FCC 47 CFR PART 15 SUBPART E

for

MainStream Main Unit Wireless presenter
Model: MUV1, MUV2, MUV3, MUV4, MUV5, MUV6
Brand: MainStream
Test Report Number:
C180524Z01-RP1-5
Issued Date: June 12, 2018

Issued for

Certus Eiger Ltd.
814, Houston Center, Mody Road, TST East, Kowloon, Hong Kong

Issued by:

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	June 12, 2018	Initial Issue	ALL	Sinphy Xie

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1. TEST CERTIFICATION

Product	MainStream Main Unit Wireless presenter
Model	MUV1, MUV2, MUV3, MUV4, MUV5, MUV6
Brand	MainStream
Tested	May 24~June 12, 2018
Applicant	**Certus Eiger Ltd.** 814, Houston Center, Mody Road, TST East, Kowloon, Hong Kong
Manufacturer	**Certus Eiger Ltd.** 814, Houston Center, Mody Road, TST East, Kowloon, Hong Kong

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

We hereby certify that:

Compliance Certification Services (Shenzhen) 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 and IC RSS-247.

The TEST RESULTS of this report relate only to the tested sample identified in this report.

Approved by:

Eve. Wang

Eve Wang
Supervisor of EMC Dept.
Compliance Certification Services (Shenzhen) Inc.

Reviewed by:

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Compliance Certification Services (Shenzhen) Inc.

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2. EUT DESCRIPTION

Product	MainStream Main Unit Wireless presenter
Model Number	MUV1, MUV2, MUV3, MUV4, MUV5, MUV6
Brand	MainStream
Model Discrepancy	They are identical to each other except for market designation for marketing purpose.
Serial Number	C180524Z01-RP1-5
Received Date	May 24, 2018
Power Supply	DC5V supplied by the adapter
Adapter Specification	**Adapter 1:** Moso Power Supply Technology Co., Ltd. Model: MSA-C2000IC5.0-12W-US Input: 100-240Vac 50/60Hz 0.5A max. Output: 5.0Vdc 2A DC cable: Unshielded, 1.20m(with a core) **Adapter 2:** Shenzhen TEKA Technology Co.,Ltd. MODEL: TEKA012-0502000XX INPUT: 100-240Vac 50/60Hz 0.35A MAX OUTPUT: 5Vdc 2A DC cable: Unshielded, 1.20m(with a core)
HDMI Cable	Shielded, 1.50m

Operating Frequency Range & Number of Channels

	Mode	Frequency Range(MHz)	Number of channel
UNII Band I:	IEEE 802.11a	5180-5240	4
	IEEE 802.11n HT20	5180-5240	4
	IEEE 802.11n HT40	5190-5230	2
	IEEE 802.11ac 80	5210	1
UNII Band II:	IEEE 802.11a	5260-5320	4
	IEEE 802.11n HT20	5260-5320	4
	IEEE 802.11n HT40	5270-5310	2
	IEEE 802.11ac 80	5290	1
UNII Band III:	IEEE 802.11a	5500-5580; 5660- 5700	8
	IEEE 802.11n HT20	5500-5580; 5660- 5700	8
	IEEE 802.11n HT40	5510-5550; 5670	3
	IEEE 802.11ac 80	5530	1
UNII Band IV:	IEEE 802.11a	5745-5825	5
	IEEE 802.11n HT20	5745-5825	5
	IEEE 802.11n HT40	5755-5795	2
	IEEE 802.11ac 80	5775	1

Modulation Technique	OFDM (QPSK, BPSK, 16-QAM, 64-QAM)

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Transmit Data Rate	IEEE 802.11a mode: 48, 36, 24, 18, 12, 9, 6Mbps IEEE802.11n HT20MHz mode: 6.5,13,19.5,26,39,52,58.5,65Mbps IEEE802.11n HT40MHz mode: 13.5,27,40.5,54,81,108,121.5,135Mbps IEEE802.11ac 80 mode: 29.3,58.5,84.8,117,175.5,234,263.3, 292.5,351,390Mbps
Antenna Specification	Internal antenna with 2dBi gain (Max)
Channels Spacing	IEEE 802.11a, 802.11n HT20 : 20MHz IEEE 802.11n HT40: 40MHz IEEE 802.11ac 80: 80MHz
Temperature Range	0°C ~ +45°C
Hardware Version	1.7
Software Version	4.9

Note: *1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.*

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Operation Frequency:

UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII)	
CHANNEL	**MHz**
36	5180
38	5190
40	5200
42	5210
44	5220
46	5230
48	5240
52	5260
54	5270
56	5280
58	5290
60	5300
62	5310
64	5320
100	5500
102	5510
104	5520
106	5530
108	5540
110	5550
112	5560
116	5580
132	5660
134	5670
136	5680
140	5700
149	5745
151	5755
153	5765
155	5775
157	5785
159	5795
161	5805
165	5825

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: 2APYB-9C1D3E filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules and FCC 14-30.

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3. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4 Radiated testing was performed at an antenna to EUT distance 3 meters.
The tests documented in this report were performed in accordance with ANSI C63.10: 2013 and FCC CFR 47 Part 15.207, 15.209, 15.407 and FCC 14-30, IC RSS-247, Radio testing was performed according to KDB DA 02-2138、KDB 789033 D02、KDB 905462 D02, KDB 905462 D03, KDB 905462 D06；

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 and IC RSS-247.

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.

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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.

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3.5 DESCRIPTION OF TEST MODES

The EUT is a 1TX configuration without beam forming function.

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

IEEE 802.11n HT 80: 5290 MHz
Channel (5290MHz) with 27Mbps data rate was chosen for the final testing.

IEEE 802.11n HT 80: 5530 MHz
Channel (5530MHz) with 27Mbps data rate was chosen for the final testing.

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4. SETUP OF EQUIPMENT UNDER TEST

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

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

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9010A	MY52221469	01/26/2019
Vector Signal Generator	KEYSIGHT	N5182B	MY53051596	04/10/2019

4.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Model No.	Serial No.	FCC ID	Brand	Data Cable	Power Cord
1	GPON ONU	G-240W-B	N/A	2ADZRG240WB	Alcatel.Lucent	N/A	N/A
2	Notebook 1#	B475	WB04861612	DoC	THINKPAD	Unshielded, 1.50m	Unshielded, 1.60m (AC Cable) Unshielded, 1.80m (DC Cable)
3	Notebook 2#	Probook 5310m	N/A	N/A	HP	Unshielded 1.50m	Shielded 0.80m (AC Cable) Shielded 1.20m (DC Cable

Note:

Grounding was established in accordance with the manufacturer’s requirements and conditions for the intended use.

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4.4 MEASUREMENT UNCERTAINTY

Parameter	Uncertainty
RF frequency	+/-1 * 10-5
RF power conducted	+/- 1,5 dB
RF power radiated	+/- 6 dB
Spurious emissions, conducted	+/- 3 dB
Spurious emissions, radiated	+/- 6 dB
Humidity	+/- 5 %
Temperature	+/- 1°C
Time	+/-10 %

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

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5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at
No.10-1 Mingkeda Logistics park, No.18, Huanguan South Rd., Guan Lan Town, Baoan District, Shenzhen, China

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

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

USA	**A2LA**
China	**CNAS**

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

USA	**FCC**
Japan	**VCCI(C-4815, R-4320,T-2317, G-10624)**
Canada	**INDUSTRY CANADA**

Copies of granted accreditation certificates are available for downloading from our web site, http://www.ccssz.com

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6. 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".

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

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

Table 2: Applicability of DFS requirements during normal operation

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

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

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

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

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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.

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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	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	$\text{Roundup}\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{\text{PRI}_{\mu\text{sec}}}\right)\right\}$	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 Waveform

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 Waveform

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

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DESCRIPTION OF EUT

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

The firmware installed in the EUT during testing was:

Firmware Rev: 1.7

The EUT operates over the 5250-5350MHz and 5475-5725MHz range was a slave device associated with the master during these tests and it did not have radar detection + capability.

The antennas assembly utilized with the EUT has a gain of 2dBi.

The EUT uses one transmitter connected to 50-ohm coaxial antenna ports via a diversity switch. Only one antennas 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 a Alcatel.Lucent 802.11a/b/g Access Point, FCC ID: 2ADZRG240WB.

The rated output power of the Master unit is < 23dBm (EIRP). Therefore the required

interference threshold level is -62 dBm.

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.

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TEST AND MEASUREMENT SYSTEM

System Overview

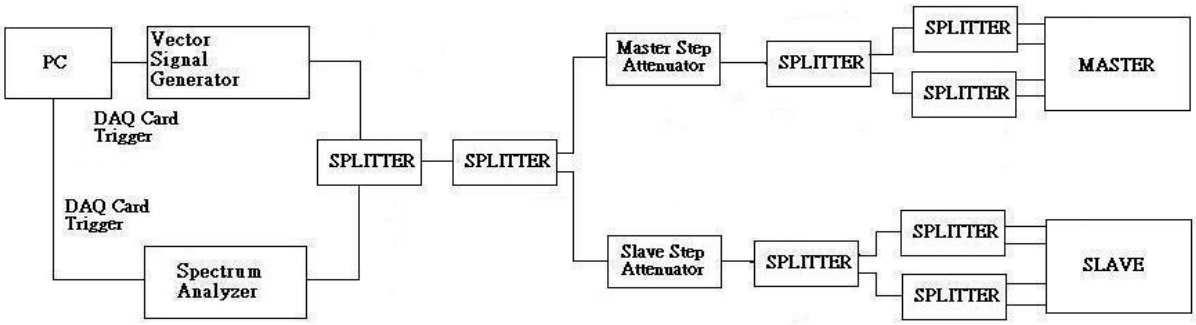
The measurement system is based on a conducted test method.

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



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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.

