



FCC Test Report

**Test report
On Behalf of
Antaira Technologies, LLC.
For
Outdoor CPE
Model No.: AMY-5133-AC-PD(-T), ARY-5133-AC-PD(-T),
AGY-5133-AC-PD(-T)
FCC ID: SGS-AMY5133ACPD**

Prepared For : Antaira Technologies, LLC.
445 Capricorn St Brea, California 92821 United States

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: Sept. 12, 2023 ~ Jan. 16, 2024
Date of Report: Jan. 16, 2024
Report Number: HK2309124188-2E



Test Result Certification

Applicant's name : Antaira Technologies, LLC.
Address..... : 445 Capricorn St Brea, California 92821 United States
Manufacturer's Name..... : Antaira Technologies, LLC.
Address..... : 445 Capricorn St Brea, California 92821 United States

Product description

Trade Mark: ANTAIRA
Product name..... : Outdoor CPE
Model and/or type reference : AMY-5133-AC-PD(-T), ARY-5133-AC-PD(-T), AGY-5133-AC-PD(-T)
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..... : Sept. 12, 2023 ~ Jan. 16, 2024
Date of Issue : Jan. 16, 2024
Test Result..... : Pass

Testing Engineer : Len Liao
 (Len Liao)

Technical Manager : Sliver Wan
 (Sliver Wan)

Authorized Signatory : Jason Zhou
 (Jason Zhou)

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**** Modified History ****

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Jan. 16, 2024	Jason Zhou



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.



1.3. Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expanded 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	$\pm 0.37\text{dB}$
2	RF power, conducted	$\pm 3.35\text{dB}$
3	Spurious emissions, conducted	$\pm 2.20\text{dB}$
4	All emissions, radiated(<1G)	$\pm 3.90\text{dB}$
5	All emissions, radiated(>1G)	$\pm 4.28\text{dB}$
6	Temperature	$\pm 0.1^\circ\text{C}$
7	Humidity	$\pm 1.0\%$



2. EUT Description

2.1. General Description of EUT

Equipment:	Outdoor CPE
Model Name:	AMY-5133-AC-PD(-T)
Serial Model:	ARY-5133-AC-PD(-T), AGY-5133-AC-PD(-T)
Model Difference:	All model's the function, software and electric circuit are the same, only with a product color and model named different. Test sample mode: AMY-5133-AC-PD(-T).
Trade Mark:	ANTAIRA
FCC ID:	SGS-AMY5133ACPD
Operation Frequency:	IEEE 802.11a/n/ac (HT20)5.745GHz-5.825GHz IEEE 802.11n/ac (HT40)5.755GHz-5.795GHz IEEE 802.11ac (HT80) 5.775GHz
Modulation Technology:	IEEE 802.11a/n/ac
Modulation Type:	OFDM, OFDMA
Antenna Type:	Internal Antenna
Antenna Gain:	Antenna 1:14dBi Antenna 2:14dBi MIMO: 17.01dBi
Power Source:	DC 48V From POE Power or DC 12V From DC Power
Power Supply:	DC 48V From POE Power or DC 12V From DC Power
Hardware Version:	V2.0
Software Version:	V2.0
<p>Note: The EUT incorporates a MIMO function. Physically, it provides two completed transmitters 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)</p>	



2.2. Operation Frequency Each of Channel

802.11a/802.11n(HT20) 802.11ac(HT20)		802.11n(HT40) 802.11ac(HT40)		802.11ac(HT80)	
Channel	Frequency	Channel	Frequency	Channel	Frequency
149	5745	151	5755	155	5775
153	5765	159	5795		
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)		
Channel Number	Channel	Frequency (MHz)
149	Low	5745
157	Mid	5785
165	High	5825

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

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

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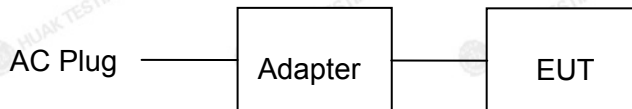


2.4. Description of Test Setup

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



Operation of EUT during Above1GHz Radiation testing:



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.



2.5. 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.

Item	Equipment	Trade Mark	Model/Type No.	Specification	Remark
1	Outdoor CPE	ANTAIRA	AMY-5133-AC-PD(-T)	N/A	EUT
2	DATA cable	N/A	N/A	Length: 0.93m	Accessory
3	Laptop	Lenovo	TP00096A	Input: DC 20V, 2.25A/3.25A	Peripheral
4	Adapter	N/A	GRT-POE15-480050	Input: AC100-240V, 50/60Hz, 0.8A Output: 48V, 500mA	Peripheral
5	RF Cable	N/A	N/A	Length: 0.1m	Peripheral

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, 6db 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.



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
<p>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.</p>	

<p>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:</p>	
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
Final Test Mode:	
Operation mode:	Keep the EUT in continuous transmitting with modulation

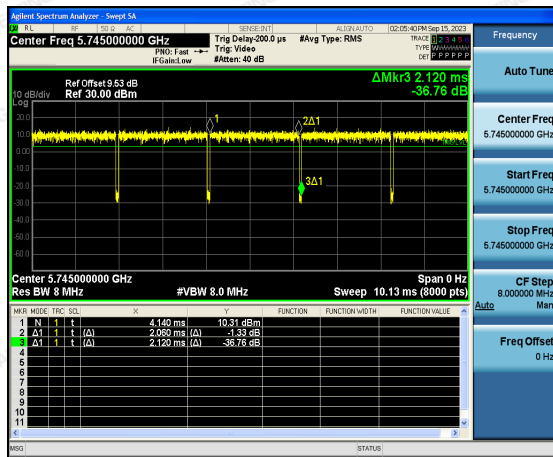


Mode Test Duty Cycle: ANT.1

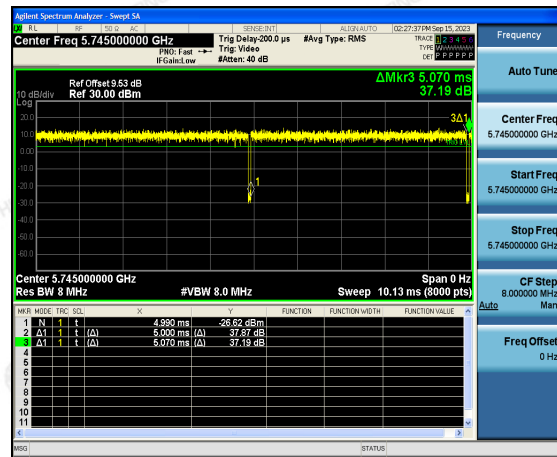
Mode	Duty Cycle	Duty Cycle Factor (dB)
802.11a	0.97	-0.13
802.11n(HT20)	0.99	-0.04
802.11n(HT40)	0.97	-0.13
802.11ac(HT20)	0.99	-0.04
802.11ac(HT40)	0.97	-0.13
802.11ac(HT80)	0.95	-0.22

Test plots as follows:

802.11a

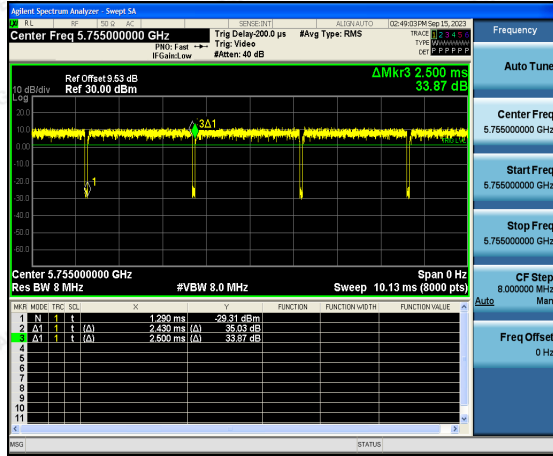


802.11n(HT20)

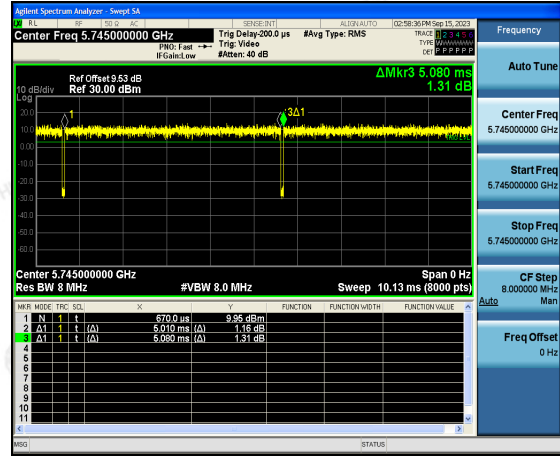




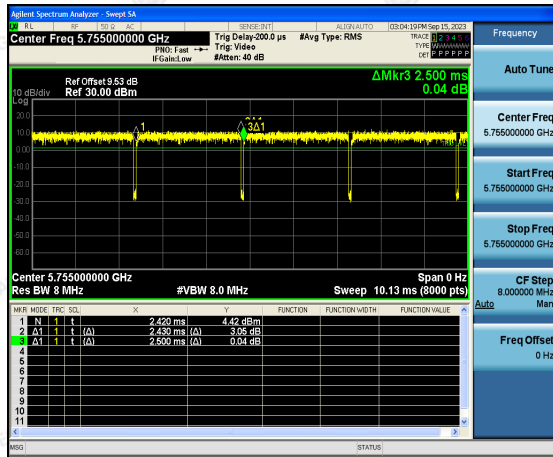
802.11n(HT40)



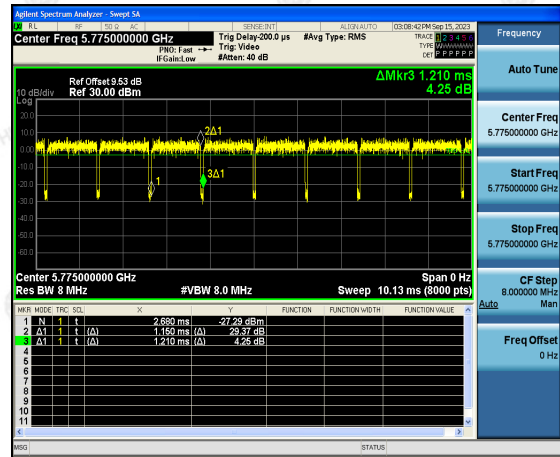
802.11ac(HT20)



802.11ac(HT40)



802.11ac(HT80)



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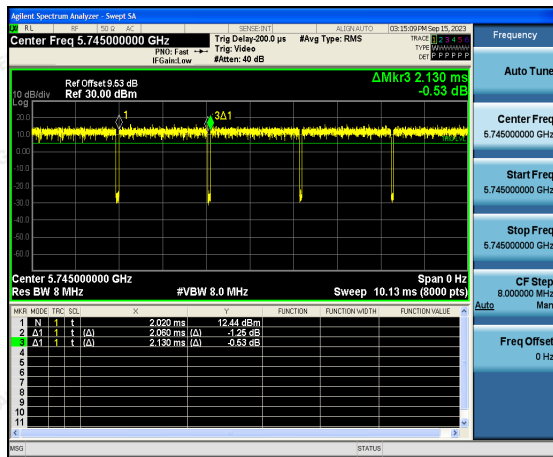


Mode Test Duty Cycle: ANT.2

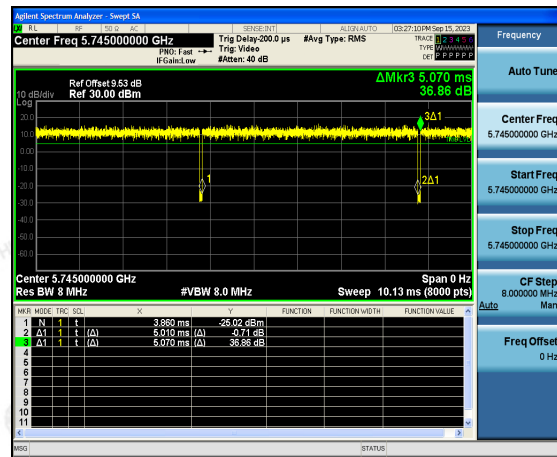
Mode	Duty Cycle	Duty Cycle Factor (dB)
802.11a	0.97	-0.13
802.11n(HT20)	0.99	-0.04
802.11n(HT40)	0.97	-0.13
802.11ac(HT20)	0.99	-0.04
802.11ac(HT40)	0.98	-0.09
802.11ac(HT80)	0.95	-0.22

Test plots as follows:

802.11a

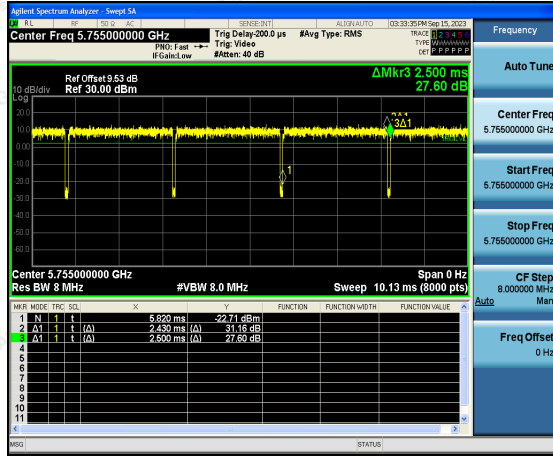


802.11n(HT20)

