FCC RF Test Report

APPLICANT	:	Xiaomi Communications Co., Ltd.
EQUIPMENT	:	Mobile Phone
BRAND NAME	:	XIAOMI
MODEL NAME	:	2107113SG
FCC ID	:	2AFZZ113SG
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System
TEST DATE(S)	:	May 29, 2021 ~ Jun. 16, 2021

We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.

Jason Jia

Reviewed by: Jason Jia / Supervisor

Alexwang

Approved by: Alex Wang / Manager

ACCREDITED
Cert #5145.02

Sporton International (Kunshan) Inc.
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China

TABLE OF CONTENTS

REVISION HISTORY **3**
SUMMARY OF TEST RESULT **4**
1 GENERAL DESCRIPTION **5**
1.1 Applicant 5
1.2 Manufacturer 5
1.3 Product Feature of Equipment Under Test 5
1.4 Product Specification of Equipment Under Test 6
1.5 Modification of EUT 6
1.6 Testing Location 7
1.7 Test Software 7
1.8 Applicable Standards 7
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST **8**
2.1 Carrier Frequency and Channel 8
2.2 Test Mode 9
2.3 Connection Diagram of Test System 10
2.4 Support Unit used in test configuration and system 11
2.5 EUT Operation Test Setup 11
2.6 Measurement Results Explanation Example 11
3 TEST RESULT **12**
3.1 6dB Bandwidth Measurement 12
3.2 Output Power Measurement 14
3.3 Power Spectral Density Measurement 15
3.4 Conducted Band Edges and Spurious Emission Measurement 17
3.5 Radiated Band Edges and Spurious Emission Measurement 42
3.6 AC Conducted Emission Measurement 46
3.7 Antenna Requirements 48
4 LIST OF MEASURING EQUIPMENT **49**
5 UNCERTAINTY OF EVALUATION **50**
APPENDIX A. CONDUCTED TEST RESULTS
APPENDIX B. AC CONDUCTED EMISSION TEST RESULT
APPENDIX C. RADIATED SPURIOUS EMISSION
APPENDIX E. DUTY CYCLE PLOTS
APPENDIX F. SETUP PHOTOGRAPHS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR151502C	Rev. 01	Initial issue of report	Jul. 16, 2021

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.1	-	99% Bandwidth	-	Not Required	-
3.2	15.247(b)	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	Conducted Band Edges	≤ 20dBc	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 3.03 dB at 2483.800 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 10.50 dB at 0.152 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	N/A	-
Remark: Not required means after assessing, test items are not necessary to carry out.					

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Applicant

Xiaomi Communications Co., Ltd.
#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

1.2 Manufacturer

Xiaomi Communications Co., Ltd.
#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Phone
Brand Name	XIAOMI
Model Name	2107113SG
FCC ID	2AFZZ113SG
EUT supports Radios application	GSM/WCDMA/LTE/5G NR WLAN 2.4GHz 802.11b/g/n/ax HT20/HT40/HE20/HE40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80/VHT160 WLAN 5GHz 802.11ax HE20/HE40/HE80/HE160 Bluetooth BR / EDR / LE NFC and GNSS
IMEI Code	Conducted: 868253050067301/868253050067319 Conduction: 868253050044789/868253050044797 Radiation: 868253050046123/868253050046131
HW Version	P2
SW Version	MIUI12.5
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz
Maximum (Peak) Output Power to antenna	<MIMO Ant.1+2> 802.11b : 24.86 dBm (0.3062 W) 802.11g : 28.08 dBm (0.6427 W) 802.11n HT20 : 28.04 dBm (0.6368 W) 802.11n HT40 : 27.94 dBm (0.6223 W) 802.11ax HE20 : 28.47 dBm (0.7031 W) 802.11ax HE40 : 28.12 dBm (0.6486 W)
Antenna Type / Gain	<Ant.1>: PIFA Antenna type with gain -2.9 dBi <Ant.2>: PIFA Antenna type with gain 0.5 dBi
Antenna Function for Transmitter	

	Ant. 1	Ant. 2
802.11b/g/n/ax SISO	V	V
802.11b/g/n/ax MIMO	V	

Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n/ax: OFDM (BPSK / QPSK / 16QAM / 64QAM/ 256QAM / 1024QAM)

Note:

1. For WLAN SISO & MIMO mode, the whole testing has assessed only MIMO mode by referring to their higher conducted power.
2. For 802.11ax mode, Partial RU combinations were verified for conducted power/PSD/ Radiated Band Edges which is lower conducted power than full RU mode.
3. For 802.11n HT20 / ax HE20 and 802.11n HT40 / ax HE40 mode, the whole testing have assessed only 802.11 ax HE20/ HE40 by referring to their maximum conducted power.

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Testing Location

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International (Kunshan) Inc.		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	CO01-KS 03CH05-KS TH01-KS	CN1257	314309

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH05-KS	AUDIX	E3	6.2009-8-24al
2.	CO01-KS	AUDIX	E3	6.2009-8-24

1.8 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 15 Subpart C §15.247
- FCC KDB 558074 D01 15.247 Meas Guidance v05r02
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Z plane) were recorded in this report.

b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437		

2.2 Test Mode

Final test modes are considering the modulation and worse data rates as below table.

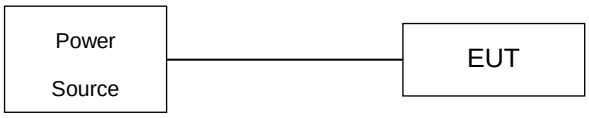
MIMO Antenna

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11ax HE20	MCS0
802.11ax HE40	MCS0

Test Cases	
AC Conducted Emission	Mode 1 :GSM 850 Idle + Bluetooth Link + WLAN Link (2.4G) + USB Cable 2(Charging from Adapter)
Remark: For Radiated Test Cases, The tests were performed with Adapter and USB Cable 1.	

2.3 Connection Diagram of Test System

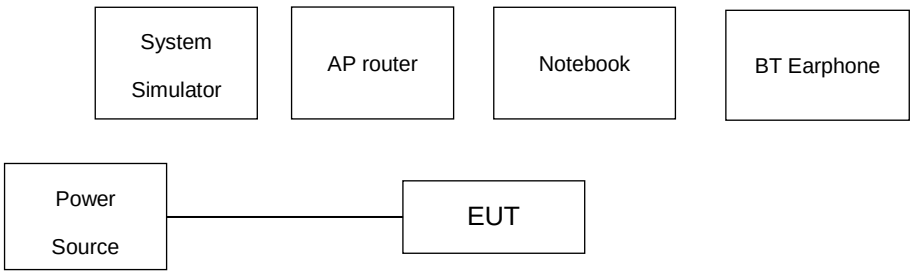
For Radiated Emission



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

For Conducted Emission



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	LTE Base Station	Anritus	MT8821C	N/A	N/A	Unshielded,1.8m
2.	Bluetooth Earphone	Xiaomi	LYEJ02LM	N/A	N/A	N/A
3.	WLAN AP	D-link	DIR-655	KA21R655B1	N/A	Unshielded,1.8m
4.	Notebook	Lenovo	G480	QDS-BRCM1050I	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
5.	SD Card	Kingston	8GB	N/A	N/A	N/A

2.5 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT continuous transmit/receive.

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP under large package sizes transmission.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss.

Offset = RF cable loss.

Following shows an offset computation example with cable loss 5.8 dB.

Offset(dB) = RF cable loss(dB) .

= 5.8 (dB)

3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

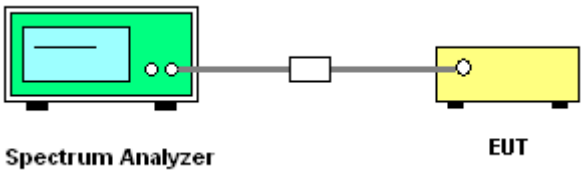
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 11.8
2. The RF output of EUT was connected to the spectrum analyzer 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. 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 6 dB bandwidth must be greater than 500 kHz.
5. Measure and record the results in the test report.

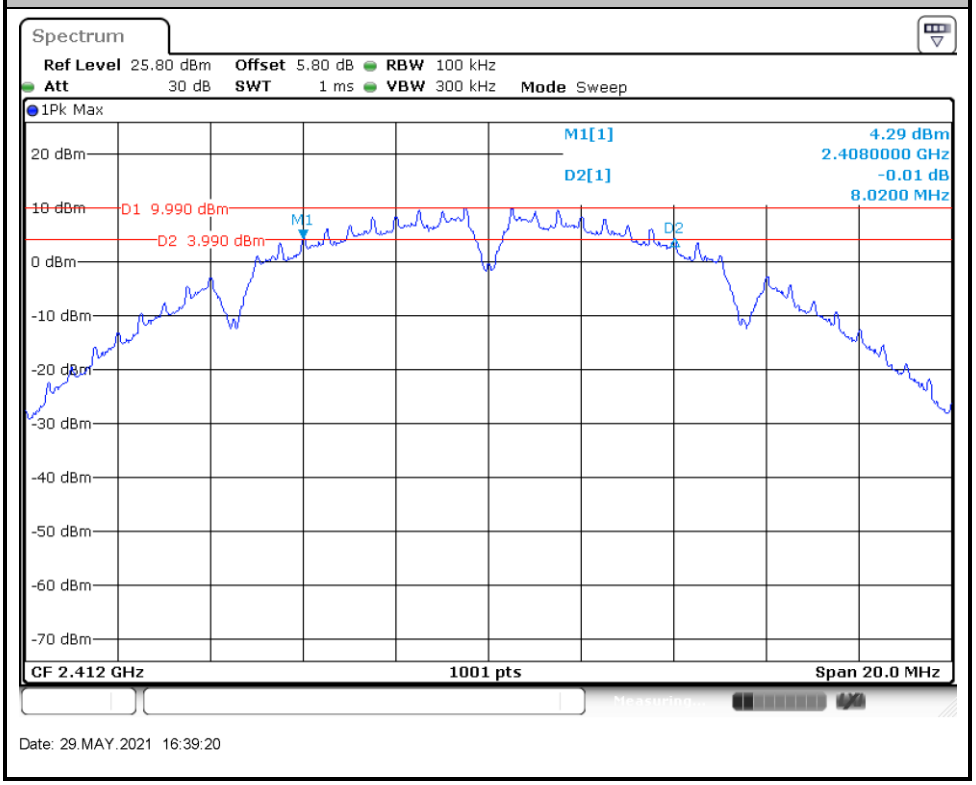
3.1.4 Test Setup



3.1.5 Test Result of 6dB Occupied Bandwidth

Please refer to Appendix A.

