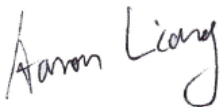
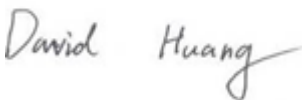



RF TEST REPORT



Report No.: 18070364-FCC-R

Supersede Report No.: N/A

| | | |
|--|---|---|
| Applicant | i.safe MOBILE GmbH | |
| Product Name | Head Mounted Tablet | |
| Model No. | T1100S | |
| Serial No. | N/A | |
| Test Standard | FCC Part 15.407: 2017, ANSI C63.10: 2013 | |
| Test Date | March 18 to April 09, 2018 | |
| Issue Date | April 10, 2018 | |
| Test Result | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail | |
| Equipment complied with the specification <input checked="" type="checkbox"/> | | |
| Equipment did not comply with the specification <input type="checkbox"/> | | |
|  |  |  |
| Aaron Liang Test Engineer | David Huang Checked By | |
| This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only | | |

Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

Zone A, Floor 1, Building 2 Wan Ye Long Technology Park

South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108

Phone: +86 0755 2601 4629801 Email: China@siemic.com.cn

Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.



In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

| Country/Region | Scope |
|----------------|------------------------------------|
| USA | EMC, RF/Wireless, SAR, Telecom |
| Canada | EMC, RF/Wireless, SAR, Telecom |
| Taiwan | EMC, RF, Telecom, SAR, Safety |
| Hong Kong | RF/Wireless, SAR, Telecom |
| Australia | EMC, RF, Telecom, SAR, Safety |
| Korea | EMI, EMS, RF, SAR, Telecom, Safety |
| Japan | EMI, RF/Wireless, SAR, Telecom |
| Singapore | EMC, RF, SAR, Telecom |
| Europe | EMC, RF, SAR, Telecom, Safety |

| | |
|-----------------|----------------|
| Test Report No. | 18070364-FCC-R |
| Page | 3 of 23 |

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1. Report Revision History

| Report No. | Report Version | Description | Issue Date |
|----------------|----------------|-------------|----------------|
| 18070364-FCC-R | NONE | Original | April 10, 2018 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

2. Customer information

| | |
|------------------|--|
| Applicant Name | i.safe MOBILE GmbH |
| Applicant Add | i_Park Tauberfranken 10 97922 Lauda-Koenigshofen, Germany |
| Manufacturer | i.safe MOBILE GmbH |
| Manufacturer Add | i_Park Tauberfranken 10 97922 Lauda-Koenigshofen, Germany |

3. Test site information

Test Lab:

| | |
|----------------------|--|
| Lab performing tests | SIEMIC (Shenzhen-China) LABORATORIES |
| Lab Address | Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108 |
| FCC Test Site No. | 535293 |
| IC Test Site No. | 4842E-1 |
| Test Software | Radiated Emission Program-To Shenzhen v2.0 |

4. Equipment under Test (EUT) Information

| | |
|-------------------------------|---|
| Description of EUT: | Head Mounted Tablet |
| Main Model: | T1100S |
| Serial Model: | N/A |
| Date EUT received: | March 17, 2018 |
| Test Date(s): | March 18 to April 09, 2018 |
| Equipment Category : | NII |
| Antenna Gain: | 5180 ~ 5240MHz: 1.8dBi Gain 5260 ~ 5320MHz: 1.8dBi Gain 5500 ~ 5700MHz: 1.8dBi Gain 5745 ~ 5825MHz: 1.8dBi Gain |
| Modulation Technology: | OFDM |
| Modulation Type: | OFDM: 64QAM, 16QAM, QPSK, BPSK |
| Number of Channels: | 5180 ~ 5240MHz: 4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz), 1 channel for 802.11ac 80MHz 5260 ~ 5320MHz: 4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz), 1 channel for 802.11ac 80MHz 5500 ~ 5700MHz: 11 for 802.11a, 802.11n (20MHz) 5 for 802.11n (40MHz), 2 channel for 802.11ac 80MHz 5745 ~ 5825MHz: 5 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz), 1 channel for 802.11ac 80MHz |
| RF Operating Frequency (ies): | 5180 ~ 5240MHz, 5260 ~ 5320MHz 5500 ~ 5700MHz, 5745 ~ 5825MHz |
| Port: | Pls refer to user' s manual |

| | |
|-----------------|----------------|
| Test Report No. | 18070364-FCC-R |
| Page | 7 of 23 |

Trade Name : i.safe MOBILE

FCC ID: 2AACZ1100S00AA

5. Test Summary

The product was tested in accordance with the following specifications.

