# FCC 47 CFR PART 15 SUBPART E

# TEST REPORT

## For

## Wireless AC Day/Night HD Mini Bullet Cloud Camera

## Model: DCS-7000L

## Trade Name: D-Link

*Issued to*

**D-Link Corporation**
**NO. 289, Sinhu 3rd Rd., Neihu District, Taipei City114, 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: September 18, 2014**

Testing Laboratory
1309

## Revision History

| Rev. | | Issue Date | | Revisions | Effect Page | Revised By |
|---|---|---|---|---|---|---|
| 00 | | September 18, 2014 | | Initial Issue | ALL | Kelly Cheng |

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# 1. TEST RESULT CERTIFICATION

| | |
|---|---|
| **Applicant:** | D-Link Corporation<br>NO. 289, Sinhu 3rd Rd., Neihu District, Taipei City114,<br>Taiwan, R.O.C. |
| **Manufacturer:** | APPRO Technology Inc.<br>13F, No. 66, Zhongzheng Rd., Xinzhuang Dist., New Taipei City,<br>Taiwan. |
| **Equipment Under Test:** | Wireless AC Day/Night HD Mini Bullet Cloud Camera |
| **Trade Name:** | D-Link |
| **Model:** | DCS-7000L |
| **Date of Test:** | August 26, 2014 |

| 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 C63.4: 2009** 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
Section Manager
Compliance Certification Services Inc.

Angel Cheng
Section Manager
Compliance Certification Services Inc.

# 2. EUT DESCRIPTION

<table>
<tr><td>Product</td><td>Wireless AC Day/Night HD Mini Bullet Cloud Camera</td></tr>
<tr><td>Trade Name</td><td>D-Link</td></tr>
<tr><td>Model Number</td><td>DCS-7000L</td></tr>
<tr><td>Model Discrepancy</td><td>N/A</td></tr>
<tr><td>Received Date</td><td>March 17, 2014</td></tr>
<tr><td>Power Supply</td><td>VDC from Power Adapter<br>D-Link / AMS1-0501200FU<br>I/P: 100-240V, 0.3A, 50-60Hz<br>O/P: 5V / 1.2A</td></tr>
<tr><td>Operating Frequency Range &<br>Number of Channels</td><td>
<table>
<tr><th></th><th>Mode</th><th>Frequency Range (MHz)</th><th>Number of Channels</th></tr>
<tr><td rowspan="4">UNII Band I</td><td>IEEE 802.11a</td><td>5180 – 5240</td><td>4 Channels</td></tr>
<tr><td>IEEE 802.11n HT 20 MHz</td><td>5180 – 5240</td><td>4 Channels</td></tr>
<tr><td>IEEE 802.11n HT 40 MHz</td><td>5190 ~ 5230</td><td>2 Channels</td></tr>
<tr><td>IEEE 802.11n HT 80 MHz</td><td>5210</td><td>1 Channels</td></tr>
<tr><td rowspan="4">UNII Band II</td><td>IEEE 802.11a</td><td>5260 - 5320</td><td>4 Channels</td></tr>
<tr><td>IEEE 802.11n HT 20 MHz</td><td>5260 - 5320</td><td>4 Channels</td></tr>
<tr><td>IEEE 802.11n HT 40 MHz</td><td>5270 ~ 5310</td><td>2 Channels</td></tr>
<tr><td>IEEE 802.11n HT 80 MHz</td><td>5290</td><td>1 Channels</td></tr>
<tr><td rowspan="4">UNII Band III</td><td>IEEE 802.11a</td><td>5500 ~ 5700</td><td>11 Channels</td></tr>
<tr><td>IEEE 802.11n HT 20 MHz</td><td>5500 ~ 5700</td><td>11 Channels</td></tr>
<tr><td>IEEE 802.11n HT 40 MHz</td><td>5510 ~ 5670</td><td>3 Channels</td></tr>
<tr><td>IEEE 802.11n HT 80 MHz</td><td>5530 ~ 5690</td><td>2 Channels</td></tr>
<tr><td rowspan="4">UNII Band IV</td><td>IEEE 802.11a</td><td>5745 – 5825</td><td>5 Channels</td></tr>
<tr><td>IEEE 802.11n HT 20 mode</td><td>5745 – 5825</td><td>5 Channels</td></tr>
<tr><td>IEEE 802.11n HT 40 mode</td><td>5670 – 5795</td><td>2 Channels</td></tr>
<tr><td>IEEE 802.11n HT 80 mode</td><td>5775</td><td>1 Channels</td></tr>
</table>
</td></tr>
<tr><td>Modulation Technique</td><td>OFDM (QPSK, BPSK, 16-QAM, 64-QAM)</td></tr>
<tr><td>Transmit Data Rate</td><td>IEEE 802.11a mode: 54, 48, 36, 24, 18, 12, 9, 6 Mbps<br>IEEE 802.11n HT 20 mode: OFDM (6.5, 7.2, 13, 14.4, 14.44, 19.5, 21.7, 26, 28.89, 28.9, 39, 43.3, 43.33 52, 57.78, 57.8, 58.5, 65.0, 72.2, 78, 86.67, 104, 115.56, 117, 130, 144.44 Mbps)<br>IEEE 802.11n HT 40 mode: OFDM (13.5, 15, 27, 30, 40.5, 45, 54, 60, 81, 90, 108, 120, 121.5, 135, 150, 162, 180, 216, 240, 243, 270, 300 Mbps)<br>IEEE 802.11n HT 80 mode: OFDM (29.3, 58.5, 87.8, 117, 175.5, 234, 263.3, 292.5, 351, 390, 468, 526.5, 585, 702, 780 Mbps)</td></tr>
<tr><td>Antenna Specification</td><td>WIESON / GY196ZT001-019<br>PCB Antenna / Gain: 3.97dBi</td></tr>
</table>

# 3. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4: 2009 Radiated testing was performed at an antenna to EUT distance 3 meters.

The tests documented in this report were performed in accordance with ANSI C63.4: 2009 and FCC CFR 47 Part 15.207, 15.209 and 15.407

## 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 C63.4, 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 0.8 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 C63.4: 2009.

## 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: DCS-7000L) had been tested under operating condition.

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

**IEEE 802.11n HT 20 MHz / 5260 ~ 5320MHz:**
Channel (5300MHz) with 6.5Mbps data rate were chosen for full testing.
**IEEE 802.11n HT 40 MHz / 5270 ~ 5310MHz:**
Channel (5500MHz) with 13.5Mbps data rate were chosen for full testing.

**IEEE 802.11n HT 20 MHz / 5500 ~ 5580MHz:**
Channel (5310MHz) with 6.5Mbps data rate were chosen for full testing..
**IEEE 802.11n HT 40 MHz / 5570MHz:**
Channel (5510MHz) with 13.5Mbps data rate was chosen for full testing.

# 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 and Loop Antenna is scheduled for calibration once three years.*

| Dynamic Frequency Selection | | | | |
|---|---|---|---|---|
| **Name of Equipment** | **Manufacturer** | **Model** | **Serial Number** | **Calibration Due** |
| Vector Signal Generator | R&S | SMU 200A | 101480 | 12/04/2014 |
| Spectrum Analyzer | R&S | FSU | 100258 | 09/02/2015 |

## 4.3 MEASUREMENT UNCERTAINTY

| PARAMETER | UNCERTAINTY |
|---|---|
| Powerline Conducted Emission | +/- 1.2575 |
| 3M Semi Anechoic Chamber / 30M~200M | +/- 4.0138 |
| 3M Semi Anechoic Chamber / 200M~1000M | +/- 3.9483 |
| 3M Semi Anechoic Chamber / 1G~8G | +/- 2.5975 |
| 3M Semi Anechoic Chamber / 8G~18G | +/- 2.6112 |
| 3M Semi Anechoic Chamber / 18G~26G | +/- 2.7389 |
| 3M Semi Anechoic Chamber / 26G~40G | +/- 2.9683 |

***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, Chunghsen 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., Luchu Hsiang, Taoyuan Hsien 338, Taiwan
Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 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 LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by American Association for Laboratory Accreditation Program for the specific scope accreditation under Lab Code: 0824-01 to perform Electromagnetic Interference tests according to FCC Part 15 and CISPR 22 requirements. In addition, the test facilities are listed with Industry Canada, Certification and Engineering Bureau, IC 2324G-1 for 3M Semi Anechoic Chamber A, 2324G-2 for 3M Semi Anechoic Chamber B.

## 5.4 TABLE OF ACCREDITATIONS AND LISTINGS

| Country | Agency | Scope of Accreditation | Logo |
|---|---|---|---|
| USA | FCC | 3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements | FCC MRA: TW1039 |
| Taiwan | TAF | LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310<br>IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12,2,<br>ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328,<br>ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893,<br>ETSI EN 301 489-1/3/7/17<br>FCC OET Bulletin 65 + Supplement C,<br>EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385,<br>EN 50392, IEC 62209, CNS 14958-1, CNS 14959<br>FCC Method –47 CFR Part 15 Subpart B<br>IEC / EN 61000-3-2, IEC / EN 61000-3-3,<br>IEC / EN 61000-4-2/3/4/5/6/8/11 | TAF Testing Laboratory 1309 |
| Canada | Industry Canada | 3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform | Canada<br>IC 2324G-1<br>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 |
|---|---|---|---|---|---|---|---|
| 1 | Wireless N600 Gigabit | D-Link | DIR-826 | QBQ91C6000056 | KA2IR826LMO1 | N/A | N/A |
| 2 | Notebook PC | HP | dv6-1332TX | **CNF9491GPS** | **PD9112BNHU** | N/A | AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core |

***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

## 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".

***Remark**: FCC Part 15 DFS rules.*

**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 |
| Uniform Spreading | Yes | Not required | Not required |

**Table 2: Applicability of DFS requirements during normal operation**

| Requirement | Operational Mode | | |
|---|---|---|---|
| | 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 |

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

| Maximum Transmit Power | Value (see note) |
|---|---|
| >=200 Milliwatt | -64 dBm |
| < 200 Milliwatt | -62 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.

**Table 4: DFS Response requirement values**

| Parameter | Value |
|---|---|
| Non-occupancy period | 30 minutes |
| Channel Availability Check Time | 60 seconds |
| Channel Move Time | 10 seconds |
| Channel Closing Transmission Time | 200 milliseconds + approx. 60 milliseconds over remaining 10 second period |

The instant that the Channel Move Time and the Channel Closing Transmission Time begins is as follows:

- For the Short pulse radar Test Signals this instant is the end of the Burst.
- For the Frequency Hopping radar Test Signal, this instant is the end of the last radar burst generated.
- For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission.

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 channel changes (an aggregate of approximately 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

**Table 5 – Short Pulse Radar Test Waveforms**

| Radar Type | Pulse Width (Microseconds) | PRI (Microseconds) | Pulses | Minimum Percentage of Successful Detection | Minimum Trials |
|---|---|---|---|---|---|
| 1 | 1 | 1428 | 18 | 60% | 30 |
| 2 | 1-5 | 150-230 | 23-29 | 60% | 30 |
| 3 | 6-10 | 200-500 | 16-18 | 60% | 30 |
| 4 | 11-20 | 200-500 | 12-16 | 60% | 30 |
| Aggregate (Radar Types 1-4) | | | | 80% | 120 |

**Table 6 – Long Pulse Radar Test Signal**

| Radar Waveform | Bursts | Pulses per Burst | Pulse Width (µsec) | Chirp Width (µsec) | PRI (µsec) | Minimum Percentage of Successful Detection | Minimum Trials |
|---|---|---|---|---|---|---|---|
| 5 | 8-20 | 1-3 | 50-100 | 5-20 | 1000-2000 | 80% | 30 |

**Table 7 – Frequency Hopping Radar Test Signal**

| Radar Waveform | Pulse Width (µsec) | PRI (µsec) | Burst Length (ms) | Pulses Per Hop | Hopping Rate (kHz) | Minimum Percentage of Successful Detection | Minimum Trials |
|---|---|---|---|---|---|---|---|
| 6 | 1 | 333 | 300 | 9 | 0.33 | 70% | 30 |

# DESCRIPTION OF EUT

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

The firmware installed in the EUT during testing was:
Firmware Rev: 1.00.01

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

The antenna assembly utilized with the EUT has a gain of 4.0dBi.

The EUT uses one transmitter connected to two 50-ohm coaxial antenna ports via a diversity switch. Only one antenna port is connected to the test system since the EUT has one antenna only.

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.

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

The Master Device is DIR-826L, Firmware Rev: 1.05

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 = -57dBm.

The calibrated conducted DFS Detection Threshold level is set to -57 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.

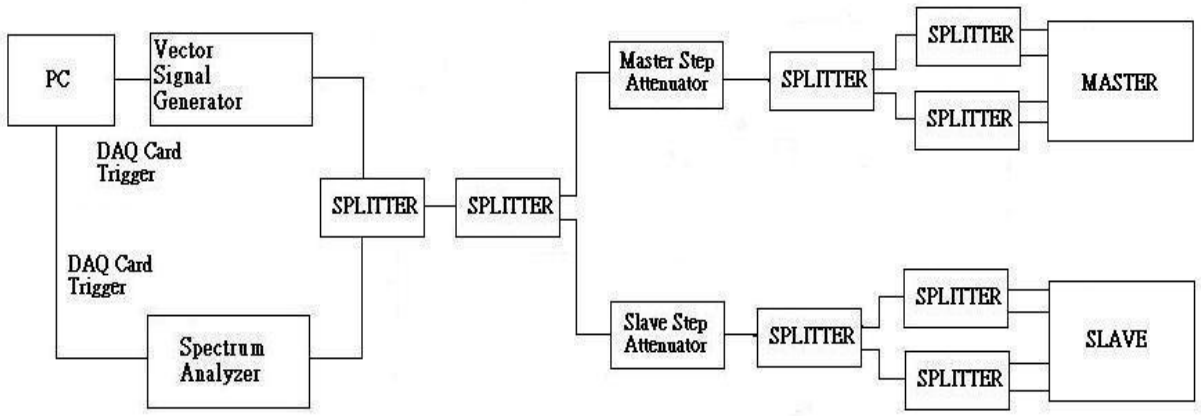
The short pulse types 2, 3 and 4, and the long pulse type 5 parameters are randomized at run-time.

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.

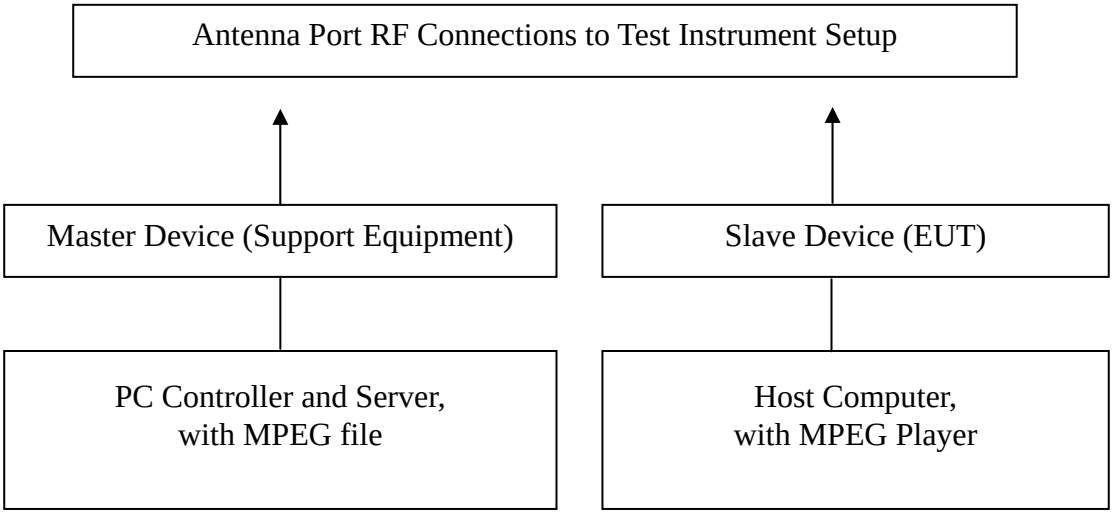
Set the signal generator to produce a radar waveform, trigger a burst manually and measure the level on the spectrum analyzer. Readjust the amplitude of the signal generator as required so that the peak level of the waveform is at a displayed level equal to the required or desired interference detection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



