CFR 47 FCC PART 15 SUBPART E

CERTIFICATION TEST REPORT

For

Wireless Moudle

MODEL NUMBER: VS0B9MW3565UE

PROJECT NUMBER: 4790751248

REPORT NUMBER: 4790751248-9

FCC ID: 2AL8S-0211C5L1

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Prepared for

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Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	04/12/2023	Initial Issue	

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	ZHEJIANG UNIVIEW TECHNOLOGIES CO., LTD
Address:	88 JIANGLING RD BINJIANG DISTRICT HANGZHOU ZHEJIANG 310051 CHINA

Manufacturer Information

Company Name:	ZHEJIANG UNIVIEW TECHNOLOGIES CO., LTD
Address:	88 JIANGLING RD BINJIANG DISTRICT HANGZHOU ZHEJIANG 310051 CHINA

EUT Description

Product Name:	Wireless Moudle
Model Name:	VS0B9MW3565UE
Sample Number:	5811281
Data of Receipt Sample:	Feb. 21, 2023
Test Date:	Feb. 23, 2023~ Apr. 11, 2023

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 FCC PART 15 SUBPART E	PASS

Summary of Test Results			
Clause	Test Items	FCC Rules	Test Results
1	6dB/26dB Bandwidth	FCC 15.407 (a)&(e)	PASS
2	Maximum Conducted Output Power	FCC 15.407 (a)	PASS
3	Power Spectral Density	FCC 15.407 (a)	PASS
4	Antenna Conducted Spurious Emission	FCC 15.407 (b)	PASS
5	Radiated Bandedge and Spurious Emission	FCC 15.407 (a), FCC 15.209, FCC 15.205, RSS-247 Clause 6.2	PASS
6	Conducted Emission Test for AC Power Port	FCC 15.207	N/A(Note3)
7	Frequency Stability	FCC 15.407 (g)	PASS
8	Dynamic Frequency Selection	FCC 15.407 (h) RSS-247 Clause 6.3	PASS
9	Antenna Requirement	FCC 15.203 RSS-GEN Clause 8.3	PASS
Note 1)The measurement result for the sample received is <Pass> according to <ANSI C63.10-2013, FCC CFR 47 Part 2 and FCC CFR 47 Part 15E > when <Accuracy Method> 2)It is a slave device without radar detection. 3)This product is power supply by DC.			

Prepared By:

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Reviewed By:

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Chris Zhong
EMC&RF Lab Operations Manager

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, 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

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.**

Note 1: All tests measurement facilities use to collect the measurement data are located at No. 2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122, China

Note 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.

Note 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.

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)	3.5dB (1GHz-18Gz)
	3.9dB (18GHz-26.5Gz)
	4.1dB (26.5GHz-40Gz)
Remark: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Product Name:	Wireless Moudle	
Model No.:	VS0B9MW3565UE	
Operating Frequency:	UNII-1 BAND：5150 ~ 5250MHz UNII-2A BAND: 5250 ~ 5350MHz UNII-2C BAND: 5470 ~ 5725MHz UNII-3 BAND: 5725 ~ 5850MHz	
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) IEEE for 802.11ax: OFDMA (BPSK, QPSK,16QAM, 64QAM, 256QAM,1024QAM)	
Channels Step:	Channels with 5MHz step	
Test software of EUT:	QATool_Dbg	
Antenna Type:	PIFA antenna	
Antenna Gain:	UNII-1 BAND	Antenna1: 6.15 dBi
		Antenna2: 5.74 dBi
	UNII-2A BAND	Antenna1: 5.69 dBi
		Antenna2: 5.28 dBi
	UNII-2C BAND	Antenna1: 5.44 dBi
		Antenna2: 4.46 dBi
	UNII-3 BAND	Antenna1: 3.19 dBi
		Antenna2: 3.17 dBi
	Remark: This data is provided by customer and our lab isn't responsible for this data	

5.2. MAXIMUM OUTPUT POWER

UNII-1 BAND

IEEE Std. 802.11	Frequency (MHz)	Maximum Average Conducted Power (dBm)		
		Ant 1	Ant 2	Total
a	5150 ~ 5250	10.05	11.08	/
ac VHT20		/	/	6.84
ac VHT40		/	/	6.78
ac VHT80		/	/	6.79
ax20		/	/	7.22
ax40		/	/	7.02
ax80		/	/	7.21

UNII-2A BAND

IEEE Std. 802.11	Frequency (MHz)	Maximum Average Conducted Power (dBm)		
		Ant 1	Ant 2	Total
a	5250 ~ 5350	8.94	9.74	/
ac VHT20		/	/	6.63
ac VHT40		/	/	6.42
ac VHT80		/	/	6.13
ax20		/	/	6.67
ax40		/	/	6.93
ax80		/	/	6.57

UNII-2C BAND

IEEE Std. 802.11	Frequency (MHz)	Maximum Average Conducted Power (dBm)		
		Ant 1	Ant 2	Total
a	5470 ~ 5725	11.29	13.80	/
ac VHT20		/	/	8.29
ac VHT40		/	/	8.25
ac VHT80		/	/	8.19
ax20		/	/	8.47
ax40		/	/	8.82
ax80		/	/	8.62

UNII-3 BAND

IEEE Std. 802.11	Frequency (MHz)	Maximum Average Conducted Power (dBm)		
		Ant 1	Ant 2	Total
a	5725 ~ 5850	5.26	7.16	/
ac VHT20		/	/	3.32
ac VHT40		/	/	3.12
ac VHT80		/	/	0.53
ax20		/	/	5.54
ax40		/	/	1.01
ax80		/	/	1.08

Remark: For this product, it has five antennas, only three antennas for WF-M921U RF module, but only two antennas for WIFI function. For this WF-M921U RF module WIFI function, only the 802.11N HT20, 802.11N HT40, 802.11 ac VHT20, 802.11 ac VHT40, 802.11 ac VHT80,802.11 ax20, 802.11 ax40 and 802.11 ax80 modes can support both the SISO and MIMO technical. For the modes of 11a only support SISO mode.

