FCC TEST REPORT

Test report
On Behalf of
Aoife Solutions S.L. (Galgus)
For
Access Point
Model No.: IX450, OX450, IX850, OX850, IC600
FCC ID: 2AYVA-IX450

Prepared for :	**Aoife Solutions S.L. (Galgus)** **Italica nr.1, First Floor, 41900 CAMAS, Sevilla, Spain**
Prepared By :	**Shenzhen HUAK Testing Technology Co., Ltd.** **1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China**

Date of Test:	**Jun.24, 2021 ~ Jul. 06, 2021**
Date of Report:	**Jul. 06, 2021**
Report Number:	**HK2106181951-3E**

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TEST RESULT CERTIFICATION

Applicant's name.....: Aoife Solutions S.L. (Galgus)

Address .....: Italica nr.1, First Floor, 41900 CAMAS, Sevilla, Spain

Manufacture's Name.....: Aoife Solutions S.L. (Galgus)

Address .....: Italica nr.1, First Floor, 41900 CAMAS, Sevilla, Spain

Product description

Trade Mark: GALGUS

Product name ..... : Access Point

Model and/or type reference .: IX450, OX450, IX850, OX850, IC600

Standards .....: FCC Rules and Regulations Part 15 Subpart E Section 15.407
ANSI C63.10: 2013

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Date of Test.....:

Date (s) of performance of tests .....: Jun.24, 2021 ~ Jul. 06, 2021

Date of Issue.....: Jul. 06, 2021

Test Result .....: Pass

Testing Engineer : Gary Qian
(Gary Qian)

Technical Manager : Eden Hu
(Eden Hu)

Authorized Signatory : Jason Zhou
(Jason Zhou)

HUAK TESTING CERTIFICATION HKTC APPROVAL

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TABLE OF CONTENTS

1. Test Result Summary 5
1.1. TEST PROCEDURES AND RESULTS 5
1.2. INFORMATION OF THE TEST LABORATORY 5
1.3. MEASUREMENT UNCERTAINTY 6
2. EUT Description 7
2.1. GENERAL DESCRIPTION OF EUT 7
2.2. OPERATION FREQUENCY EACH OF CHANNEL 8
2.3. OPERATION OF EUT DURING TESTING 8
2.4. DESCRIPTION OF TEST SETUP 9
3. Genera Information 10
3.1. TEST ENVIRONMENT AND MODE 10
3.2. DESCRIPTION OF SUPPORT UNITS 11
4. Test Results and Measurement Data 12
4.1. CONDUCTED EMISSION 12
4.2. MAXIMUM CONDUCTED OUTPUT POWER 16
4.3. 6DB EMISSION BANDWIDTH 20
4.4. 26DB BANDWIDTH AND 99% OCCUPIED BANDWIDTH 37
4.5. POWER SPECTRAL DENSITY 39
4.6. BAND EDGE 57
4.7. SPURIOUS EMISSION 112
4.8. FREQUENCY STABILITY MEASUREMENT 137
4.9. ANTENNA REQUIREMENT 139
4.10. PHOTOGRAPHS OF TEST SETUP 140
4.11. PHOTOS OF THE EUT 142

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** Modified History **

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Jul. 06, 2021	Jason Zhou

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1. Test Result Summary

1.1. TEST PROCEDURES AND RESULTS

Requirement	CFR 47 Section	Result
Antenna requirement	§15.203	PASS
AC Power Line Conducted Emission	§15.207	PASS
Maximum Conducted Output Power	§15.407(a)	PASS
6dB Emission Bandwidth	§15.407(e)	PASS
26dB Emission Bandwidth& 99% Occupied Bandwidth	§15.407(a)	N/A
Power Spectral Density	§15.407(a)	PASS
Band edge	§15.407(b)/15.209/15.205	PASS
Radiated Emission	§15.407(b)/15.209/15.205	PASS
Frequency Stability	§15.407(g)	PASS

Note:

1. PASS: Test item meets the requirement.

2. Fail: Test item does not meet the requirement.

3. N/A: Test case does not apply to the test object.

4. The test result judgment is decided by the limit of test standard.

1.2. Information of the Test Laboratory

Shenzhen HUAK Testing Technology Co., Ltd.
Add.: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Testing Laboratory Authorization：

A2LA Accreditation Code is 4781.01.
FCC Designation Number is CN1229.
Canada IC CAB identifier is CN0045.
CNAS Registration Number is L9589.

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1.3. Measurement Uncertainty

The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	±2.56dB
2	RF power, conducted	±0.12dB
3	Spurious emissions, conducted	±0.11dB
4	All emissions, radiated(<1G)	±3.92dB
5	All emissions, radiated(>1G)	±4.28dB
6	Temperature	±0.1°C
7	Humidity	±1.0%

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2. EUT Description

2.1. GENERAL DESCRIPTION OF EUT

Equipment	Access Point
Model Name	IX450
Serial No.	OX450, IX850, OX850, IC600
Trade Mark	GALGUS
Model Difference	All model's the function, software and electric circuit are the sam e, only with a product color, appearance and model named differ ent. Test sample model: IX450
FCC ID	2AYVA-IX450
Operation Frequency:	IEEE 802.11a/n/ac/ax(HT20)5.745GHz-5.825GHz IEEE 802.11n/ac/ax(HT40)5.755GHz-5.795GHz IEEE 802.11ac/ax(HT80) 5.775GHz
Modulation Technology:	IEEE 802.11a/n/ac/ax
Modulation Type	OFDM, OFDMA
Antenna Type	Internal Antenna
Antenna Gain	Antenna 1:0dBi Antenna 2:0dBi MIMO: 3.010dBi
Power Source	POE IN: 48V, 0.5A DC IN: 12V, 1.5A
Power Supply:	POE IN: 48V, 0.5A DC IN: 12V, 1.5A
Note: The EUT incorporates a MIMO function. Physically, it provides two completed transmitt ers and receivers(2T2R), two transmit signals are completely correlated, then, Direction gain= GANT + Array Gain(Array Gain=10 log(2) dB for power spectral density; Array Gain=0 for power measurement)	

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2.2. Operation Frequency each of channel

802.11a/802.11n(HT20) 802.11ac(HT20) 802.11ax(HT20)		802.11n(HT40)/ 802.11ac(HT40) 802.11ax(HT40)		802.11ac(HT80) 802.11ax(HT80)	
Channel	Frequency	Channel	Frequency	Channel	Frequency
149	5745	151	5755	155	5775
153	5765	159	5790		
157	5785				
161	5805				
165	5825				

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

2.3. Operation of EUT during testing

Band IV (5725 - 5850 MHz)		
For 802.11a/n (HT20)/ac(HT20)/axHT20)		
Channel Number	Channel	Frequency (MHz）
149	Low	5745
157	Mid	5785
165	High	5825

For 802.11n (HT40)/ ac(HT40)/axHT40)		
Channel Number	Channel	Frequency (MHz）
151	Low	5755
159	High	5795

For 802.11ac(HT80)/ax(HT80)		
Channel Number	Channel	Frequency (MHz）
155	/	5775

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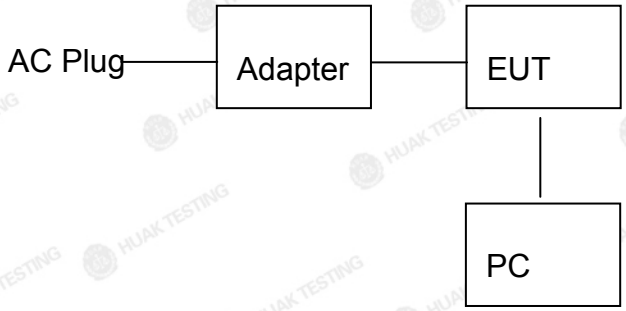
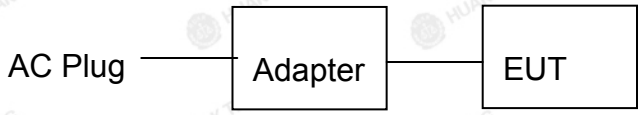
2.4. DESCRIPTION OF TEST SETUP

Operation of EUT during conducted testing and below 1GHz Radiation testing:



Operation of EUT during Above1GHz Radiation testing:



- PC information
  Model: TP00067A
  Input: DC 20V, 2.25~3.25A
  Output: 5VDC, 0.5A

  Adapter information
  Model: GRT-POE15-480050
  Input: AC100-240V 0.8A Max 50/60Hz
  Output: DC48V 500mA

The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. The worst case is X position

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3. Genera Information

3.1. Test environment and mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	56 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel and modulations(The value of duty cycle is 100%)
The sample was placed 0.8m/1.5m for blow/above 1GHz above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.	

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:	
Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.	
Mode	Data rate
802.11a	6 Mbps
802.11n(HT20)	MCS0
802.11n(HT40)	MCS0
802.11ac(HT20)/ac(HT40)/ac(HT80)	MCS0
802.11ax(HT20)/ax(HT40)/ax(HT80)	MCS0
Final Test Mode:	
Operation mode:	Keep the EUT in continuous transmitting with modulation

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3.2. 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.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
/	/	/	/	/

Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.