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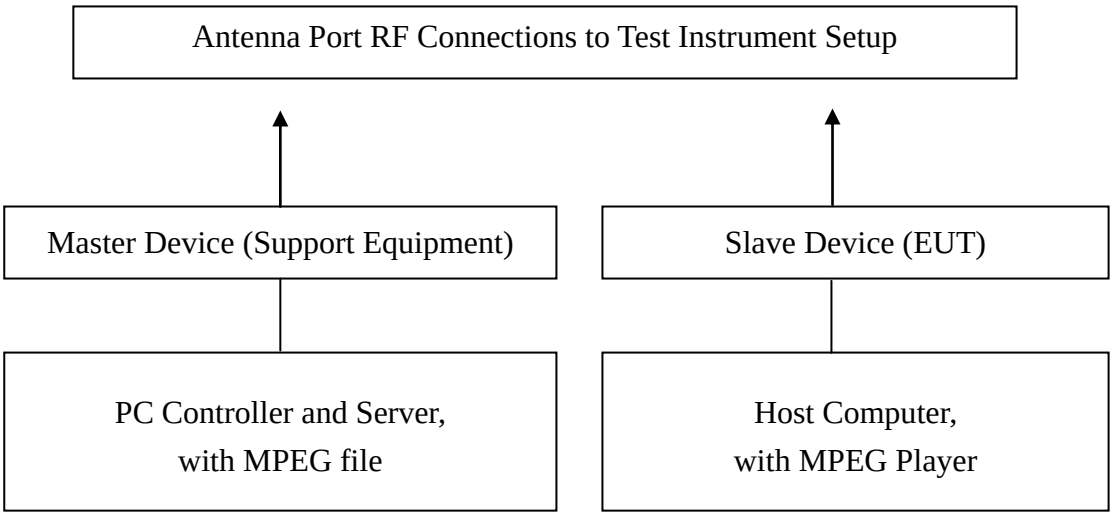
Test Setup



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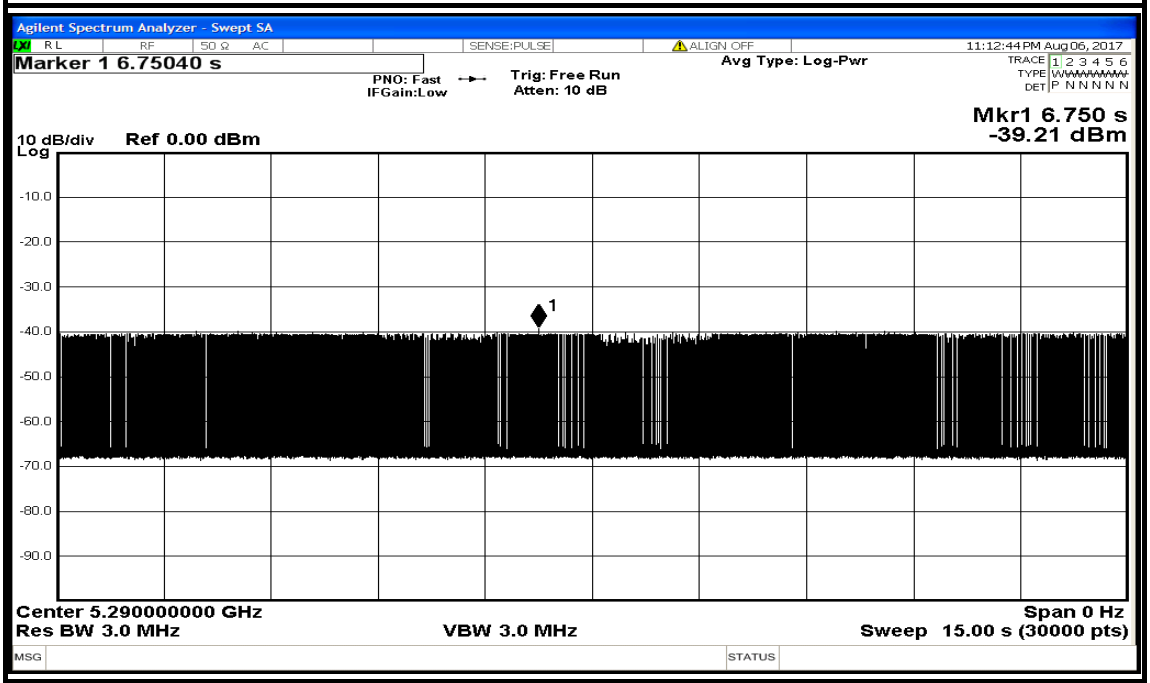
TEST RESULTS

No non-compliance noted

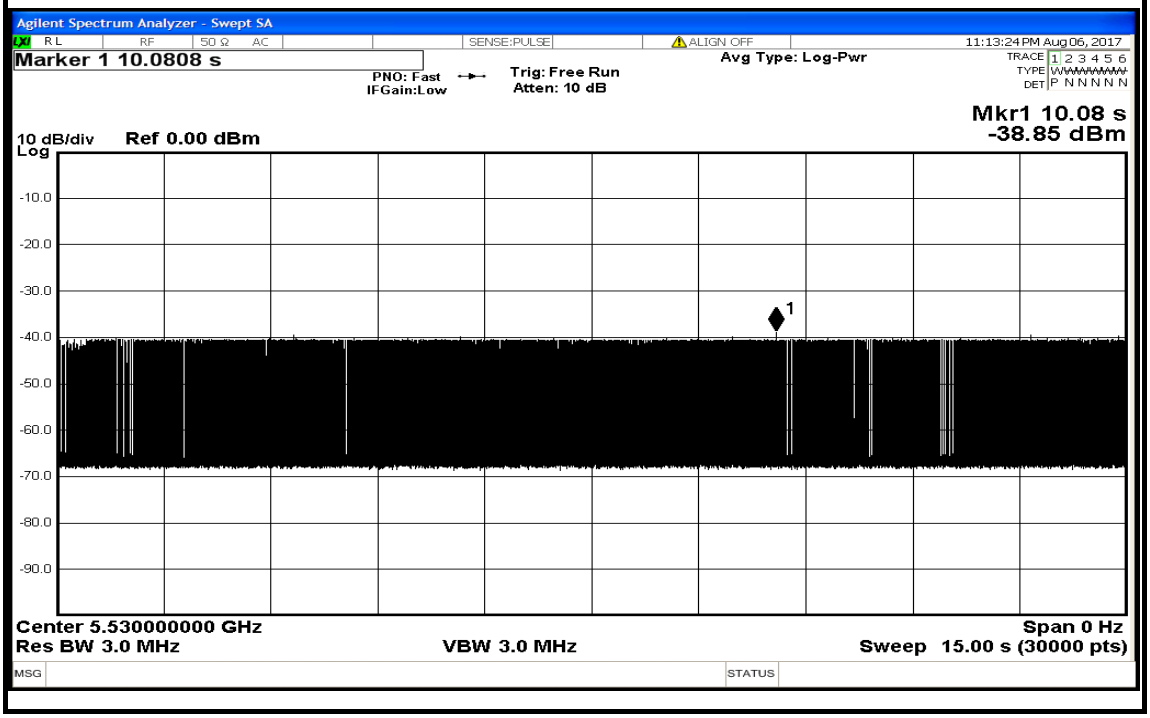
Test plot

Bandwidth 80 MHz Mode

Master Throughput



Master Throughput



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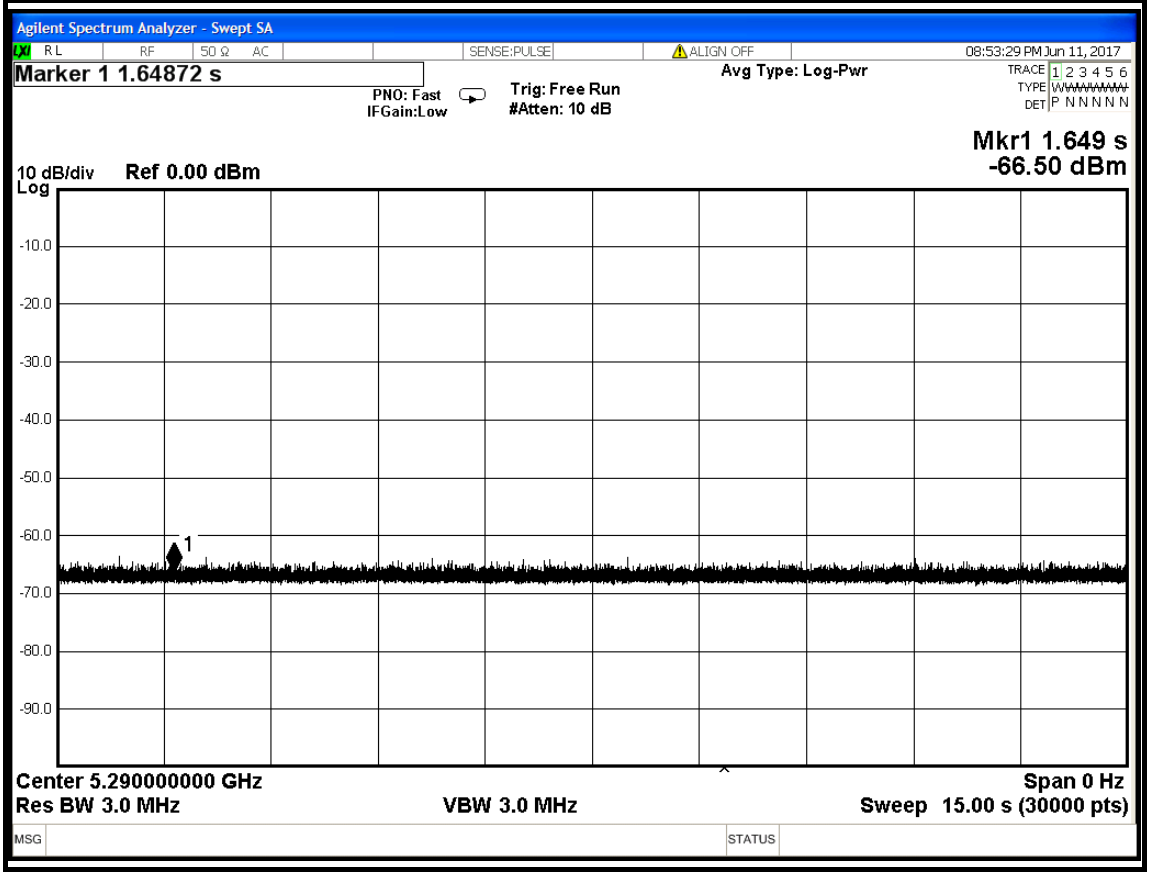
Slave Throughtput

No Throughtput



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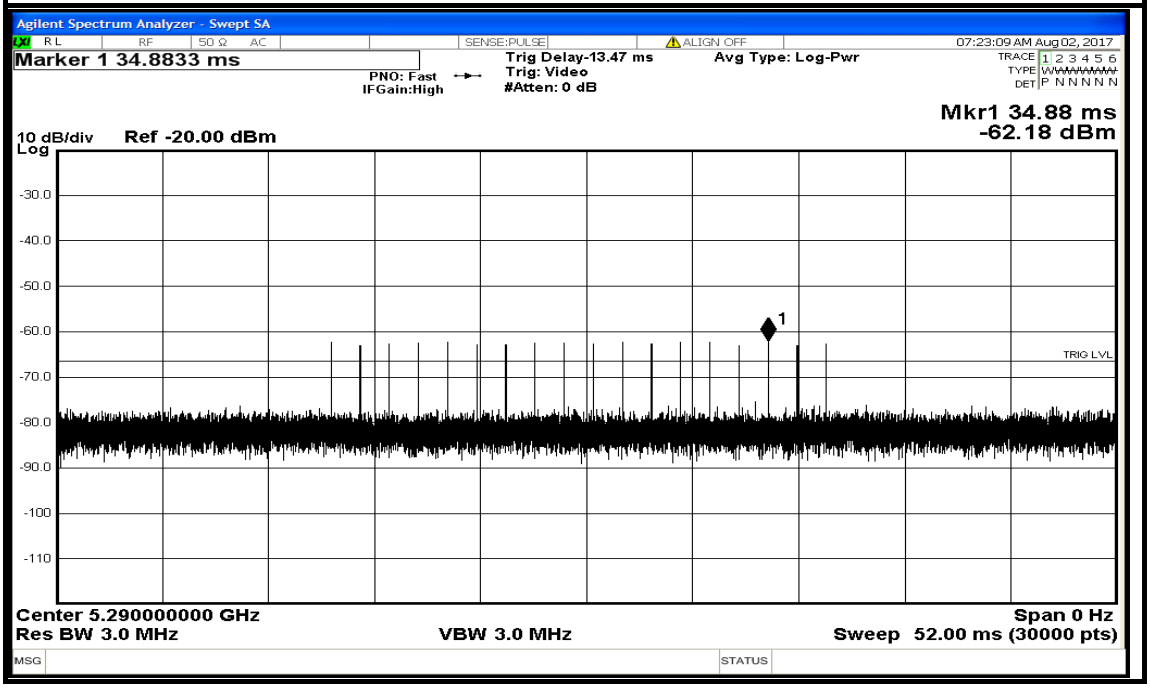
PLOTS OF RADAR WAVEFORMS

