TEST REPORT

Product	:	PANEL PC
Trade mark	:	IEI
Model/Type reference	:	IOVU-210AD-RK39
Serial Model	:	/
Report Number	:	EED39N00008305
FCC ID	:	RFH-IOVU-210AD
Date of Issue	:	July 16, 2021

Test Standards	Results
☒ 47 CFR Part 15 Subpart E	PASS

Prepared for:

IEI INTEGRATION CORP.
NO.29,ZHONGXING RD.,XIZHI DIST.,NEW TAIPEI CITY 22161,TAIWAN

Prepared by:

Centre Testing International (Suzhou) CO., LTD.
Building 18, Zhihui New Town Ecological Industrial Park, No. 1206, Jinyang East Road, Lujia Town, Kunshan, Jiangsu, China
TEL: +86-0512-5015 8288

Compiled by: Jenny. Yu Reviewed by: Lily. Wang

Approved by: Jeff Fang Date: July 16, 2021

Check No.: 3915514199

Modification Record

No.	Last Report No.	Modification Description
1	EED39N00008305	First report

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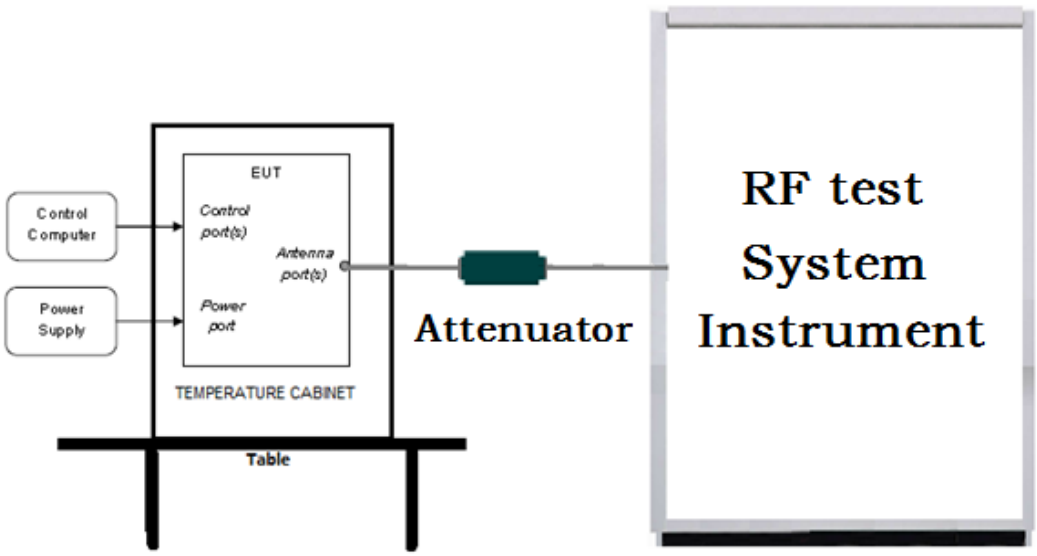
1. Test Summary

Test item	Test Requirement	Result
Non-Occupancy Period	47 CFR Part 15 Subpart E Section 15.407 (h)(2)(iv)	PASS
DFS Detection Threshold	47 CFR Part 15 Subpart E Section 15.407 (h)(2)	Not require
Channel Availability Check Time	47 CFR Part 15 Subpart E Section 15.407 (h)(2)(ii)	Not require
Uniform Spreading	47 CFR Part 15 Subpart E Section 15.407 (h)(2)	Not require
U-NII Detection Bandwidth	47 CFR Part 15 Subpart E Section 15.407 (h)(2)	Not require
Channel Closing Transmission Time	47 CFR Part 15 Subpart E Section 15.407 (h)(2)(iii)	PASS
Channel Move Time	47 CFR Part 15 Subpart E Section 15.407 (h)(2)(iii)	PASS