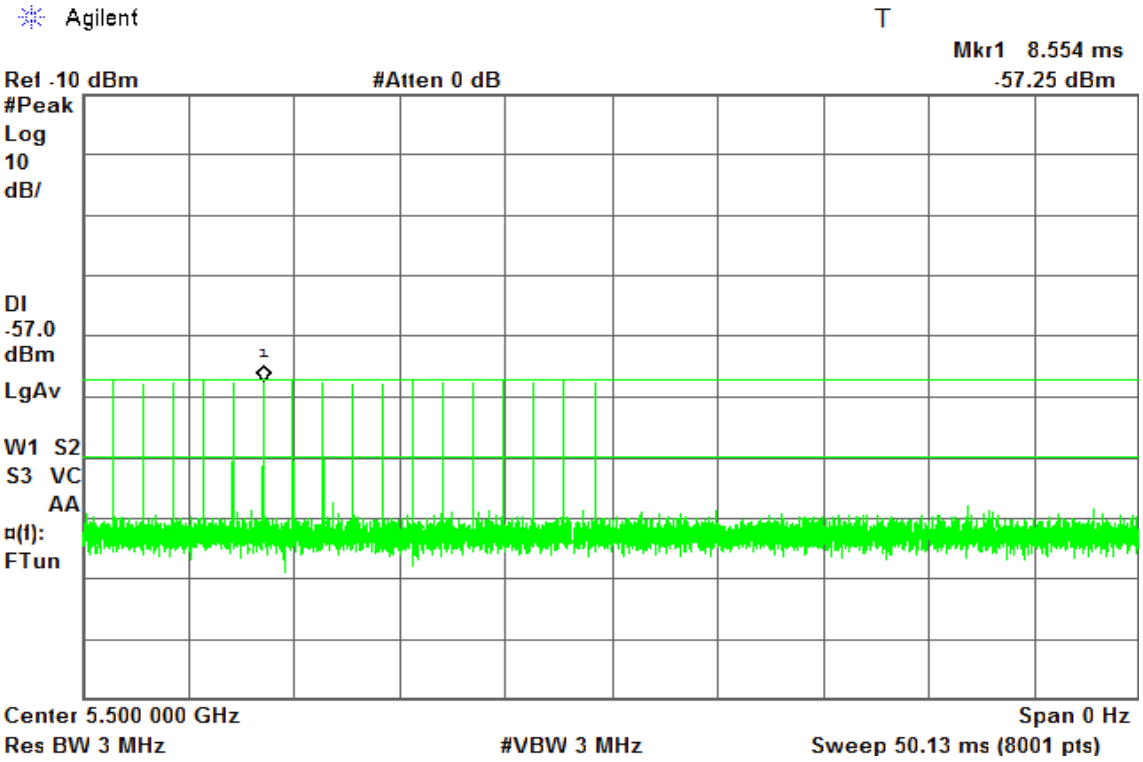

## TEST RESULTS

*No non-compliance noted*

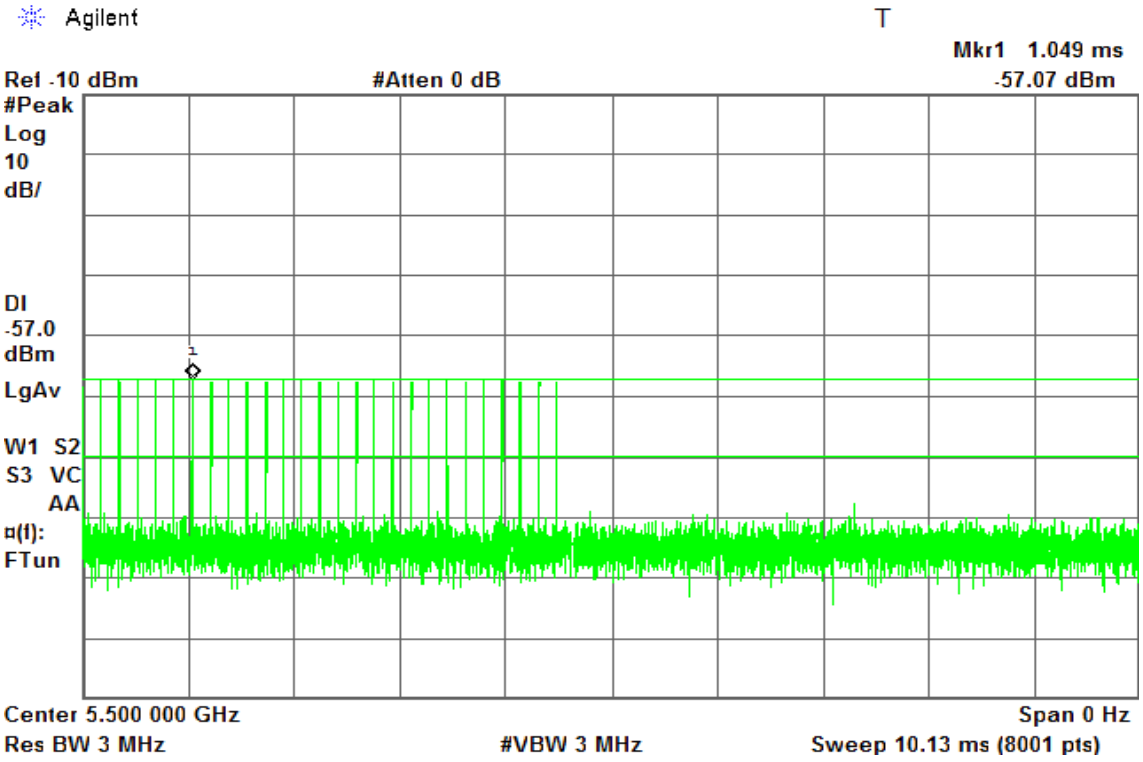
## Test Plot

## PLOTS OF RADAR WAVEFORMS

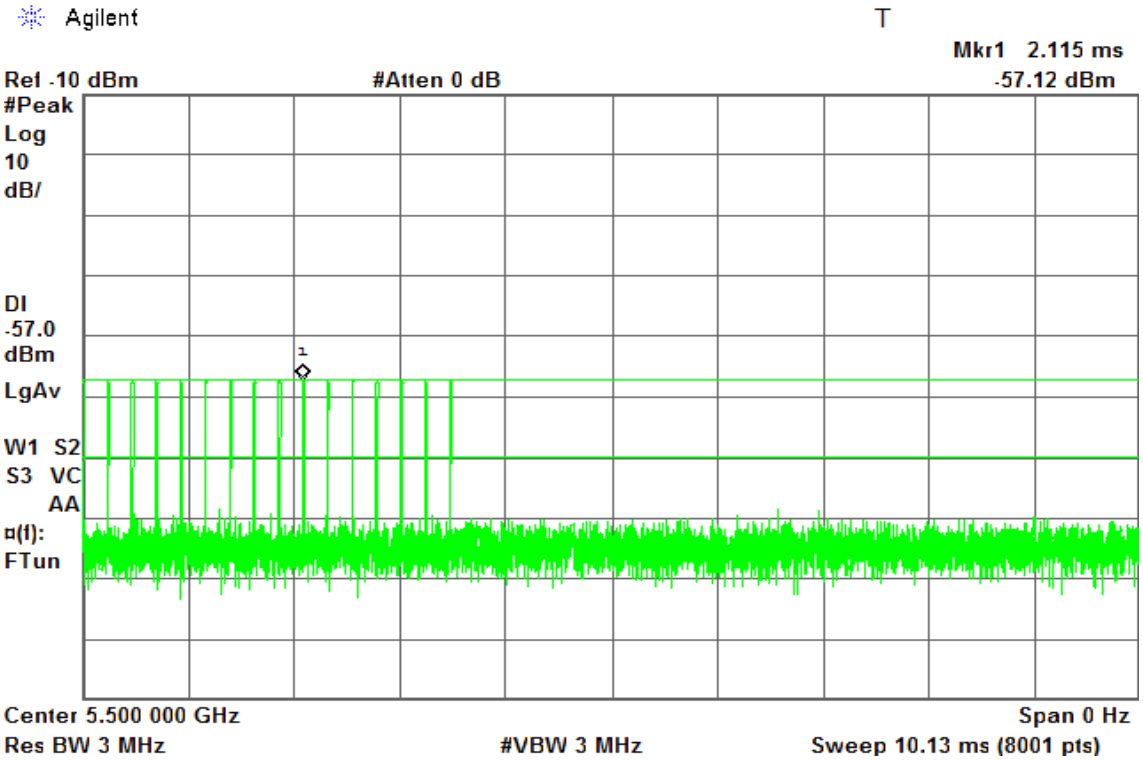
### Sample of Short Pulse Radar Type 1



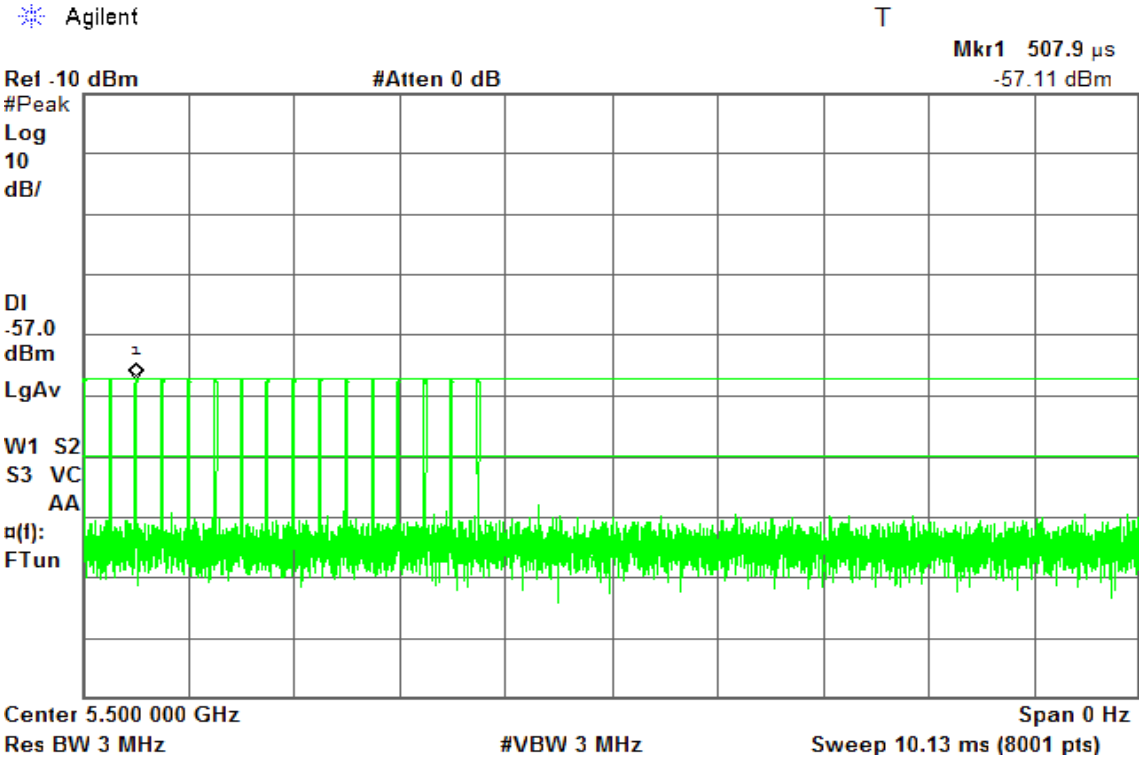

### Sample of Short Pulse Radar Type 2



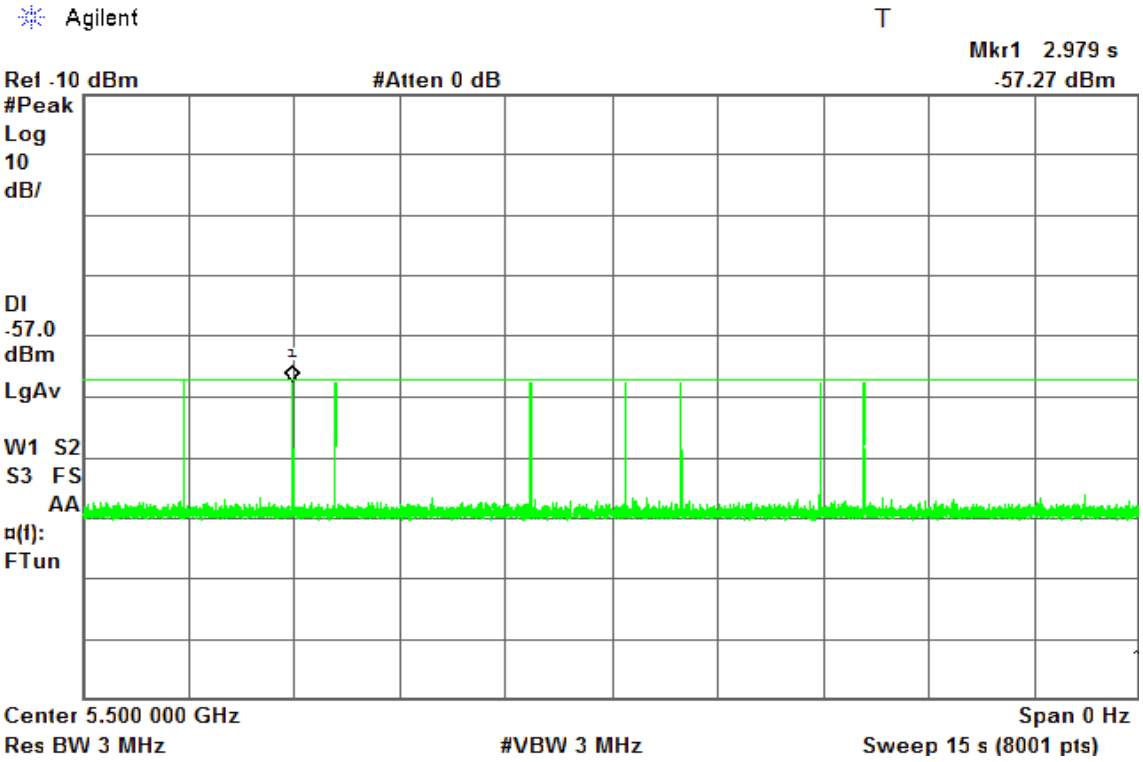
## Sample of Short Pulse Radar Type 3



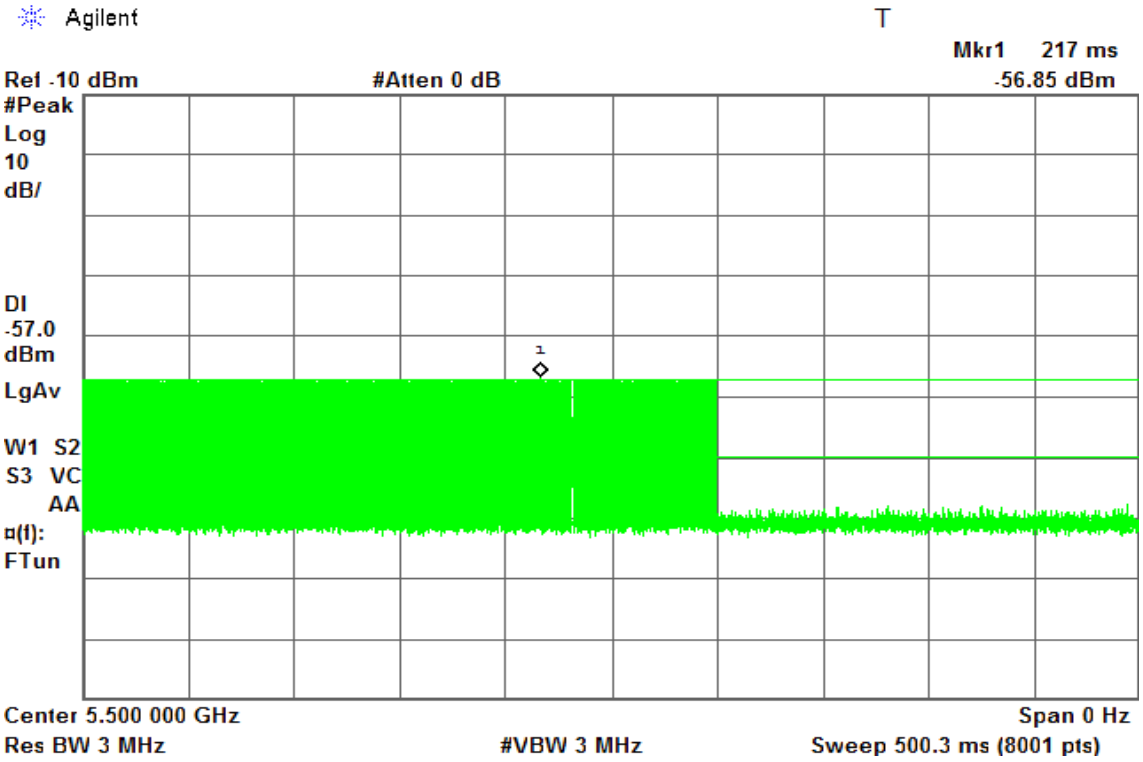

## Sample of Short Pulse Radar Type 4

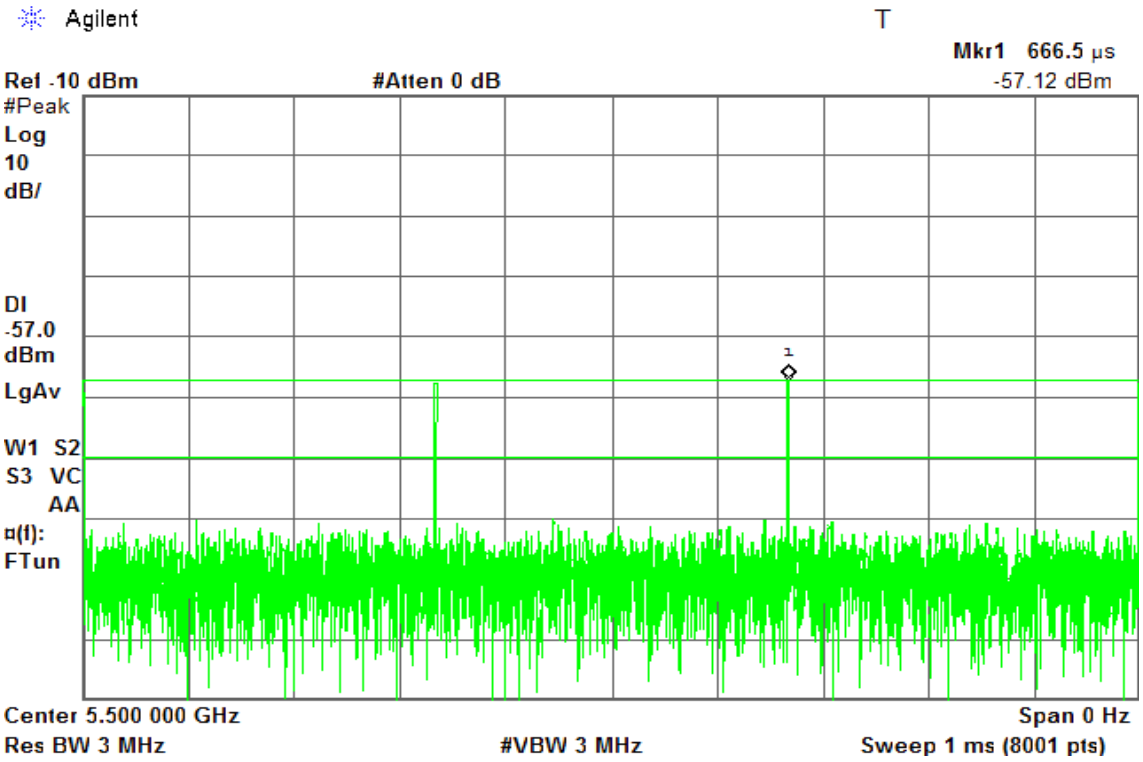


## Sample of Long Pulse Radar Type 5



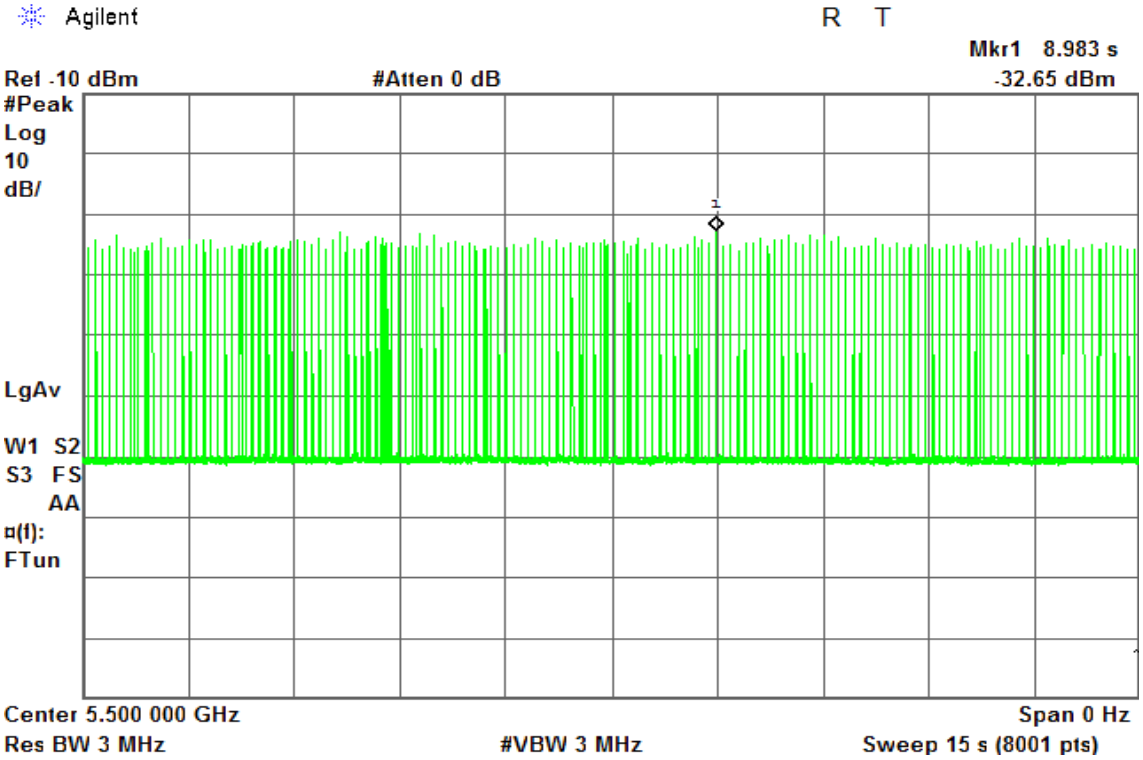
## Sample of Frequency Hopping Radar Type 6



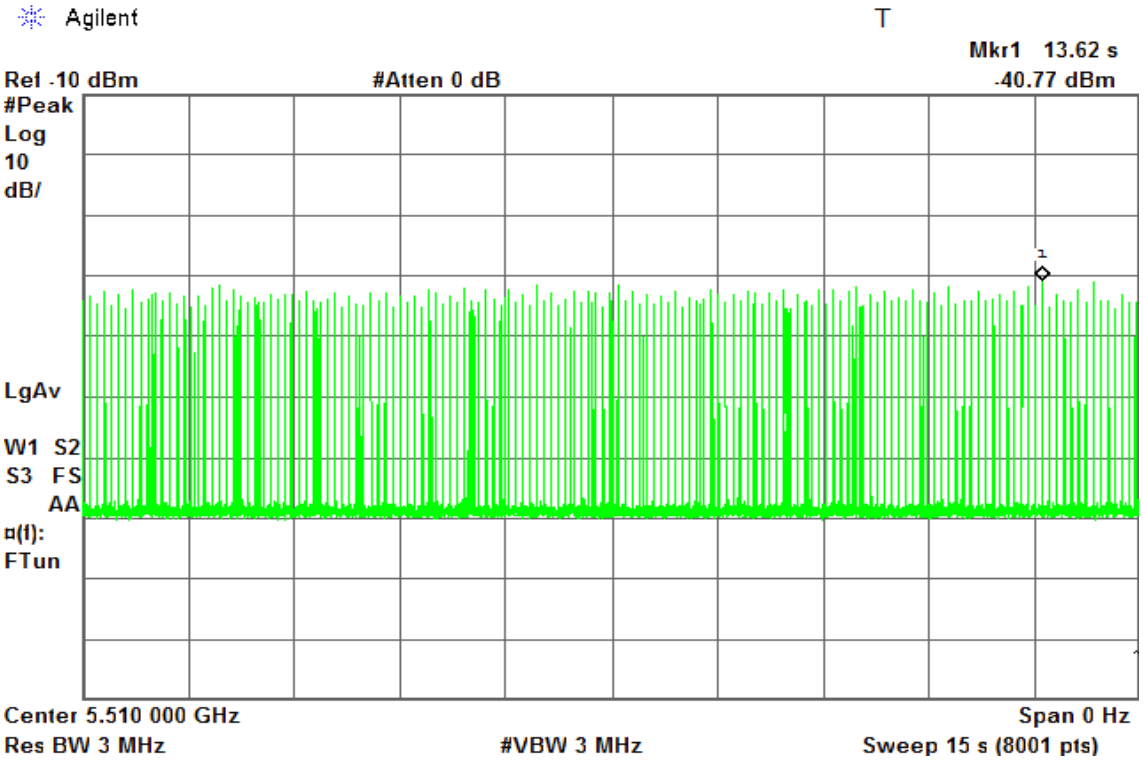



**Plot of WLAN Traffic from Slave**

**IEEE 802.11n HT 20 MHz mode**




**IEEE 802.11n HT 40 MHz mode**



# TEST CHANNEL AND METHOD

All tests were performed at a channel center frequency of 5300 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).