5290MHz

Sample of Short Pulse Radar Type 0



	Trial Id	Radar Type	Pulse Width (us)	PRI (us)	Number of Pulses	Waveform Length (us)
Download	0	Type 0	1.0	1428.0	18	25704.0
Download	1	Type 0	1.0	1428.0	18	25704.0
Download	2	Type 0	1.0	1428.0	18	25704.0
Download	3	Type 0	1.0	1428.0	18	25704.0
Download	4	Type 0	1.0	1428.0	18	25704.0
Download	5	Type 0	1.0	1428.0	18	25704.0
Download	6	Type 0	1.0	1428.0	18	25704.0
Download	7	Type 0	1.0	1428.0	18	25704.0
Download	8	Type 0	1.0	1428.0	18	25704.0
Download	9	Type 0	1.0	1428.0	18	25704.0
Download	10	Type 0	1.0	1428.0	18	25704.0
Download	11	Type 0	1.0	1428.0	18	25704.0
Download	12	Type 0	1.0	1428.0	18	25704.0
Download	13	Type 0	1.0	1428.0	18	25704.0
Download	14	Type 0	1.0	1428.0	18	25704.0
Download	15	Type 0	1.0	1428.0	18	25704.0
Download	16	Type 0	1.0	1428.0	18	25704.0
Download	17	Type 0	1.0	1428.0	18	25704.0
Download	18	Type 0	1.0	1428.0	18	25704.0
Download	19	Type 0	1.0	1428.0	18	25704.0
Download	20	Type 0	1.0	1428.0	18	25704.0
Download	21	Type 0	1.0	1428.0	18	25704.0
Download	22	Type 0	1.0	1428.0	18	25704.0
Download	23	Type 0	1.0	1428.0	18	25704.0
Download	24	Type 0	1.0	1428.0	18	25704.0
Download	25	Type 0	1.0	1428.0	18	25704.0
Download	26	Type 0	1.0	1428.0	18	25704.0
Download	27	Type 0	1.0	1428.0	18	25704.0
Download	28	Type 0	1.0	1428.0	18	25704.0
Download	29	Type 0	1.0	1428.0	18	25704.0

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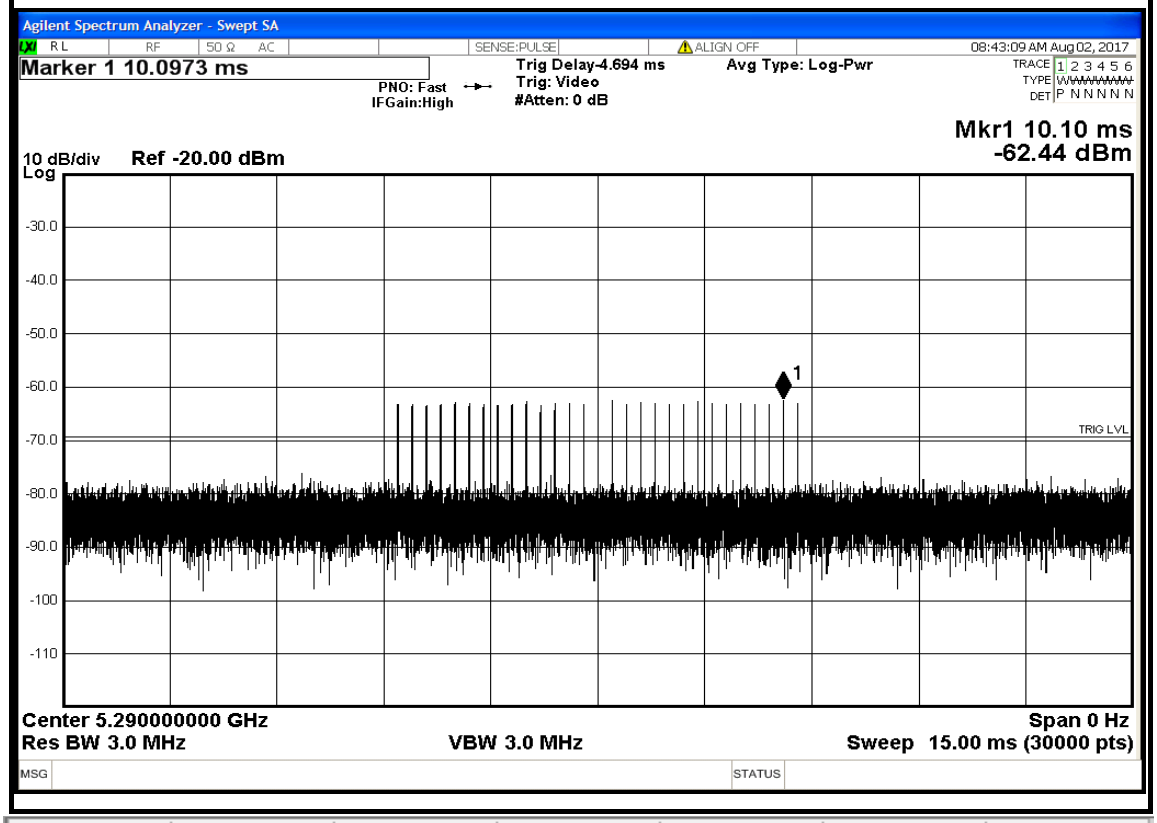
Sample of Short Pulse Radar Type 2



	Trial Id	Radar Type	Pulse Width (us)	PRI (us)	Number of Pulses	Waveform Length (us)
Download	0	Type 2	3.2	179.0	26	4654.0
Download	1	Type 2	1.1	207.0	23	4761.0
Download	2	Type 2	2.1	230.0	24	5520.0
Download	3	Type 2	4.8	200.0	29	5800.0
Download	4	Type 2	3.9	214.0	28	5992.0
Download	5	Type 2	2.9	222.0	26	5772.0
Download	6	Type 2	3.2	204.0	26	5304.0
Download	7	Type 2	2.5	192.0	25	4800.0
Download	8	Type 2	3.1	164.0	26	4264.0
Download	9	Type 2	1.2	156.0	23	3588.0
Download	10	Type 2	3.9	210.0	27	5670.0
Download	11	Type 2	4.6	201.0	29	5829.0
Download	12	Type 2	3.2	162.0	26	4212.0
Download	13	Type 2	2.2	197.0	25	4925.0
Download	14	Type 2	4.5	163.0	29	4727.0
Download	15	Type 2	3.0	203.0	26	5278.0
Download	16	Type 2	5.0	168.0	29	4872.0
Download	17	Type 2	2.4	217.0	25	5425.0
Download	18	Type 2	2.9	191.0	26	4966.0
Download	19	Type 2	2.3	166.0	25	4150.0
Download	20	Type 2	3.7	150.0	27	4050.0
Download	21	Type 2	2.2	176.0	25	4400.0
Download	22	Type 2	4.9	195.0	29	5655.0
Download	23	Type 2	2.9	202.0	26	5252.0
Download	24	Type 2	2.5	178.0	25	4450.0
Download	25	Type 2	1.1	206.0	23	4738.0
Download	26	Type 2	3.8	155.0	27	4185.0
Download	27	Type 2	4.7	157.0	29	4553.0
Download	28	Type 2	2.4	224.0	25	5600.0
Download	29	Type 2	4.2	159.0	28	4452.0

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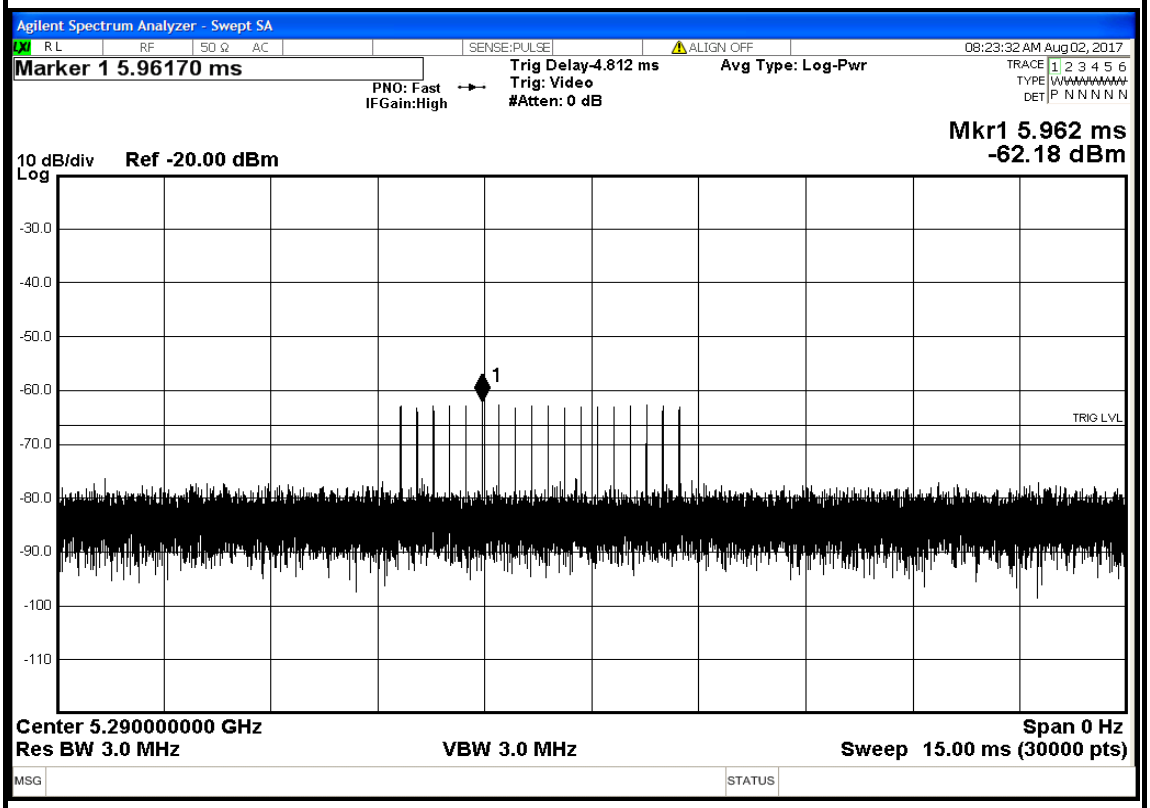
Sample of Short Pulse Radar Type 3