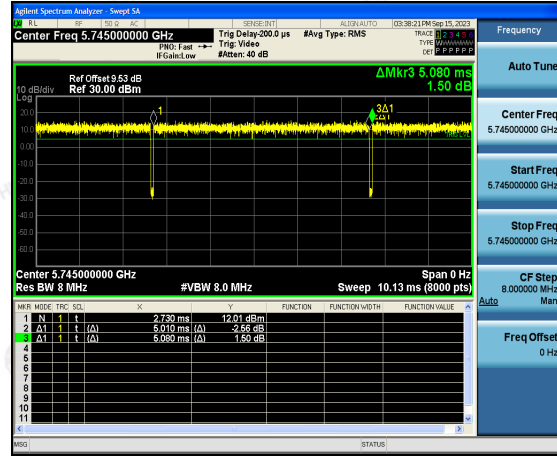




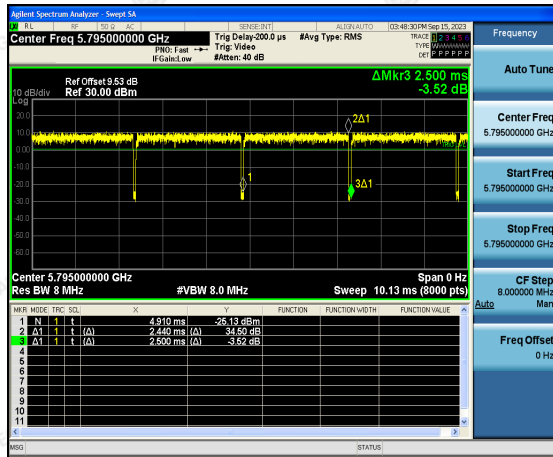
802.11n(HT40)



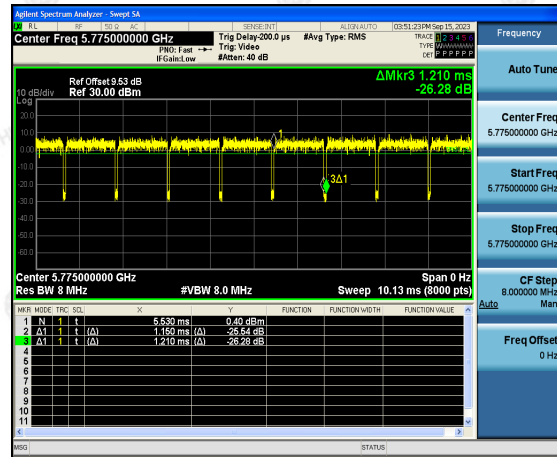
802.11ac(HT20)



802.11ac(HT40)



802.11ac(HT80)



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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:	<p><i>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</i></p>		
Test Mode:	Tx Mode		
Test Procedure:	<ol style="list-style-type: none"> 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

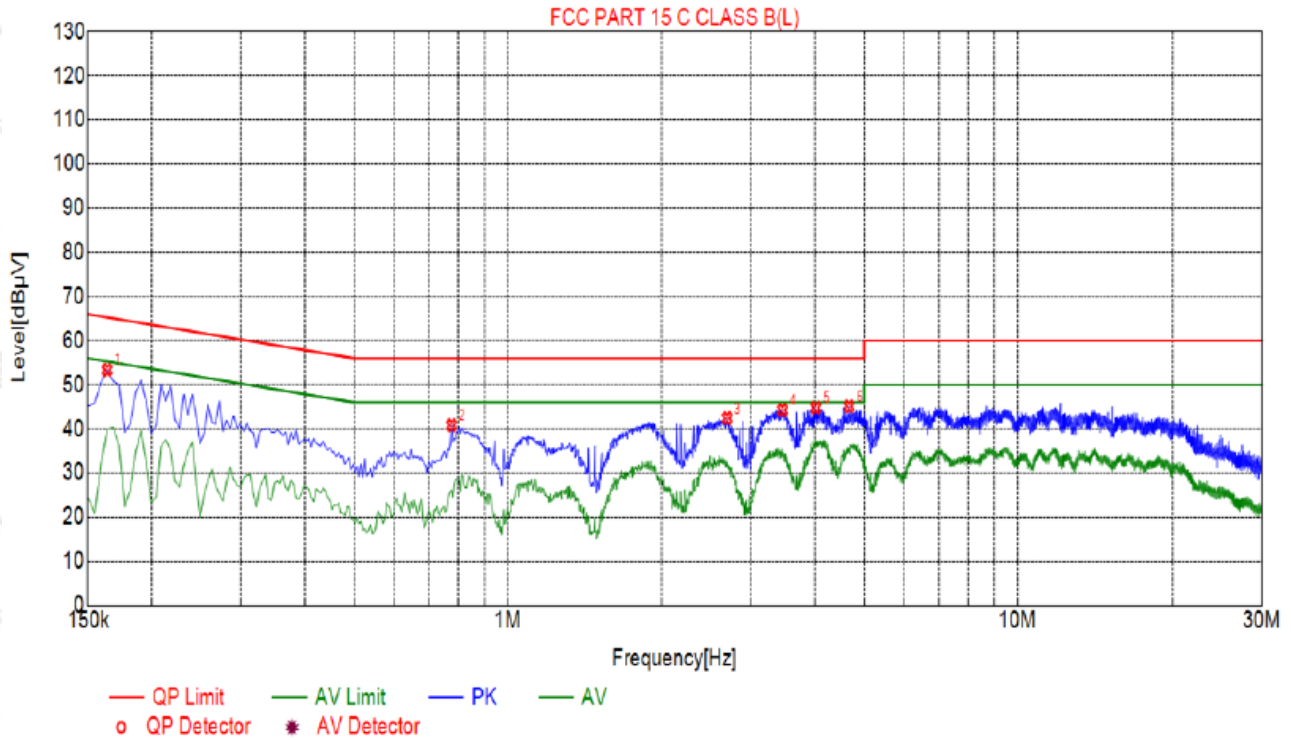
Conducted Emission Shielding Room Test Site (843)					
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Receiver	R&S	ESR-7	HKE-005	Feb. 17, 2023	Feb. 16, 2024
LISN	R&S	ENV216	HKE-002	Feb. 17, 2023	Feb. 16, 2024
Coax cable (9KHz-30MHz)	Times	381806-00 2	N/A	Feb. 17, 2023	Feb. 16, 2024
10dB Attenuator	Schwarzbeck	VTSD9561 F	HKE-153	Feb. 17, 2023	Feb. 16, 2024
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).



4.1.3. Test data

Test Specification: Line

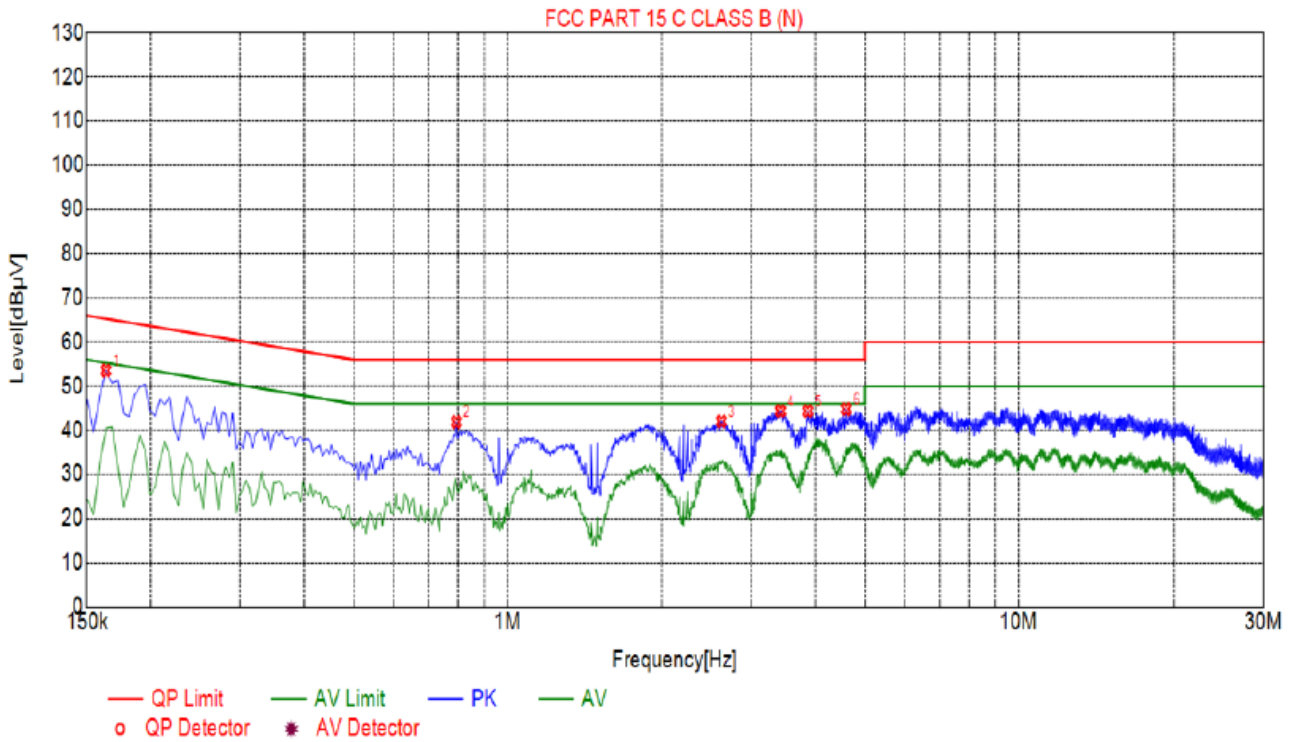


Suspected List								
NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Reading [dBµV]	Detector	Type
1	0.1635	53.38	19.98	65.28	11.90	33.40	PK	L
2	0.7755	40.81	20.05	56.00	15.19	20.76	PK	L
3	2.6925	42.42	20.21	56.00	13.58	22.21	PK	L
4	3.4575	44.27	20.25	56.00	11.73	24.02	PK	L
5	4.0200	44.81	20.25	56.00	11.19	24.56	PK	L
6	4.6725	45.09	20.26	56.00	10.91	24.83	PK	L

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



Test Specification: Neutral



Suspected List								
NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Reading [dBµV]	Detector	Type
1	0.1635	53.57	19.98	65.28	11.71	33.59	PK	N
2	0.7935	41.89	20.05	56.00	14.11	21.84	PK	N
3	2.6205	42.03	20.21	56.00	13.97	21.82	PK	N
4	3.4215	44.38	20.24	56.00	11.62	24.14	PK	N
5	3.8670	44.36	20.25	56.00	11.64	24.11	PK	N
6	4.5960	44.82	20.25	56.00	11.18	24.57	PK	N

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

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:	<table border="1"> <thead> <tr> <th>Frequency Band (MHz)</th> <th>Limit</th> </tr> </thead> <tbody> <tr> <td>5725-5850</td> <td>1 W</td> </tr> </tbody> </table>	Frequency Band (MHz)	Limit	5725-5850	1 W
	Frequency Band (MHz)	Limit			
5725-5850	1 W				
Test Setup:	<p>The diagram shows a green Power meter connected to a yellow EUT (Equipment Under Test) through a white attenuator. The connection is made via RF cables.</p>				
Test Mode:	Transmitting mode with modulation				
Test Procedure:	<ol style="list-style-type: none"> 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. 4. Measure the conducted output power and record the results in the test report. 				
Test Result:	PASS				
Remark:	<p>Conducted output power= measurement power +10log(1/x) X is duty cycle=1, so 10log(1/1)=0</p> <p>Conducted output power= measurement power</p>				



4.2.2. Test Instruments

RF Test Room					
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 17, 2023	Feb. 16, 2024
Power meter	Agilent	E4419B	HKE-085	Feb. 17, 2023	Feb. 16, 2024
Power Sensor	Agilent	E9300A	HKE-086	Feb. 17, 2023	Feb. 16, 2024
RF cable	Times	1-40G	HKE-034	Feb. 17, 2023	Feb. 16, 2024
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 17, 2023	Feb. 16, 2024

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



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	MIMO		
11a	CH149	10.94	11.28	/	30	PASS
11a	CH157	8.80	10.04	/	30	PASS
11a	CH165	8.45	10.59	/	30	PASS
11n(HT20)	CH149	7.97	9.84	12.02	30	PASS
11n(HT20)	CH157	8.61	9.74	12.22	30	PASS
11n(HT20)	CH165	8.23	10.30	12.40	30	PASS
11n(HT40)	CH151	9.77	10.66	13.25	30	PASS
11n(HT40)	CH159	8.08	9.22	11.70	30	PASS
11ac(HT20)	CH149	8.00	9.83	12.02	30	PASS
11ac(HT20)	CH157	8.62	9.74	12.23	30	PASS
11ac(HT20)	CH165	8.17	10.31	12.38	30	PASS
11ac(HT40)	CH151	9.88	10.62	13.28	30	PASS
11ac(HT40)	CH159	7.98	9.18	11.63	30	PASS
11ac(HT80)	CH155	7.40	8.39	10.93	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:	 <p style="text-align: center;">Spectrum Analyzer EUT</p>
Test Mode:	Transmitting mode with modulation
Test Procedure:	<ol style="list-style-type: none"> 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	Feb. 17, 2023	Feb. 16, 2024
RF cable	Times	1-40G	HKE-034	Feb. 17, 2023	Feb. 16, 2024
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 17, 2023	Feb. 16, 2024