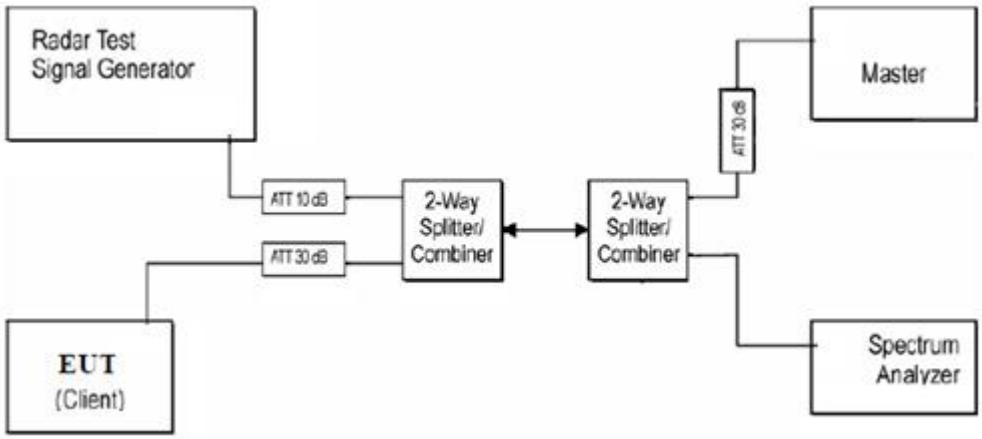
2. Test Requirement

2.1. Test Setup

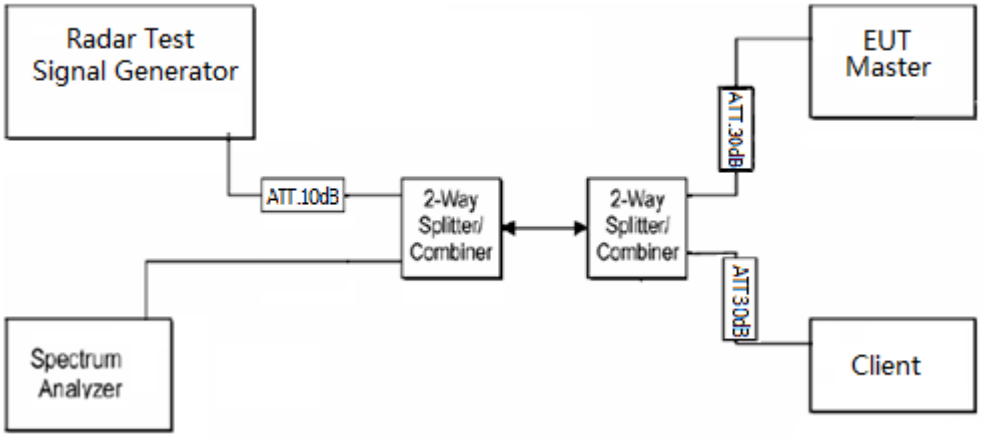
2.1.1. For Conducted Test Setup



2.1.2. Slave and Client device(EUT) block diagram of Test Setup



2.1.3. Mast device(EUT) block diagram of Test Setup



2.2. Test Environment

Operating Environment:	
Temperature:	19.8.0 °C
Humidity:	55 % RH
Atmospheric Pressure:	1019mbar

2.3. Test Condition

2.3.1. 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, 1MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms.

2.3.1.1. Short Pulse Radar Test Waveforms

Radar Type	Pulse width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of 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

A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4.For Short Pulse Radar Type 1, the same waveform is used a minimum of 30 times. If more than 30waveforms 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.

The aggregate is the average of the percentage of successful detections of Short Pulse Radar Types 1-4.

2.3.1.2. Long Pulse Radar Test Waveform

Radar Type	Pulse width (μsec)	Chirp Width (MHz)	PRI (μsec)	Number of Pulses per Burst	Number of Burst	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.

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 frequency modulated 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 indifferent 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 at5290 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 and2000

