CFR 47 FCC PART 15 SUBPART E
ISED RSS-247 ISSUE 2

CERTIFICATION TEST REPORT

For

2K Outdoor Floodlight Camera

PROJECT NUMBER: 4790053054

REPORT NUMBER: 4790053054-6

FCC ID: UCZ-W452AS-Z

IC: 8575A-W452ASZ

ISSUE DATE: Sep 10, 2021

Prepared for

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Prepared by

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The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report apply to the test sample(s) mentioned above at the time of the testing period only and are not to be used to indicate applicability to other similar products.

Revision History

Rev.	Issue Date	Revisions	Revised By
V0	09/10/2021	Initial Issue	

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: Lorex Technology Inc.
Address: 250 Royal crest Court, Markham, L3R 3S1, Ontario, Canada.

Manufacturer Information

Company Name: Lorex Technology Inc.
Address: 250 Royal crest Court, Markham, L3R 3S1, Ontario, Canada.

EUT Description

Product Name: 2K Outdoor Floodlight Camera
Model Name: W452AS-Z
Sample Number: 4113018
Data of Receipt Sample: Aug 02, 2021
Date Tested: Aug 02, 2021 ~ Aug 31, 2021

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 FCC PART 15 SUBPART E	PASS
ISED RSS-247 Issue 2	PASS
ISED RSS-GEN Issue 5	PASS

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Summary of Test Results			
Clause	Test Items	FCC/IC Rules	Test Results
1	6dB/26dB Bandwidth	FCC 15.407 (a)&(e) RSS-247 Clause 6.2	PASS
2	99% Occupied Bandwidth	RSS-Gen Clause 6.6	PASS
3	Maximum Conducted Output Power	FCC 15.407 (a) RSS-247 Clause 6.2	PASS
4	Power Spectral Density	FCC 15.407 (a) RSS-247 Clause 6.2	PASS
5	Antenna Conducted Spurious Emission	FCC 15.407 (b) RSS-247 Clause 6.2	PASS
6	Radiated Bandedge and Spurious Emission	FCC 15.407 (a), FCC 15.209, FCC 15.205, RSS-247 Clause 6.2 RSS-GEN Clause 8.9	PASS
7	Conducted Emission Test for AC Power Port	FCC 15.207 RSS-GEN Clause 8.8	PASS
8	Frequency Stability	FCC 15.407 (g)	PASS
9	Dynamic Frequency Selection	FCC 15.407 (h) RSS-247 Clause 6.3	PASS
10	Antenna Requirement	FCC 15.203 RSS-GEN Clause 8.3	PASS
Remark: 1) The measurement result for the sample received is <Pass> according to < ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15C and ISED RSS-247 ISSUE 2> when <Accuracy Method> 2) It is a slave device without radar detection.			

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Project Engineer

Checked By:

Leon Wu

Leon Wu
Senior Project Engineer

Approved By:

Chris Zhong

Chris Zhong
Laboratory Leader

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, CFR 47 FCC Part 2, CFR 47 FCC Part 15, KDB 789033 D02 v02r01, RSS-GEN Issue 5, RSS-247 Issue 2, KDB414788 D01 Radiated Test Site v01r01, KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02 and 905462 C Client Without DFS New Rules v01r02.

3. FACILITIES AND ACCREDITATIO

Test Location	**UL-CCIC Company Limited, EMC&RF Lab**
Address	**No. 2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122, China**
Accreditation Certificate	**A2LA (Certificate No.: 4829.01)** **UL-CCIC COMPANY LIMITED has been assessed and proved to be in compliance with A2LA.** **FCC (FCC Designation No.: CN1247)** **UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules.** **IC (IC Designation No.: 25056 CAB No.: CN0073)** **UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules.**

Remark 1: All tests measurement facilities use to collect the measurement data are located at No. 2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122, People’s Republic of China

Remark 2: For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. These measurements below 30MHz had been correlated to measurements performed on an OFS based on KDB 414788.

Remark 3: The test anechoic chamber in UL-CCIC COMPANY LIMITED had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

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4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognize national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty
Uncertainty for Conduction emission test	3.1dB
Uncertainty for Radiation Emission test (include Fundamental emission) (9KHz-30MHz)	3.4dB
Uncertainty for Radiation Emission test (include Fundamental emission) (30MHz-1GHz)	3.4dB
Uncertainty for Radiation Emission test (1GHz to 40GHz) (include Fundamental emission)	3.9dB (1GHz-18Gz)
	4.2dB (18GHz-26.5Gz)
	4.6dB (26.5GHz-40Gz)
Remark: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Product Name:	2K Outdoor Floodlight Camera	
Model No.:	W452AS-Z	
Operating Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422MHz to 2452MHz IEEE 802.11a/n/ac 20MHz:5180MHz to 5240MHz (ISED not include this band), 5260MHz to 5320MHz, 5500MHz to 5720MHz (ISED not include 5600MHz to 5640MHz), 5745MHz to 5825MHz IEEE 802.11n/ac 40MHz: 5190MHz to 5230MHz (ISED not include this band), 5270MHz to 5310MHz, 5510MHz to 5710MHz (ISED not include 5590MHz to 5630MHz), 5755MHz-5795MHz IEEE 802.11ac 80MHz: 5210MHz (ISED not include this channel), 5290MHz, 5530MHz to 5690MHz (ISED not include 5610MHz), 5775MHz	
	This report just including 5G WIFI part.	
Type of Modulation:	IEEE for 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE for 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n (HT20 and HT40): OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11a/n: OFDM (BPSK, QPSK,16QAM, 64QAM) IEEE for 802.11ac: OFDM (BPSK, QPSK,16QAM, 64QAM, 256QAM)	
Channels Step:	Channels with 5MHz step	
Test software of EUT:	SecureCRT (manufacturer declare)	
Antenna Type:	Patch antenna	
Antenna Gain:	UNII-1 BAND	Antenna1: 3.08 dBi
		Antenna2: 3.08 dBi
	UNII-2A BAND	Antenna1: 3.58 dBi
		Antenna2: 3.58 dBi
	UNII-2C BAND	Antenna1: 2.74 dBi
		Antenna2: 2.74 dBi
	UNII-3 BAND	Antenna1: 1.40 dBi
		Antenna2: 1.40 dBi
	Remark: This data is provided by customer and our lab isn't responsible for this data	

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5.2. MAXIMUM OUTPUT POWER

UNII-1 BAND

IEEE Std. 802.11	Frequency (MHz)	Maximum Average Conducted Power (dBm)			Max Average EIRP (dBm)		
		Ant 1	Ant 2	Total	Ant 1	Ant 2	Total
a	5150 ~ 5250	9.50	/	/	12.58	/	/
ac VHT20		7.91	5.50	9.60	10.52	8.58	15.69
ac VHT40		7.94	5.52	9.90	11.02	8.60	15.99
ac VHT80		6.40	3.74	8.30	9.48	6.82	14.39

UNII-2A BAND

IEEE Std. 802.11	Frequency (MHz)	Maximum Average Conducted Power (dBm)		
		Ant 1	Ant 2	Total
a	5250 ~ 5350	10.13	/	/
ac VHT20		7.38	6.46	10.0
ac VHT40		7.60	6.74	10.20
ac VHT80		6.51	5.00	8.80