All testing has been performed according to below product classification:

| Test Item | Test standard | Test Method/Procedure | Result |
|---|-----------------|---|--------|
| UNII Detection Bandwidth | 47CFR15.407 (h) | 905462 D02 UNII DFS Compliance Procedures New Rules v02 | N/A |
| Initial Channel Availability Check Time | 47CFR15.407 (h) | 905462 D02 UNII DFS Compliance Procedures New Rules v02 | N/A |
| Radar Burst at the Beginning of the Channel Availability Check Time | 47CFR15.407 (h) | 905462 D02 UNII DFS Compliance Procedures New Rules v02 | N/A |
| Radar Burst at the End of the Channel Availability Check Time | 47CFR15.407 (h) | 905462 D02 UNII DFS Compliance Procedures New Rules v02 | N/A |
| In-Service Monitoring - Channel Move Time | 47CFR15.407 (h) | 905462 D02 UNII DFS Compliance Procedures New Rules v02 | Pass |
| In-Service Monitoring - Channel Closing Transmission Time | 47CFR15.407 (h) | 905462 D02 UNII DFS Compliance Procedures New Rules v02 | Pass |
| In-Service Monitoring - Non-Occupancy Period | 47CFR15.407 (h) | 905462 D02 UNII DFS Compliance Procedures New Rules v02 | N/A |
| Statistical Performance Check | 47CFR15.407 (h) | 905462 D02 UNII DFS Compliance Procedures New Rules v02 | N/A |

Measurement Uncertainty

| Emissions | | |
|---|---|-------------|
| Test Item | Description | Uncertainty |
| Dynamic frequency selection (DFS) Conducted Measurement | Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 | ±1.5dB |

Note1:

Operating frequency bands and mode of EUT

| Operational Mode | Operating Frequency Range | |
|--|---------------------------|--------------|
| | 5250~5350MHz | 5470~5725MHz |
| Client without radar detection and ad hoc function | V | V |

Note: The EUT has disabled the 5600-5650MHz band

6. Measurements, Examination And Derived Results

6.1 Dynamic Frequency Selection (DFS)

6.1.1 General introduction

Interference Threshold values, Master or Client incorporating In-Service Monitoring

| Maximum Transmit Power | Value (see note) |
|---|------------------|
| ≥ 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 spectra 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.

DFS Response requirement values

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

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

Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required facilitating 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.

Radar Test Waveforms

This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms

1. Short Pulse Radar Test Waveforms

| Radar Type | Pulse Width (μsec) | PRI (μsec) | Number of Pulses | Minimum Percentage of Successful Detection | Minimum |
|--|--------------------|---|---|--|------------|
| 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 | Roundup { (1/360) * (19 106/PRI _{μsec}) } | 60% | 30 |
| | | 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. | | | | | |

2. 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 Trials |
|------------|--------------------|-------------------|------------|----------------------------|------------------|--|----------------|
| 5 | 50-100 | 5-20 | 1000-2000 | 1-3 | 8-20 | 80% | 30 |

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for the Long Pulse radar test signal. If more than 30 waveforms are used for the Long Pulse radar test signal, then each additional waveform must also be unique and not repeated from the previous waveforms.