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

3. For conducted measurements (Output Power, Emission Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.

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4. Test Results and Measurement Data

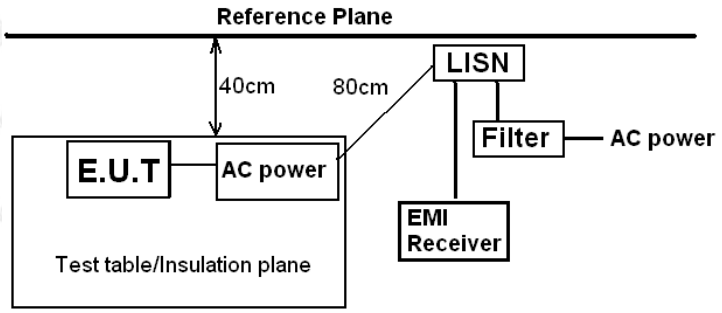
4.1. Conducted Emission

4.1.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Frequency Range:	150 kHz to 30 MHz
Receiver setup:	RBW=9 kHz, VBW=30 kHz, Sweep time=auto
Limits:	

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

Test Setup:



Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m

Test Mode:	Tx Mode
Test Procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.
Test Result:	Pass

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4.1.2. Test Instruments

Conducted Emission Shielding Room Test Site (843)					
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Receiver	R&S	ESR-7	HKE-010	Dec. 10, 2020	Dec. 09, 2021
LISN	R&S	ENV216	HKE-002	Dec. 10, 2020	Dec. 09, 2021
Coax cable (9KHz-30MHz)	Times	381806-002	N/A	Dec. 10, 2020	Dec. 09, 2021
Conducted test software	Tonscend	TS+ Rev 2.5.0.0	HKE-081	N/A	N/A

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

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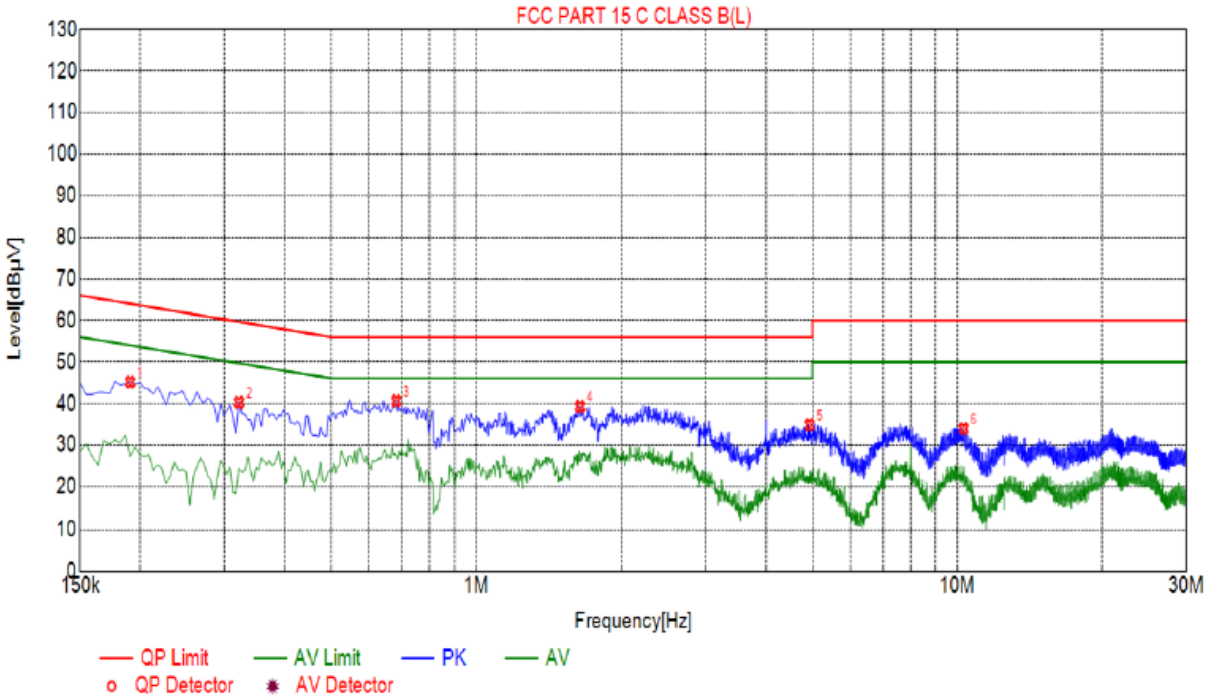
4.1.3. Test data

Test Specification: Line



Suspected List								
NO.	Freq. [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Reading [dBμV]	Detector	Type
1	0.1905	45.12	20.04	64.01	18.89	25.08	PK	L
2	0.3210	40.31	20.05	59.68	19.37	20.26	PK	L
3	0.6810	40.64	20.05	56.00	15.36	20.59	PK	L
4	1.6440	39.29	20.12	56.00	16.71	19.17	PK	L
5	4.9290	34.90	20.26	56.00	21.10	14.64	PK	L
6	10.3110	33.98	20.05	60.00	26.02	13.93	PK	L

Remark: Margin = Limit – Level
Correction factor = Cable lose + LISN insertion loss
Level=Test receiver reading + correction factor

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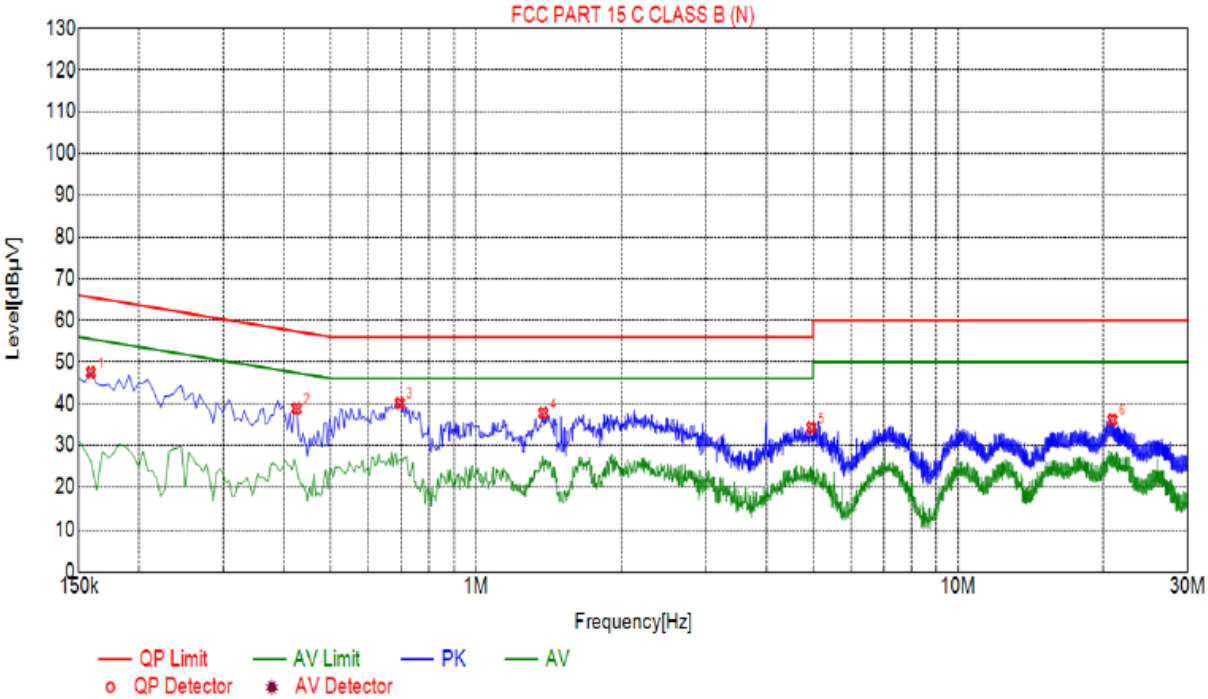
Test Specification: Neutral



Suspected List								
NO.	Freq. [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Reading [dBμV]	Detector	Type
1	0.1590	47.49	20.01	65.52	18.03	27.48	PK	N
2	0.4245	38.84	20.04	57.36	18.52	18.80	PK	N
3	0.6945	40.15	20.05	56.00	15.85	20.10	PK	N
4	1.3785	37.77	20.11	56.00	18.23	17.66	PK	N
5	4.9560	34.28	20.26	56.00	21.72	14.02	PK	N
6	20.9040	36.15	20.13	60.00	23.85	16.02	PK	N

Remark: Margin = Limit – Level
Correction factor = Cable lose + LISN insertion loss