UNII-2C BAND

IEEE Std. 802.11	Frequency (MHz)	Max Power (dBm)		
		Ant 1	Ant 2	Total
a	5470 ~ 5725	10.56	/	/
ac VHT20		7.88	7.28	10.60
ac VHT40		8.89	7.46	11.20
ac VHT80		7.77	4.99	9.60

UNII-3 BAND

IEEE Std. 802.11	Frequency (MHz)	Max Power (dBm)		
		Ant 1	Ant 2	Total
a	5725 ~ 5850	11.40	/	/
ac VHT20		8.27	7.24	10.80
ac VHT40		8.93	7.41	11.20
ac VHT80		7.86	5.99	10.00

Remark:

1. Only the antenna1 can transmit at the 11a mode.
2. The UNII-1 band is disabled for ISED

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5.3. CHANNEL LIST

UNII-1 (For Bandwidth = 20 MHz)		UNII-1 (For Bandwidth = 40 MHz)		UNII-1 (For Bandwidth = 80 MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	38	5190	42	5210
40	5200	46	5230		
44	5220				
48	5240				

Remark: The UNII-1 band is disabled for ISED

UNII-2A (For Bandwidth = 20 MHz)		UNII-2A (For Bandwidth = 40 MHz)		UNII-2A (For Bandwidth = 80 MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
52	5260	54	5270	58	5290
56	5280	62	5310		
60	5300				
64	5320				

UNII-2C (For Bandwidth = 20 MHz)		UNII-2C (For Bandwidth = 40 MHz)		UNII-2C (For Bandwidth = 80 MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
100	5500	102	5510	106	5530
104	5520	110	5550	122	5610
108	5540	118	5590	138	5690
112	5560	126	5630		
116	5580	134	5670		
120	5600	142	5710		
124	5620				
128	5640				
132	5660				
136	5680				
140	5700				
144	5720				

UNII-3 (For Bandwidth = 20 MHz)		UNII-3 (For Bandwidth = 40 MHz)		UNII-3 (For Bandwidth = 80 MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	151	5755	155	5775
153	5765	159	5795		
157	5785				
161	5805				
165	5825				

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5.4. TEST CHANNEL CONFIGURATION

UNII-1 Test Channel Configuration		
IEEE Std.	Test Channel Number	Frequency
802.11a	CH 36(Low Channel), CH 40(MID Channel), CH 48(High Channel)	5180 MHz, 5200 MHz, 5240 MHz
802.11n HT20	CH 36(Low Channel), CH 40(MID Channel), CH 48(High Channel)	5180 MHz, 5200 MHz, 5240 MHz
802.11n HT40	CH 38(Low Channel), CH 46(High Channel)	5190 MHz, 5230 MHz
802.11ac VHT20	CH 36(Low Channel), CH 40(MID Channel), CH 48(High Channel)	5180 MHz, 5200 MHz, 5240 MHz
802.11ac VHT40	CH 38(Low Channel), CH 46(High Channel)	5190 MHz, 5230 MHz
802.11ac VHT80	CH 42(Low Channel)	5210 MHz

UNII-2A Test Channel Configuration		
IEEE Std.	Test Channel Number	Frequency
802.11a	CH 52(Low Channel), CH 56(MID Channel), CH 64(High Channel)	5260 MHz, 5280 MHz, 5320 MHz
802.11n HT20	CH 52(Low Channel), CH 56(MID Channel), CH 64(High Channel)	5260 MHz, 5280 MHz, 5320 MHz
802.11n HT40	CH 54(Low Channel), CH 62(High Channel)	5270 MHz, 5310 MHz
802.11ac VHT20	CH 52(Low Channel), CH 56(MID Channel), CH 64(High Channel)	5260 MHz, 5280 MHz, 5320 MHz
802.11ac VHT40	CH 54(Low Channel), CH 62(High Channel)	5270 MHz, 5310 MHz
802.11ac VHT80	CH 58(Low Channel)	5290 MHz

UNII-2C Test Channel Configuration		
IEEE Std.	Test Channel Number	Frequency
802.11a	CH 100(Low Channel), CH 116(MID Channel), CH 140(MID Channel), CH 144(High Channel)	5500 MHz, 5580 MHz, 5700 MHz,5720 MHz
802.11n HT20	CH 100(Low Channel), CH 116(MID Channel), CH 140(MID Channel), CH 144(High Channel)	5500 MHz, 5580 MHz, 5700 MHz,5720 MHz
802.11n HT40	CH 102(Low Channel), CH 110(MID Channel), CH 134(MID Channel), CH 142(High Channel)	5510 MHz, 5550 MHz, 5670 MHz, 5710 MHz,
802.11ac VHT20	CH 100(Low Channel), CH 116(MID Channel), CH 140(MID Channel), CH 144(High Channel)	5500 MHz, 5580 MHz, 5700 MHz,5720 MHz
802.11ac VHT40	CH 102(Low Channel), CH 110(MID Channel), CH 134(MID Channel), CH 142(High Channel)	5510 MHz, 5550 MHz, 5670 MHz, 5710 MHz,
802.11ac VHT80	CH 102(Low Channel), CH 122(MID Channel) CH 138(High Channel)	5530 MHz, 5610 MHz, 5690 MHz

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UNII-3 Test Channel Configuration		
IEEE Std.	Test Channel Number	Frequency
802.11a	CH 149(Low Channel), CH 157(MID Channel), CH 165(High Channel)	5745 MHz, 5785 MHz, 5825 MHz
802.11n HT20	CH 149(Low Channel), CH 157(MID Channel), CH 165(High Channel)	5745 MHz, 5785 MHz, 5825 MHz
802.11n HT40	CH 151(Low Channel), CH 159(High Channel)	5755MHz, 5795MHz
802.11ac VHT20	CH 149(Low Channel), CH 157(MID Channel), CH 165(High Channel)	5745 MHz, 5785 MHz, 5825 MHz
802.11ac VHT40	CH 151(Low Channel), CH 159(High Channel)	5755 MHz, 5795 MHz
802.11ac VHT80	CH 155(Low Channel)	5775 MHz

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5.5. DESCRIPTION OF AVAILABLE ANTENNAS

c	Frequency Band	Antenna Type	Maximum Antenna Gain (dBi)	Directional Gain (dBi) MIMO Mode
1	UNII-1	Patch	3.08	6.09
2	UNII-1	Patch	3.08	
1	UNII-2A	Patch	3.58	6.59
2	UNII-2A	Patch	3.58	
1	UNII-2C	Patch	2.74	5.75
2	UNII-2C	Patch	2.74	
1	UNII-3	Patch	1.40	3.41
2	UNII-3	Patch	1.40	

IEEE Std. 802.11	Transmit and Receive Mode	Description
a	☒1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
n HT20	☒2TX, 2RX	ANT 1, 2 can be used as transmitting/receiving antenna.
n HT40	☒2TX, 2RX	ANT 1, 2 can be used as transmitting/receiving antenna.
ac VHT20	☒2TX, 2RX	ANT 1, 2 can be used as transmitting/receiving antenna.
ac VHT40	☒2TX, 2RX	ANT 1, 2 can be used as transmitting/receiving antenna.
ac VHT80	☒2TX, 2RX	ANT 1, 2 can be used as transmitting/receiving antenna.
Remark: 1. Only 802.11n and 802.11ac modes can support for SISO and MIMO transmission, and for the modes of 11a only the antenna1 is working. 2. 2.4 GHz WLAN& 5 GHz WLAN can't transmit simultaneously. (Declared by customer.)		