	Trial Id	Radar Type	Pulse Width (us)	PRI (us)	Number of Pulses	Waveform Length (us)
Download	0	Type 3	8.2	355.0	17	6035.0
Download	1	Type 3	6.1	487.0	16	7792.0
Download	2	Type 3	7.1	344.0	16	5504.0
Download	3	Type 3	9.8	288.0	18	5184.0
Download	4	Type 3	8.9	230.0	18	4140.0
Download	5	Type 3	7.9	432.0	17	7344.0
Download	6	Type 3	8.2	207.0	17	3519.0
Download	7	Type 3	7.5	443.0	17	7531.0
Download	8	Type 3	8.1	439.0	17	7463.0
Download	9	Type 3	6.2	223.0	16	3568.0
Download	10	Type 3	8.9	208.0	18	3744.0
Download	11	Type 3	9.6	463.0	18	8334.0
Download	12	Type 3	8.2	441.0	17	7497.0
Download	13	Type 3	7.2	323.0	16	5168.0
Download	14	Type 3	9.5	297.0	18	5346.0
Download	15	Type 3	8.0	412.0	17	7004.0
Download	16	Type 3	10.0	324.0	18	5832.0
Download	17	Type 3	7.4	271.0	17	4607.0
Download	18	Type 3	7.9	349.0	17	5933.0
Download	19	Type 3	7.3	409.0	16	6544.0
Download	20	Type 3	8.7	373.0	18	6714.0
Download	21	Type 3	7.2	254.0	16	4064.0
Download	22	Type 3	9.9	274.0	18	4932.0
Download	23	Type 3	7.9	278.0	17	4726.0
Download	24	Type 3	7.5	317.0	17	5389.0
Download	25	Type 3	6.1	260.0	16	4160.0
Download	26	Type 3	8.8	211.0	18	3798.0
Download	27	Type 3	9.7	272.0	18	4896.0
Download	28	Type 3	7.4	264.0	17	4488.0
Download	29	Type 3	9.2	284.0	18	5112.0

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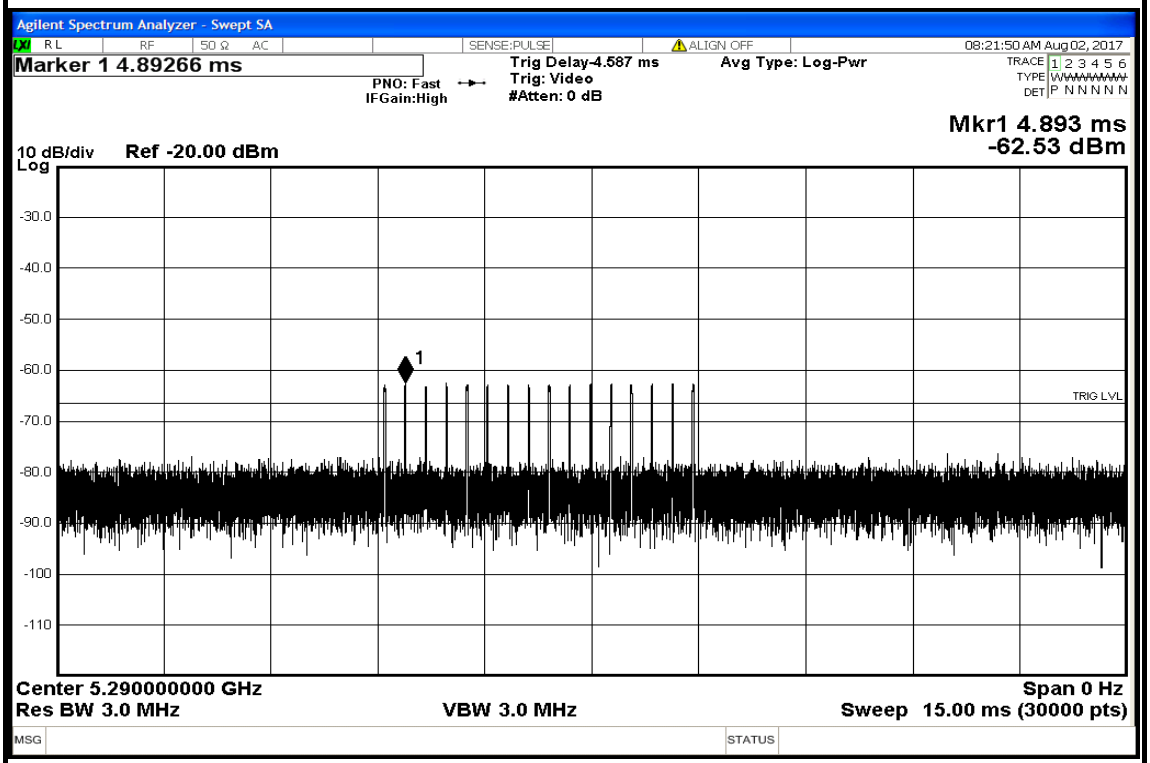
Sample of Short Pulse Radar Type 4



	Trial Id	Radar Type	Pulse Width (us)	PRI (us)	Number of Pulses	Waveform Length (us)
Download	0	Type 4	16.0	355.0	14	4970.0
Download	1	Type 4	11.3	487.0	12	5844.0
Download	2	Type 4	13.5	344.0	13	4472.0
Download	3	Type 4	19.4	288.0	16	4608.0
Download	4	Type 4	17.5	230.0	15	3450.0
Download	5	Type 4	15.3	432.0	14	6048.0
Download	6	Type 4	15.9	207.0	14	2898.0
Download	7	Type 4	14.3	443.0	13	5759.0
Download	8	Type 4	15.8	439.0	14	6146.0
Download	9	Type 4	11.5	223.0	12	2676.0
Download	10	Type 4	17.4	208.0	15	3120.0
Download	11	Type 4	19.0	463.0	16	7408.0
Download	12	Type 4	16.0	441.0	14	6174.0
Download	13	Type 4	13.8	323.0	13	4199.0
Download	14	Type 4	18.9	297.0	16	4752.0
Download	15	Type 4	15.5	412.0	14	5768.0
Download	16	Type 4	19.9	324.0	16	5184.0
Download	17	Type 4	14.1	271.0	13	3523.0
Download	18	Type 4	15.2	349.0	14	4886.0
Download	19	Type 4	13.8	409.0	13	5317.0
Download	20	Type 4	17.1	373.0	15	5595.0
Download	21	Type 4	13.8	254.0	13	3302.0
Download	22	Type 4	19.8	274.0	16	4384.0
Download	23	Type 4	15.3	278.0	14	3892.0
Download	24	Type 4	14.5	317.0	13	4121.0
Download	25	Type 4	11.3	260.0	12	3120.0
Download	26	Type 4	17.3	211.0	15	3165.0
Download	27	Type 4	19.2	272.0	16	4352.0
Download	28	Type 4	14.2	264.0	13	3432.0
Download	29	Type 4	18.2	284.0	15	4260.0

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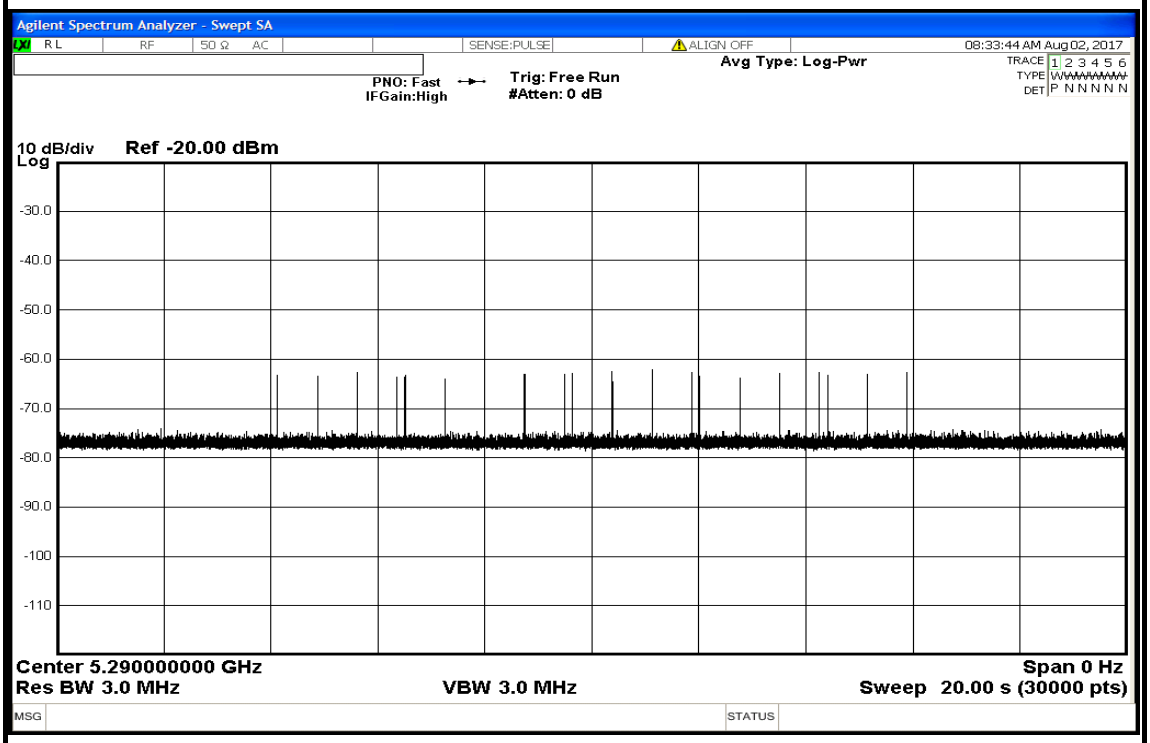
Sample of Long Pulse Radar Type 5



		Trial Id	Radar Type	Number of Bursts	Burst Period (s)	Waveform Length (s)	Center Frequency (GHz)		
⊞	Download	0	Type 5	15	0.8000000	12.0000000	5.500000000		
⊞	Download	1	Type 5	8	1.5000000	12.0000000	5.500000000		
⊞	Download	2	Type 5	11	1.0909091	12.0000000	5.500000000		
⊞	Download	3	Type 5	20	0.6000000	12.0000000	5.500000000		
⊞	Download	4	Type 5	17	0.7058824	12.0000000	5.500000000		
⊞	Download	5	Type 5	14	0.8571429	12.0000000	5.500000000		
⊞	Download	6	Type 5	15	0.8000000	12.0000000	5.500000000		
⊞	Download	7	Type 5	12	1.0000000	12.0000000	5.500000000		
⊞	Download	8	Type 5	14	0.8571429	12.0000000	5.500000000		
⊞	Download	9	Type 5	8	1.5000000	12.0000000	5.500000000		
⊞	Download	10	Type 5	17	0.7058824	12.0000000	5.503900000		
⊞	Download	11	Type 5	19	0.6315789	12.0000000	5.505100000		
⊞	Download	12	Type 5	15	0.8000000	12.0000000	5.502700000		
⊞	Download	13	Type 5	12	1.0000000	12.0000000	5.501500000		
⊞	Download	14	Type 5	19	0.6315789	12.0000000	5.504700000		
⊞	Download	15	Type 5	14	0.8571429	12.0000000	5.502300000		
⊞	Download	16	Type 5	20	0.6000000	12.0000000	5.505500000		
⊞	Download	17	Type 5	12	1.0000000	12.0000000	5.501500000		
⊞	Download	18	Type 5	14	0.8571429	12.0000000	5.502300000		
⊞	Download	19	Type 5	12	1.0000000	12.0000000	5.501500000		
⊞	Download	20	Type 5	16	0.7500000	12.0000000	5.496500000		
⊞	Download	21	Type 5	12	1.0000000	12.0000000	5.498900000		
⊞	Download	22	Type 5	20	0.6000000	12.0000000	5.494500000		
⊞	Download	23	Type 5	14	0.8571429	12.0000000	5.497700000		
⊞	Download	24	Type 5	13	0.9230769	12.0000000	5.498100000		
⊞	Download	25	Type 5	8	1.5000000	12.0000000	5.500500000		
⊞	Download	26	Type 5	17	0.7058824	12.0000000	5.496100000		
⊞	Download	27	Type 5	19	0.6315789	12.0000000	5.494900000		
⊞	Download	28	Type 5	12	1.0000000	12.0000000	5.498500000		
⊞	Download	29	Type 5	18	0.6666667	12.0000000	5.495700000		

