APPLICATION CERTIFICATION FCC Part 15C&RSS-247
On Behalf of
Chuango Security Technology Corporation

UFO Panoramic WiFi HD Camera
Model No.: UFO, PT-180, PT-180H

FCC ID: RJY-UFO
IC: 20008-UFO

Prepared for	:	Chuango Security Technology Corporation.
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Report No.	:	ATE20170448
Date of Test	:	Apr. 01, 2017-May 14, 2017
Date of Report	:	May 15, 2017

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Test Report Certification

Applicant	:	Chuango Security Technology Corporation.
Address	:	Room 6-17, Overseas Students Pioneer Park, No.108, Jiangbin East Road, Economic & Technological Development Zone, Fuzhou 350015, China
Manufacturer	:	Chuango Security Technology Corporation
Address	:	Room 6-17, Overseas Students Pioneer Park, No.108, Jiangbin East Road, Economic & Technological Development Zone, Fuzhou 350015, China
Product	:	UFO Panoramic WiFi HD Camera
Model No.	:	UFO, PT-180, PT-180H
Trade name	:	smanos

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.407:2016
KDB 789033 D02 General UNII Test Procedures New Rules v01r04
KDB 905462 D02 UNII DFS Compliance Procedures NEW Rules v02
KDB 905462 D03 UNII Clients Without Radar Detection New Rules v01r02
RSS-247 Issue 2 February 2017

The device described above is tested by ACCURATE TECHNOLOGY CO. LTD to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.407 and RSS-247 limits. The measurement results are contained in this test report and ACCURATE TECHNOLOGY CO. LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO. LTD.

Date of Test : Apr. 01, 2017-May 14, 2017

Date of Report : May 15, 2017

Prepared by :

(Tim[illegible]g Engineer)

Approved & Authorized Signer :

(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1.Description of Device (EUT)

EUT	:	UFO Panoramic WiFi HD Camera
Model Number	:	UFO, PT-180, PT-180H Note: These three models are used only for FCC certification, Only model PT-180H is used for IC certification.
Frequency Range	:	5250-5350MHz, 5470-5725MHz
Operating Mode	:	Client Without Radar Detection
$G_{ANT\ MAX}$	:	2dBi
Type of Antenna	:	SISO antenna
Power Supply	:	DC 5V(Powered by Adapter)
Adapter information	:	Model: SA-US5V Input: AC 100-240V～60Hz 0.3A Output: DC 5.0V 1.0A
Modulation Type	:	BPSK/QPSK/16QAM/64QAM (OFDM)
TPC	:	Not Supported
RF power setting in TEST	:	Max power
EUT Hardware Version	:	F11AUUM13-W2
EUT Software Version	:	V41
Test Software Version	:	V41
Radio Software Version	:	V41
Radio Hardware Version	:	F11AUUM13-W2
Date of sample received	:	Apr. 01, 2017
Date of Test	:	Apr. 01, 2017-May 14, 2017

1.2.Description of Test Facility

EMC Lab	:	Accredited by TUV Rheinland Shenzhen Listed by FCC The Registration Number is 752051 Listed by Industry Canada The Registration Number is 5077A-2 Accredited by China National Accreditation Committee for Laboratories The Certificate Registration Number is L3193
Name of Firm	:	ACCURATE TECHNOLOGY CO. LTD
Site Location	:	F1, Bldg. A, Changyuan New Material Port, Keyuan Rd. Science & Industry Park, Nanshan, Shenzhen, Guangdong P.R. China

1.3.Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty (9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty (30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty (Above 1GHz)	=	4.06dB, k=2

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	Rohde & Schwarz	FSV-40	101495	Jan.07, 2017	1 Year
2.	Vector Signal Generator	Rohde & Schwarz	SMBV100A	260434	Jan.07, 2017	1 Year
3.	Signal Generator	Rohde & Schwarz	SMB100A	108362	Jan.07, 2017	1 Year
4.	Open Switch and Control Unit	Rohde & Schwarz	OSP120 + OSP-B157	101244 + 100866	Jan.07, 2017	1 Year

3. U-NII DFS RULE REQUIREMENTS

3.1.WORKING MODES AND REQUIRED TEST ITEMS

The manufacturer shall state whether the EUT is capable of operating as a Master and /or Client. If the EUT is capable of operating in more than one operating mode then each operating mode shall be tested separately. See tables 1 and 2 for the applicability of DFS requirements for each of the operational modes.

