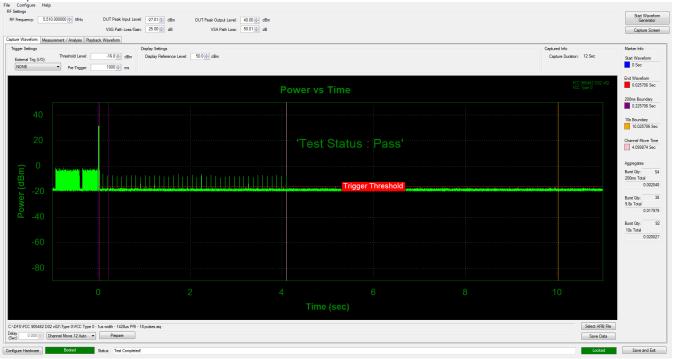


Figure 9-35. 5510MHz - Channel Move/ Closing Transmission Time - Mode 4 (40 MHz)

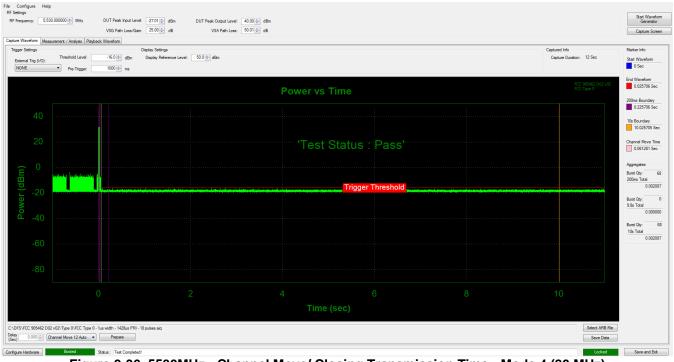


Figure 9-36. 5530MHz - Channel Move/ Closing Transmission Time - Mode 4 (80 MHz)

FCC ID: BCGA2428	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 45 of 54
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## 9.4 Non-Occupancy Period

## 9.4.1 Non-Occupancy Period (30 Minutes) Mode 1:

### Notes:

1. No frequency transmission detected during the Non-Occupancy Period of 30 minutes monitoring.

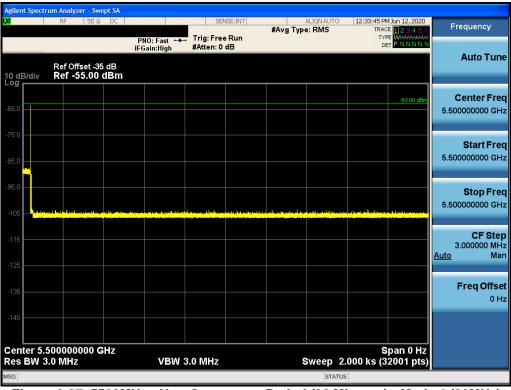


Figure 9-37. 5500MHz - Non-Occupancy Period (30 Minutes) - Mode 1 (20MHz)

FCC ID: BCGA2428	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 46 of 54
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10. dB/div       Ref -55.00 dBm         65.0	-135											он
10.dB/div       Ref -55.00 dBm         65.0	-135											Freq Offse
10 dB/div       Ref -55.00 dBm       Center         65.0	-125											
10 dB/div         Ref -55.00 dBm         Center           66 0	-115											CF Step
10 dB/div       Ref -55.00 dBm       Center         -65.0	-105		soulton to day	uluiyaa <mark>baabd</mark>	laan allaan sooraad allaa	at Han bitter to the	de dationale opti		l Bruccashe e	and dents and the	etter dan en er bell	5.510000000 GH
10 dB/div Ref -55.00 dBm Center -65.0 -75.0	-95.0											Stop Fre
10 dB/div Ref -55.00 dBm	-85.0											5.510000000 GH
10 dB/div Ref -55.00 dBm	-75.0											Start Free
10 dB/div Ref -55.00 dBm	-65.0											5.510000000 GH
10 dB/div Ref -55.00 dBm											-63.00 dBm	Center Fre
Ref Offset -35 dB	10 dB/d											Auto Tun
		RF	50 Ω		PNO: Fast 🔸			#Avg Type	ALIGN AUTO B: RMS	TRAC	M Jun 12, 2020 26 <b>1 2 3 4 5 6</b> 26 WWWWWWW 27 P N N N N N	Frequency