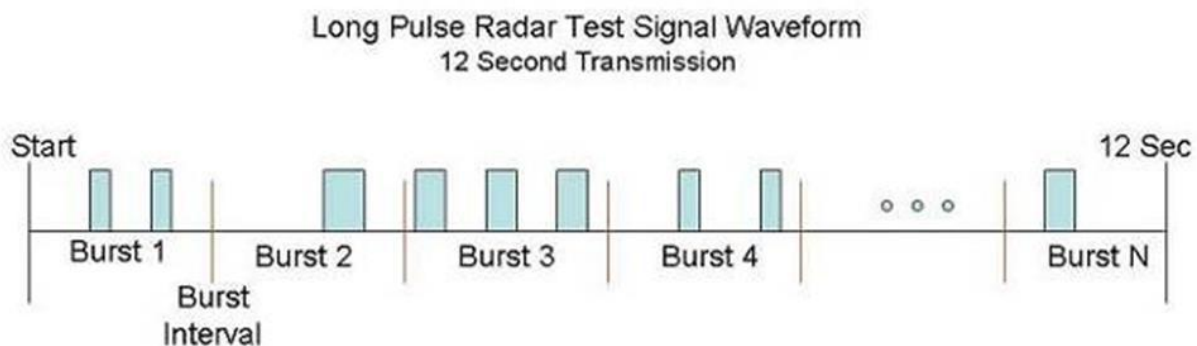
Each waveform is defined as follows:

- 1) The transmission period for the Long Pulse Radar test signal is 12 seconds.

- 2) There are a total of 8 to 20 Bursts in the 12 second period, with the number of Bursts being randomly chosen. This number is Burst_Count.
- 3) Each Burst consists of 1 to 3 pulses, with the number of pulses being randomly chosen. Each Burst within the 12 second sequence may have a different number of pulses.
- 4) The pulse width is between 50 and 100 microseconds, with the pulse width being randomly chosen. Each pulse within a Burst will have the same pulse width. Pulses in different Bursts may have different pulse widths.
- 5) Each pulse has a linear FM chirp between 5 and 20 MHz, with the chirp width being randomly chosen. Each pulse within a Burst will have the same chirp width. Pulses in different Bursts may have different chirp widths. The chirp is centered on the pulse. For example, with a radar frequency of 5300 MHz and a 20 MHz chirped signal, the chirp starts at 5290 MHz and ends at 5310 MHz.
- 6) If more than one pulse is present in a Burst, the time between the pulses will be between 1000 and 2000 microseconds, with the time being randomly chosen. If three pulses are present in a Burst, the time between the first and second pulses is chosen independently of the time between the second and third pulses.
- 7) The 12 second transmission period is divided into even intervals. The number of intervals is equal to Burst_Count. Each interval is of length $(12,000,000 / \text{Burst_Count})$ microseconds. Each interval contains one Burst. The start time for the Burst, relative to the beginning of the interval, is between 1 and $[(12,000,000 / \text{Burst_Count}) - (\text{Total Burst Length}) + (\text{One Random PRI Interval})]$ microseconds, with the start time being randomly chosen. The step interval for the start time is 1 microsecond. The start time for each Burst is chosen independently.

A representative example of a Long Pulse radar test waveform:

- 1) The total test signal length is 12 seconds.
- 2) 8 Bursts are randomly generated for the Burst Count.
- 3) Burst 1 has 2 randomly generated pulses.
- 4) The pulse width (for both pulses) is randomly selected to be 75 microseconds.
- 5) The PRI is randomly selected to be at 1213 microseconds.
- 6) Bursts 2 through 8 are generated using steps 3 – 5.
- 7) Each Burst is contained in even intervals of 1,500,000 microseconds. The starting location for Pulse 1, Burst 1 is randomly generated (1 to 1,500,000 minus the total Burst 1 length + 1 random PRI interval) at the 325,001 microsecond step. Bursts 2 through 8 randomly fall in successive 1,500,000 microsecond intervals (i.e. Burst 2 falls in the 1,500,001 – 3,000,000 microsecond range)



3. Frequency Hopping Radar Type

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

For the Frequency Hopping Radar Type, the same Burst parameters are used for each waveform. The hopping sequence is different for each waveform and a 100-length segment is selected 1 from the hopping sequence defined by the following algorithm:

The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250 – 5724 MHz. Next, the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.