Applicability of DFS requirements prior to use a channel

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

Table 6: Applicability of DFS requirements during normal operation.

Requirement	Operational Mode		
	Master	Client without radar detection	Client with radar detection
DFS Detection Threshold	✓	Not required	✓
Channel Closing Transmission Time	✓	✓	✓
Channel Move Time	✓	✓	✓
U-NII Detection Bandwidth	✓	Not required	✓

3.2.Test limits and radar signal parameters

Detection threshold values

Table 7: DFS Detection Thresholds for Master Devices and Client Devices With Radar Detection.

Maximum Transmit Power	Value (See Notes 1 and 2)
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 spectraldensity requirement	-64 dBm

Table 8: 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% transmissionpower bandwidth. SeeNote 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.

Short Pulse Radar Test Waveforms

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	$\text{Roundup}\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot10^6}{\text{PRI}_{\mu\text{sec}}}\right)\right\}$	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.					

A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4. If more than 30 waveforms are used for Short Pulse Radar Types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. If more than 30 waveforms are used for Short Pulse Radar Type 1, then each additional waveform is generated with Test B and must also be unique and not repeated from the previous waveforms in Tests A or B.

For example if in Short Pulse Radar Type 1 Test B a PRI of 3066 μsec is selected, the number of pulses would be $\text{Roundup}\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot10^6}{3066}\right)\right\}$ = Round up {17.2} = 18.

Long Pulse Radar Test Waveform

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

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

Frequency Hopping Radar Test Waveform

Table 7 – Frequency Hopping Radar Test Waveform

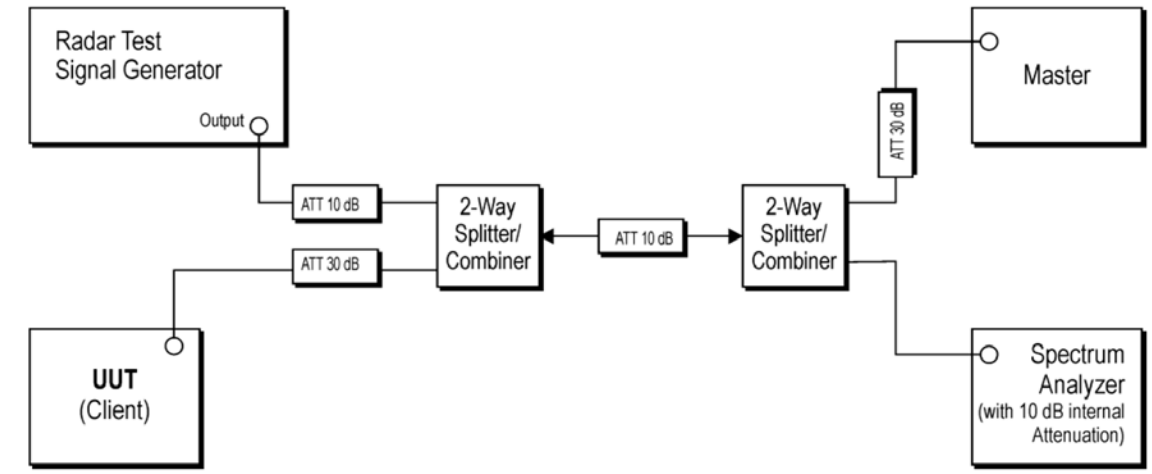
Radar Type	Pulse Width (μsec)	PRI (μsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

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 from the hopping sequence defined by the following algorithm: [4]

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.