Remark : MIMO Mode Directional gain= $10 \log [(10^{G1/20} + 10^{G2/20})^2/N_{ANT}]$
G_{ANT}: Average of the Antenna Gain
N_{ANT}: Antenna numbers

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5.6. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter	
Test Software	Secure CRT

UNII-1

IEEE Std. 802.11	Rate	Channel	Test Software Setting Value	
			ANT 1	ANT 2
a	6M	36	default	/
		40	default	/
		48	default	/
ac VHT20	MCS0	36	default	default
		40	default	default
		48	default	default
ac VHT40	MCS0	38	default	default
		46	default	default
ac VHT80	MCS0	42	default	default

UNII-2A

IEEE Std. 802.11	Rate	Channel	Test Software Setting Value	
			ANT 1	ANT 2
a	6M	52	default	/
		60	default	/
		64	default	/
ac VHT20	MCS0	52	default	default
		60	default	default
		64	default	default
ac VHT40	MCS0	54	default	default
		62	default	default
ac VHT80	MCS0	58	default	default

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UNII-2C

IEEE Std. 802.11	Rate	Channel	Test Software Setting Value	
			ANT 1	ANT 2
a	6M	100	default	/
		116	default	/
		140	default	/
		144	default	/
ac VHT20	MCS0	100	default	default
		116	default	default
		140	default	default
		144	default	default
ac VHT40	MCS0	102	default	default
		118	default	default
		134	default	default
		142	default	default
ac VHT80	MCS0	106	default	default
		122	default	default
		138	default	default

UNII-3

IEEE Std. 802.11	Rate	Channel	Test Software Setting Value	
			ANT 1	ANT 2
a	6M	149	default	/
		157	default	/
		165	default	/
ac VHT20	MCS0	149	default	default
		157	default	default
		165	default	default
ac VHT40	MCS0	151	default	default
		159	default	default
ac VHT80	MCS0	155	default	default

Remark: Since 802.11ac VHT20/VHT40 modes are different from 802.11n HT20/HT40 only in control messages, so all the tests are performed on the worst case (802.11ac VHT20/802.11ac VHT40) mode between these 4 modes and only the worst data was recorded in this report.

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5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	Description
1	Laptop	ThinkPad	E550c	N/A
2	Fixed Frequency Board	N/A	N/A	Supply by UL Lab
3	AC/DC Adaptor	HOIOTO	ADS-12AM-12 12012EPG	INPUT: 100-240V~50/60Hz Max.0.3A OUTPUT: 12.0V⎓1.0A 12.0W

I/O PORT

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	USB	USB to TTL	100cm Length (Supply by UL Lab)	N/A

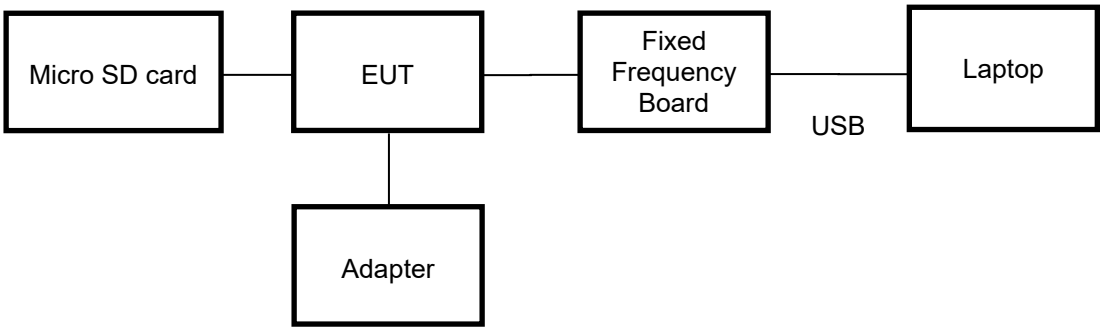
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	Micro SD card	Sandisk	A1	32GB

TEST SETUP

The EUT can work in an engineer mode with a software through a PC.

SETUP DIAGRAM FOR TESTS



Remark: The EUT has been built one Micro SD card during the testing

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5.8. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions (Instrument)							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
☑	EMI Test Receiver	R&S	ESR3	126700	2019-12-12	2020-12-05	2021-12-04
☑	Two-Line V-Network	R&S	ENV216	126701	2019-12-12	2020-12-05	2021-12-04
☑	Artificial Mains Networks	R&S	ENY81	126711	2019-12-12	2020-12-05	2021-12-04

Software					
Used	Description	Manufacturer	Name	Version	
☑	Test Software for Conducted disturbance	R&S	EMC32	Ver. 9.25	

Radiated Emissions (Instrument)							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
☑	Spectrum Analyzer	Keysight	N9010B	155727	2020-05-10	2021-05-09	2022-05-08
☑	EMI test receiver	R&S	ESR26	126703	2019-12-12	2020-12-05	2021-12-04
☑	Receiver Antenna (9kHz-30MHz)	Schwarzbeck	FMZB 1513	155456	2018-06-15	2021-06-03	2022-06-02
☑	Receiver Antenna (30MHz-1GHz)	SunAR RF Motion	JB1	177821	N/A	2019-01-28	2022-01-27
☑	Receiver Antenna (1GHz-18GHz)	R&S	HF907	126705	2018-01-29	2019-01-28	2022-01-27
☑	Receiver Antenna (18GHz-26.5GHz)	Schwarzbeck	BBHA9170	126706	2018-01-06	2019-01-05	2022-01-04
☑	Receiver Antenna (26.5GHz-40GHz)	TOYO	HAP 26-40W	155567	2020-07-22	2021-07-29	2022-07-28
☑	Pre-amplification (To 18GHz)	Compliance Direction System Inc.	PAP-1G18-50	177825	2019-03-18	2020-12-05	2022-03-25
☑	Pre-amplification (To 26.5GHz)	R&S	SCU-26D	135391	2019-02-06	2020-09-27	2021-09-26
☑	Band Reject Filter	Wainwright	WRCJV12-5120-5150-5350-5380-40SS	3	2020-05-10	2021-05-09	2022-05-08
☑	Band Reject Filter	Wainwright	WRCJV16-5440-5470-5725-5755-40SS	4	2020-05-10	2021-05-09	2022-05-08
☑	Band Reject Filter	Wainwright	WRCJV12-5695-5725-5850-5880-40SS	5	2020-05-10	2021-05-09	2022-05-08
☑	Highpass Filter	Wainwright	WHKX10-5850-6500-1800-40SS	6	2020-05-10	2021-05-09	2022-05-08

Software					
Used	Description	Manufacturer	Name	Version	
☑	Test Software for Radiated disturbance	Tonscend	TS+	Ver. 2.5	

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Other instruments							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
☑	Spectrum Analyzer	Keysight	N9010B	155368	2020-05-10	2021-05-09	2022-05-08
☑	Power Meter	Keysight	U2021XA	155370	2020-05-10	2021-05-09	2022-05-08