6.1.2 Radar Waveform Calibration

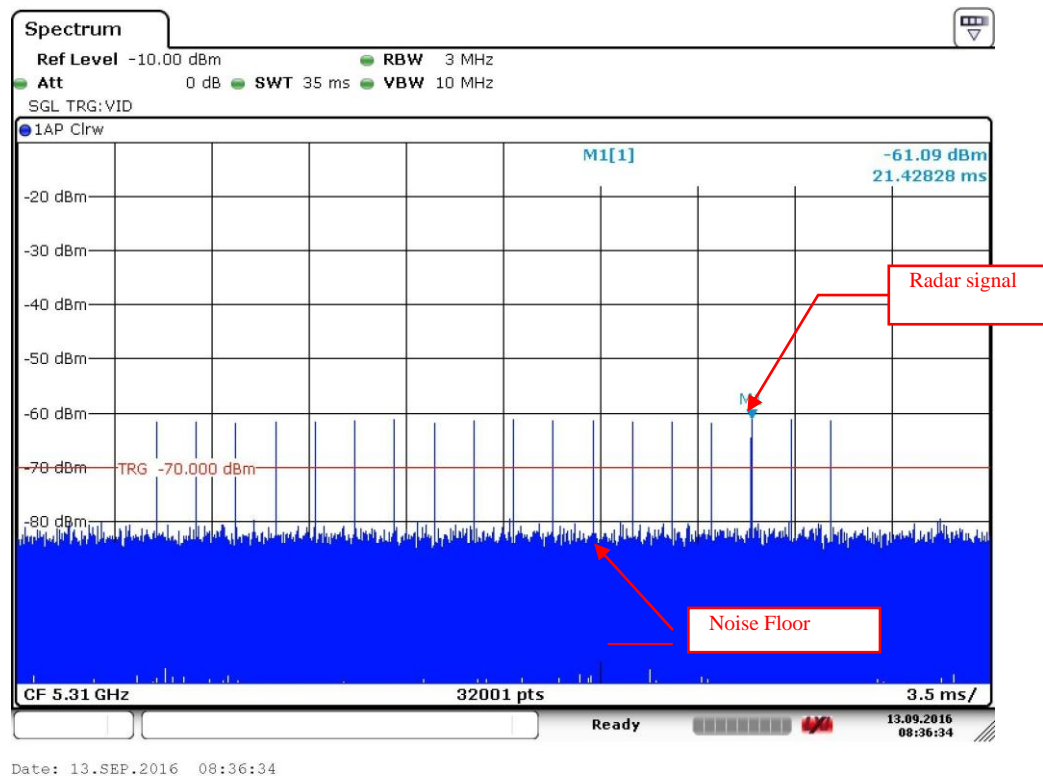
The following equipment setup was used to calibrate the conducted Radar Waveform. A spectrum analyzer was used to establish the test signal level for each radar type. During this process there were no transmissions by either the Master or Client Device. The spectrum analyzer was switched to the zero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

For a detection threshold level of -62dBm and the Master antenna gain is -0.98 dBi for the band 5250-5350MHz, and -0.26 dBi for the band 5470-5725MHz., required detection threshold is -62.98dBi for the band 5250-5350MHz, and -62.26 dBi for the band 5470-5725MHz.

Note: Maximum Transmit Power is less than 200 milliwatt in this report, so detection threshold level is -62dBm

The device transmits one type of radar as specified in the DFS Order.

The Required detection threshold is $-61\text{dBm} = -62 + 1\text{dBi}$. The conducted radar burst level is set to -61.0dBm .



Radar Signal (Type 0)

6.1 In-Service Monitoring for Channel Move Time , Channel Closing Transmission Time

These tests define how the following DFS parameters are verified during In-Service Monitoring; Channel Closing Transmission Time, Channel Move Time, and Non-Occupancy Period.

The steps below define the procedure to determine the above mentioned parameters when a radar Burst with a level equal to the DFS Detection Threshold + 1dB is generated on the Operating Channel of the U-NII device.

the UUT (Client) operating as a Client Device will associate with master at Mid Channel. Stream the MPEG test file from the Master Device to the Client Device on the selected Channel for the entire period of the test. At time T0 the Radar Waveform generator sends a Burst of pulses for each of the radar types at -62dBm. Observe the transmissions of the UUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds. Measure and record the transmissions from the UUT during the observation time (Channel Move Time). Compare the Channel Move Time and Channel Closing Transmission Time results to the limits defined in the DFS Response requirement values table.