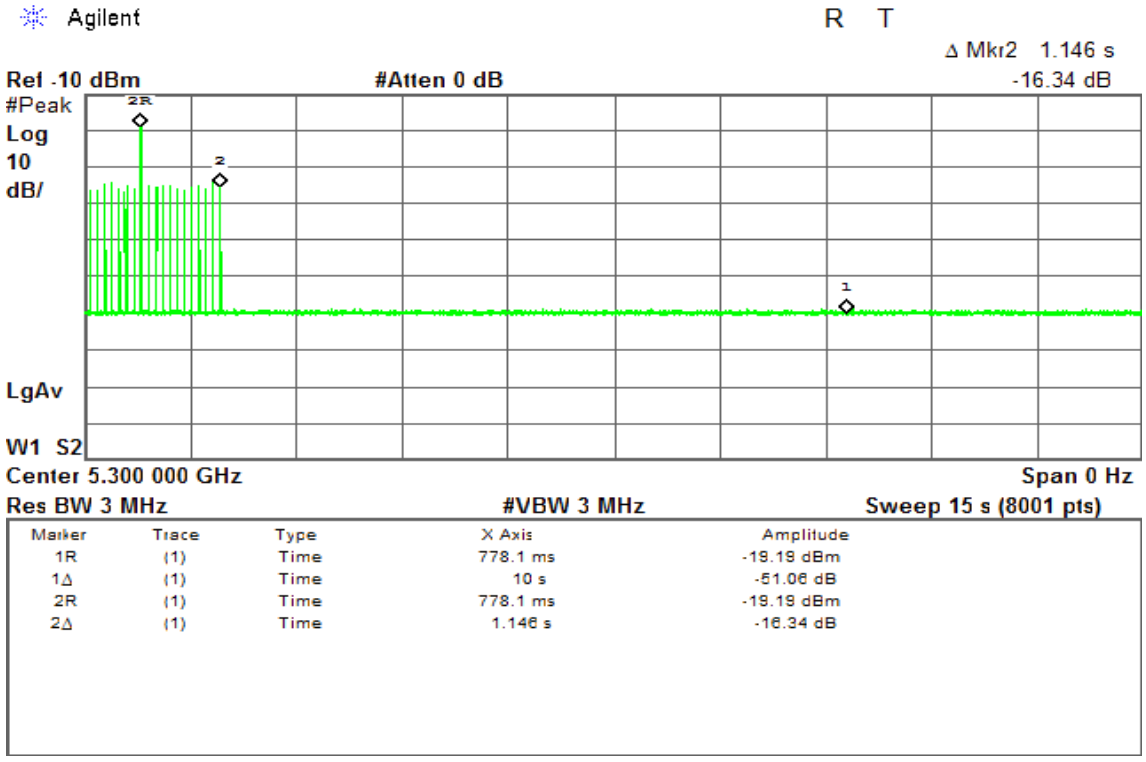
# LOW BAND RESULTS

## Bandwidth 20 MHz Mode

### Type 1 Channel Move Time Results

*No non-compliance noted.*

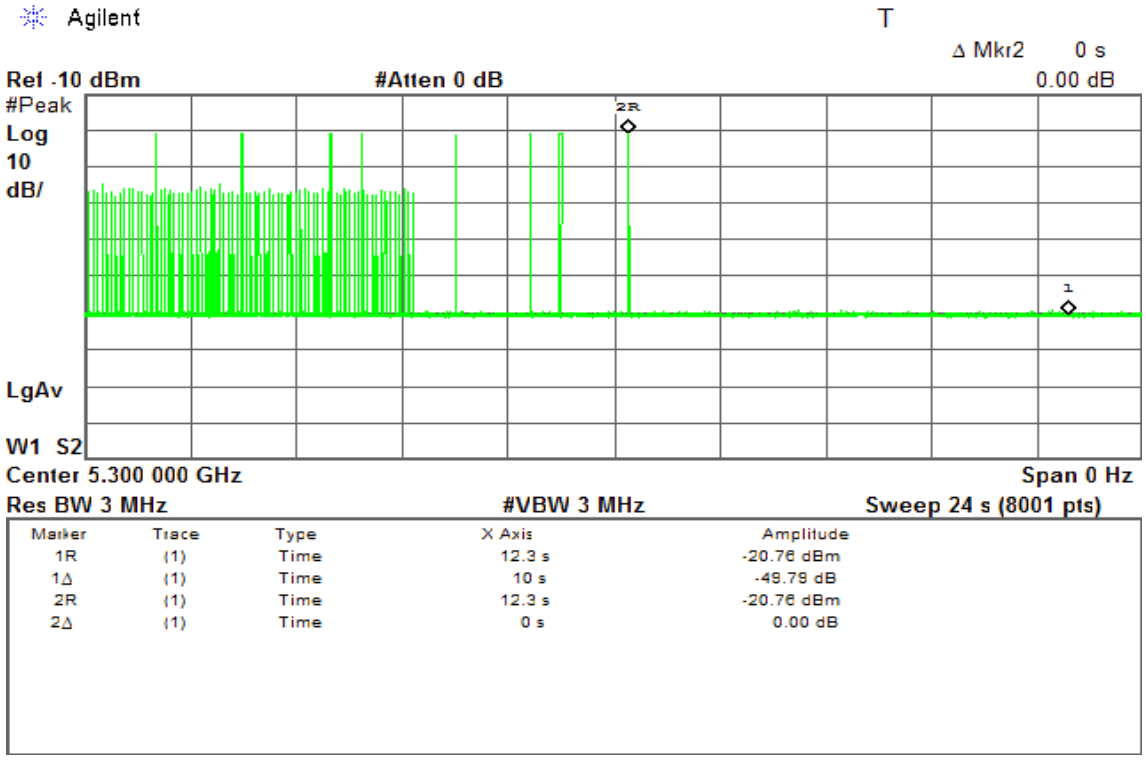
| Channel Move Time (s) | Limit (s) |
|---|---|
| 1.146 | 10 |



## Type 5 Channel Move Time Results

*No non-compliance noted.*

| Channel Move Time (s) | Limit (s) |
|---|---|
| 0 | 10 |



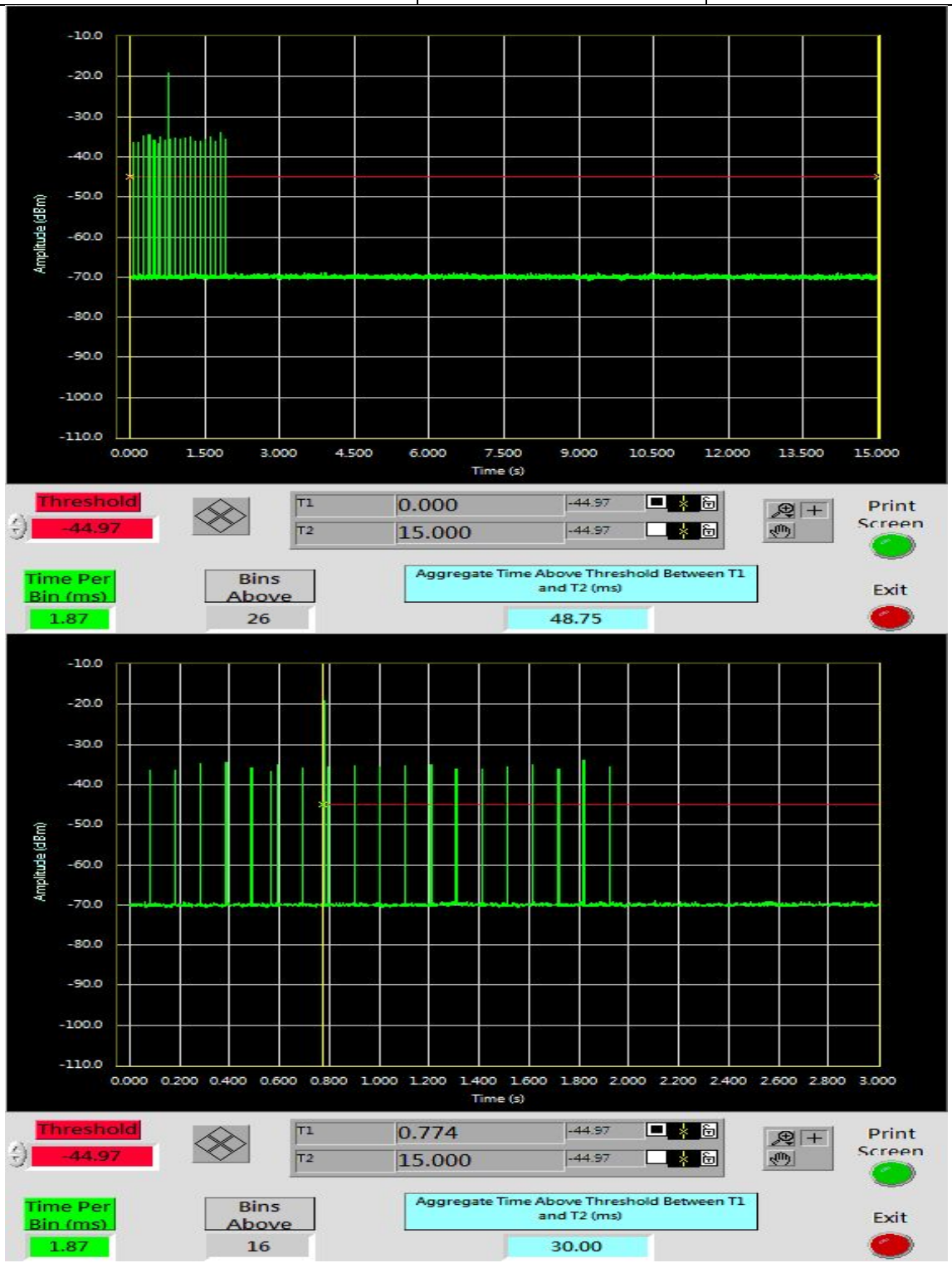
# Bandwidth 20 MHz Mode

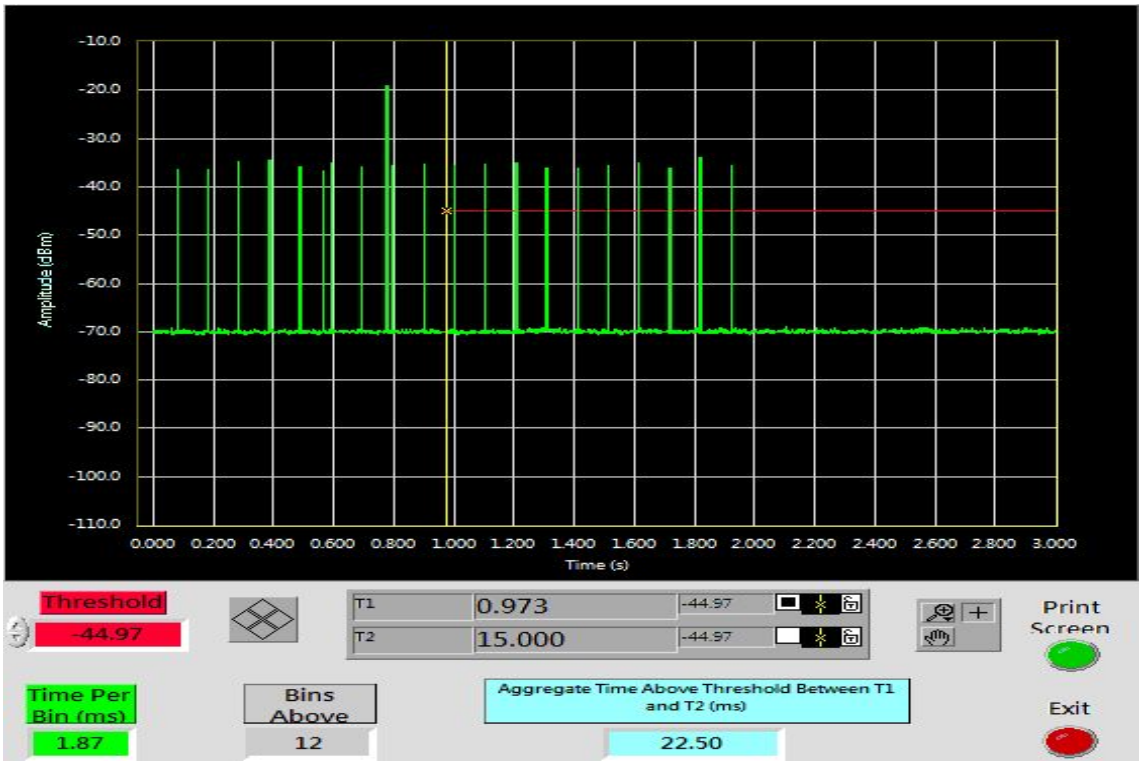
## Type 1 Channel Closing Transmission Time Results

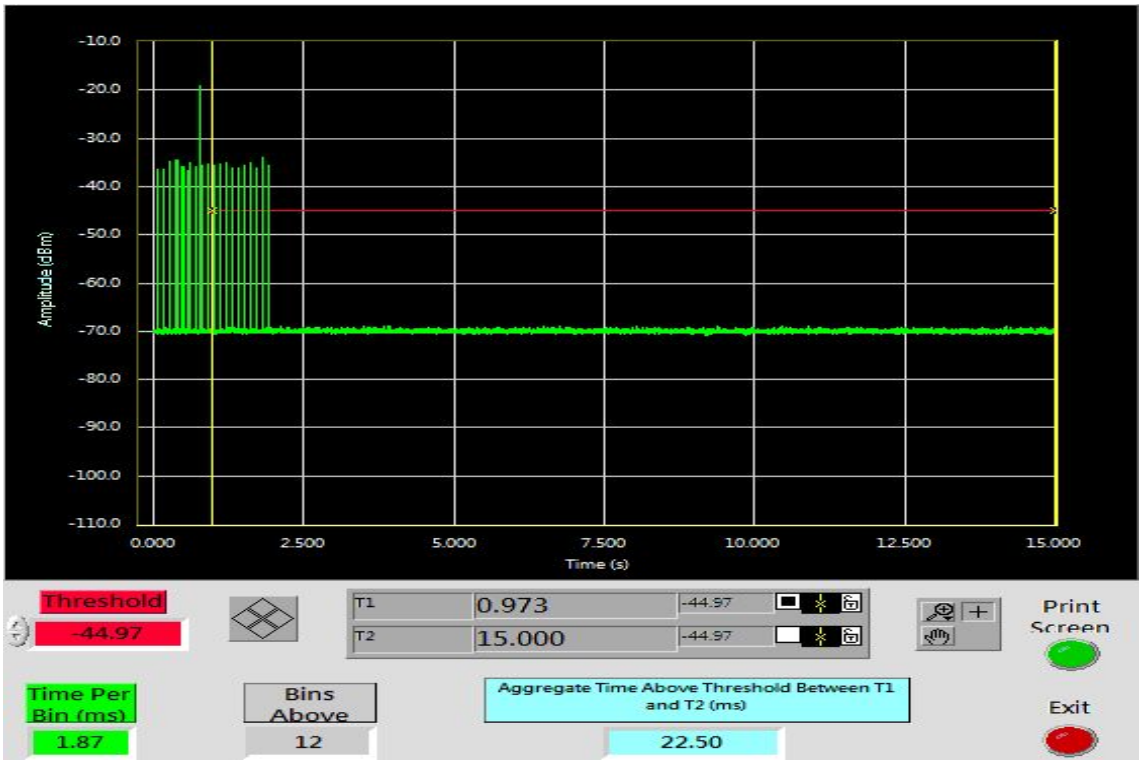
*No non-compliance noted.*

**For R1**

| Aggregate Transmission Time (ms) | Limit (ms) | Margin (ms) |
|---|---|---|
| 22.50 | 60 | -37.5 |

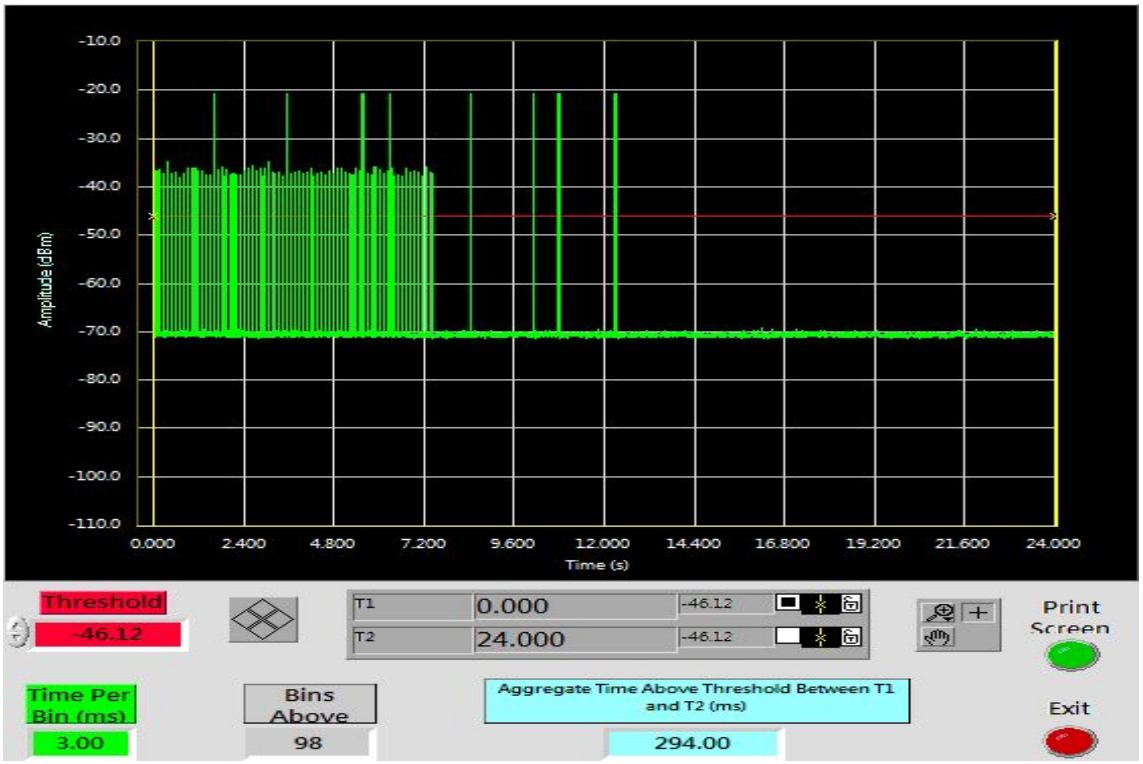


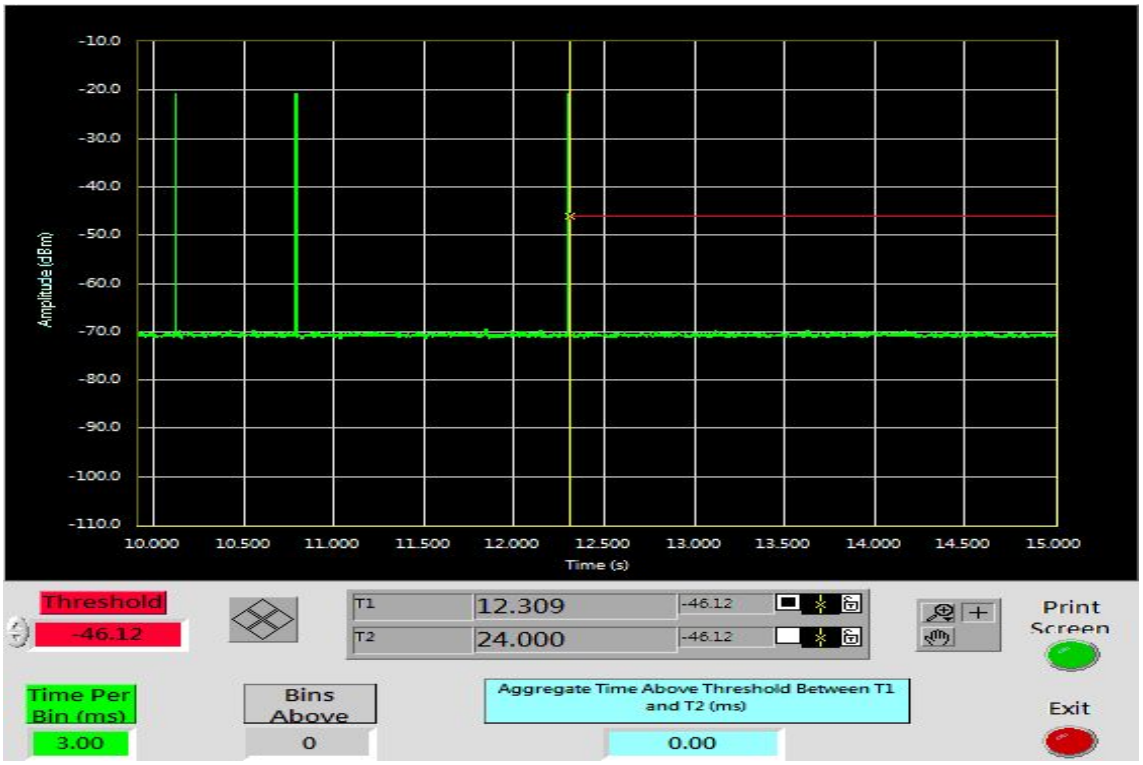

-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
Amplitude (dBm)
0.000 0.200 0.400 0.600 0.800 1.000 1.200 1.400 1.600 1.800 2.000 2.200 2.400 2.600 2.800 3.000
Time (s)
Threshold
-44.97
T1
0.973
-44.97
T2
15.000
-44.97
Print Screen
Exit
Time Per Bin (ms)
1.87
Bins Above
12
Aggregate Time Above Threshold Between T1 and T2 (ms)
22.50