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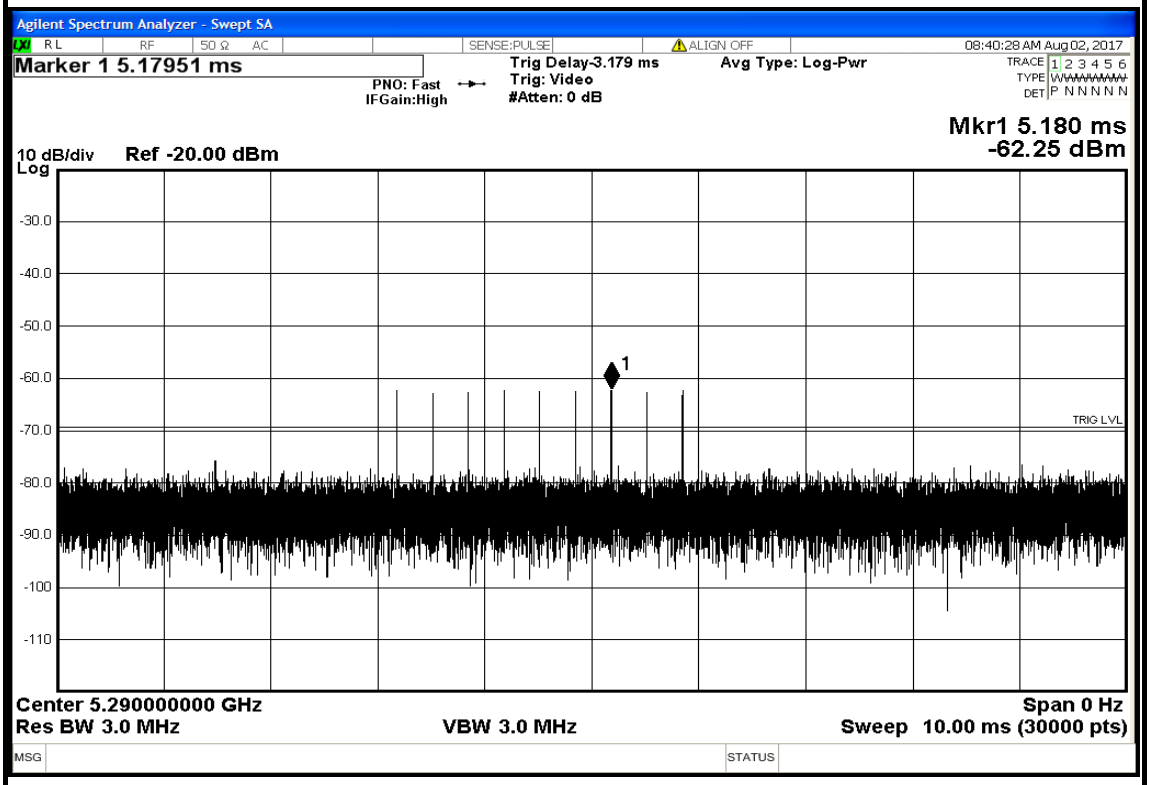
Sample of Frequency Hopping Radar Type 6



	Trial Id	Radar Type	Pulse Width (us)	PRI (us)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (ms)	Visible Frequency Number
Download	0	Type 6	1.0	333.3	9	0.3333	300.0000000	32
Download	1	Type 6	1.0	333.3	9	0.3333	300.0000000	27
Download	2	Type 6	1.0	333.3	9	0.3333	300.0000000	25
Download	3	Type 6	1.0	333.3	9	0.3333	300.0000000	33
Download	4	Type 6	1.0	333.3	9	0.3333	300.0000000	37
Download	5	Type 6	1.0	333.3	9	0.3333	300.0000000	30
Download	6	Type 6	1.0	333.3	9	0.3333	300.0000000	33
Download	7	Type 6	1.0	333.3	9	0.3333	300.0000000	27
Download	8	Type 6	1.0	333.3	9	0.3333	300.0000000	33
Download	9	Type 6	1.0	333.3	9	0.3333	300.0000000	30
Download	10	Type 6	1.0	333.3	9	0.3333	300.0000000	37
Download	11	Type 6	1.0	333.3	9	0.3333	300.0000000	36
Download	12	Type 6	1.0	333.3	9	0.3333	300.0000000	38
Download	13	Type 6	1.0	333.3	9	0.3333	300.0000000	35
Download	14	Type 6	1.0	333.3	9	0.3333	300.0000000	28
Download	15	Type 6	1.0	333.3	9	0.3333	300.0000000	37
Download	16	Type 6	1.0	333.3	9	0.3333	300.0000000	35
Download	17	Type 6	1.0	333.3	9	0.3333	300.0000000	37
Download	18	Type 6	1.0	333.3	9	0.3333	300.0000000	27
Download	19	Type 6	1.0	333.3	9	0.3333	300.0000000	34
Download	20	Type 6	1.0	333.3	9	0.3333	300.0000000	35
Download	21	Type 6	1.0	333.3	9	0.3333	300.0000000	37
Download	22	Type 6	1.0	333.3	9	0.3333	300.0000000	41
Download	23	Type 6	1.0	333.3	9	0.3333	300.0000000	36
Download	24	Type 6	1.0	333.3	9	0.3333	300.0000000	29
Download	25	Type 6	1.0	333.3	9	0.3333	300.0000000	32
Download	26	Type 6	1.0	333.3	9	0.3333	300.0000000	30
Download	27	Type 6	1.0	333.3	9	0.3333	300.0000000	31
Download	28	Type 6	1.0	333.3	9	0.3333	300.0000000	31
Download	29	Type 6	1.0	333.3	9	0.3333	300.0000000	40

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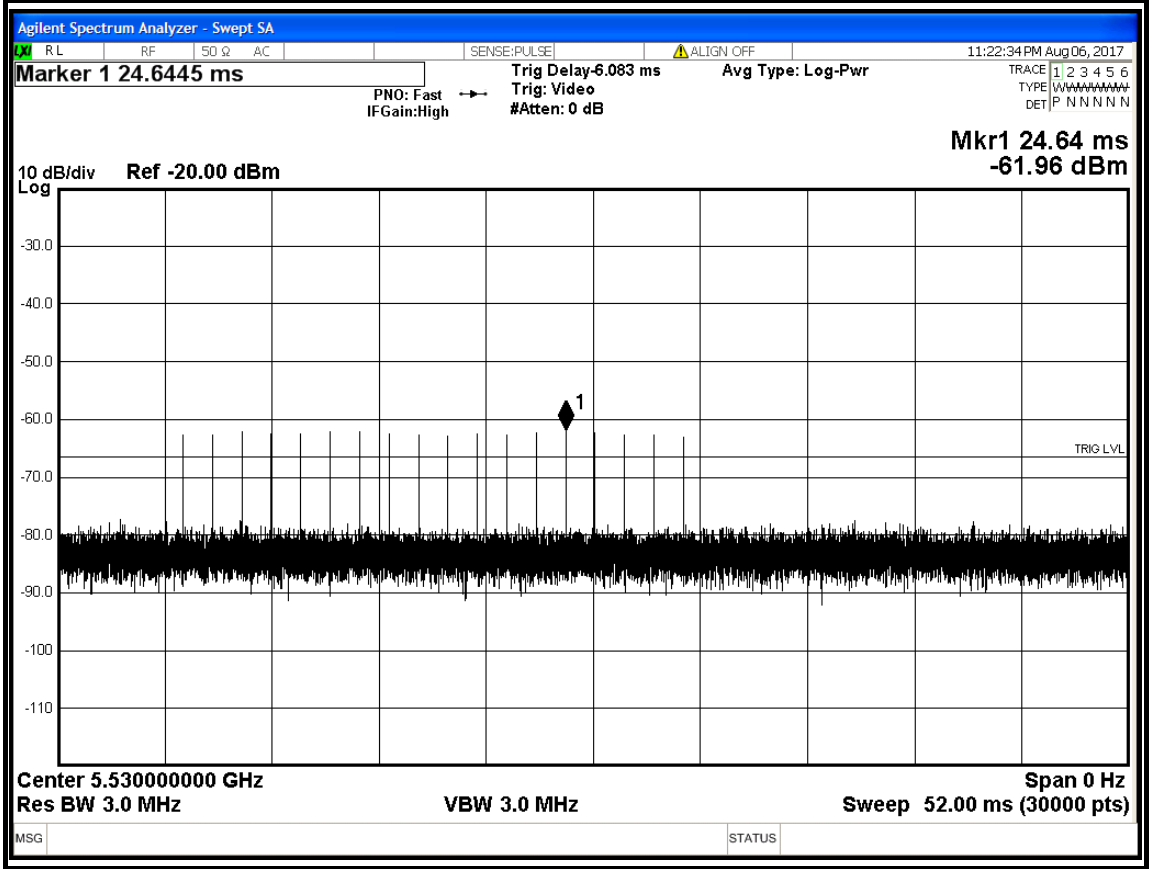
5530MHz

Sample of Short Pulse Radar Type 0



	Trial Id	Radar Type	Pulse Width (us)	PRI (us)	Number of Pulses	Waveform Length (us)
Download	0	Type 0	1.0	1428.0	18	25704.0
Download	1	Type 0	1.0	1428.0	18	25704.0
Download	2	Type 0	1.0	1428.0	18	25704.0
Download	3	Type 0	1.0	1428.0	18	25704.0
Download	4	Type 0	1.0	1428.0	18	25704.0
Download	5	Type 0	1.0	1428.0	18	25704.0
Download	6	Type 0	1.0	1428.0	18	25704.0
Download	7	Type 0	1.0	1428.0	18	25704.0
Download	8	Type 0	1.0	1428.0	18	25704.0
Download	9	Type 0	1.0	1428.0	18	25704.0
Download	10	Type 0	1.0	1428.0	18	25704.0
Download	11	Type 0	1.0	1428.0	18	25704.0
Download	12	Type 0	1.0	1428.0	18	25704.0
Download	13	Type 0	1.0	1428.0	18	25704.0
Download	14	Type 0	1.0	1428.0	18	25704.0
Download	15	Type 0	1.0	1428.0	18	25704.0
Download	16	Type 0	1.0	1428.0	18	25704.0
Download	17	Type 0	1.0	1428.0	18	25704.0
Download	18	Type 0	1.0	1428.0	18	25704.0
Download	19	Type 0	1.0	1428.0	18	25704.0
Download	20	Type 0	1.0	1428.0	18	25704.0
Download	21	Type 0	1.0	1428.0	18	25704.0
Download	22	Type 0	1.0	1428.0	18	25704.0
Download	23	Type 0	1.0	1428.0	18	25704.0
Download	24	Type 0	1.0	1428.0	18	25704.0
Download	25	Type 0	1.0	1428.0	18	25704.0
Download	26	Type 0	1.0	1428.0	18	25704.0
Download	27	Type 0	1.0	1428.0	18	25704.0
Download	28	Type 0	1.0	1428.0	18	25704.0
Download	29	Type 0	1.0	1428.0	18	25704.0

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TEST CHANNEL AND METHOD

All tests were performed at a channel center frequency of 5290 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. Thisdelta 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).