Level=Test receiver reading + correction factor

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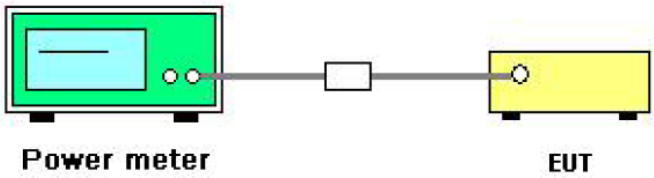
4.2. Maximum Conducted Output Power

4.2.1. Test Specification

Test Requirement:	FCC Part15 E Section 15.407(a)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v02.r01 Section E
Limit:	Frequency Band (MHz) / Limit 5725-5850 / 1 W
Test Setup:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. The testing follows the Measurement Procedure of KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section E, 3, a 2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement. 3. Set to the maximum power setting and enable the EUT transmit continuously. 5. Measure the conducted output power and record the results in the test report.
Test Result:	PASS
Remark:	Conducted output power= measurement power +10log(1/x) X is duty cycle=1, so 10log(1/1)=0 Conducted output power= measurement power

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4.2.2. Test Instruments

RF Test Room					
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 10, 2020	Dec. 09, 2021
Power meter	Agilent	E4419B	HKE-085	Dec. 10, 2020	Dec. 09, 2021
Power Sensor	Agilent	E9300A	HKE-086	Dec. 10, 2020	Dec. 09, 2021
RF cable	Times	1-40G	HKE-034	Dec. 10, 2020	Dec. 09, 2021
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 10, 2020	Dec. 09, 2021

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

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Test Data

Configuration Band IV (5725 - 5850 MHz)					
Mode	Test channel	Maximum Conducted Output Power (dBm)		FCC Limit (dBm)	Result
		Antenna port 1	Antenna port 2		
11a	CH149	12.41	13.02	30	PASS
11a	CH157	12.26	13.43	30	PASS
11a	CH165	12.29	13.74	30	PASS
11n(HT20)	CH149	11.90	12.30	30	PASS
11n(HT20)	CH157	11.88	13.04	30	PASS
11n(HT20)	CH165	11.97	13.34	30	PASS
11n(HT40)	CH151	12.92	13.67	30	PASS
11n(HT40)	CH159	12.46	13.90	30	PASS
11ac(HT20)	CH149	11.86	12.65	30	PASS
11ac(HT20)	CH157	12.00	13.08	30	PASS
11ac(HT20)	CH165	11.76	13.59	30	PASS
11ac(HT40)	CH151	12.87	13.80	30	PASS
11ac(HT40)	CH159	12.50	14.09	30	PASS
11ac(HT80)	CH155	12.44	13.82	30	PASS
11ax(HT20)	CH149	10.77	11.12	30	PASS
11ax(HT20)	CH157	10.87	12.18	30	PASS
11ax(HT20)	CH165	10.76	11.98	30	PASS
11ax(HT40)	CH151	11.48	12.94	30	PASS
11ax(HT40)	CH159	11.41	12.28	30	PASS
11ax(HT80)	CH155	11.29	12.39	30	PASS

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Configuration Band IV (5725 - 5850 MHz)				
Mode	Test channel	Maximum Conducted Output Power (dBm)	FCC Limit (dBm)	Result
		MIMO		
11n(HT20)	CH149	15.11	30	PASS
11n(HT20)	CH157	15.51	30	PASS
11n(HT20)	CH165	15.72	30	PASS
11n(HT40)	CH151	16.32	30	PASS
11n(HT40)	CH159	16.25	30	PASS
11ac(HT20)	CH149	15.28	30	PASS
11ac(HT20)	CH157	15.58	30	PASS
11ac(HT20)	CH165	15.78	30	PASS
11ac(HT40)	CH151	16.37	30	PASS
11ac(HT40)	CH159	16.38	30	PASS
11ac(HT80)	CH155	16.19	30	PASS
11ax(HT20)	CH157	13.96	30	PASS
11ax(HT20)	CH165	14.58	30	PASS
11ax(HT40)	CH151	14.42	30	PASS
11ax(HT40)	CH159	15.28	30	PASS
11ax(HT80)	CH155	14.88	30	PASS

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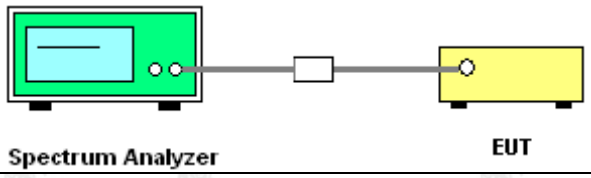
4.3. 6dB Emission Bandwidth

4.3.1. Test Specification

Test Requirement:	FCC CFR47 Part 15 Section 15.407(e)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v01r04 Section C
Limit:	>500kHz
Test Setup:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section C 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6dB bandwidth must be greater than 500 kHz. 4. Measure and record the results in the test report.
Test Result:	PASS

4.3.2. Test Instruments

RF Test Room					
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 10, 2020	Dec. 09, 2021
RF cable	Times	1-40G	HKE-034	Dec. 10, 2020	Dec. 09, 2021
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 10, 2020	Dec. 09, 2021

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

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4.3.3. Test data

ANT 1

Band IV (5725 - 5850 MHz)					
Mode	Test channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)	Result
11a	CH149	5745	15.520	0.5	PASS
11a	CH157	5785	15.640	0.5	PASS
11a	CH165	5825	15.520	0.5	PASS
11n(HT20)	CH149	5745	16.720	0.5	PASS
11n(HT20)	CH157	5785	17.600	0.5	PASS
11n(HT20)	CH165	5825	17.600	0.5	PASS
11n(HT40)	CH151	5755	35.440	0.5	PASS
11n(HT40)	CH159	5795	36.480	0.5	PASS
11ac(HT20)	CH149	5745	17.240	0.5	PASS
11ac(HT20)	CH157	5785	17.000	0.5	PASS
11ac(HT20)	CH165	5825	17.600	0.5	PASS
11ac(HT40)	CH151	5755	36.000	0.5	PASS
11ac(HT40)	CH159	5795	36.480	0.5	PASS
11ac(HT80)	CH155	5775	75.520	0.5	PASS
11ax(HT20)	CH149	5745	18.280	0.5	PASS
11ax(HT20)	CH157	5785	17.600	0.5	PASS
11ax(HT20)	CH165	5825	18.360	0.5	PASS
11ax(HT40)	CH151	5755	38.000	0.5	PASS
11ax(HT40)	CH159	5795	37.840	0.5	PASS
11ax(HT80)	CH155	5775	77.440	0.5	PASS

Test plots as follows:

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Band IV (5725 – 5850 MHz)

802.11a

Low

Mid

High

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802.11n(HT20)

Low

Mid

High

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802.11n(HT40)

Low

High

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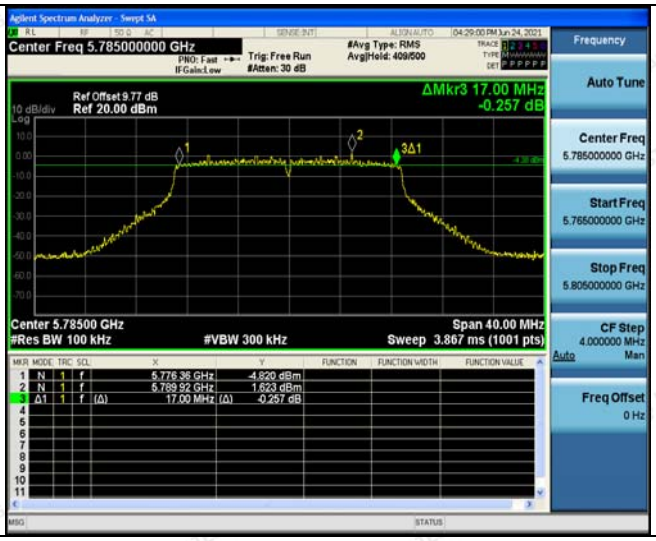
802.11ac(HT20)

Low



Mid

High

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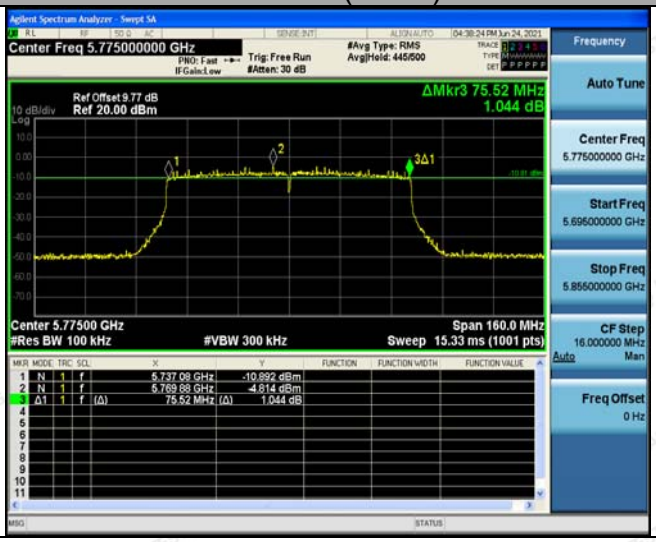
802.11ac(HT40)