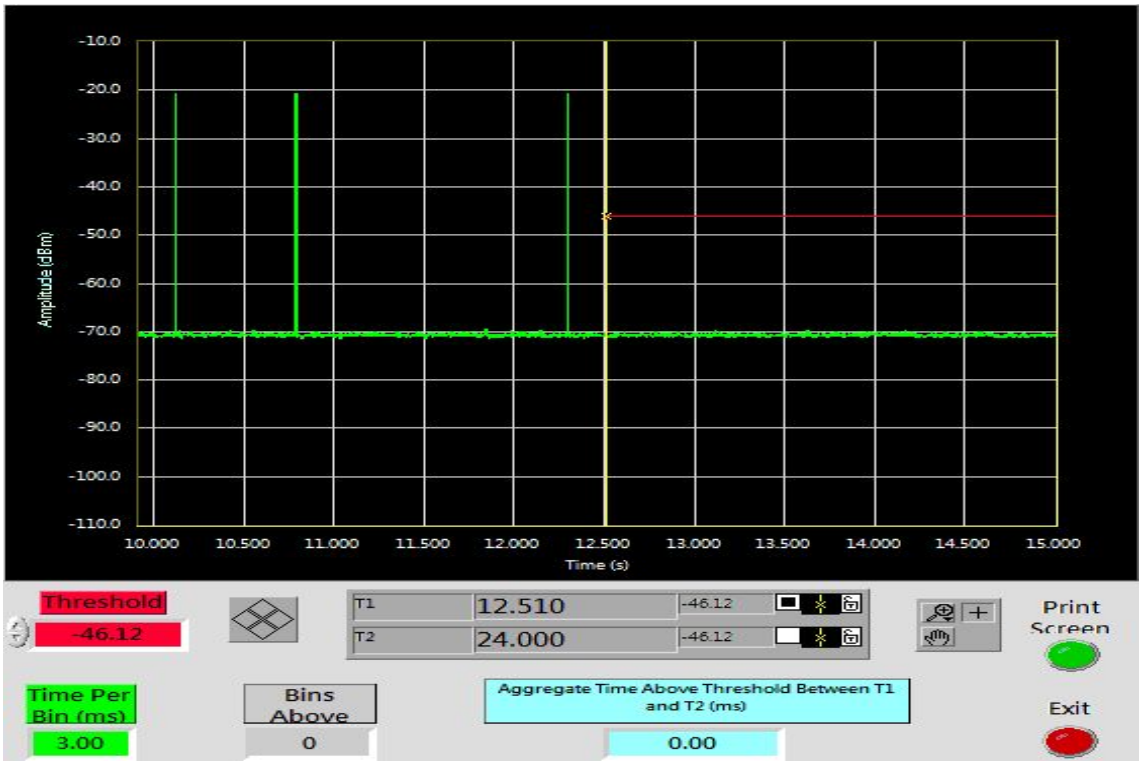

-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
Amplitude (dBm)
0.000 2.500 5.000 7.500 10.000 12.500 15.000
Time (s)
Threshold
-44.97
T1
0.973
-44.97
T2
15.000
-44.97
Print Screen
Exit
Time Per Bin (ms)
1.87
Bins Above
12
Aggregate Time Above Threshold Between T1 and T2 (ms)
22.50

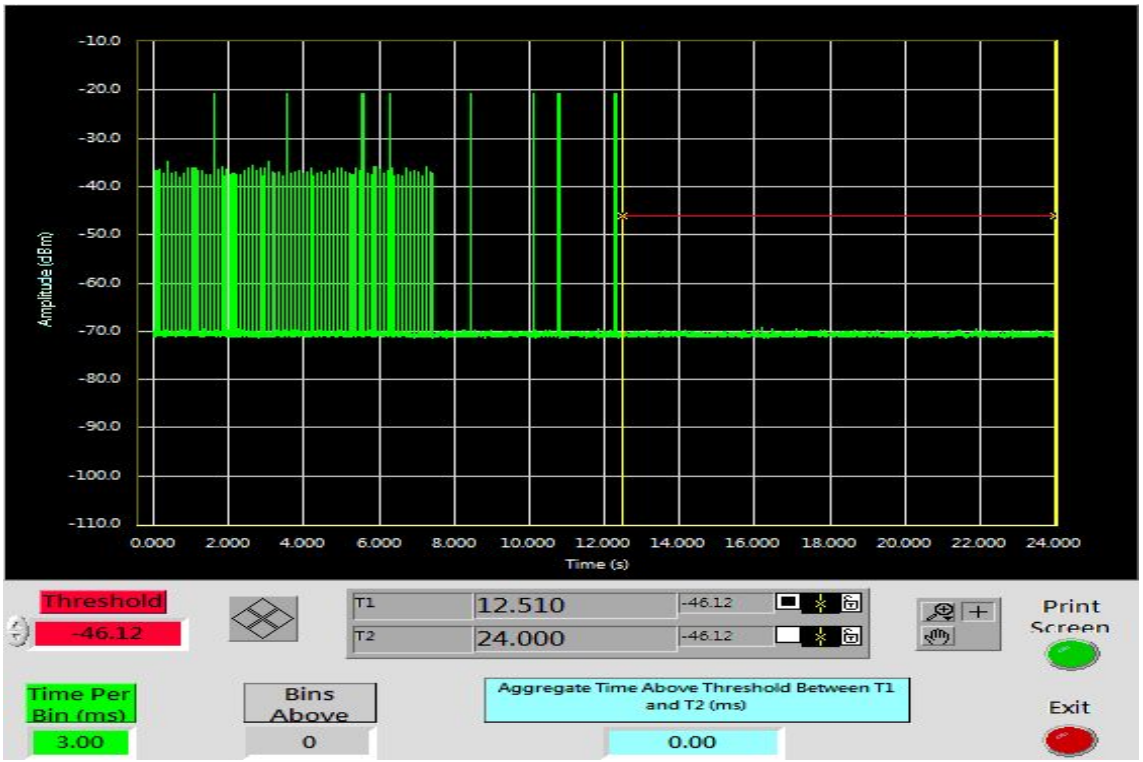
**For R5**

| Aggregate Transmission Time (ms) | Limit (ms) | Margin (ms) |
|---|---|---|
| 0 | 60 | -60 |




-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
Amplitude (dBm)
10.000
10.500
11.000
11.500
12.000
12.500
13.000
13.500
14.000
14.500
15.000
Time (s)
Threshold
-46.12
T1
12.510
-46.12
T2
24.000
-46.12
Print Screen
Time Per Bin (ms)
3.00
Bins Above
0
Aggregate Time Above Threshold Between T1 and T2 (ms)
0.00
Exit

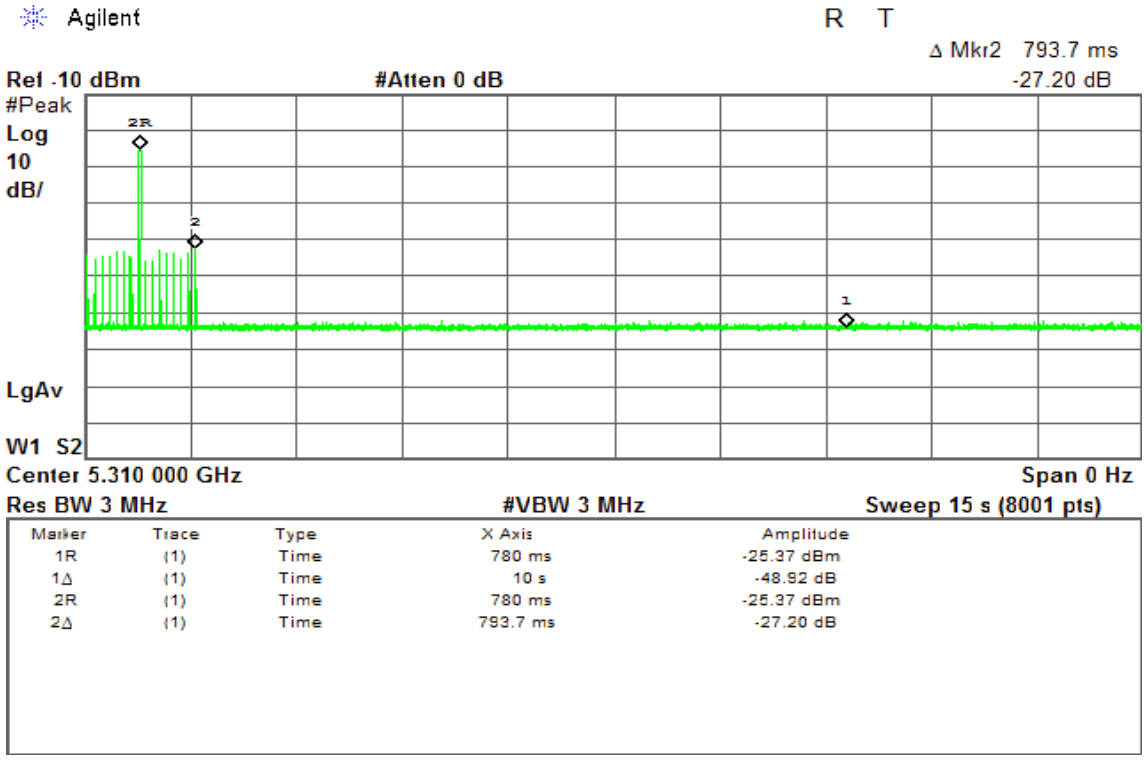

-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
Amplitude (dBm)
0.000
2.000
4.000
6.000
8.000
10.000
12.000
14.000
16.000
18.000
20.000
22.000
24.000
Time (s)
Threshold
-46.12
T1
12.510
-46.12
T2
24.000
-46.12
Print Screen
Time Per Bin (ms)
3.00
Bins Above
0
Aggregate Time Above Threshold Between T1 and T2 (ms)
0.00
Exit

# Bandwidth 40 MHz Mode

## Type 1 Channel Move Time Results

*No non-compliance noted.*

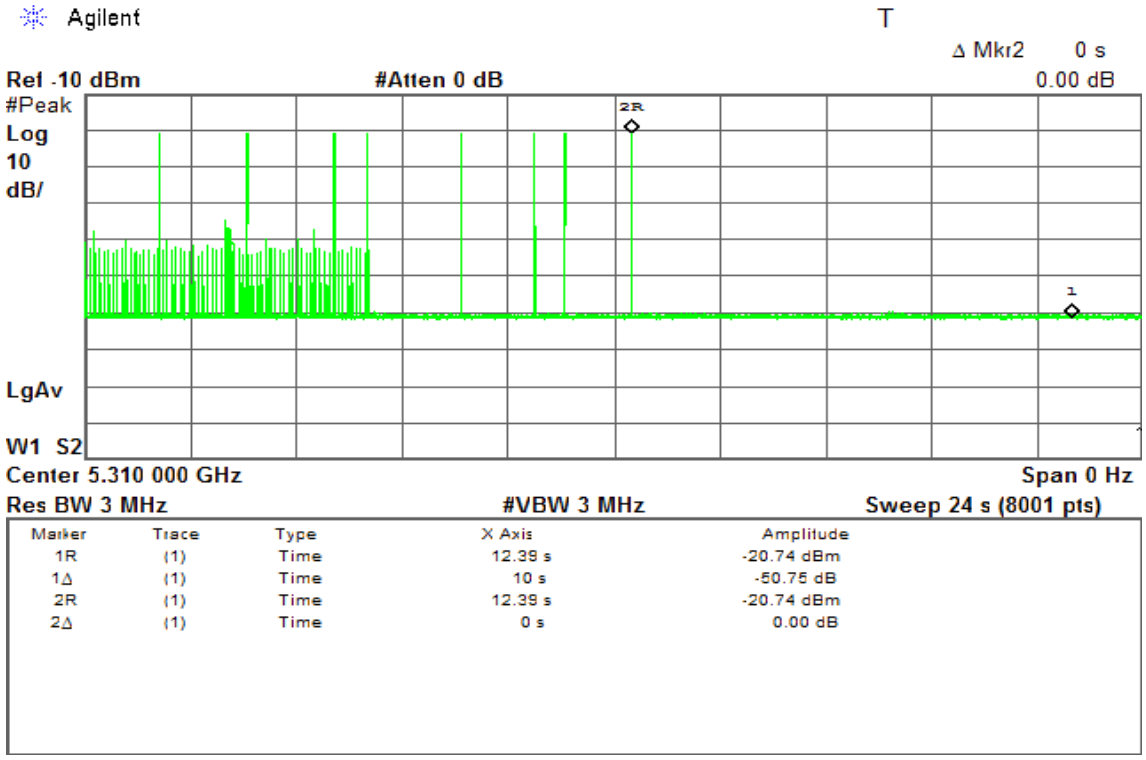
| Channel Move Time (s) | Limit (s) |
|---|---|
| 0.7937 | 10 |



## Type 5 Channel Move Time Results

*No non-compliance noted.*

| Channel Move Time (s) | Limit (s) |
|---|---|
| 0 | 10 |



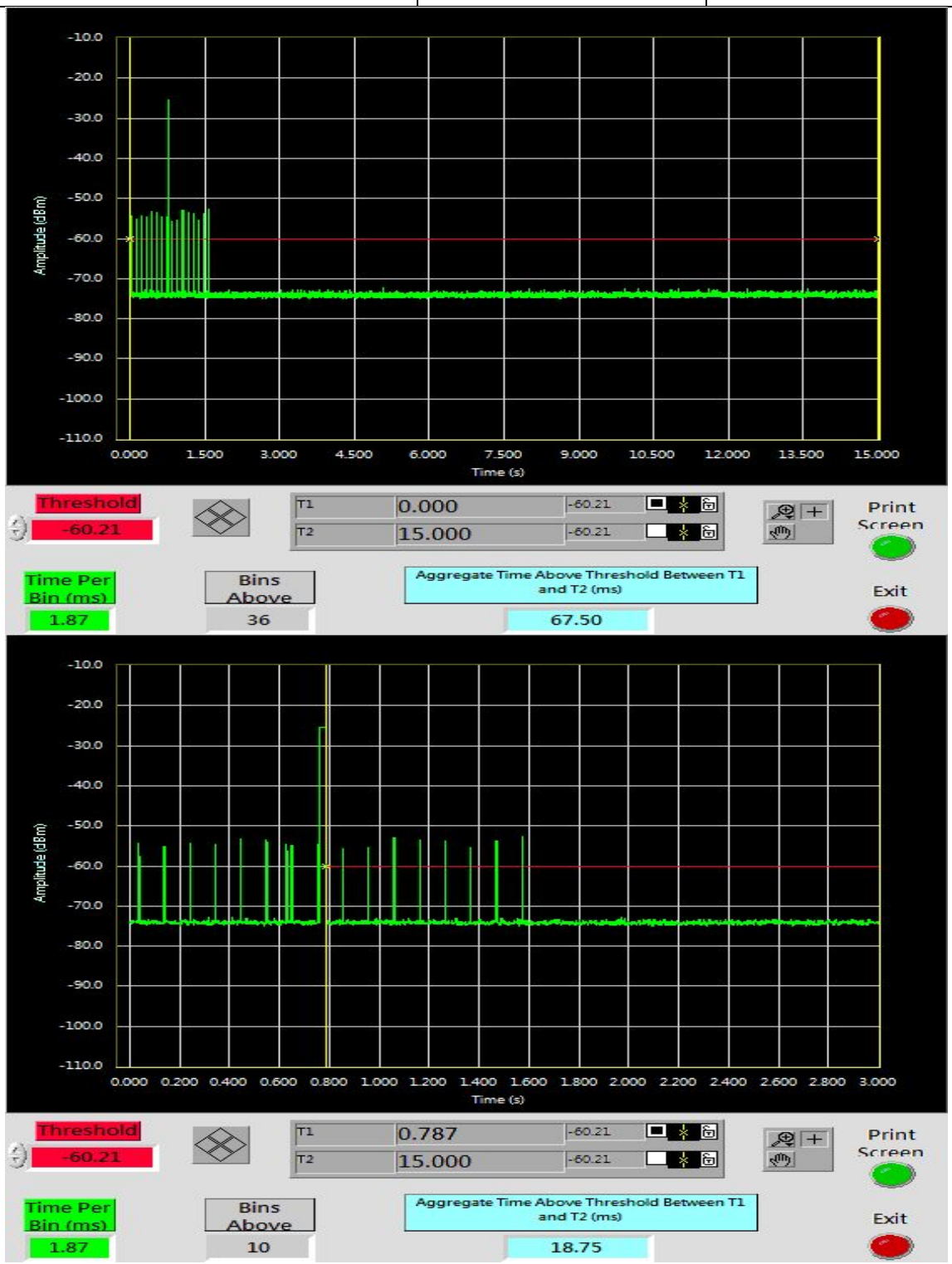
# Bandwidth 40 MHz Mode

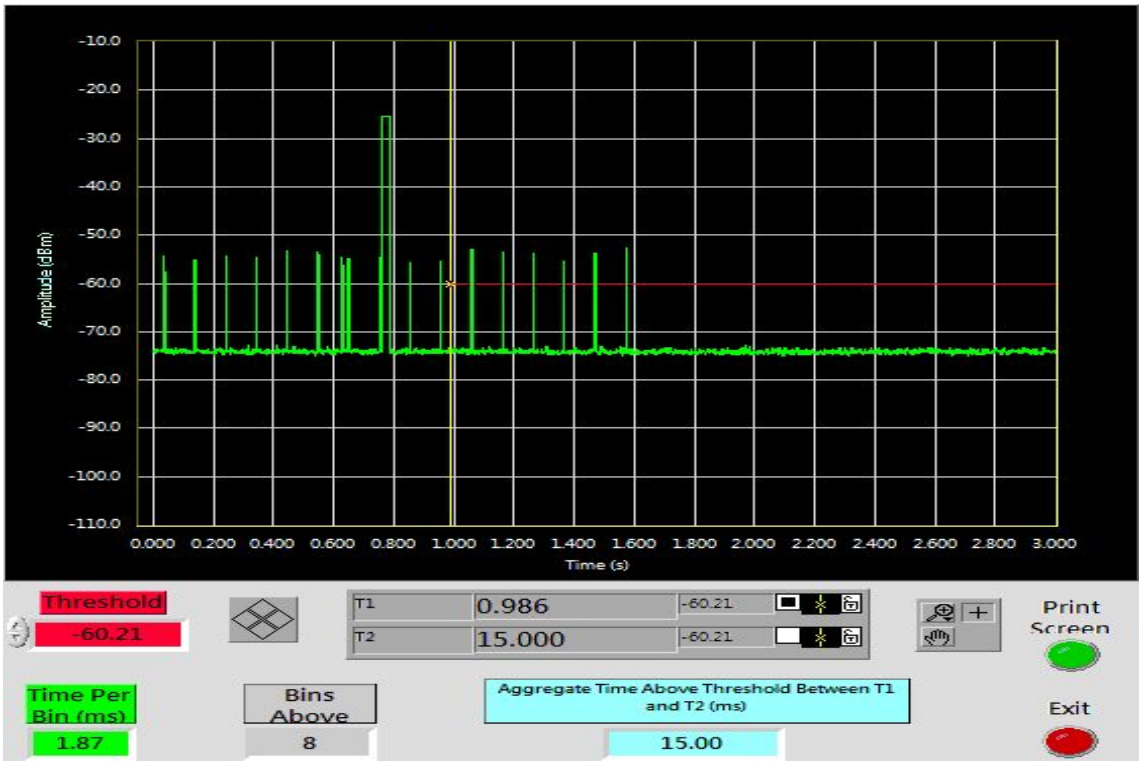
## Type 1 Channel Closing Transmission Time Results

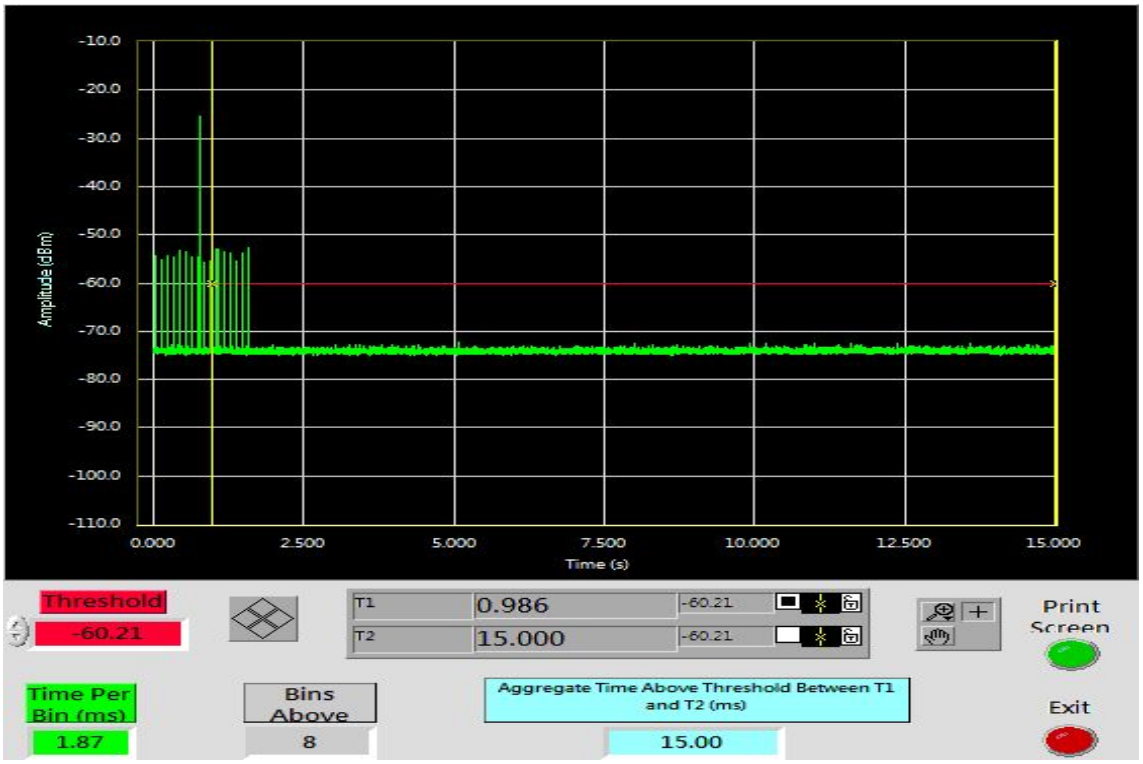
*No non-compliance noted.*

**For R1**

| Aggregate Transmission Time (ms) | Limit (ms) | Margin (ms) |
|---|---|---|
| 15.00 | 60 | -45 |