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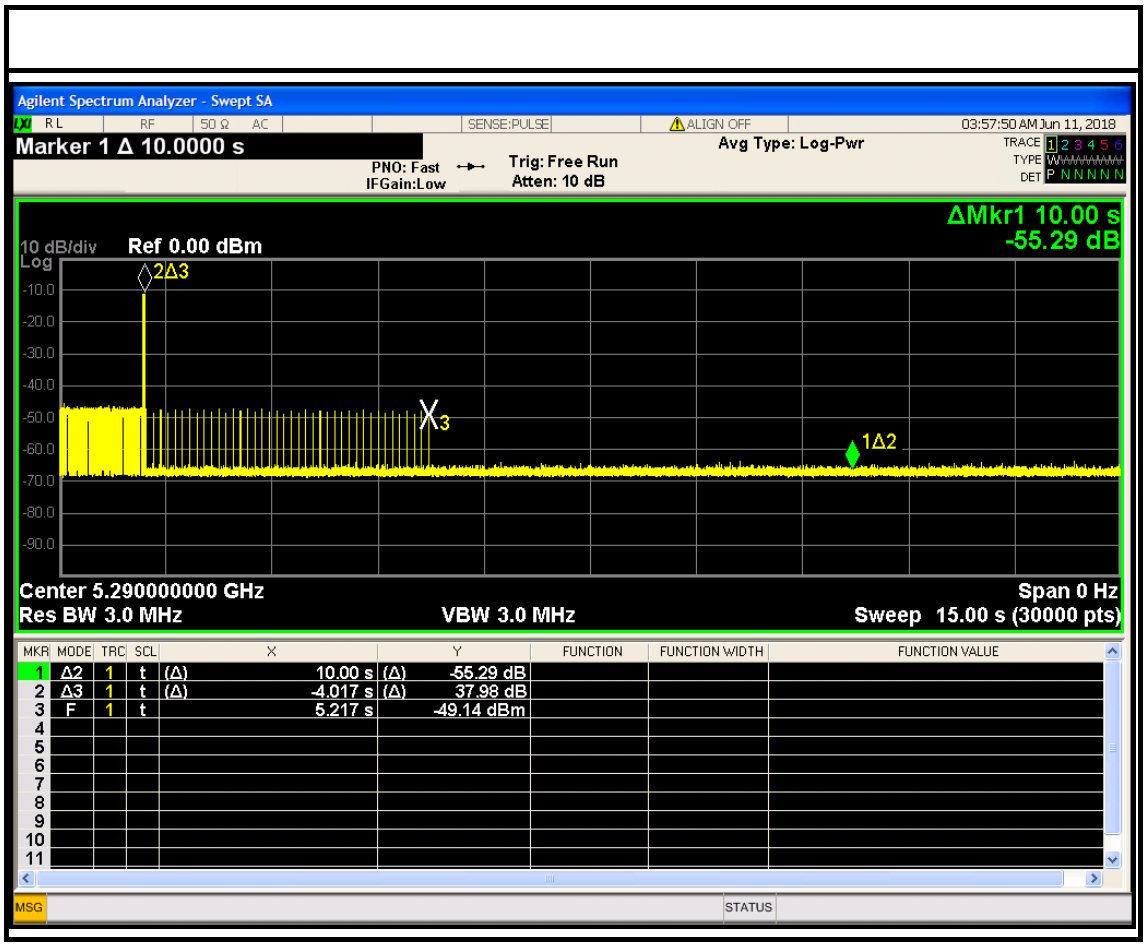
TEST RESULTS

Bandwidth 80 MHz Mode

Type 0 Channel Move Time Results

No non-compliance noted.

Channel Move Time (s)	Limit (s)
4.017	10



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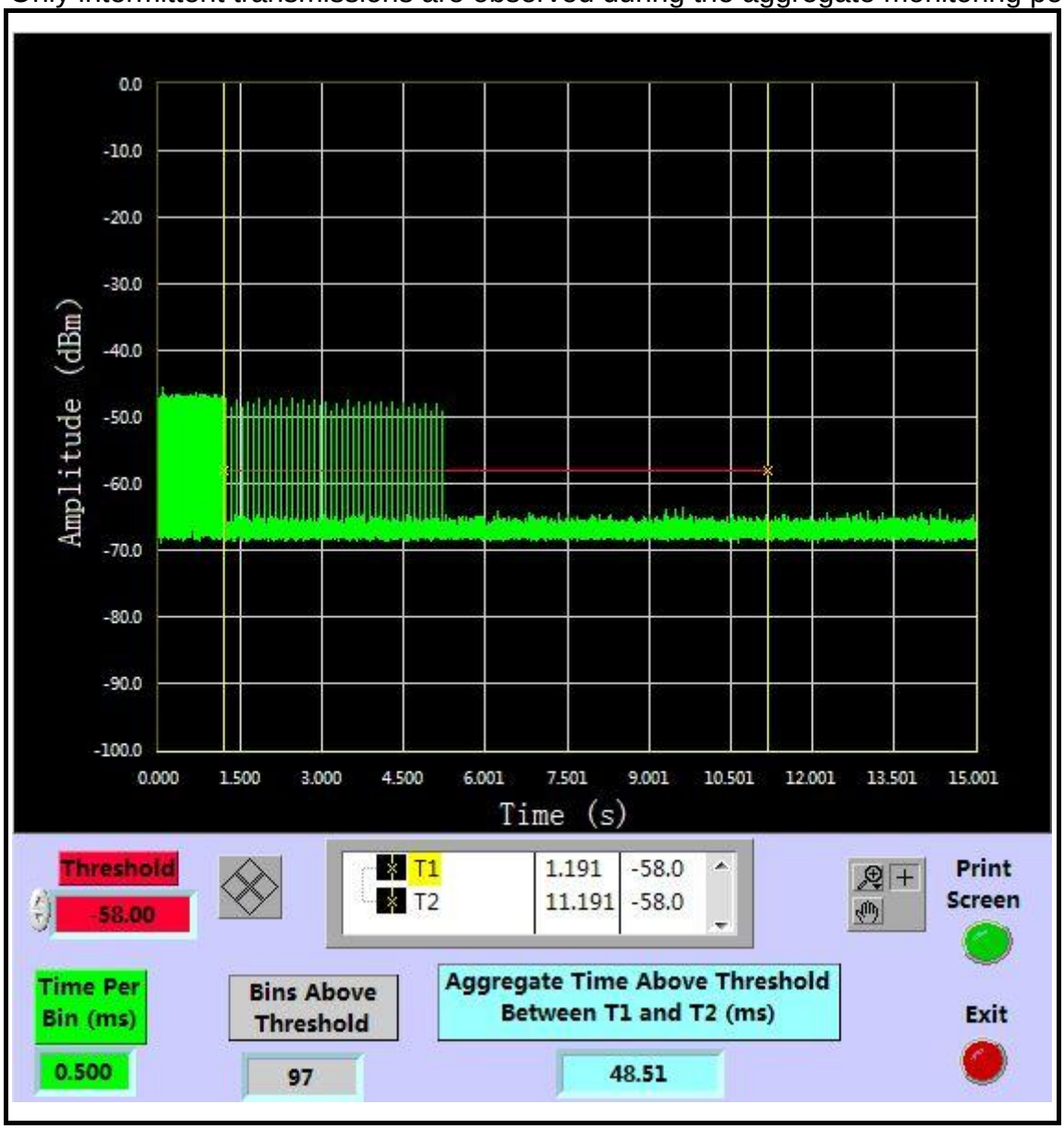
Bandwidth 80 MHz Mode

Type 0 Channel Closing Transmission Time Results

No non-compliance noted.

Transmission After 200(ms)	Aggregate Transmission Time (ms)	Limit for Aggregate Transmission Time After 200 (ms)	Result
Yes	37.00	60	Pass

Only intermittent transmissions are observed during the aggregate monitoring period.



NOTE: Type 0 Radar signal trigger at T1, channel stop data transmission and move.

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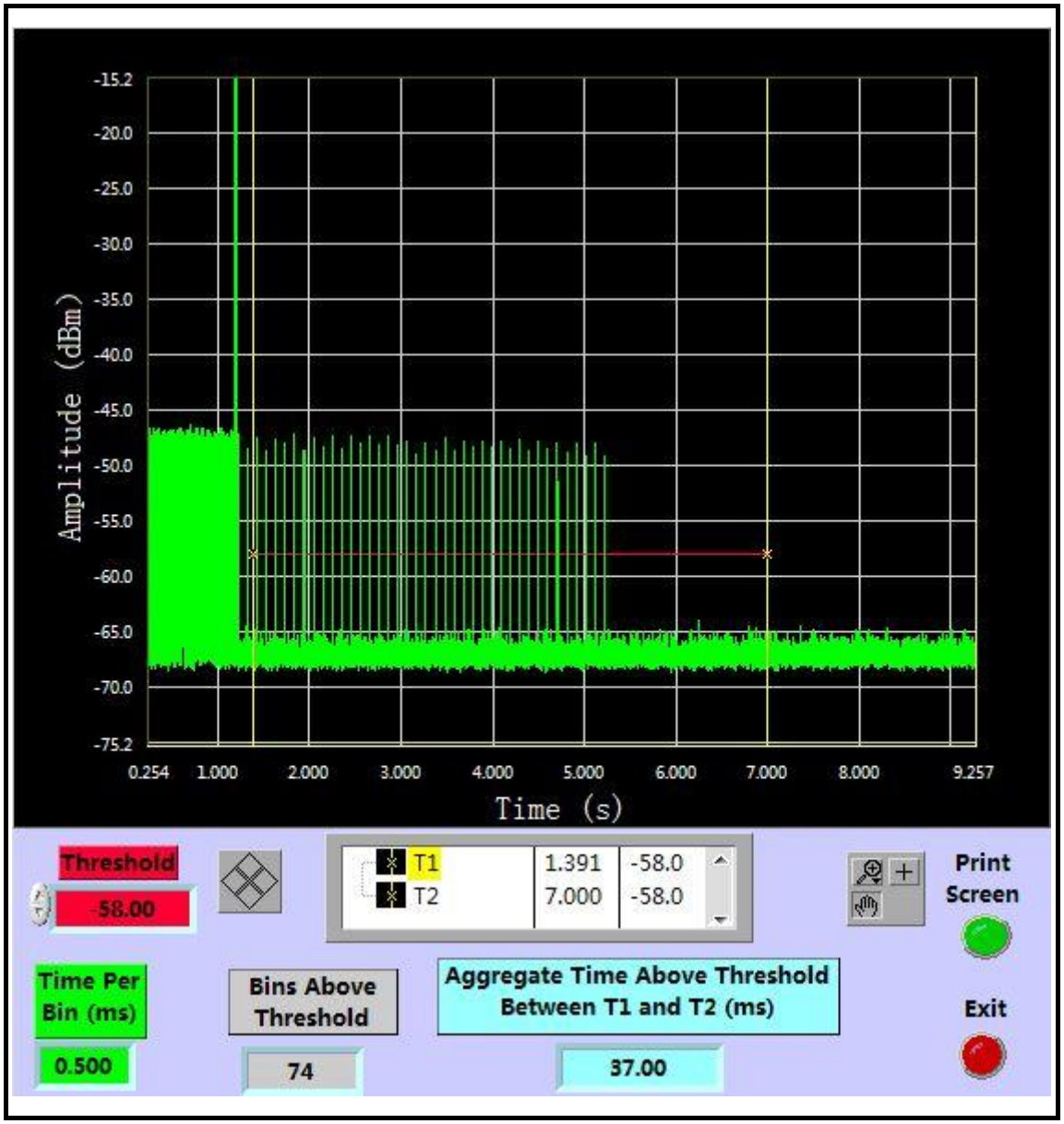

NOTE: Result time begin at T1 which was 60MS behind the radar signal trigger time.