Table 4: DFS Response Requirement Values

| Parameter | Value |
|--|---|
| <i>Non-occupancy period</i> | Minimum 30 minutes |
| <i>Channel Availability Check Time</i> | 60 seconds |
| <i>Channel Move Time</i> | 10 seconds See Note 1. |
| <i>Channel Closing Transmission Time</i> | 200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2. |
| <i>U-NII Detection Bandwidth</i> | 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.

Channel Closing Transmission Time- Measurement

A type 1 waveform was introduced to the EUT and the Spectrum Analyzer sweep time was set to 1s for monitoring and capturing the plot. A LabView program was created to collect trace data and capturing the plot. The program will calculate the channel closing time base on the spectrum analyzer result. The result will be calculated based on FCC procedure.

$$C = N \cdot D_{\text{well}}$$

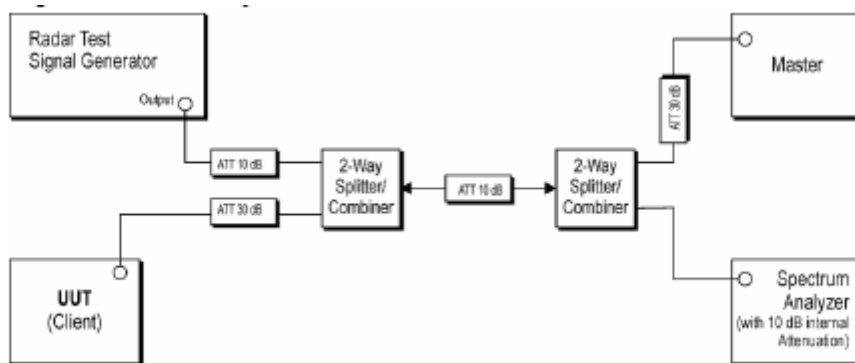
C is the closing time, N is the number of spectrum analyzer sampling bins showing a U-NII transmission and dwell is the dwell time per bin.

$$\text{Dwell} = S/B$$

Where Dwell is the dwell time per spectrum analyzer sampling bin, S is the sweep time and B is the number of spectrum analyzer sampling bins.

10.1.4 DFS Test Setup

Test Setup Block Diagram



The radio was set at the center channel frequency of tested Channel.

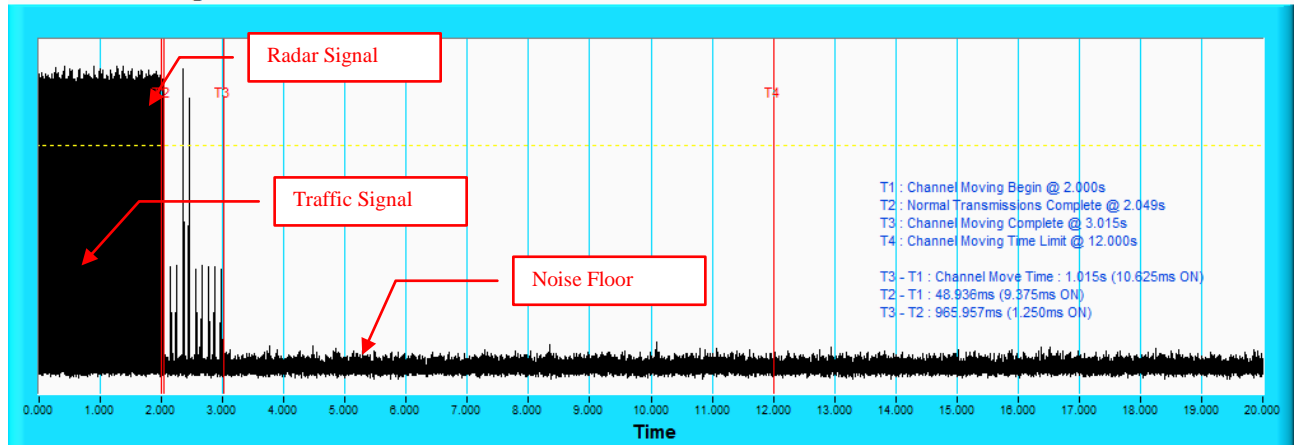
A FCC approved mater device – (FCC ID: Q87-WBV-AP230) AP was used to link with the UUT (Client) device.