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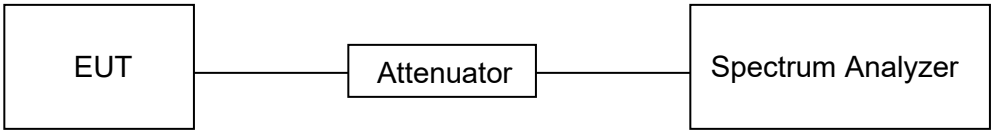
6. ANTENNA PORT TEST RESULTS

6.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

TEST SETUP



TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests
Relative Humidity	65%
Atmospheric Pressure:	101kPa
Temperature	21.5°C
Test date	08/12/2021

RESULTS

ANTENNA 1

Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (KHz)	Final setting For VBW (KHz)
11a	2.06	2.19	0.941	94.1	0.26	0.49	1
11ac HT20	1.93	2.10	0.919	91.9	0.37	0.52	1
11ac HT40	0.95	1.08	0.880	88.0	0.56	1.05	2
11ac HT80	0.46	0.60	0.767	76.7	1.15	2.17	3

Remark:
1. Duty Cycle Correction Factor=10log (1/x).
2. Where: x is Duty Cycle (Linear)
3. Where: T is On Time
4. If that calculated VBW is not available on the analyzer then the next higher value should be used.
5. Antenna 1 and Antenna 2 has the same duty cycle, only Antenna 1 data show here.

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11a ON TIME AND DUTY CYCLE MID CH (WORSE CASE)

11ac20 ON TIME AND DUTY CYCLE MID CH (WORSE CASE)

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11ac40 ON TIME AND DUTY CYCLE MID CH (WORSE CASE)

11ac80 ON TIME AND DUTY CYCLE MID CH (WORSE CASE)

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6.2. 6dB/26dB/99% OCCUPIED BANDWIDTH

LIMITS

CFR 47 FCC Part15, Subpart E ISED RSS-247 ISSUE 2		
Test Item	Limit	Frequency Range (MHz)
26 dB Emission Bandwidth	For reporting purposes only.	5150 ~ 5250
26 dB Emission Bandwidth	For reporting purposes only.	5250 ~ 5350
26 dB Emission Bandwidth	For reporting purposes only.	5470 ~ 5725 (For FCC) 5470 ~ 5600 (For ISED) 5650 ~ 5725 (For ISED)
6 dB Emission Bandwidth	The minimum 6 dB emission bandwidth shall be 500 kHz.	5725 ~ 5850
99 % Occupied Bandwidth	For reporting purposes only.	5150 ~ 5825 (For ISED)

TEST PROCEDURE

Refer to KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 section II.C1. for 26 dB Emission Bandwidth; section II.C2. for 6 dB Emission Bandwidth; section II.D. for 99 % Occupied Bandwidth.
Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	For 6 dB Emission Bandwidth: RBW=100 kHz For 26 dB Emission bandwidth: approximately 1 % of the EBW. For 99 % Occupied Bandwidth: approximately 1 % ~ 5 % of the OBW.
VBW	For 6 dB Bandwidth: ≥ 3*RBW For 26 dB Bandwidth: > RBW For 99 % Bandwidth: >3*RBW
Trace	Max hold
Sweep	Auto couple

a) Use the 99 % power bandwidth function of the instrument, allow the trace to stabilize and report the measured bandwidth.
b) Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6/26 dB relative to the maximum level measured in the fundamental emission.

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Calculation for 99 % Bandwidth and 26 dB Bandwidth of UNII-2C and UNII-3 Straddle Channel:

For Example: Fundamental Frequency: 5720 MHz

FL: 5710.60 MHz

FH: 5728.33 MHz

Turning Frequency: 5725 MHz

UNII-2C Band Portion = 5725-5710.60 = 14.40 MHz

UNII-3 Band Portion = 5728.33-5725 = 3.30 MHz

Calculation for 6dB Bandwidth of UNII-3 Straddle Channel:

For Example: Fundamental frequency: 5720 MHz

6 dB BW: 16.44 MHz

FL: 5711.76 MHz

FH: 5728.2 MHz

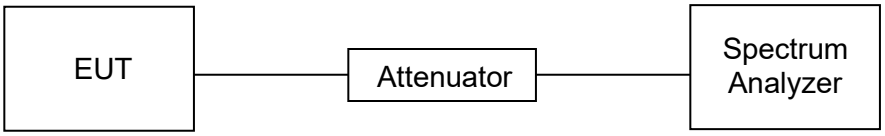
Turning Frequency: 5725 MHz

6 dB Bandwidth of UNII-3 band Portion = 5728.2-5725=3.2 MHz

TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests
Relative Humidity	65%
Atmospheric Pressure:	101kPa
Temperature	21.5°C
Test date	08/12/2021

TEST SETUP



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RESULTS TABLE ANTENNA 1 (WORST-CASE CONFIGURATION)

1) 26 dB Emission Bandwidth Part:

Test Mode	Antenna	Channel	26dB EBW [MHz]	FL[MHz]	FH[MHz]	Verdict
11A	Ant1	5180	5180	20.680	5169.480	PASS
		5200	5200	20.040	5189.960	PASS
		5240	5240	20.440	5229.800	PASS
		5260	5260	19.840	5249.960	PASS
		5280	5280	20.560	5269.640	PASS
		5320	5320	20.160	5309.920	PASS
		5500	5500	20.680	5489.800	PASS
		5580	5580	20.680	5569.480	PASS
		5700	5700	20.440	5689.640	PASS
		5720	5720	20.320	5709.800	PASS
		5720_UNII-2C	5720_UNII-2C	15.200	5709.800	PASS
		5720_UNII-3	5720_UNII-3	5.120	5725.000	PASS
		5745	5745	20.760	5734.600	PASS
		5785	5785	20.200	5774.960	PASS
		5825	5825	19.880	5815.000	PASS
11AC20 MIMO	Ant1	5180	5180	21.080	5169.400	PASS
		5200	5200	21.040	5189.520	PASS
		5240	5240	21.160	5229.360	PASS
		5260	5260	20.400	5249.600	PASS
		5280	5280	20.920	5269.440	PASS
		5320	5320	20.800	5309.440	PASS
		5500	5500	20.840	5489.600	PASS
		5580	5580	20.240	5569.800	PASS
		5700	5700	20.720	5689.400	PASS
		5720	5720	20.800	5709.440	PASS
		5720_UNII-2C	5720_UNII-2C	15.560	5709.440	PASS
		5720_UNII-3	5720_UNII-3	5.240	5725.000	PASS
		5745	5745	20.520	5734.640	PASS
		5785	5785	20.880	5774.560	PASS
		5825	5825	21.080	5814.400	PASS
11AC40 MIMO	Ant1	5190	5190	41.840	5168.880	PASS
		5230	5230	42.480	5208.480	PASS
		5270	5270	42.480	5248.640	PASS
		5310	5310	42.480	5288.480	PASS
		5510	5510	42.160	5488.960	PASS
		5550	5550	41.600	5529.120	PASS
		5670	5670	42.160	5648.720	PASS
		5710	5710	42.320	5688.720	PASS
		5710_UNII-2C	5710_UNII-2C	36.280	5688.720	PASS
		5710_UNII-3	5710_UNII-3	6.040	5725.000	PASS
		5755	5755	43.120	5733.400	PASS
		5795	5795	42.160	5773.800	PASS
11AC80 MIMO	Ant1	5210	5210	81.760	5168.880	PASS
		5290	5290	81.600	5248.880	PASS
		5530	5530	81.440	5489.200	PASS
		5610	5610	80.800	5569.680	PASS
		5690	5690	81.600	5649.360	PASS
		5690_UNII-2C	5690_UNII-2C	75.640	5649.360	PASS
		5690_UNII-3	5690_UNII-3	5.960	5725.000	PASS
		5775	5775	80.640	5734.680	PASS

Remark: The two antennas had been tested, but only the worst data was recorded in the report.