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



4.3.3. Test data

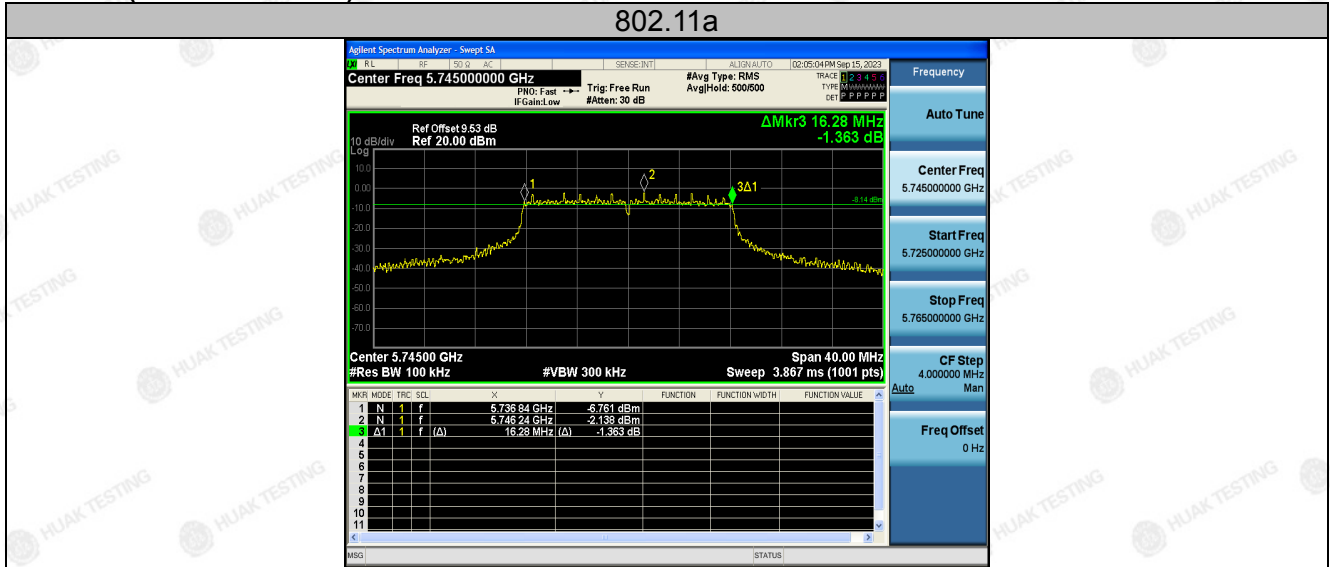
ANT 1

Band IV (5725 - 5850 MHz)					
Mode	Test channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)	Result
11a	CH149	5745	16.28	0.5	PASS
11a	CH157	5785	16.28	0.5	PASS
11a	CH165	5825	16.32	0.5	PASS
11n(HT20)	CH149	5745	17.32	0.5	PASS
11n(HT20)	CH157	5785	17.20	0.5	PASS
11n(HT20)	CH165	5825	17.32	0.5	PASS
11n(HT40)	CH151	5755	33.84	0.5	PASS
11n(HT40)	CH159	5795	35.04	0.5	PASS
11ac(HT20)	CH149	5745	17.28	0.5	PASS
11ac(HT20)	CH157	5785	17.28	0.5	PASS
11ac(HT20)	CH165	5825	17.28	0.5	PASS
11ac(HT40)	CH151	5755	35.04	0.5	PASS
11ac(HT40)	CH159	5795	33.84	0.5	PASS
11ac(HT80)	CH155	5775	75.84	0.5	PASS

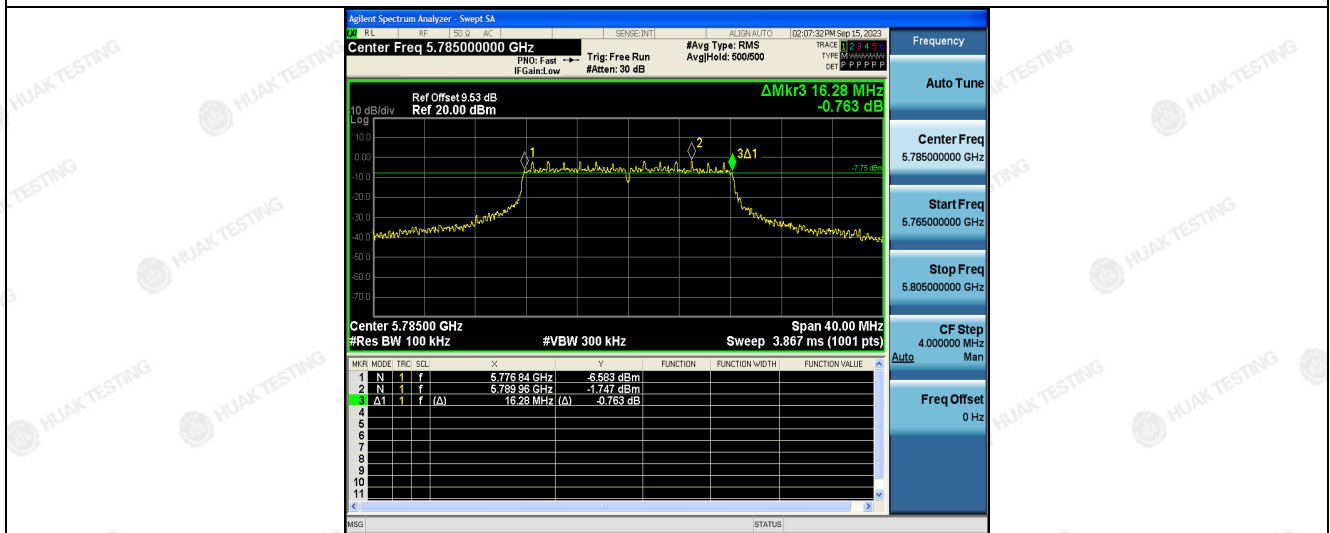
Test plots as follows:



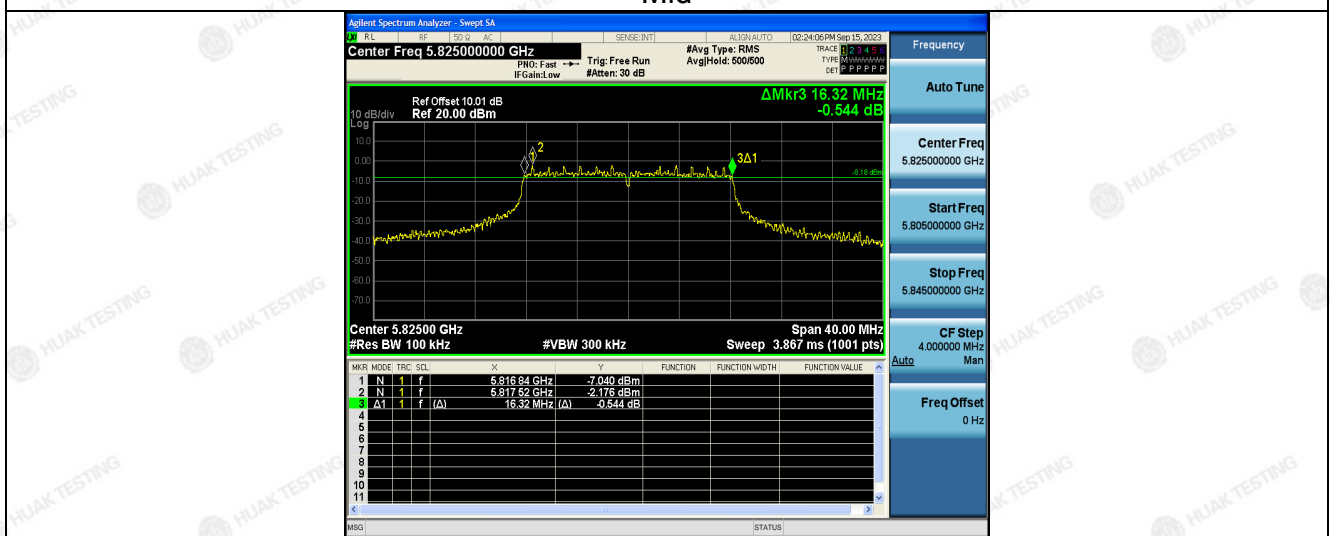
Band IV (5725 – 5850 MHz)



Low



Mid

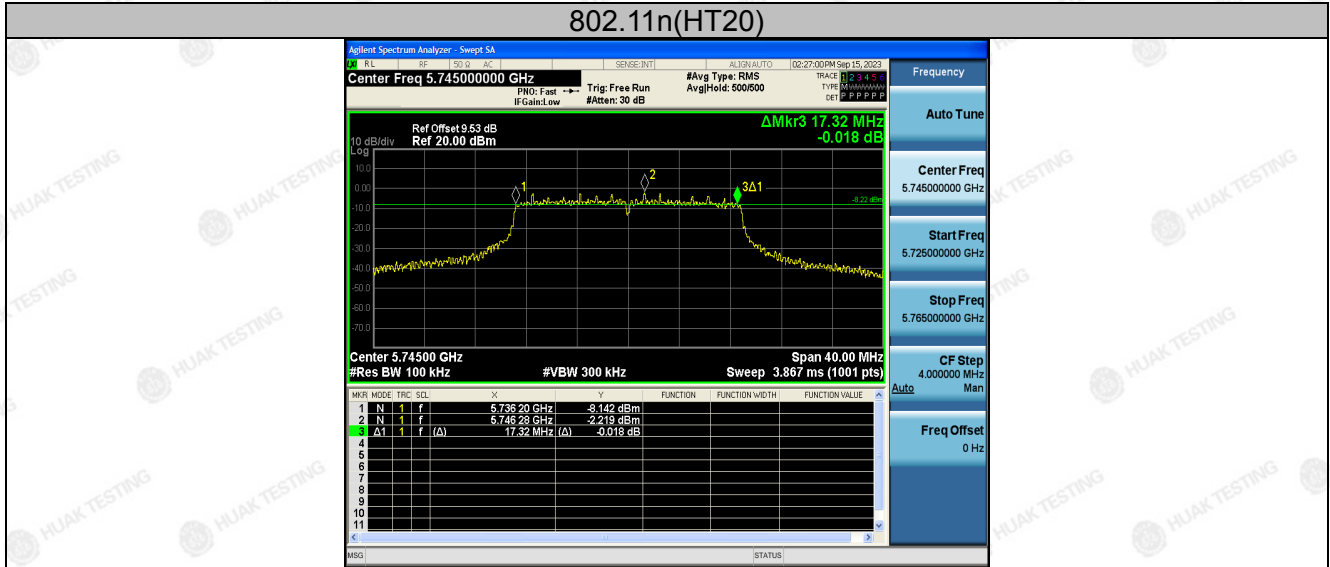


High

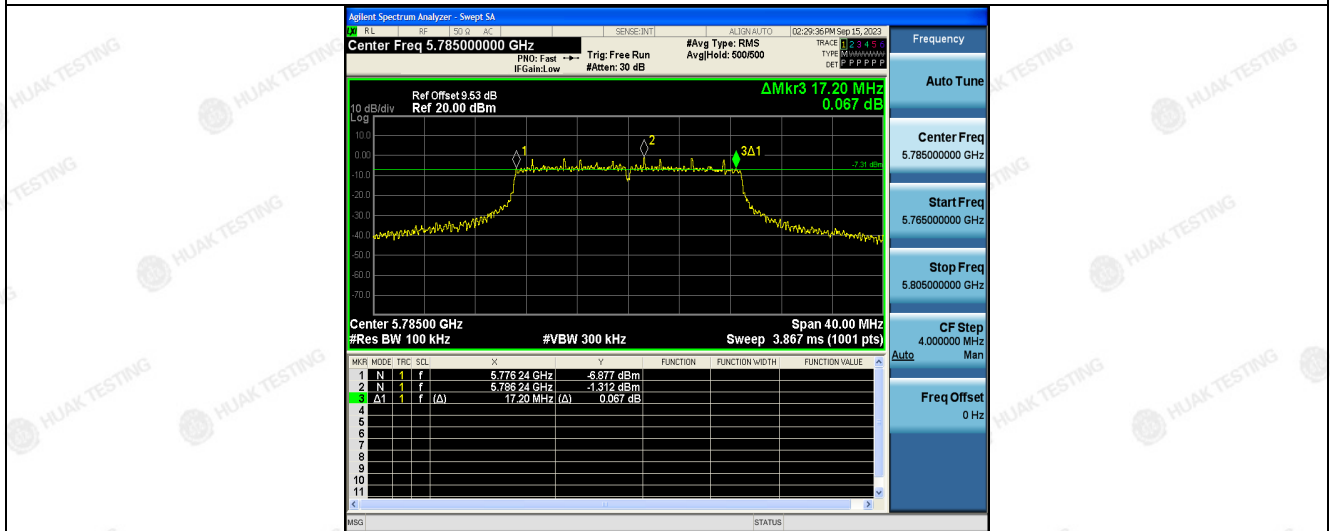
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Low