Figure 9-38. 5510MHz - Non-Occupancy Period (30 Minutes) - Mode 1 (40MHz)

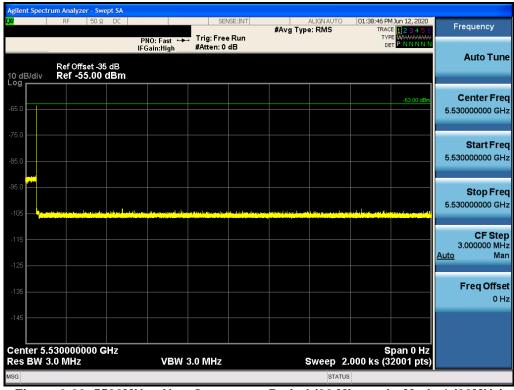


Figure 9-39. 5530MHz - Non-Occupancy Period (30 Minutes) - Mode 1 (80MHz)

FCC ID: BCGA2428	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 47 of 54
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# 9.4.2 Non-Occupancy Period (30 Minutes) Mode 2:

### Notes:

1. No frequency transmission detected during the Non-Occupancy Period of 30 minutes monitoring.

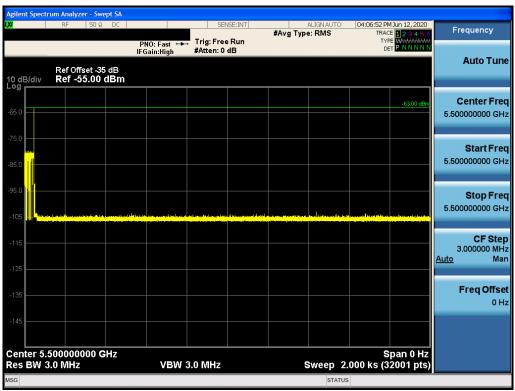


Figure 9-40. 5500MHz - Non-Occupancy Period (30 Minutes) - Mode 2 (20MHz)