Minimum 6dB Bandwidth



Note : The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna with directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

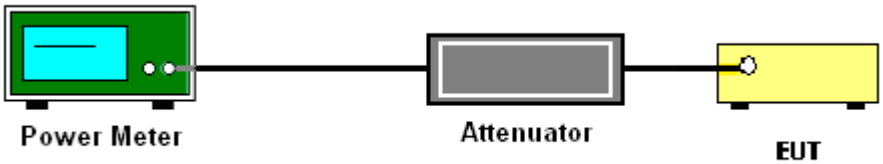
3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of ANSI C63.10-2013 clause 11.9.1.3 PKPM1 Peak power meter or ANSI C63.10-2013 clause 11.9.2.3.2 Method AVGPM-G method.
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.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Please refer to Appendix A.

3.2.6 Test Result of Average output Power (Reporting Only)

Please refer to Appendix A.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

1. The testing follows Measurement Procedure of ANSI C63.10-2013 clause 11.10.2 Method PKPSD.
2. The RF output of EUT was connected to the spectrum analyzer 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. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.
7. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

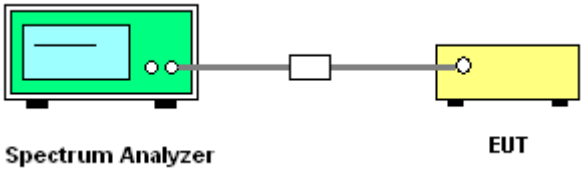
   If measurements performed using method (2) plus 10 log (N) exceeds the emission limit, the test should choose method (1) before declaring that the device fails the emission limit.

   Method (1): Measure and sum the spectra across the outputs.

   The total final Power Spectral Density is from a device with 2 transmitter outputs. The spectrum measurements of the individual outputs are all performed with the same span and number of points, the spectrum value in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 to obtain the value for the first frequency bin of the summed spectrum.

   Method (2): Measure and add 10 log (N) dB, where N is the number of outputs. (N=2)

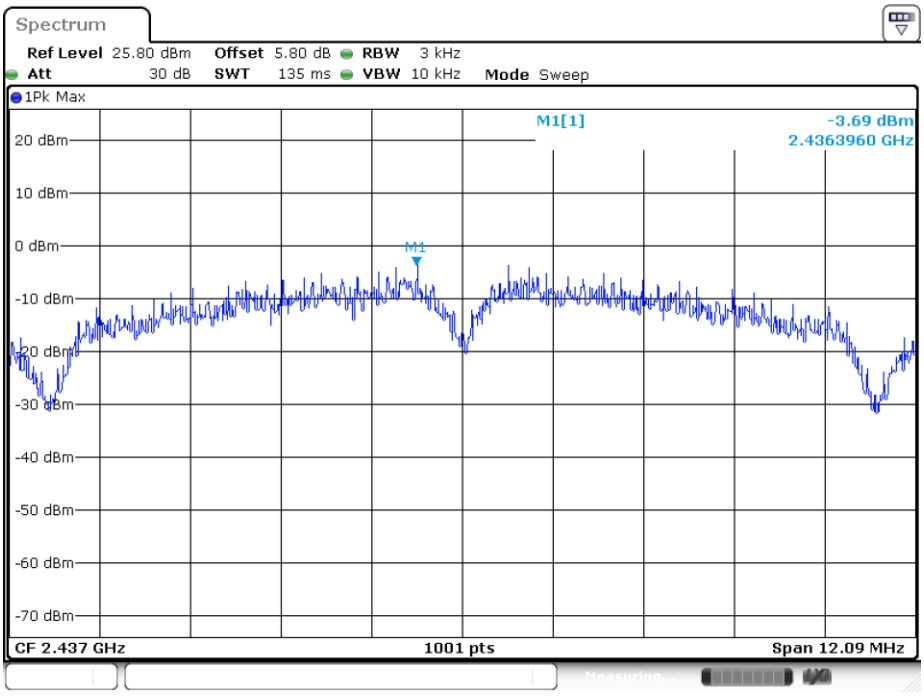
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Worst Case Power Density (dBm/3kHz)



3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission Measurement

In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement.

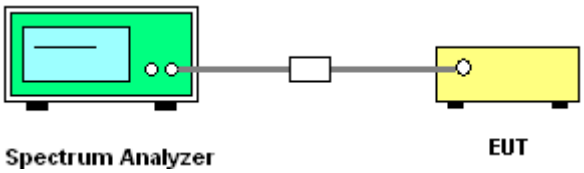
3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.4.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 11.13
2. The RF output of EUT was connected to the spectrum analyzer 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. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.4.4 Test Setup



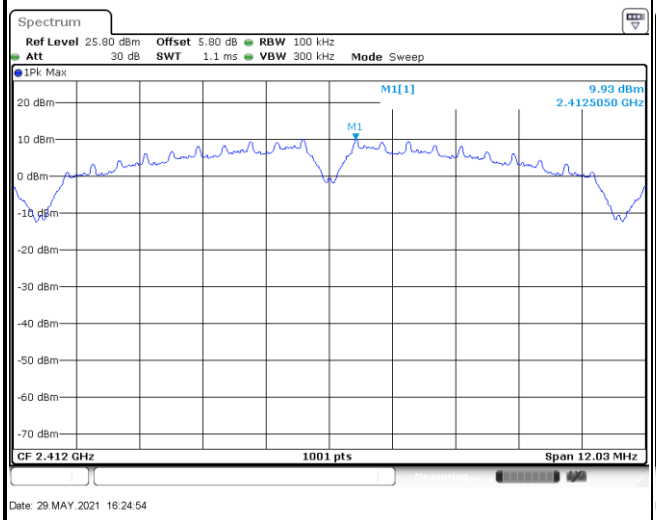
3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Engineer :	Jiang Jun	**Temperature :**	19~21℃
		Relative Humidity :	51~54%

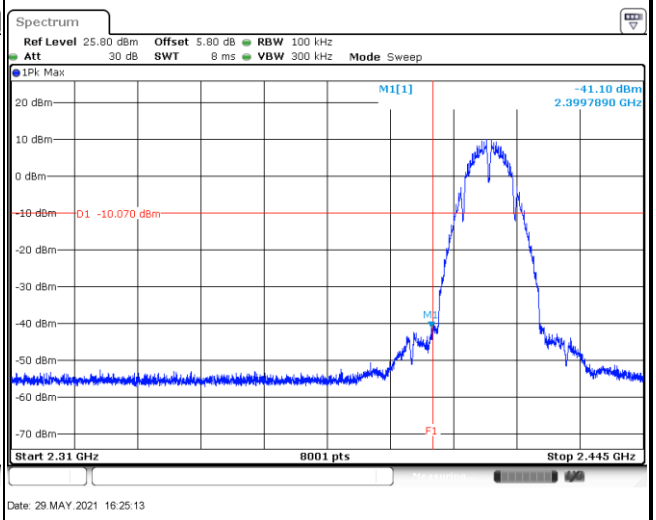
Number of TX = 2, Ant. 1 (Measured)