Mid

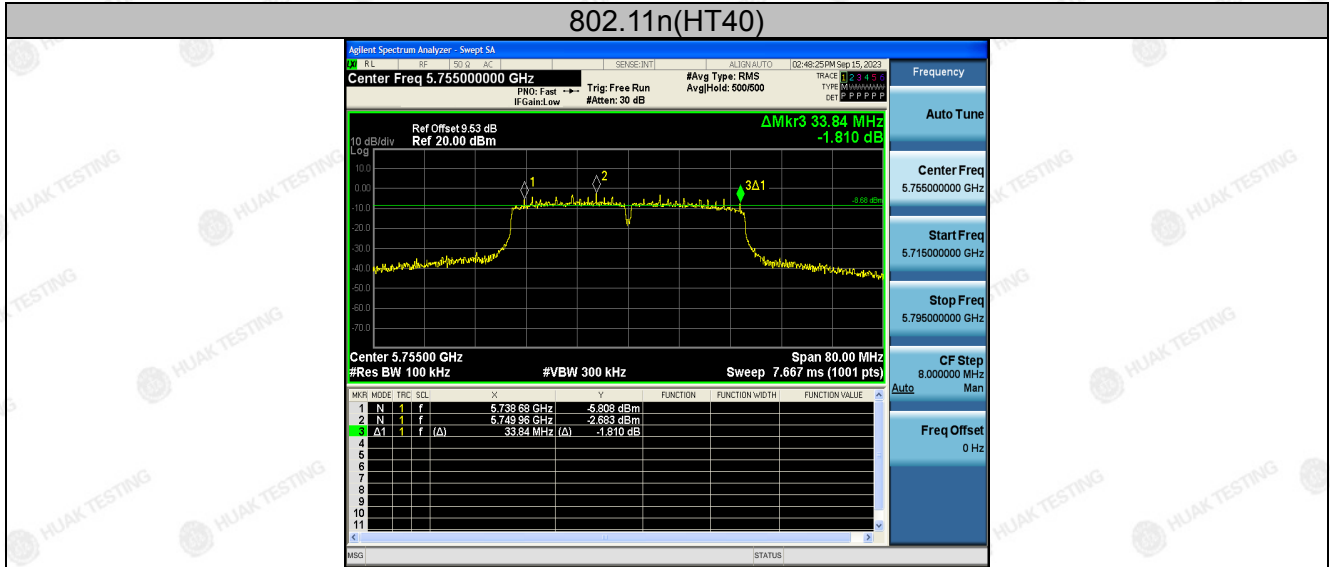


High

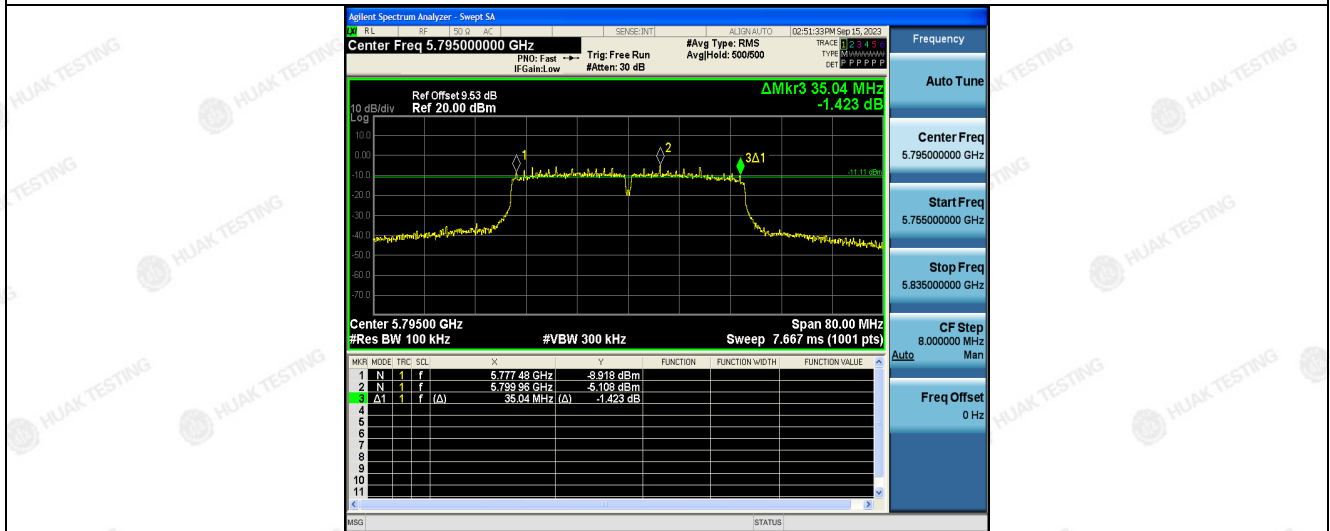
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

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Low

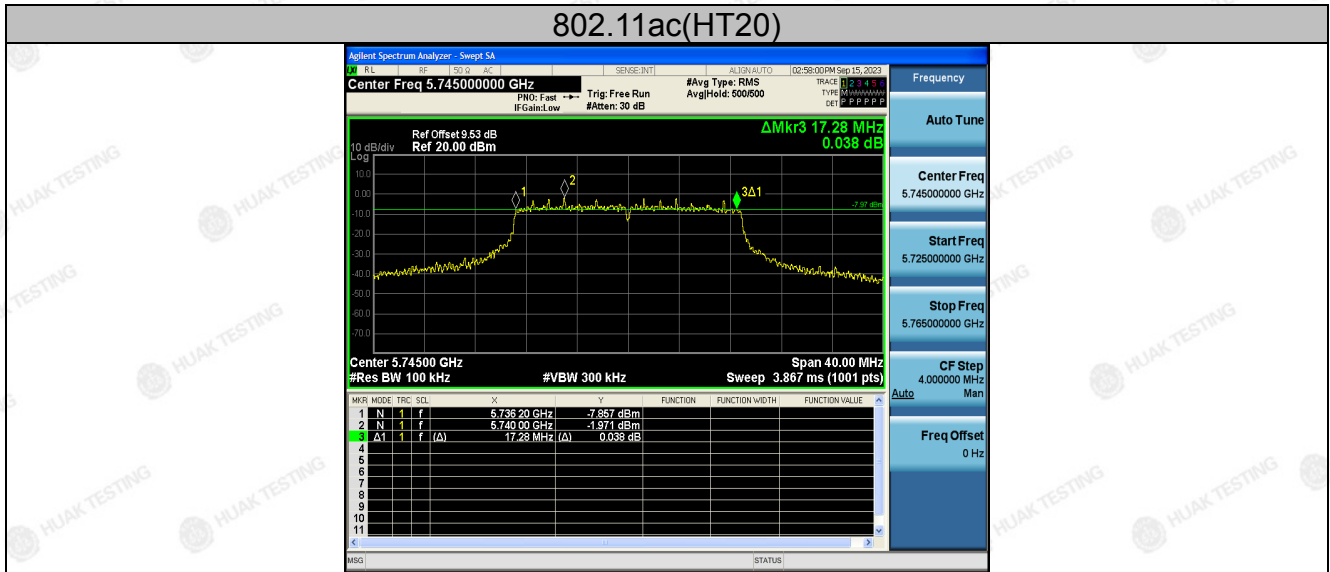


High

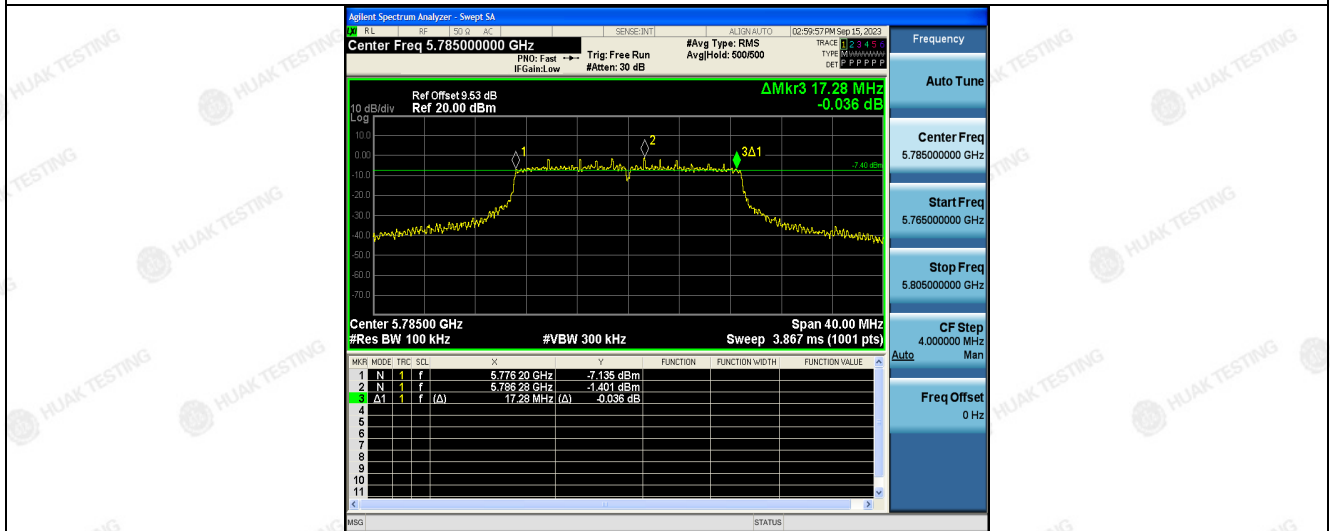
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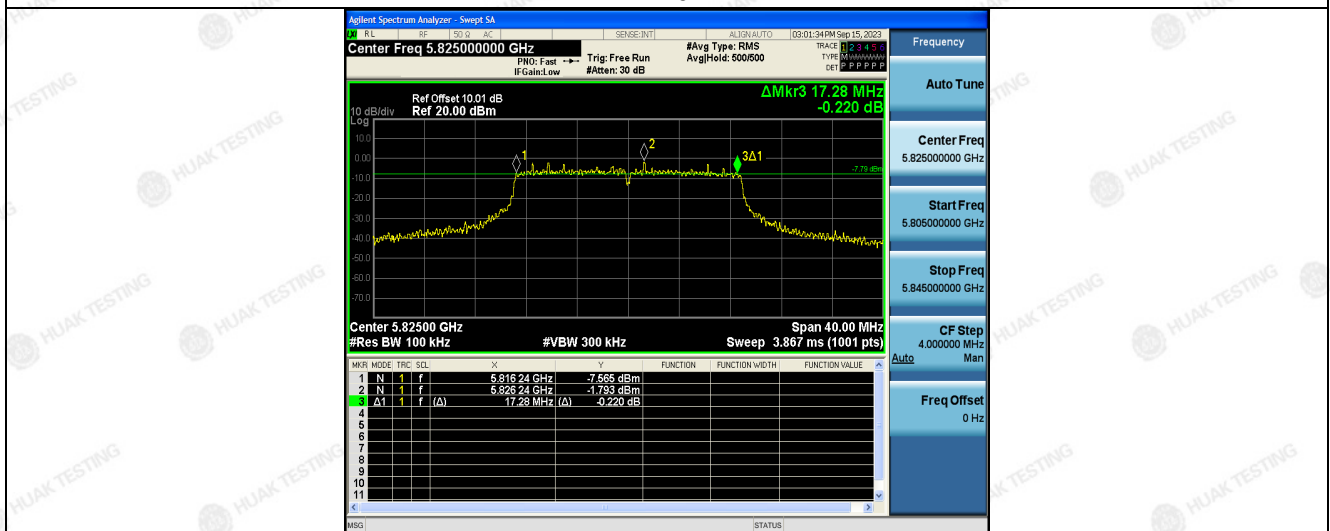
Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