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				

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				

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
802.11ax20	CH 36(Low Channel), CH 40(MID Channel), CH 48(High Channel)	5180 MHz, 5200 MHz, 5240 MHz
802.11ax40	CH 38(Low Channel), CH 46(High Channel)	5190 MHz, 5230 MHz
802.11ax80	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
802.11ax20	CH 52(Low Channel), CH 56(MID Channel), CH 64(High Channel)	5260 MHz, 5280 MHz, 5320 MHz
802.11ax40	CH 54(Low Channel), CH 62(High Channel)	5270 MHz, 5310 MHz
802.11ax80	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
802.11ax20	CH 100(Low Channel), CH 116(MID Channel), CH 140(MID Channel), CH 144(High Channel)	5500 MHz, 5580 MHz, 5700 MHz,5720 MHz
802.11ax40	CH 102(Low Channel), CH 110(MID Channel), CH 134(MID Channel), CH 142(High Channel)	5510 MHz, 5550 MHz, 5670 MHz, 5710 MHz,
802.11ax80	CH 102(Low Channel), CH 122(MID Channel) CH 138(High Channel)	5530 MHz, 5610 MHz, 5690 MHz

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
802.11ax20	CH 149(Low Channel), CH 157(MID Channel), CH 165(High Channel)	5745 MHz, 5785 MHz, 5825 MHz
802.11ax40	CH 151(Low Channel), CH 159(High Channel)	5755 MHz, 5795 MHz
802.11ax80	CH 155(Low Channel)	5775 MHz

5.5. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna	Frequency Band	Antenna Type	Maximum Antenna Gain (dBi)	Directional Gain (dBi) MIMO Mode
1	UNII-1	PCB antenna	6.15	8.96
2	UNII-1		5.74	
1	UNII-2A	PCB antenna	5.69	8.50
2	UNII-2A		5.28	
1	UNII-2C	PCB antenna	5.44	7.99
2	UNII-2C		4.46	
1	UNII-3	PCB antenna	3.19	6.19
2	UNII-3		3.17	
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				

IEEE Std. 802.11	Transmit and Receive Mode	Description
a	☒2TX, 2RX	ANT 1, 2 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.
ax20	☒2TX, 2RX	ANT 1, 2 can be used as transmitting/receiving antenna.
ax40	☒2TX, 2RX	ANT 1, 2 can be used as transmitting/receiving antenna.
ax80	☒2TX, 2RX	ANT 1, 2 can be used as transmitting/receiving antenna.

Remark:
1) For this product, it has five antennas, only three antennas for WF-M921U RF module, but only two antennas for WIFI function. For this WF-M921U RF module WIFI function, only the 802.11N HT20, 802.11N HT40, 802.11 ac VHT20, 802.11 ac VHT40, 802.11 ac VHT80,802.11 ax20, 802.11 ax40 and 802.11 ax80 modes can support both the SISO and MIMO technical. For the modes of 11a only support SISO mode.
2) The EUT support Cyclic Shift Diversity (CDD), Space Time Coding (STBC), Spartial Division Multiplexing (SDM) modes. They use the same conducted power per chain in any given mode, CDD mode have the maximum power setting, so we only chose the worst case mode CDD for final testing.

5.6. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter	
Test Software	QATool_Dbg

UNII-1

IEEE Std. 802.11	Rate	Channel	Test Software Setting Value	
			ANT 1	ANT 2
a	6M	36	14	14
		40	14	14
		48	14	14
ac VHT20	MCS0	36	8	8
		40	8	8
		48	8	8
ac VHT40	MCS0	38	8	8
		46	8	8
ac VHT80	MCS0	42	8	8
ax20	MCS0	36	8	8
		40	8	8
		48	8	8
ax40	MCS0	38	8	8
		46	8	8
ax80	MCS0	42	8	8

UNII-2A

IEEE Std. 802.11	Rate	Channel	Test Software Setting Value	
			ANT 1	ANT 2
a	6M	52	12	12
		60	12	12
		64	12	12
ac VHT20	MCS0	52	7	7
		60	7	7
		64	7	7
ac VHT40	MCS0	54	7	7
		62	7	7
ac VHT80	MCS0	58	7	7
ax20	MCS0	52	7	7
		60	7	7
		64	7	7
ax40	MCS0	54	7	7
		62	7	7
ax80	MCS0	58	7	7