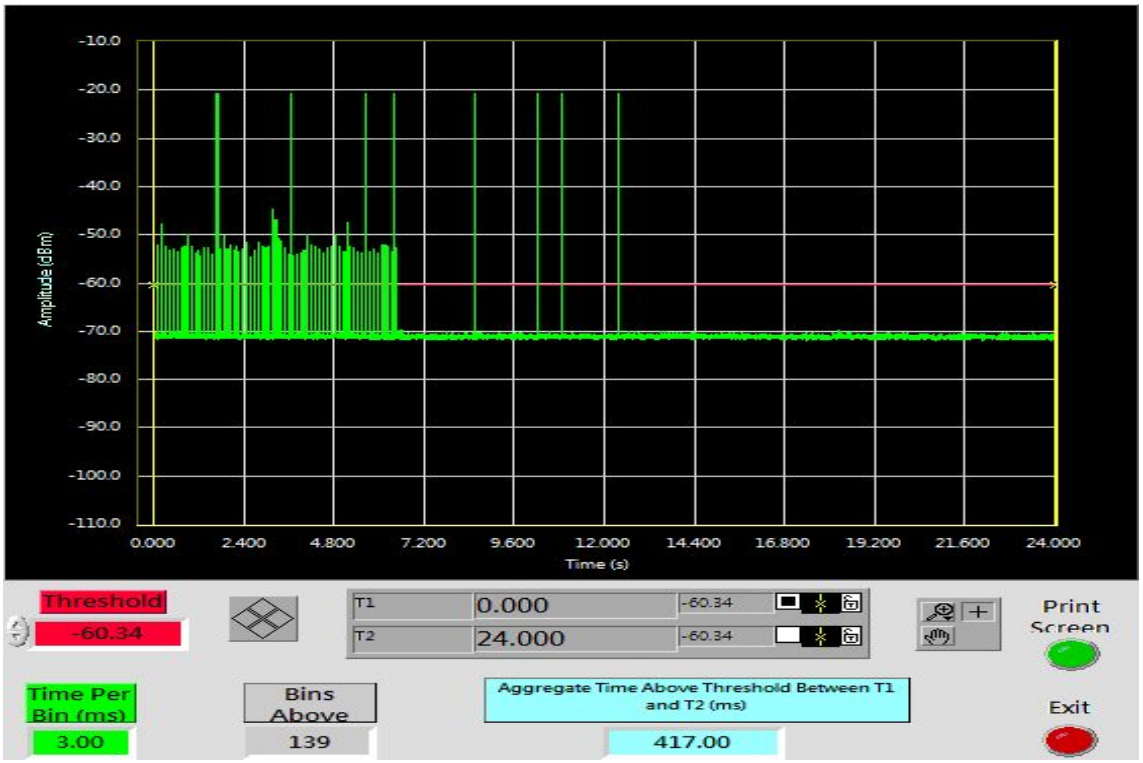


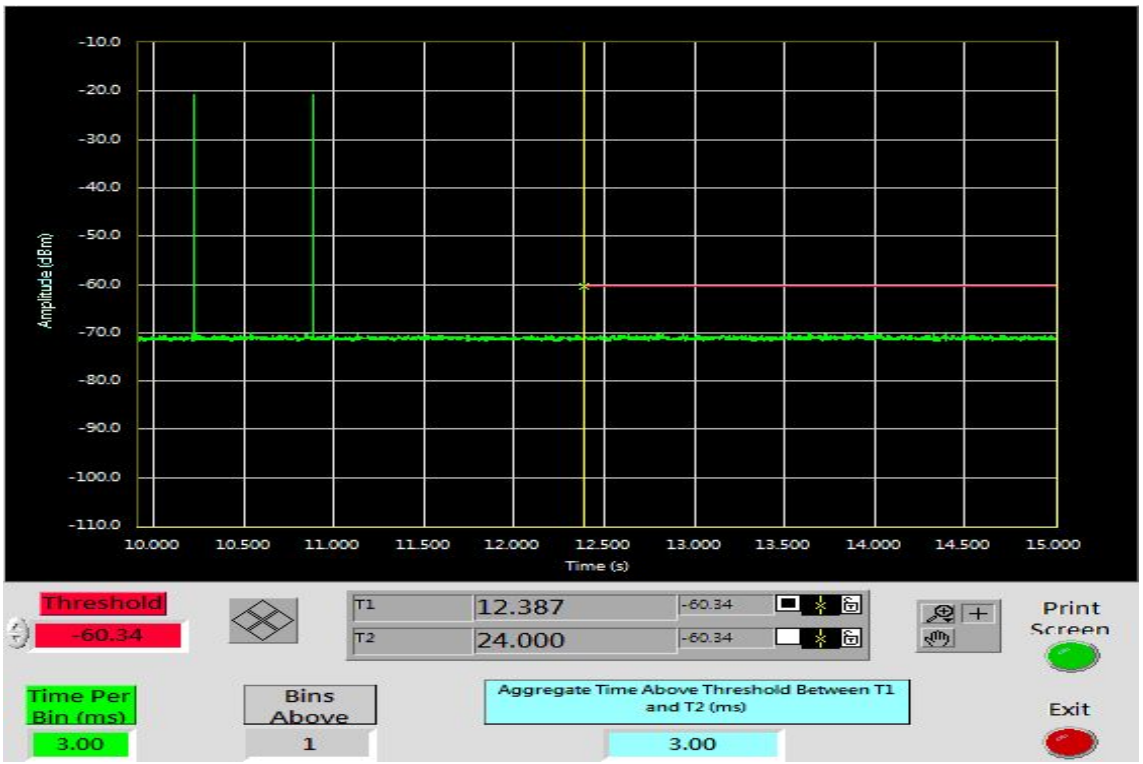

-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
Amplitude (dBm)
0.000 0.200 0.400 0.600 0.800 1.000 1.200 1.400 1.600 1.800 2.000 2.200 2.400 2.600 2.800 3.000
Time (s)
Threshold
-60.21
T1
0.986
-60.21
T2
15.000
-60.21
Print Screen
Time Per Bin (ms)
1.87
Bins Above
8
Aggregate Time Above Threshold Between T1 and T2 (ms)
15.00
Exit

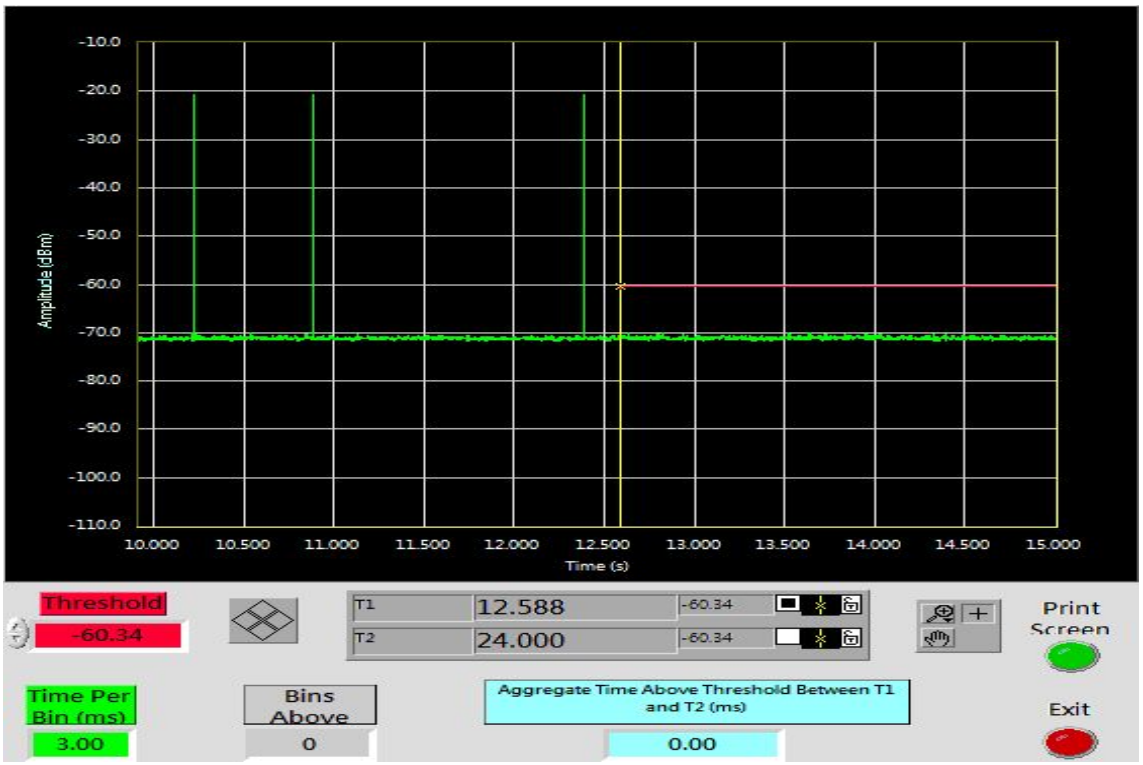

-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
Amplitude (dBm)
0.000 2.500 5.000 7.500 10.000 12.500 15.000
Time (s)
Threshold
-60.21
T1
0.986
-60.21
T2
15.000
-60.21
Print Screen
Time Per Bin (ms)
1.87
Bins Above
8
Aggregate Time Above Threshold Between T1 and T2 (ms)
15.00
Exit

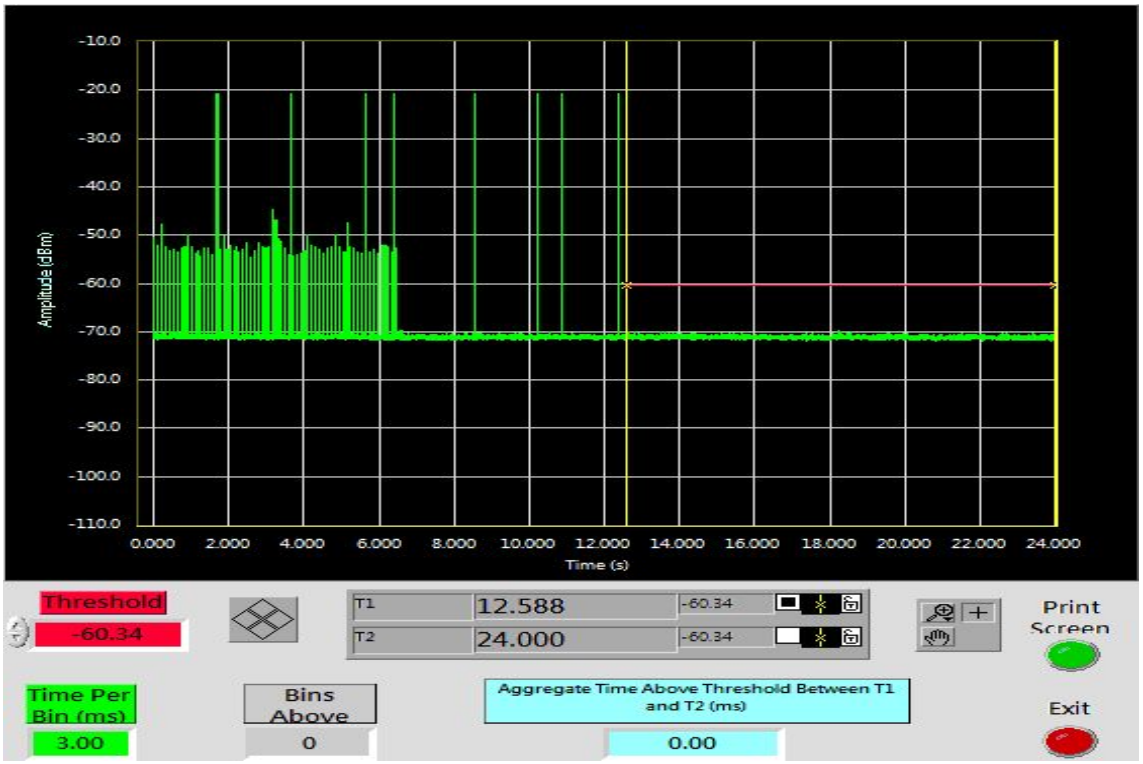
**For R5**

| Aggregate Transmission Time (ms) | Limit (ms) | Margin (ms) |
|---|---|---|
| 0 | 60 | -60 |




-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
Amplitude (dBm)
10.000 10.500 11.000 11.500 12.000 12.500 13.000 13.500 14.000 14.500 15.000
Time (s)
Threshold
-60.34
T1 12.588 -60.34
T2 24.000 -60.34
Print Screen
Exit
Time Per Bin (ms)
3.00
Bins Above
0
Aggregate Time Above Threshold Between T1 and T2 (ms)
0.00


-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
Amplitude (dBm)
0.000 2.000 4.000 6.000 8.000 10.000 12.000 14.000 16.000 18.000 20.000 22.000 24.000
Time (s)
Threshold
-60.34
T1 12.588 -60.34
T2 24.000 -60.34
Print Screen
Exit
Time Per Bin (ms)
3.00
Bins Above
0
Aggregate Time Above Threshold Between T1 and T2 (ms)
0.00

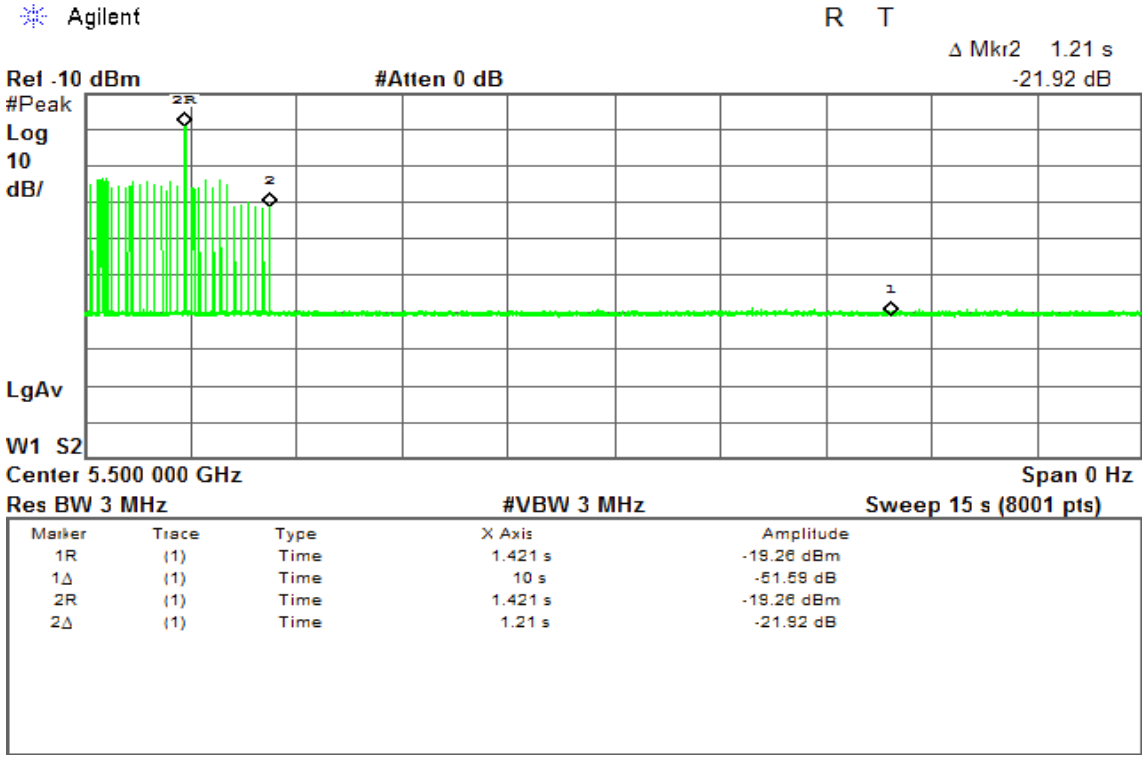
# HIGH BAND RESULTS

## Bandwidth 20 MHz Mode

### Type 1 Channel Move Time Results

*No non-compliance noted.*

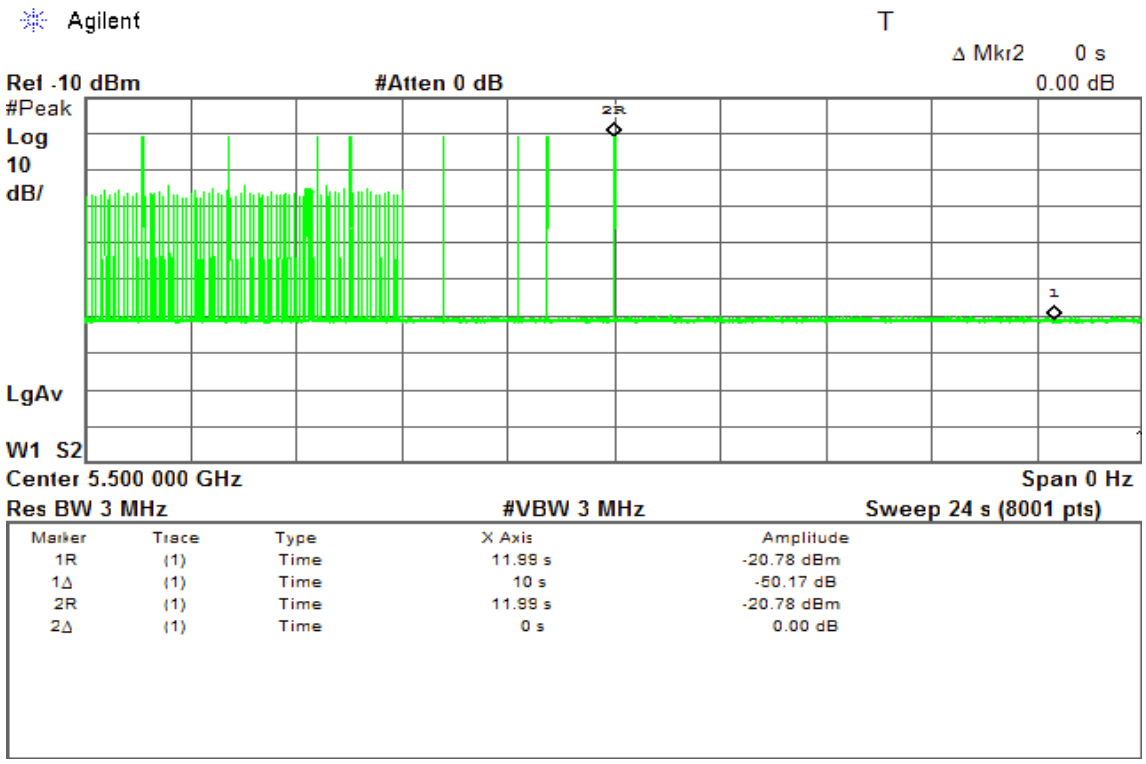
| Channel Move Time (s) | Limit (s) |
|---|---|
| 1.21 | 10 |