Low



Mid



High

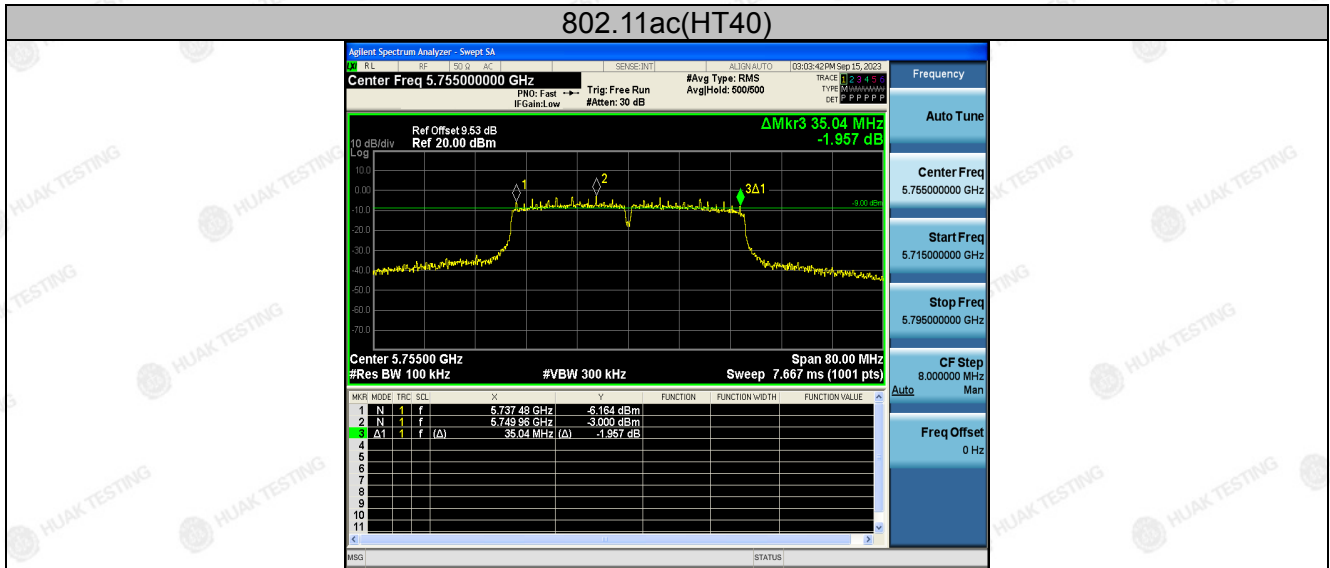
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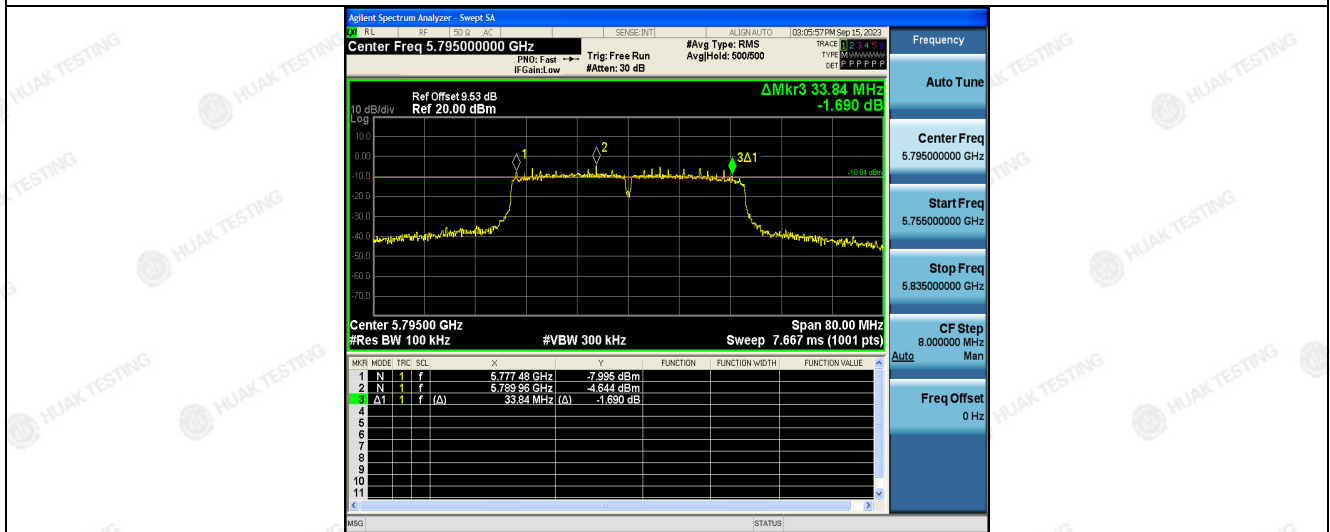
Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



802.11ac(HT40)



Low

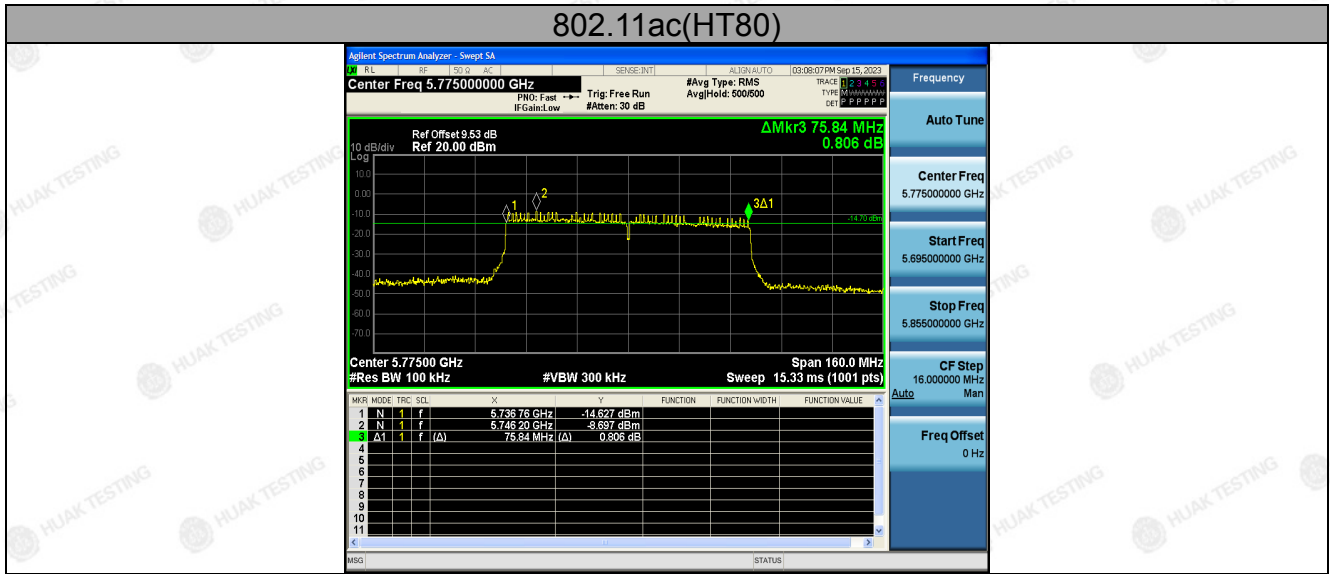


High

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ANT 2

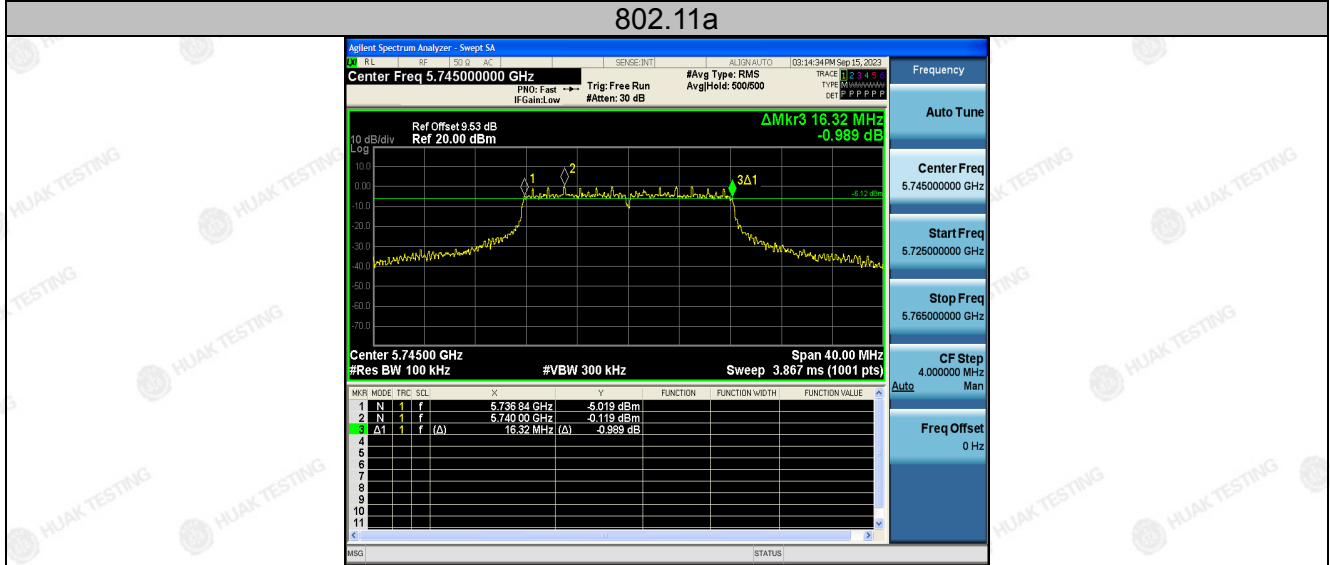
Band IV (5725 - 5850 MHz)					
Mode	Test channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)	Result
11a	CH149	5745	16.32	0.5	PASS
11a	CH157	5785	16.28	0.5	PASS
11a	CH161	5825	16.28	0.5	PASS
11n(HT20)	CH149	5745	17.32	0.5	PASS
11n(HT20)	CH157	5785	17.32	0.5	PASS
11n(HT20)	CH161	5825	17.28	0.5	PASS
11n(HT40)	CH151	5755	35.04	0.5	PASS
11n(HT40)	CH159	5795	35.04	0.5	PASS
11ac(HT20)	CH149	5745	17.32	0.5	PASS
11ac(HT20)	CH157	5785	17.56	0.5	PASS
11ac(HT20)	CH165	5825	17.32	0.5	PASS
11ac(HT40)	CH151	5755	35.12	0.5	PASS
11ac(HT40)	CH159	5795	35.28	0.5	PASS
11ac(HT80)	CH155	5775	75.84	0.5	PASS

Test plots as follows:

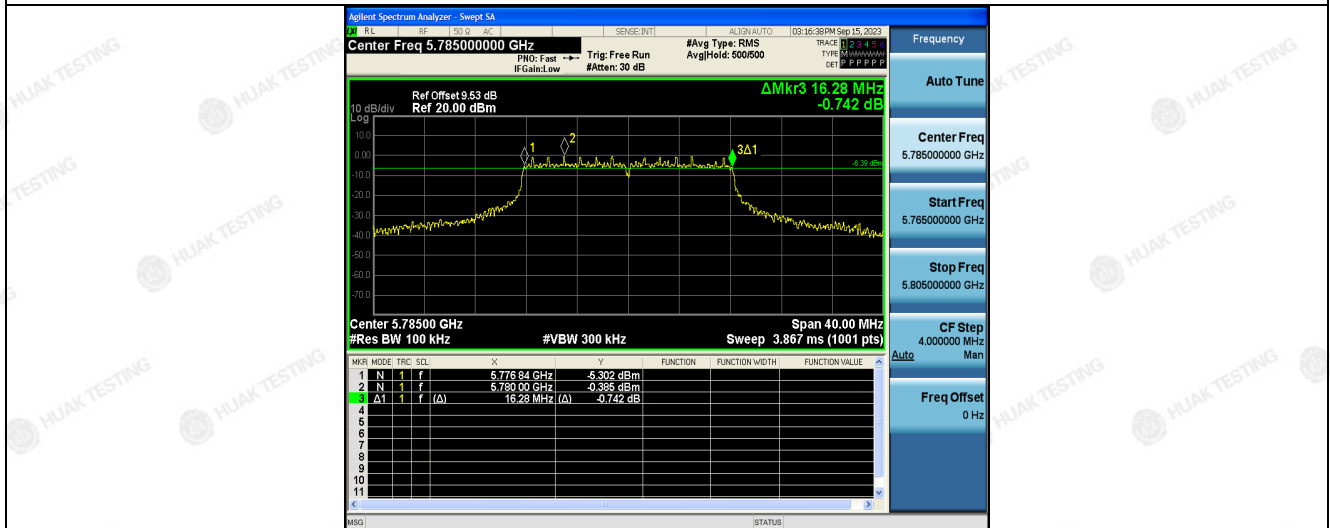


Band IV (5725 – 5850 MHz)