UNII-2C

IEEE Std. 802.11	Rate	Channel	Test Software Setting Value	
			ANT 1	ANT 2
a	6M	100	14	14
		116	14	14
		140	16	16
		144	16	16
ac VHT20	MCS0	100	8	8
		116	8	8
		140	10	10
		144	10	10
ac VHT40	MCS0	102	8	8
		118	8	8
		134	10	10
		142	10	10
ac VHT80	MCS0	106	8	8
		122	8	8
		138	10	10
ax20	MCS0	100	8	8
		116	8	8
		140	10	10
		144	10	10
ax40	MCS0	102	8	8
		118	8	8
		134	10	10
		142	10	10
ax80	MCS0	106	8	8
		122	8	8
		138	10	10

UNII-3

IEEE Std. 802.11	Rate	Channel	Test Software Setting Value	
			ANT 1	ANT 2
a	6M	149	10	10
		157	10	10
		165	10	10
ac VHT20	MCS0	149	4	4
		157	4	4
		165	4	4
ac VHT40	MCS0	151	4	4
		159	4	4
ac VHT80	MCS0	155	2	2
ax20	MCS0	149	4	4
		157	4	4
		165	4	4
ax40	MCS0	151	4	4
		159	4	4
ax80	MCS0	155	2	2

Remark:
1) 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.
2) For 802.11AX mode only support full RU mode.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	Description
1	Laptop	ThinkPad	E590	N/A

I/O PORT

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	USB	USB	100cm Length	N/A

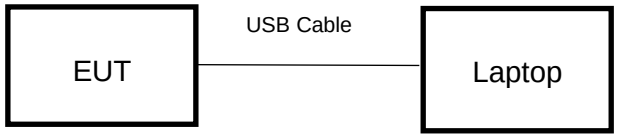
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	N/A	N/A	N/A	N/A

TEST SETUP

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

SETUP DIAGRAM FOR TESTS



5.8. MEASURING INSTRUMENT AND SOFTWARE USED

Radiated Emissions (Instrument**)**							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
☑	EMI test receiver	R&S	ESR7	222993	/	2022-05-20	2023-05-19
☑	EMI test receiver	R&S	ESR26	126703	2021-12-04	2022-12-03	2023-12-02
☑	Spectrum Analyzer	R&S	FSV3044	222992	/	2022-05-27	2023-05-26
☑	Receiver Antenna (9kHz-30MHz)	Schwarzbeck	FMZB 1513	155456	2018-06-15	2021-06-03	2024-06-02
☑	Receiver Antenna (30MHz-1GHz)	Schwarzbeck	VULB 9163	126704	2019-01-28	2022-01-18	2025-01-17
☑	Receiver Antenna (1GHz-18GHz)	R&S	HF907	126705	2018-01-29	2022-02-28	2025-02-27
☑	Receiver Antenna (18GHz-26.5GHz)	Schwarzbeck	BBHA9170	126706	2019-01-05	2021-07-15	2024-07-14
☑	Pre-amplification (To 18GHz)	Tonscned	TAP01018050	224539	/	2022-10-20	2023-10-19
☑	Pre-amplification (To 18GHz)	R&S	SCU-18D	134667	2021-12-05	2022-12-04	2023-12-03
☑	Pre-amplification (To 26.5GHz)	R&S	SCU-26D	135391	2021-12-05	2022-12-04	2023-12-03
☑	Band Reject Filter	Wainwright	WRCGV12-2375-2400-2485-2510-40SS	1	2021-12-05	2022-12-04	2023-12-03
☑	High Pass Filter	COM-MW	ZBF13-3-18G-01	2	2021-12-05	2022-12-04	2023-12-03
☑	Chamber A	Albatross	9*6*6	126721	2019-05-31	2022-05-30	2025-05-29
☑	Chamber B	SAEMC	9*6*6	220350	/	2022-07-03	2025-06-01
☑	Temperature and Humidity Datalogger	Omega Engineering Inc.	iTHX-SD-5	183135	/	2022-07-20	2023-07-19

Software					
Used	Description	Manufacturer	Name	Version	
☑	Test Software for Radiated disturbance	JSTONSCEND	JS32-RE	Ver. 4.0.0.1	
☑	Test Software for Radiated disturbance	Chinese-EMC	RE_RSE	Ver. 3.03	

Other instruments							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
☑	Spectrum Analyzer	Keysight	N9010B	155368	2022-04-09	2023-04-08	2024-04-07
☑	Power Meter	MWT	MW100-RFCB	221694	2022-04-09	2023-04-08	2024-04-07
☑	Attenuator	PASTERNACK	PE7087-6	1624	2022-04-09	2023-04-08	2024-04-07

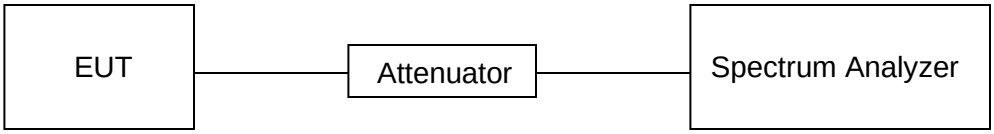
6. ANTENNA PORT TEST RESULTS

6.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

TEST SETUP



TEST ENVIRONMENT

Temperature	22.2℃	Relative Humidity	50.9%
Atmosphere Pressure	102.2kpa	Test Voltage	DC5V