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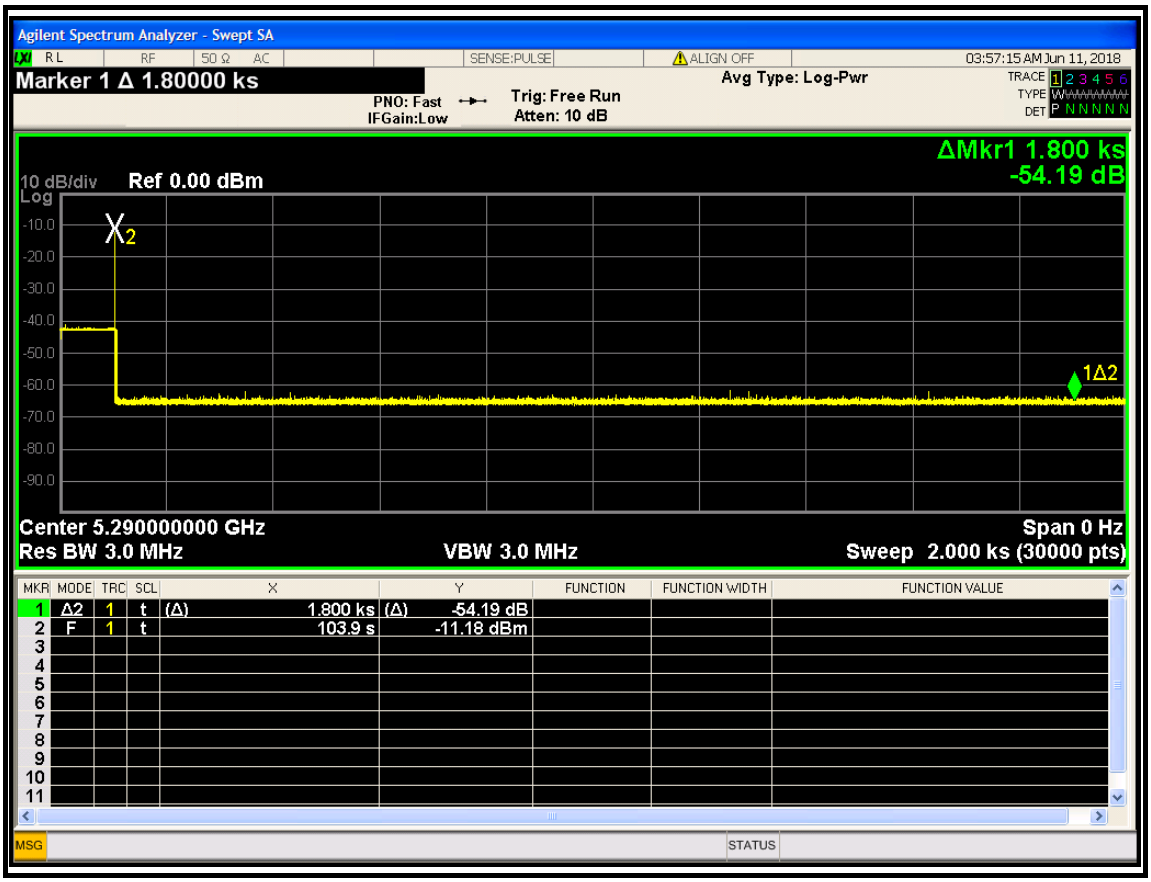
NON-OCCUPANCY PERIOD

LOW BAND RESULTS / BANDWIDTH 80 MHZ MODE

Type 0 Non-Occupancy Period Test Results

No non-compliance noted.
No EUT transmissions were observed on the test channel during the 30 minute observation time.



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TEST CHANNEL AND METHOD

All tests were performed at a channel center frequency of 5530 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. Thisdelta 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).

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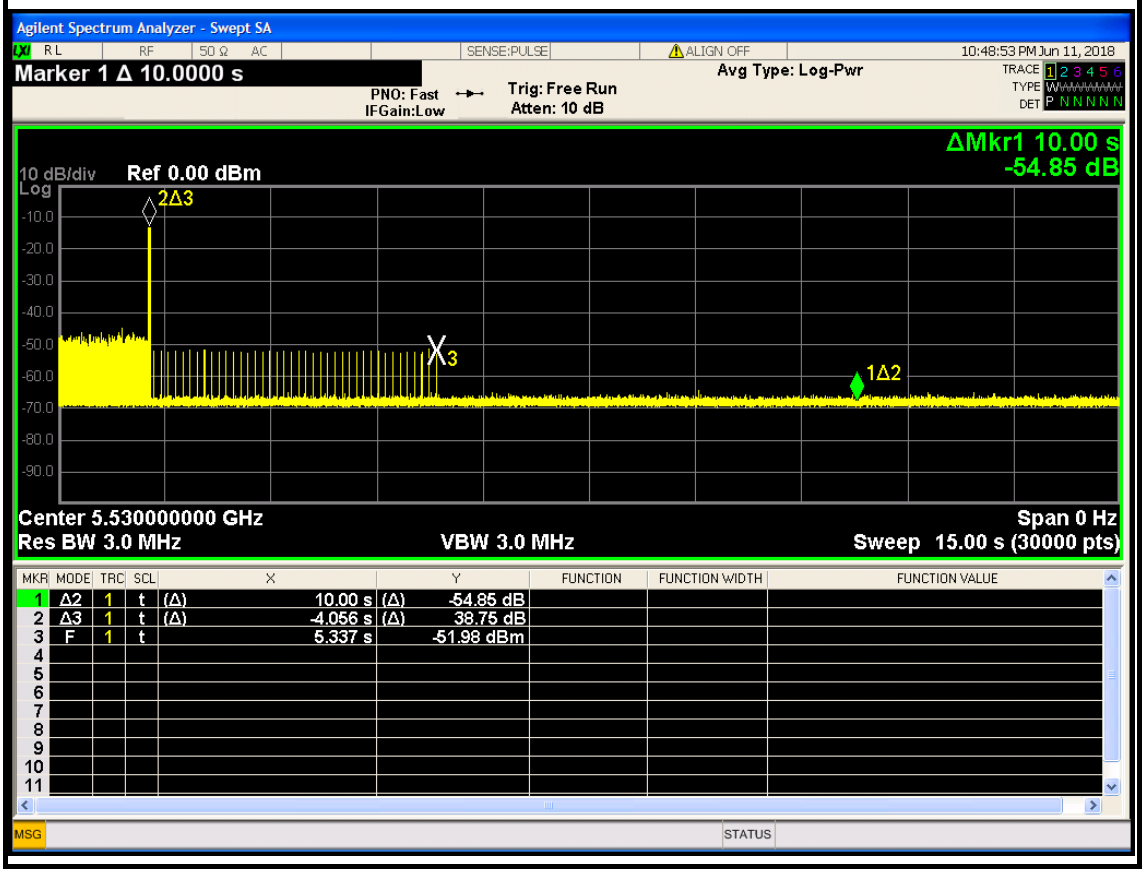
TEST RESULTS

Bandwidth 80 MHz Mode

Type 0 Channel Move Time Results

No non-compliance noted.

Channel Move Time (s)	Limit (s)
4.056	10



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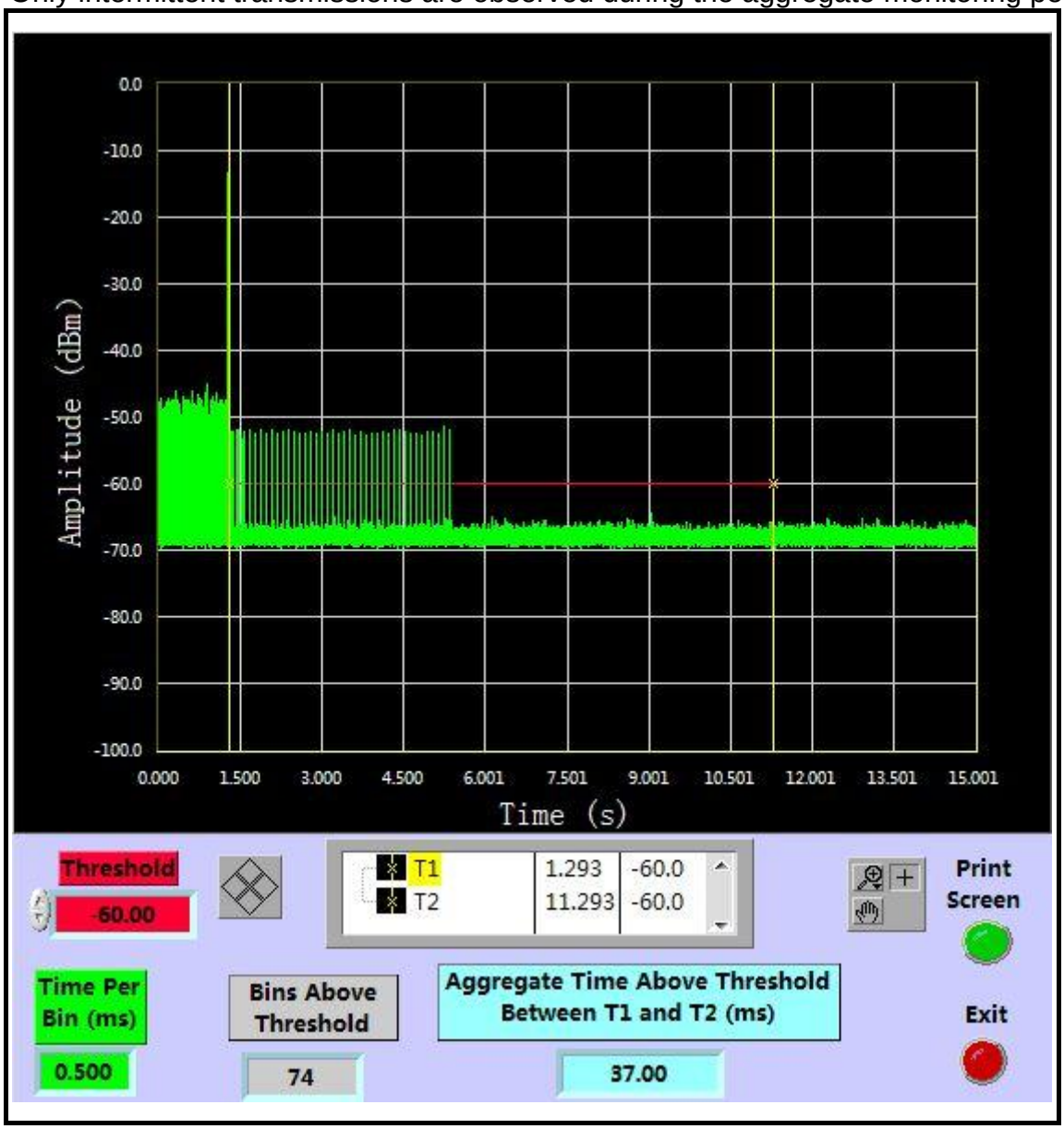
Bandwidth 80 MHz Mode

Type 0 Channel Closing Transmission Time Results

No non-compliance noted.

Transmission After 200(ms)	Aggregate Transmission Time (ms)	Limit for Aggregate Transmission Time After 200 (ms)	Result
Yes	35.50	60	Pass

Only intermittent transmissions are observed during the aggregate monitoring period.