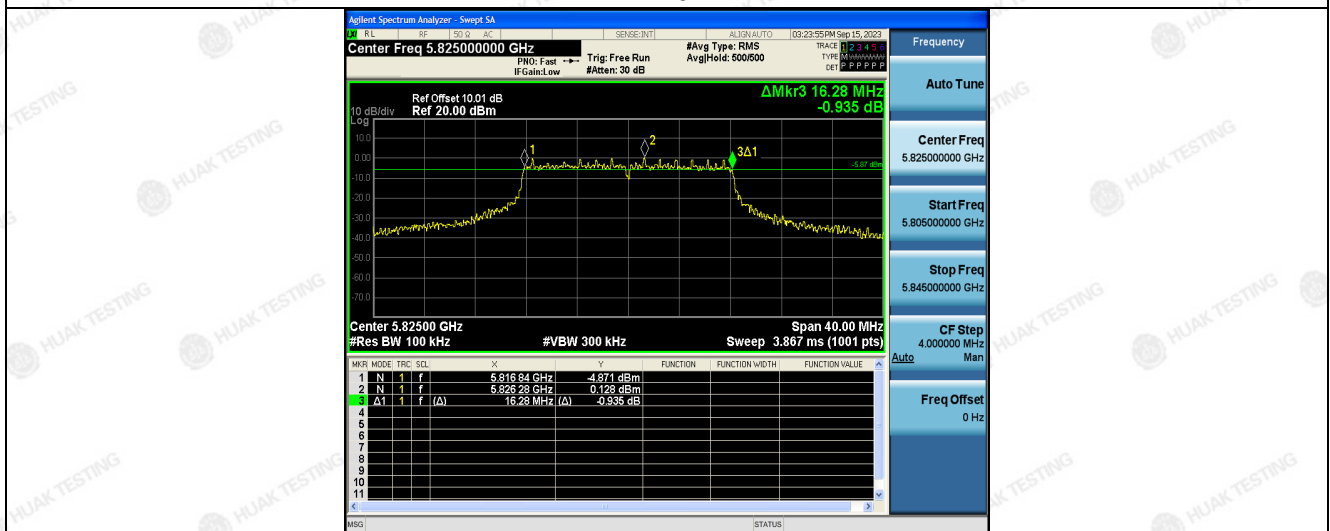
802.11a



Low



Mid

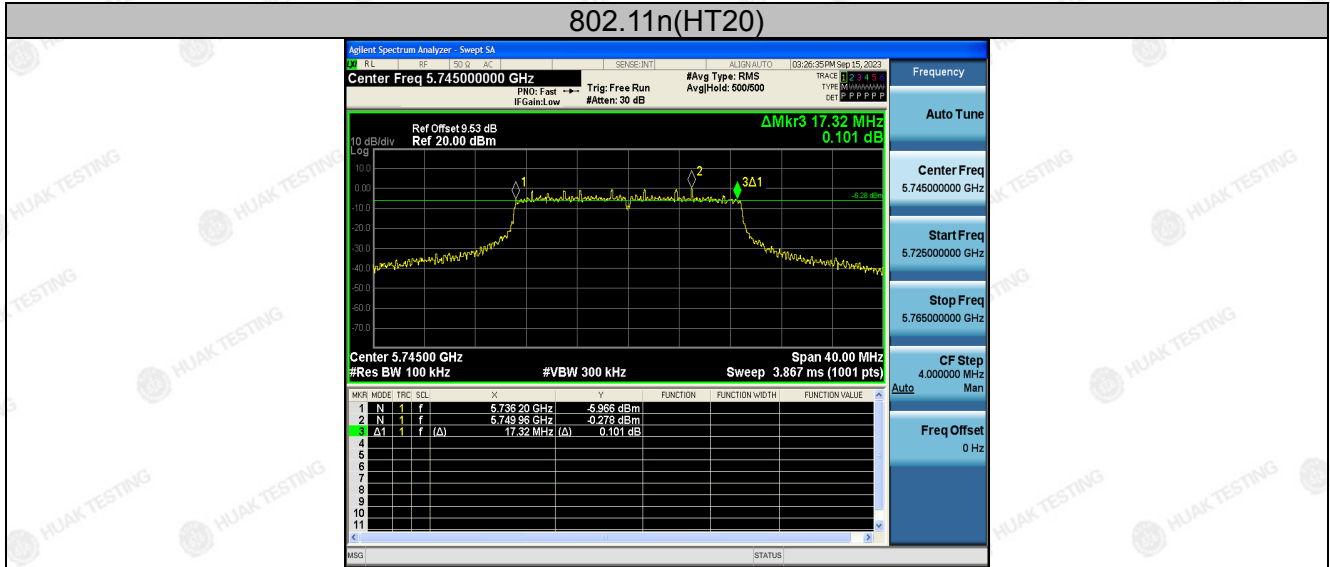


High

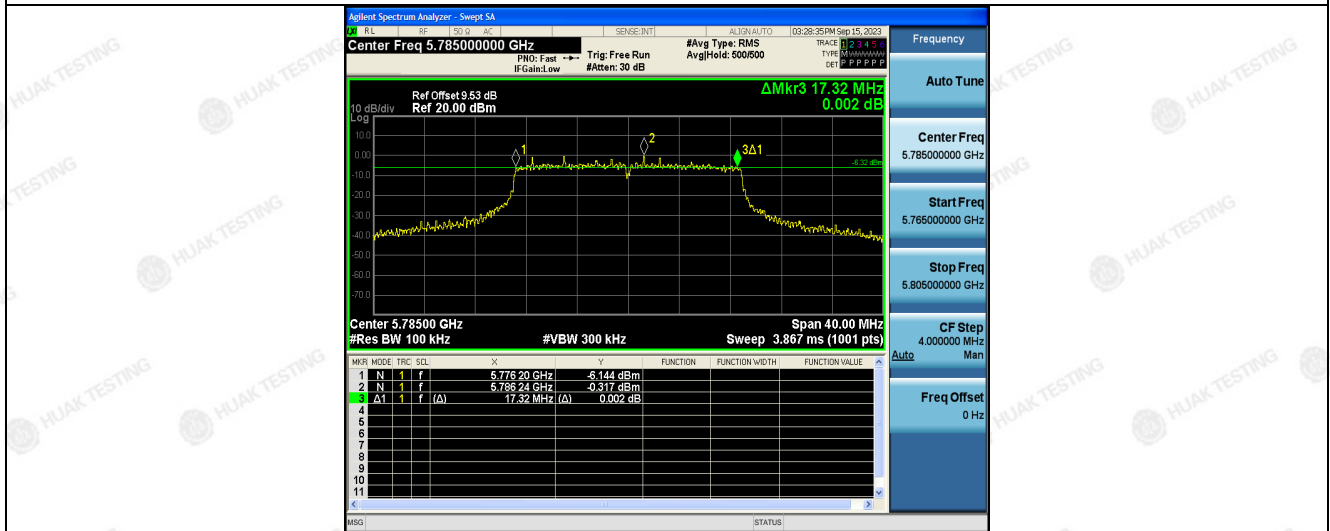
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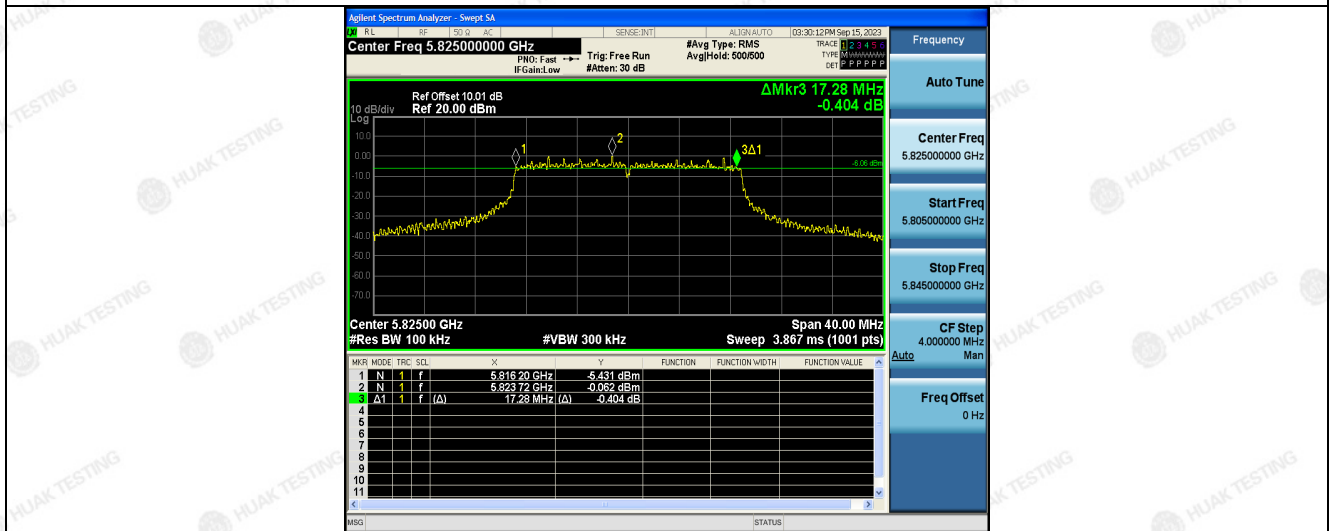
Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



Low



Mid

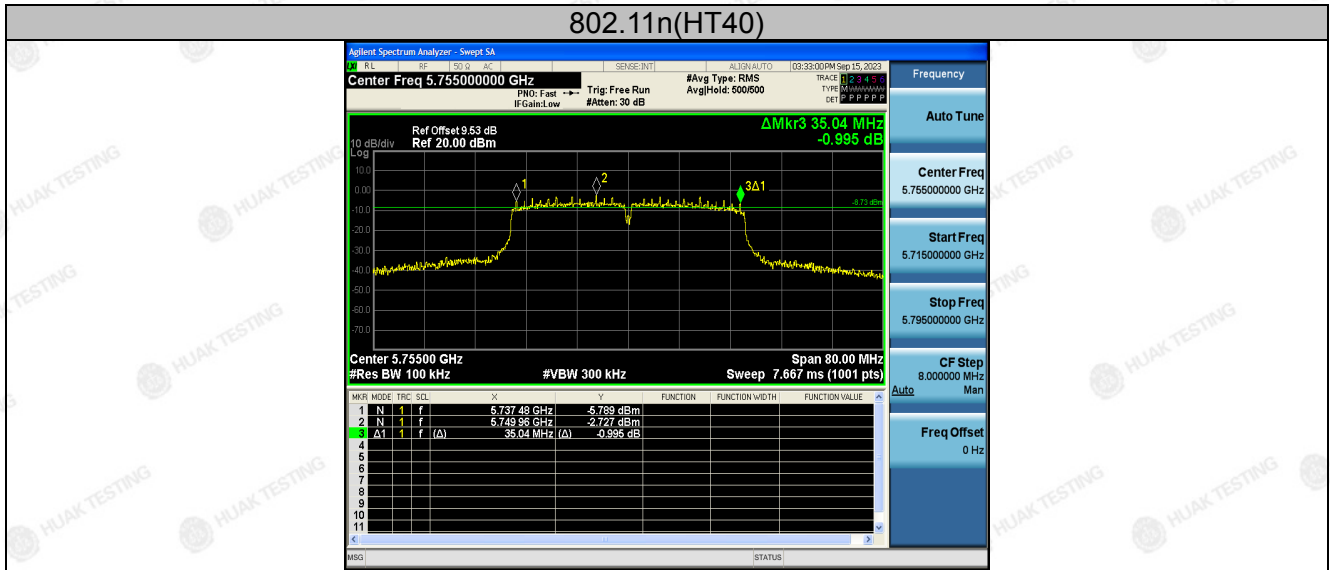


High

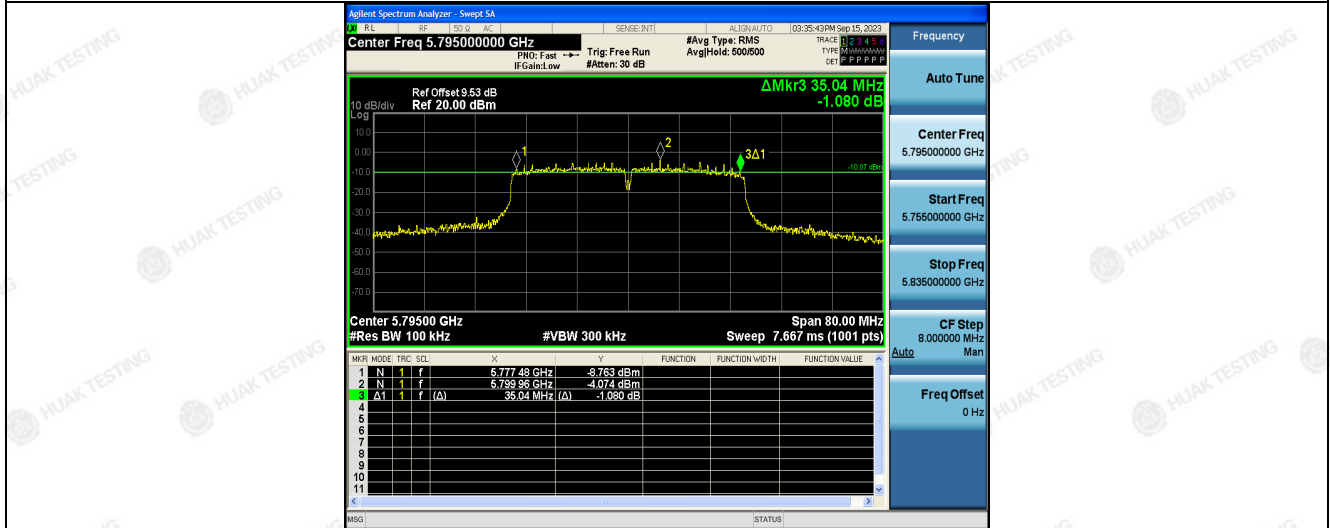
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Low