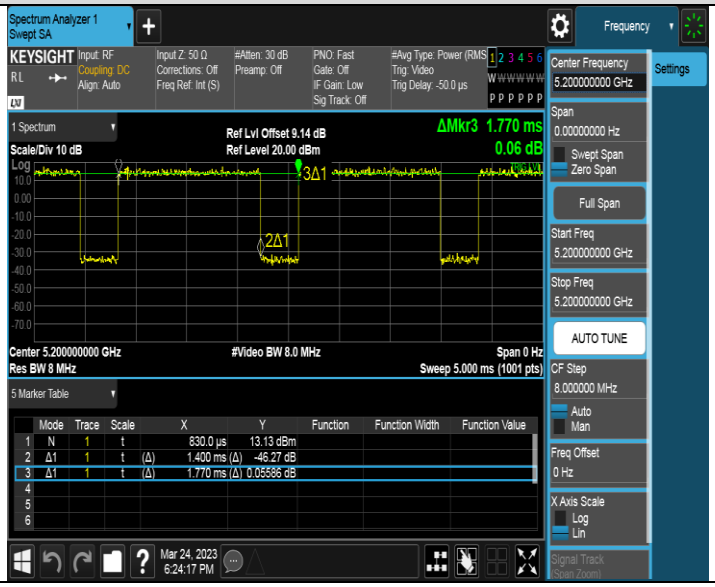
RESULTS

ANTENNA 2

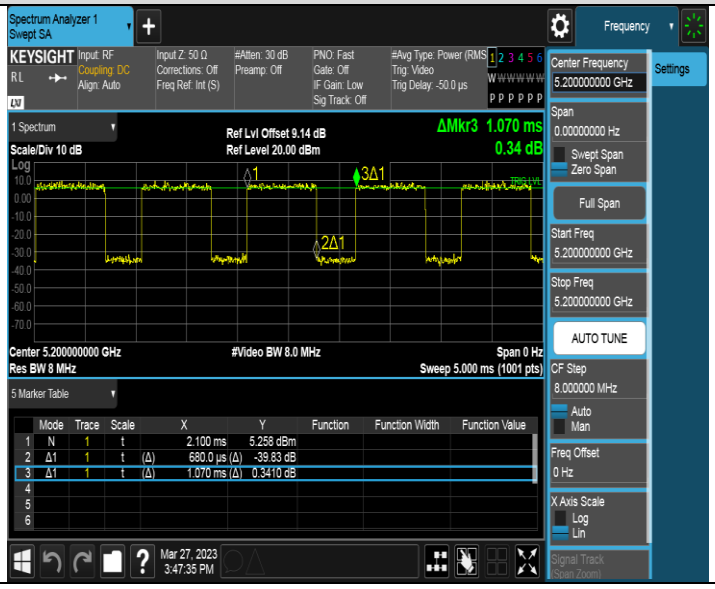
Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)	Final setting For VBW (kHz)
11a	1.40	1.77	0.791	79.1	1.02	0.71	1
11ac HT20	0.68	1.07	0.636	63.6	1.97	1.47	2
11ac HT40	0.35	0.73	0.480	48.0	3.19	2.86	3
11ac HT80	0.19	0.58	0.328	32.8	4.84	5.26	6
11ax20	0.20	0.55	0.364	36.4	4.39	5	5
11ax40	0.20	0.55	0.364	36.4	4.39	5	5
11ax80	0.19	0.58	0.328	32.8	4.84	5.26	6

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 2 data show here.

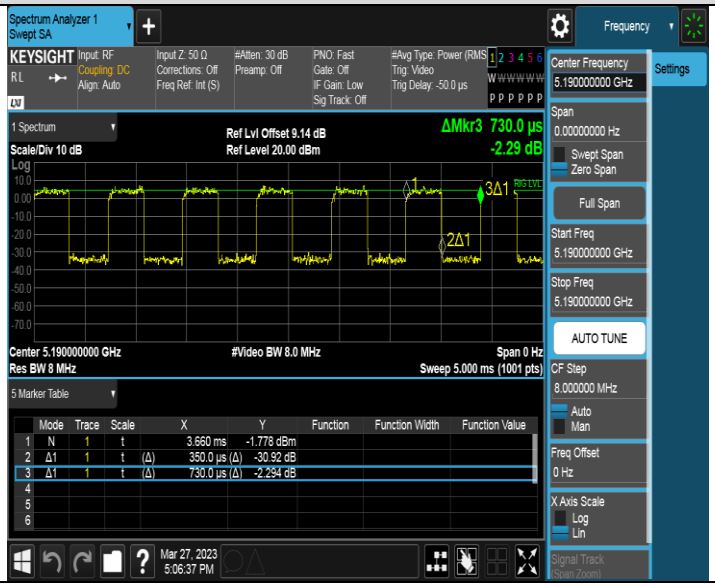
11a ON TIME AND DUTY CYCLE MID CH (WORSE CASE)