3.3.Conducted test setup plot

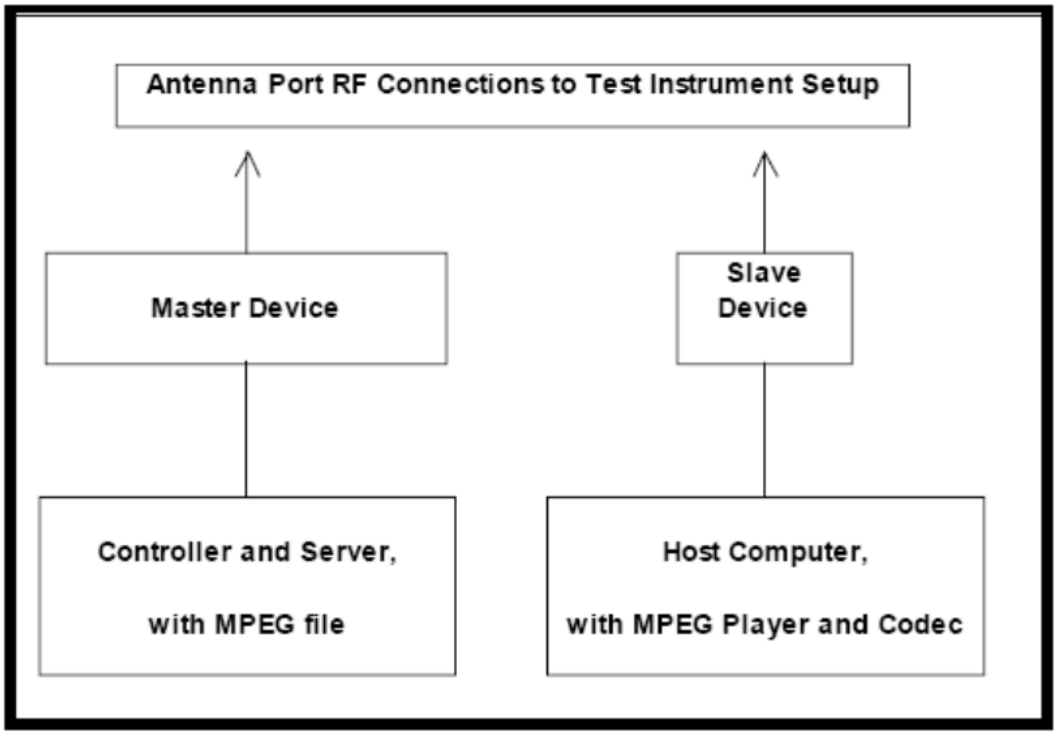
Setup for Client with injection at the Master



3.4.CALIBRATION OF DFS DETECTION THRESHOLD LEVEL

A 50 ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected in place of the master device and the signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of –62 dBm as measured on the spectrum analyzer.

Without changing any of the instrument settings, the spectrum analyer is reconnected to the Common port of the Spectrum Analyzer Combiner/Divider. Measure the amplitude and calculate the difference from –62 dBm. Adjust the Reference Level Offset of the spectrum analyzer to this difference.
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.



4. TEST RESULTS

4.1.SUMMARY OF TEST RESULT

Clause	Test Parameter	Remarks	Pass/Fail
FCC 15.407&RSS-247	DFS Detection Threshold	Not Applicable	N/A
FCC 15.407&RSS-247	Channel Availability Check Time	Not Applicable	N/A
FCC 15.407&RSS-247	Channel Move Time	Applicable	PASS
FCC 15.407&RSS-247	Channel Closing Transmission Time	Applicable	PASS
FCC 15.407&RSS-247	Non-Occupancy Period	Applicable	PASS
FCC 15.407&RSS-247	Uniform Spreading	Not Applicable	N/A
FCC 15.407&RSS-247	U-NII Detection Bandwidth	Not Applicable	N/A

4.2.TEST MODE: DEVICE OPERATING IN MASTER MODE.

The EUT is Slave equipment, it need a master device when testing.
Master with injection at the Master. (Radar Test Waveforms are injected into the Master)

Master information:
Name: NEC router(AtermWF1200HP)
Model: PA-WF1200HP

You can control the connection between the EUT and the master through the mobile phone's APP or PC's program .
We can transfer different rate data between the EUT and the master through the iperf program.