High

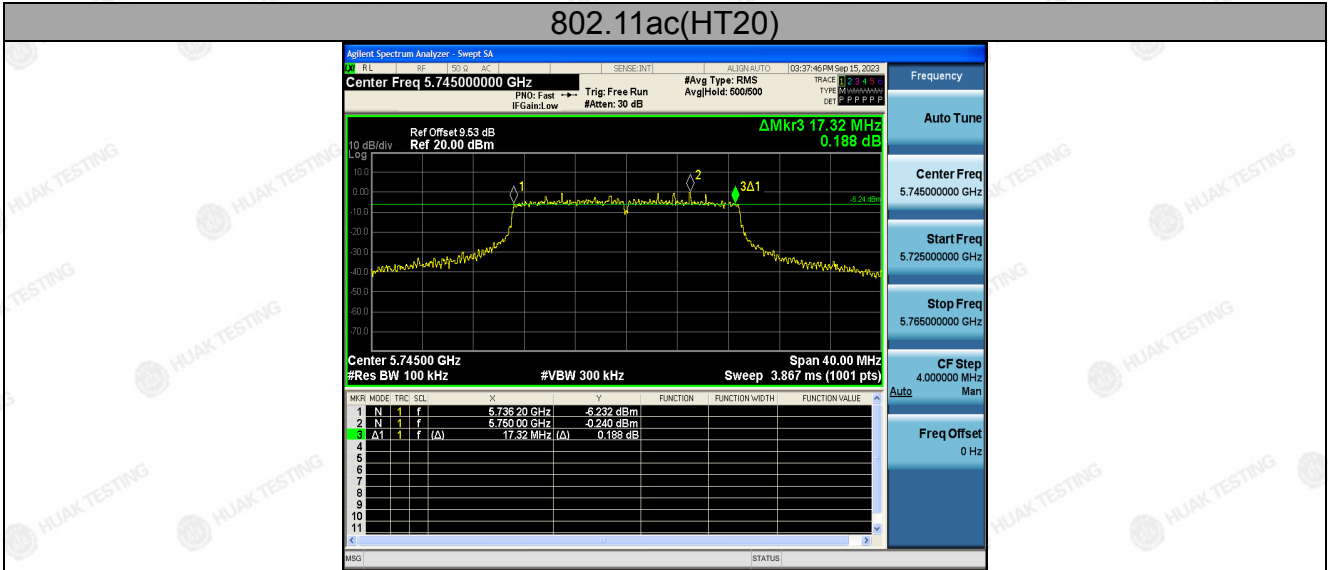
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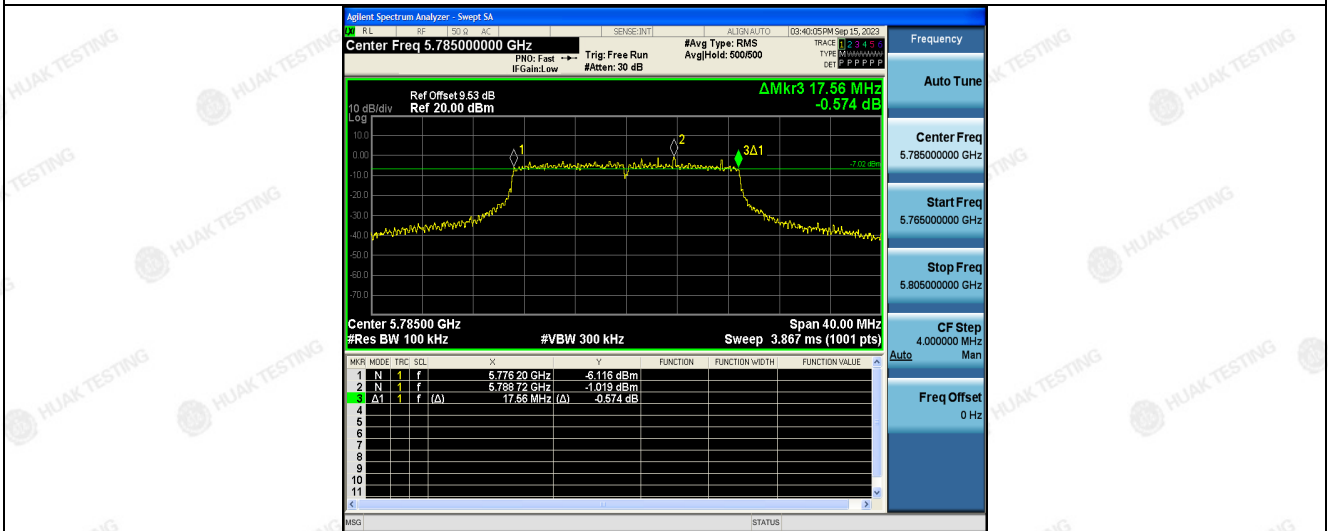
Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



802.11ac(HT20)



Low



Mid



High

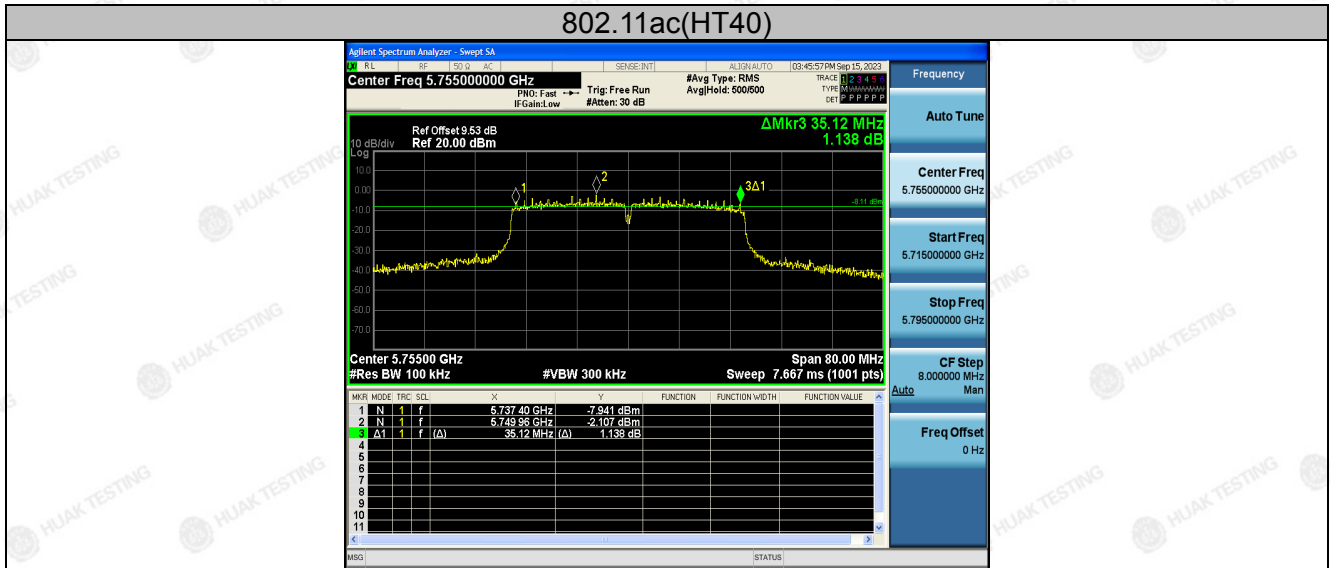
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAJ, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

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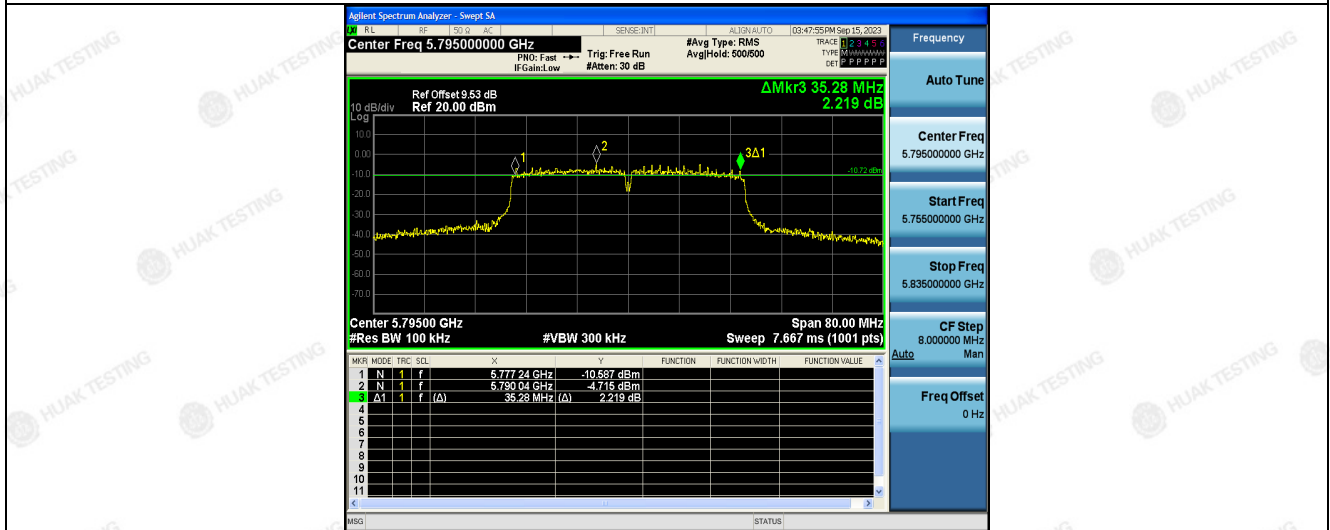
Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



802.11ac(HT40)



Low

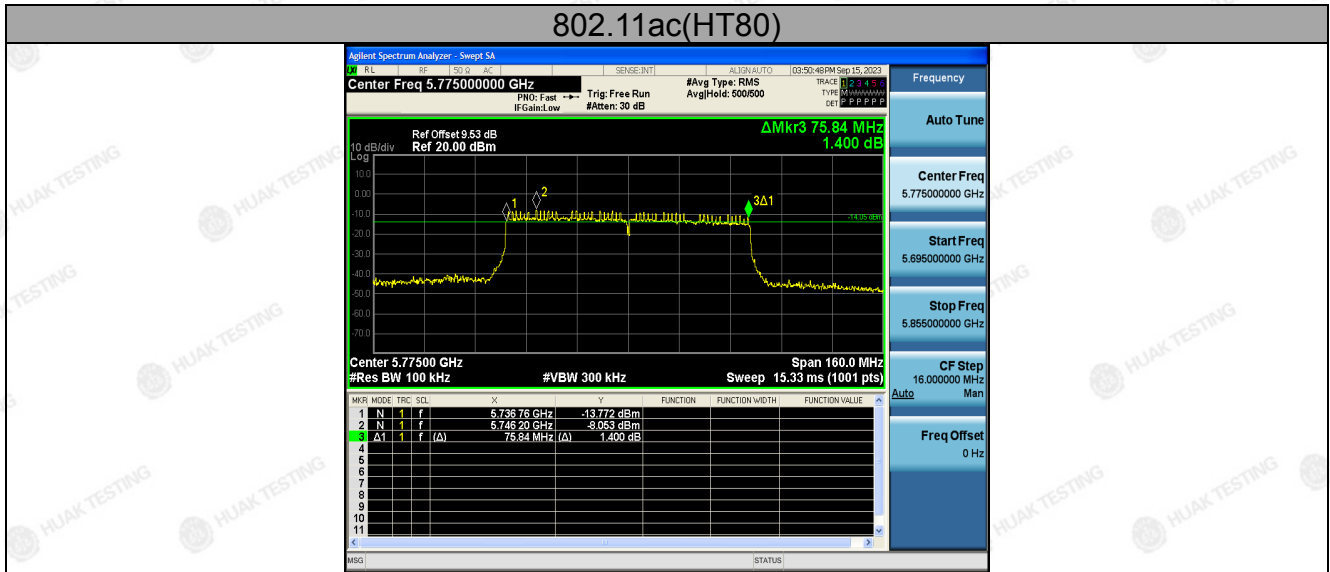


High

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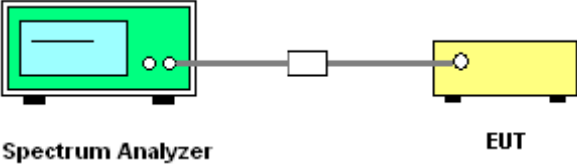
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4.4. 26db Bandwidth and 99% Occupied Bandwidth

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:	 <p style="text-align: center;">Spectrum Analyzer EUT</p>
Test Mode:	Transmitting mode with modulation
Test Procedure:	<ol style="list-style-type: none"> 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 $RBW = 1\% EBW$, $VBW \geq 3RBW$, 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	Feb. 17, 2023	Feb. 16, 2024
RF cable	Times	1-40G	HKE-034	Feb. 17, 2023	Feb. 16, 2024
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 17, 2023	Feb. 16, 2024