FCC ID: BCGA2428	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 48 of 54
1C2004270033-08.BCG	05/01/2020-07/22/2020	Tablet Device	Fage 46 01 54
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PNO: Fast       Trig: Free Run       #Avg Type: RMS       TRACE       2.3.4 5 G       Frequency         Ref Offset -35 dB       Image: Start Free       Image: Start Free	SG							STATUS	5		
PNO: Fast       Trig: Free Run #Atten: 0 dB       Trig: Free Run Trig: Free Run Ref Offset -35 dB       Auto Tun         0 dB/div       Ref -55.00 dBm	Center 5. Res BW 3	510000000 G 3.0 MHz	Hz	VBW :	3.0 MHz		5	Sweep 2.	S 000 ks (3	pan 0 Hz 2001 pts)	
PNO: Fast       Trig: Free Run       #Avg Type: RMS       TRACE       2.3.4 5 G       Frequency         Ref Offset -35 dB       Image: Start Free       Image: Start Free											
PNO: Fast       Trig: Free Run IFGain:High       Trig: Free Run #Atten: 0 dB       TRACE       23:4:5 m Trig: Tree Run Der PNNNNN       Frequency         Ref Offset -35 dB 0 dB/div       Ref -55.00 dBm       Auto Tun       Center Fre         0 dB/div       Ref -55.00 dBm       -6500 dem       Center Fre         0 dB/div       Ref -00ffset -35 dB       -6500 dem       -6500 dem         0 dB/div       Ref -00ffset -35 dB       -6500 dem       -6500 dem         0 dB/div       Ref -00ffset -35 dB       -6500 dem       -6500 dem         0 dB/div       Ref -00ffset -35 dB       -6500 dem       -6500 dem         0 dB/div       Ref -00ffset -35 dB       -6500 dem       -6500 dem         0 dB/div       Ref -00ffset -35 dB       -6500 dem       -6500 dem         0 dB/div       Ref -00ffset -35 dB       -6500 dem       -6500 dem         0 dB/div       Ref -00ffset -30 dem       -6500 dem       -6500 dem         0 dB/div       Ref -00ffset -30 dem       -6500 dem       -6500 dem         105       Ref -00ffset -30 dem       -600 dem       -6500 dem       -6500 dem         115       Ref -00ffset -30 dem       -600 dem       -6500 dem       -6500 dem         115       Ref -00ffset -30 dem       -600 dem	-145										0 H
PNO: Fast       Trig: Free Run       #Avg Type: RMS       TRACE       2.3.4.5       Frequency         IFGain:High       #Atten: 0 dB       0 dB       0 dB/div       0 dE       0 dB/div       0 dE       0 dB/div       0 dE       0 dB/div       0 dE	-135										
PNO: Fast       Trig: Free Run       #Avg Type: RMS       TRACE       2.3.4.5 of       Frequency         Ref Offset .35 dB	-125										
PNO: Fast       →       Trig: Free Run       #Avg Type: RMS       Trace       1/2 3 4 5 0       Frequency         Ref Offset 35 dB       0 dB/div       Ref -55.00 dBm       0	-115										
PNO: Fast →→ Trig: Free Run IFGain:High Ref Offset 35 dB 0 dB/div Ref -55.00 dBm Center Fre 5.510000000 GF 5.510000000 GF	-105	de groot Hell at the description of the	nd transferra a	dellatore (1860), a sta	production and the lat	tin dan se bahalaran.	to many forthandly.	an an an an an Art a	literi et et entre ikeni	este chama a stalle	
PN0: Fast       →       Trig: Free Run       #Avg Type: RMS       Trace       1/2 3 4 5 5       Frequency         Ref Offset 35 dB       0 dB/div       Ref -55.00 dBm       Auto Tun       0 dB/div       Center Fre         55.0       -65.00 dBm       -65.00 dBm       -65.00 dBm       -65.00 dBm       -65.00 dBm         75.0       -65.00 dBm       -65.00 dBm       -65.00 dBm       -65.00 dBm       -65.00 dBm         75.0       -65.00 dBm       -65.00 dBm       -65.00 dBm       -65.00 dBm       -65.00 dBm	95.0										<b>2</b> 1
PNO: Fast →→ Trig: Free Run IFGain:High Ref Offset -35 dB 0 dB/div Ref -55.00 dBm Center Fre 55.00 cm	85.0										
PN0: Fast →→ Trig: Free Run IFGain:High 0 dB/div Ref Offset -35 dB 0 dB/div Ref -55.00 dBm ····································	75.0										
PNO: Fast →→ Trig: Free Run #Avg Type: RMS TFACE 1 2 3 4 5 5 PNO: Fast →→ Trig: Free Run #Avg Type: RMS TYPE WWWWWWW IFGain:High #Atten: 0 dB DET P NNNNN Ref Offset -35 dB 0 dB/div Ref -55.00 dBm	65.0									-63.00 dBm	
PNO: Fast Trig: Free Run #Avg Type: RMS TRACE 2345 6 IFGain:High #Atten: 0 dB DET PINNINN	0 dB/div										
#Avg Type: RMS TRACE T23456 Frequency									TYF	E WWWWWWWW T P N N N N N	Auto Tun
		RF 50 Ω	DC					ALIGN AUTO	TRAC	E 1 2 3 4 5 6	Frequency