NOTE: Type 0 Radar signal trigger at T1, channel stop data transmission and move.

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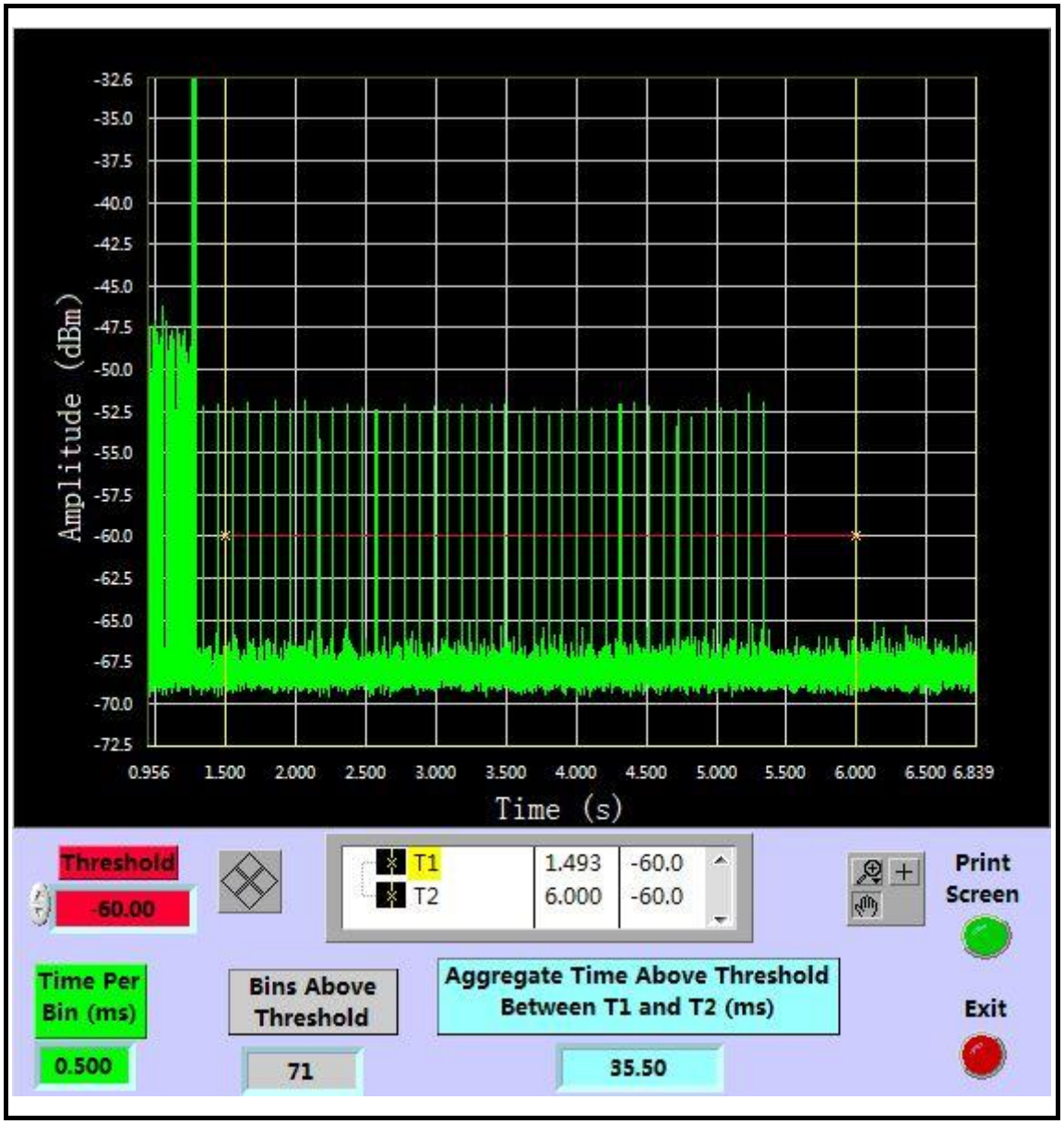

NOTE: Result time begin at T1 which was 60MS behind the radar signal trigger time.

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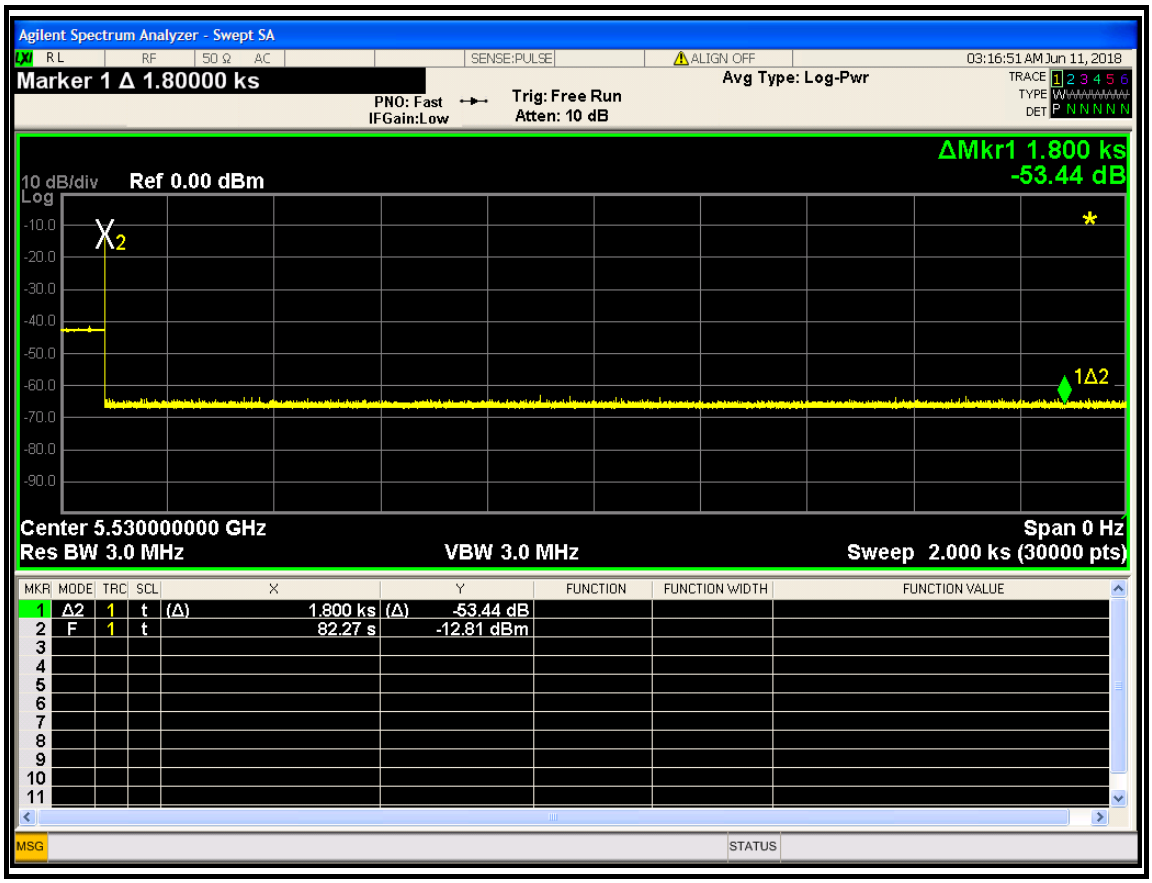
NON-OCCUPANCY PERIOD

LOW BAND RESULTS / BANDWIDTH 80 MHZ MODE

Type 0 Non-Occupancy Period Test Results

No non-compliance noted.

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



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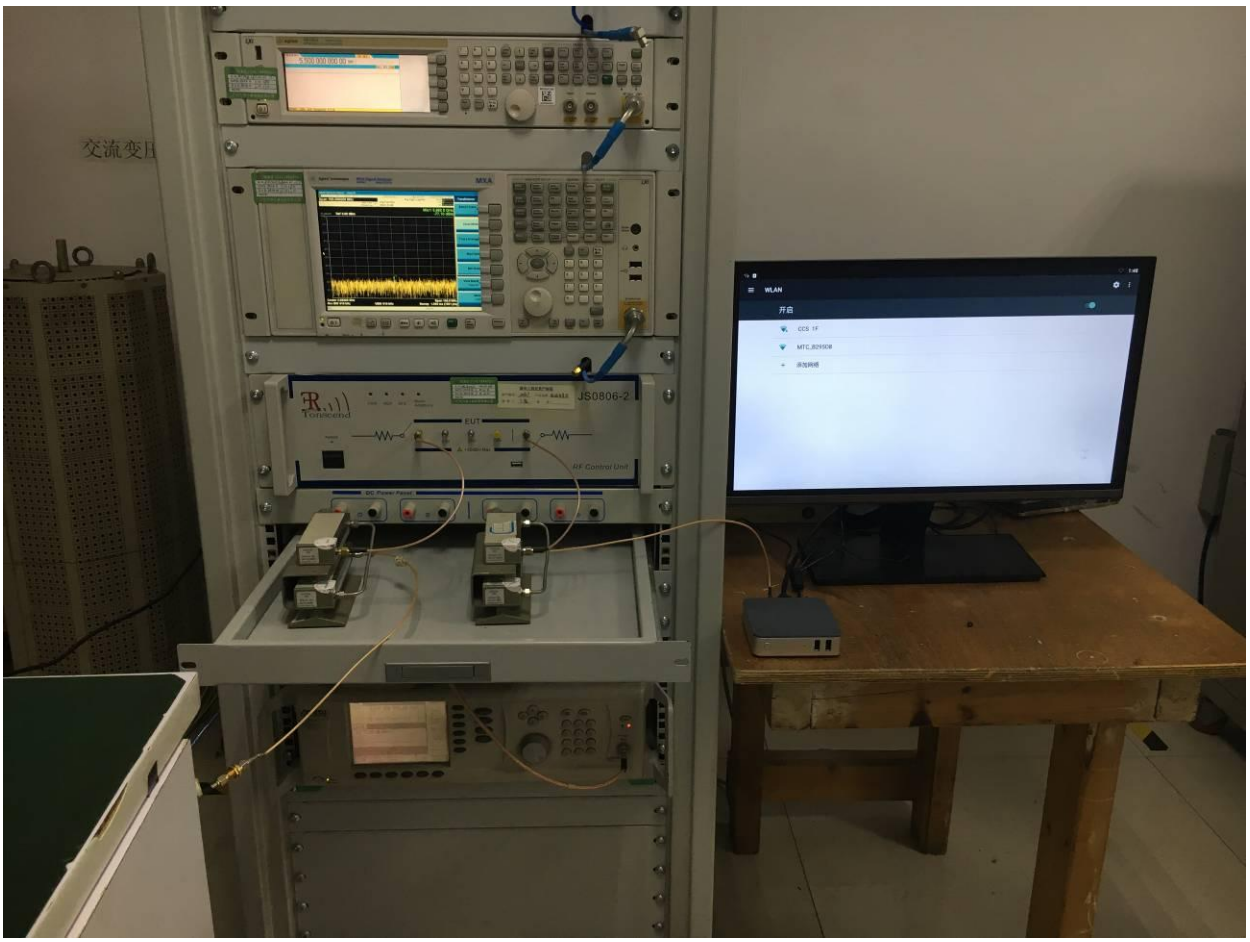
APPENDIX I PHOTOGRAPHS OF TEST SETUP



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