Low

High

802.11ac(HT80)



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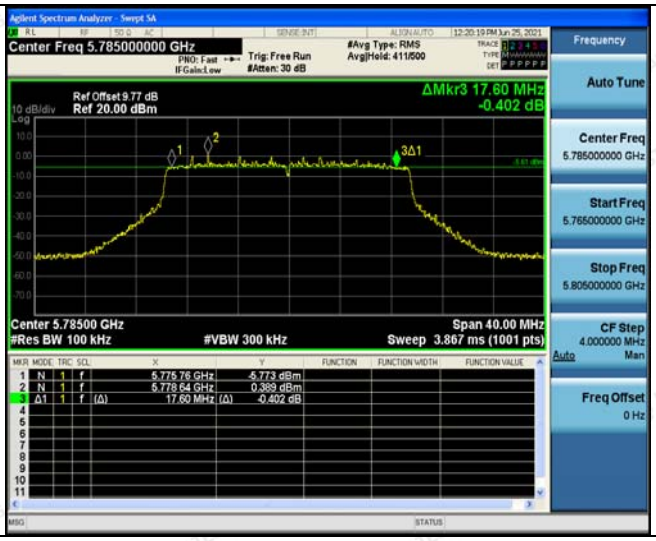
802.11ax(HT20)

Low



Mid

High

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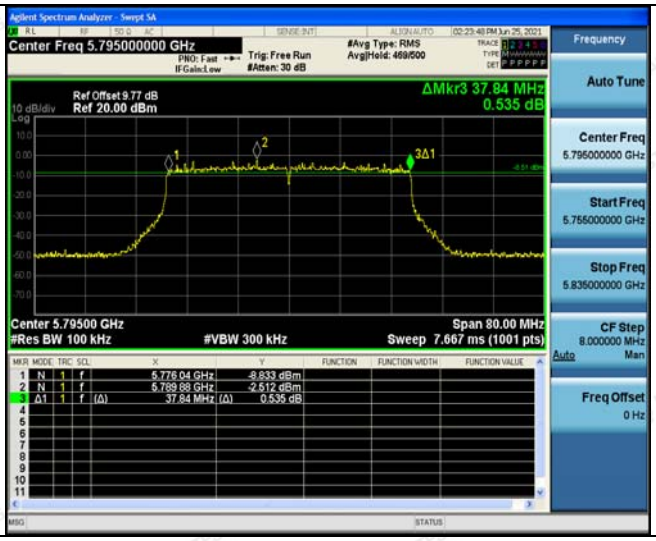
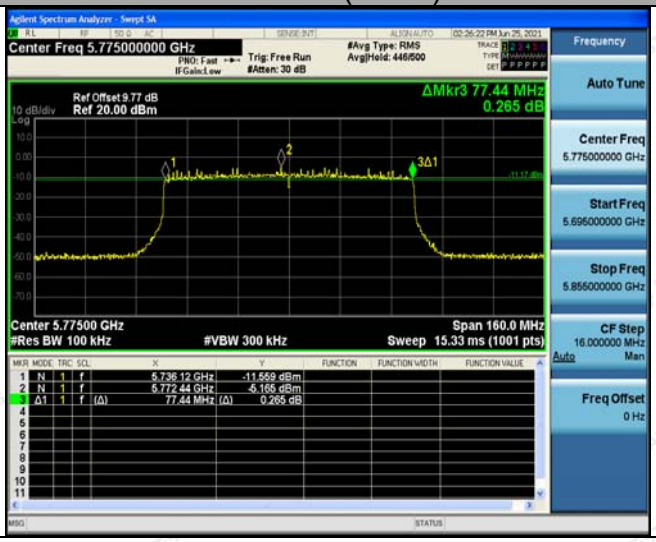
802.11ax(HT40)

Low



High

802.11ax(HT80)



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ANT 2

Band IV (5725 - 5850 MHz)					
Mode	Test channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)	Result
11a	CH149	5745	15.760	0.5	PASS
11a	CH157	5785	15.840	0.5	PASS
11a	CH161	5825	15.560	0.5	PASS
11n(HT20)	CH149	5745	16.600	0.5	PASS
11n(HT20)	CH157	5785	16.000	0.5	PASS
11n(HT20)	CH161	5825	16.360	0.5	PASS
11n(HT40)	CH151	5755	36.480	0.5	PASS
11n(HT40)	CH159	5795	36.480	0.5	PASS
11ac(HT20)	CH149	5745	17.000	0.5	PASS
11ac(HT20)	CH157	5785	17.360	0.5	PASS
11ac(HT20)	CH165	5825	16.320	0.5	PASS
11ac(HT40)	CH151	5755	36.480	0.5	PASS
11ac(HT40)	CH159	5795	35.920	0.5	PASS
11ac(HT80)	CH155	5755	75.360	0.5	PASS
11ax(HT20)	CH149	5745	17.640	0.5	PASS
11ax(HT20)	CH157	5785	18.640	0.5	PASS
11ax(HT20)	CH165	5825	16.960	0.5	PASS
11ax(HT40)	CH151	5755	38.000	0.5	PASS
11ax(HT40)	CH159	5795	38.080	0.5	PASS
11ax(HT80)	CH155	5755	76.480	0.5	PASS

Test plots as follows:

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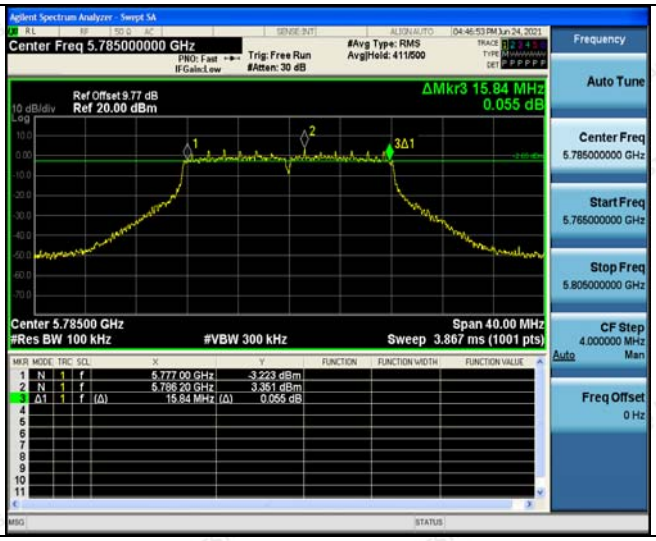
Band IV (5725 – 5850 MHz)

802.11a

Low



Mid

High

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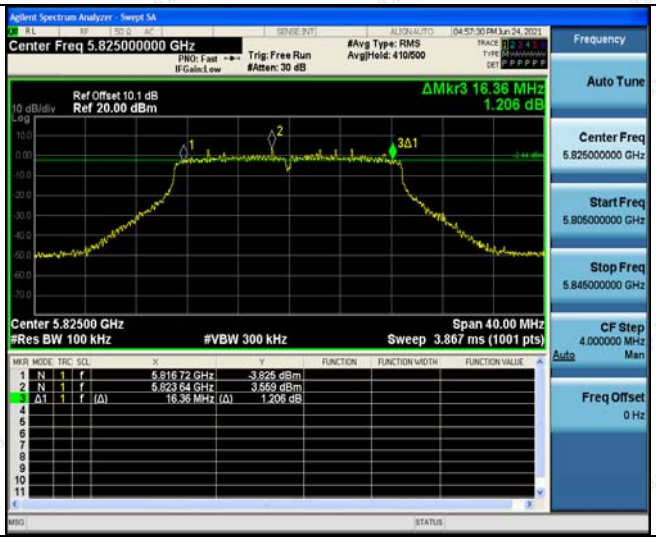
802.11n(HT20)

Low

Mid



High

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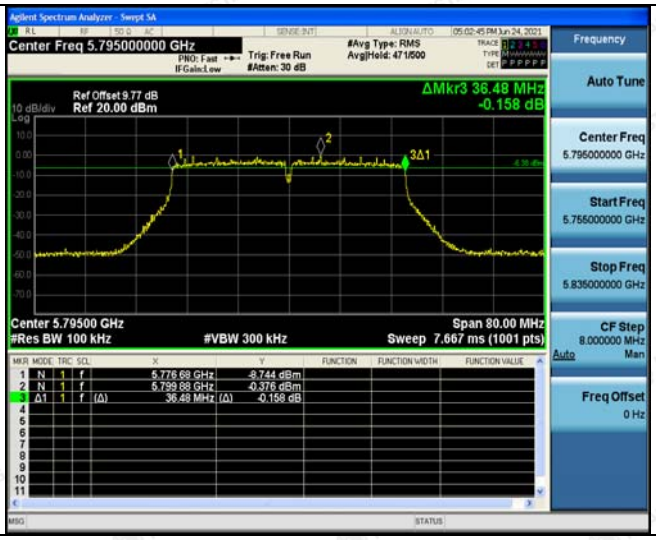
802.11n(HT40)