Figure 9-41. 5510MHz - Non-Occupancy Period (30 Minutes) - Mode 2 (40MHz)

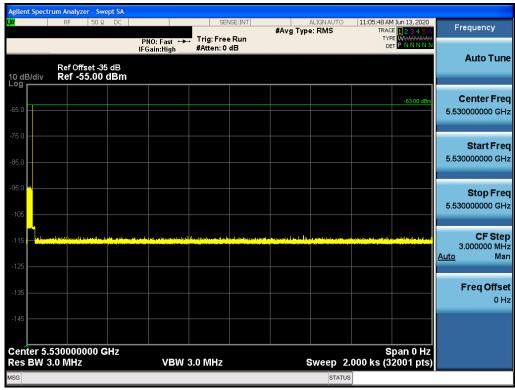


Figure 9-42. 5530MHz - Non-Occupancy Period (30 Minutes) - Mode 2 (80MHz)

FCC ID: BCGA2428	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 49 of 54
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# 9.4.3 Non-Occupancy Period (30 Minutes) Mode 3:

### Notes:

1. No frequency transmission detected during the Non-Occupancy Period of 30 minutes monitoring.

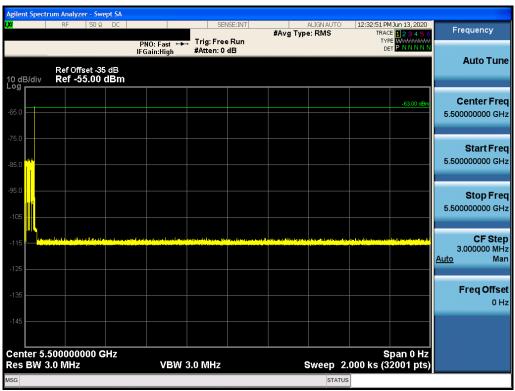


Figure 9-43. 5500MHz - Non-Occupancy Period (30 Minutes) - Mode 3 (20MHz)

FCC ID: BCGA2428	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 50 of 54
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sg				202-00112			STATUS	Y	200 - 013)	
Center 5. Res BW 3	510000000 G	Hz	VBW :	3.0 MHz			weep 2	S 000 ks (3	pan 0 Hz 2001 pts)	
-145										
-135										FreqOffse 0⊢
-125										
										3.000000 MH <u>Auto</u> Ma
-115	an tool of the second second second second		and a state of the s		na shkata anta		at a bar at the second		an an tea state to be the last of the	CF Ste
105										5.510000000 GH
95.0 <mark>       </mark>										Stop Fre
85.0										5.510000000 GH
/5.0										Start Fre
75.0										
65.0									-63.00 dBm	Center Fre 5.510000000 GH
0 dB/div <sup>.og</sup> r	Ref -55.00 c	IBm								
	Ref Offset -35		IFGain:High	#Atten: 0 d	38			D.		Auto Tur
			PNO: Fast	Trig: Free		#Avg Type	: RMS	TYP	E 123456 E WWWWWW T P N N N N N	Frequency
1	RF 50 Ω	DC		SEN	SE:INT		ALIGN AUTO		4 Jun 13, 2020	Fraguanau

Figure 9-44. 5510MHz - Non-Occupancy Period (30 Minutes) - Mode 3 (40MHz)

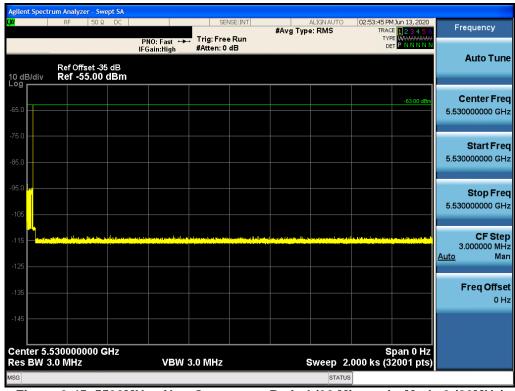


Figure 9-45. 5530MHz - Non-Occupancy Period (30 Minutes) - Mode 3 (80MHz)

