



FCC 47 CFR PART 15 SUBPART E

TEST REPORT

For

Notebook Computer

Model:

Satellite L4***.C***** ,**

Satellite Radius L4***.C***** ,**

Satellite Radius E4***.C*******

(* means 0-9; a-z; A-Z; / ; - ; no symbol, or blank for marketing purpose)

Trade Name: TOSHIBA

Issued to

Pegatron Corporation

5F, NO. 76, LIGONG ST., BEITOU DISTRICT, TAIPEI CITY 112, TAIWAN (R.O.C.)

Issued by

Compliance Certification Services Inc.

**No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City 24891, Taiwan. (R.O.C.)**

<http://www.ccsrf.com>

service@ccsrf.com

Issued Date: April 23, 2015



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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	April 23, 2015	Initial Issue	ALL	Doris Chu



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1. TEST RESULT CERTIFICATION

Applicant: Pegatron Corporation
5F, NO. 76, LIGONG ST., BEITOU DISTRICT, TAIPEI CITY
112, TAIWAN (R.O.C.)

Equipment Under Test: Notebook Computer

Trade Name: TOSHIBA

Model: Satellite L4*****-C***** ,
Satellite Radius L4*****-C***** ,
Satellite Radius E4*****-C*****
(* means 0-9; a-z; A-Z; / ; - ; no symbol, or blank for marketing purpose)

Date of Test: April 17, 2015

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart E	No non-compliance noted

We hereby certify that:

Compliance Certification Services Inc. tested the above equipment. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.407.

The test results of this report relate only to the tested sample identified in this report.

Approved by:

Reviewed by:

Miller Lee
Manager
Compliance Certification Services Inc.

Angel Cheng
Section Manager
Compliance Certification Services Inc.



2. EUT DESCRIPTION

Product	Notebook Computer		
Trade Name	TOSHIBA		
Model Number	Satellite L4*****_C***** , Satellite Radius L4*****_C***** , Satellite Radius E4*****_C***** (* means 0-9; a-z; A-Z; / ; - ; no symbol, or blank for marketing purpose)		
Model Discrepancy	All the above models are identical except for the designation of model numbers. The suffix of “*” (* means 0-9; a-z; A-Z; / ; - ; no symbol, or blank for marketing purpose) on model number is just for marketing purpose only.		
WLAN Manufacturer	Realtek	Model	RTL8821AE
Received Date	March 31, 2015		
Power Supply	1. VDC from Power Adapter 2. Power from Battery		
Power Adaptor Power Rating / Manufacturer	TOSHIBA (Vendor: Delta) / PA5177U-1ACA I/P: 100-240Vac, 50/60Hz, 1.2A O/P: 19Vdc, 2.37A		
	TOSHIBA (Vendor: Liteon) / PA5177U-1ACA I/P: 100-240Vac, 50-60Hz, 1.3A O/P: 19Vdc, 2.37A		
	TOSHIBA (Vendor: Chicony) / PA5177U-1ACA I/P: 100-240Vac, 50-60Hz, 1.3A O/P: 19Vdc, 2.37A		
	TOSHIBA (Vendor: Liteon) / PA5177E-1AC3 I/P: 100-240Vac, 50-60Hz, 1.3A O/P: 19Vdc, 2.37A		
	TOSHIBA (Vendor: Delta) / PA5177E-1AC3 I/P: 100-240Vac, 50/60Hz, 1.2A O/P: 19Vdc, 2.37A		
	TOSHIBA (Vendor: Chicony) / PA5177E-1AC3 I/P: 100-240Vac, 50-60Hz, 1.3A O/P: 19Vdc, 2.37A		
	TOSHIBA (Sanyo) / PA5208U-1BRS 10.8Vdc, 45Wh, 3860mAh		
Battery Rating / Manufacturer	TOSHIBA (LG) / PA5208U-1BRS 10.8Vdc, 45Wh, 3860mAh		
	TOSHIBA (Samsung) (SDI) / PA5208U-1BRS 10.8Vdc, 45Wh, 3860mAh		
	TOSHIBA (BYD) / PA5208U-1BRS 10.8Vdc, 45Wh, 3860mAh		
	TOSHIBA (BYD) / PA5208U-1BRS 10.8Vdc, 45Wh, 3860mAh		



Operating Frequency Range & Number of Channels		Mode	Frequency Range (MHz)	Number of Channels
	UNII Band II	IEEE 802.11a	5260 - 5320	4 Channels
		IEEE 802.11n HT 20 MHz	5260 - 5320	4 Channels
		IEEE 802.11n HT 40 MHz	5270 ~ 5310	2 Channels
		IEEE 802.11ac VHT 80 MHz	5290	1 Channels
	UNII Band III	IEEE 802.11a	5500 ~ 5700	11 Channels
		IEEE 802.11n HT 20 MHz	5500 ~ 5700	11 Channels
		IEEE 802.11n HT 40 MHz	5510 ~ 5670	5 Channels
IEEE 802.11ac VHT 80 MHz		5530 ~ 5690	3 Channels	
Modulation Technique	OFDM (QPSK, BPSK, 16-QAM, 64-QAM)			
Antenna Specification	1. ACON ANP6Y-100012 (TX1) / -1.75 dBi ANP6Y-100013 (TX2) / -1.08 dBi (Worst) 2. INPAQ WA-P-LB-01-126 (TX1) / -1.94 dBi WA-P-LB-02-257 (TX2) / -2.03 dBi			
Antenna Designation	PIFA Antenna			

Remark:

1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: **VUI-EOS8821** filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.



3. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10: 2013 Radiated testing was performed at an antenna to EUT distance 3 meters.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed for RF field strength measurement to meet the Commissions requirement, and is operated in a manner intended to generate the maximum emission in a continuous normal application.

3.2 EUT EXERCISE

The EUT is operated in the engineering mode to fix the Tx frequency for the purposes of measurement.

According to its specifications, the EUT must comply with the requirements of Section 15.407 under the FCC Rules Part 15 Subpart E.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is positioned at 0.8 m above the ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.10: 2013, the conducted emission from the EUT is measured in the frequency range between 0.15 MHz and 30MHz, using the CISPR Quasi-Peak detector mode.

Radiated Emissions

The EUT is placed on the turntable, which is 1.5 m above the ground plane. The turntable is then rotated for 360 degrees to determine the proper orientation for the maximum emission level. The EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission level. And, each emission is to be maximized by changing the horizontal and vertical polarization of the receiving antenna. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.10: 2013.



3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



3.5 DESCRIPTION OF TEST MODES

The EUT (model: Satellite L4-C) comes with four types of antenna (model: ANP6Y-100012 (TX1) / ANP6Y-100013 (TX2) / WA-P-LB-01-126 (TX1) / WA-P-LB-02-257 (TX2)) for sale. After the preliminary test, the antenna ANP6Y-100013 (TX2) was found to emit the worst emissions and therefore had been tested under operating condition.

The EUT comes with one battery and one power adapter for sale. After the preliminary test, the EUT with power adapter was found to emit the worst emissions and therefore had been tested under standby condition.

Software used to control the EUT for staying in continuous transmitting mode was programmed.

IEEE 802.11n HT 20 mode / 5260 ~ 5320MHz:

Channel (5300MHz) with 6.5Mbps data rate were chosen for full testing.

IEEE 802.11n HT 40 mode / 5270 ~ 5310MHz:

Channel (5310MHz) with 13.5Mbps data rate were chosen for full testing.

IEEE 802.11ac VHT 80 MHz for 5290MHz:

Channel (5290MHz) with 29.3Mbps data rate were chosen for full testing.

IEEE 802.11n HT 20 mode / 5500 ~ 5700MHz:

Channel (5500MHz) with 6.5Mbps data rate were chosen for full testing.

IEEE 802.11n HT 40 mode / 5510 ~ 5670MHz:

Channel (5510MHz) with 13.5Mbps data rate were chosen for full testing.

IEEE 802.11n HT 80 MHz for 5530 ~ 5690MHz:

Channel (5530MHz) with 6.5Mbps data rate were chosen for full testing.

The field strength of spurious emission was measured in the following position: The EUT has Notebook mode, Flat mode, Tent mode, Stand mode, Tablet X, Y and Z axis modes. The worst emission was found in Notebook mode and the worst case was recorded.



4. INSTRUMENT CALIBRATION

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Remark: Each piece of equipment is scheduled for calibration once a year.

Dynamic Frequency Selection				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4445A	MY48250198	04/01/2015
Vector Signal Generator	ROHDE&SCHWARZ	SMU200A	102239	12/07/2015

4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
3M Semi Anechoic Chamber / 30MHz ~ 1GHz	+/-3.7046
3M Semi Anechoic Chamber / Above 1GHz	+/-3.0958

Remark: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No.199, Chungshen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.

Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)

Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

No.81-1, Lane 210, Bade 2nd Rd., Lujhu Township, Taoyuan County 33841, TAIWAN, R.O.C.

Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10: 2013 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.




Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."



5.3 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3M Semi Anechoic Chamber (FCC MRA: TW1309) to perform FCC Part 15 measurements	 FCC MRA: TW1309
Taiwan	TAF	LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310 IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12.2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17 FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959 FCC Method -47 CFR Part 15 Subpart B IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11	
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	 IC 2324G-1 IC 2324G-2

* No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.



6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
	N/A						

Remark:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



7. FCC PART 15 REQUIREMENTS

7.1 DYNAMIC FREQUENCY SELECTION

TEST PROCEDURE

According to “KDB 905462 D02 v01r01” and “KDB 905462 D03 v01r01”

LIMIT

According to §15.407 (h) and FCC 06-96 appendix “compliance measurement procedures for unlicensed-national information infrastructure devices operating in the 5250-5350 MHz and 5470-5725 MHz bands incorporating dynamic frequency selection”.

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

Table 3: Interference Threshold values, Master or Client incorporating In-Service

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP \geq 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.



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 U-NII 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 (µsec)	PRI (µsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	60%	30
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	$\text{Roundup} \left\{ \begin{array}{l} \left(\frac{1}{360} \right) \\ \left(\frac{19 \cdot 10^6}{\text{PRI}_{\mu\text{sec}}} \right) \end{array} \right\}$	60%	30
		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			
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	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	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 (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



DESCRIPTION OF EUT

Overview Of EUT With Respect To §15.407 (H) Requirements

The EUT operates over the 5250-5350 MHz range as a Client Device that does not have radar detection capability.

The Slave device associated with the EUT during these tests does not have radar detection capability.

WLAN traffic is generated by streaming the video file TestFile.mp2 “6 ½ Magic Hours” from the Master to the Slave in full motion video mode using the media player with the V2.61 Codec package.

TPC is not required since the maximum EIRP is less than 500 mW (27 dBm).

The EUT utilizes the 802.11a architecture, with a nominal channel bandwidth of 20 MHz.

The Master Device is a Notebook Computer, FCC ID: VUI-EOS8821

The rated output power of the Master unit is < 23dBm (EIRP). Therefore the required interference threshold level is -62 dBm. After correction for antenna gain and procedural adjustments, the required conducted threshold at the antenna port is $-62 + 5 = -57$ dBm.

The calibrated conducted DFS Detection Threshold level is set to -62 dBm. The tested level is lower than the required level hence it provides margin to the limit.

Manufacturer’s Statement Regarding Uniform Channel Spreading

The end product implements an automatic channel selection feature at startup such that operation commences on channels distributed across the entire set of allowed 5GHz channels. This feature will ensure uniform spreading is achieved while avoiding non-allowed channels due to prior radar events.



TEST AND MEASUREMENT SYSTEM

System Overview

The measurement system is based on a conducted test method.

The short pulse and long pulse signal generating system utilizes the NTIA software. The Vector Signal Generator has been validated by the NTIA. The hopping signal generating system utilizes the CCS simulated hopping method and system, which has been validated by the DoD, FCC and NTIA. The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution.

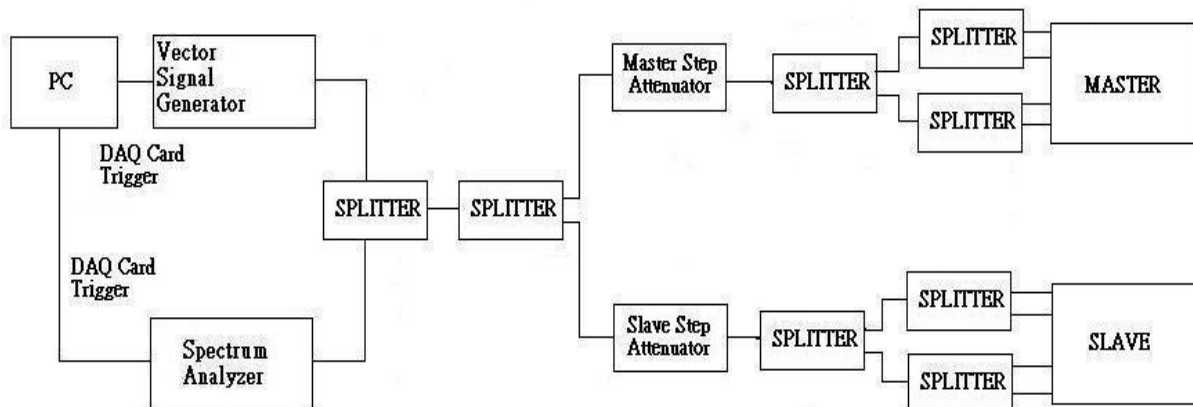
The short pulse types 2, 3 and 4, and the long pulse type 5 parameters are randomized at run-time.

The hopping type 6 pulse parameters are fixed while the hopping sequence is based on the August 2005 NTIA Hopping Frequency List. The initial starting point randomized at run-time and each subsequent starting point is incremented by 475. Each frequency in the 100-length segment is compared to the boundaries of the EUT Detection Bandwidth and the software creates a hopping burst pattern in accordance with Section 7.4.1.3 Method #2 Simulated Frequency Hopping Radar Waveform Generating Subsystem of FCC 06-96 APPENDIX. The frequency of the signal generator is incremented in 1 MHz steps from FL to FH for each successive trial. This incremental sequence is repeated as required to generate a minimum of 30 total trials and to maintain a uniform frequency distribution over the entire Detection Bandwidth.

The signal monitoring equipment consists of a spectrum analyzer set to display 8001 bins on the horizontal axis. The time-domain resolution is 2 msec / bin with a 16 second sweep time, meeting the 10 second short pulse reporting criteria. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection and max hold. The time-domain resolution is 3 msec / bin with a 24 second sweep time, meeting the 22 second long pulse reporting criteria and allowing a minimum of 10 seconds after the end of the long pulse waveform.

Should multiple RF ports be utilized for the Master and/or Slave devices (for example, for diversity or MIMO implementations), 50 ohm termination would be removed from the splitter so that connection can be established between splitter and the Master and/or Slave devices.

Conducted Method System Block Diagram





System Calibration

Connect the spectrum analyzer to the test system in place of the master device. Set the signal generator to CW mode. Adjust the amplitude of the signal generator to yield a measured level of -62 dBm on the spectrum analyzer.

Without changing any of the instrument settings, reconnect the spectrum analyzer to the Common port of the Spectrum Analyzer Combiner/Divider and connect a 50 ohm load to the Master Device port of the test system.

Measure the amplitude and calculate the difference from -62 dBm. Adjust the Reference Level Offset of the spectrum analyzer to this difference. Confirm that the signal is displayed at -62 dBm. Readjust the RBW and VBW to 3 MHz, set the span to 10 MHz, and confirm that the signal is still displayed at -62 dBm.

The spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device. The interference detection threshold may be varied from the calibrated value of -62 dBm and the spectrum analyzer will still indicate the level as received by the Master Device.

Set the signal generator to produce a radar waveform, trigger a burst manually and measure the level on the spectrum analyzer. Readjust the amplitude of the signal generator as required so that the peak level of the waveform is at a displayed level equal to the required or desired interference detection threshold. Separate signal generator amplitude settings are determined as required for each radar type.

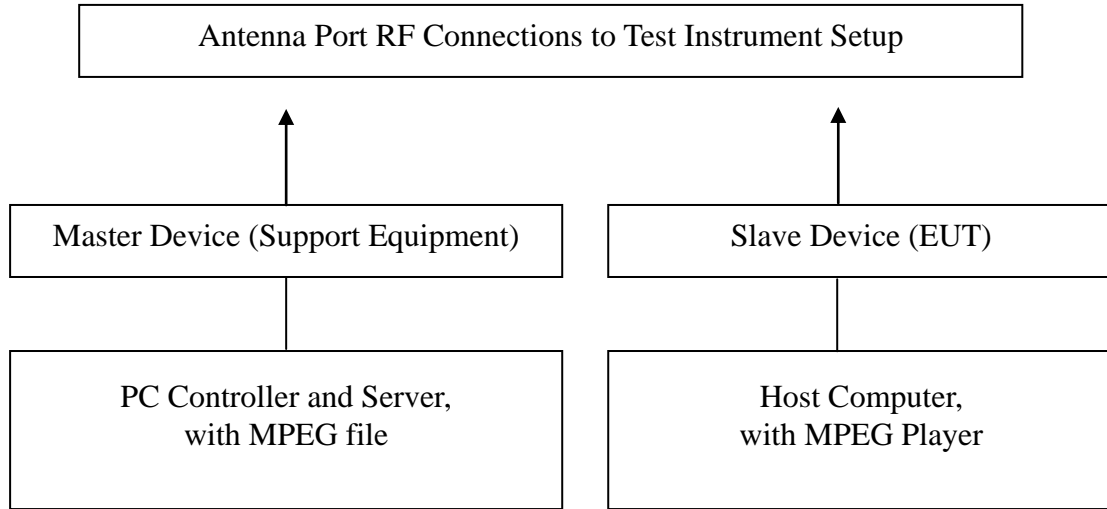
Adjustment Of Displayed Traffic Level

Establish a link between the Master and Slave, adjusting the Link Step Attenuator as needed to provide a suitable received level at the Master and Slave devices. Stream the video test file to generate WLAN traffic. Confirm that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold. Confirm that the displayed traffic is from the Master Device. For Master Device testing confirm that the displayed traffic does not include Slave Device traffic. For Slave Device testing confirm that the displayed traffic does not include Master Device traffic.

If a different setting of the Master Step Attenuator is required to meet the above conditions, perform a new System Calibration for the new Master Step Attenuator setting.