For the frequency bands 5250MHz to 5725MHz the master device provides, on aggregate, uniform loading of the spectrum across all devices by selecting an operating channel among the available channels using a random algorithm.

Channel Closing Transmission and Channel Move Time

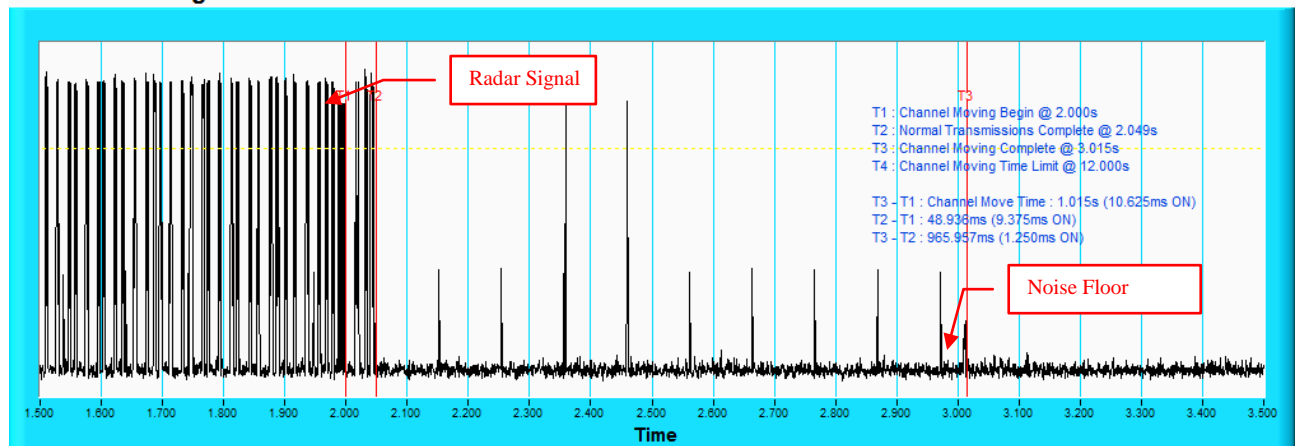
ac (80 MHz) 5290MHz

Channel Closing Transmission Time & Channel Move Time



NOTE: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T4 denotes the 10 second from T1 to observe the aggregate duration of transmissions.

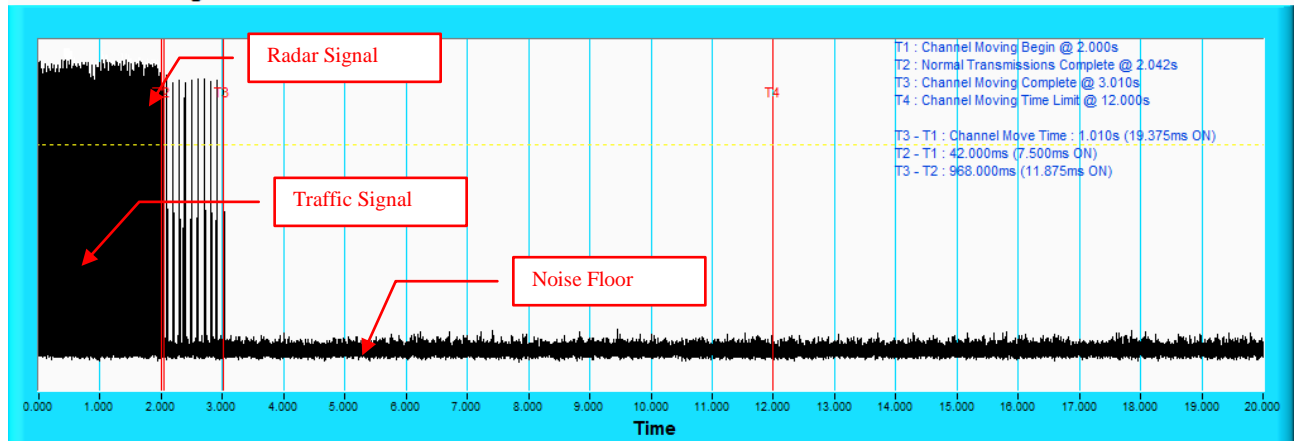
Channel Closing Transmission Time & Channel Move Time



NOTE: An expanded plot for the device vacates the channel in the required 500ms.