FCC ID: BCGA2428	PCTEST <sup>®</sup> Proud to be part of <b>®</b> element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 51 of 54
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## 9.4.4 Non-Occupancy Period (30 Minutes) Mode 4:

#### Notes:

1. No frequency transmission detected during the Non-Occupancy Period of 30 minutes monitoring.

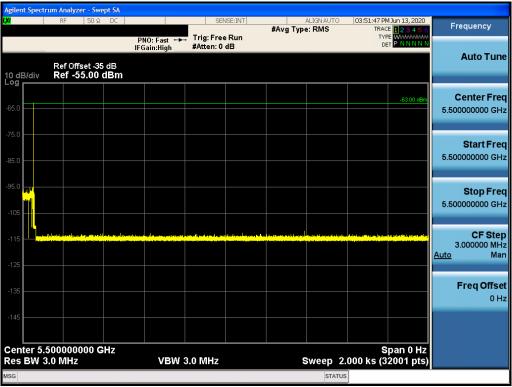


Figure 9-46. 5500MHz - Non-Occupancy Period (30 Minutes) - Mode 4 (20MHz)

FCC ID: BCGA2428	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 52 of 54
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Agilent Spectı <mark>XI</mark>		50 Ω DC		SEN	SE:INT		ALIGN AUTO		1 Jun 13, 2020	Frequenc	
			BN0 5	. Trig: Free Run		#Avg Type	#Avg Type: RMS		TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P N N N N N		у
			PNO: Fast 🔸 IFGain:High	#Atten: 0				DE	T P N N N N N		
10 dB/div Log	Ref Offse <b>Ref -55</b>	et -35 dB .00 dBm								Auto 1	Tun
-09									-63.00 dBm	Center	Fre
65.0									-03100 0.511	5.510000000	
75.0										Start	Fre
85.0										5.51000000	0 GH
95.0										Stop	Fre
-105										5.51000000	0 GH
-115	en distant telan se	di matali di mili dan da	ing des status addition			ldin i dan balikan olat h	u eleteletetelete		<b>Benn det betende</b>	CF 3.000000	Ste
105										Auto	Ma
-125											
-135										Freq O	
											0 +
-145											
Center 5. Res BW 3	51000000 .0 MHz	00 GHz	VBW 3	.0 MHz		s	weep 2	S 000 ks <u>(</u> 3	pan 0 Hz 2001 pts)		
ISG	SG STATUS										



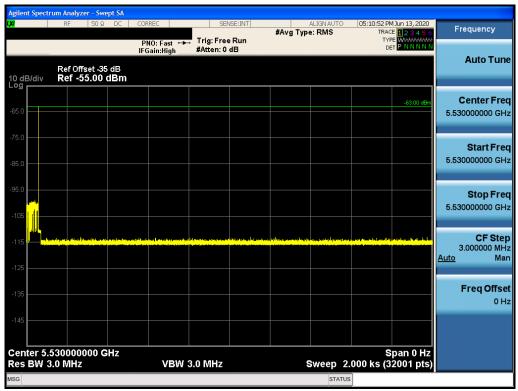


Figure 9-48. 5530MHz - Non-Occupancy Period (30 Minutes) - Mode 4 (80MHz)

FCC ID: BCGA2428	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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The data collected relate only to the item(s) tested and show that the **Apple Tablet Device FCC ID: BCGA2428** is in compliance with the DFS requirements for a Client Device without radar detection in accordance with Part 15.407 of the FCC Rules and RSS-247 of the Innovation, Science and Economic Development Canada Rules.

FCC ID: BCGA2428	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:	Daga E4 of E4	
1C2004270033-08.BCG	05/01/2020-07/22/2020	Tablet Device	Page 54 of 54	
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