Test Mode :	802.11b	**Test Channel :**	01

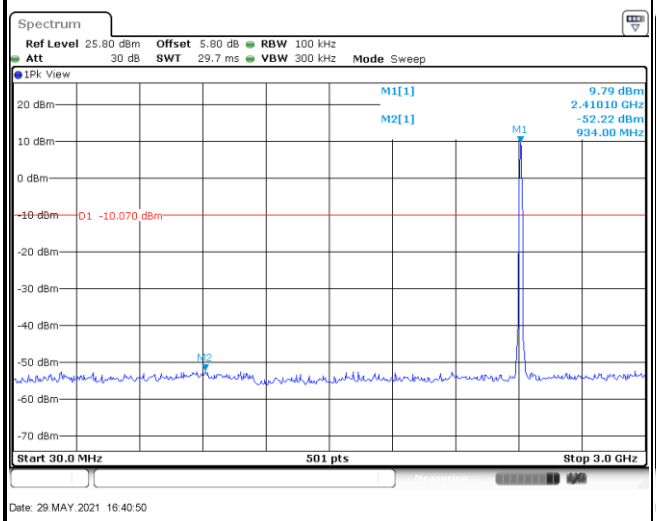
100kHz PSD reference Level



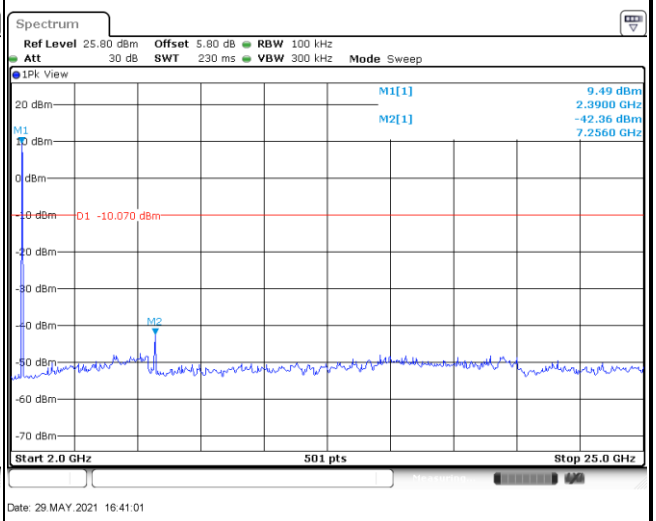
Channel Plot



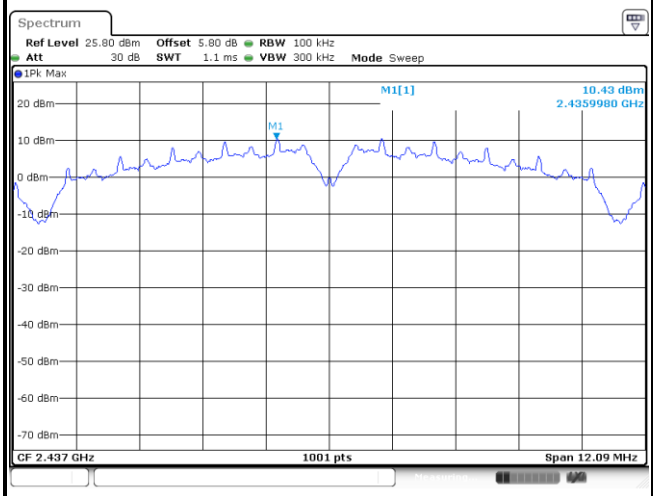
Spurious Emission 30MHz~3GHz

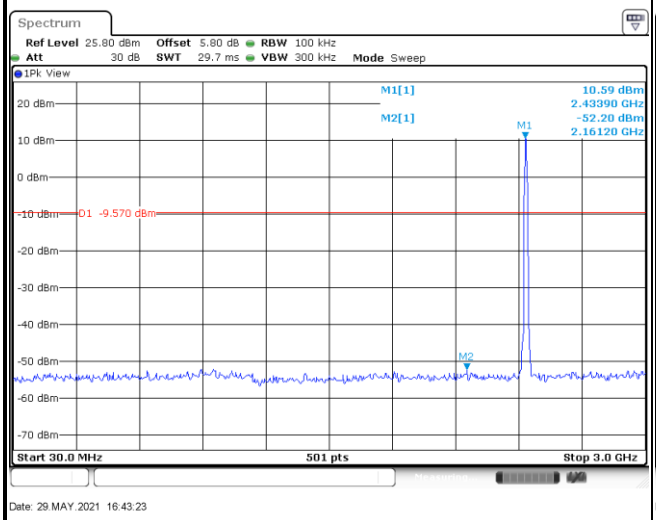
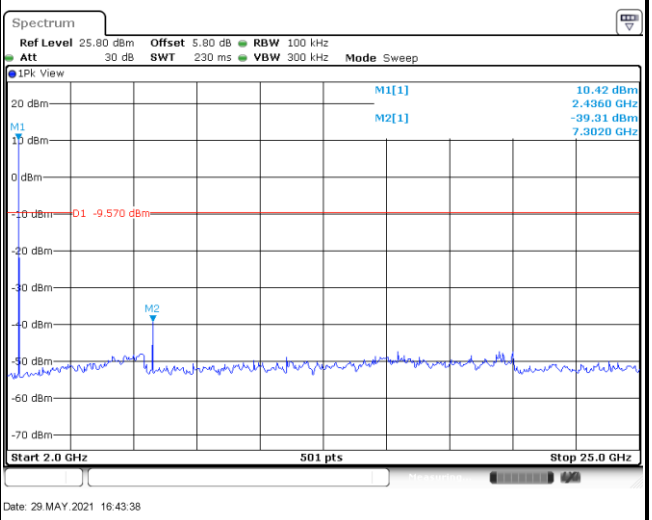


Spurious Emission 2GHz~25GHz

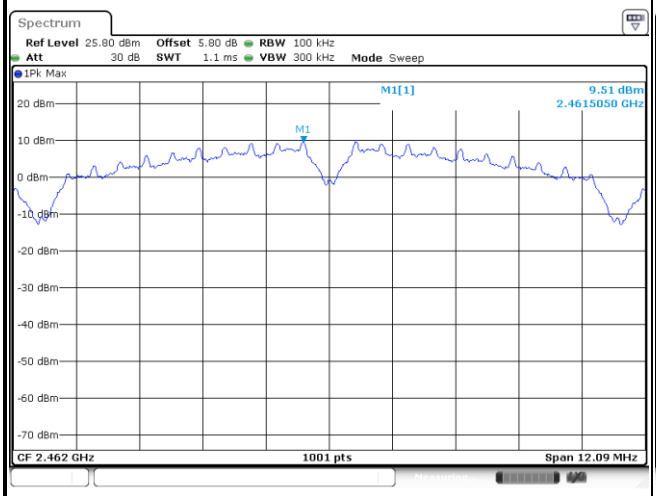
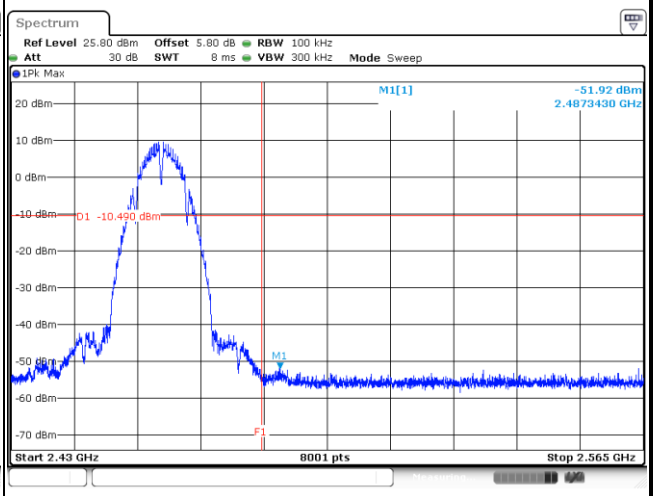
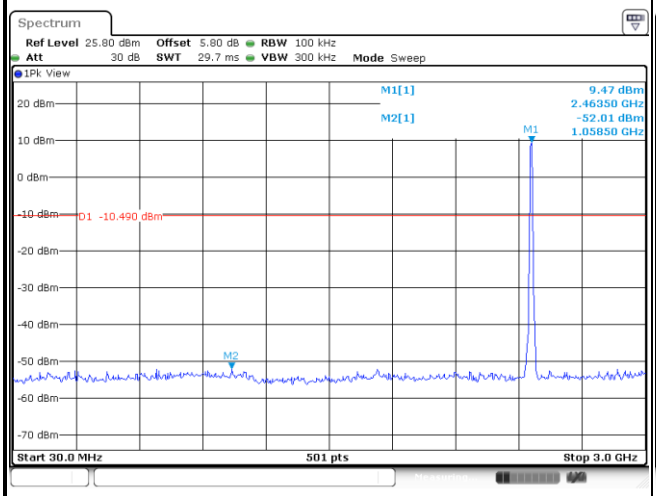
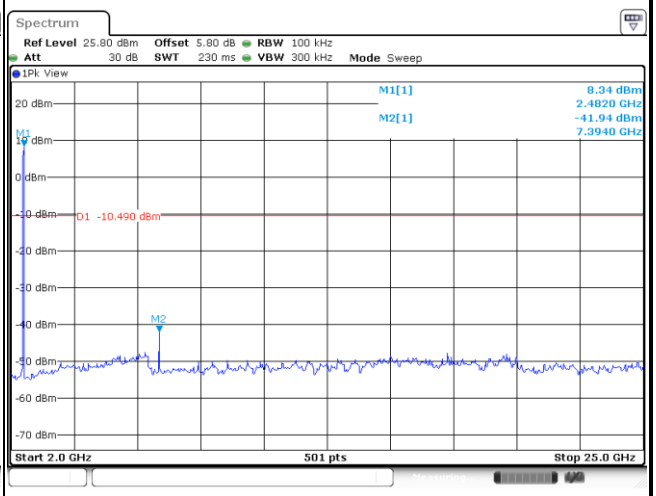


Test Mode :	802.11b	Test Channel :	06

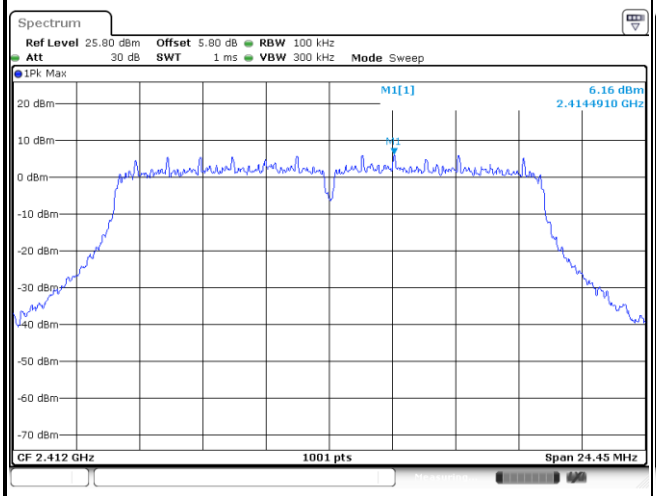
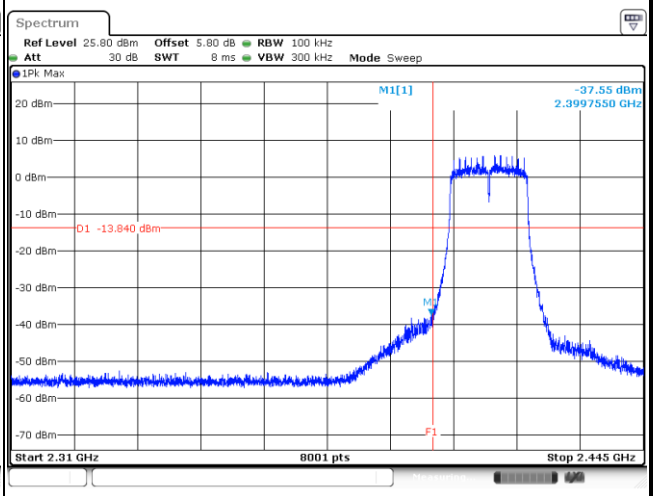
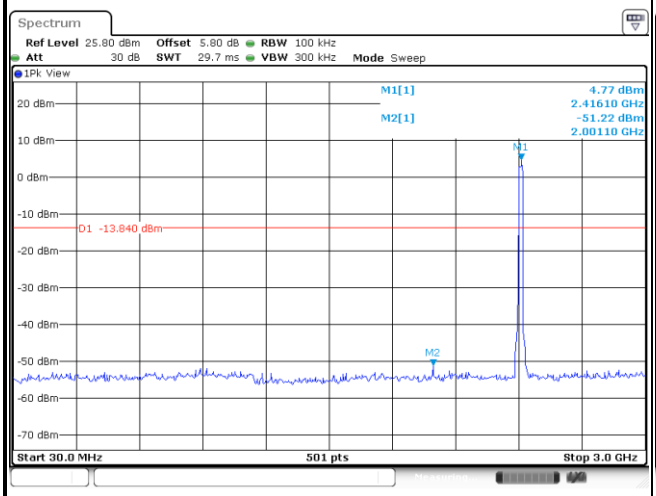
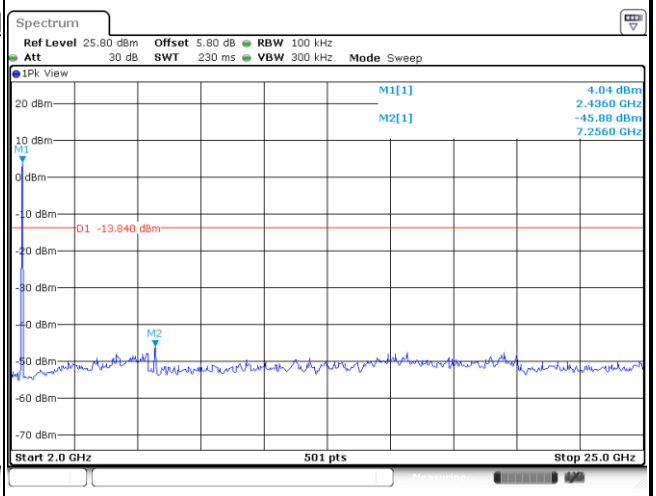
100kHz PSD reference Level	Channel Plot
	

Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

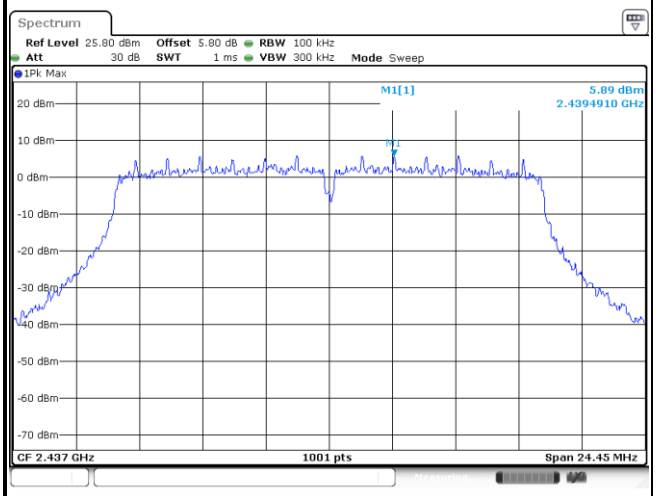
Test Mode :	802.11b	Test Channel :	11

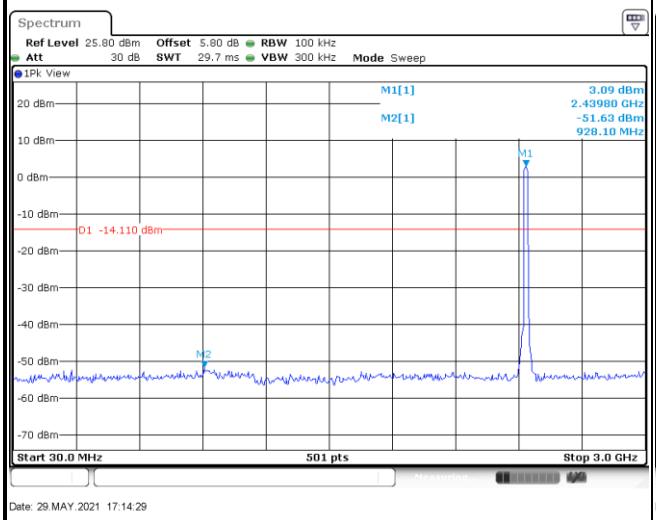
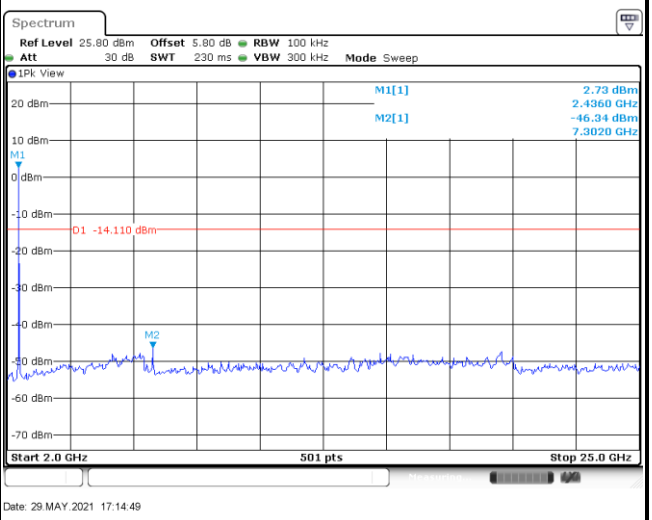
100kHz PSD reference Level	Channel Plot
	
Date: 29.MAY.2021 16:44:53	Date: 29.MAY.2021 16:45:08
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 29.MAY.2021 16:45:32	Date: 29.MAY.2021 16:45:44

Test Mode :	802.11g	Test Channel :	01

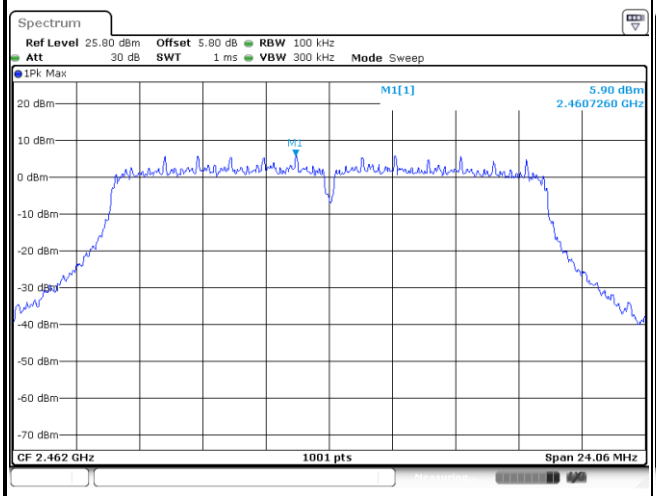
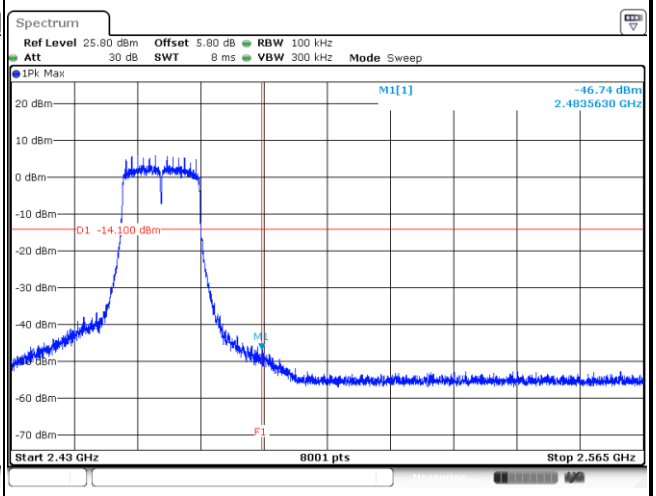
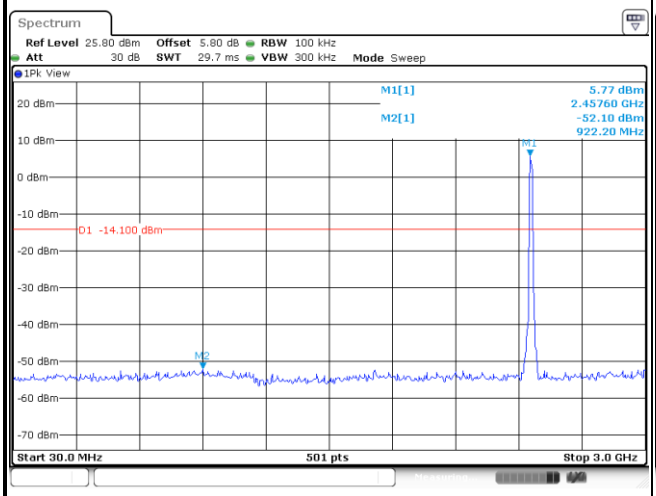
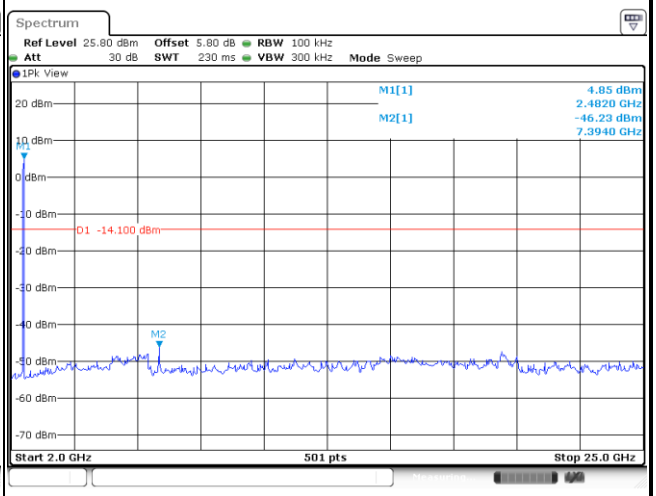
100kHz PSD reference Level	Channel Plot
	
Date: 29.MAY.2021 17:11:14	Date: 29.MAY.2021 17:11:33
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 29.MAY.2021 17:38:29	Date: 29.MAY.2021 17:38:41