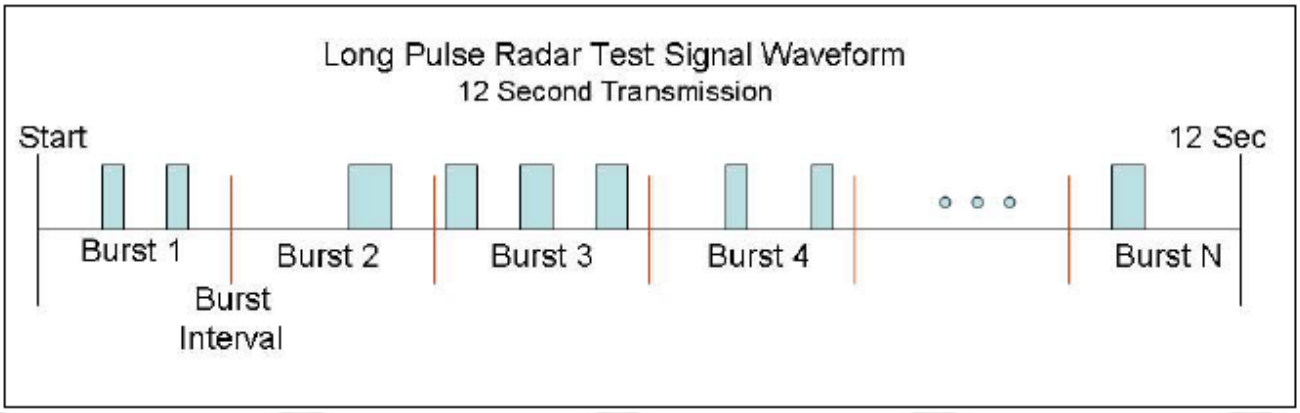
microseconds, with the time being randomly chosen. If three pulses are present in a Burst,the random time interval between the first and second pulses is chosen independently of the random time interval between the second and third pulses.

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 / 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 / Burst_Count) – (Total Burst Length) + (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 randomly.

A representative example of a Long Pulse Radar Type waveform:

1) The total test waveform length is 12 seconds.
2) Eight (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 successive1,500,000 microsecond intervals (i.e. Burst 2 falls in the 1,500,001 – 3,000,000 microsecond range).

Graphical representation of the Long Pulse Radar Test Waveform.



2.3.1.3. Frequency Hopping Radar Test Waveform

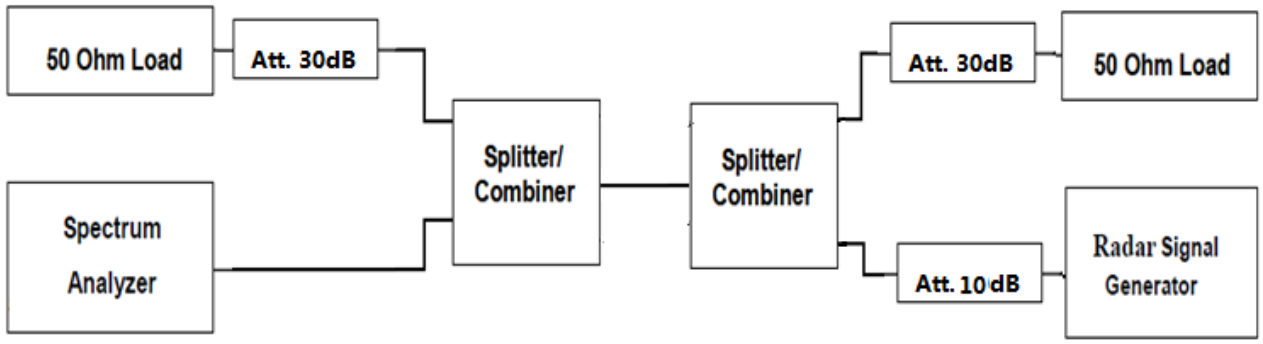
Radar Type	Pulse width (μsec)	PRI (μsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (m sec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

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.

2.3.1.4. 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 replace 50ohm terminal from master and client device and no transmissions by either the master or client device. The spectrum analyzer was switched to the zero span (time domain) 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 3MHz and 3 MHz.
The signal generator amplitude was set so that the power level measured at the spectrum analyzer was -61dBm due to the interference threshold level is not required.

Conducted Calibration Setup



2.3.2. Technical requirement

2.3.2.1. Applicability of DFS Requirements

Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operation Mode		
	Master	Client without Radar Detection	Client with Radar Detection
Non-Occupancy Period	Yes	Not require	Yes
DFS Detection Threshold	Yes	Not require	Yes
Channel Availability Check Time	Yes	Not require	Not require
Uniform Spreading	Yes	Not require	Not require
U-NII Detection Bandwidth	Yes	Not require	Yes

Applicability of DFS requirements during normal operation

Requirement	Operation Mode		
	Master	Client without Radar Detection	Client with Radar Detection
DFS Detection Threshold	Yes	Not require	Yes
Channel Closing Transmission Time	Yes	Yes	Yes
Channel Move Time	Yes	Yes	Yes
U-NII Detection Bandwidth	Yes	Not require	Yes

2.3.2.2. DFS Detection Thresholds and Response Requirement

DFS Detection Thresholds for Master Devices and Client Devices With Radar Detection

Maximum Transmit Power	Value(See Notes 1 and 2)
≥ 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.	