Low



High

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802.11ac(HT20)

Low

Mid

High

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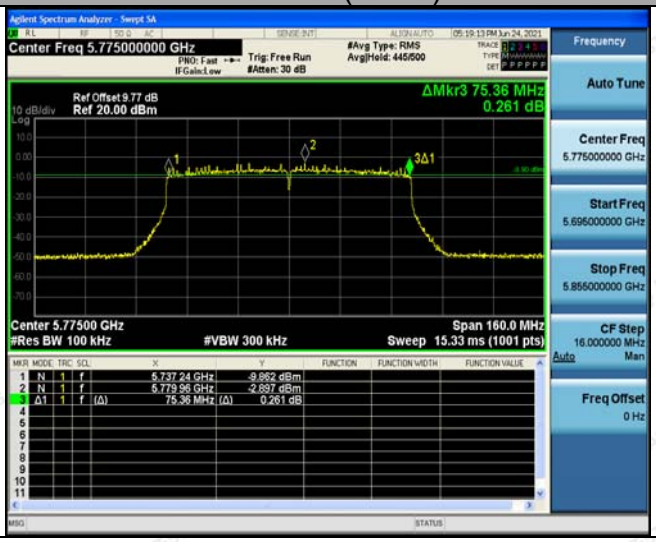
802.11ac(HT40)

Low

High

802.11ac(HT80)



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802.11ax(HT20)

Low

Mid

High

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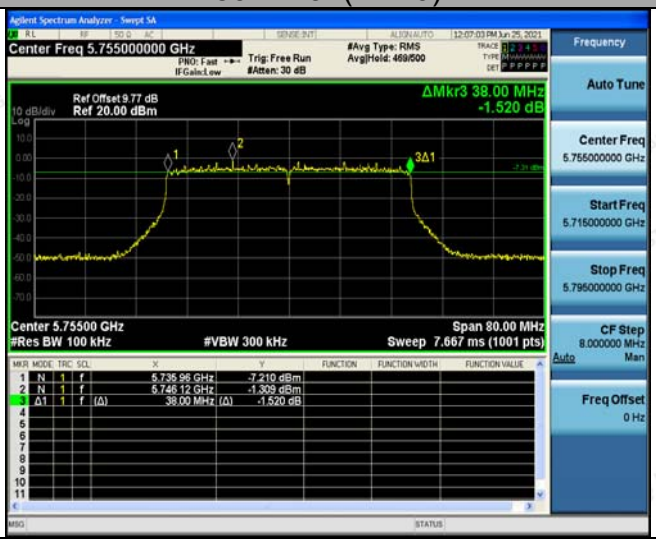
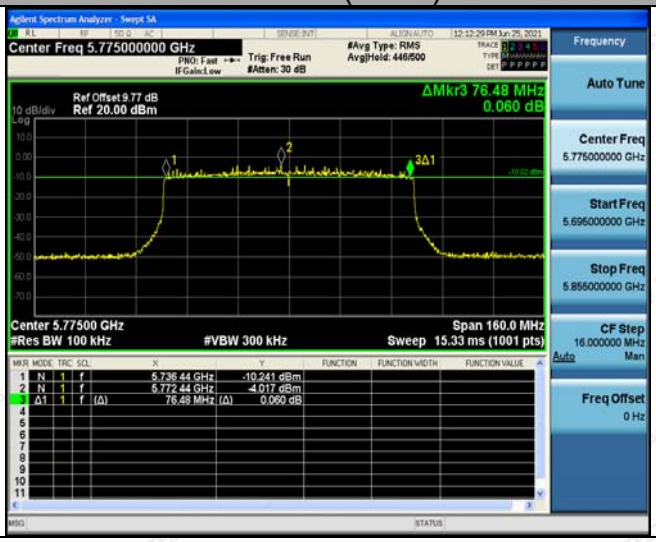
802.11ax(HT40)



Low

High

802.11ax(HT80)



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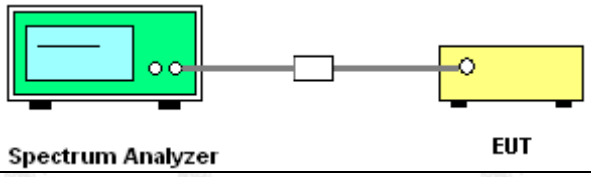
4.4. 26dB Bandwidth and 99% Occupied Bandwidth

4.4.1. Test Specification

Test Requirement:	47 CFR Part 15C Section 15.407 (a)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section C
Limit:	No restriction limits
Test Setup:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section C 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Make the measurement with the spectrum analyzer's resolution bandwidth RBW = 1% EBW, VBW≥3RBW, In order to make an accurate measurement. 4. Measure and record the results in the test report.
Test Result:	N/A

4.4.2. Test Instruments

RF Test Room					
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 10, 2020	Dec. 09, 2021
RF cable	Times	1-40G	HKE-034	Dec. 10, 2020	Dec. 09, 2021
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 10, 2020	Dec. 09, 2021

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

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4.4.3. Test Result

N/A

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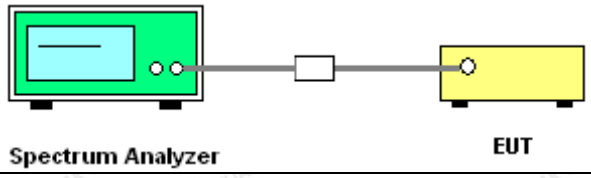
HUAK Testing Lab TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com
1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

4.5. Power Spectral Density

4.5.1. Test Specification

Test Requirement:	FCC Part15 E Section 15.407 (a)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section F
Limit:	≤30.00dBm/500KHz for Band IV 5725MHz-5850MHz
Test Setup:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. Set the spectrum analyzer or EMI receiver span to view the entire emission bandwidth. 1. Set RBW = 510 kHz/1 MHz, VBW ≥ 3*RBW, Sweep time = Auto, Detector = RMS. 2. Allow the sweeps to continue until the trace stabilizes. 3. Use the peak marker function to determine the maximum amplitude level. 4. The E.I.R.P spectral density used radiated test method. At a test site that has been validated using the procedures of ANSI C63.4 or the latest CISPR 16-1-4 for measurements above 1 GHz, so as to simulate a near free-space environment.
Test Result:	PASS

4.5.2. Test Instruments

RF Test Room					
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 10, 2020	Dec. 09, 2021
RF cable	Times	1-40G	HKE-034	Dec. 10, 2020	Dec. 09, 2021
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 10, 2020	Dec. 09, 2021

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

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4.5.3. Test data

ANT 1

Configuration Band IV (5725 - 5850 MHz)						
Mode	Test channel	Level [dBm/510kHz]	10log(500/510)	Power Spectral Density	Limit (dBm/500kHz)	Result
11a	CH149	5.49	-0.086	5.404	30	PASS
11a	CH157	5.39	-0.086	5.304	30	PASS
11a	CH165	5.55	-0.086	5.464	30	PASS
11n HT20	CH149	4.75	-0.086	4.664	30	PASS
11n HT20	CH157	4.93	-0.086	4.844	30	PASS
11n HT20	CH165	4.84	-0.086	4.754	30	PASS
11n HT40	CH151	2.91	-0.086	2.824	30	PASS
11n HT40	CH159	2.76	-0.086	2.674	30	PASS
11ac HT20	CH149	4.87	-0.086	4.784	30	PASS
11ac HT20	CH157	5.54	-0.086	5.454	30	PASS
11ac HT20	CH165	5.01	-0.086	4.924	30	PASS
11ac HT40	CH151	2.35	-0.086	2.264	30	PASS
11ac HT40	CH159	2.36	-0.086	2.274	30	PASS
11ac HT80	CH155	-0.23	-0.086	-0.316	30	PASS
11ax HT20	CH149	4.92	-0.086	4.834	30	PASS
11ax HT20	CH157	6.61	-0.086	6.524	30	PASS
11ax HT20	CH165	5.65	-0.086	5.564	30	PASS
11ax HT40	CH151	4.05	-0.086	3.964	30	PASS
11ax HT40	CH159	2.83	-0.086	2.744	30	PASS
11ax HT80	CH155	0.11	-0.086	0.024	30	PASS

Test plots as follows:

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Band IV (5725 – 5850 MHz)

802.11a

Low

Mid

High

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802.11n(HT20)

Low

Mid

High

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802.11n(HT40)

Low

High

802.11ac(HT20)

Low

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Mid

High

802.11ac(HT40)