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2) **Occupied channel bandwidth Part:**

Test Mode	Antenna	Channel	Occupied Bandwidth [MHz]	FL[MHz]	FH[MHz]	Verdict
11A	Ant1	5180	16.937	5171.43	5188.367	PASS
		5200	16.928	5191.457	5208.385	PASS
		5240	16.863	5231.504	5248.367	PASS
		5260	16.786	5251.515	5268.301	PASS
		5280	16.971	5271.456	5288.427	PASS
		5320	16.877	5311.471	5328.348	PASS
		5500	16.943	5491.498	5508.441	PASS
		5580	16.861	5571.506	5588.367	PASS
		5700	16.965	5691.429	5708.394	PASS
		5720	16.738	5711.596	5728.334	PASS
		5720_UNII-2C	13.404	5711.596	5725	PASS
		5720_UNII-3	3.334	5725	5728.334	PASS
		5745	16.832	5736.545	5753.377	PASS
		5785	16.822	5776.499	5793.321	PASS
		5825	16.85	5816.519	5833.369	PASS
11AC20 MIMO	Ant1	5180	17.846	5171.005	5188.851	PASS
		5200	17.842	5191.007	5208.849	PASS
		5240	17.863	5230.982	5248.845	PASS
		5260	17.929	5251.03	5268.959	PASS
		5280	17.813	5271.028	5288.841	PASS
		5320	17.798	5311.035	5328.833	PASS
		5500	17.864	5491.061	5508.925	PASS
		5580	17.816	5571.021	5588.837	PASS
		5700	17.877	5690.96	5708.837	PASS
		5720	17.827	5711.044	5728.871	PASS
		5720_UNII-2C	13.956	5711.044	5725	PASS
		5720_UNII-3	3.871	5725	5728.871	PASS
		5745	17.829	5736.014	5753.843	PASS
		5785	17.827	5776.031	5793.858	PASS
		5825	17.764	5816.034	5833.798	PASS
11AC40 MIMO	Ant1	5190	36.514	5171.622	5208.136	PASS
		5230	36.577	5211.629	5248.206	PASS
		5270	36.55	5251.704	5288.254	PASS
		5310	36.504	5291.642	5328.146	PASS
		5510	36.557	5491.757	5528.314	PASS
		5550	36.581	5531.769	5568.35	PASS
		5670	36.545	5651.616	5688.161	PASS
		5710	36.544	5691.681	5728.225	PASS
		5710_UNII-2C	33.319	5691.681	5725	PASS
		5710_UNII-3	3.225	5725	5728.225	PASS
		5755	36.573	5736.648	5773.221	PASS
		5795	36.514	5776.596	5813.11	PASS
11AC80 MIMO	Ant1	5210	75.726	5172.145	5247.871	PASS
		5290	75.467	5252.272	5327.739	PASS
		5530	75.546	5492.332	5567.878	PASS
		5610	75.551	5572.283	5647.834	PASS
		5690	75.535	5652.153	5727.688	PASS
		5690_UNII-2C	72.847	5652.153	5725	PASS
		5690_UNII-3	2.688	5725	5727.688	PASS
		5775	75.496	5737.252	5812.748	PASS

Remark: The two antennas had been tested, but only the worst data was recorded in the report.

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3) 6dB Minimum Emission Bandwidth

Test Mode	Antenna	Channel	6db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5745	16.360	5736.760	5753.120	0.5	PASS
		5785	16.440	5776.720	5793.160	0.5	PASS
		5825	16.400	5816.760	5833.160	0.5	PASS
11AC20 MIMO	Ant1	5745	16.840	5736.520	5753.360	0.5	PASS
		5785	16.840	5776.520	5793.360	0.5	PASS
		5825	17.000	5816.360	5833.360	0.5	PASS
11AC40 MIMO	Ant1	5755	35.360	5737.160	5772.520	0.5	PASS
		5795	35.840	5776.920	5812.760	0.5	PASS
11AC80 MIMO	Ant1	5775	74.240	5737.240	5811.480	0.5	PASS

Remark: The two antennas had been tested, but only the worst data was recorded in the report.

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Test Graphs

1) For 26 dB Emission Bandwidth Part:

Test Mode	Test Channel	Verdict
11A	5180	PASS

Test Mode	Test Channel	Verdict
11A	5200	PASS

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Test Mode	Test Channel	Verdict
11A	5240	PASS

Test Mode	Test Channel	Verdict
11A	5260	PASS

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Test Mode	Test Channel	Verdict
11A	5280	PASS

Test Mode	Test Channel	Verdict
11A	5320	PASS

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Test Mode	Test Channel	Verdict
11A	5500	PASS

Test Mode	Test Channel	Verdict
11A	5580	PASS

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Test Mode	Test Channel	Verdict
11A	5700	PASS

Test Mode	Test Channel	Verdict
11A	5720	PASS

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Test Mode	Test Channel	Verdict
11A	5745	PASS

Test Mode	Test Channel	Verdict
11A	5785	PASS

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Test Mode	Test Channel	Verdict
11A	5825	PASS

Test Mode	Test Channel	Verdict
11AC20	5180	PASS

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Test Mode	Test Channel	Verdict
11AC20	5200	PASS

Test Mode	Test Channel	Verdict
11AC20	5240	PASS

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Test Mode	Test Channel	Verdict
11AC20	5260	PASS

Test Mode	Test Channel	Verdict
11AC20	5280	PASS

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Test Mode	Test Channel	Verdict
11AC20	5320	PASS

Test Mode	Test Channel	Verdict
11AC20	5500	PASS

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Test Mode	Test Channel	Verdict
11AC20	5580	PASS

Test Mode	Test Channel	Verdict
11AC20	5700	PASS

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Test Mode	Test Channel	Verdict
11AC20	5720	PASS

Test Mode	Test Channel	Verdict
11AC20	5745	PASS

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Test Mode	Test Channel	Verdict
11AC20	5785	PASS

Test Mode	Test Channel	Verdict
11AC20	5825	PASS

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Test Mode	Test Channel	Verdict
11AC40	5190	PASS

Test Mode	Test Channel	Verdict
11AC40	5230	PASS

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Test Mode	Test Channel	Verdict
11AC40	5270	PASS

Test Mode	Test Channel	Verdict
11AC40	5310	PASS

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Test Mode	Test Channel	Verdict
11AC40	5510	PASS

Test Mode	Test Channel	Verdict
11AC40	5550	PASS

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Test Mode	Test Channel	Verdict
11AC40	5670	PASS