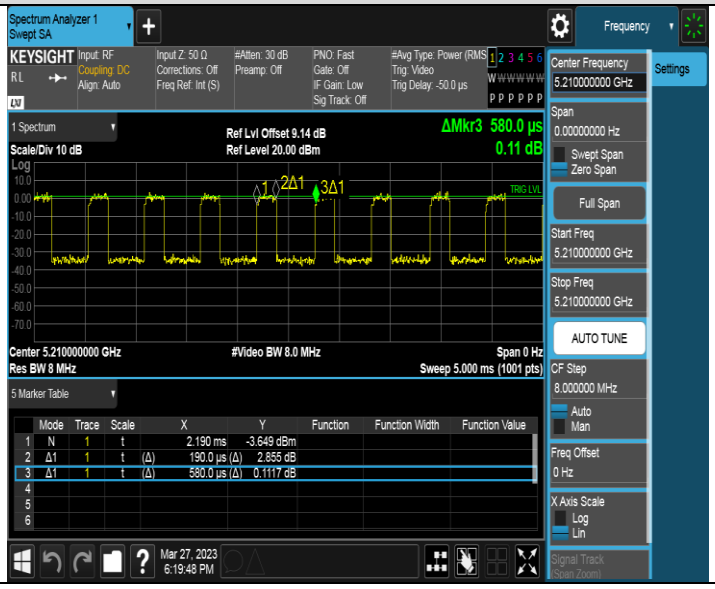
11ac20 ON TIME AND DUTY CYCLE MID CH (WORSE CASE)



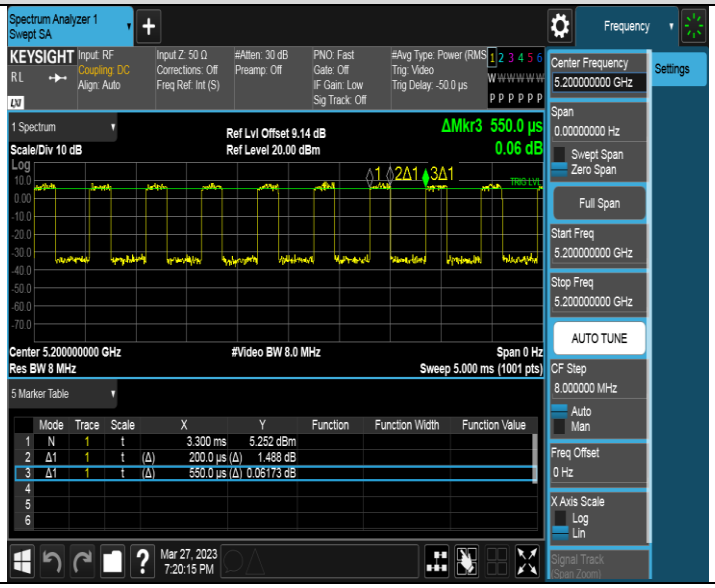
11ac40 ON TIME AND DUTY CYCLE MID CH (WORSE CASE)



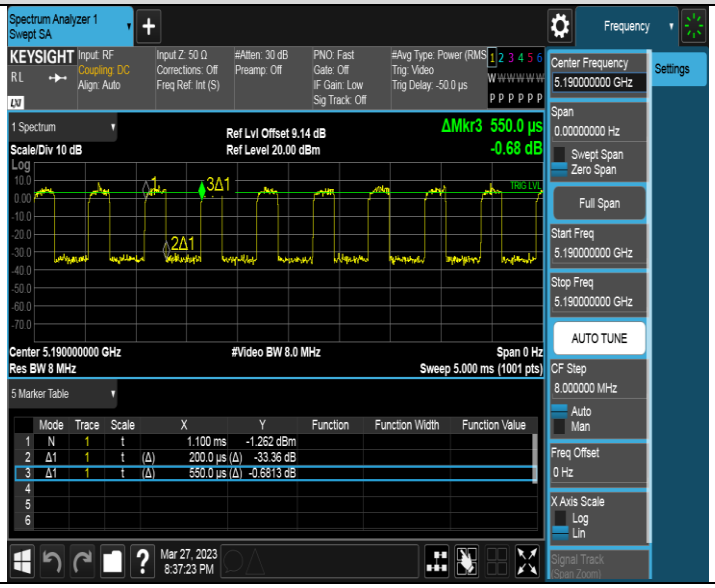
11ac80 ON TIME AND DUTY CYCLE MID CH (WORSE CASE)

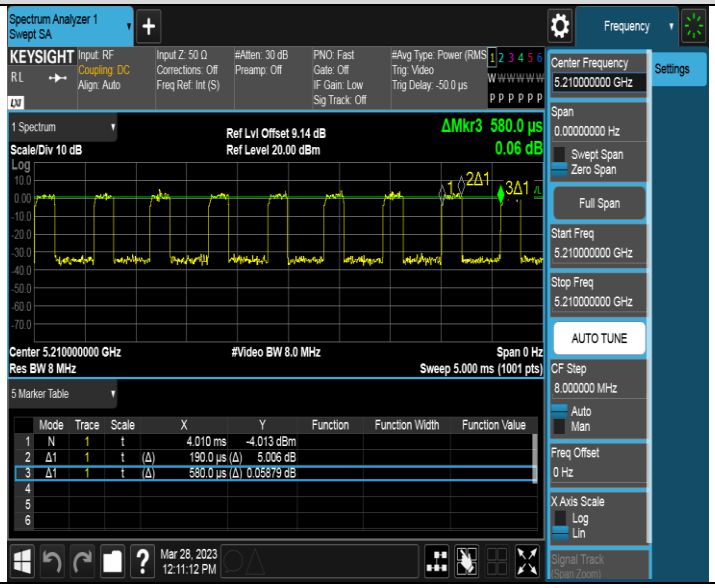


11ax20 ON TIME AND DUTY CYCLE MID CH (WORSE CASE)



11ax40 ON TIME AND DUTY CYCLE MID CH (WORSE CASE)



11ax80 ON TIME AND DUTY CYCLE MID CH (WORSE CASE)


6.2. 6dB/26dB OCCUPIED BANDWIDTH

LIMITS

CFR 47 FCC Part15, Subpart E		
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
6 dB Emission Bandwidth	The minimum 6 dB emission bandwidth shall be 500 kHz.	5725 ~ 5850

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.
VBW	For 6 dB Bandwidth: ≥ 3*RBW For 26 dB Bandwidth: > RBW
Trace	Max hold
Sweep	Auto couple

a) 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.