Low

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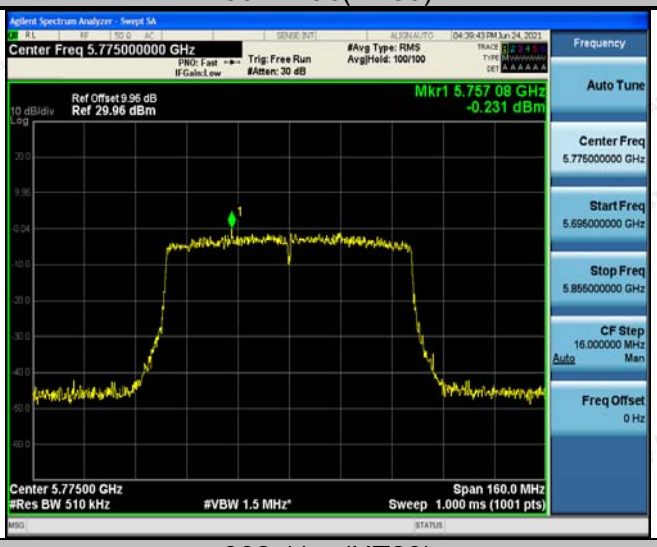
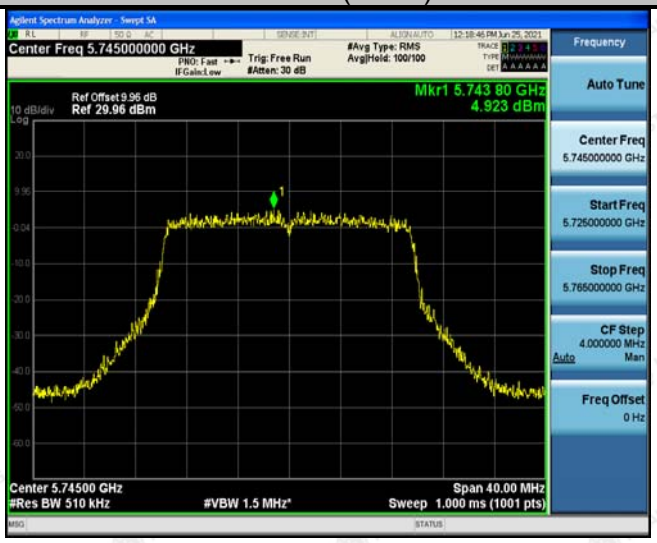
High

802.11ac(HT80)



802.11ax(HT20)



Low

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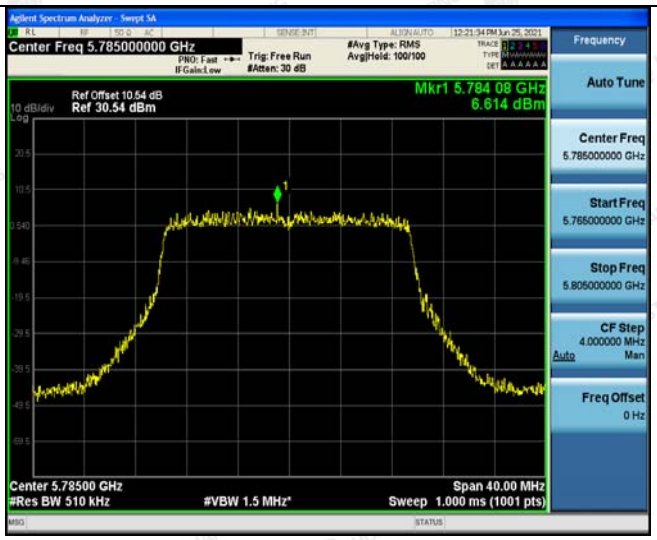
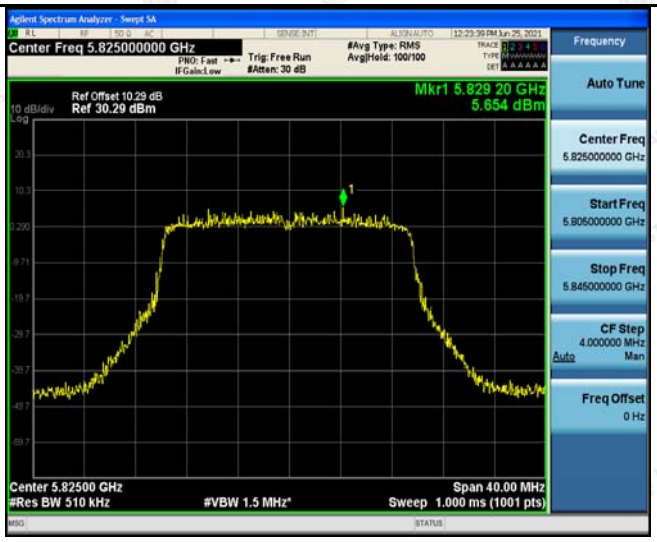
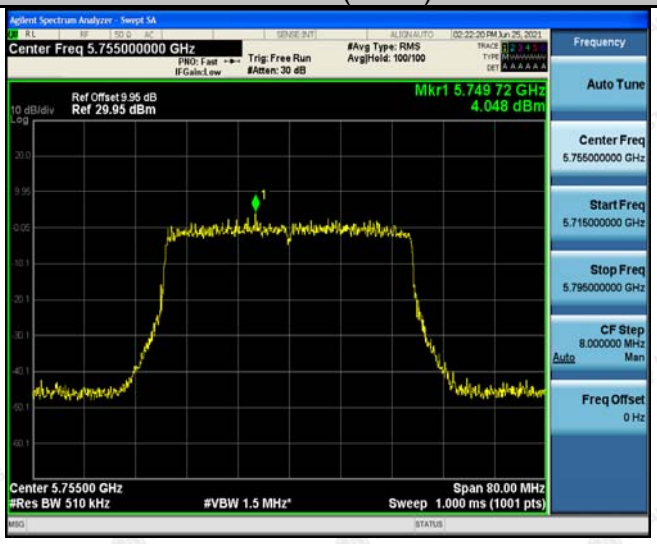


Mid



High

802.11ax(HT40)



Low

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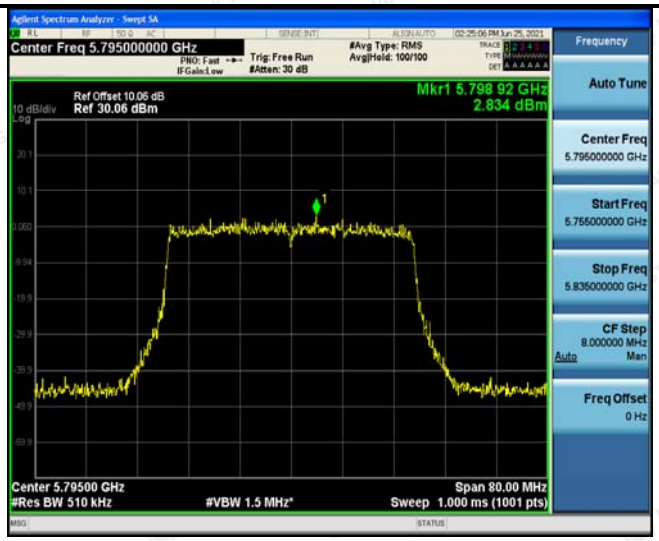
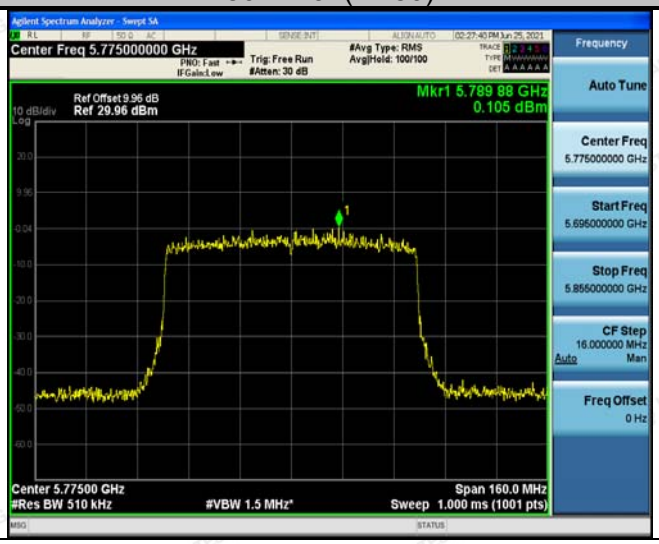


High

802.11ax(HT80)