Test Setup



TEST RESULTS

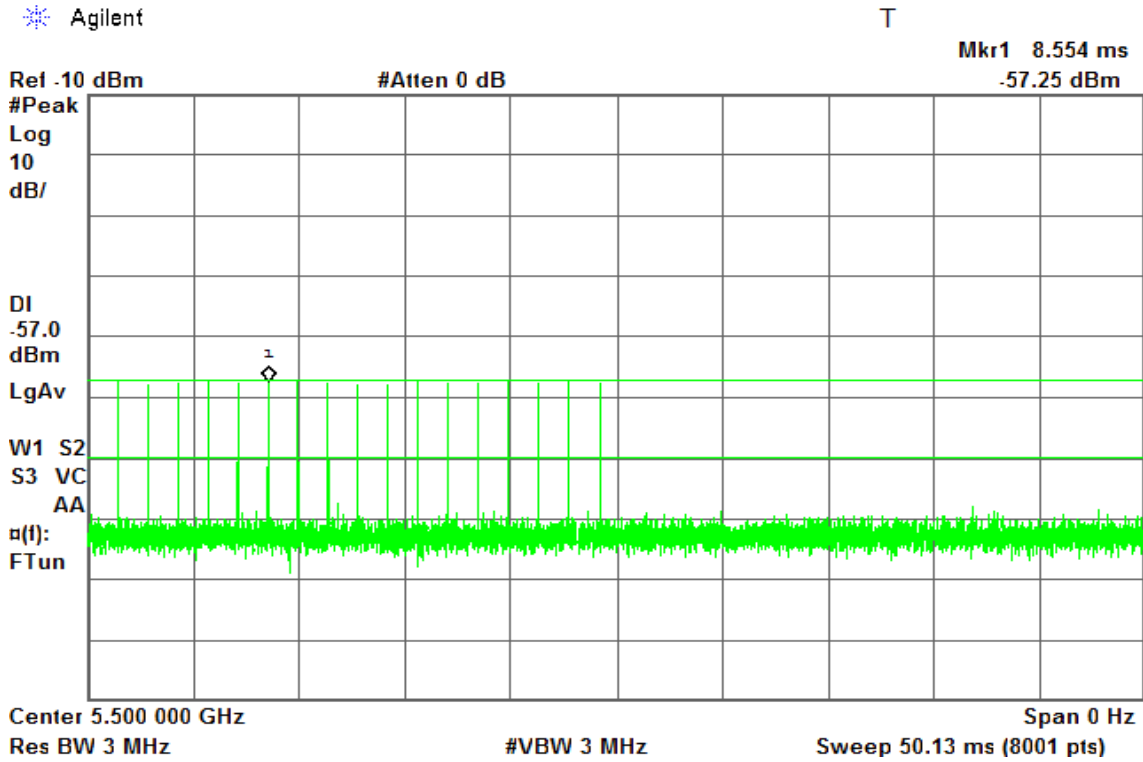
No non-compliance noted



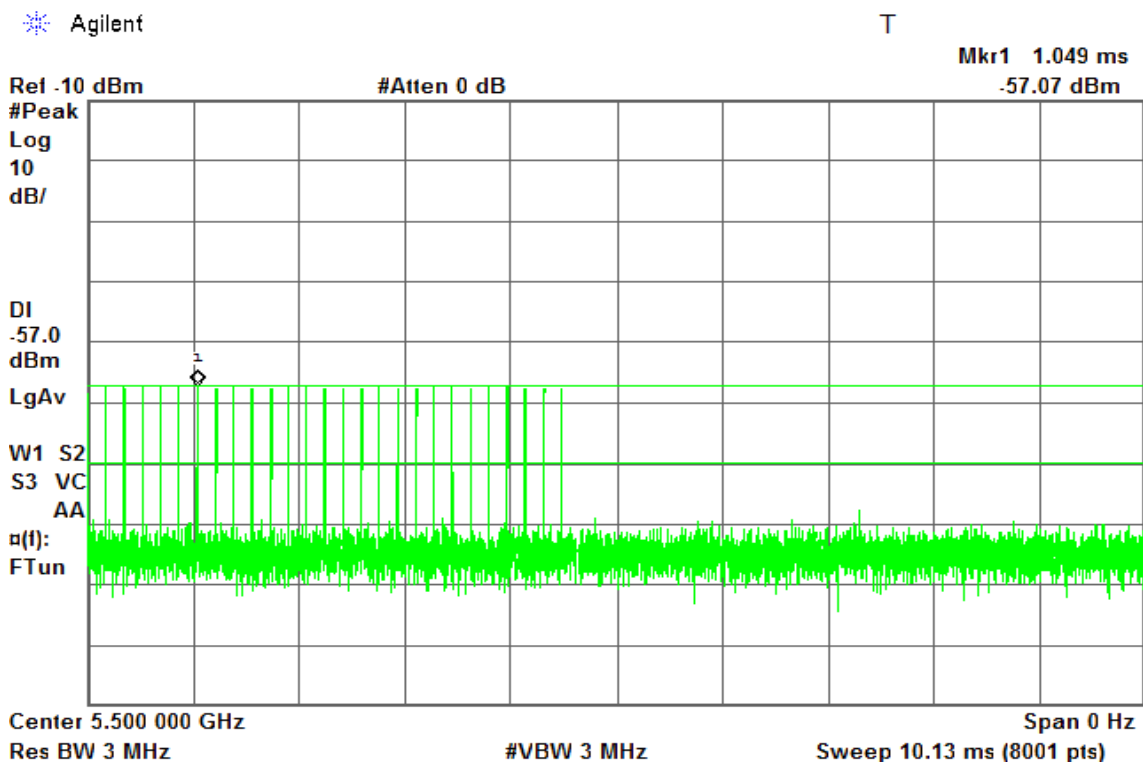
Test Plot

PLOTS OF RADAR WAVEFORMS

Sample of Short Pulse Radar Type 1

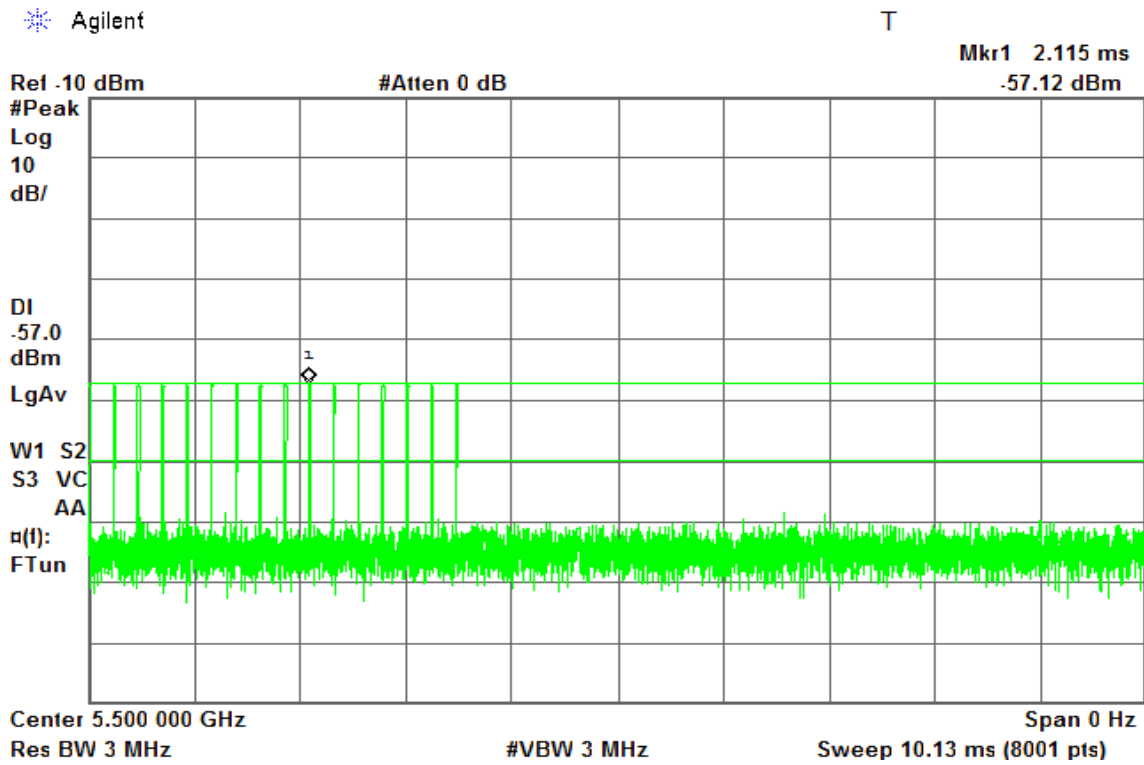


Sample of Short Pulse Radar Type 2

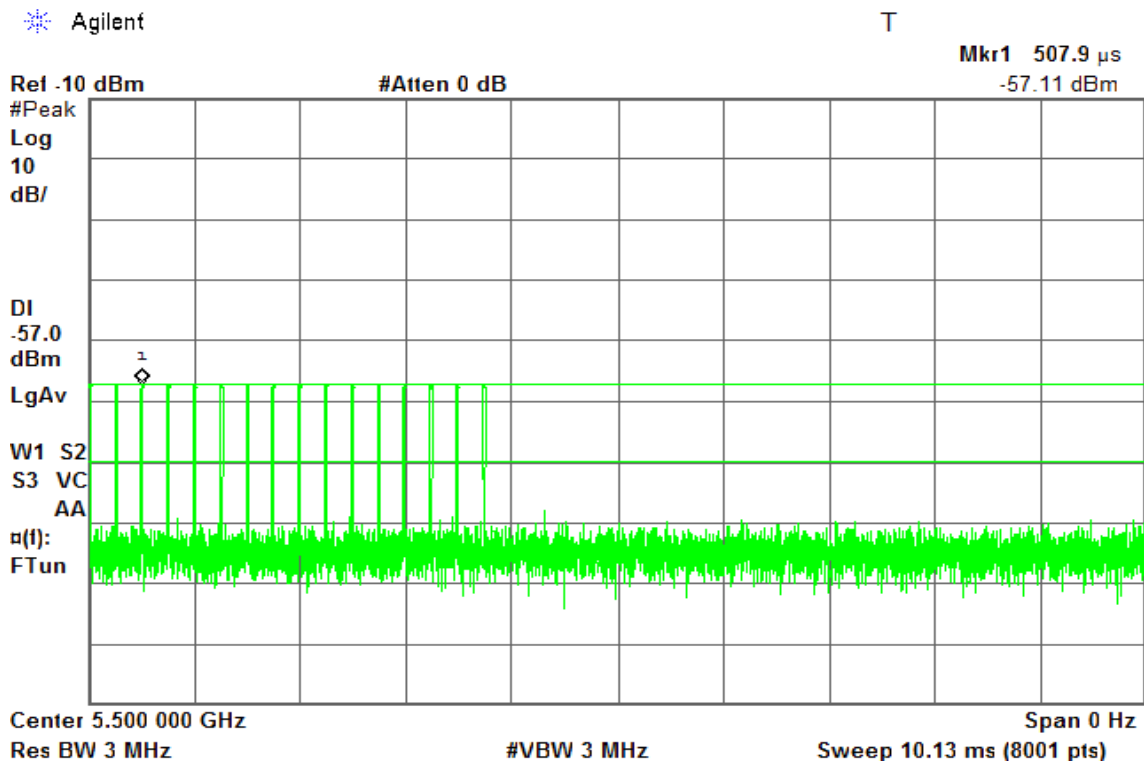




Sample of Short Pulse Radar Type 3



Sample of Short Pulse Radar Type 4



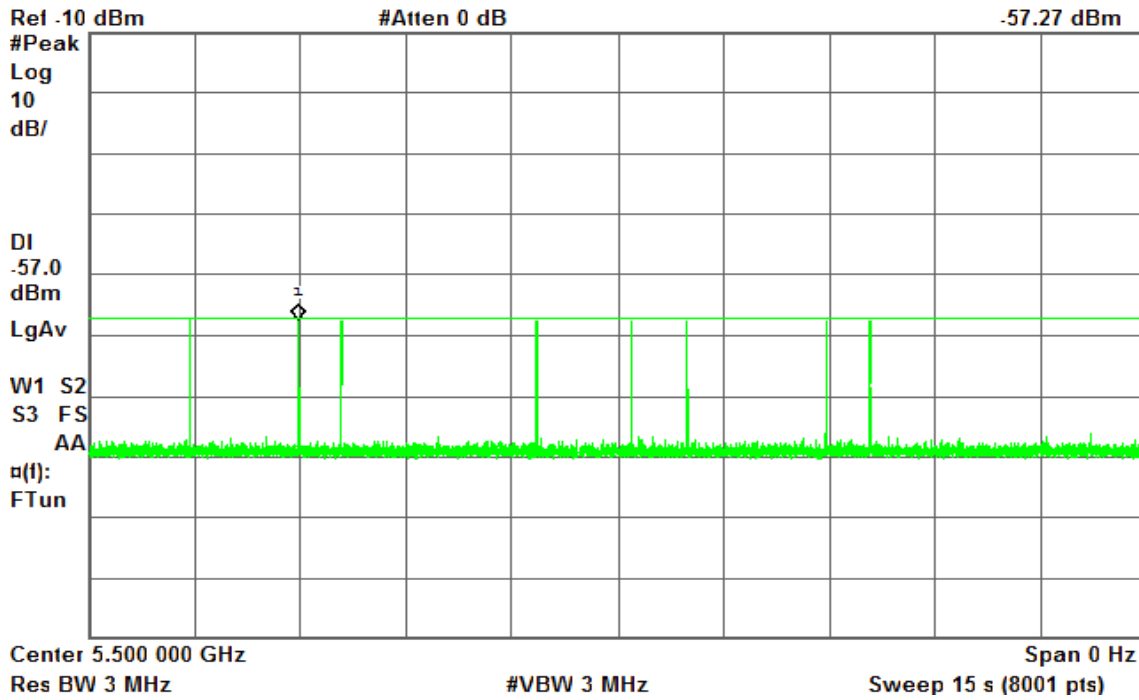


Sample of Long Pulse Radar Type 5

Agilent

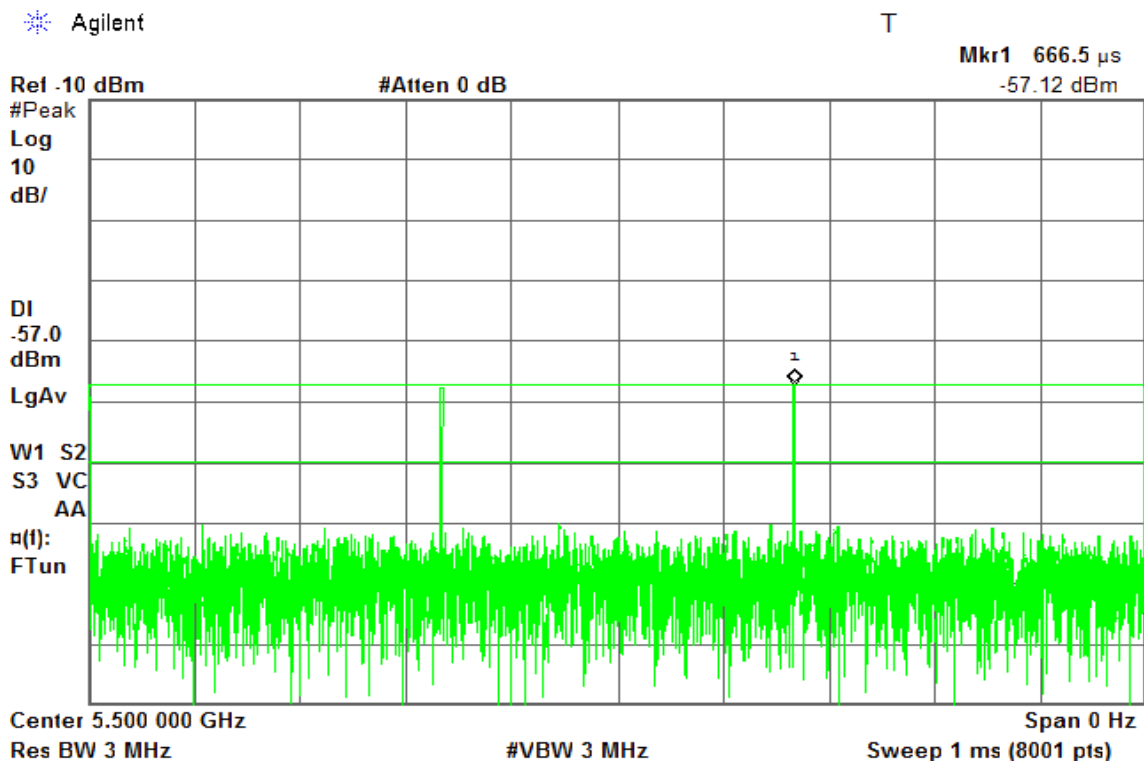
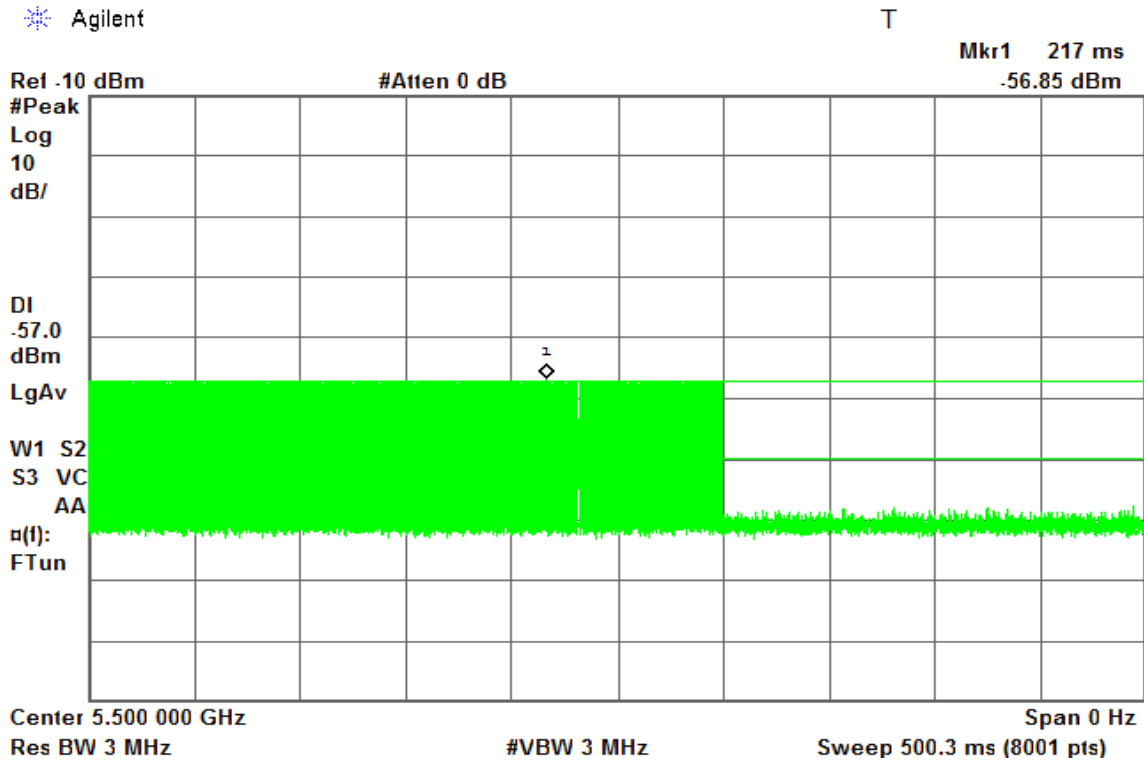
T