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 60milliseconds over remaining 10 second period. See Notes 1 and 2
U-NII Detection Bandwidth	Minimum 80% of the UNII99% transmission power bandwidth See Note 3

Note 1: 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 Waveform.

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 10second 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 1 is used and for each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

2.3.3. Slave device setting

2.3.3.1. Master AP setting

WiFi mode:802.11a/802.11n/802.11ac chose one mode to set
Channel: chose one test channel
Channel bandwidth: 20MHz, 40MHz, 80MHz chose one bandwidth

Test channel:

Test Mode	Tx/Rx	RF Channel		
		Low(L)	Middle(M)	High(H)
802.11a/n/ac(20M)	5250MHz ~5350 MHz	Channel 52	Channel 56	Channel 64
		5260MHz	5280MHz	5320MHz
802.11a/n/ac(20M)	5470MHz ~5725 MHz	Channel 100	Channel 116	Channel 140
		5500MHz	5580MHz	5700MHz
802.11n/ac(40M)	5250MHz ~5350 MHz	Channel 54	N/A	Channel 62
		5270MHz	N/A	5310MHz
802.11n/ac(40M)	5470MHz ~5725 MHz	Channel 102	Channel 110	Channel 134
		5510MHz	5550MHz	5670MHz
802.11ac(80M)	5250MHz ~5350 MHz	N/A	Channel 58	N/A
		N/A	5290MHz	N/A
802.11ac(80M)	5470MHz ~5725 MHz	Channel 106	N/A	Channel 122
		5530MHz	N/A	5610MHz

2.3.3.1. WiFi connection steps:

Turn on WIFI
Search for the SSID to connect
Click on the SSID you want to connect to
After connecting, there will be a WiFi icon on the top

3. General Information

3.1. Client Information

Applicant:	IEI INTEGRATION CORP.
Address of Applicant:	NO.29,ZHONGXING RD.,XIZHI DIST.,NEW TAIPEI CITY 22161,TAIWAN
Manufacturer:	IEI INTEGRATION CORP.
Address of Manufacturer:	NO.29,ZHONGXING RD.,XIZHI DIST.,NEW TAIPEI CITY 22161,TAIWAN
Factory:	Armorlink SH Corp.
Address of Factory:	No.515,Shenfu Rd,Xinzhuang Industrial Development Zone,Minhang District,Shanghai,P.R.China

3.2. General Description of EUT

Product Name:	PANEL PC
Model No.(EUT):	IOVU-210AD-RK39
Trade Mark:	
EUT Supports Radios application:	2.4G WIFI: IEEE802.11b/g/n(20MHz), 2412MHz-2462MHz 5G WIFI: IEEE802.11a/ac(HT20)/ac(HT40)/ac(HT80),5150-5350MHz,5470-5725MHz, 5725-5850MHz. Bluetooth BR+EDR& Bluetooth V4.1 BLE NFC13.56MHz
Power Supply:	Model No: FSP060-DHAN3 Input: AC100-240V 1.8A, 50/60Hz Output: DC 12V 5.0A
Sample Received Date:	Feb 09, 2021
Sample tested Date:	Feb 09, 2021 to Apr 07, 2021

3.3. Product Specification subjective to this standard

Operation Frequency:	IEEE 802.11a/n/ac(20M): 5150MHz ~5250 MHz IEEE 802.11a/n/ac(20M): 5250MHz ~5350 MHz IEEE802.11a/n/ac(20M): 5470MHz ~5725 MHz IEEE802.11a/n/ac(20M): 5725MHz ~5850 MHz IEEE802.11n/ac(40M) 5150MHz ~5250 MHz IEEE802.11n/ac(40M) 5250MHz ~5350 MHz IEEE802.11n/ac(40M) 5470MHz ~5725 MHz IEEE802.11n/ac(40M): 5725MHz ~5850 MHz IEEE802.11n/ac(80M) 5150MHz ~5250 MHz IEEE802.11n/ac(80M) 5250MHz ~5350 MHz IEEE802.11n/ac(80M) 5470MHz ~5725 MHz IEEE802.11n/ac(80M): 5725MHz ~5850 MHz
Channel Numbers:	IEEE 802.11a/n/ac(20M): 5150MHz ~5250 MHz/ 4 channel IEEE 802.11a/n/ac(20M): 5250MHz ~5350 MHz/ 4 channel IEEE 802.11a/n/ac(20M): 5470MHz ~5725 MHz/ 11 channel IEEE 802.11a/n/ac(20M): 5725MHz ~5850 MHz/ 5 channel IEEE 802.11n/ac(40M): 5150MHz ~5250 MHz/ 2 channel IEEE 802.11n/ac(40M): 5250MHz ~5350 MHz/ 2 channel IEEE 802.11n/ac(40M): 5470MHz ~5725 MHz/ 5 channel IEEE 802.11n/ac(40M): 5725MHz ~5850 MHz/ 2 channel EEE 802.11n/ac(80M): 5150MHz ~5250 MHz/ 1 channel IEEE 802.11n/ac(80M): 5250MHz ~5350 MHz/ 1 channel