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ANT 2

Configuration Band IV (5725 - 5850 MHz)						
Mode	Test channel	Level [dBm/500kHz]	10log(1/x) Factor[dB]	Power Spectral Density	Limit (dBm/500kHz)	Result
11a	CH149	6	-0.086	5.914	30	PASS
11a	CH157	7.19	-0.086	7.104	30	PASS
11a	CH161	7.45	-0.086	7.364	30	PASS
11n(HT20)	CH149	5.54	-0.086	5.454	30	PASS
11n(HT20)	CH157	6.4	-0.086	6.314	30	PASS
11n(HT20)	CH161	6.88	-0.086	6.794	30	PASS
11n(HT40)	CH151	3.25	-0.086	3.164	30	PASS
11n(HT40)	CH159	3.71	-0.086	3.624	30	PASS
11ac(HT20)	CH149	6.05	-0.086	5.964	30	PASS
11ac(HT20)	CH157	6.24	-0.086	6.154	30	PASS
11ac(HT20)	CH161	7.09	-0.086	7.004	30	PASS
11ac(HT40)	CH151	4.04	-0.086	3.954	30	PASS
11ac(HT40)	CH159	4.48	-0.086	4.394	30	PASS
11ac(HT80)	CH155	0.43	-0.086	0.344	30	PASS
11ax(HT20)	CH149	6.53	-0.086	6.444	30	PASS
11ax(HT20)	CH157	8.05	-0.086	7.964	30	PASS
11ax(HT20)	CH161	6.94	-0.086	6.854	30	PASS
11ax(HT40)	CH151	5.16	-0.086	5.074	30	PASS
11ax(HT40)	CH159	3.56	-0.086	3.474	30	PASS
11ax(HT80)	CH155	1.34	-0.086	1.254	30	PASS

limit=30dBm-(direction gain-6dBi)=30-(4.5+10log2-6)=28.5dBm

Test plots as follows:

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Band IV (5725 – 5850 MHz)

802.11a

Low

Mid

High

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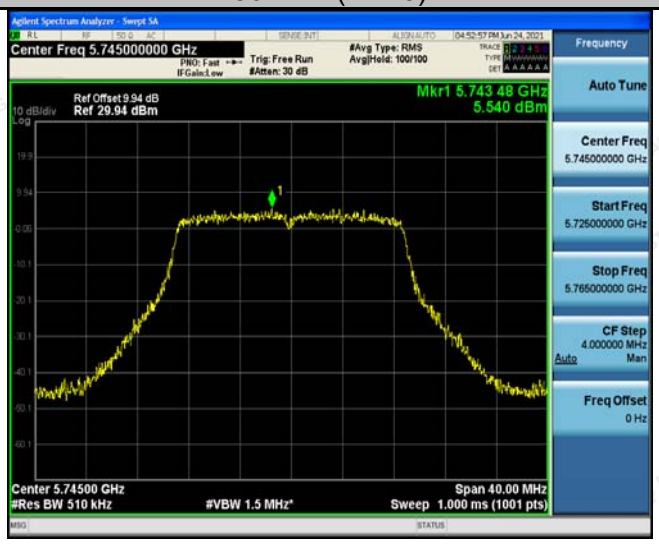
802.11n(HT20)



Low

Mid

High

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802.11n(HT40)

Low

High

802.11ac(HT20)

Low

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Mid

High

802.11ac(HT40)

Low

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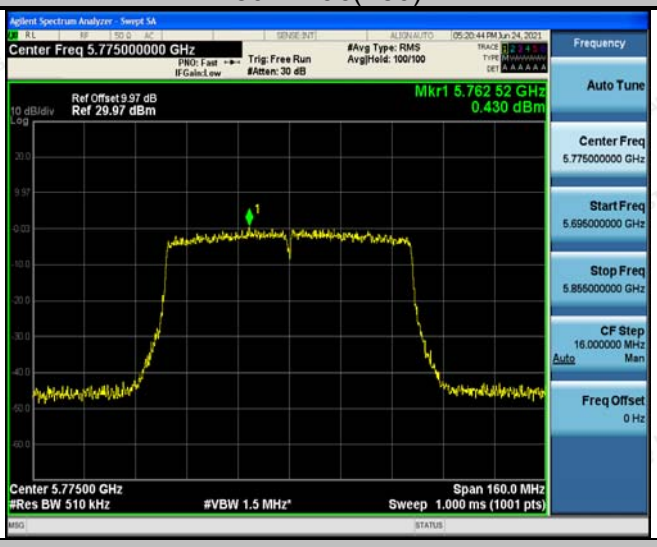
High

802.11ac(T80)



802.11ax(HT20)

Low

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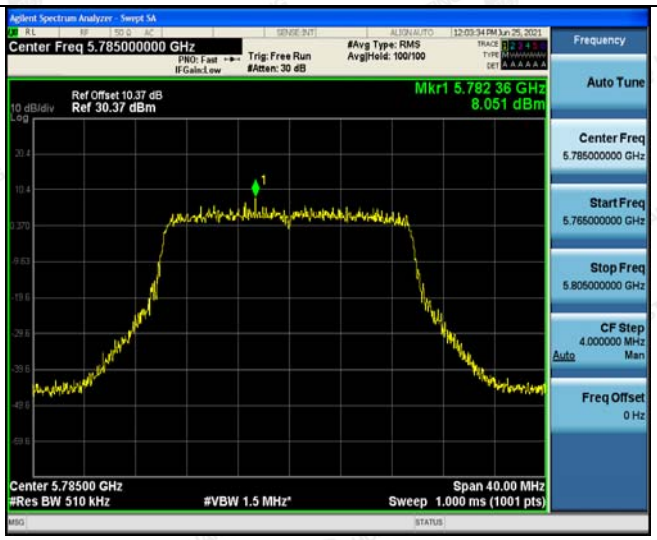

Mid

High

802.11ax(HT40)

Low

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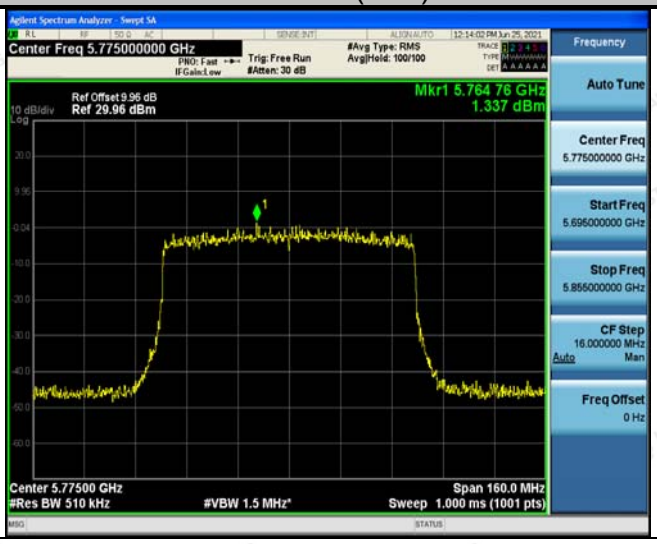
High

802.11ax(T80)



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For MIMO antenna port 1+antenna port 2

Configuration Band IV (5725 - 5850 MHz)				
Mode	Test channel	Power Density (dBm)	Limit (dBm)	Result
11a	CH149	/	30	/
11a	CH157	/	30	/
11a	CH161	/	30	/
11n(HT20)	CH149	8.17	30	PASS
11n(HT20)	CH157	8.74	30	PASS
11n(HT20)	CH161	8.99	30	PASS
11n(HT40)	CH151	6.09	30	PASS
11n(HT40)	CH159	6.27	30	PASS
11ac(HT20)	CH149	8.51	30	PASS
11ac(HT20)	CH157	8.91	30	PASS
11ac(HT20)	CH161	9.18	30	PASS
11ac(HT40)	CH151	6.29	30	PASS
11ac(HT40)	CH159	6.56	30	PASS
11ac(HT80)	CH155	3.12	30	PASS
11ax(HT20)	CH149	8.81	30	PASS
11ax(HT20)	CH157	10.40	30	PASS
11ax(HT20)	CH161	9.35	30	PASS
11ax(HT40)	CH151	7.65	30	PASS
11ax(HT40)	CH159	6.22	30	PASS
11ax(HT80)	CH155	3.78	30	PASS
	Note: 1 According to KDB 662911, Result power = $10\log(10^{(ant1/10)}+10^{(ant2/10)})$. 2 Result unit: W, The end result is converted to units of dBm.			

Note: This product supports antenna 1 and antenna 2 launch, but only support 802.11 n/ac for MIMO mode, not support 802.11 a for MIMO mode.