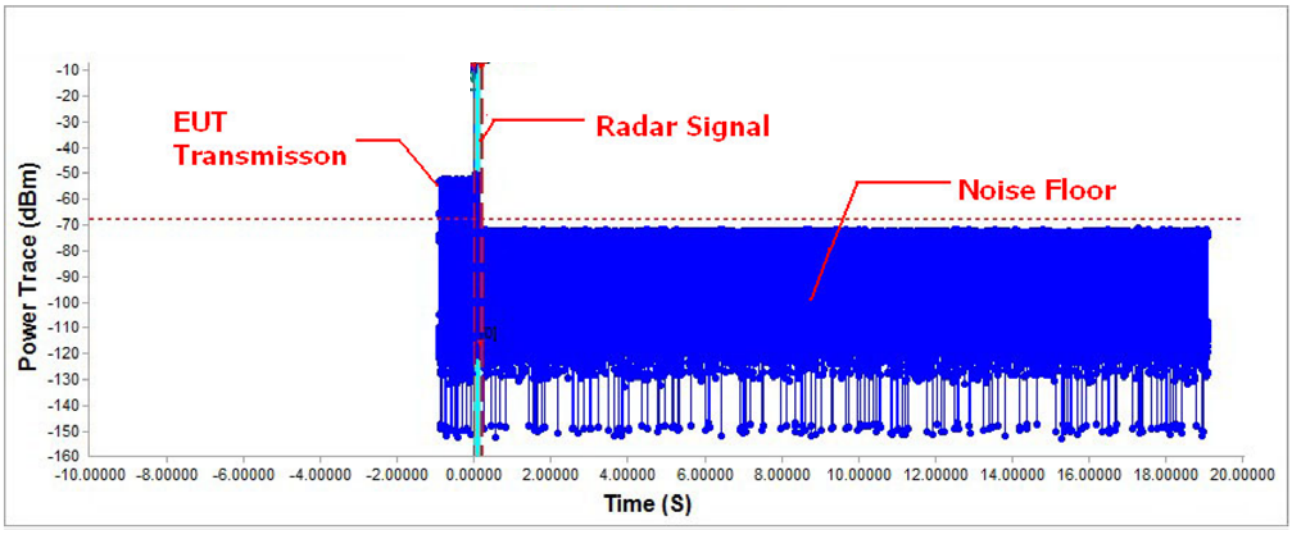
4.3.DFS DETECTION THRESHOLD

Calibration:
The EUT is slave equipment and it with a max gain is 2dBi.
For a detection threshold level of -62dBm and the master antenna gain is 1dBi,
required detection threshold is -61dBm(=-62+1).

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

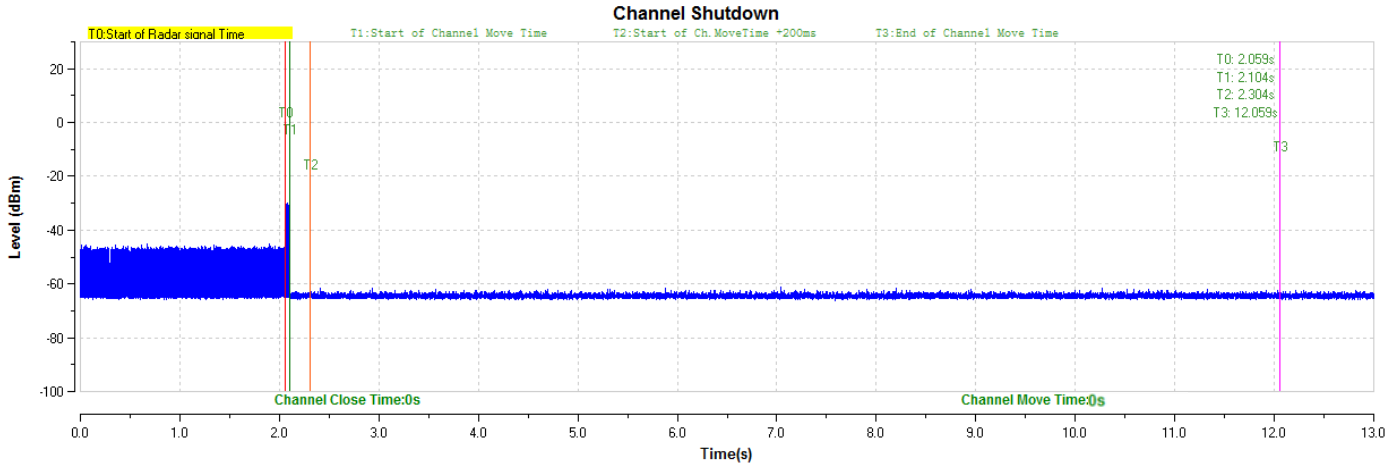
4.4.CHANNEL CLOSING TRANSMISSION AND CHANNEL MOVE TIME