	IEEE 802.11n/ac(80M): 5470MHz ~5725 MHz/ 2 channel IEEE 802.11n/ac(80M): 5725MHz ~5850 MHz/ 1 channel	
Type of Modulation:	OFDM, DSSS	
Device -TPC type:	Without TPC mechanism	
Sample Type:	Mobile production	
Test Software of EUT:	AMPK TOOL (manufacturer declare)	
Antenna Type and Gain[①]:	Type: FPC antenna ANT1 Gain for 5G :3.68dBi ANT2 Gain for 5G: 3.95dBi	
Highest EIRP:	ANT1	15.26 dBm
	ANT2	15.59 dBm
Lowest EIRP:	ANT1	7.89 dBm
	ANT2	8.14 dBm

Note: 1 The antenna gain is provided by the client and we Centre Testing International (Suzhou) CO., LTD. test lab is not responsible for the accuracy of the antenna gain information.

3.4. Other Information

Operation Frequency each of channel

For 802.11a/n/ac(20M) Operation in the 5250MHz ~5350 MHz band							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
52	5260MHz	56	5280MHz	60	5300MHz	64	5320MHz
For 802.11a/n/ac(20M) Operation in the 5470MHz ~5725 MHz band							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
100	5500MHz	112	5560MHz	124	5620MHz	136	5680MHz
104	5520MHz	116	5580MHz	128	5640MHz	140	5700MHz
108	5540MHz	120	5600MHz	132	5660MHz	N/A	N/A

For 802.11n/ac(40M) Operation in the 5250MHz ~5350 MHz band					
Channel	Frequency	Channel	Frequency	Channel	Frequency
54	5270MHz	62	5310MHz	N/A	N/A
For 802.11n/ac(40M) Operation in the 5470MHz ~5725 MHz band					
Channel	Frequency	Channel	Frequency	Channel	Frequency
102	5510MHz	118	5590MHz	134	5670MHz
110	5550MHz	126	5630MHz	N/A	N/A
For 802.11n/ac(40M) Operation in the 5250MHz ~5350 MHz band					
Channel	Frequency	Channel	Frequency	Channel	Frequency
58	5290MHz	N/A	N/A	N/A	N/A
For 802.11n/ac(40M) Operation in the 5470MHz ~5725 MHz band					
Channel	Frequency	Channel	Frequency	Channel	Frequency
106	5530MHz	122	5610MHz	N/A	N/A

3.5. Test Location

All test facilities used to collect the test data are located at Building 18, Zhihui New Town Ecological Industrial Park, No. 1206, Jinyang East Road, Lujia Town, Kunshan, Jiangsu, China.

3.6. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:
A2LA-Lab Cert. No. 5734.01
Centre Testing International (Suzhou) CO., LTD. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration. Laboratories and any additional program requirements in the identified field of testing.

FCC-Designation No.:CN1290

Centre Testing International Group Co., Ltd EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The American association for Centre Testing International Group Co., Ltd. EMC laboratory accreditation Designation No.:CN1290

3.7. Deviation from Standards

None.

3.8. Abnormalities from Standard Conditions

None.

3.9. Other Information Requested by the Customer

None.