Test Mode	Test Channel	Verdict
11AC40	5710	PASS

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Test Mode	Test Channel	Verdict
11AC40	5755	PASS

Test Mode	Test Channel	Verdict
11AC40	5795	PASS

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Test Mode	Test Channel	Verdict
11AC80	5210	PASS

Test Mode	Test Channel	Verdict
11AC80	5290	PASS

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Test Mode	Test Channel	Verdict
11AC80	5530	PASS

Test Mode	Test Channel	Verdict
11AC80	5610	PASS

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Test Mode	Test Channel	Verdict
11AC80	5690	PASS

Test Mode	Test Channel	Verdict
11AC80	5775	PASS

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2) For Occupied Bandwidth Part:

Test Mode	Test Channel	Verdict
11A	5180	PASS

Test Mode	Test Channel	Verdict
11A	5200	PASS

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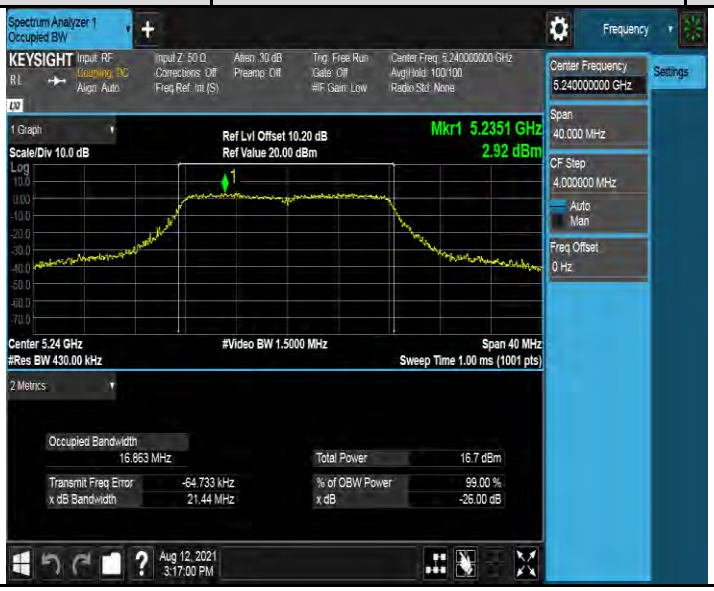
Test Mode	Test Channel	Verdict
11A	5240	PASS



Test Mode	Test Channel	Verdict
11A	5260	PASS

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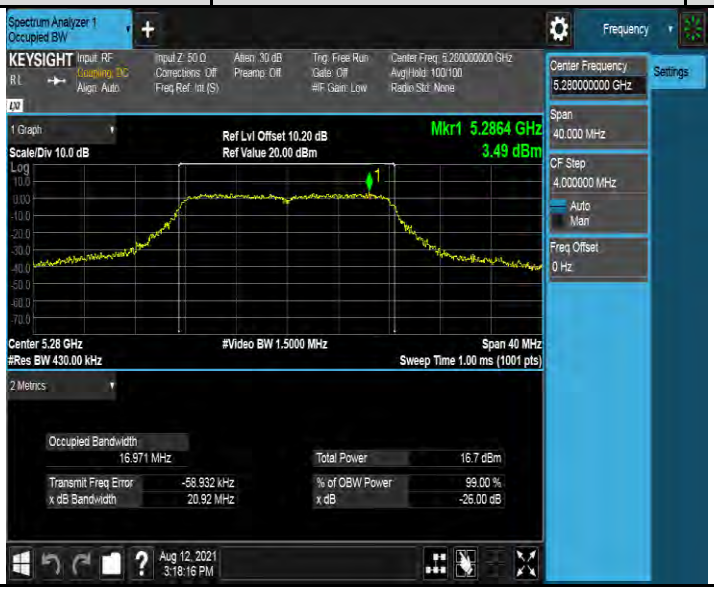
Test Mode	Test Channel	Verdict
11A	5280	PASS



Test Mode	Test Channel	Verdict
11A	5320	PASS

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Test Mode	Test Channel	Verdict
11A	5500	PASS

Test Mode	Test Channel	Verdict
11A	5580	PASS

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Test Mode	Test Channel	Verdict
11A	5700	PASS

Test Mode	Test Channel	Verdict
11A	5720	PASS

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Test Mode	Test Channel	Verdict
11A	5745	PASS

Test Mode	Test Channel	Verdict
11A	5785	PASS

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Test Mode	Test Channel	Verdict
11A	5825	PASS

Test Mode	Test Channel	Verdict
11AC20	5180	PASS

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Test Mode	Test Channel	Verdict
11AC20	5200	PASS

Test Mode	Test Channel	Verdict
11AC20	5240	PASS

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Test Mode	Test Channel	Verdict
11AC20	5260	PASS

Test Mode	Test Channel	Verdict
11AC20	5280	PASS

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Test Mode	Test Channel	Verdict
11AC20	5320	PASS

Test Mode	Test Channel	Verdict
11AC20	5500	PASS

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Test Mode	Test Channel	Verdict
11AC20	5580	PASS

Test Mode	Test Channel	Verdict
11AC20	5700	PASS

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Test Mode	Test Channel	Verdict
11AC20	5720	PASS

Test Mode	Test Channel	Verdict
11AC20	5745	PASS

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Test Mode	Test Channel	Verdict
11AC20	5785	PASS

Test Mode	Test Channel	Verdict
11AC20	5825	PASS

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Test Mode	Test Channel	Verdict
11AC40	5190	PASS

Test Mode	Test Channel	Verdict
11AC40	5230	PASS

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Test Mode	Test Channel	Verdict
11AC40	5270	PASS

Test Mode	Test Channel	Verdict
11AC40	5310	PASS

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Test Mode	Test Channel	Verdict
11AC40	5510	PASS

Test Mode	Test Channel	Verdict
11AC40	5550	PASS

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Test Mode	Test Channel	Verdict
11AC40	5670	PASS

Test Mode	Test Channel	Verdict
11AC40	5710	PASS

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Test Mode	Test Channel	Verdict
11AC40	5755	PASS

Test Mode	Test Channel	Verdict
11AC40	5795	PASS

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Test Mode	Test Channel	Verdict
11AC80	5210	PASS

Test Mode	Test Channel	Verdict
11AC80	5290	PASS

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Test Mode	Test Channel	Verdict
11AC80	5530	PASS

Test Mode	Test Channel	Verdict
11AC80	5610	PASS

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Test Mode	Test Channel	Verdict
11AC80	5690	PASS

Test Mode	Test Channel	Verdict
11AC80	5775	PASS

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3) For 6 dB Emission Bandwidth Part:

Test Mode	Test Channel	Verdict
11A	5745	PASS

Test Mode	Test Channel	Verdict
11A	5785	PASS

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Test Mode	Test Channel	Verdict
11A	5825	PASS

Test Mode	Test Channel	Verdict
11AC20	5745	PASS

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Test Mode	Test Channel	Verdict
11AC20	5785	PASS

Test Mode	Test Channel	Verdict
11AC20	5825	PASS

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Test Mode	Test Channel	Verdict
11AC40	5755	PASS