Mkr1 2.979 s
-57.27 dBm





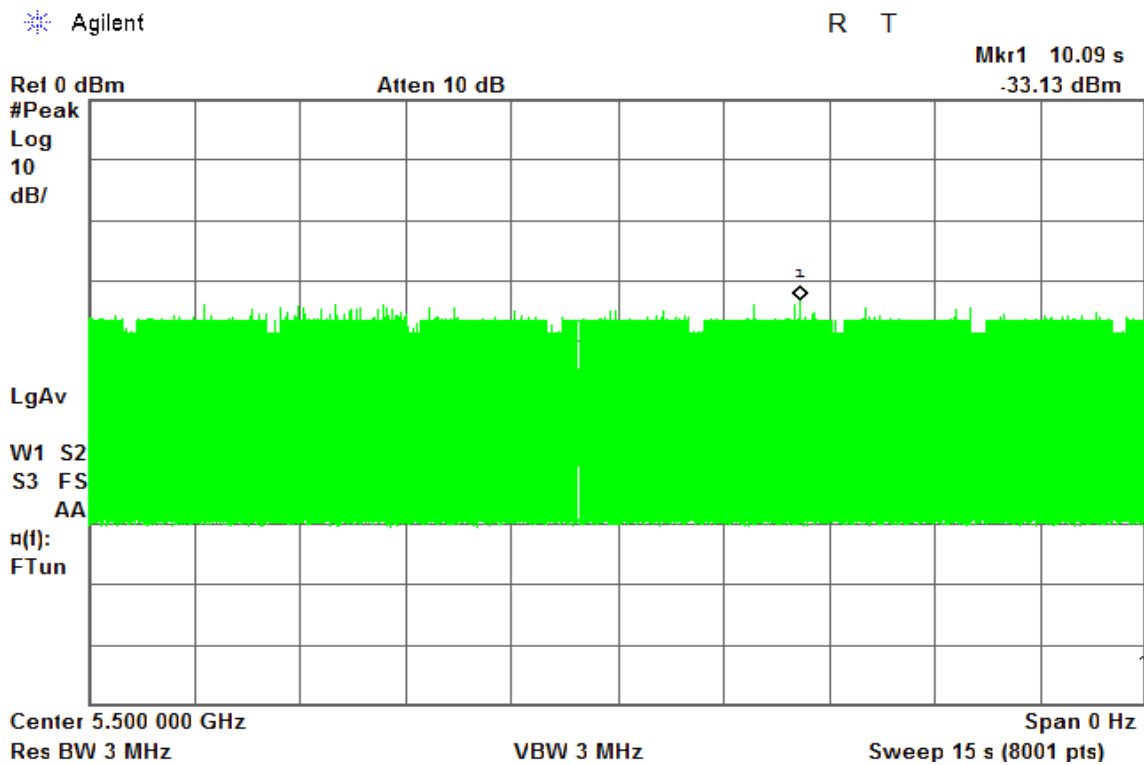
Sample of Frequency Hopping Radar Type 6



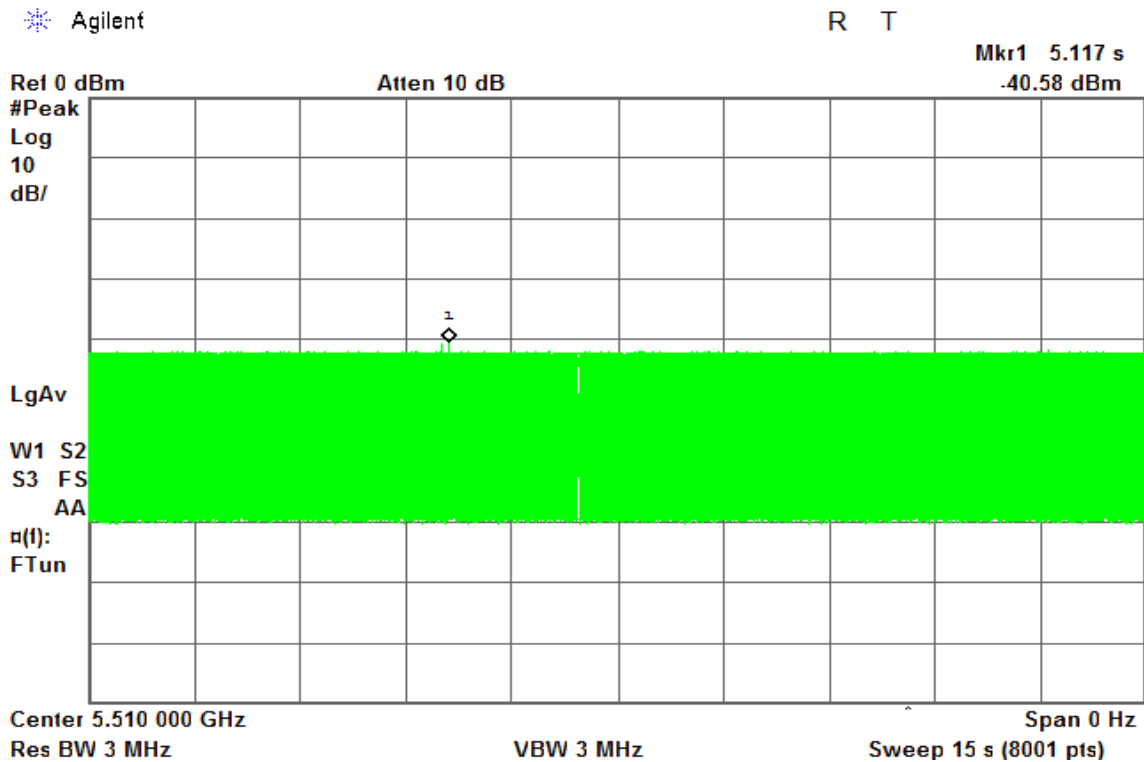


PLOT OF WLAN TRAFFIC FROM SLAVE

IEEE 802.11n HT 20 MHz mode



IEEE 802.11n HT 40 MHz mode



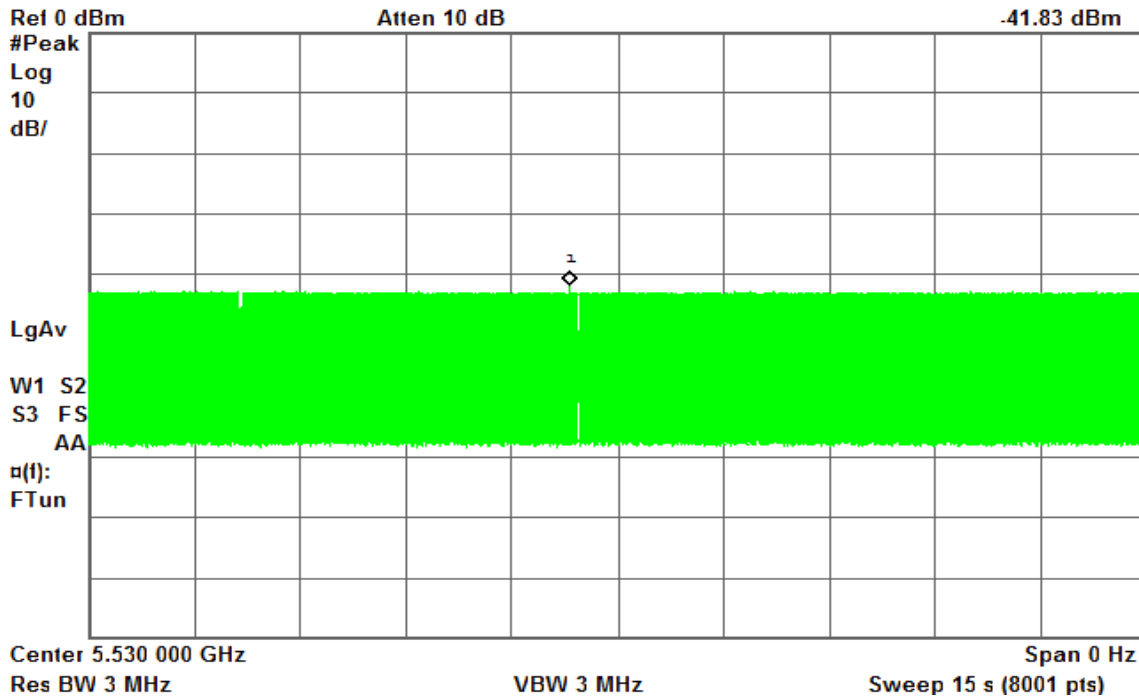


IEEE 802.11ac VHT 80 MHz mode

Agilent

R T

Mkr1 6.84 s
-41.83 dBm





TEST CHANNEL AND METHOD

All tests were performed at a channel center frequency of 5500 MHz utilizing a conducted test method.

CHANNEL MOVE TIME AND CHANNEL CLOSING TRANSMISSION TIME

GENERAL REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =

(Number of analyzer bins showing transmission) * (dwell time per bin)

The observation period over which the aggregate time is calculated

Begins at (Reference Marker + 200 msec) and

Ends no earlier than (Reference Marker + 10 sec).



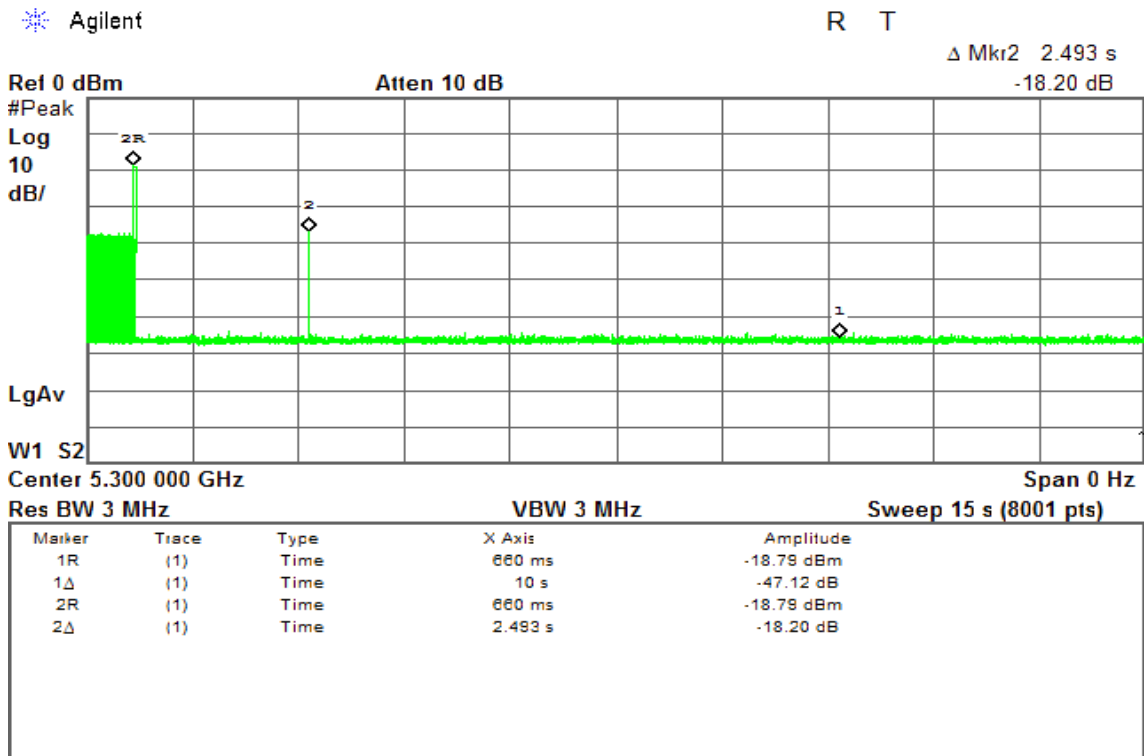
UNII Band II

IEEE 802.11n HT 20 mode

Type 1 Channel Move Time Results

No non-compliance noted.

Channel Move Time (s)	Limit (s)
2.493	10



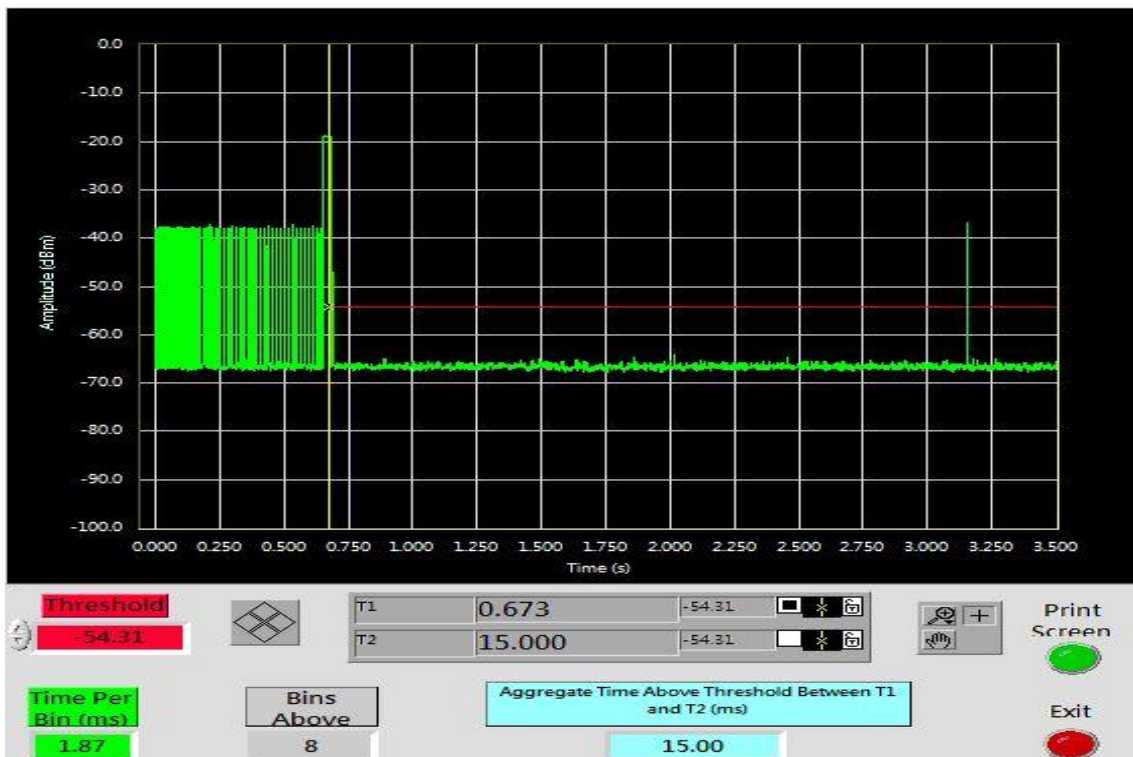
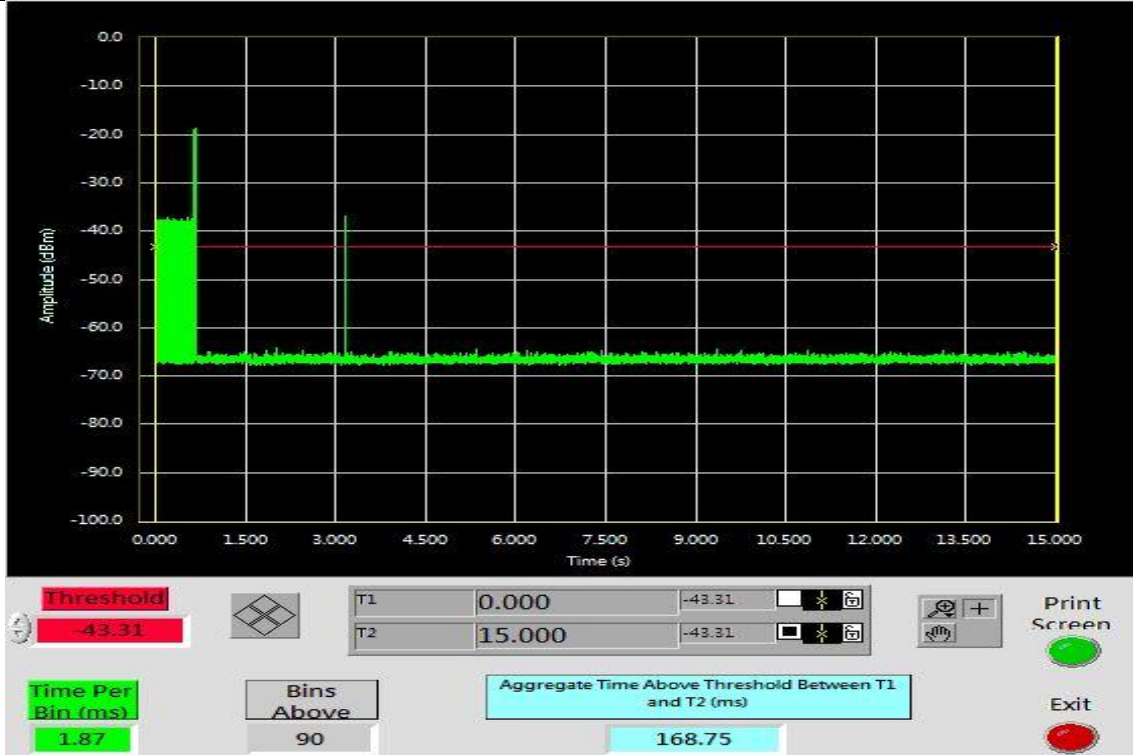