3.10. Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9×10^{-8}
2	Occupied Bandwidth	0.56%
3	RF Power conducted	0.59 dB
4	Power Spectral Density, conducted	2.37 dB
5	Unwanted Emission, conducted	2.68 dB
6	All Emission, radiated	4.41 dB(30MHz-1GHz)
		4.99 dB(1GHz-18GHz)
		5.307 dB(18GHz-40GHz)
7	Temperature test	0.54°C
8	Humidity test	1.62%
9	DC and low frequency voltages test	1.14%

4. Equipment List

RF test system					
Equipment	**Manufacturer**	**Mode No.**	**Serial Number**	**Cal. Date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
Signal Generator	R&S	SMB100A	182002	2020-10-23	2021-10-22
Communication test set test set	R&S	CMW500	107929	2020-04-27	2021-04-26
Spectrum Analyzer	R&S	FSV40	101588	2020-10-23	2021-10-22
Vector signal generator	R&S	SMBV100B	101985	2020-10-23	2021-10-22
Temperature/ Humidity Indicator	testo	608-H1	1945222628	2020-12-10	2021-11-08
Switch Automatic control	R&S	OSP-B157W8	101111	2020-10-23	2021-10-22
High-low temperature chamber	GIANT FORCE	GTH-800-40-CP	MAA1908-003	2020-12-08	2021-12-07
Automatic test software	Shenzhen JS TONSCEND	/	V2.6.77.0518	/	/
Master AP	LINKSYS	EA8300	21P10C63728 953	/	

Note：Master AP FCC ID:Q87-EA8300

966 Semi-anechoic Chamber					
Equipment	**Manufacturer**	**Mode No.**	**Serial Number**	**Cal. Date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
Receiver	R&S	ESU8	100537	2020-12-10	2021-12-09
Spectrum analyzer	R&S	FSV40	101185	2020-12-10	2021-12-09
Preamplifier (30MHz~1GHz)	SONOMA	317	393347	2020-12-04	2021-12-03
Preamplifier (1GHz~18GHz)	R&S	SCU-18D	1987397	2020-12-10	2021-12-09
Preamplifier (18GHz~40GHz)	/	MTLNA1804003 0235	12009007	2020-10-23	2021-10-22
Loop Antenna (9kHz~30MHz)	TESEQ	HLA6121	54575	2021-02-27	2022-02-26
Antenna (30MHz~1GHz)	SCHWARZBEC K	VULB9163	9163-965	2020-10-16	2021-10-15
Antenna (1GHz~18GHz)	R&S	HF907	102524	2020-12-15	2021-12-14
Antenna (18GHz~40GHz)	R&S	BBHA9170	1032	2020-10-23	2021-10-22
Band rejection filter	Xi'an xingbo	XBLBQ-DZA81	200827-1-02	/	/
Band rejection filter	Xi'an xingbo	XBLBQ-DZA104	200827-1-11	/	/
Band rejection filter	Xi'an xingbo	XBLBQ-DZA118	200827-1-10	/	/
Band rejection filter	Xi'an xingbo	XBLBQ-DZA105	200827-1-12	/	/

5. Radio Technical Requirements Specification

5.1. Reference documents for testing

No.	Identity	Document Title
1	FCC Part15E (2015)	Subpart C-Intentional Radiators
2	FCC Order, ET Docket No.03-122 (FCC 06-96)	Compliance Measurement Procedures for Unlicensed-National Information Infrastructure Devices Operating in the 5.25-5.35 GHz and 5.47-5.725 GHz Bands Incorporating Dynamic Frequency Selection

5.2. Test Results List

FCC Part15E	Test item	Operation Mode verdict	Note
		Client without Radar Detection	
47 CFR Part 15 Subpart E Section 15.407 (h)(2)	DFS Detection Threshold	Not require	/
47 CFR Part 15 Subpart E Section 15.407 (h)(2)(ii)	Channel Availability Check Time	Not require	/
47 CFR Part 15 Subpart E Section 15.407 (h)(2)	U-NII Detection Bandwidth	Not require	/
47 CFR Part 15 Subpart E Section 15.407 (h)(2)(iii)	Channel Closing Transmission Time	PASS	Appendix A)
47 CFR Part 15 Subpart E Section 15.407 (h)(2)(iii)	Channel Move Time	PASS	Appendix A)
47 CFR Part 15 Subpart E Section 15.407 (h)(2)(iv)	Non-Occupancy Period	PASS	Appendix B)
47 CFR Part 15 Subpart E Section 15.407 (h)(2)	Uniform Spreading	Not require	/