Sample graph

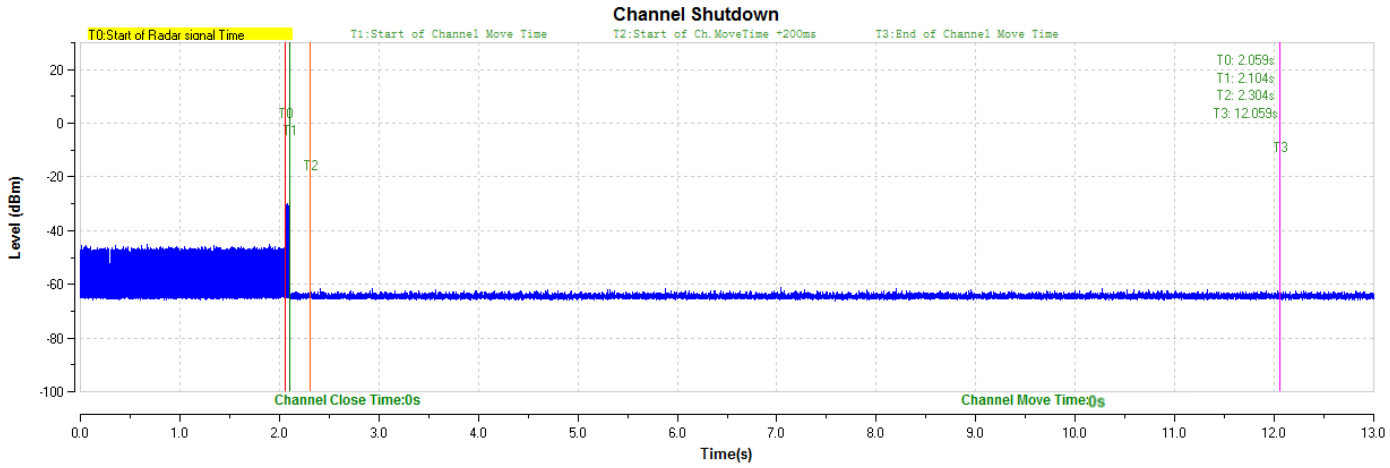


Test result

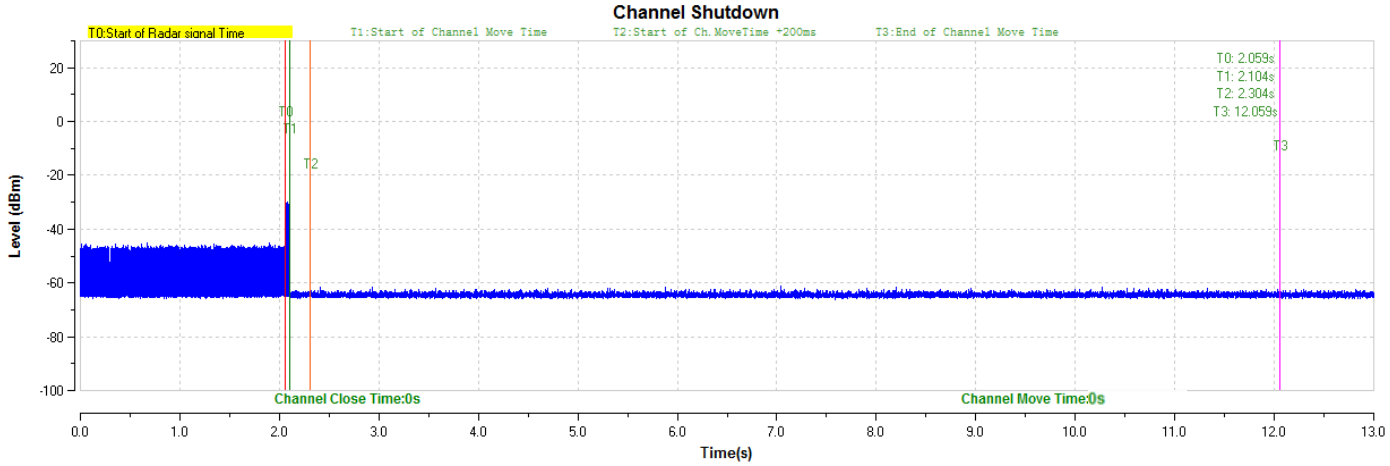
TX 11a mode 5530MHz



TX 11n 40MHz mode 5540MHz



TX 11ac 80MHz mode 5550MHz



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.
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.
3. T0 denotes the start of Channel Move Time upon the end of the Radar burst.
4. T1 denotes the data transmission time of 200ms from T0.
5. T2 denotes the end of Channel Move Time.
6. T3 denotes the 10 second from T0 to observe the aggregate duration of transmissions.

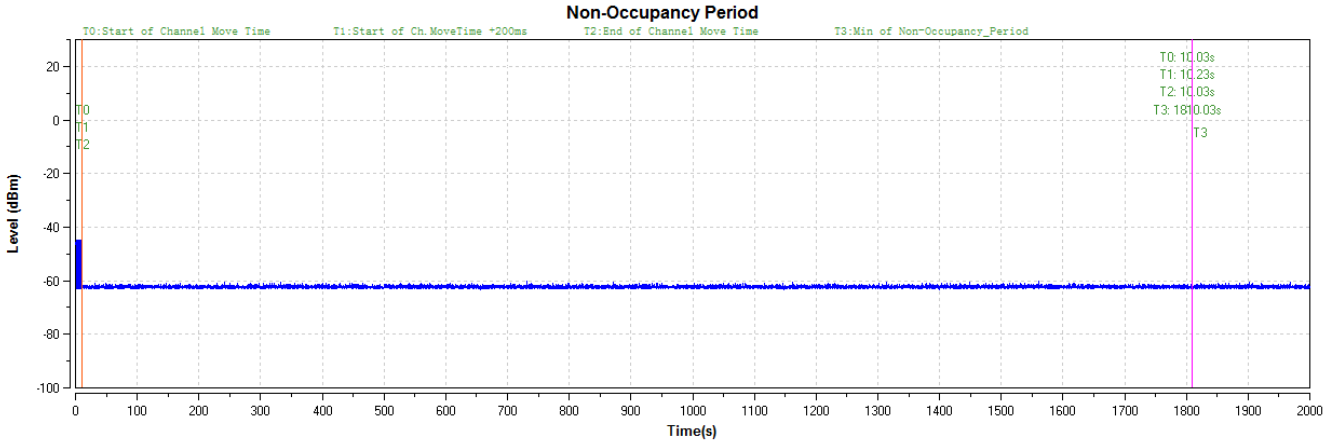
4.5.Non-Occupancy Period

According to KDB905462 D03 UNII Clients Without Radar Detection New Rules v01r02 requirements, As an Clients device without Radar Detection function, it must be tested with a master device operating in the same band and operation mode. The test frequency has been monitored to ensure no transmission of any type has occurred for 30 minutes.
Note: If the client moves with the master, the device is considered compliant if nothing appears in the client non-occupancy period test. For devices that shut down(rather than moving channels), no beacons should appear.

Test result of Non-Occupancy Period

TX 11a mode 5530MHz

Test condition: master on(associated mode)



Test condition: master off(non-associated mode)