## Type 5 Channel Move Time Results

*No non-compliance noted.*

| Channel Move Time (s) | Limit (s) |
|---|---|
| 0 | 10 |



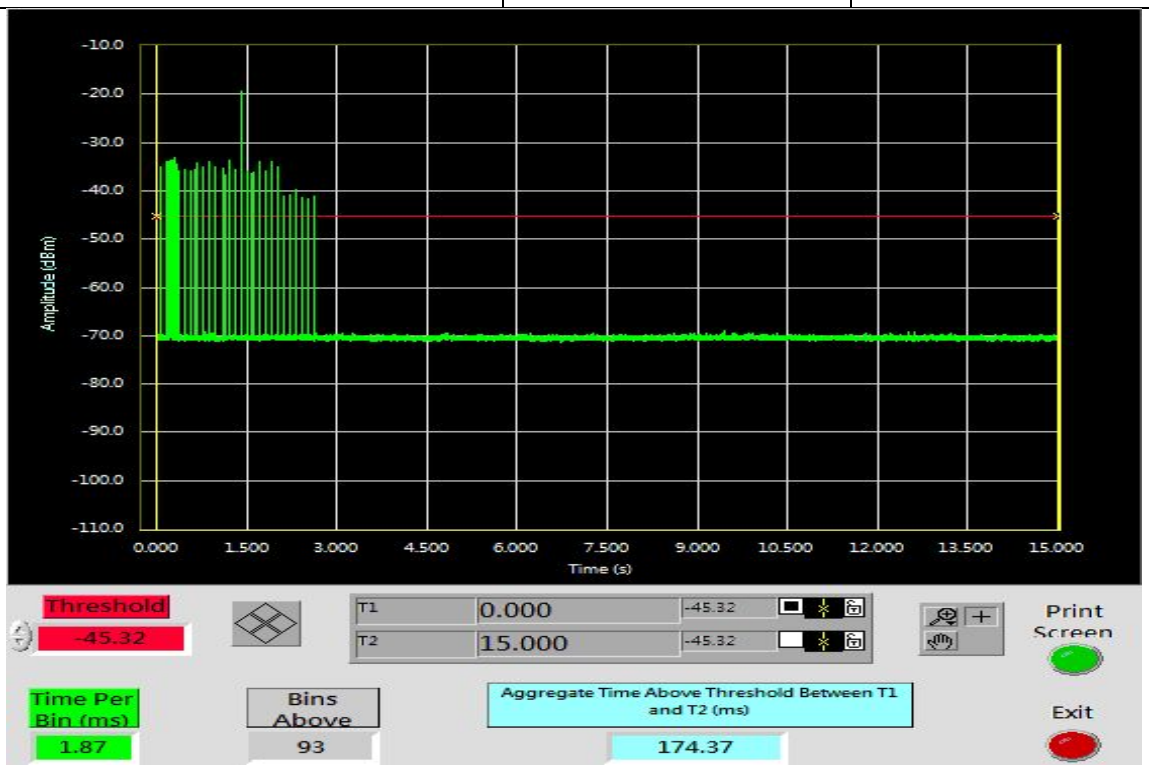
# Bandwidth 20 MHz Mode

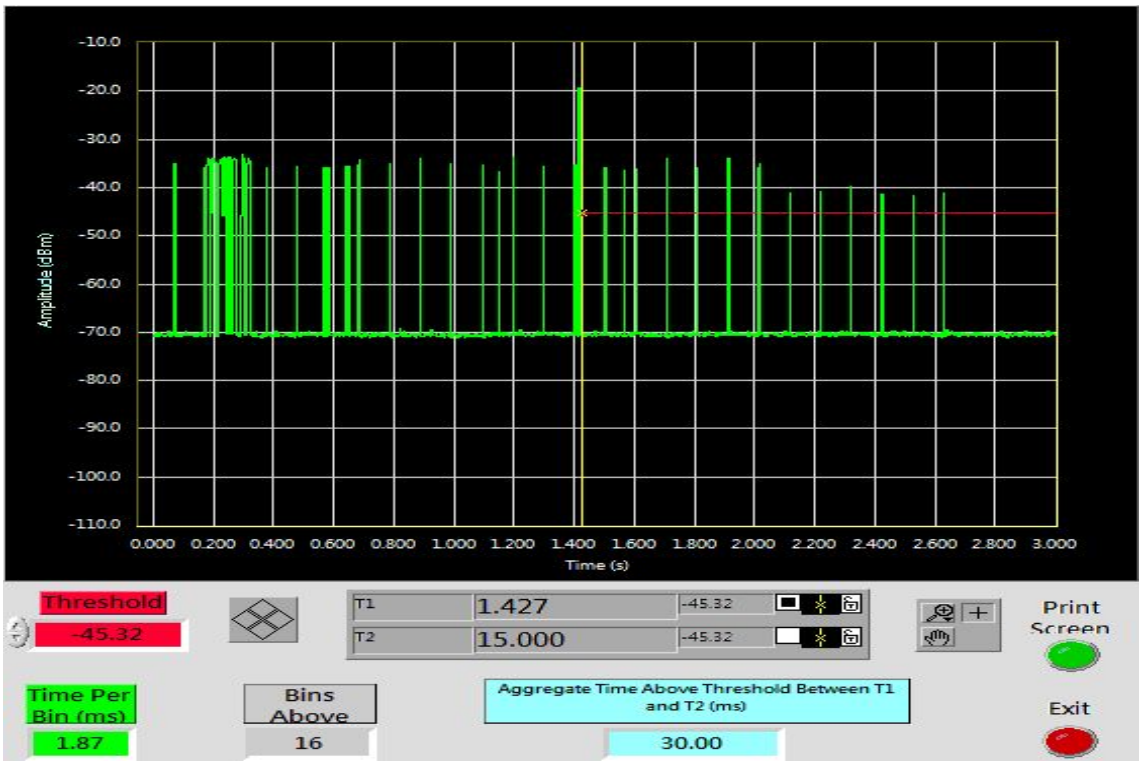
## Type 1 Channel Closing Transmission Time Results

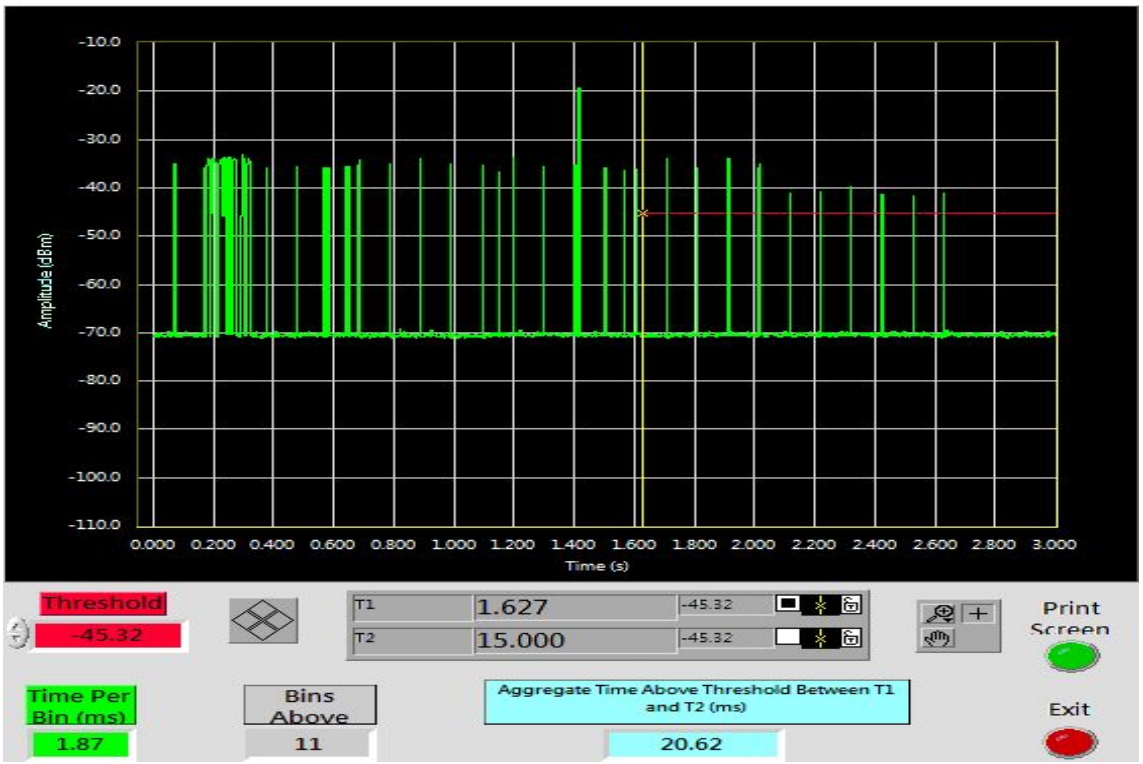
*No non-compliance noted.*

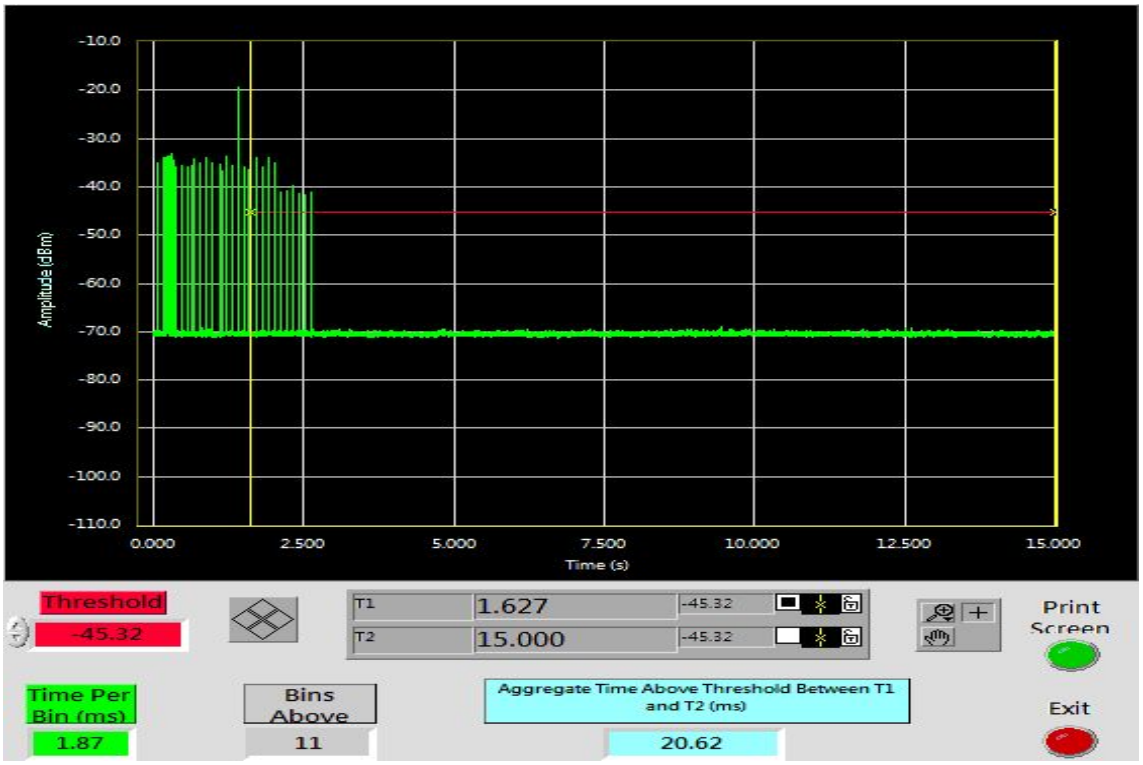
**For R1**

| Aggregate Transmission Time (ms) | Limit (ms) | Margin (ms) |
|---|---|---|
| 20.62 | 60 | -39.38 |



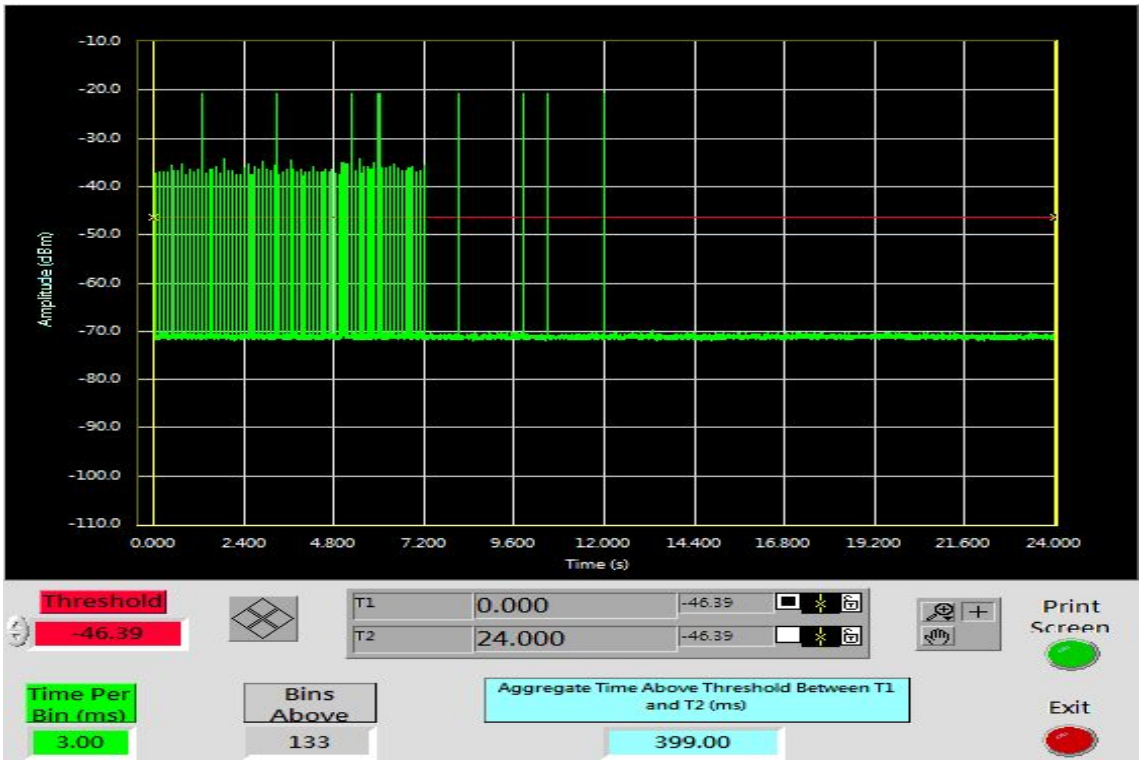



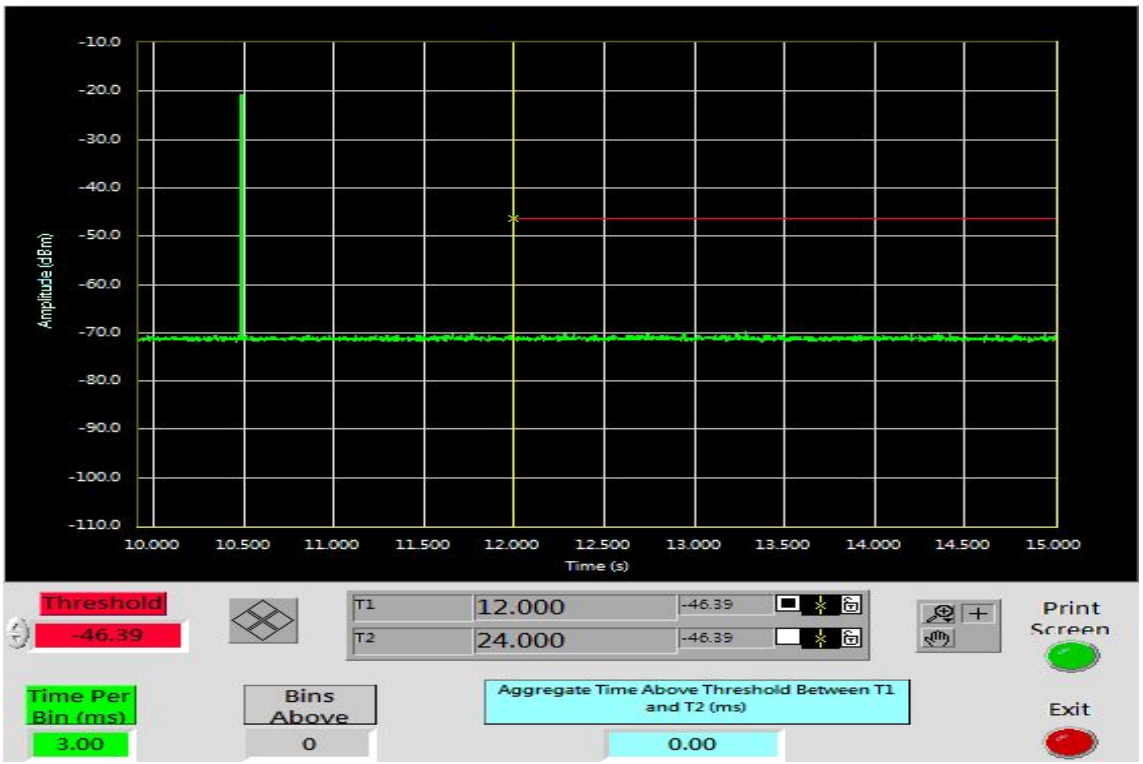

-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
Amplitude (dBm)
0.000 0.200 0.400 0.600 0.800 1.000 1.200 1.400 1.600 1.800 2.000 2.200 2.400 2.600 2.800 3.000
Time (s)
Threshold
-45.32
T1 1.627 -45.32
T2 15.000 -45.32
Print Screen
Time Per Bin (ms)
1.87
Bins Above
11
Aggregate Time Above Threshold Between T1 and T2 (ms)
20.62
Exit

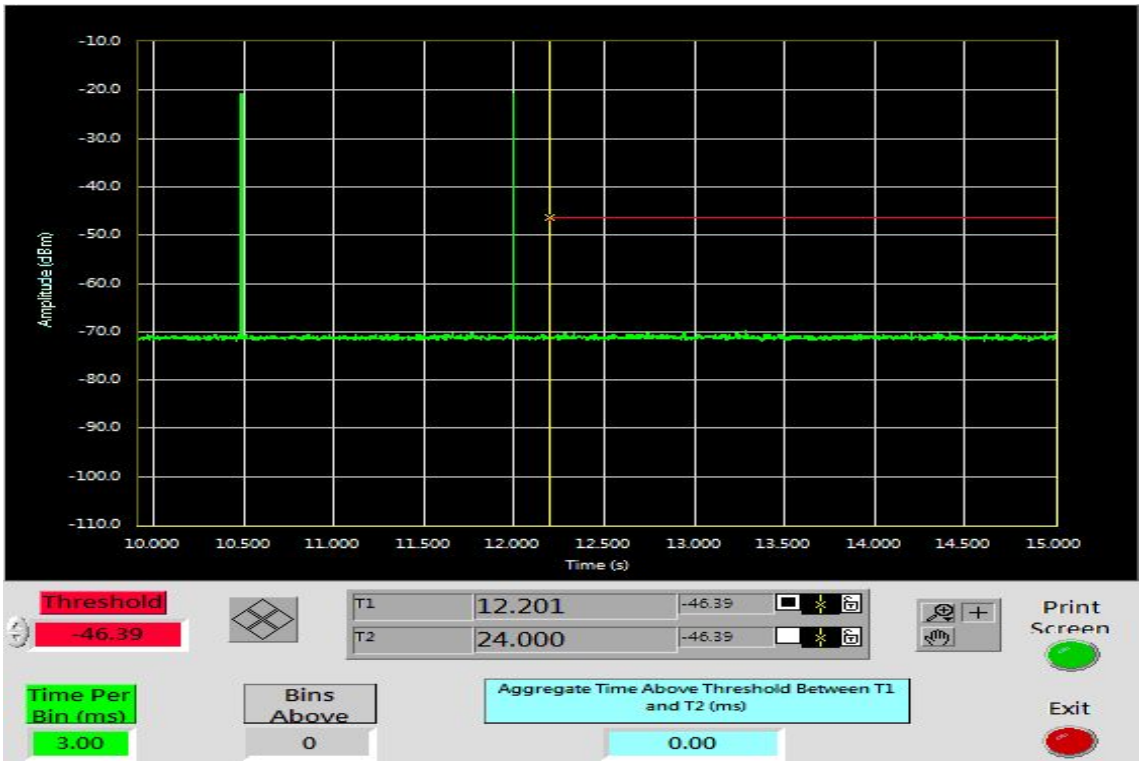

-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
Amplitude (dBm)
0.000 2.500 5.000 7.500 10.000 12.500 15.000
Time (s)
Threshold
-45.32
T1 1.627 -45.32
T2 15.000 -45.32
Print Screen
Time Per Bin (ms)
1.87
Bins Above
11
Aggregate Time Above Threshold Between T1 and T2 (ms)
20.62
Exit

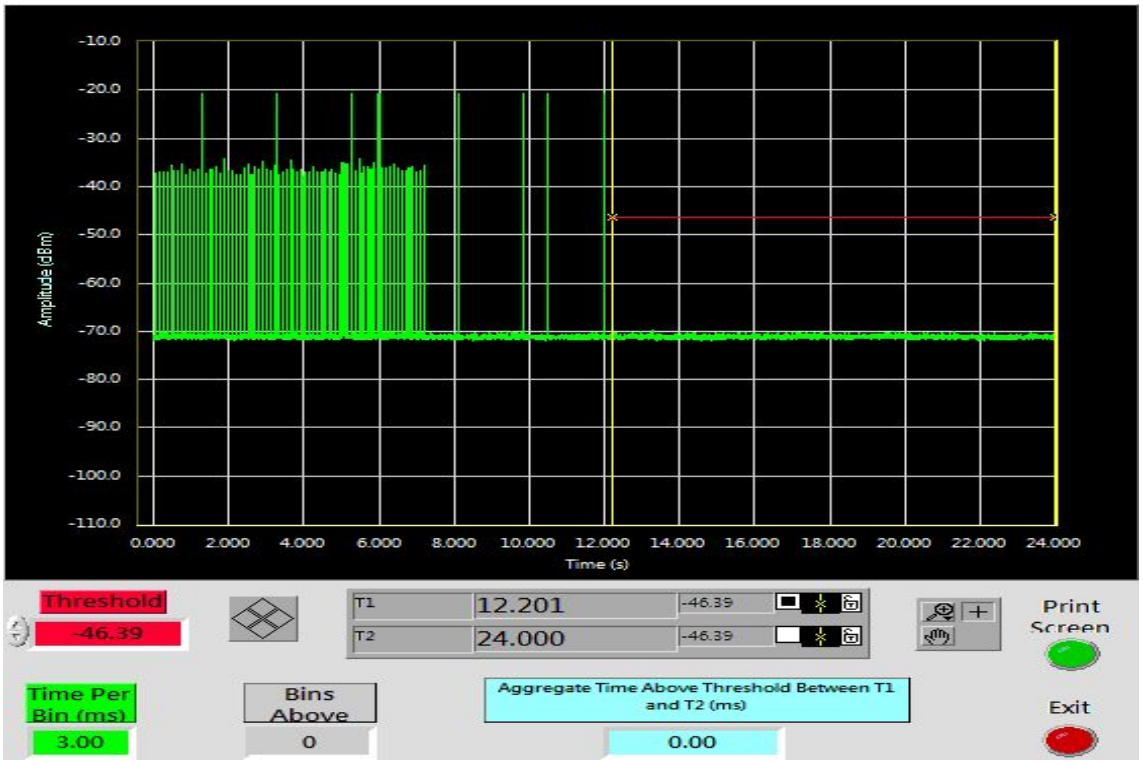
**For R5**

| Aggregate Transmission Time (ms) | Limit (ms) | Margin (ms) |
|---|---|---|
| 0 | 60 | -60 |