Calculation for 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

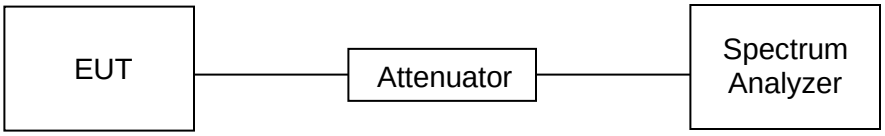
Turning Frequency: 5725 MHz

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

TEST ENVIRONMENT

Temperature	22.2℃	Relative Humidity	50.9%
Atmosphere Pressure	102.2kpa	Test Voltage	DC5V

TEST SETUP



RESULTS TABLE ANTENNA 2 (WORST-CASE CONFIGURATION)

I) For 26 dB Emission Bandwidth Part:

Test Mode	Antenna	Channel	26dB EBW [MHz]	FL[MHz]	FH[MHz]	Verdict
11A	Ant2	5180	23.400	5167.600	5191.000	PASS
		5200	24.880	5188.160	5213.040	PASS
		5240	19.600	5230.120	5249.720	PASS
		5260	23.640	5248.160	5271.800	PASS
		5280	24.400	5267.000	5291.400	PASS
		5320	23.760	5307.640	5331.400	PASS
		5500	23.840	5487.960	5511.800	PASS
		5580	22.840	5568.400	5591.240	PASS
		5700	25.760	5686.000	5711.760	PASS
		5720	24.200	5707.640	5731.840	PASS
		5720_UNII-2C	17.360	5707.640	5725.000	PASS
		5720_UNII-3	6.840	5725.000	5731.840	PASS
		5745	24.400	5732.800	5757.200	PASS
		5785	23.800	5772.600	5796.400	PASS
		5825	24.000	5812.800	5836.800	PASS
11AC20 MIMO	Ant2	5180	25.200	5167.120	5192.320	PASS
		5200	24.680	5187.760	5212.440	PASS
		5240	19.960	5230.040	5250.000	PASS
		5260	23.960	5248.240	5272.200	PASS
		5280	26.000	5266.840	5292.840	PASS
		5320	25.240	5307.760	5333.000	PASS
		5500	26.320	5486.480	5512.800	PASS
		5580	24.280	5568.200	5592.480	PASS
		5700	25.560	5687.520	5713.080	PASS
		5720	24.840	5707.680	5732.520	PASS
		5720_UNII-2C	17.320	5707.680	5725.000	PASS
		5720_UNII-3	7.520	5725.000	5732.520	PASS
		5745	23.480	5733.080	5756.560	PASS
		5785	26.440	5771.920	5798.360	PASS
		5825	26.000	5811.680	5837.680	PASS
11AC40 MIMO	Ant2	5190	39.680	5170.240	5209.920	PASS
		5230	39.440	5210.160	5249.600	PASS
		5270	40.160	5249.920	5290.080	PASS
		5310	40.000	5289.920	5329.920	PASS
		5510	40.080	5489.840	5529.920	PASS
		5550	39.680	5530.160	5569.840	PASS
		5670	39.840	5649.760	5689.600	PASS
		5710	39.600	5690.160	5729.760	PASS
		5710_UNII-2C	34.840	5690.160	5725.000	PASS
		5710_UNII-3	4.760	5725.000	5729.760	PASS
		5755	39.760	5735.080	5774.840	PASS
		5795	39.280	5775.240	5814.520	PASS
11AC80 MIMO	Ant2	5210	79.040	5170.480	5249.520	PASS
		5290	79.360	5250.320	5329.680	PASS
		5530	79.200	5490.480	5569.680	PASS
		5610	79.040	5570.640	5649.680	PASS
		5690	79.520	5650.160	5729.680	PASS
		5690_UNII-2C	74.840	5650.160	5725.000	PASS
		5690_UNII-3	4.680	5725.000	5729.680	PASS
		5775	79.360	5735.320	5814.680	PASS