Test Mode :	802.11g	Test Channel :	06

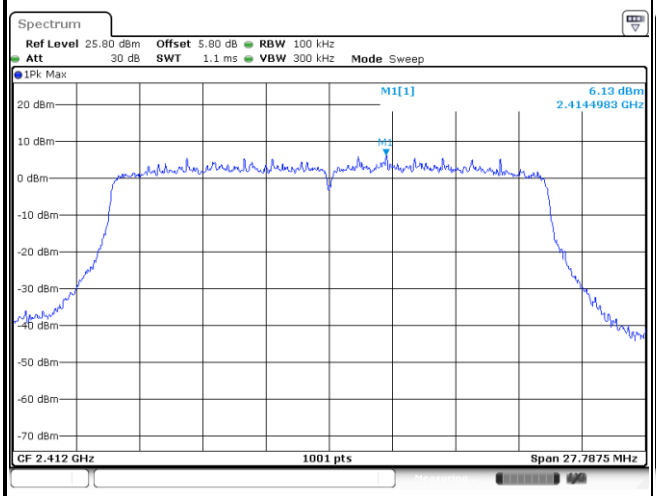
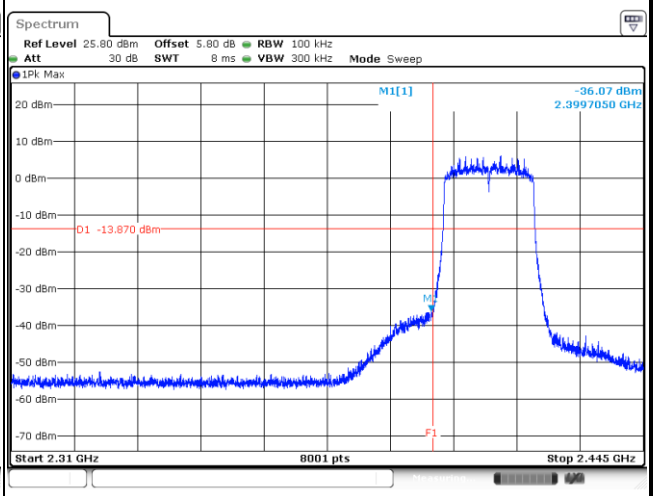
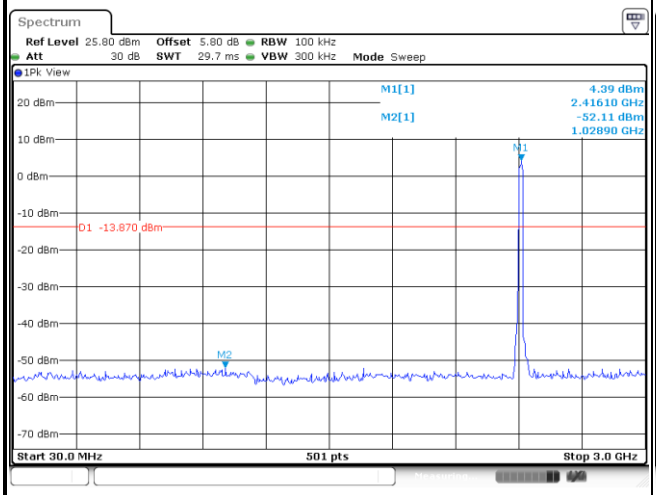
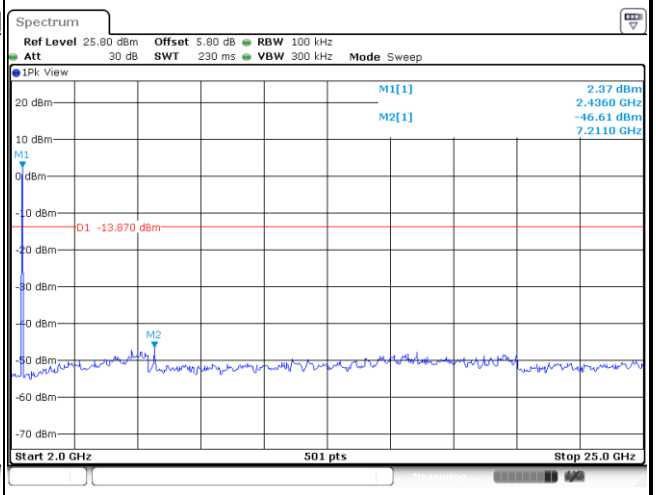
100kHz PSD reference Level	Channel Plot
	

Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

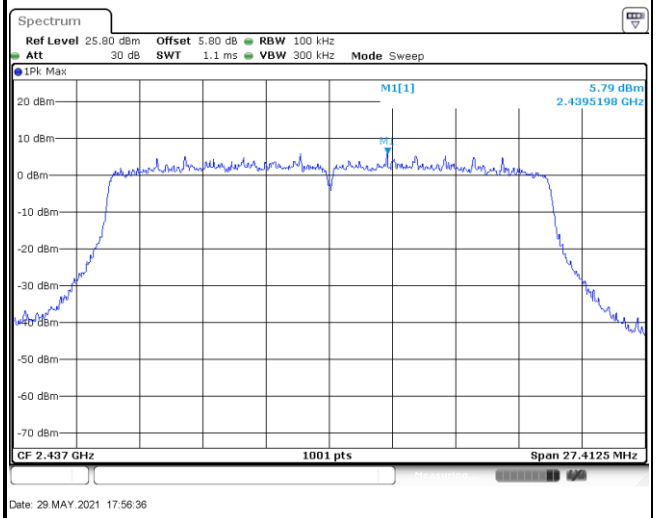
Test Mode :	802.11g	Test Channel :	11

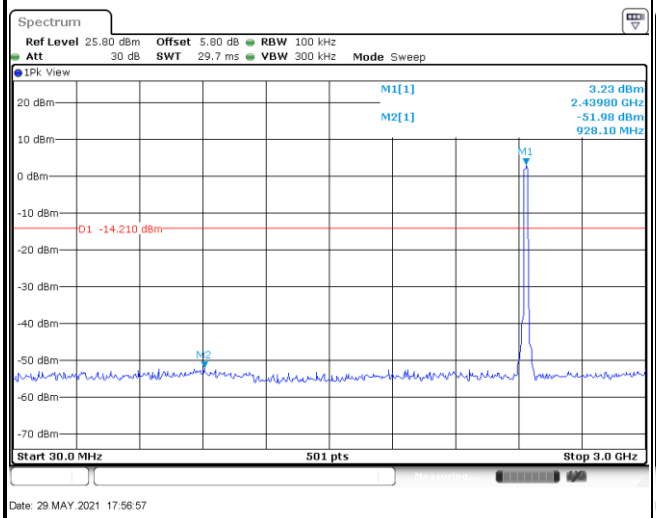
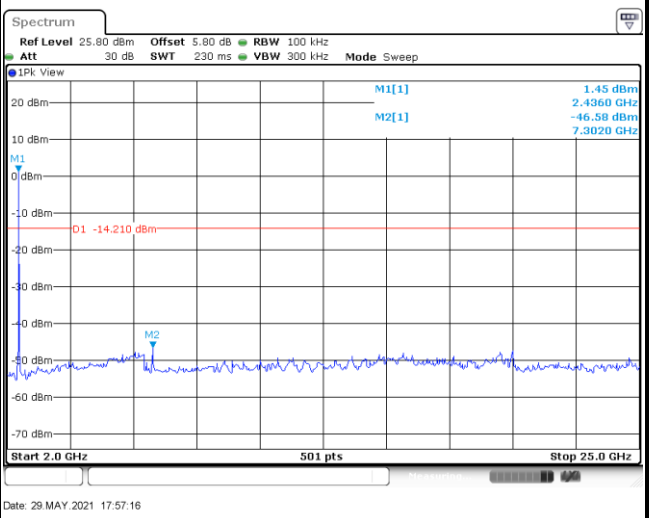
100kHz PSD reference Level	Channel Plot
	
Date: 29.MAY.2021 17:16:44	Date: 29.MAY.2021 17:17:02
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 29.MAY.2021 17:40:21	Date: 29.MAY.2021 17:40:32

Test Mode :	802.11ax HE20	Test Channel :	01

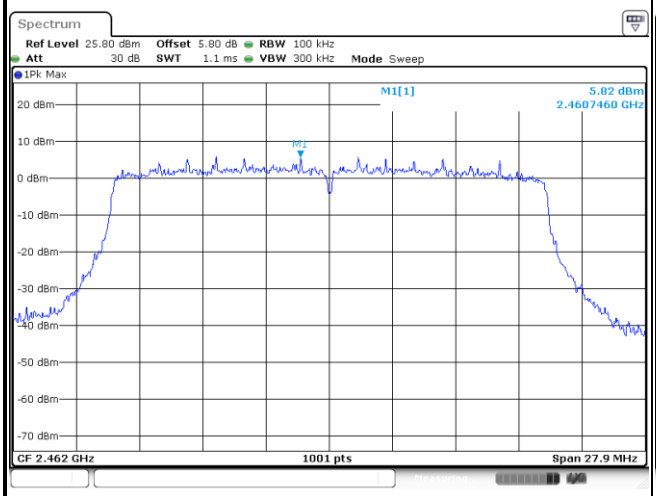
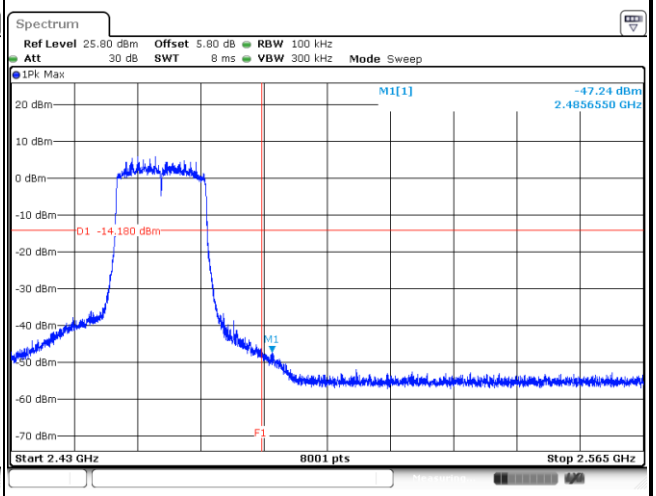
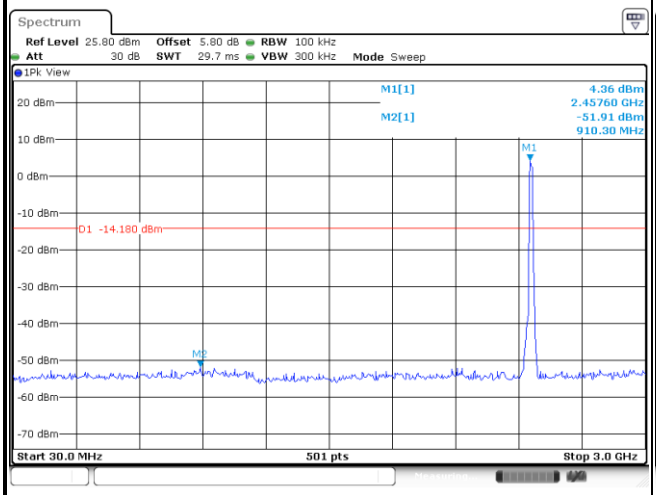
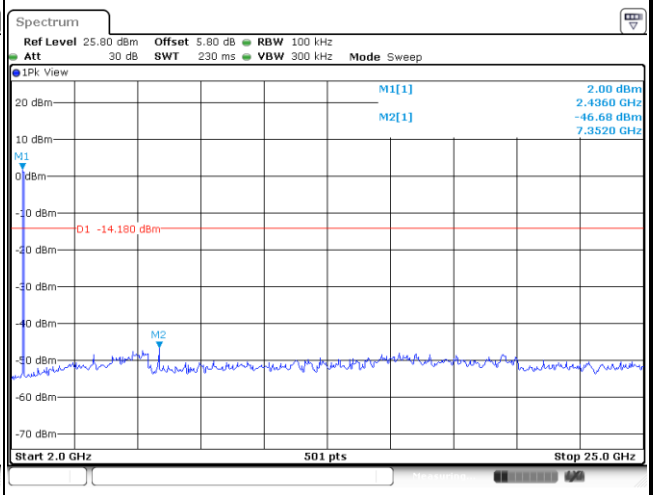
100kHz PSD reference Level	Channel Plot
	