Test Mode	Test Channel	Verdict
11AC40	5795	PASS

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Test Mode	Test Channel	Verdict
11AC80	5775	PASS

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6.3. MAXIMUM CONDUCTED AVERAGE OUTPUT POWER

LIMITS

CFR 47 FCC Part15, Subpart E		
Test Item	Limit	Frequency Range (MHz)
Conducted Output Power	☐ Outdoor Access Point: 1 W (30 dBm) ☐ Indoor Access Point: 1 W (30 dBm) ☐ Fixed Point-To-Point Access Points: 1 W (30 dBm) ☒ Client Devices: 250 mW (24 dBm)	5150 ~ 5250
	Shall not exceed the lesser of 250 mW (24dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.	5250 ~ 5350 5470 ~ 5725
	Shall not exceed 1 Watt (30 dBm).	5725 ~ 5850

ISED RSS-247 ISSUE 2		
Test Item	Limit	Frequency Range (MHz)
Conducted Output Power or e.i.r.p.	The maximum e.i.r.p. shall not exceed 200 mW (23 dBm) or 10 + 10 $\log_{10}$B, dBm, whichever power is less. B is the 99 % emission bandwidth in megahertz.	5150 ~ 5250
	a. The maximum conducted output power shall not exceed 250 mW (24 dBm) or 11 + 10 $\log_{10}$B dBm, whichever is less. b. The maximum e.i.r.p. shall not exceed 1.0 W (30 dBm) or 17 + 10 $\log_{10}$B dBm, whichever is less. B is the 99 % emission bandwidth in megahertz. Remark that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.	5250 ~ 5350 5470 ~ 5600 5650 ~ 5725
	Shall not exceed 1 Watt (30 dBm).	5725 ~ 5850

Remark:
The above limits are based upon the maximum antenna gain does not exceed 6 dBi.
If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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TEST PROCEDURE

Refer to KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 section II.E.

Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep):
(i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.
(ii) Set RBW = 1 MHz.
(iii) Set VBW ≥ 3 MHz.
(iv) Number of points in sweep ≥ 2 × span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
(v) Sweep time = auto.
(vi) Detector = power averaging (rms), if available. Otherwise, use sample detector mode.
(vii) If transmit duty cycle < 98 %, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 %, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run."
(viii) Trace average at least 100 traces in power averaging (rms) mode.
(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

Method PM (Measurement using an RF average power meter):
(i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the following conditions are satisfied:
a. The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
b. At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
c. The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
(ii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in II.B.
(iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
(iv) Adjust the measurement in dBm by adding 10 log (1/x) where x is the duty cycle (e.g., 10 log (1/0.25) if the duty cycle is 25 %).

Method PM-G (Measurement using a gated RF average power meter):
Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

Straddle channel power was measured using spectrum analyzer.

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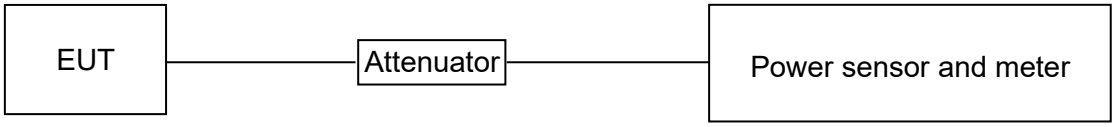
TEST SETUP



TEST RESULT TABLE

Mode	Frequency (MHz)	Average Conducted Output Power (dBm)			FCC Conducted Power Limit (dBm)	ISED Conducted Power Limit (dBm)	Average EIRP (dBm)			ISED EIRP Limit (dBm)
		ANT 1	ANT 2	Total			ANT 1	ANT 2	Total	
802.11a	5180	9.37	/	/	24.00	/	12.45	/	/	22.30
	5200	9.47	/	/	24.00	/	12.55	/	/	22.30
	5240	9.50	/	/	24.00	/	12.58	/	/	22.30
	5260	9.60	/	/	23.55	23.55	13.18	/	/	29.55
	5280	9.88	/	/	23.55	23.55	13.46	/	/	29.55
	5320	10.13	/	/	23.55	23.55	13.71	/	/	29.55
	5500	9.80	/	/	23.55	23.55	12.54	/	/	29.55
	5580	10.50	/	/	23.55	23.55	13.24	/	/	29.55
	5700	10.56	/	/	23.55	23.55	13.30	/	/	29.55
	5720_UNII-2C	8.70	/	/	23.55	23.55	11.44	/	/	29.55
	5720_UNII-3	2.38	/	/	30.00	30.00	5.12	/	/	36.00
	5745	11.40	/	/	30.00	30.00	12.80	/	/	36.00
	5785	10.34	/	/	30.00	30.00	11.74	/	/	36.00
	5825	11.30	/	/	30.00	30.00	12.70	/	/	36.00

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Mode	Frequency (MHz)	Average Conducted Output Power (dBm)			FCC Conducted Power Limit (dBm)	ISED Conducted Power Limit (dBm)	Average EIRP (dBm)			ISED EIRP Limit (dBm)
		ANT 1	ANT 2	Total			ANT 1	ANT 2	Total	
802.11 ac VHT20	5180	7.91	4.03	9.40	24.00	/	10.99	7.11	15.49	22.30
	5200	7.50	4.36	9.20	24.00	/	10.58	7.44	15.29	22.30
	5240	7.44	5.50	9.60	24.00	/	10.52	8.58	15.69	22.30
	5260	7.49	5.69	9.70	24.00	23.55	11.07	9.27	16.29	29.55
	5280	7.21	6.04	9.70	24.00	23.55	10.79	9.62	16.29	29.55
	5320	7.38	6.46	10.00	24.00	23.55	10.96	10.04	16.59	29.55
	5500	7.00	5.48	9.30	24.00	23.55	9.74	8.22	15.05	29.55
	5580	7.64	5.61	9.80	24.00	23.55	10.38	8.35	15.55	29.55
	5700	7.88	7.28	10.60	24.00	23.55	10.62	10.02	16.35	29.55
	5720_UNII-2C	6.31	5.60	9.00	24.00	23.55	9.05	8.34	14.75	29.55
	5720_UNII-3	0.30	-0.48	2.90	30.00	30.00	1.70	0.92	6.31	36.00
	5745	8.27	7.24	10.80	30.00	30.00	9.67	8.64	14.21	36.00
	5785	7.89	6.51	10.30	30.00	30.00	9.29	7.91	13.71	36.00
	5825	7.52	5.11	9.50	30.00	30.00	8.92	6.51	12.91	36.00
802.11 ac VHT40	5190	7.56	4.39	9.30	24.00	/	10.64	7.47	15.39	22.30
	5230	7.94	5.52	9.90	24.00	/	11.02	8.60	15.99	22.30
	5270	7.57	6.38	10.00	24.00	24.00	11.15	9.96	16.59	30.00
	5310	7.60	6.74	10.20	24.00	24.00	11.18	10.32	16.79	30.00
	5510	7.56	6.18	9.90	24.00	24.00	10.30	8.92	15.65	30.00
	5550	8.05	6.56	10.40	24.00	24.00	10.79	9.30	16.15	30.00
	5670	8.89	7.46	11.20	24.00	24.00	11.63	10.20	16.95	30.00
	5720_UNII-2C	8.30	7.79	11.10	24.00	24.00	11.04	10.53	16.85	30.00
	5720_UNII-3	-3.29	-3.60	-0.40	30.00	30.00	-1.89	-2.20	3.01	36.00
	5755	8.93	7.41	11.20	30.00	30.00	10.33	8.81	14.61	36.00
	5795	8.45	7.12	10.80	30.00	30.00	9.85	8.52	14.21	36.00
802.11 ac VHT80	5210	6.40	3.74	8.30	24.00	/	9.48	6.82	14.39	22.30
	5290	6.51	5.00	8.80	24.00	24.00	10.09	8.58	15.39	30.00
	5530	6.97	5.44	9.30	24.00	24.00	9.71	8.18	15.05	30.00
	5610	7.77	4.99	9.60	24.00	24.00	10.51	7.73	15.35	30.00
	5690_UNII-2C	7.96	6.73	10.40	24.00	24.00	10.70	9.47	16.15	30.00
	5690_UNII-3	-7.42	-8.31	-4.80	30.00	30.00	-6.02	-6.91	-1.39	36.00
	5775	7.86	5.99	10.00	30.00	30.00	9.26	7.39	13.41	36.00