-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
Amplitude (dBm)
10.000
10.500
11.000
11.500
12.000
12.500
13.000
13.500
14.000
14.500
15.000
Time (s)
Threshold
-46.39
T1
12.201
-46.39
T2
24.000
-46.39
Print Screen
Time Per Bin (ms)
3.00
Bins Above
0
Aggregate Time Above Threshold Between T1 and T2 (ms)
0.00
Exit

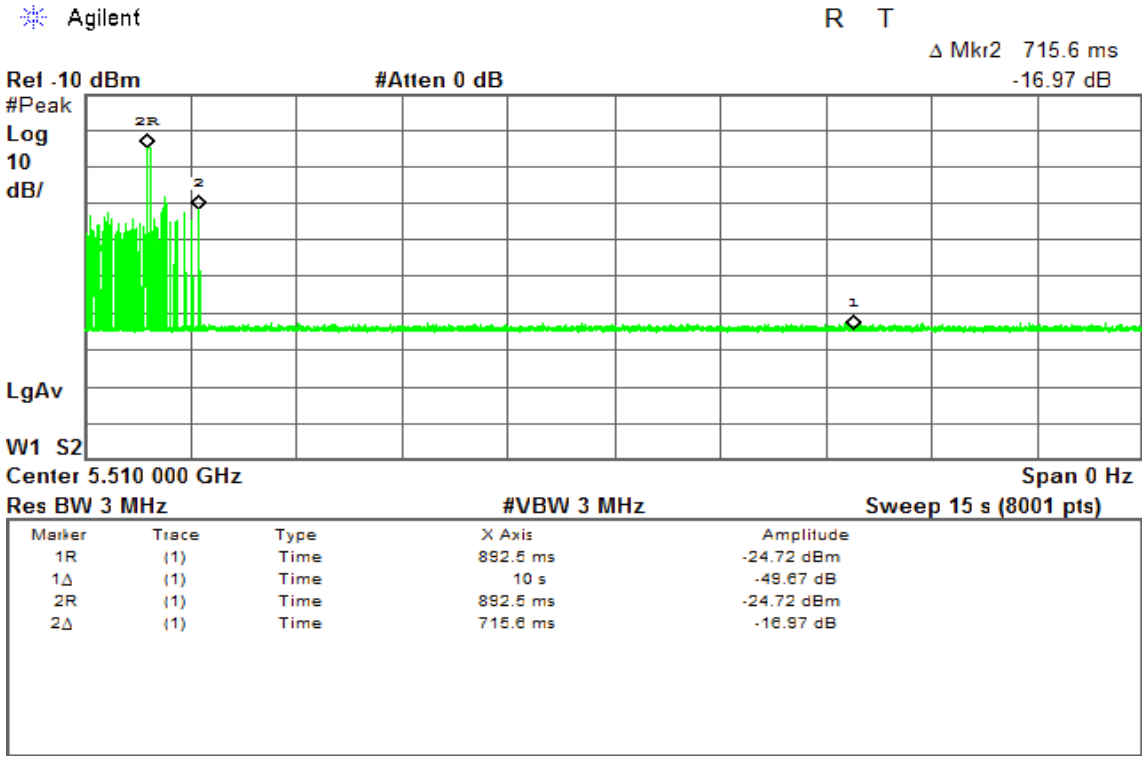

-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
Amplitude (dBm)
0.000
2.000
4.000
6.000
8.000
10.000
12.000
14.000
16.000
18.000
20.000
22.000
24.000
Time (s)
Threshold
-46.39
T1
12.201
-46.39
T2
24.000
-46.39
Print Screen
Time Per Bin (ms)
3.00
Bins Above
0
Aggregate Time Above Threshold Between T1 and T2 (ms)
0.00
Exit

# Bandwidth 40 MHz Mode

## Type 1 Channel Move Time Results

*No non-compliance noted.*

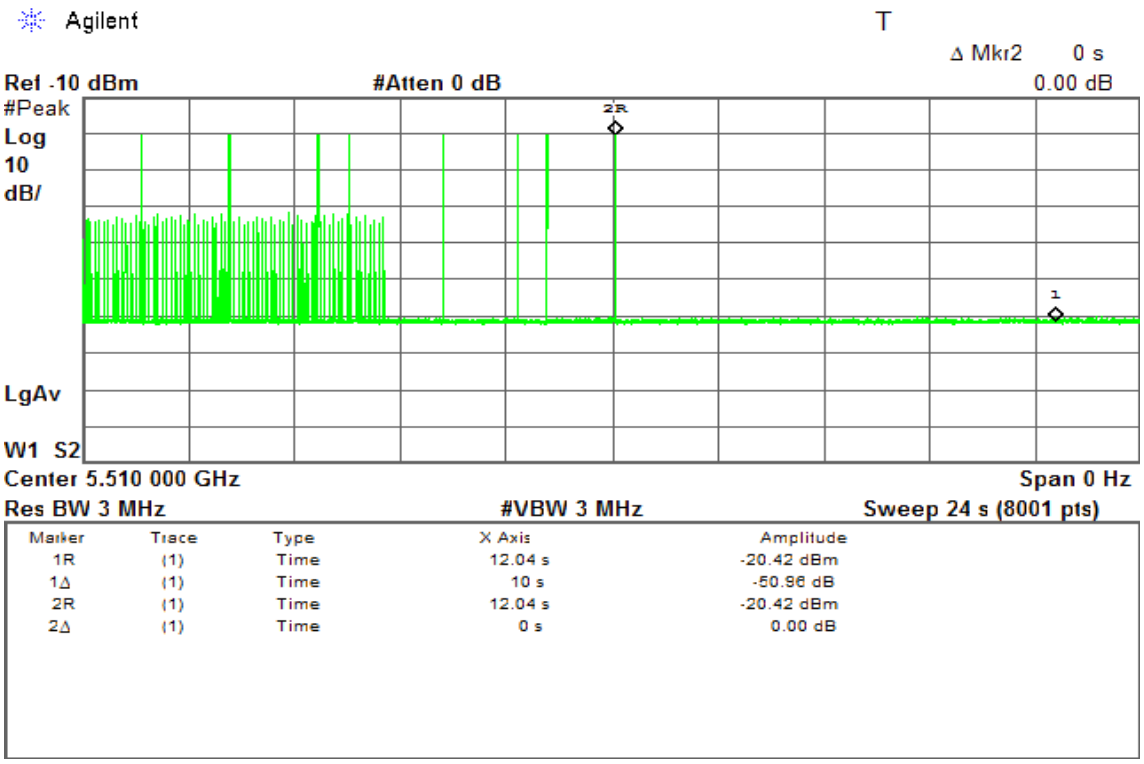
| Channel Move Time (s) | Limit (s) |
|---|---|
| 0.7156 | 10 |



## Type 5 Channel Move Time Results

*No non-compliance noted.*

| Channel Move Time (s) | Limit (s) |
|---|---|
| 0 | 10 |



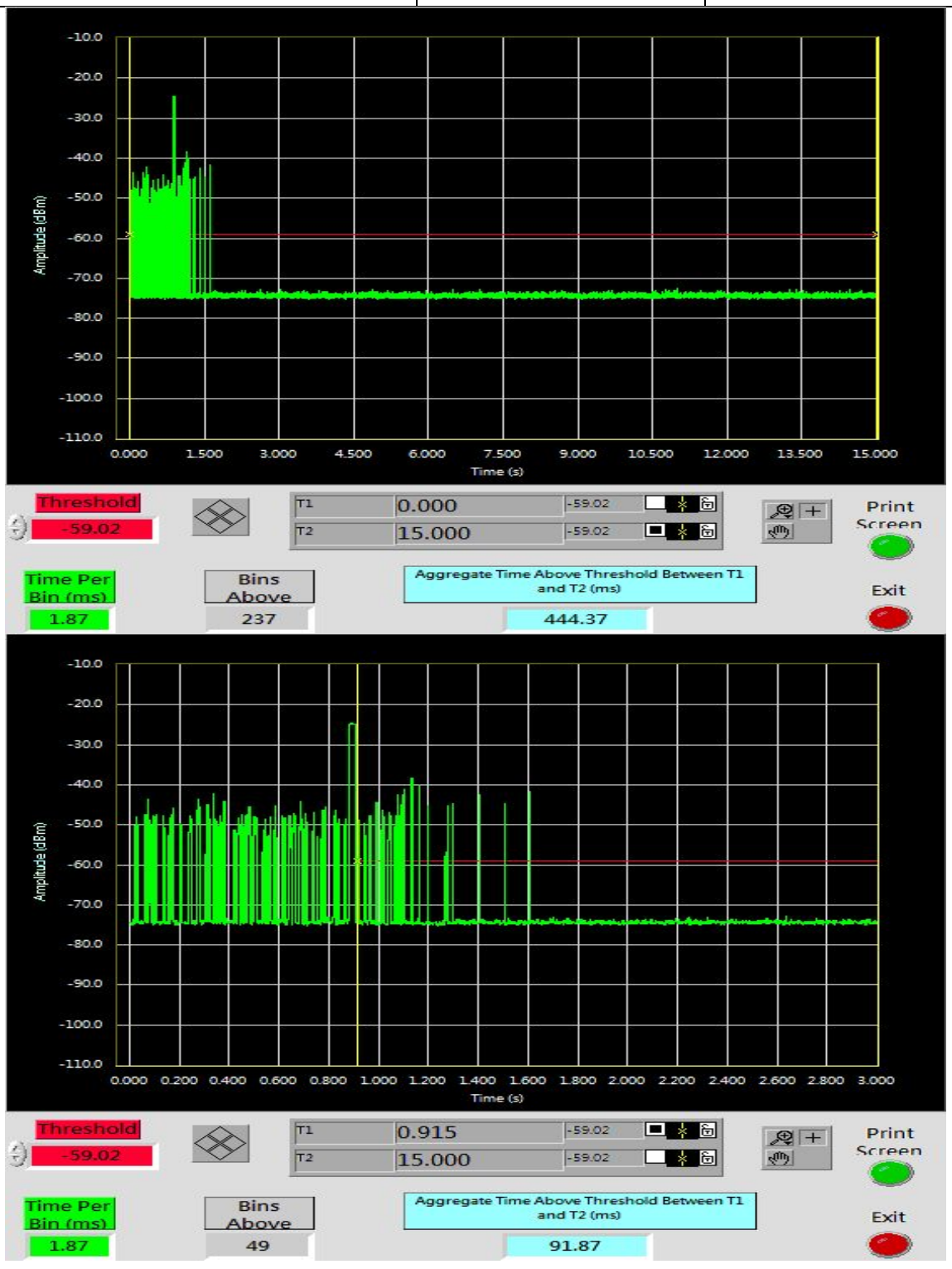
# Bandwidth 40 MHz Mode

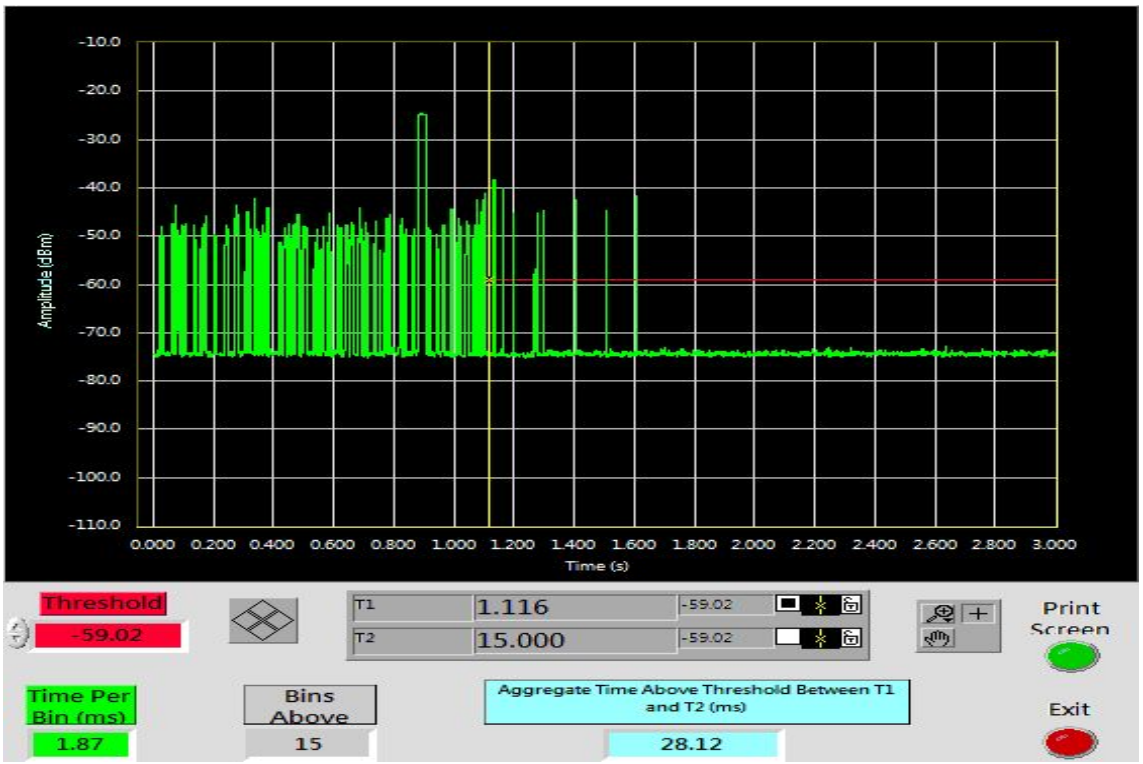
## Type 1 Channel Closing Transmission Time Results

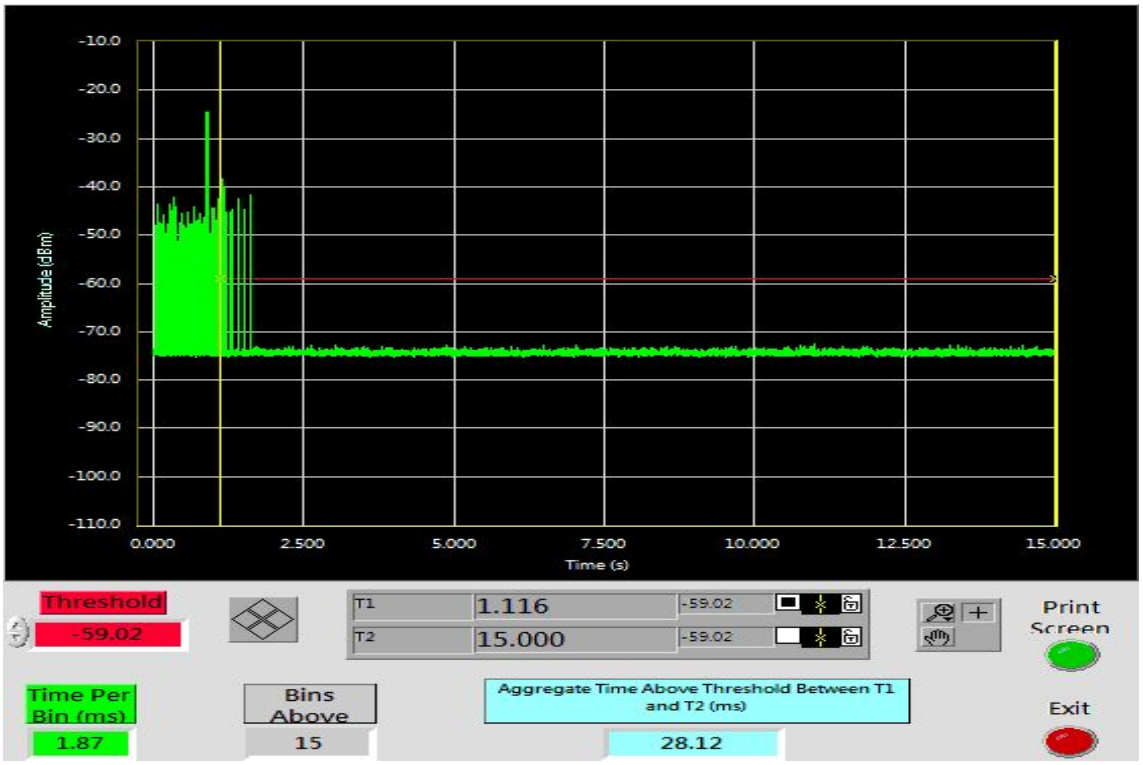
*No non-compliance noted.*

**For R1**

| Aggregate Transmission Time (ms) | Limit (ms) | Margin (ms) |
|---|---|---|
| 28.12 | 60 | -31.88 |

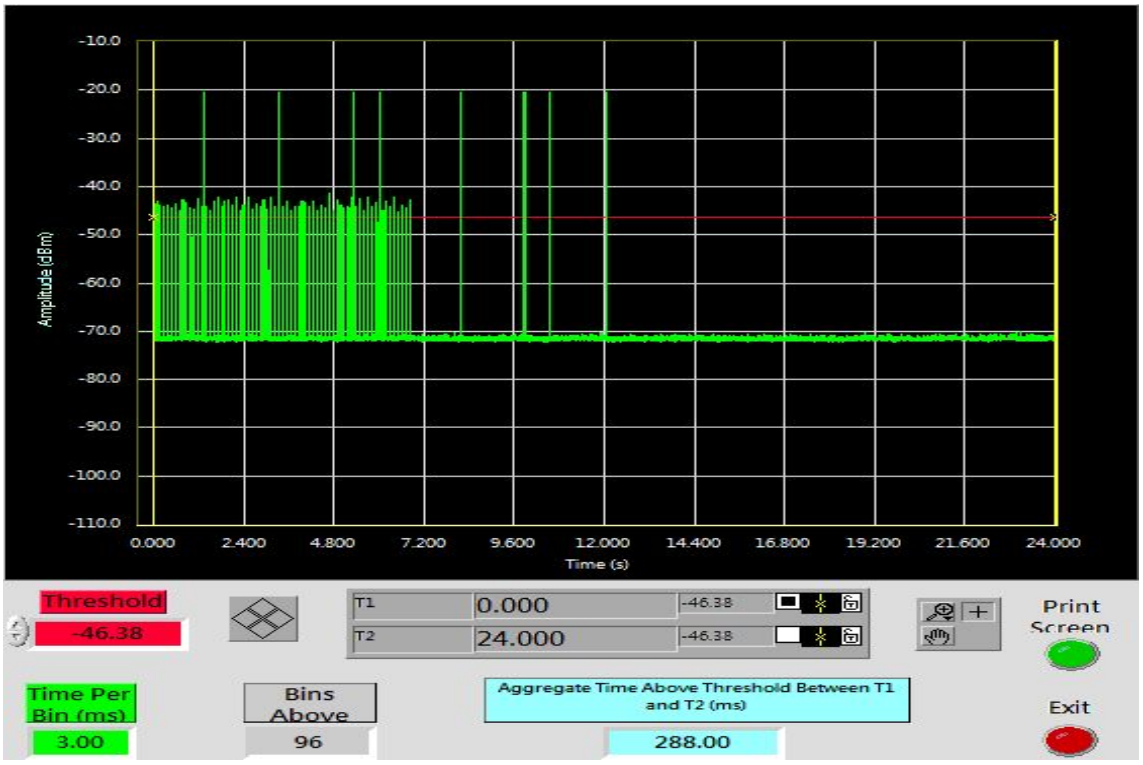


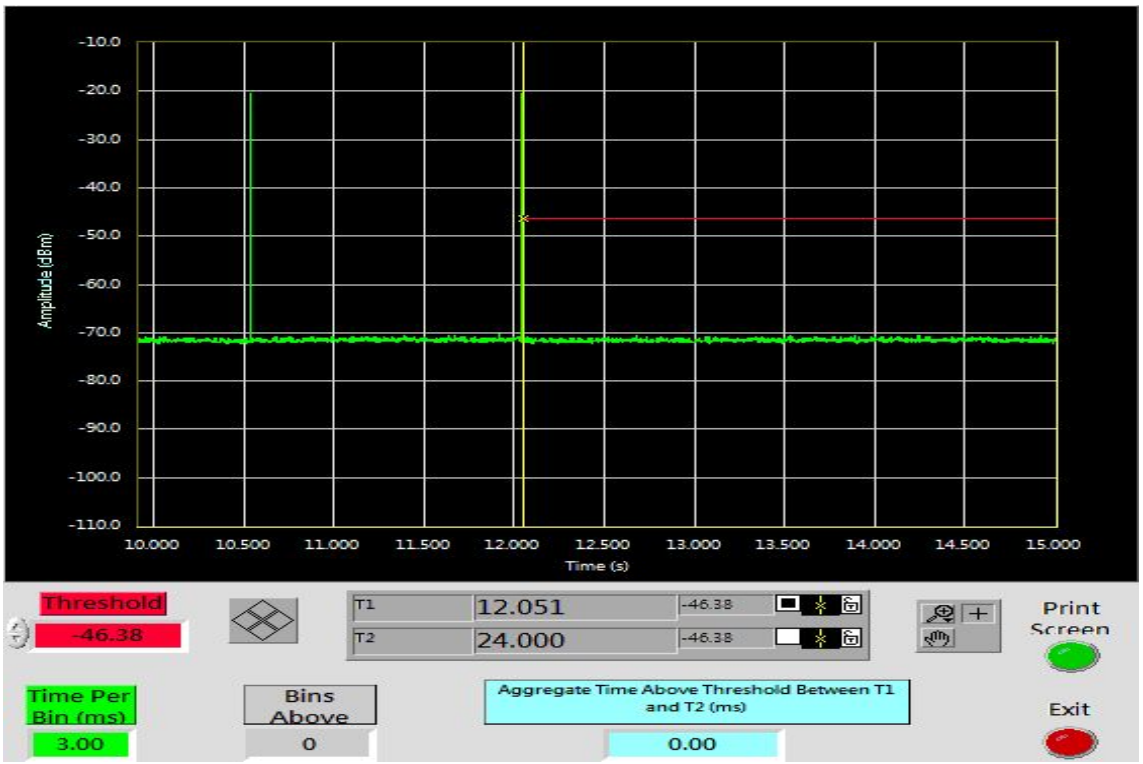

-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
Amplitude (dBm)
0.000 0.200 0.400 0.600 0.800 1.000 1.200 1.400 1.600 1.800 2.000 2.200 2.400 2.600 2.800 3.000
Time (s)
Threshold
-59.02
T1 1.116 -59.02
T2 15.000 -59.02
Print Screen
Exit
Time Per Bin (ms)
1.87
Bins Above
15
Aggregate Time Above Threshold Between T1 and T2 (ms)
28.12