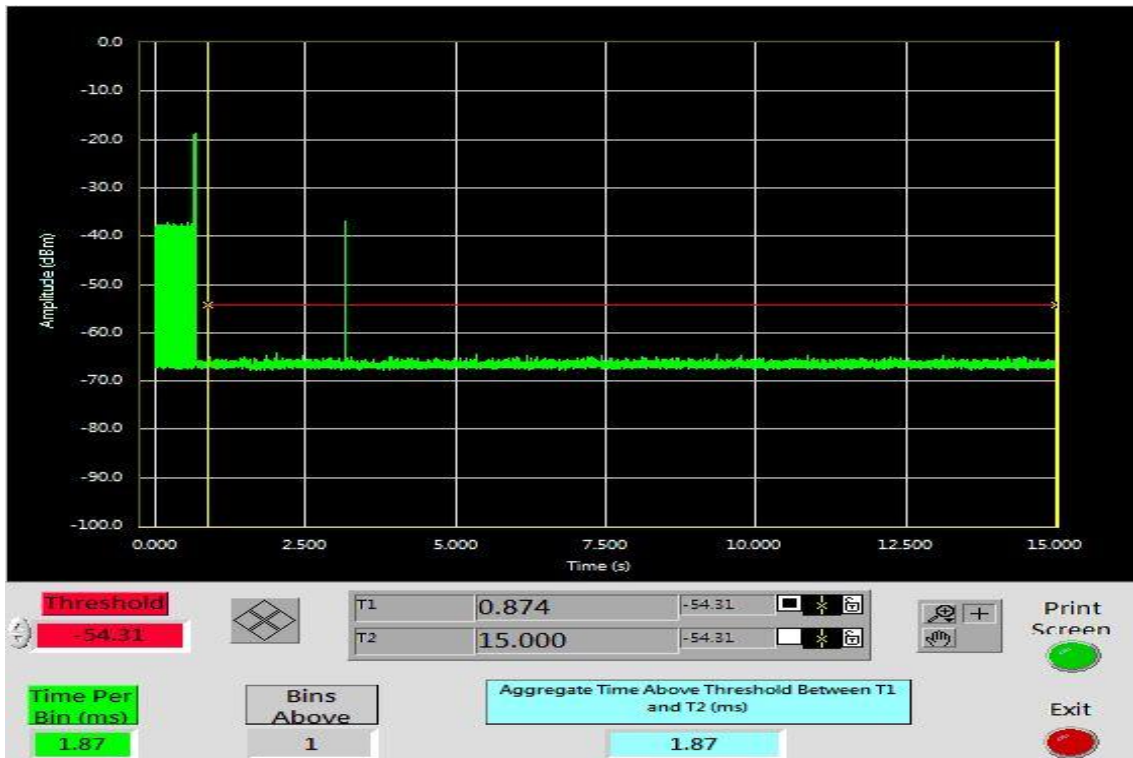
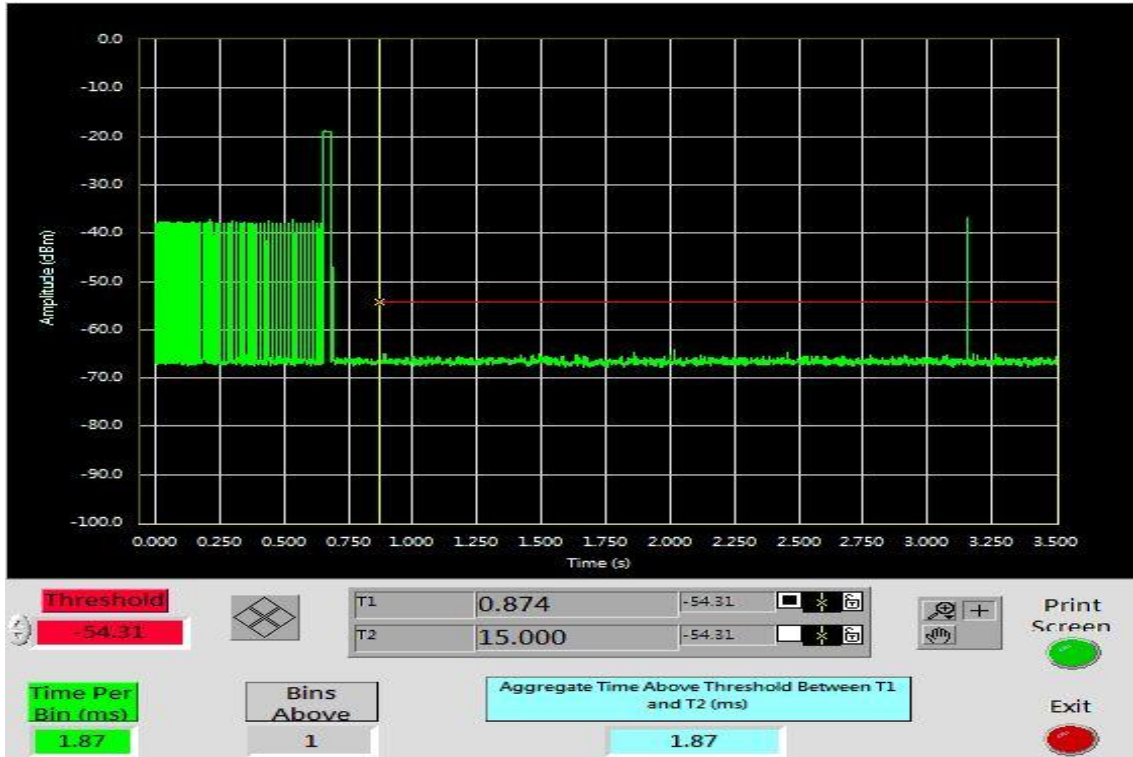
IEEE 802.11n HT 20 mode

Type 1 Channel Closing Transmission Time Results

No non-compliance noted.

Aggregate Transmission Time (ms)	Limit (ms)	Margin (ms)
1.87	60	-58.13





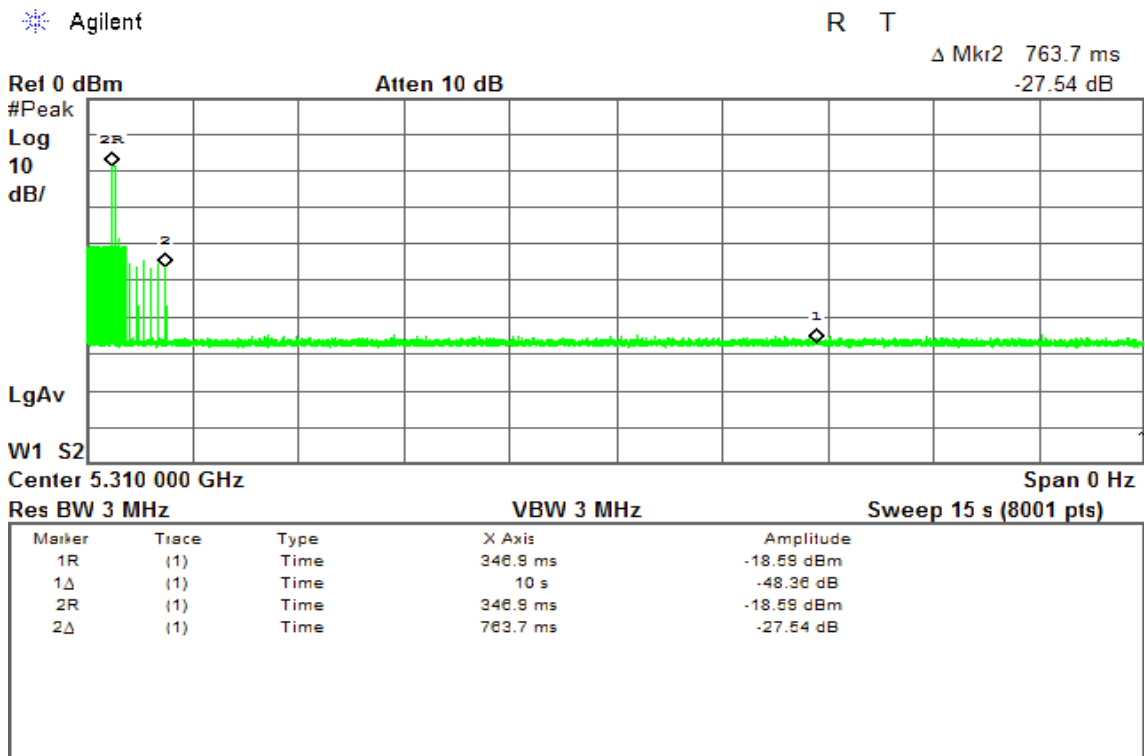


IEEE 802.11n HT 40 mode

Type 1 Channel Move Time Results

No non-compliance noted.

Channel Move Time (ms)	Limit (s)
763.7	10



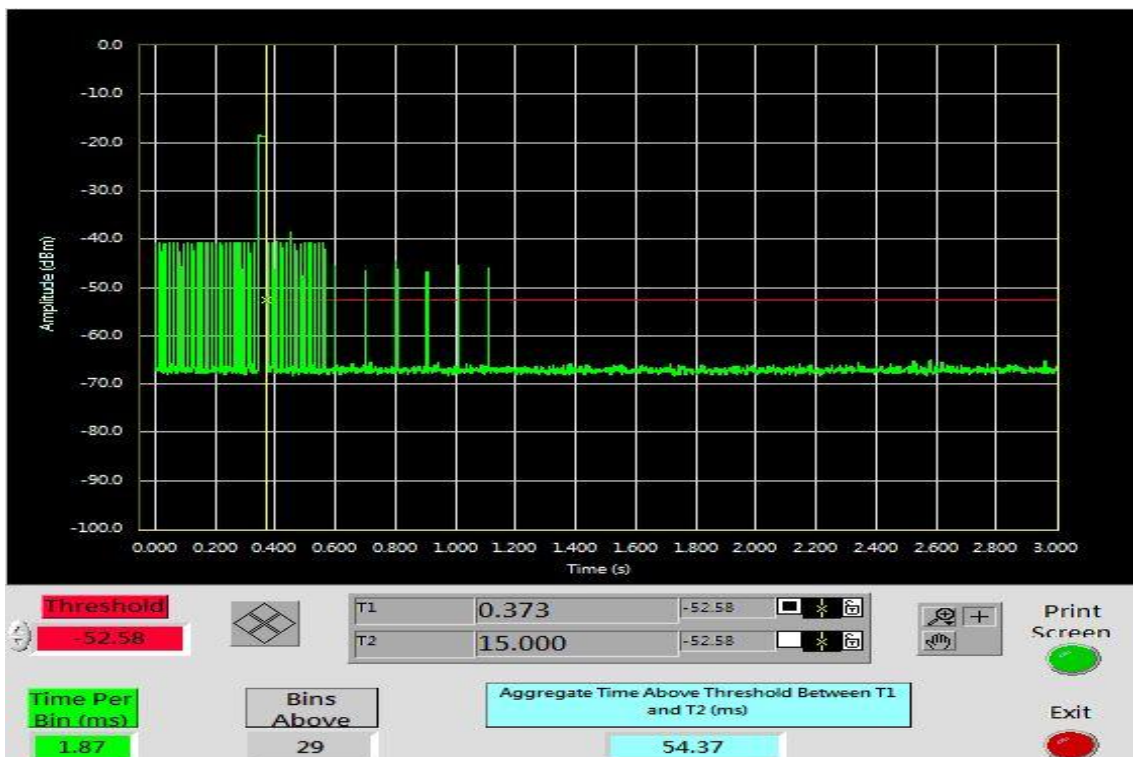
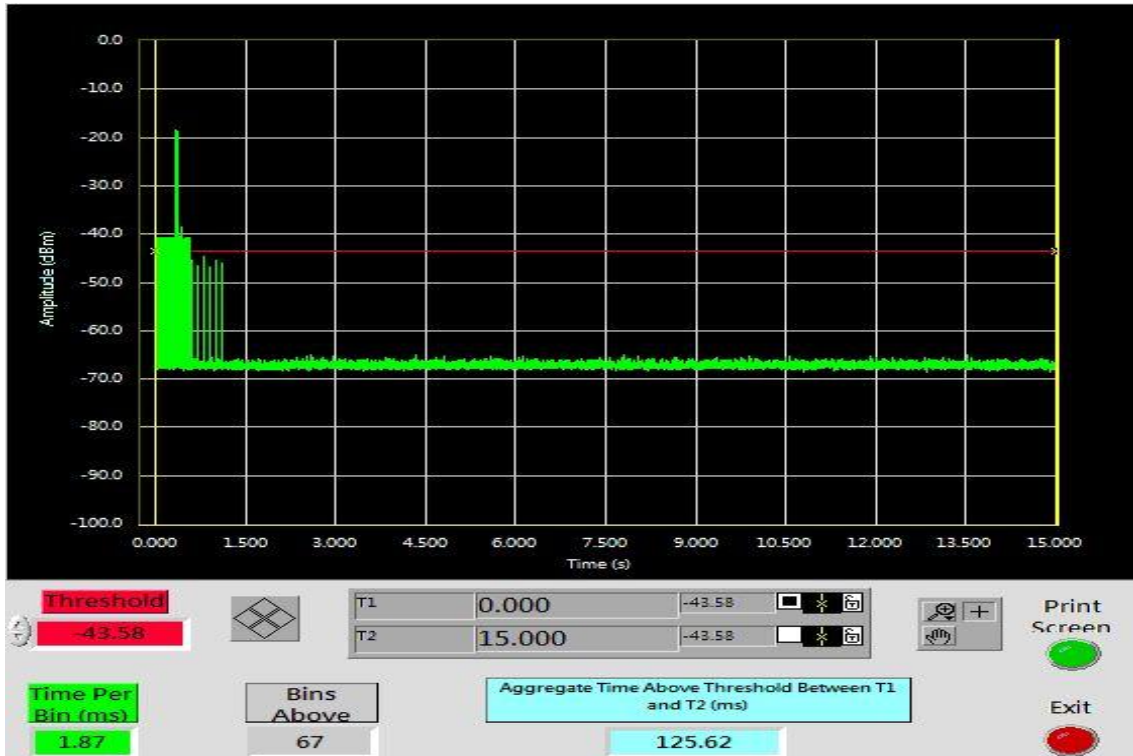


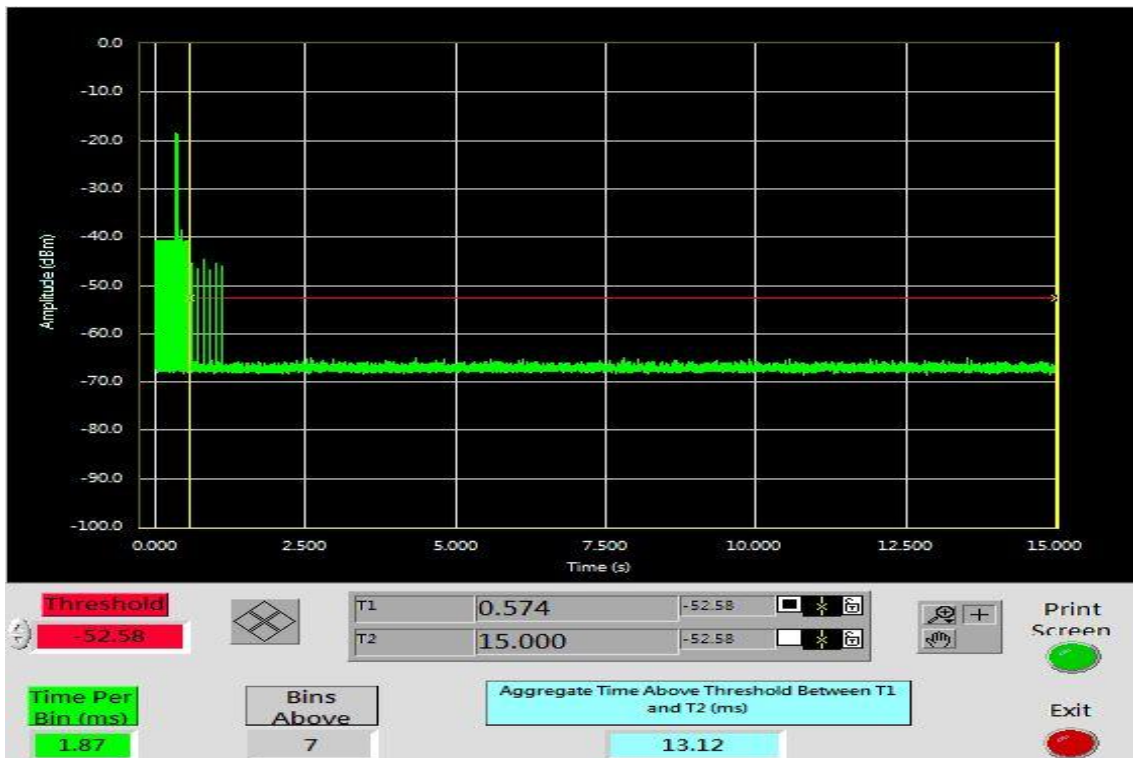
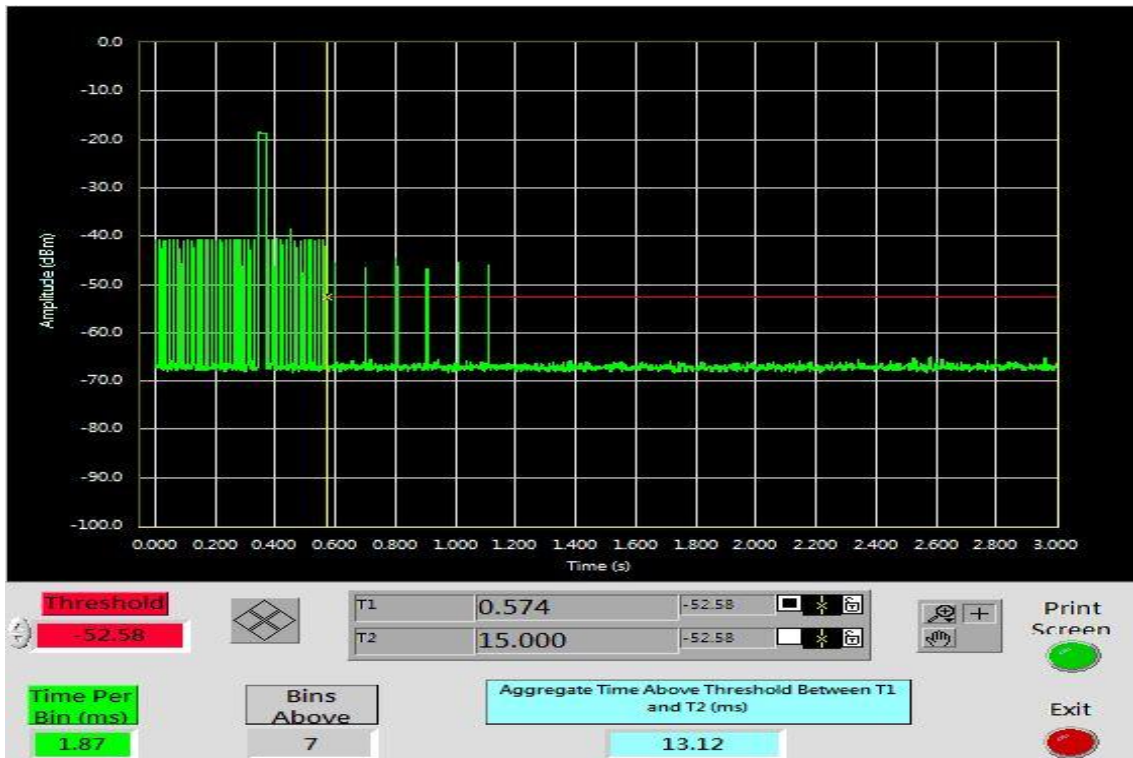
IEEE 802.11n HT 40 mode

Type 1 Channel Closing Transmission Time Results

No non-compliance noted.