Test Mode	Antenna	Channel	26dB EBW [MHz]	FL[MHz]	FH[MHz]	Verdict
11AX20 MIMO	Ant2	5180	21.480	5169.320	5190.800	PASS
		5200	21.160	5189.120	5210.280	PASS
		5240	19.880	5230.000	5249.880	PASS
		5260	23.120	5247.840	5270.960	PASS
		5280	22.240	5269.480	5291.720	PASS
		5320	23.000	5307.760	5330.760	PASS
		5500	21.240	5489.400	5510.640	PASS
		5580	23.000	5568.040	5591.040	PASS
		5700	21.920	5689.160	5711.080	PASS
		5720	24.400	5707.760	5732.160	PASS
		5720_UNII-2C	17.240	5707.760	5725.000	PASS
		5720_UNII-3	7.160	5725.000	5732.160	PASS
		5745	22.120	5733.920	5756.040	PASS
		5785	25.720	5771.240	5796.960	PASS
		5825	21.760	5813.920	5835.680	PASS
11AX40 MIMO	Ant2	5190	39.280	5170.320	5209.600	PASS
		5230	39.280	5210.400	5249.680	PASS
		5270	39.440	5250.240	5289.680	PASS
		5310	39.200	5290.480	5329.680	PASS
		5510	39.200	5490.480	5529.680	PASS
		5550	39.200	5530.400	5569.600	PASS
		5670	39.200	5650.400	5689.600	PASS
		5710	39.200	5690.400	5729.600	PASS
		5710_UNII-2C	34.600	5690.400	5725.000	PASS
		5710_UNII-3	4.600	5725.000	5729.600	PASS
		5755	39.120	5735.480	5774.600	PASS
		5795	39.120	5775.480	5814.600	PASS
11AX80 MIMO	Ant2	5210	79.520	5170.320	5249.840	PASS
		5290	79.840	5250.000	5329.840	PASS
		5530	79.840	5490.160	5570.000	PASS
		5610	79.840	5570.160	5650.000	PASS
		5690	79.680	5650.160	5729.840	PASS
		5690_UNII-2C	74.840	5650.160	5725.000	PASS
		5690_UNII-3	4.840	5725.000	5729.840	PASS
		5775	79.680	5735.160	5814.840	PASS

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

II) 6dB Minimum Emission Bandwidth

Test Mode	Antenna	Channel	6db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant2	5745	16.320	5736.800	5753.120	≥0.5	PASS
		5785	16.360	5776.760	5793.120	≥0.5	PASS
		5825	16.040	5816.800	5832.840	≥0.5	PASS
11AC20 MIMO	Ant2	5745	17.280	5736.440	5753.720	≥0.5	PASS
		5785	15.800	5777.040	5792.840	≥0.5	PASS
		5825	17.200	5816.200	5833.400	≥0.5	PASS
11AC40 MIMO	Ant2	5755	33.840	5738.680	5772.520	≥0.5	PASS
		5795	33.840	5778.680	5812.520	≥0.5	PASS
11AC80 MIMO	Ant2	5775	74.880	5737.560	5812.440	≥0.5	PASS
11AX20 MIMO	Ant2	5745	18.120	5735.920	5754.040	≥0.5	PASS
		5785	18.640	5775.680	5794.320	≥0.5	PASS
		5825	18.400	5815.520	5833.920	≥0.5	PASS
11AX40 MIMO	Ant2	5755	35.120	5737.400	5772.520	≥0.5	PASS
		5795	35.120	5777.400	5812.520	≥0.5	PASS
11AX80 MIMO	Ant2	5775	73.920	5737.400	5811.320	≥0.5	PASS

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

Test Graphs

I) For 26 dB Emission Bandwidth Part:

Test Mode	Test Channel	Verdict
11A	5180	PASS

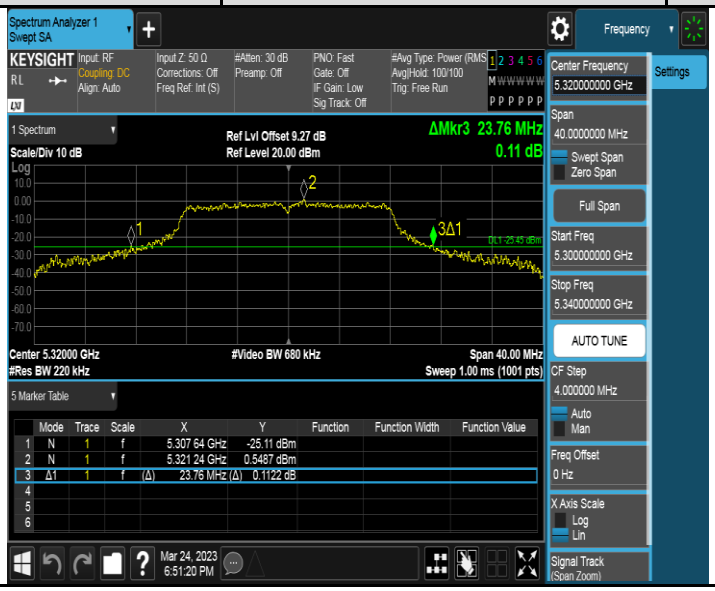
Test Mode	Test Channel	Verdict
11A	5200	PASS