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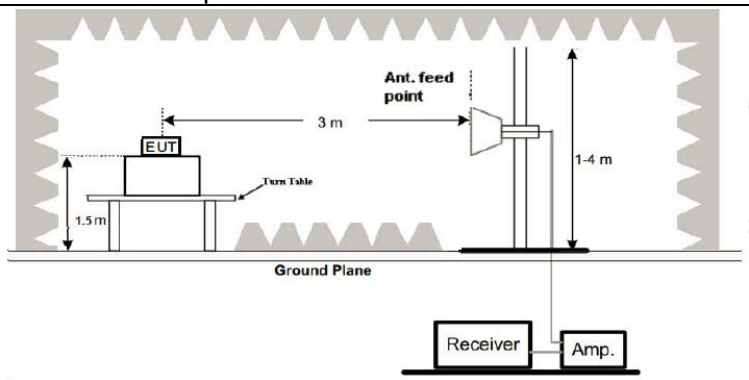
4.6. Band edge

4.6.1. Test Specification

Test Requirement:	FCC CFR47 Part 15E Section 15.407
Test Method:	ANSI C63.10 2013
Limit:	(1)For transmitters operating in the 5.725-5.85 GHz band: (i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. The limit of frequency below 1GHz and which fall in restricted ba nds should complies 15.209.
Test Setup:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

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	6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasipeak or average method as specified and then reported in a data sheet.
Test Result:	PASS

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4.6.2. Test Instruments

Radiated Emission Test Site (966)					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Receiver	R&S	ESRP3	HKE-005	Dec. 10, 2020	Dec. 09, 2021
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 10, 2020	Dec. 09, 2021
Preamplifier	EMCI	EMC051845SE	HKE-015	Dec. 10, 2020	Dec. 09, 2021
Preamplifier	Agilent	83051A	HKE-016	Dec. 10, 2020	Dec. 09, 2021
Loop antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 10, 2020	Dec. 09, 2021
Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	Dec. 10, 2020	Dec. 09, 2021
Horn antenna	Schwarzbeck	9120D	HKE-013	Dec. 10, 2020	Dec. 09, 2021
Antenna Mast	Keleto	CC-A-4M	N/A	N/A	N/A
Position controller	Taiwan MF	MF7802	HKE-011	Dec. 10, 2020	Dec. 09, 2021
Radiated test software	Tonscend	TS+ Rev 2.5.0.0	HKE-082	N/A	N/A
RF cable (9KHz-1GHz)	Times	381806-001	N/A	N/A	N/A
Hf antenna	Schwarzbeck	LB-180400-KF	HKE-031	Dec. 10, 2020	Dec. 09, 2021
RF cable	Tonscend	1-18G	HKE-099	Dec. 10, 2020	Dec. 09, 2021
RF cable	Times	1-40G	HKE-034	Dec. 10, 2020	Dec. 09, 2021
Horn Antenna	Schewarzbeck	BBHA 9170	HKE-017	Dec. 10, 2020	Dec. 09, 2021
Spectrum analyzer	R&S	FSP40	HKE-025	Dec. 10, 2020	Dec. 09, 2021

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

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4.6.3. Test Data

ANT 1

Operation Mode: 802.11a Mode with 5.8G TX CH Low

Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5650	56.17	-2.06	54.11	68.2	-14.09	peak
5700	88.03	-1.96	86.07	105.2	-19.13	peak
5720	95.71	-2.87	92.84	110.8	-17.96	peak
5725	110.32	-2.14	108.18	122.2	-14.02	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5650	59.32	-2.06	57.26	68.2	-10.94	peak
5700	87.45	-1.96	85.49	105.2	-19.71	peak
5720	95.36	-2.87	92.49	110.8	-18.31	peak
5725	111.73	-2.14	109.59	122.2	-12.61	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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Operation Mode: TX CH High with 5.8G

Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5850	110.39	-1.97	108.42	122.2	-13.78	peak
5855	96.62	-2.13	94.49	110.8	-16.31	peak
5875	88.39	-2.65	85.74	105.2	-19.46	peak
5925	53.66	-2.28	51.38	68.2	-16.82	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5850	105.32	-1.97	103.35	122.2	-18.85	peak
5855	94.25	-2.13	92.12	110.8	-18.68	peak
5875	88.37	-2.65	85.72	105.2	-19.48	peak
5925	54.16	-2.28	51.88	68.2	-16.32	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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Operation Mode: 802.11n20 Mode with 5.8G TX CH Low

Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5650	57.19	-2.06	55.13	68.2	-13.07	peak
5700	90.35	-1.96	88.39	105.2	-16.81	peak
5720	96.38	-2.87	93.51	110.8	-17.29	peak
5725	113.4	-2.14	111.26	122.2	-10.94	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5650	58.64	-2.06	56.58	68.2	-11.62	peak
5700	96.34	-1.96	94.38	105.2	-10.82	peak
5720	96.78	-2.87	93.91	110.8	-16.89	peak
5725	112.02	-2.14	109.88	122.2	-12.32	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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Operation Mode: TX CH High with 5.8G
Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5850	111.34	-1.97	109.37	122.2	-12.83	peak
5855	95.67	-2.13	93.54	110.8	-17.26	peak
5875	95.33	-2.65	92.68	105.2	-12.52	peak
5925	54.79	-2.28	52.51	68.2	-15.69	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5850	107.82	-1.97	105.85	122.2	-16.35	peak
5855	94.36	-2.13	92.23	110.8	-18.57	peak
5875	88.47	-2.65	85.82	105.2	-19.38	peak
5925	57.34	-2.28	55.06	68.2	-13.14	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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Operation Mode: 802.11n40 Mode with 5.8G TX CH Low

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5650	58.64	-2.06	56.58	68.2	-11.62	peak
5700	93.15	-1.96	91.19	105.2	-14.01	peak
5720	94.35	-2.87	91.48	110.8	-19.32	peak
5725	110.44	-2.14	108.3	122.2	-13.9	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5650	59.32	-2.06	57.26	68.2	-10.94	peak
5700	92.32	-1.96	90.36	105.2	-14.84	peak
5720	95.32	-2.87	92.45	110.8	-18.35	peak
5725	110.62	-2.14	108.48	122.2	-13.72	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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Operation Mode: TX CH High with 5.8G
Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5850	106.25	-1.97	104.28	122.2	-17.92	peak
5855	93.69	-2.13	91.56	110.8	-19.24	peak
5875	88.47	-2.65	85.82	105.2	-19.38	peak
5925	54.13	-2.28	51.85	68.2	-16.35	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5850	107.89	-1.97	105.92	122.2	-16.28	peak
5855	93.25	-2.13	91.12	110.8	-19.68	peak
5875	88.64	-2.65	85.99	105.2	-19.21	peak
5925	54.54	-2.28	52.26	68.2	-15.94	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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Operation Mode: 802.11ac20 Mode with 5.8G TX CH Low

Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5650	57.64	-2.06	55.58	68.2	-12.62	peak
5700	88.14	-1.96	86.18	105.2	-19.02	peak
5720	95.35	-2.87	92.48	110.8	-18.32	peak
5725	110.45	-2.14	108.31	122.2	-13.89	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5650	58.64	-2.06	56.58	68.2	-11.62	peak
5700	91.35	-1.96	89.39	105.2	-15.81	peak
5720	95.95	-2.87	93.08	110.8	-17.72	peak
5725	110.45	-2.14	108.31	122.2	-13.89	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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Operation Mode: TX CH High with 5.8G

Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5850	110.65	-1.97	108.68	122.2	-13.52	peak
5855	95.35	-2.13	93.22	110.8	-17.58	peak
5875	89.98	-2.65	87.33	105.2	-17.87	peak
5925	54.22	-2.28	51.94	68.2	-16.26	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5850	110.39	-1.97	108.42	122.2	-13.78	peak
5855	93.65	-2.13	91.52	110.8	-19.28	peak
5875	88.47	-2.65	85.82	105.2	-19.38	peak
5925	56.25	-2.28	53.97	68.2	-14.23	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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Operation Mode: 802.11ac40 Mode with 5.8G TX CH Low

Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5650	58.61	-2.06	56.55	68.2	-11.65	peak
5700	88.92	-1.96	86.96	105.2	-18.24	peak
5720	94.34	-2.87	91.47	110.8	-19.33	peak
5725	110.28	-2.14	108.14	122.2	-14.06	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5650	57.62	-2.06	55.56	68.2	-12.64	peak
5700	89.65	-1.96	87.69	105.2	-17.51	peak
5720	94.15	-2.87	91.28	110.8	-19.52	peak
5725	111.28	-2.14	109.14	122.2	-13.06	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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Operation Mode: TX CH High with 5.8G

Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5850	113.62	-1.97	111.65	122.2	-10.55	peak
5855	94.27	-2.13	92.14	110.8	-18.66	peak
5875	88.33	-2.65	85.68	105.2	-19.52	peak
5925	56.38	-2.28	54.1	68.2	-14.1	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5850	112.08	-1.97	110.11	122.2	-12.09	peak
5855	93.65	-2.13	91.52	110.8	-19.28	peak
5875	89.72	-2.65	87.07	105.2	-18.13	peak
5925	60.24	-2.28	57.96	68.2	-10.24	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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Operation Mode: 802.11ac80 Mode with 5.8G TX CH Low

Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5650	57.29	-2.06	55.23	68.2	-12.97	peak
5700	89.98	-1.96	88.02	105.2	-17.18	peak
5720	94.36	-2.87	91.49	110.8	-19.31	peak
5725	110.26	-2.14	108.12	122.2	-14.08	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5650	57.74	-2.06	55.68	68.2	-12.52	peak
5700	90.32	-1.96	88.36	105.2	-16.84	peak
5720	94.36	-2.87	91.49	110.8	-19.31	peak
5725	111.25	-2.14	109.11	122.2	-13.09	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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