Date: 29.MAY.2021 17:53:41	Date: 29.MAY.2021 17:54:00
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 29.MAY.2021 17:54:21	Date: 29.MAY.2021 17:54:41

Test Mode :	802.11ax HE20	Test Channel :	06

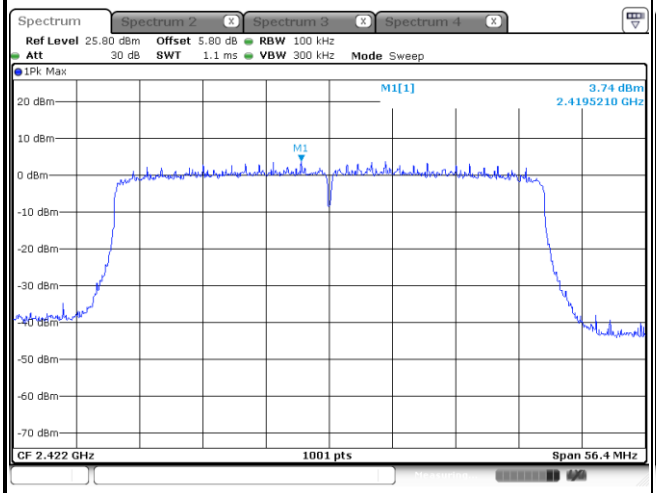
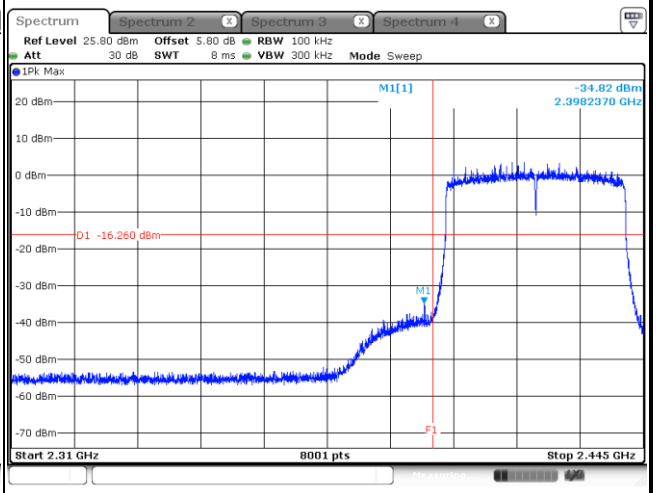
100kHz PSD reference Level	Channel Plot
	

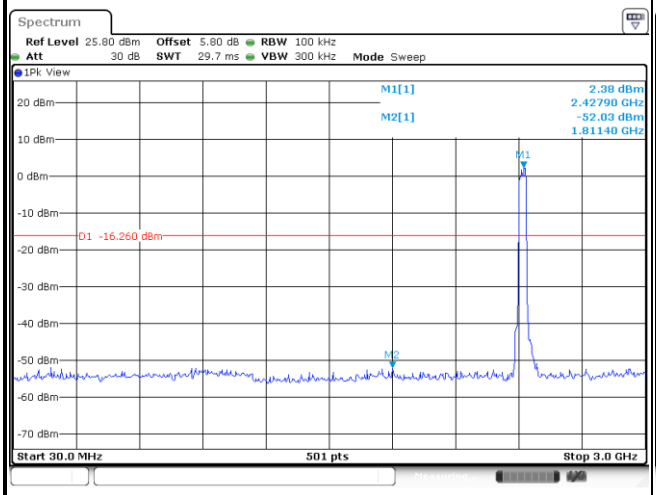
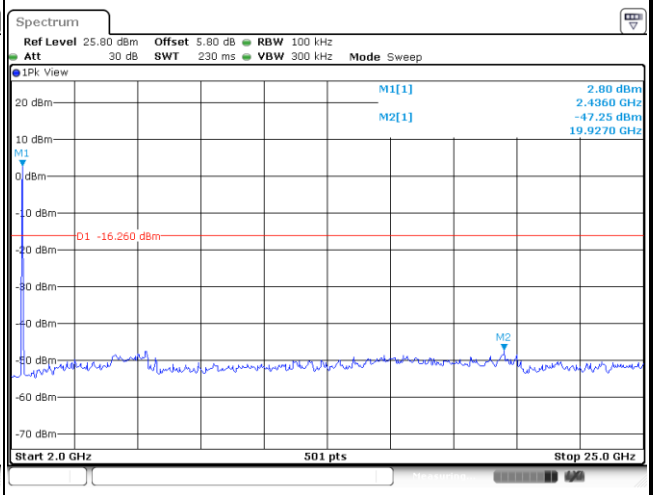
Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

Test Mode :	802.11ax HE20	Test Channel :	11

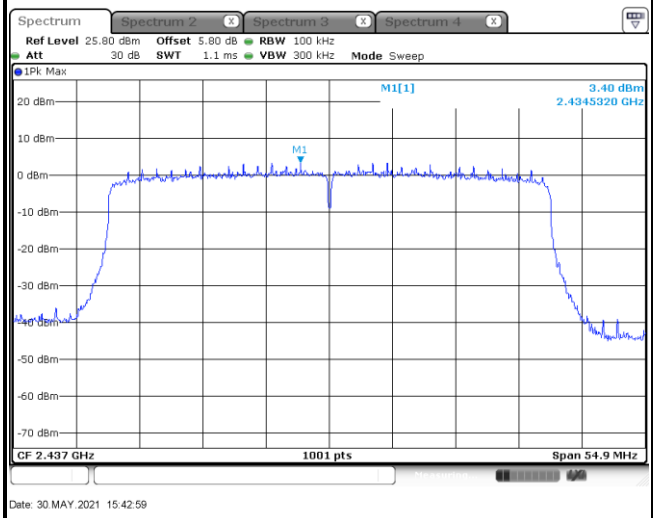
100kHz PSD reference Level	Channel Plot
	
Date: 29.MAY.2021 17:59:11	Date: 29.MAY.2021 17:59:30
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 29.MAY.2021 17:59:51	Date: 29.MAY.2021 18:00:11

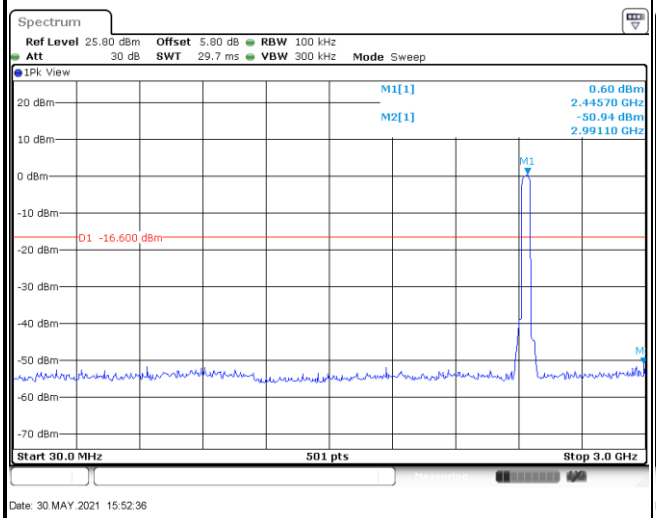
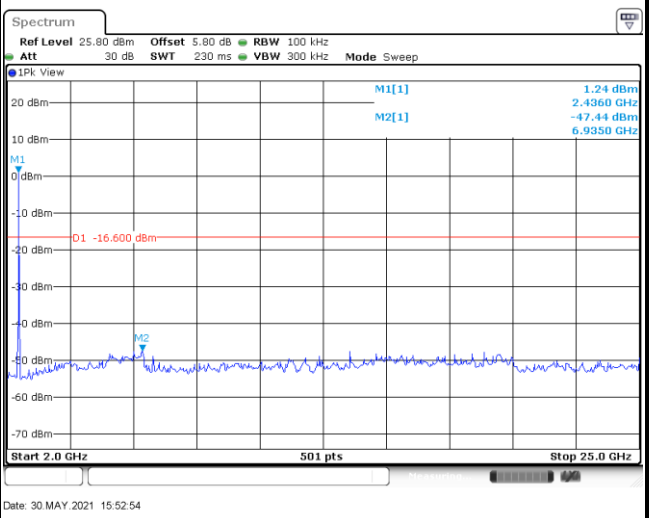
Test Mode :	802.11ax HE40	Test Channel :	03