Aggregate Transmission Time (ms)	Limit (ms)	Margin (ms)
13.12	60	-46.88





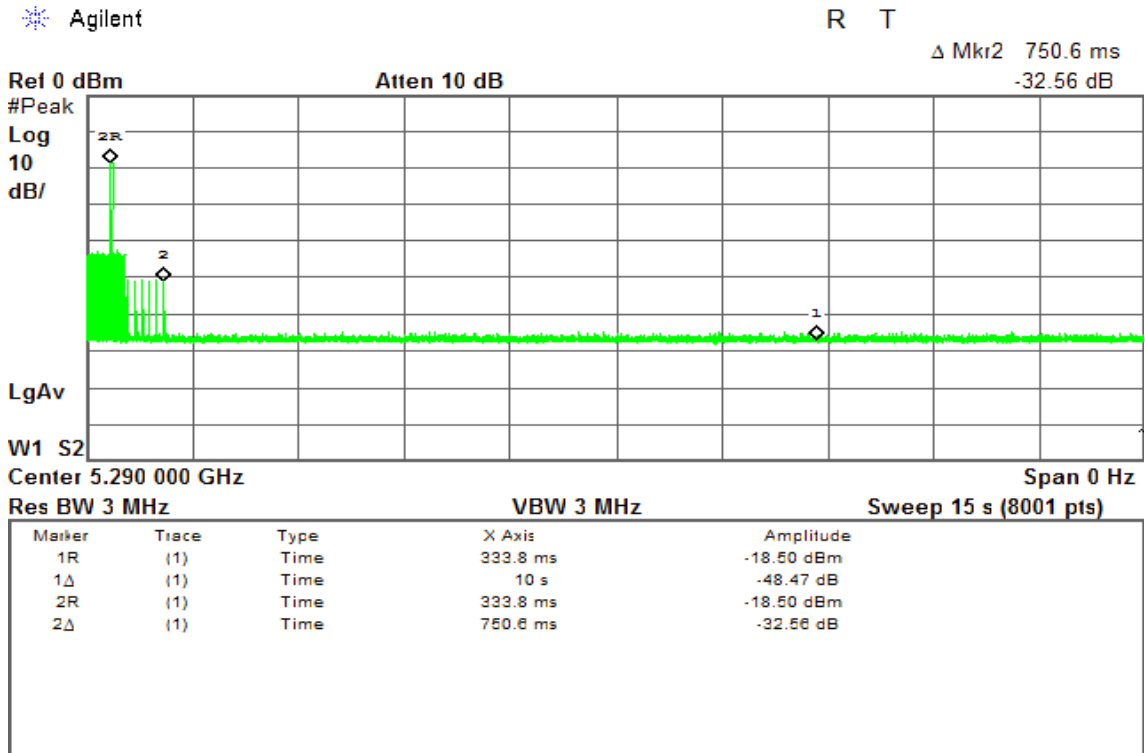


IEEE 802.11ac VHT 80 MHz mode

Type 1 Channel Move Time Results

No non-compliance noted.

Channel Move Time (ms)	Limit (s)
750.6	10



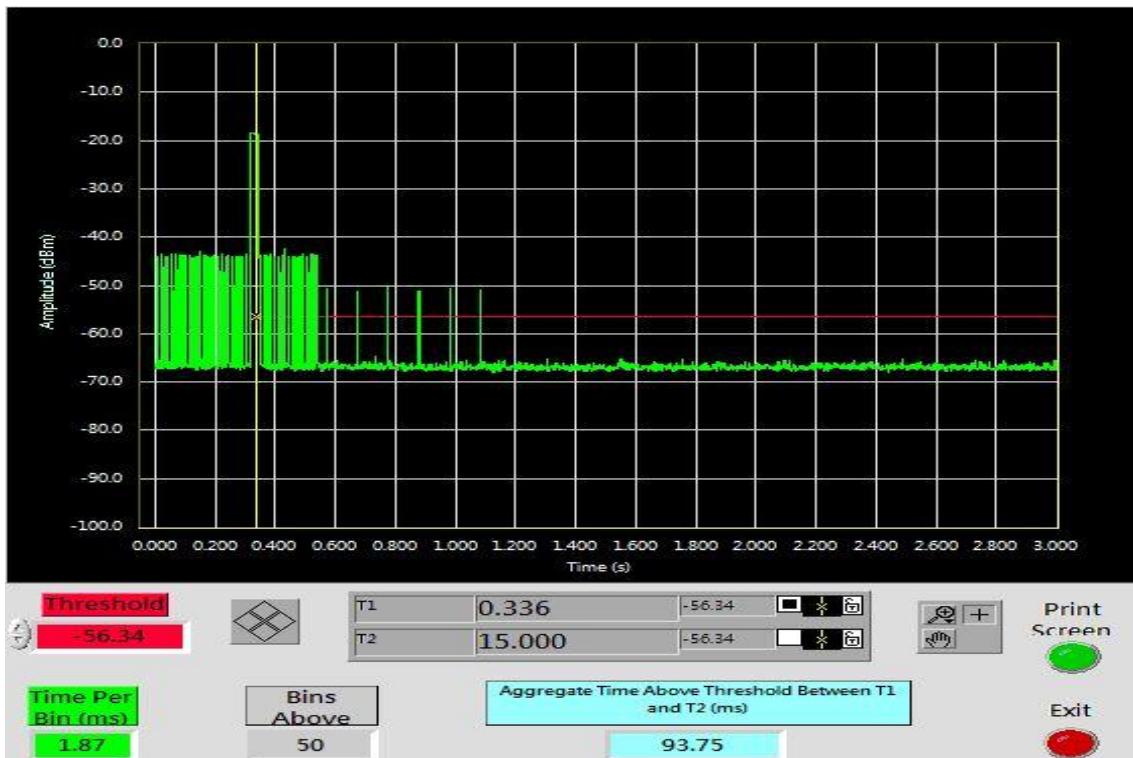
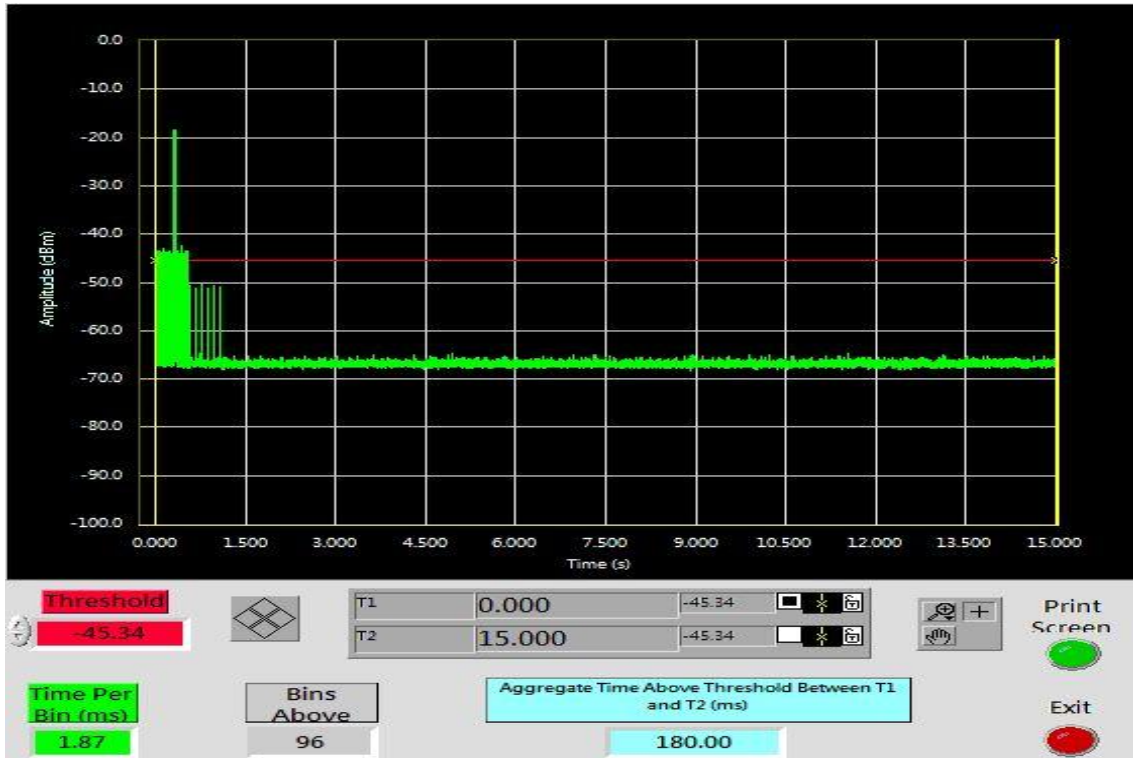


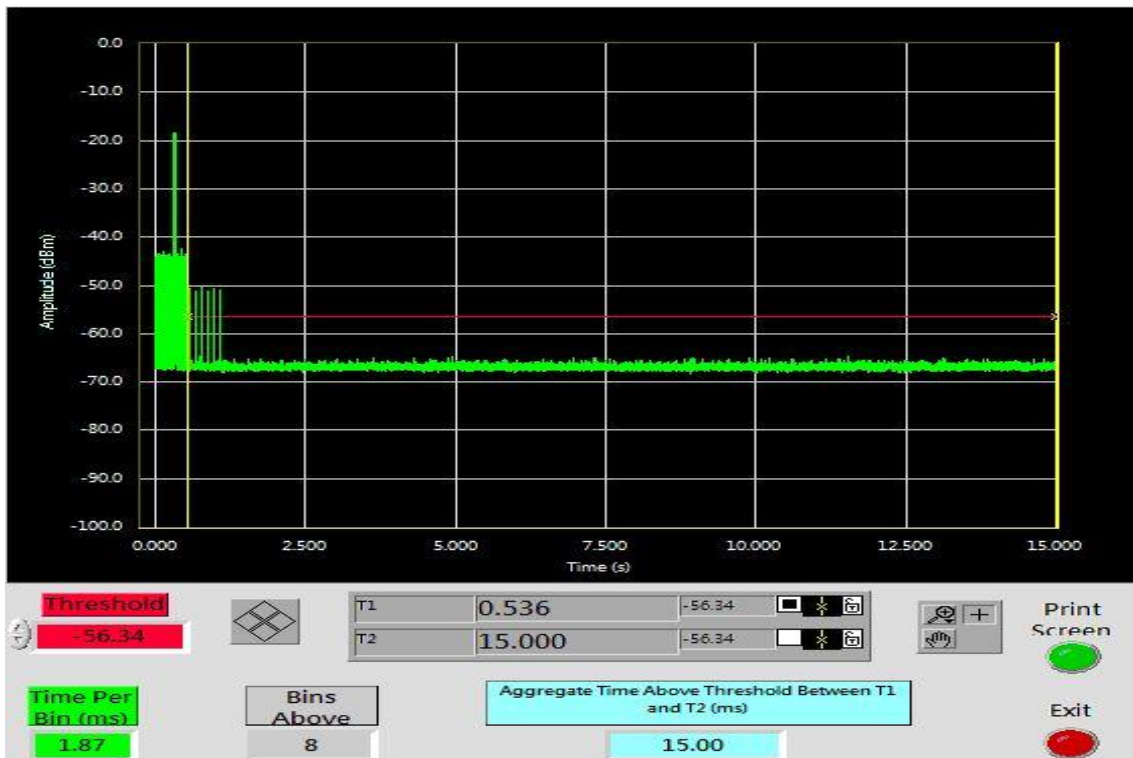
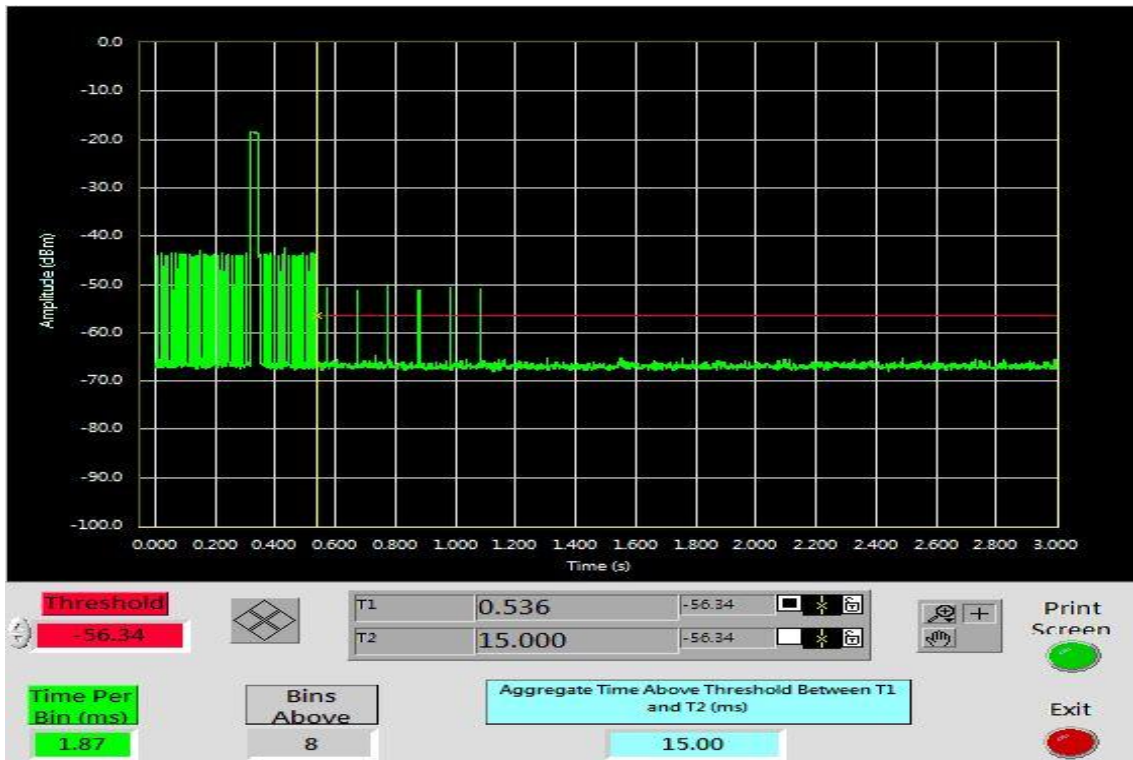
IEEE 802.11ac VHT 80 MHz mode

Type 1 Channel Closing Transmission Time Results

No non-compliance noted.

Aggregate Transmission Time (ms)	Limit (ms)	Margin (ms)
15	60	-45







UNII Band III

IEEE 802.11n HT 20 mode

Type 1 Channel Move Time Results

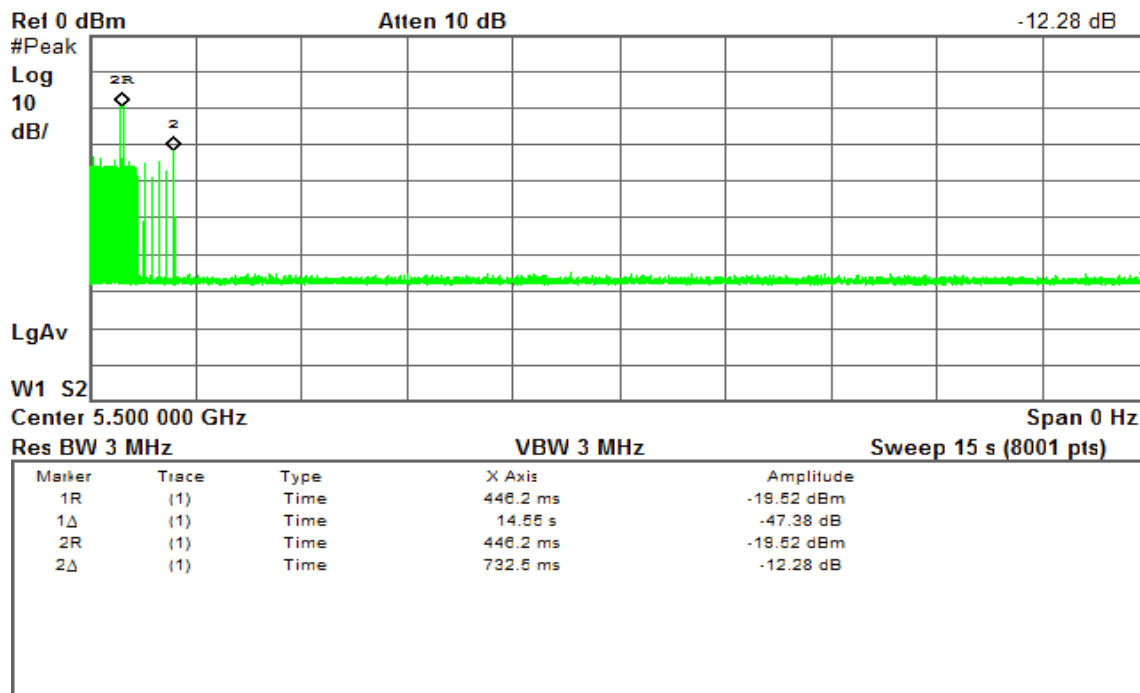
No non-compliance noted.