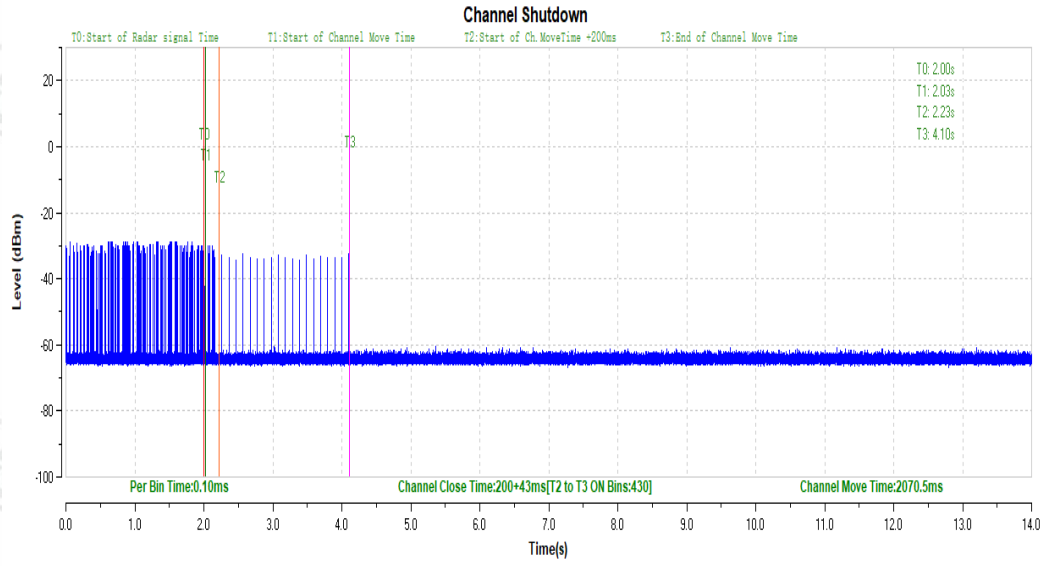
Note : The time required for the device to fully boot up : 1 minute

Appendix A: Channel Move Time and Channel Closing Transmission Time

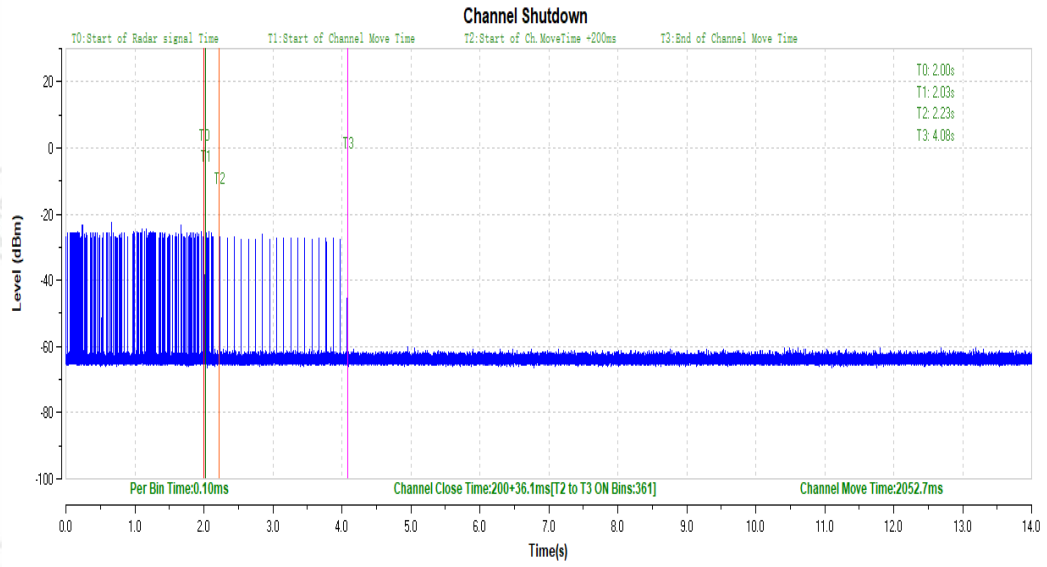
Test Result:

Test Mode	Channel	CCT[ms]	Limit[ms]	CMT[ms]	Limit[ms]	Verdict
11AC80SISO	5290	200+43	200+60	2070.5	10000	PASS
	5530	200+36.1	200+60	2052.7	10000	PASS

Test Graphs:



11AC80SISO_5290



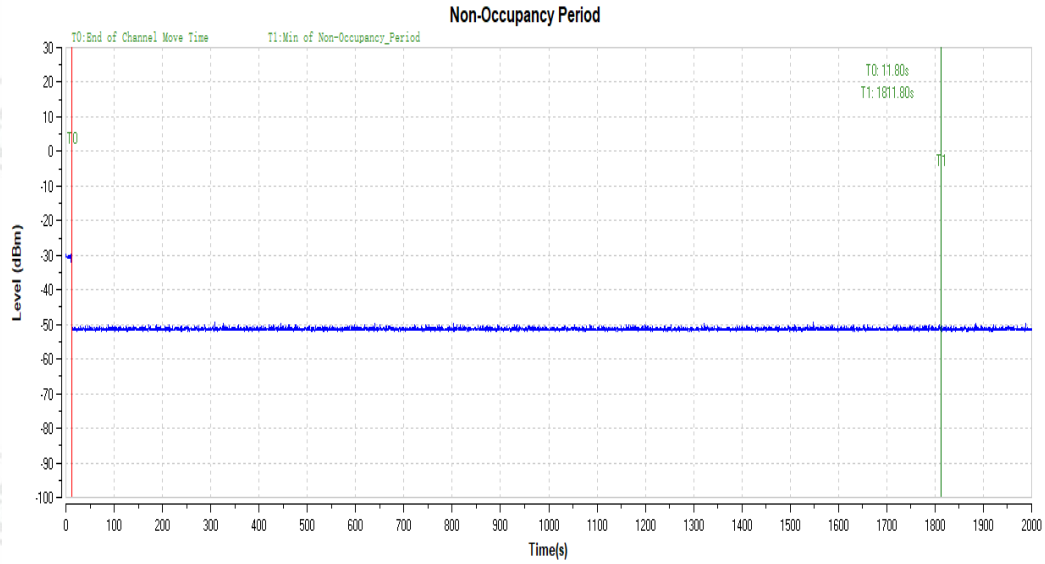
11AC80SISO_5530

Appendix B: Non-Occupancy Period

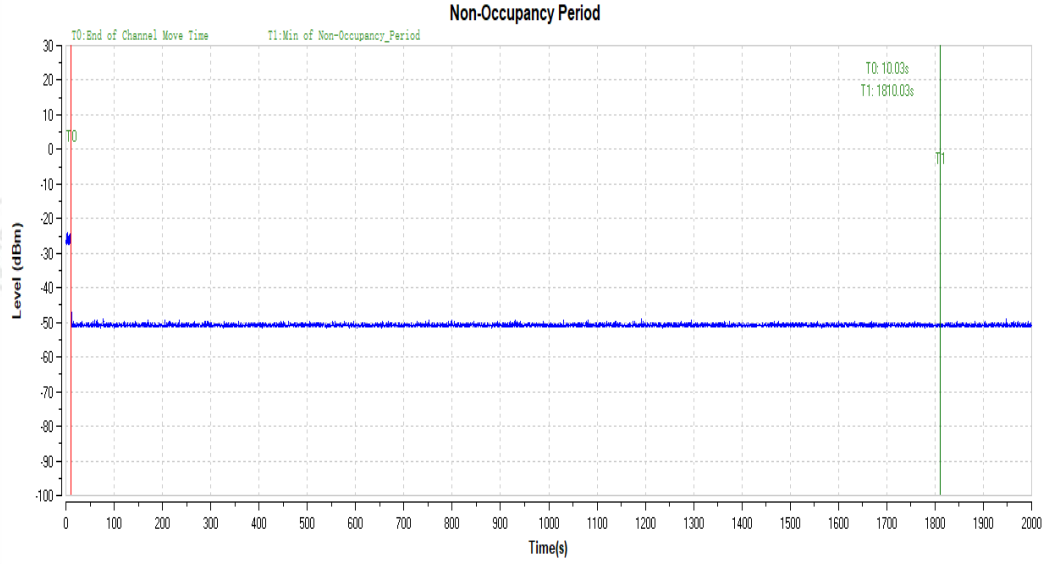
Test Result

Test Mode	Channel	Result	Limit[s]	Verdict
11AC80SISO	5290	see test graph	>=1800	PASS
	5530	see test graph	>=1800	PASS

Test Graphs:



11AC80SISO_5290



11AC80SISO_5530

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

Refer to Report No. EED39N00008301 for test setup photos.

APPENDIX 2 PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS

Refer to Report No. EED39N00008301 for EUT external and internal photos.

The testing data and results in this report are just for scientific research, education, internal quality control and product development etc.

*** End of Report ***