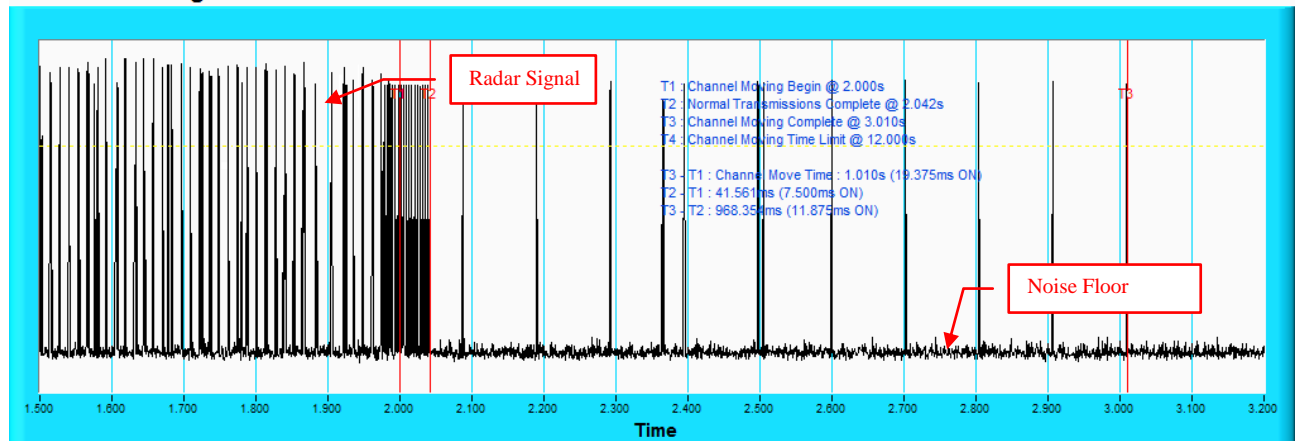
ac (80 MHz) 5530MHz

Channel Closing Transmission Time & Channel Move Time



NOTE: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T4 denotes the 10 second from T1 to observe the aggregate duration of transmissions.

Channel Closing Transmission Time & Channel Move Time



NOTE: An expanded plot for the device vacates the channel in the required 500ms.

Annex A. TEST INSTRUMENT

| Instrument | Model | Serial # | Cal Date | Cal Due | In use |
|----------------------------------|------------|------------|------------|------------|-------------------------------------|
| Radiated DFS Measurement | | | | | |
| Keysight Signal Analyzer | N9020A | MY49100060 | 11/14/2017 | 11/13/2018 | <input checked="" type="checkbox"/> |
| Splitter/Combiner (Mini-Circuit) | PD-2/8-2S | XA022154 | 11/14/2017 | 11/13/2018 | <input checked="" type="checkbox"/> |
| Splitter/Combiner (Mini-Circuit) | PD-2/8-2S | XA022155 | 11/14/2017 | 11/13/2018 | <input checked="" type="checkbox"/> |
| Splitter/Combiner (Mini-Circuit) | PD-2/8-2S | XA022159 | 11/14/2017 | 11/13/2018 | <input checked="" type="checkbox"/> |
| Agilent Signal Generator | MXG N5182A | MY50140530 | 11/16/2017 | 11/15/2018 | <input checked="" type="checkbox"/> |

Annex C. i. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

Supporting Equipment:

| Manufacturer | Equipment Description | Model | Serial No |
|--------------|-----------------------|-------|-----------|
| Aerohive | Access point | AP230 | N/A |

Annex C.ii. EUT OPERATING CONDITIONS

The following is the description of how the EUT is exercised during testing.

| Test | Description Of Operation |
|-------------------|--|
| Emissions Testing | The EUT was continuously transmitting to stimulate the worst case. |

Annex D. User Manual / Block Diagram / Schematics / Partlist

See attachment

Annex E. DECLARATION OF SIMILARITY

N/A