Remark: 1. Only the antenna1 can transmit at the 11a mode.
2. Average EIRP = Average Conducted Output Power + Antenna gain/Directional gain.
3. The test results have already included the duty cycle correction factor. About correction Factor please refer to section 6.2.
4. MIMO mode use the same power setting, only the worst EIRP data was recorded in the report, for more about the antenna gain/directional gain, please refer to clause 5.4.

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6.4. POWER SPECTRAL DENSITY

LIMITS

CFR 47 FCC Part15, Subpart E		
Test Item	Limit	Frequency Range (MHz)
Power Spectral Density	☐ Outdoor Access Point: 17 dBm/MHz ☐ Indoor Access Point: 17 dBm/MHz ☐ Fixed Point-To-Point Access Points: 17 dBm/MHz ☒ Client Devices: 11 dBm/MHz	5150 ~ 5250
	11 dBm/MHz	5250 ~ 5350 5470 ~ 5725
	30 dBm/500kHz	5725 ~ 5850

ISED RSS-247 ISSUE 2		
Test Item	Limit	Frequency Range (MHz)
Power Spectral Density	The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.	5150 ~ 5250
	The power spectral density shall not exceed 11 dBm inany 1.0 MHz band.	5250 ~ 5350 5470 ~ 5600 5650 ~ 5725
	30 dBm / 500 kHz	5725 ~ 5850

Remark:
The above limits are based upon the maximum antenna gain does not exceed 6 dBi.
If transmitting antennas of directional gain greater than 6 dBi are used, maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

Refer to KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 section II.F.

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Connect the EUT to the spectrum analyser and use the following settings:

For U-NII-1, U-NII-2A and U-NII-2C band:

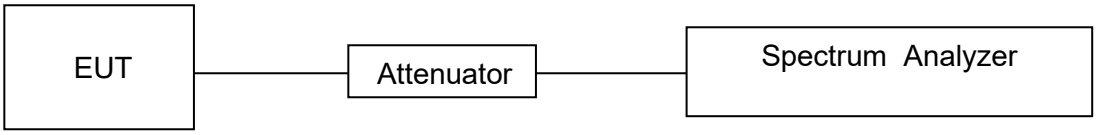
Center Frequency	The center frequency of the channel under test
Detector	RMS
RBW	1 MHz
VBW	≥3 × RBW
Span	Encompass the entire emissions bandwidth (EBW) of the signal
Trace	Max hold
Sweep time	Auto

For U-NII-3:

Center Frequency	The center frequency of the channel under test
Detector	RMS
RBW	500 kHz
VBW	≥3 × RBW
Span	Encompass the entire emissions bandwidth (EBW) of the signal
Trace	Max hold
Sweep time	Auto

Allow trace to fully stabilize and Use the peak search function on the instrument to find the peak of the spectrum and record its value.
Add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum, the result is the Maximum PSD over 1 MHz / 500 kHz reference bandwidth.

TEST SETUP



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RESULTS

Test Mode	Antenna	Channel	Power [dBm/MHz]	Limit [dBm/MHz]	EIRP [dBm/MHz]	Limit [dBm/MHz]	Verdict
11A	Ant1	5180	0.259	<=11		<=10	PASS
	Ant1	5200	0.168	<=11		<=10	PASS
	Ant1	5240	0.498	<=11		<=10	PASS
	Ant1	5260	0.265	<=11	/	/	PASS
	Ant1	5280	0.389	<=11	/	/	PASS
	Ant1	5320	0.328	<=11	/	/	PASS
	Ant1	5500	0.203	<=11	/	/	PASS
	Ant1	5580	0.747	<=11	/	/	PASS
	Ant1	5700	0.285	<=11	/	/	PASS
	Ant1	5720_UNII-2C	0.321	<=11	/	/	PASS
	Ant1	5720_UNII-3	-2.685	<=30	/	/	PASS
	Ant1	5745	-2.155	<=30	/	/	PASS
	Ant1	5785	-2.474	<=30	/	/	PASS
	Ant1	5825	-1.846	<=30	/	/	PASS
11AC20MIMO	Ant1	5180	-3.004	<=11	/	/	PASS
	Ant2		-6.814	<=11	/	/	PASS
	total		-1.49	<=11		<=10	PASS
	Ant1	5200	-3.652	<=11	/	/	PASS
	Ant2		-6.685	<=11	/	/	PASS
	total		-1.90	<=11		<=10	PASS
	Ant1	5240	-3.740	<=11	/	/	PASS
	Ant2		-5.744	<=11	/	/	PASS
	total		-1.62	<=11		<=10	PASS
	Ant1	5260	-3.590	<=11	/	/	PASS
	Ant2		-5.547	<=11	/	/	PASS
	total		-1.45	<=11	/	/	PASS
	Ant1	5280	-3.944	<=11	/	/	PASS
	Ant2		-5.321	<=11	/	/	PASS
	total		-1.57	<=11	/	/	PASS
	Ant1	5320	-3.734	<=11	/	/	PASS
	Ant2		-4.948	<=11	/	/	PASS
	total		-1.29	<=11	/	/	PASS
	Ant1	5500	-4.081	<=11	/	/	PASS
	Ant2		-6.489	<=11	/	/	PASS
	total		-2.11	<=11	/	/	PASS
	Ant1	5580	-3.098	<=11	/	/	PASS
	Ant2		-6.341	<=11	/	/	PASS
	total		-1.41	<=11	/	/	PASS
	Ant1	5700	-3.507	<=11	/	/	PASS
	Ant2		-4.719	<=11	/	/	PASS
	total		-1.06	<=11	/	/	PASS
	Ant1	5720_UNII-2C	-3.927	<=11	/	/	PASS
	Ant2		-5.470	<=11	/	/	PASS
	total		-1.62	<=11	/	/	PASS
	Ant1	5720_UNII-3	-6.746	<=30	/	/	PASS
	Ant2		-8.486	<=30	/	/	PASS
	total		-4.52	<=30	/	/	PASS
	Ant1	5745	-5.829	<=30	/	/	PASS
	Ant2		-8.345	<=30	/	/	PASS

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