Test Mode	Test Channel	Verdict
11A	5240	PASS

Test Mode	Test Channel	Verdict
11A	5260	PASS

Test Mode	Test Channel	Verdict
11A	5280	PASS

Test Mode	Test Channel	Verdict
11A	5320	PASS



Test Mode	Test Channel	Verdict
11A	5500	PASS

Test Mode	Test Channel	Verdict
11A	5580	PASS

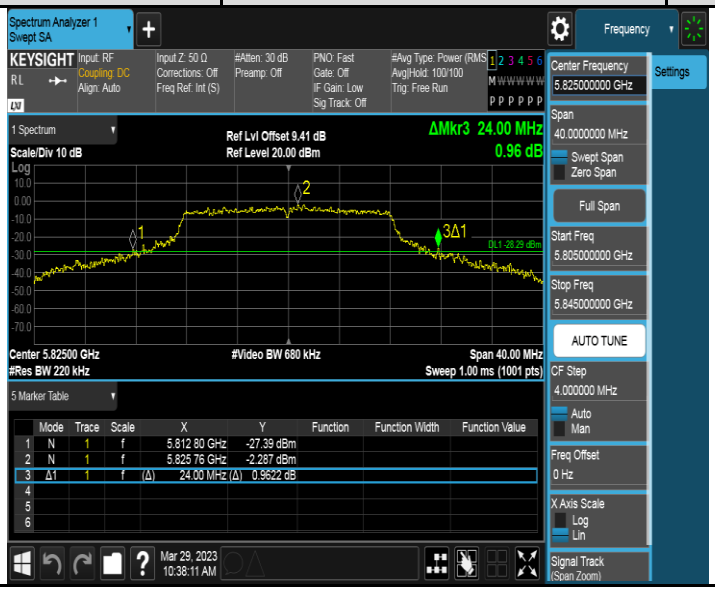
Test Mode	Test Channel	Verdict
11A	5700	PASS

Test Mode	Test Channel	Verdict
11A	5720	PASS

Test Mode	Test Channel	Verdict
11A	5745	PASS

Test Mode	Test Channel	Verdict
11A	5785	PASS

Test Mode	Test Channel	Verdict
11A	5825	PASS



Test Mode	Test Channel	Verdict
11AC20	5180	PASS

Test Mode	Test Channel	Verdict
11AC20	5200	PASS

Test Mode	Test Channel	Verdict
11AC20	5240	PASS

Test Mode	Test Channel	Verdict
11AC20	5260	PASS

Test Mode	Test Channel	Verdict
11AC20	5280	PASS

Test Mode	Test Channel	Verdict
11AC20	5320	PASS

Test Mode	Test Channel	Verdict
11AC20	5500	PASS

Test Mode	Test Channel	Verdict
11AC20	5580	PASS

Test Mode	Test Channel	Verdict
11AC20	5700	PASS

Test Mode	Test Channel	Verdict
11AC20	5720	PASS

Test Mode	Test Channel	Verdict
11AC20	5745	PASS

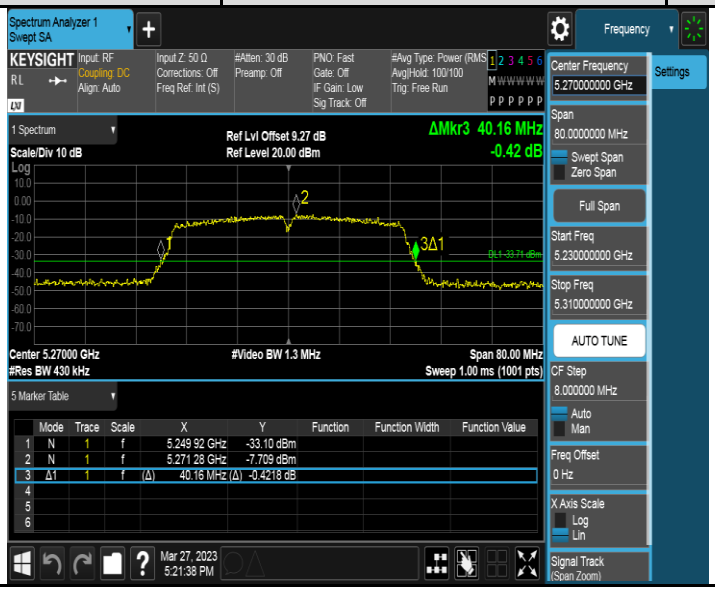
Test Mode	Test Channel	Verdict
11AC20	5785	PASS

Test Mode	Test Channel	Verdict
11AC20	5825	PASS

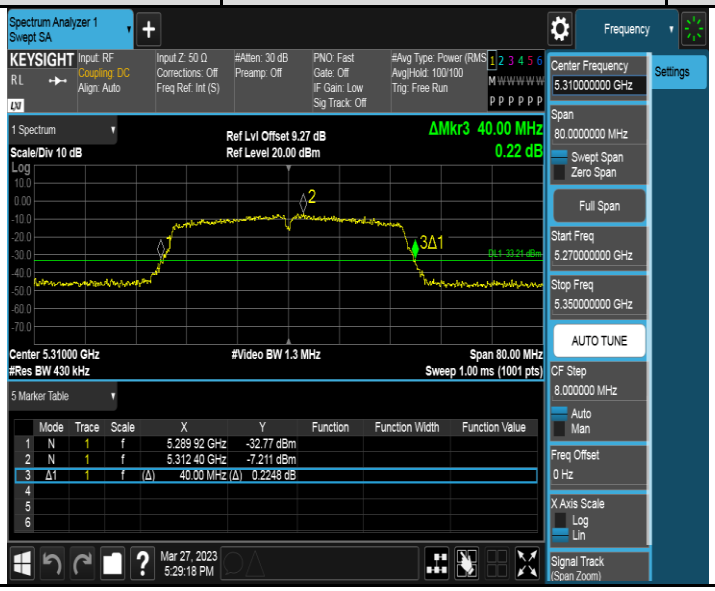
Test Mode	Test Channel	Verdict
11AC40	5190	PASS

Test Mode	Test Channel	Verdict
11AC40	5230	PASS

Test Mode	Test Channel	Verdict
11AC40	5270	PASS



Test Mode	Test Channel	Verdict
11AC40	5310	PASS



Test Mode	Test Channel	Verdict
11AC40	5510	PASS

Test Mode	Test Channel	Verdict
11AC40	5550	PASS