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

4.4.3. Test Result

N/A



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	1.86	-0.086	1.774	30	PASS
11a	CH157	2.8	-0.086	2.714	30	PASS
11a	CH165	2.17	-0.086	2.084	30	PASS
11n HT20	CH149	2.31	-0.086	2.224	30	PASS
11n HT20	CH157	2.83	-0.086	2.744	30	PASS
11n HT20	CH165	2.87	-0.086	2.784	30	PASS
11n HT40	CH151	1.07	-0.086	0.984	30	PASS
11n HT40	CH159	-0.67	-0.086	-0.756	30	PASS
11ac HT20	CH149	2.53	-0.086	2.444	30	PASS
11ac HT20	CH157	3.26	-0.086	3.174	30	PASS
11ac HT20	CH165	2.33	-0.086	2.244	30	PASS
11ac HT40	CH151	0.54	-0.086	0.454	30	PASS
11ac HT40	CH159	-1.76	-0.086	-1.846	30	PASS
11ac HT80	CH155	-4.83	-0.086	-4.916	30	PASS

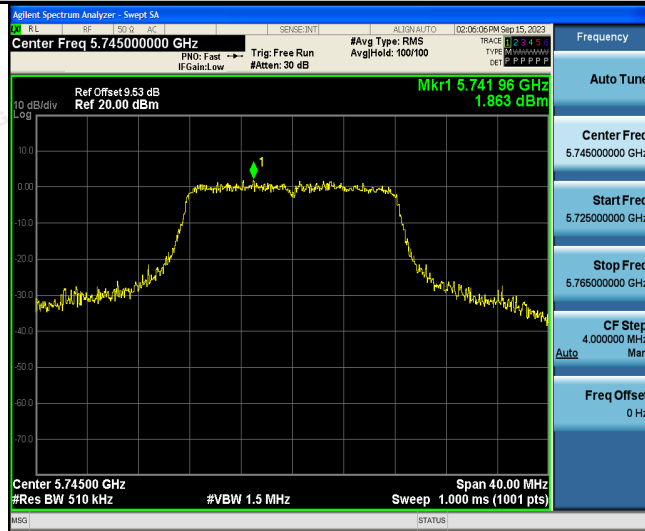
Note: Power Spectral Density= Level [dBm/510kHz]+ (10log(Limit RBW/Test RBW))

Test plots as follows:

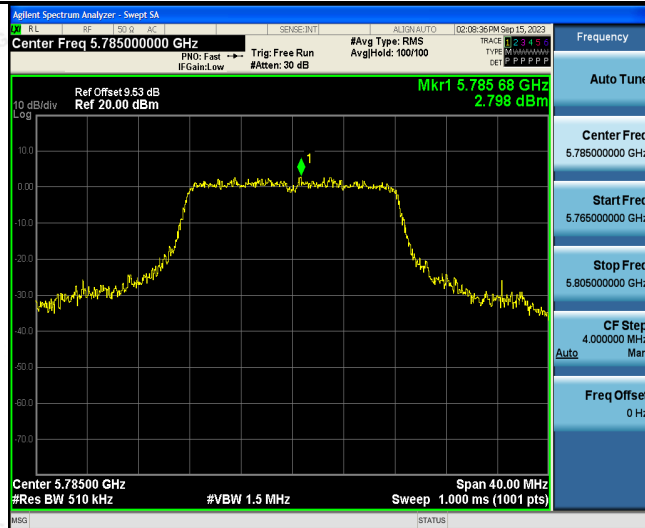


Band IV (5725-5850 MHz)

802.11a



Low



Mid



High

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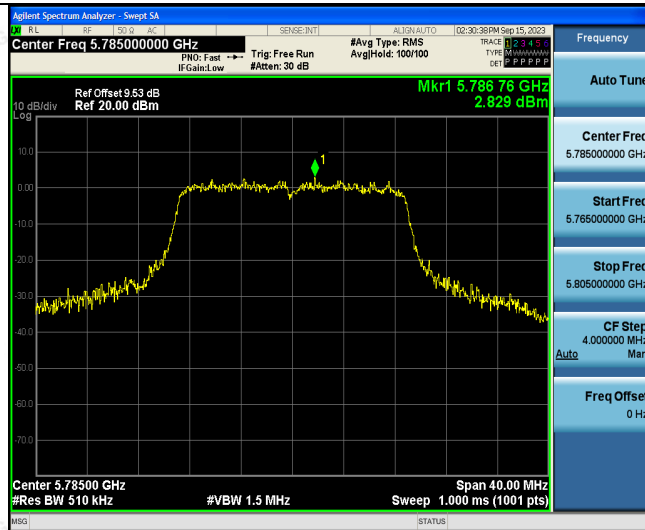
Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



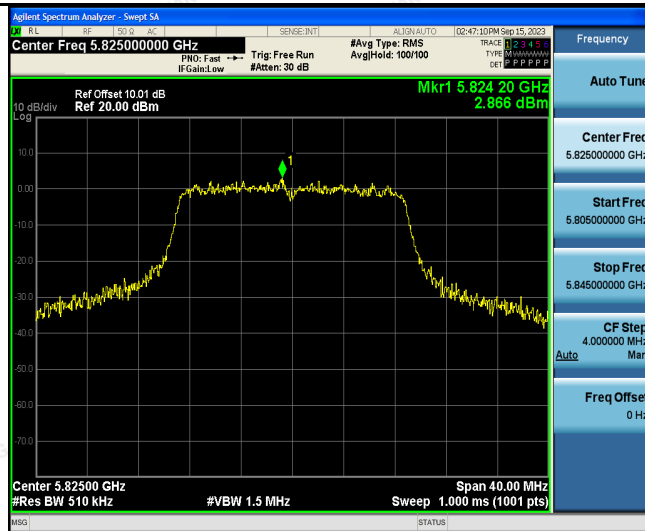
802.11n(HT20)



Low



Mid



High

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802.11n(HT40)

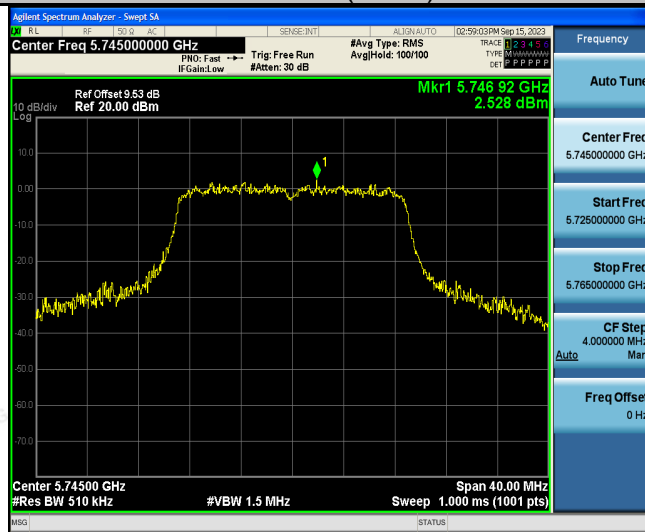


Low



High

802.11ac(HT20)



Low

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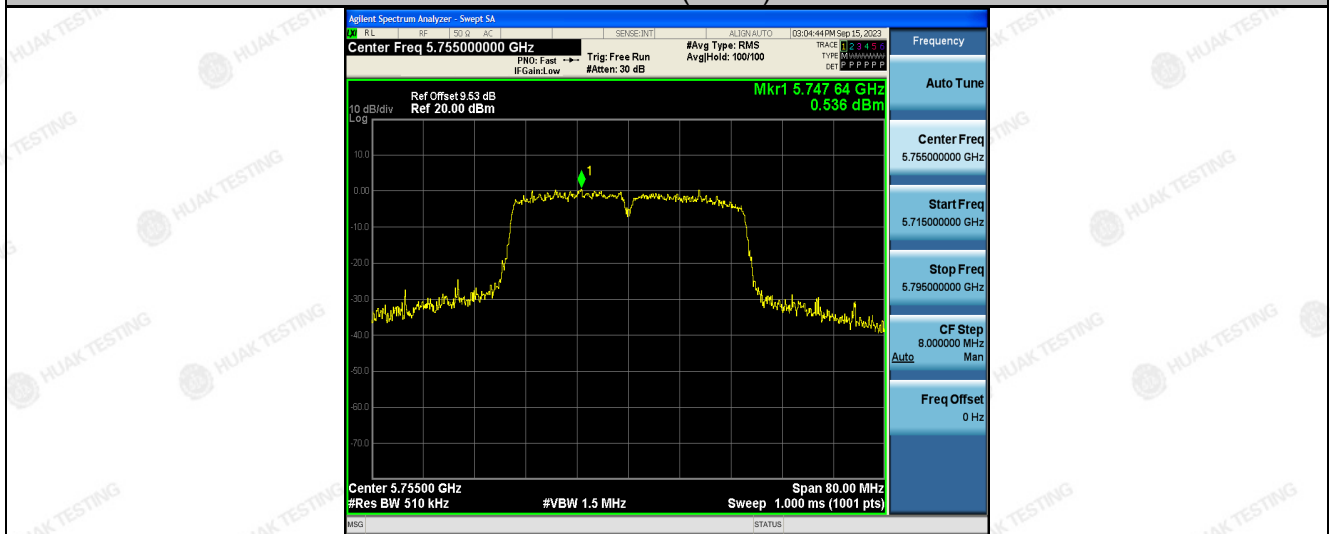


Mid



High

802.11ac(HT40)



Low

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High

802.11ac(HT80)



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ANT 2

Configuration Band IV (5725 - 5850 MHz)						
Mode	Test channel	Level [dBm/510kHz]	10log(500/510)	Power Spectral Density	Limit (dBm/500kHz)	Result
11a	CH149	4.19	-0.086	4.104	30	PASS
11a	CH157	4.42	-0.086	4.334	30	PASS
11a	CH165	4.53	-0.086	4.444	30	PASS
11n HT20	CH149	4.4	-0.086	4.314	30	PASS
11n HT20	CH157	4.17	-0.086	4.084	30	PASS
11n HT20	CH165	4.76	-0.086	4.674	30	PASS
11n HT40	CH151	1.45	-0.086	1.364	30	PASS
11n HT40	CH159	-0.22	-0.086	-0.306	30	PASS
11ac HT20	CH149	3.79	-0.086	3.704	30	PASS
11ac HT20	CH157	4.04	-0.086	3.954	30	PASS
11ac HT20	CH165	4.75	-0.086	4.664	30	PASS
11ac HT40	CH151	1.51	-0.086	1.424	30	PASS
11ac HT40	CH159	0.23	-0.086	0.144	30	PASS
11ac HT80	CH155	-4.24	-0.086	-4.326	30	PASS

Note: Power Spectral Density= Level [dBm/510kHz]+ (10log(Limit RBW/Test RBW))

Test plots as follows:



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)



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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
11n(HT20)	CH149	6.40	18.99	PASS
11n(HT20)	CH157	6.48	18.99	PASS
11n(HT20)	CH161	6.84	18.99	PASS
11n(HT40)	CH151	4.19	18.99	PASS
11n(HT40)	CH159	2.49	18.99	PASS
11ac(HT20)	CH149	6.13	18.99	PASS
11ac(HT20)	CH157	6.59	18.99	PASS
11ac(HT20)	CH161	6.63	18.99	PASS
11ac(HT40)	CH151	3.98	18.99	PASS
11ac(HT40)	CH159	2.27	18.99	PASS
11ac(HT80)	CH155	-1.60	18.99	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. limit=30dBm-(direction gain-6dBi) =30-(14+10log2-6)=18.99dBm				

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.

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:	<p>(1) For transmitters operating in the 5.725-5.85 GHz band:</p> <p>(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.</p> <p>The limit of frequency below 1GHz and which fall in restricted bands should complies 15.209.</p>
Test Setup:	<p>The diagram illustrates the test setup. An EUT (Equipment Under Test) is placed on a turn table at a height of 1.5 m. The turn table is positioned 3 m away from an antenna tower. The antenna tower has an antenna feed point at a height of 1-4 m. The entire setup is on a ground plane. A receiver and an amplifier (Amp.) are connected to the antenna tower.</p>
Test Mode:	Transmitting mode with modulation
Test Procedure:	<ol style="list-style-type: none"> 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.



	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, quasi peak or average method as specified and then reported in a data sheet.
Test Result:	PASS



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	Feb. 17, 2023	Feb. 16, 2024
Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 17, 2023	Feb. 16, 2024
Preamplifier	EMCI	EMC051845S E	HKE-015	Feb. 17, 2023	Feb. 16, 2024
Preamplifier	Agilent	83051A	HKE-016	Feb. 17, 2023	Feb. 16, 2024
Loop antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Feb. 17, 2023	Feb. 16, 2024
Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	Feb. 17, 2023	Feb. 16, 2024
Horn antenna	Schwarzbeck	9120D	HKE-013	Feb. 17, 2023	Feb. 16, 2024
Antenna Mast	Keleto	CC-A-4M	N/A	N/A	N/A
Position controller	Taiwan MF	MF7802	HKE-011	Feb. 17, 2023	Feb. 16, 2024
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	Feb. 17, 2023	Feb. 16, 2024
RF cable	Tonscend	1-18G	HKE-099	Feb. 17, 2023	Feb. 16, 2024
RF cable	Times	1-40G	HKE-034	Feb. 17, 2023	Feb. 16, 2024
Horn Antenna	Schwarzbeck	BBHA 9170	HKE-017	Feb. 17, 2023	Feb. 16, 2024
Spectrum analyzer	R&S	FSP40	HKE-025	Feb. 17, 2023	Feb. 16, 2024

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