Channel Move Time (ms)	Limit (s)
732.5	10

Agilent

R T

Δ Mkr2 732.5 ms
-12.28 dB



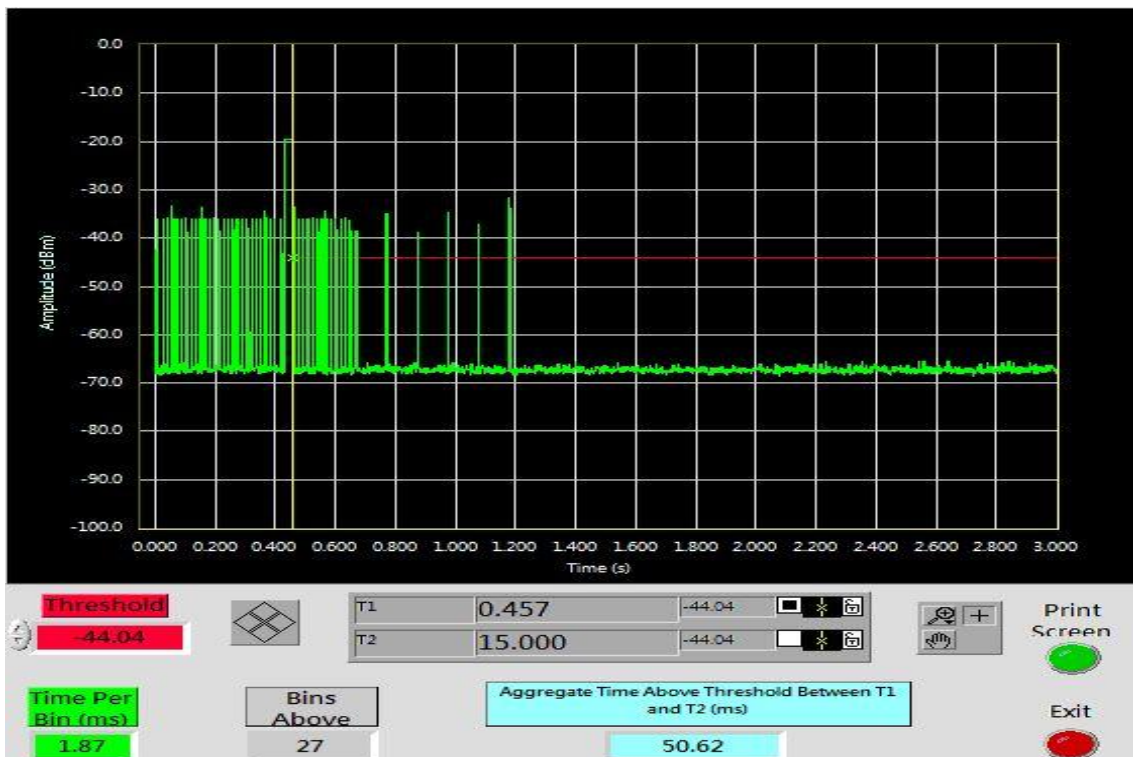
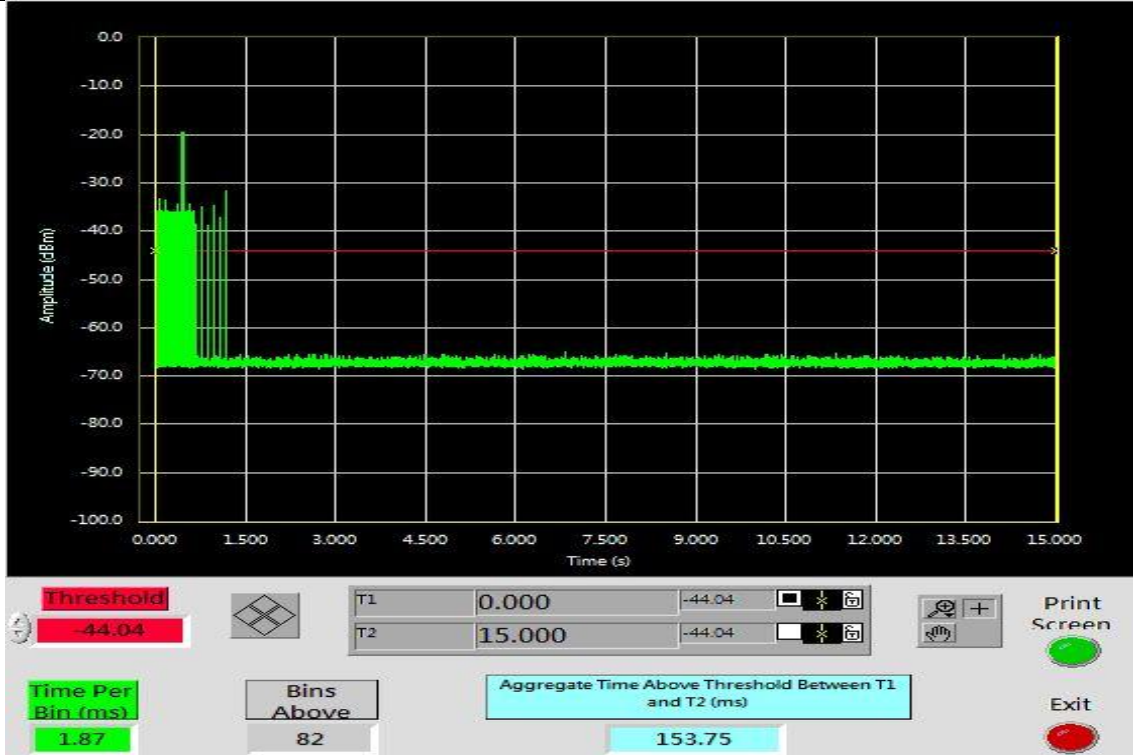


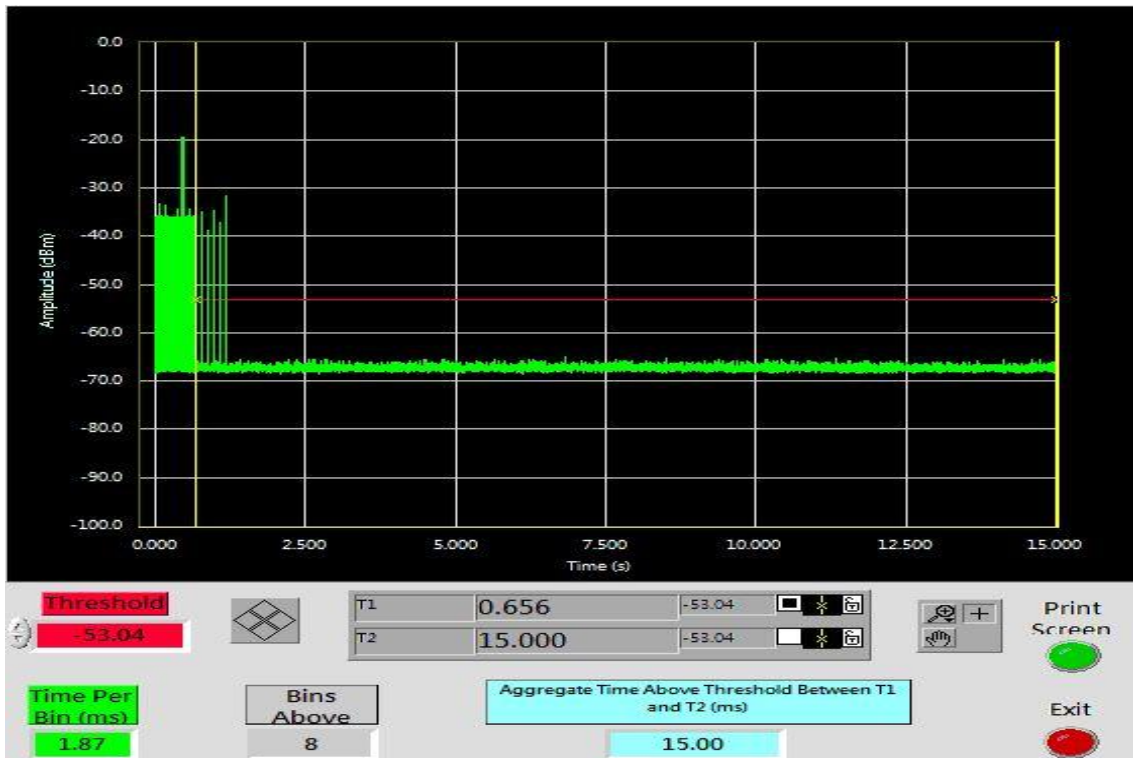
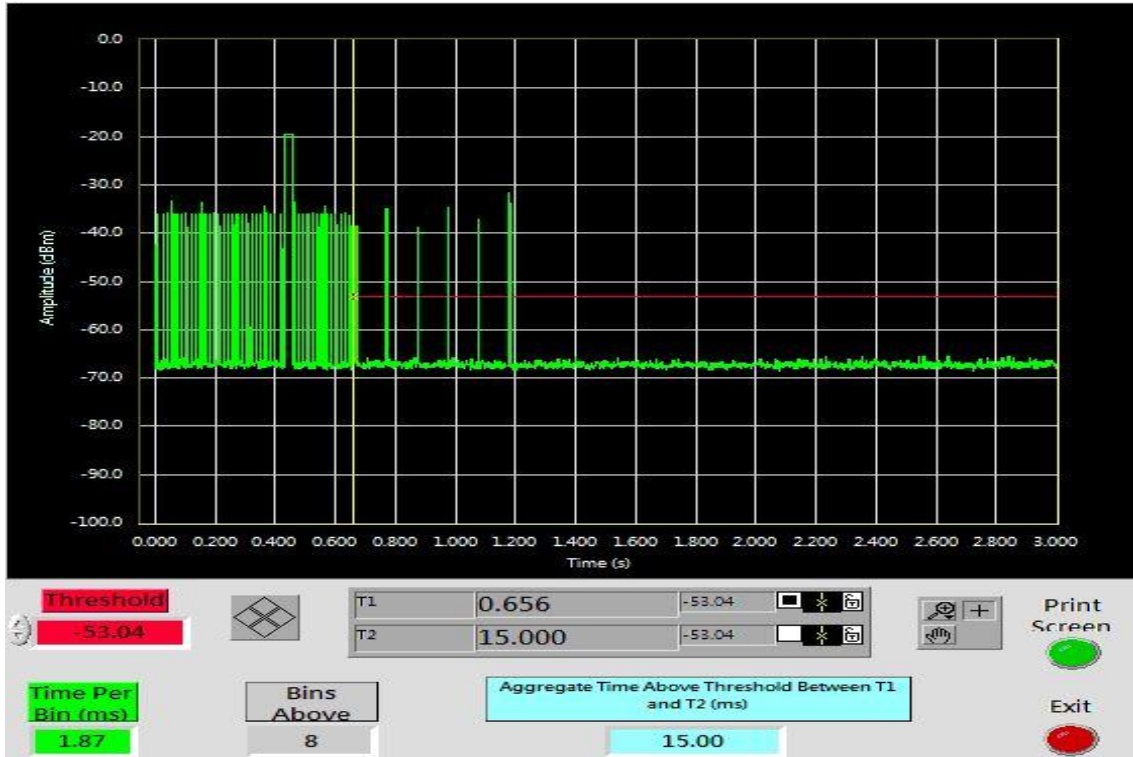
IEEE 802.11n HT 20 mode

Type 1 Channel Closing Transmission Time Results

No non-compliance noted.

Aggregate Transmission Time (ms)	Limit (ms)	Margin (ms)
15	60	-45







IEEE 802.11n HT 40 mode

Type 1 Channel Move Time Results

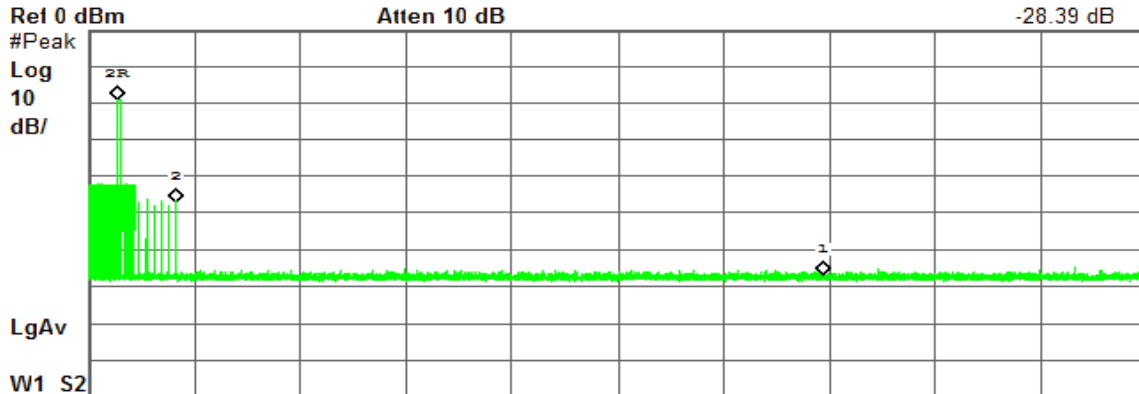
No non-compliance noted.

Channel Move Time (ms)	Limit (s)
816.2	10

Agilent

R T

Δ Mkr2 816.2 ms
-28.39 dB



Center 5.510 000 GHz Span 0 Hz
Res BW 3 MHz VBW 3 MHz Sweep 15 s (8001 pts)

Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Time	412.5 ms	-18.94 dBm
1Δ	(1)	Time	10 s	-48.23 dB
2R	(1)	Time	412.5 ms	-18.94 dBm
2Δ	(1)	Time	816.2 ms	-28.39 dB

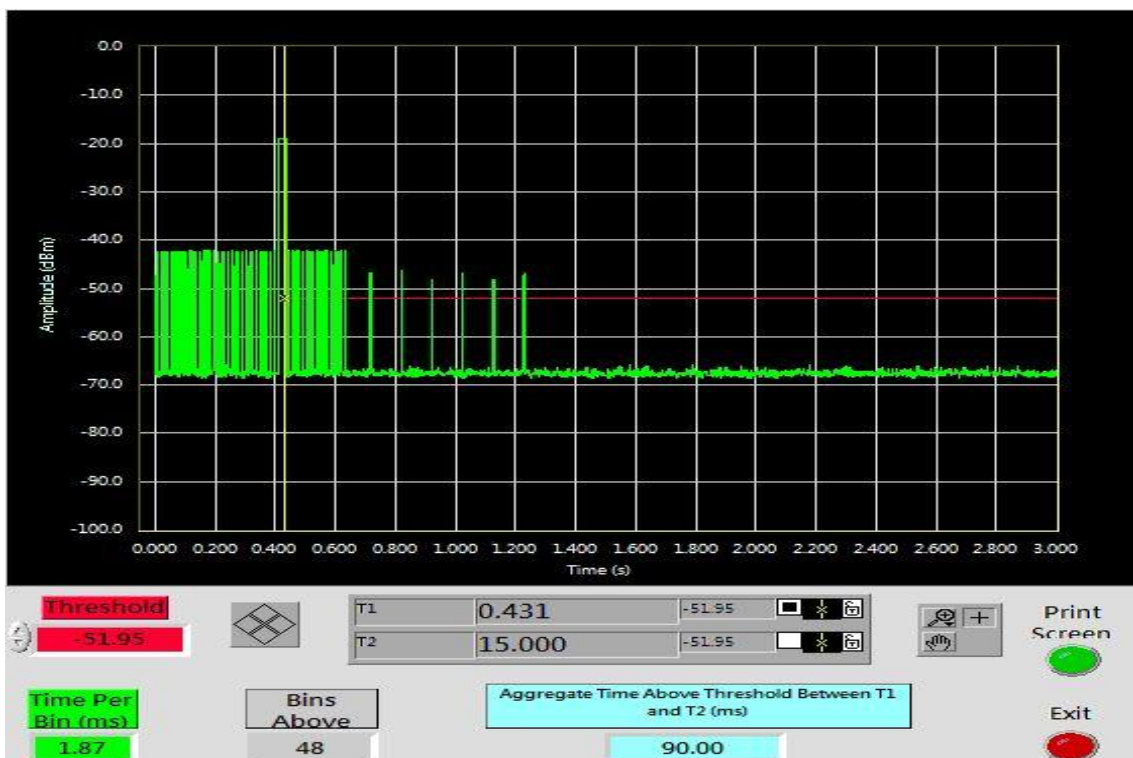
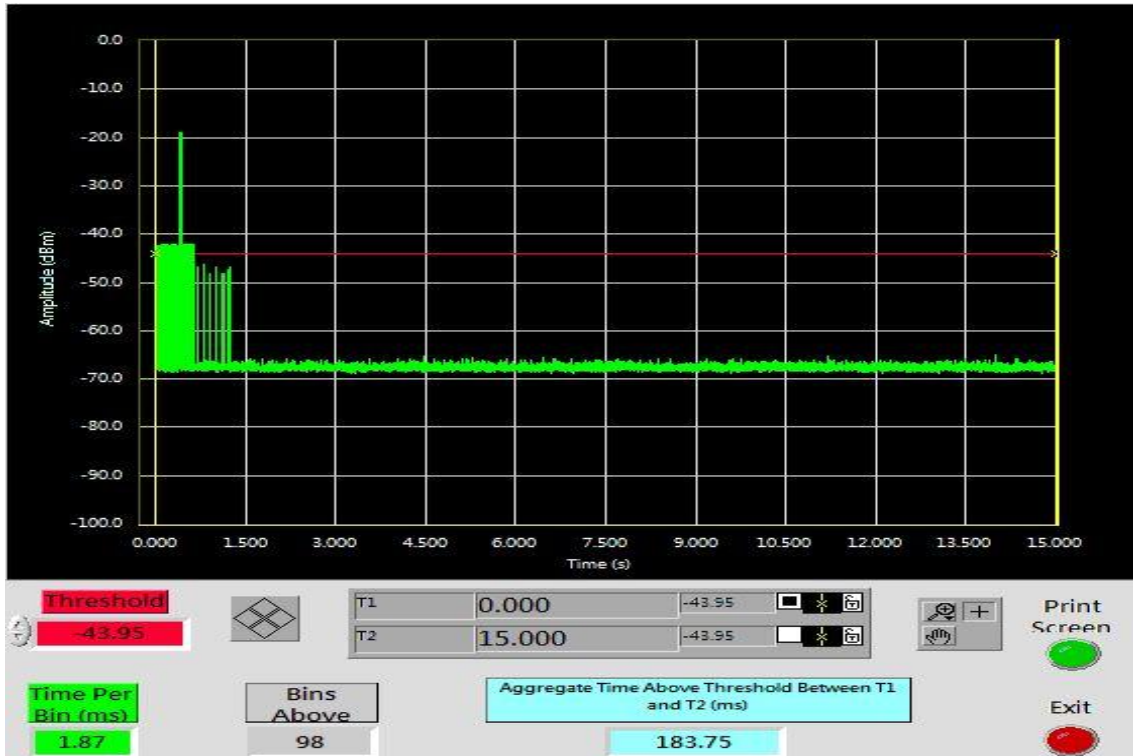