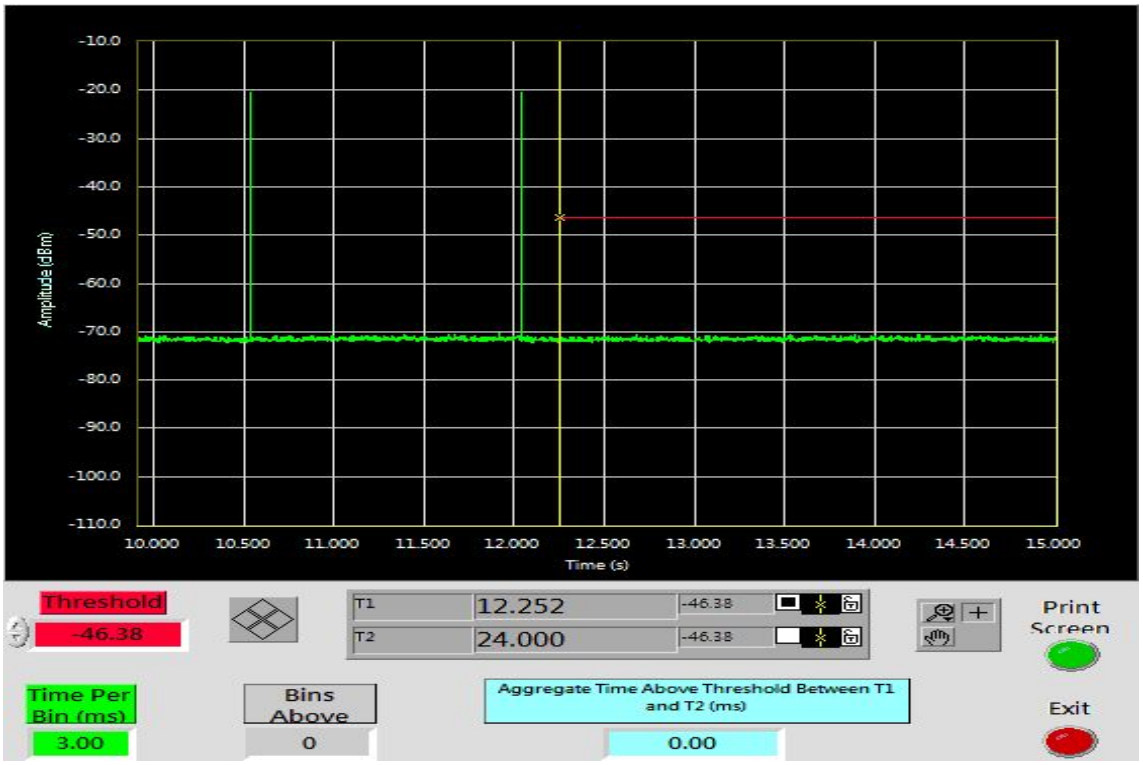

-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
Amplitude (dBm)
0.000 2.500 5.000 7.500 10.000 12.500 15.000
Time (s)
Threshold
-59.02
T1 1.116 -59.02
T2 15.000 -59.02
Print Screen
Exit
Time Per Bin (ms)
1.87
Bins Above
15
Aggregate Time Above Threshold Between T1 and T2 (ms)
28.12

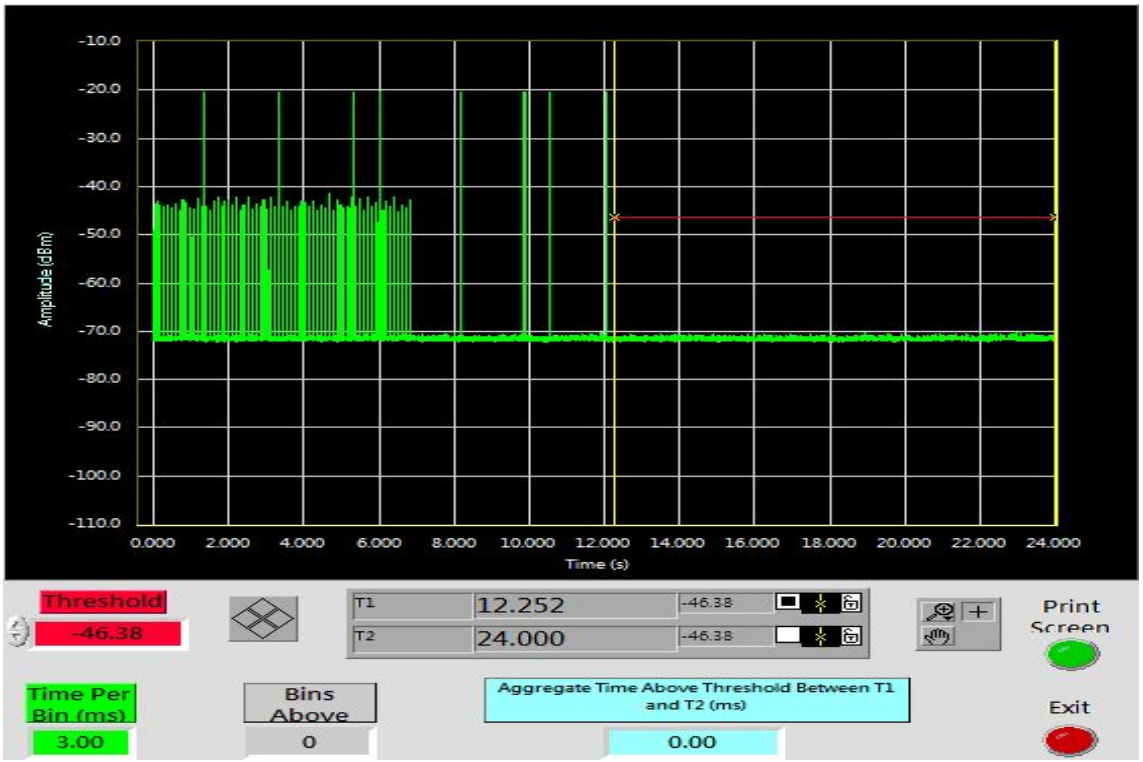
**For R5**

| Aggregate Transmission Time (ms) | Limit (ms) | Margin (ms) |
|---|---|---|
| 0 | 60 | -60 |




-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
Amplitude (dBm)
10.000
10.500
11.000
11.500
12.000
12.500
13.000
13.500
14.000
14.500
15.000
Time (s)
Threshold
-46.38
T1
12.252
-46.38
T2
24.000
-46.38
Print Screen
Time Per Bin (ms)
3.00
Bins Above
0
Aggregate Time Above Threshold Between T1 and T2 (ms)
0.00
Exit


-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
Amplitude (dBm)
0.000
2.000
4.000
6.000
8.000
10.000
12.000
14.000
16.000
18.000
20.000
22.000
24.000
Time (s)
Threshold
-46.38
T1
12.252
-46.38
T2
24.000
-46.38
Print Screen
Time Per Bin (ms)
3.00
Bins Above
0
Aggregate Time Above Threshold Between T1 and T2 (ms)
0.00
Exit

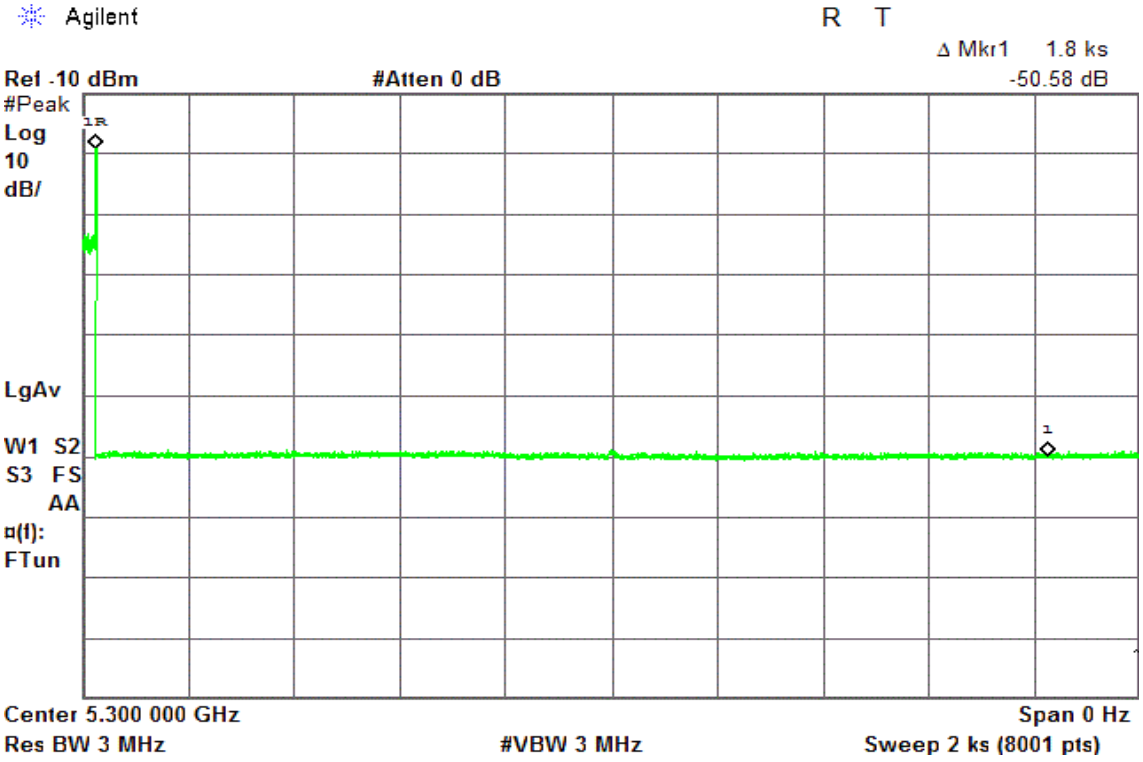
# NON-OCCUPANCY PERIOD

## LOW BAND RESULTS / Bandwidth 20 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.

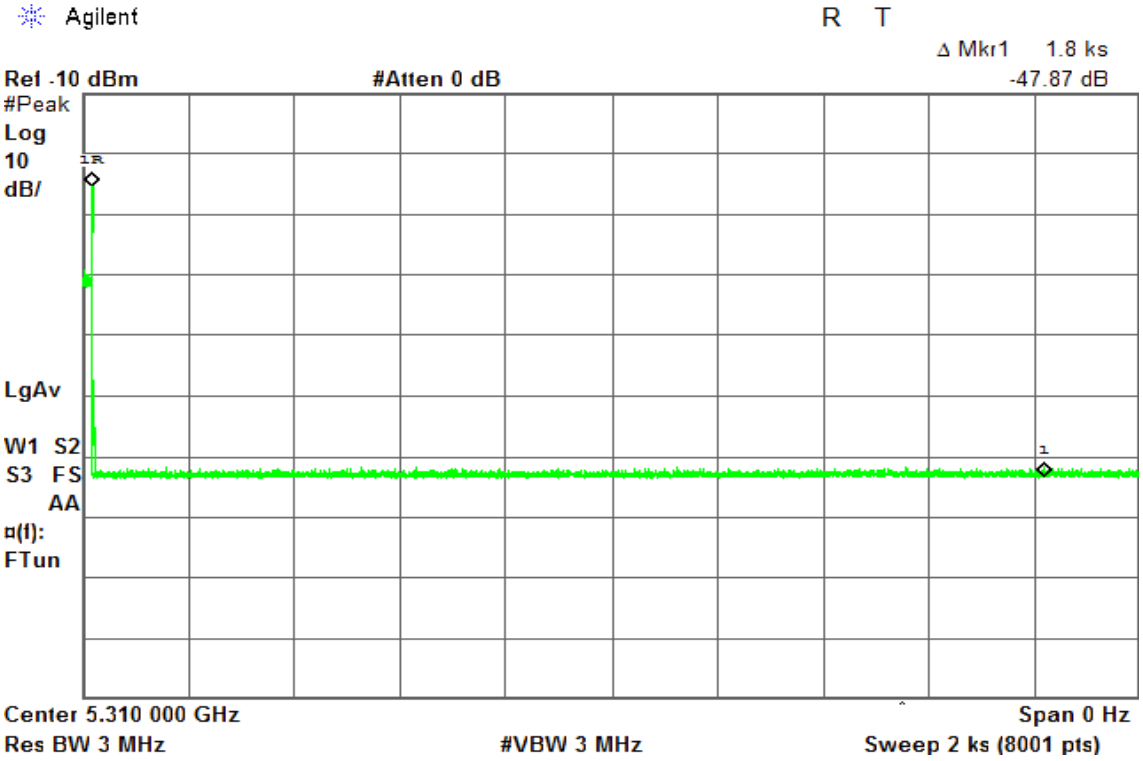


# LOW BAND RESULTS / Bandwidth 40 MHz Mode

## 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.

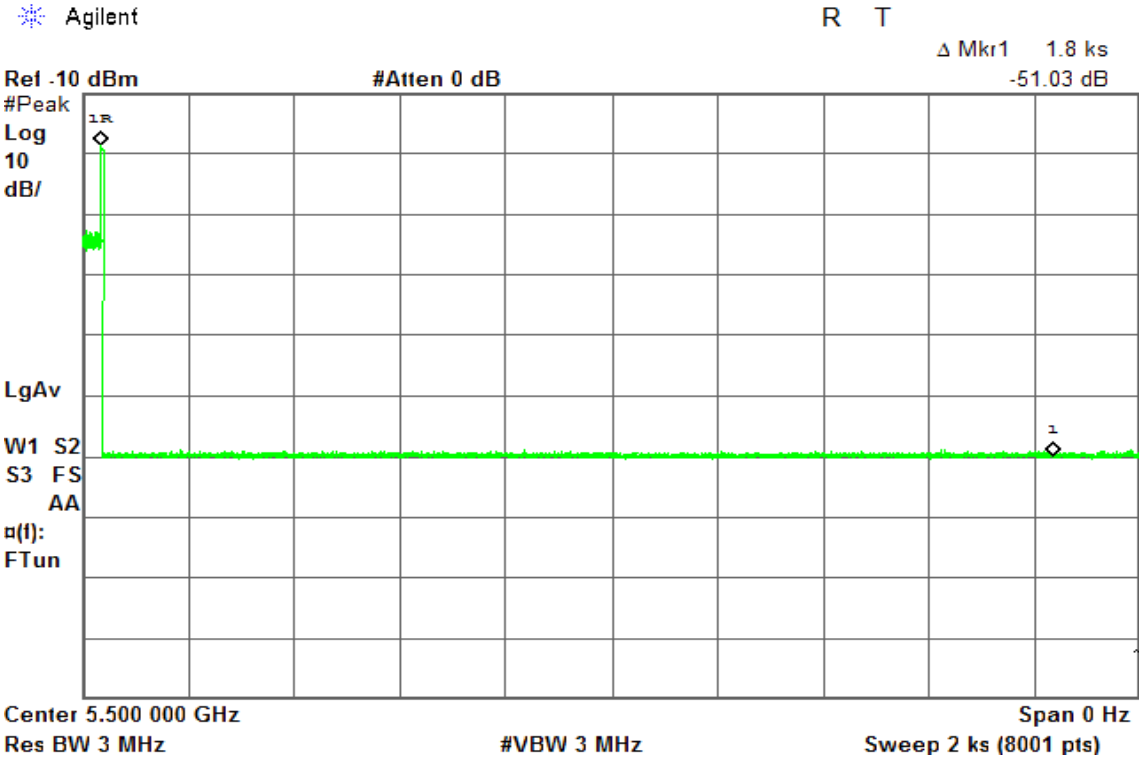


# HIGH BAND RESULTS / Bandwidth 20 MHz Mode

## 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.

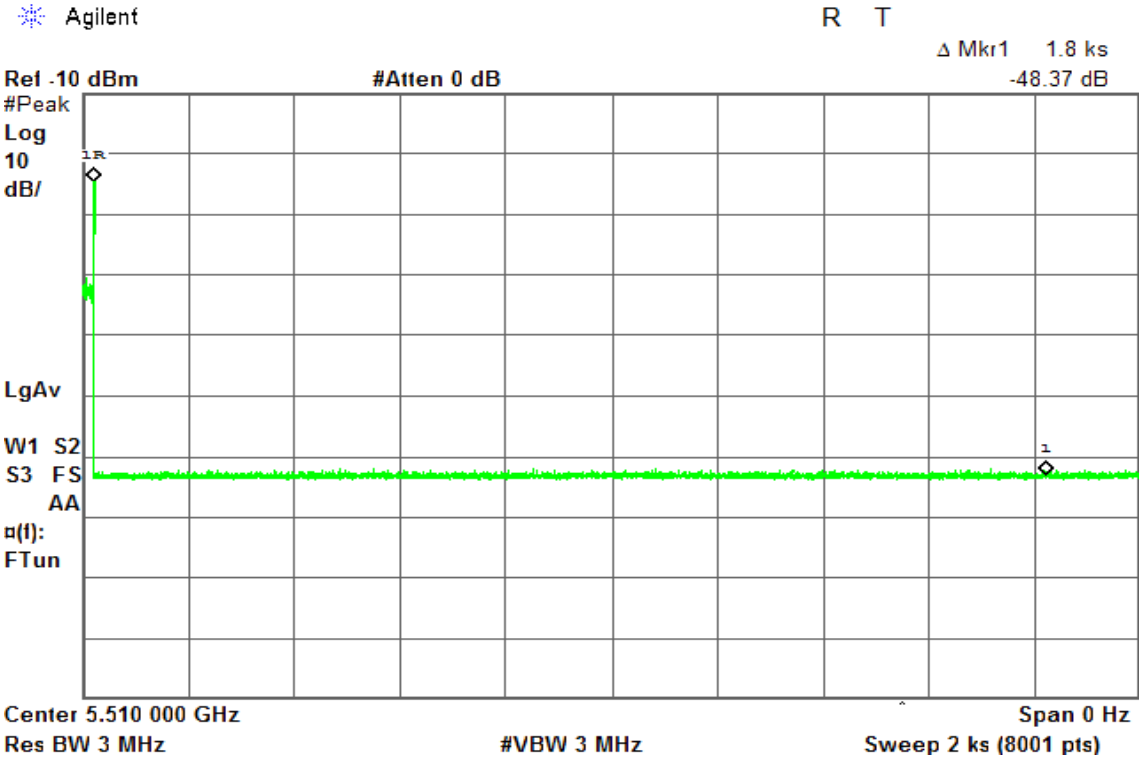


# HIGH BAND RESULTS / Bandwidth 40 MHz Mode

## 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.



# APPENDIX I
# PHOTOGRAPHS OF TEST SETUP