100kHz PSD reference Level	Channel Plot
	
Date: 30.MAY.2021 15:40:04	Date: 30.MAY.2021 15:40:23

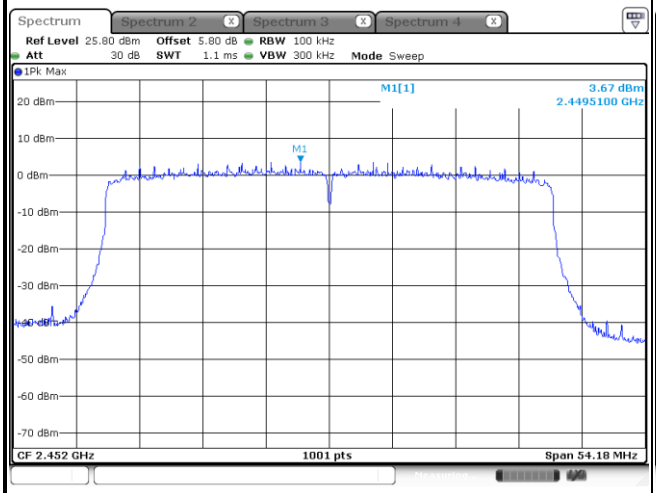
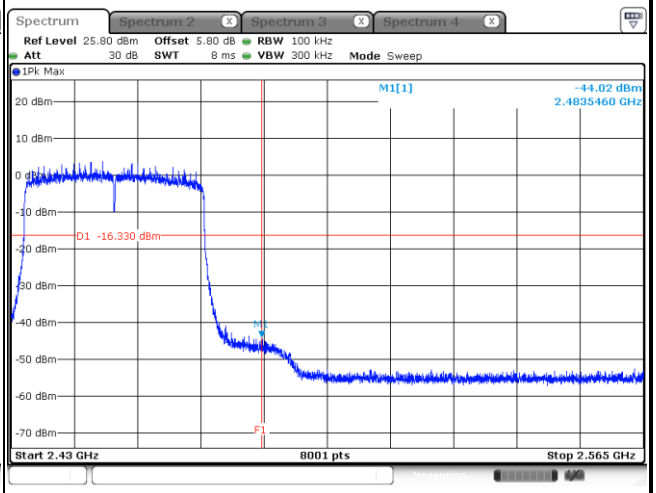
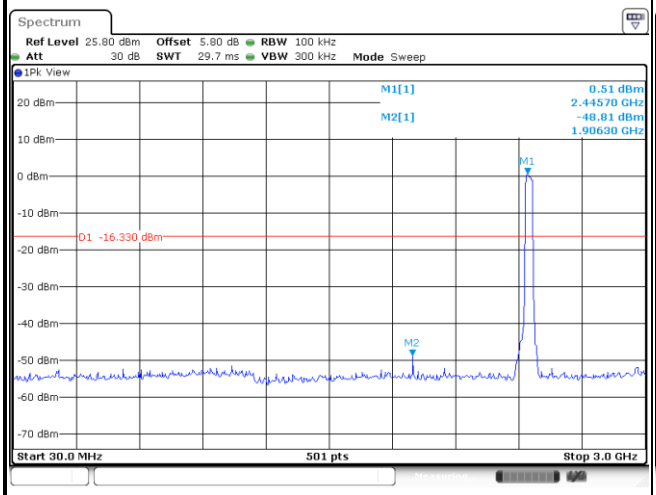
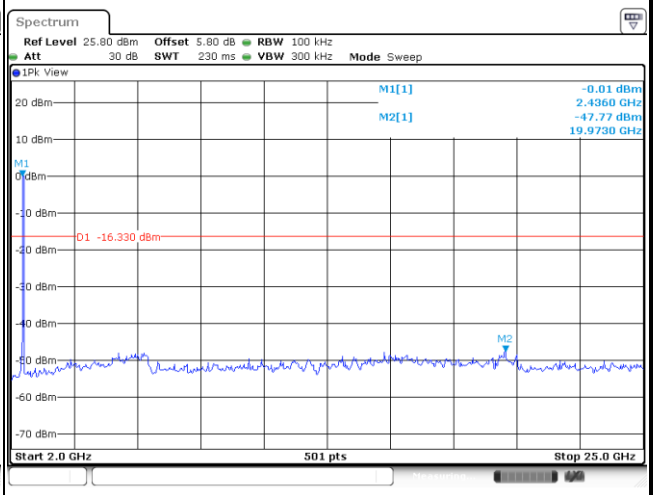
Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	
Date: 30.MAY.2021 15:53:58	Date: 30.MAY.2021 15:54:09

Test Mode :	802.11ax HE40	Test Channel :	06

100kHz PSD reference Level	Channel Plot
	

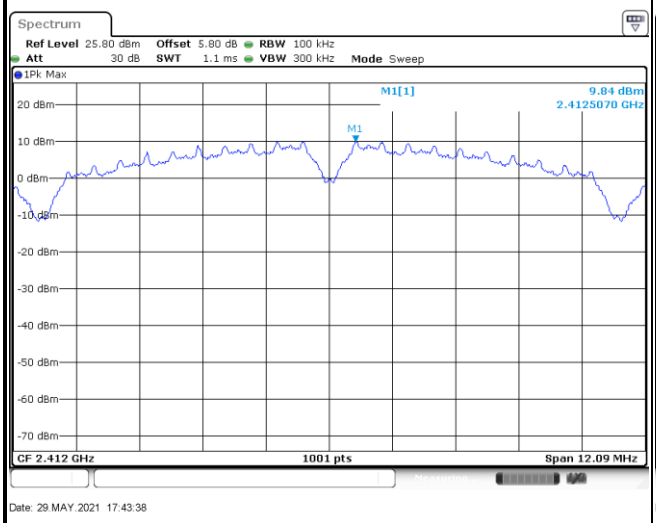
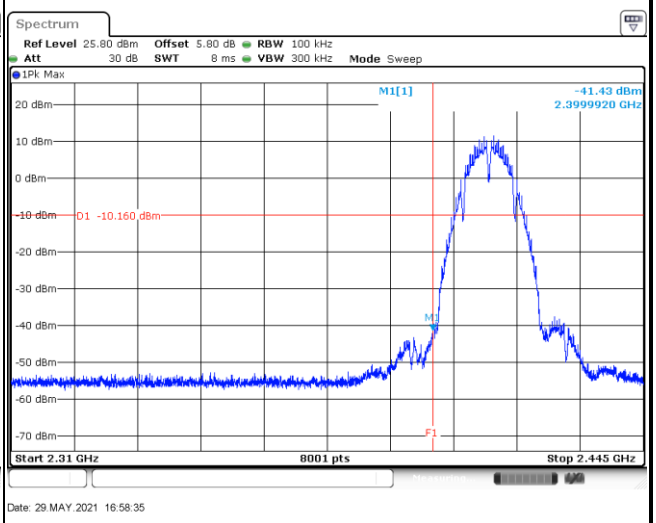
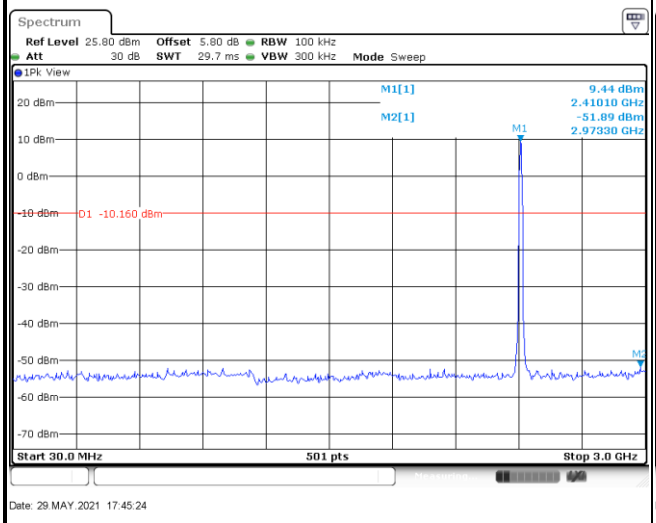
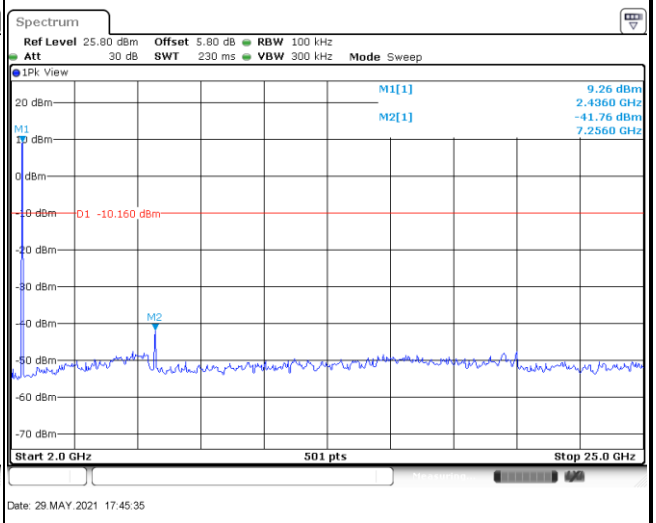
Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

Test Mode :	802.11ax HE40	Test Channel :	09

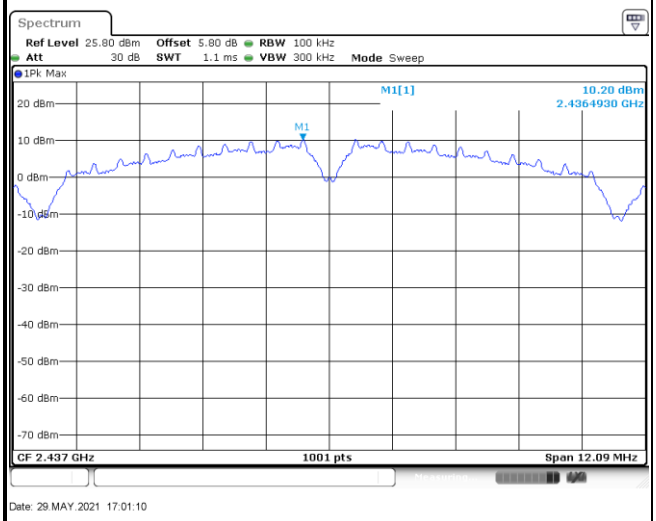
100kHz PSD reference Level	Channel Plot
	
Date: 30.MAY.2021 15:45:36	Date: 30.MAY.2021 15:45:55
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 30.MAY.2021 15:50:05	Date: 30.MAY.2021 15:50:32