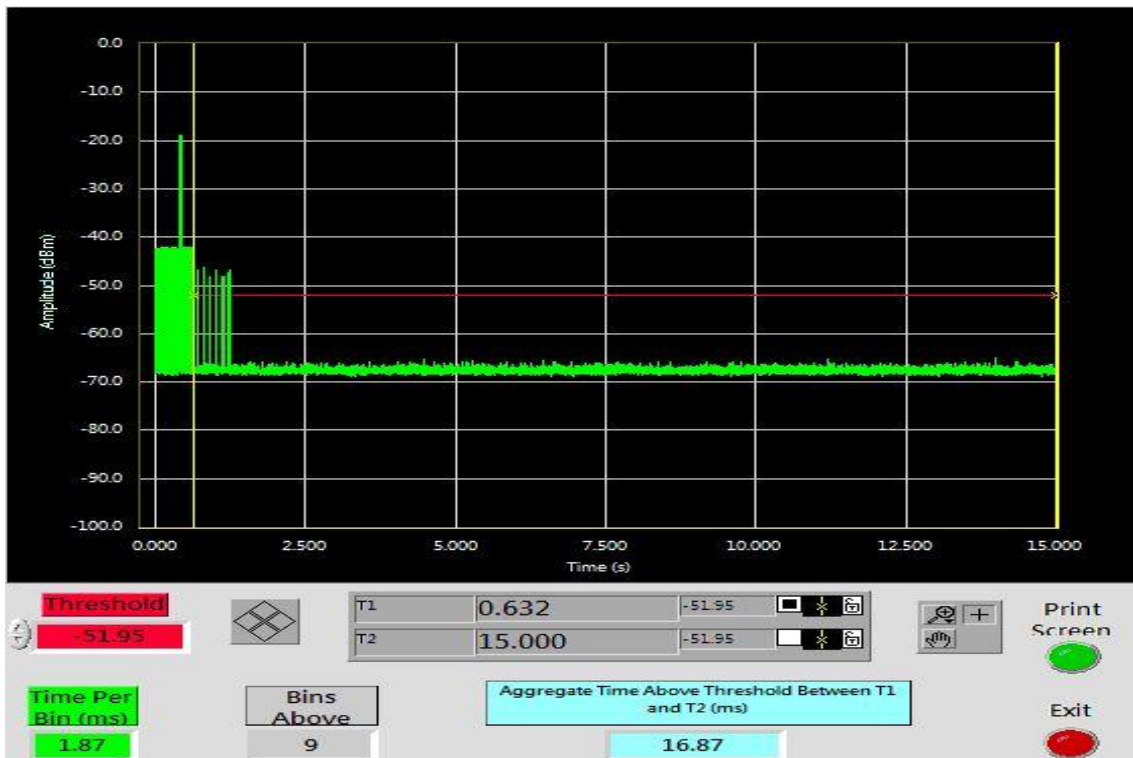
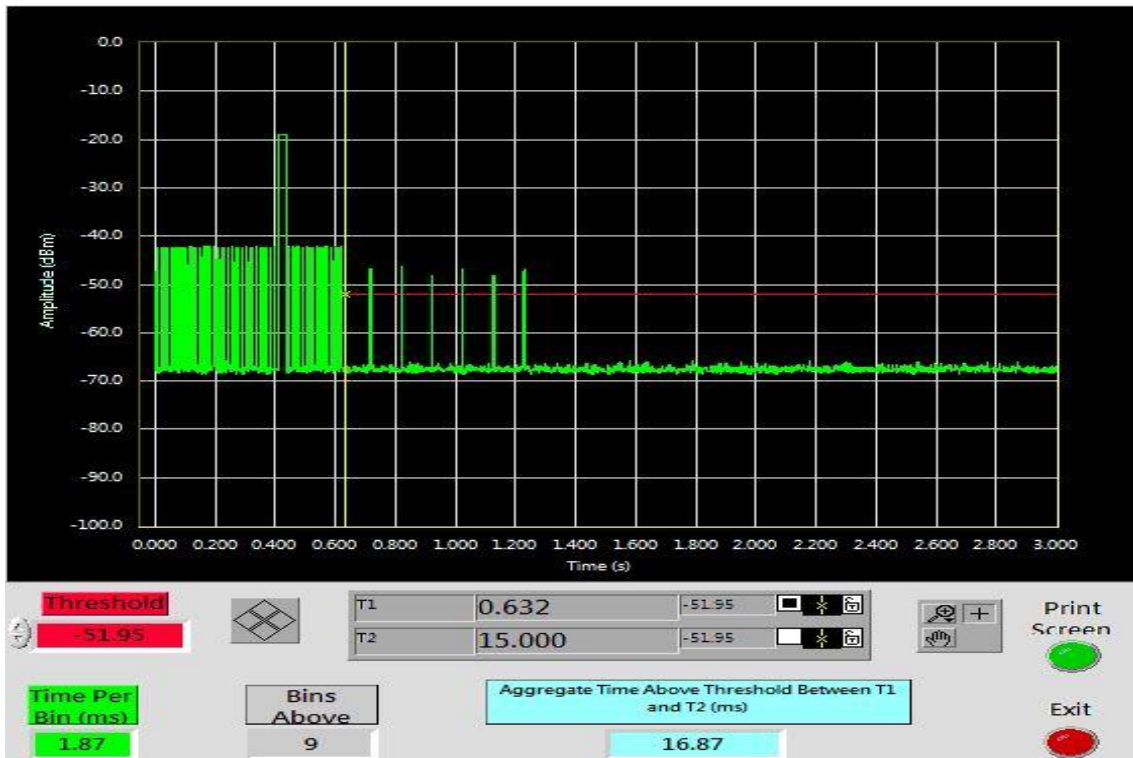
IEEE 802.11n HT 40 mode

Type 1 Channel Closing Transmission Time Results

No non-compliance noted.

Aggregate Transmission Time (ms)	Limit (ms)	Margin (ms)
16.87	60	-43.13







IEEE 802.11ac VHT 80 MHz mode

Type 1 Channel Move Time Results

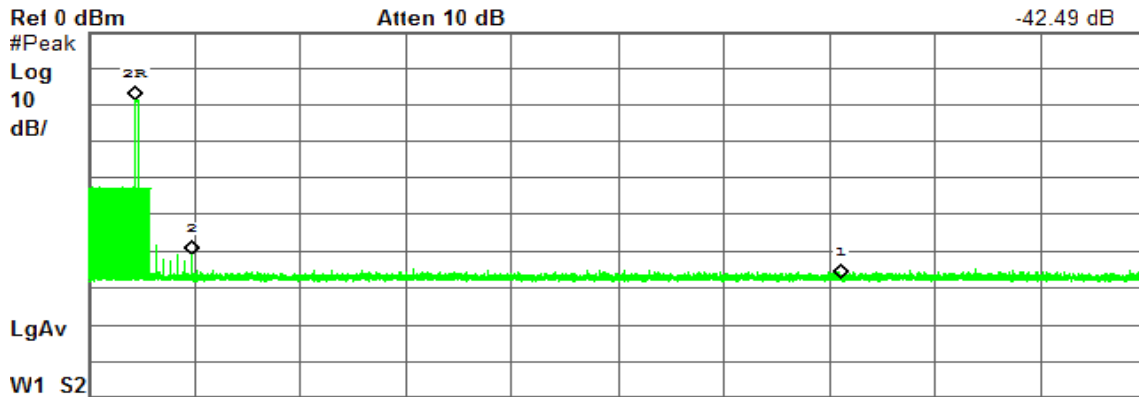
No non-compliance noted.

Channel Move Time (ms)	Limit (s)
808.7	10

Agilent

R T

Δ Mkr2 808.7 ms
-42.49 dB



Center 5.530 000 GHz Span 0 Hz
Res BW 3 MHz VBW 3 MHz Sweep 15 s (8001 pts)

Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Time	661.9 ms	-18.59 dBm
1Δ	(1)	Time	10 s	-48.98 dB
2R	(1)	Time	661.9 ms	-18.59 dBm
2Δ	(1)	Time	808.7 ms	-42.49 dB

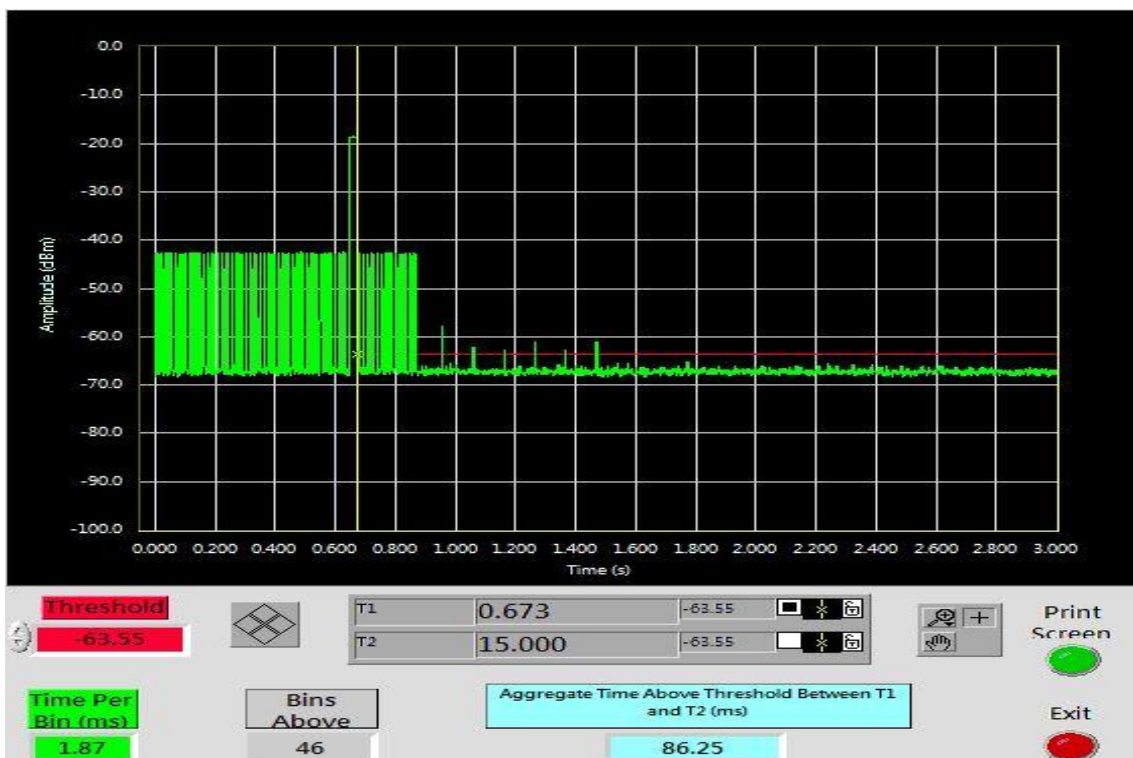
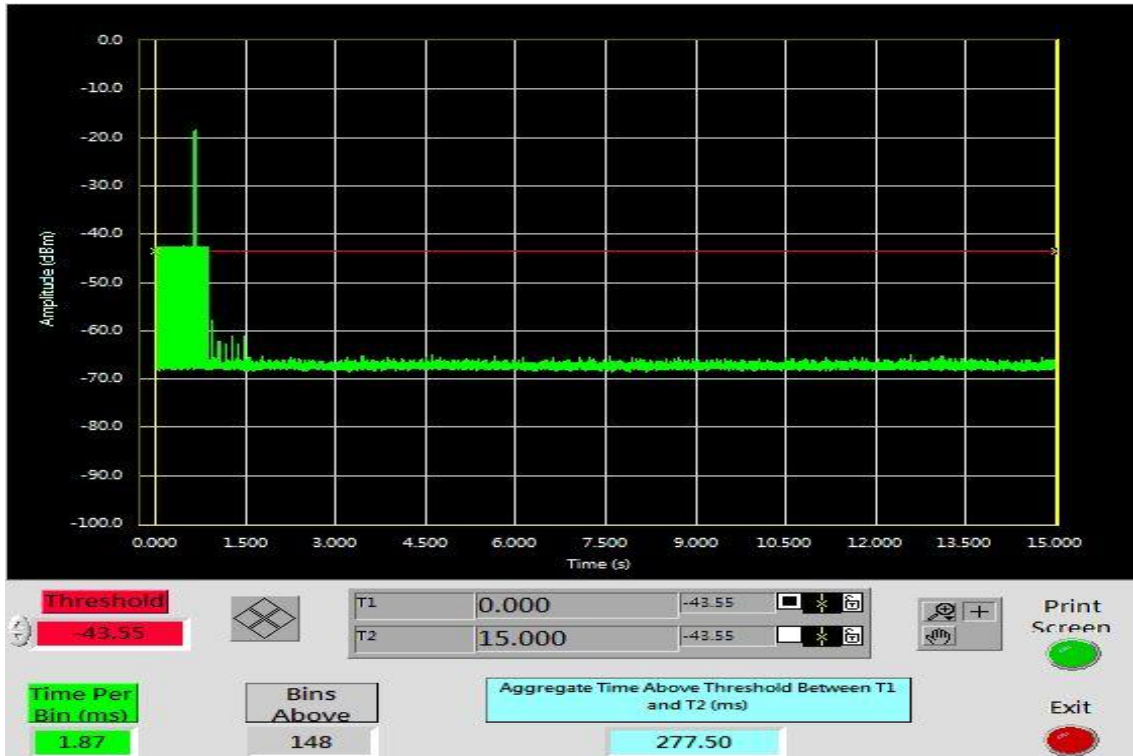


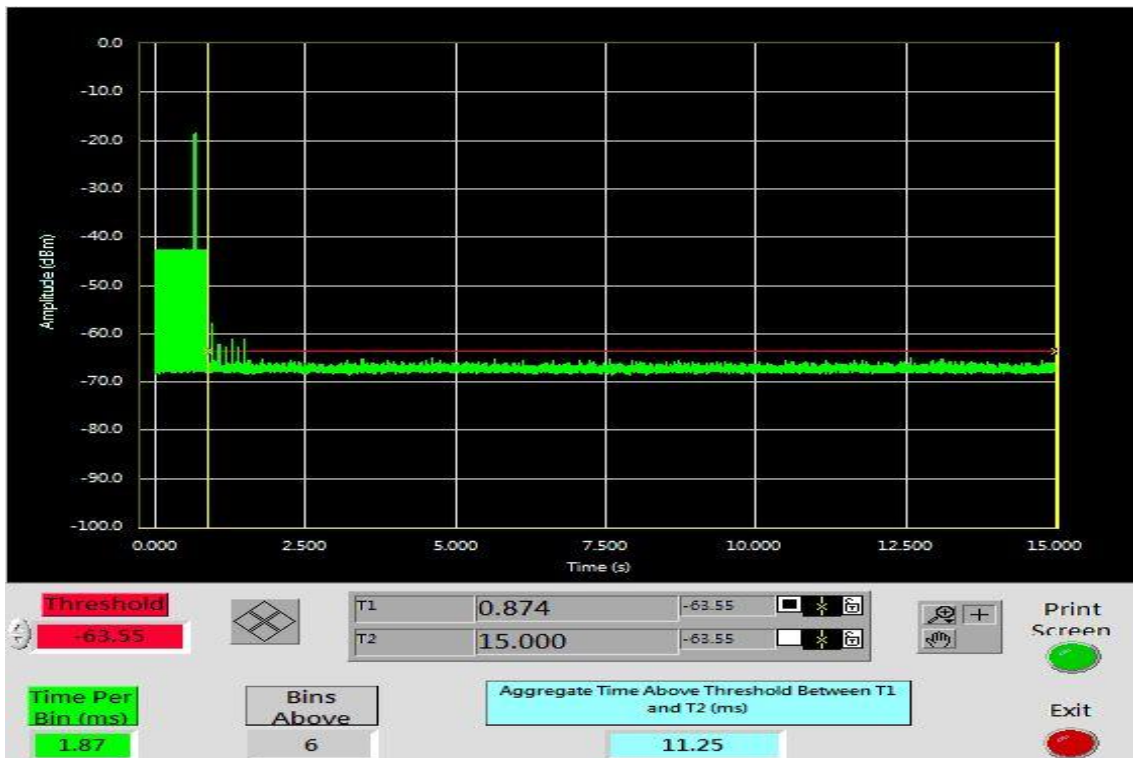
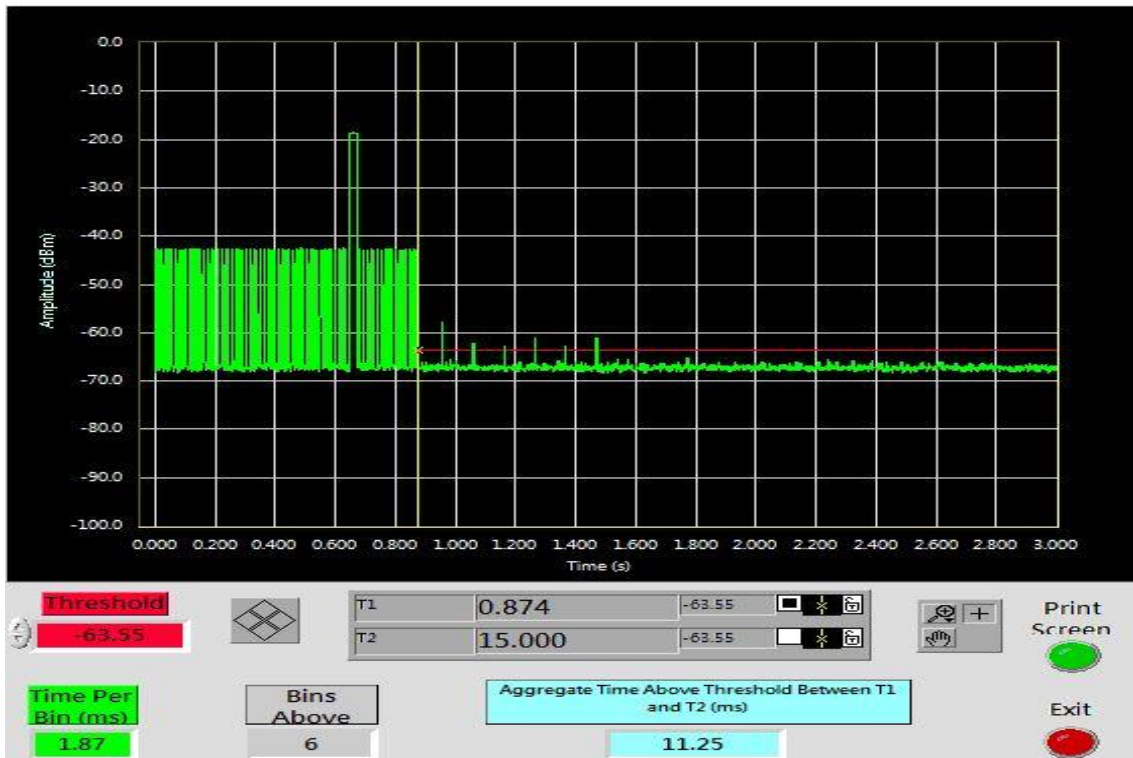
IEEE 802.11ac VHT 80 MHz mode

Type 1 Channel Closing Transmission Time Results

No non-compliance noted.

Aggregate Transmission Time (ms)	Limit (ms)	Margin (ms)
11.25	60	-48.75







NON-OCCUPANCY PERIOD

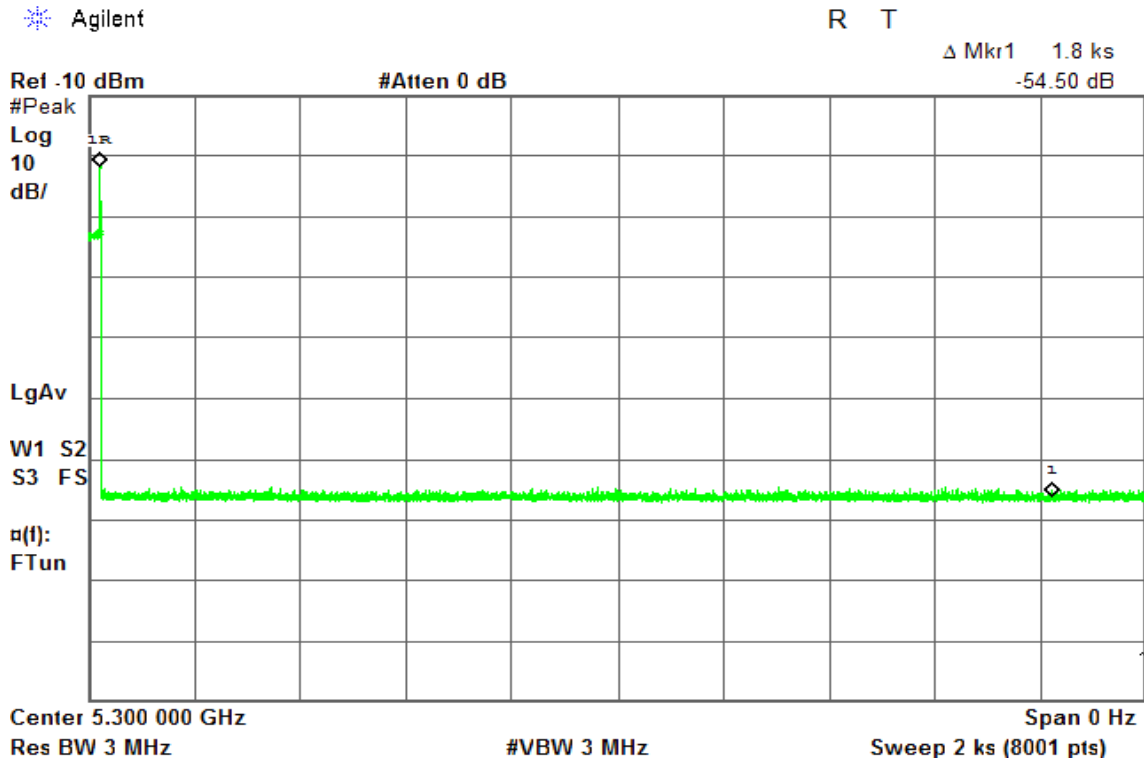
UNII Band II

IEEE 802.11n HT 20 mode

Type 1 Non-Occupancy Period Test Results

No non-compliance noted.

No EUT transmissions were observed on the test channel during the 30 minute observation time.



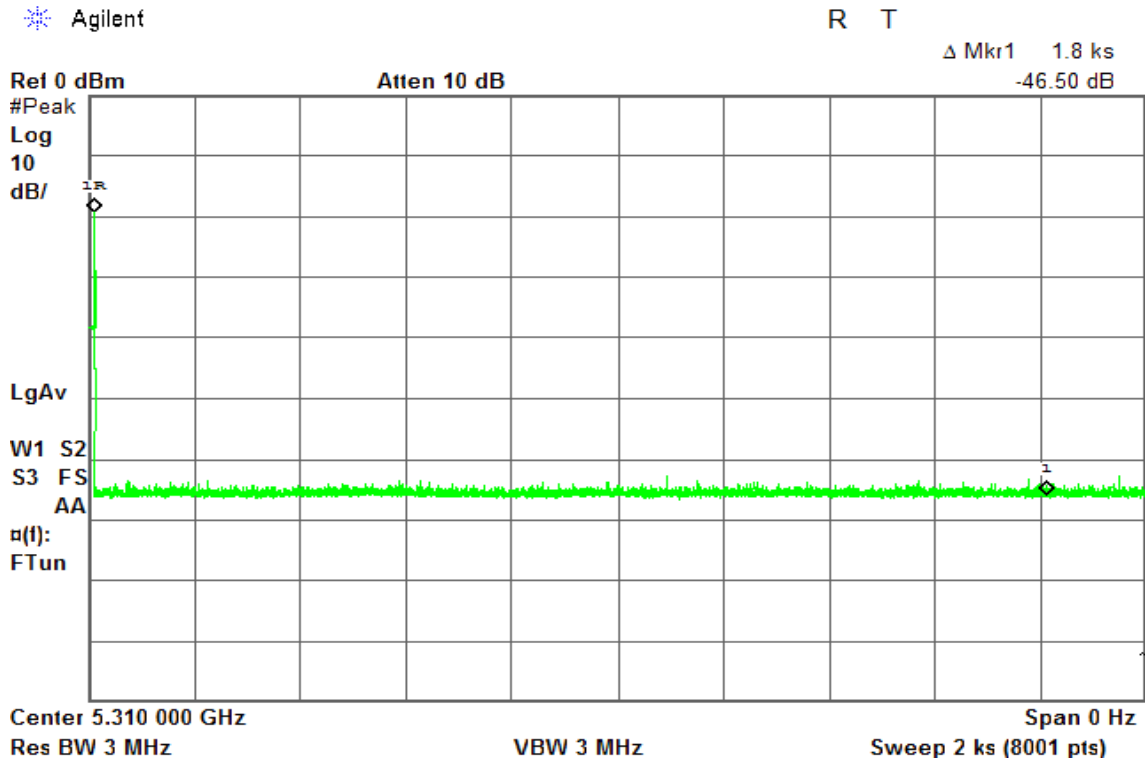


IEEE 802.11n HT 40 mode

Type 1 Non-Occupancy Period Test Results

No non-compliance noted.

No EUT transmissions were observed on the test channel during the 30 minute observation time.



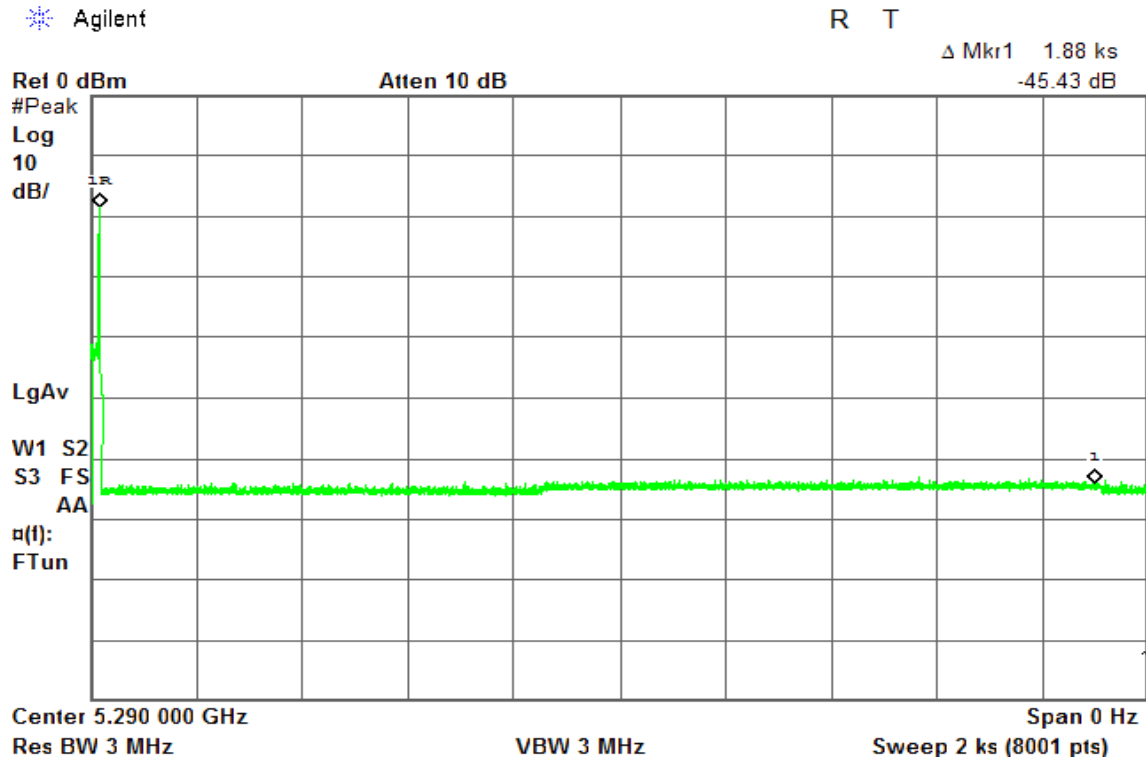


IEEE 802.11ac VHT 80 MHz mode

Type 1 Non-Occupancy Period Test Results

No non-compliance noted.

No EUT transmissions were observed on the test channel during the 30 minute observation time.





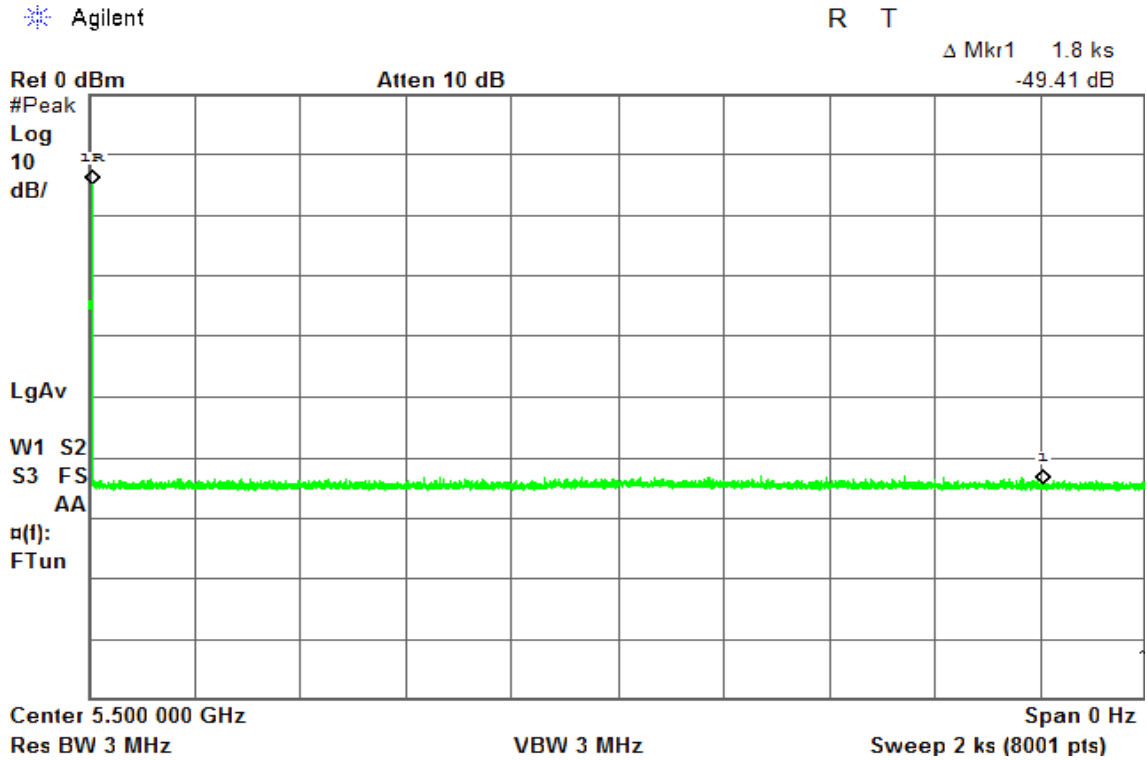
UNII Band III

IEEE 802.11n HT 20 mode

Type 1 Non-Occupancy Period Test Results

No non-compliance noted.

No EUT transmissions were observed on the test channel during the 30 minute observation time.



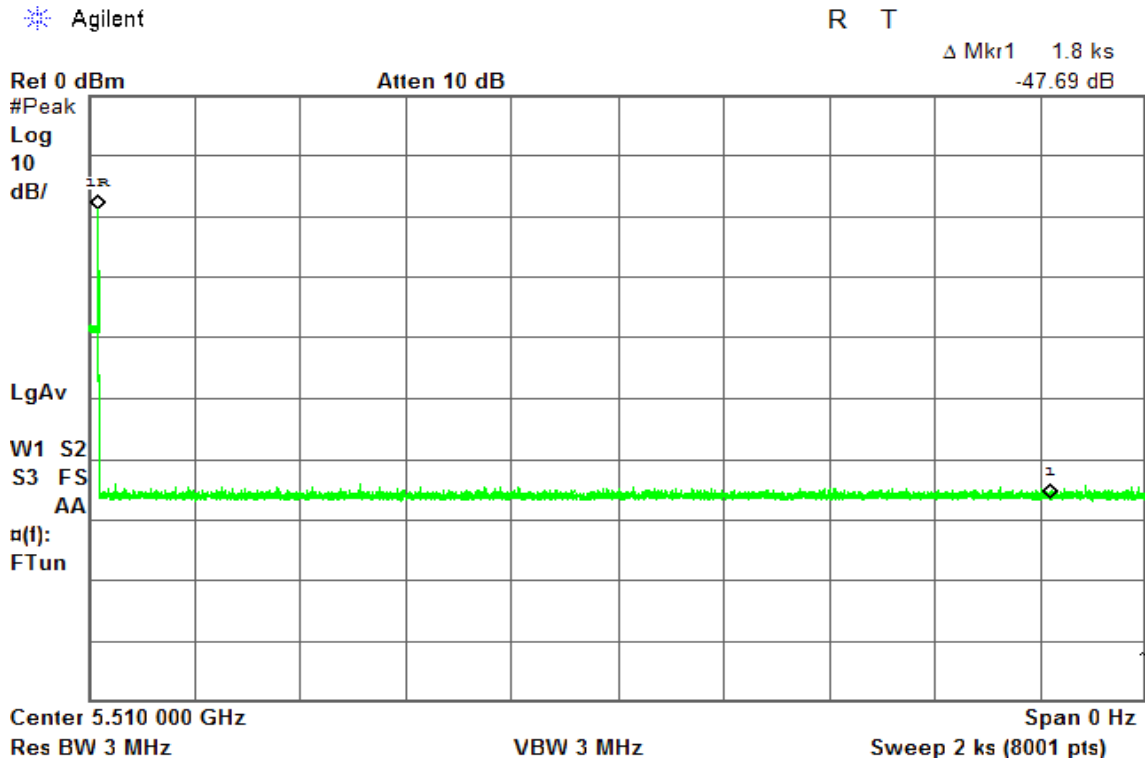


IEEE 802.11n HT 40 mode

Type 1 Non-Occupancy Period Test Results

No non-compliance noted.

No EUT transmissions were observed on the test channel during the 30 minute observation time.





IEEE 802.11ac VHT 80 MHz mode

Type 1 Non-Occupancy Period Test Results

No non-compliance noted.

No EUT transmissions were observed on the test channel during the 30 minute observation time.