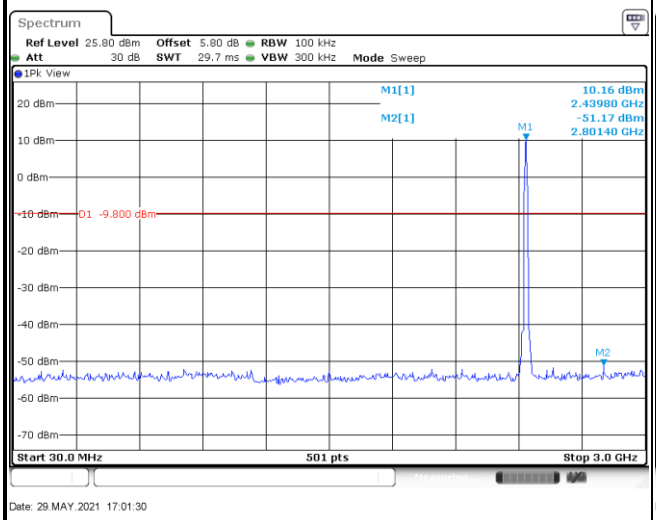
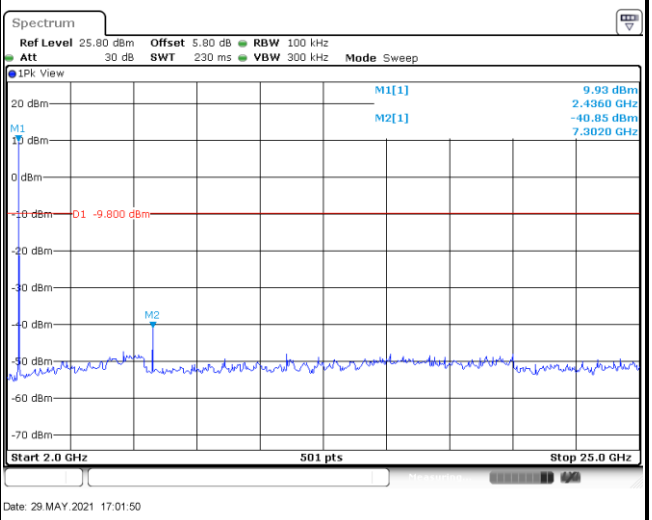
Number of TX = 2, Ant. 2 (Measured)

Test Mode :	802.11b	Test Channel :	01

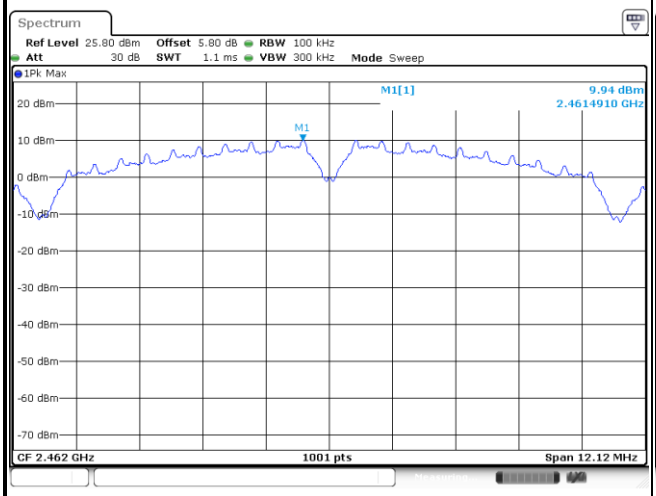
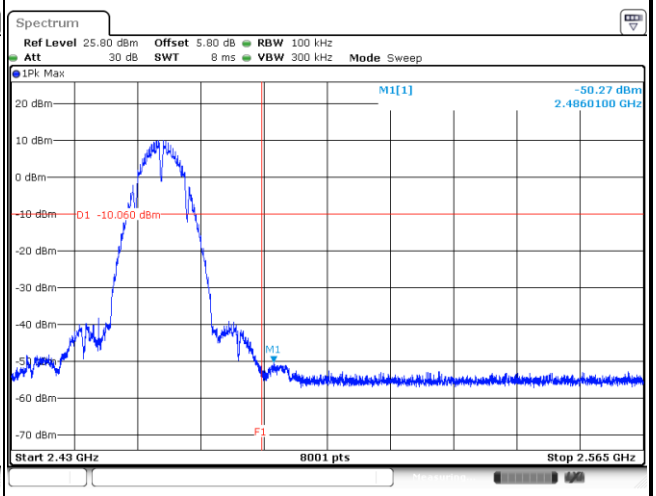
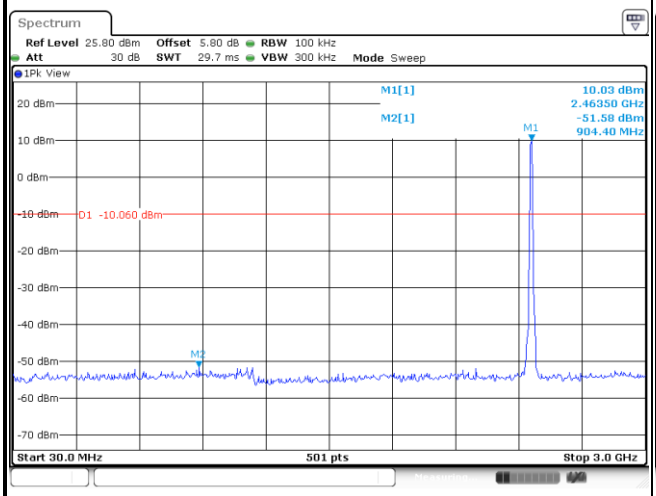
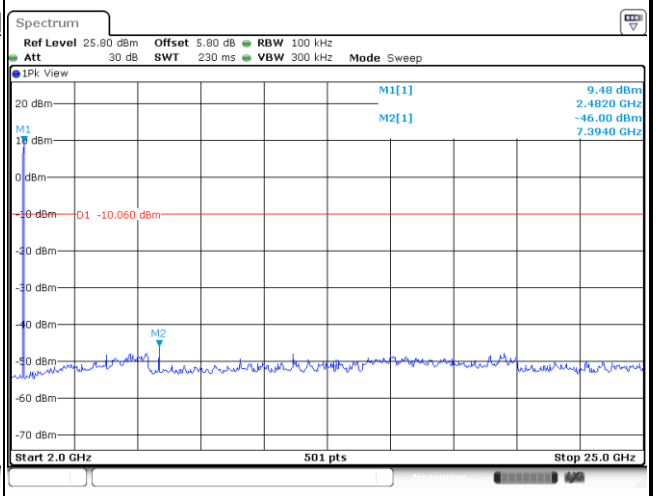
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11b	Test Channel :	06

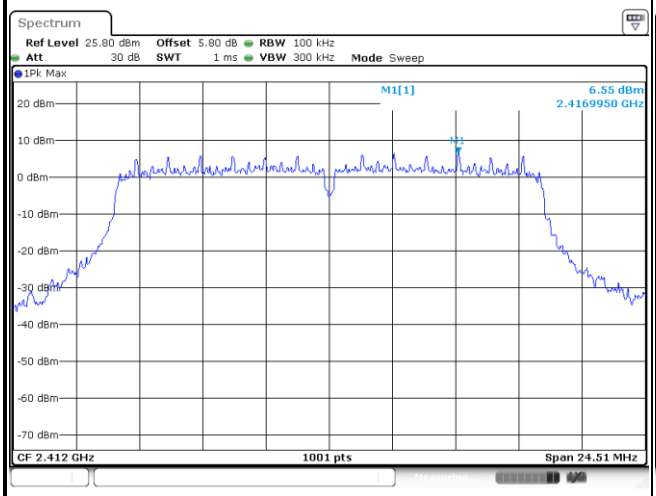
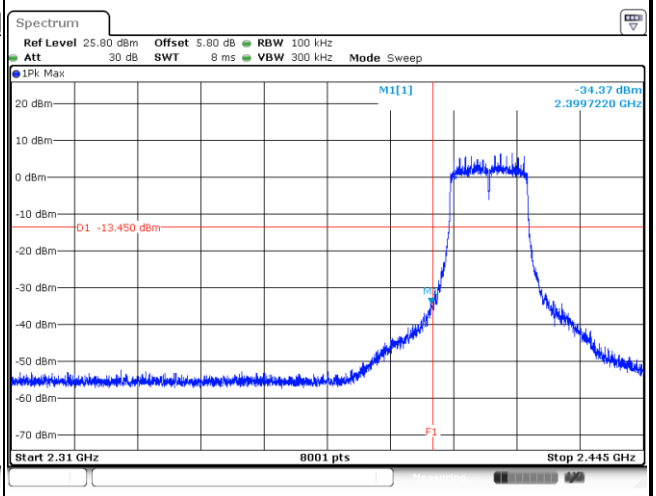
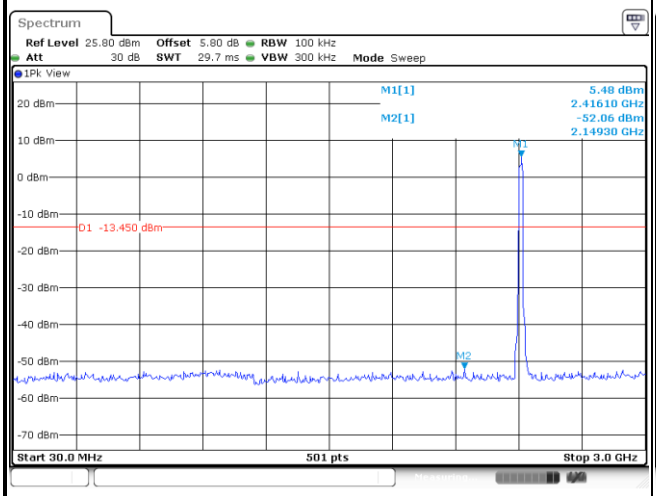
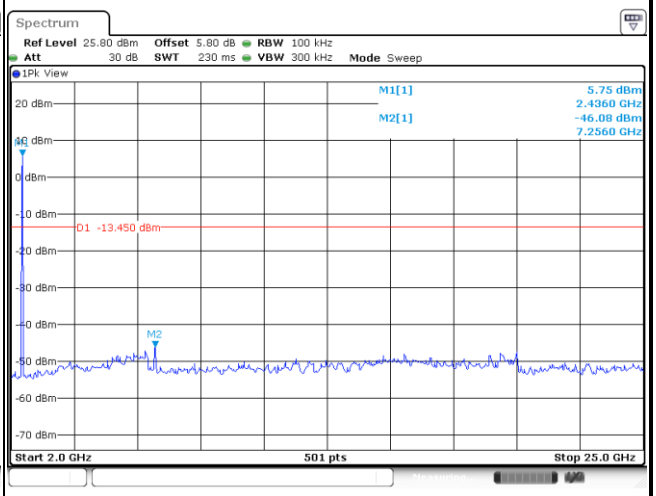
100kHz PSD reference Level	Channel Plot
	

Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

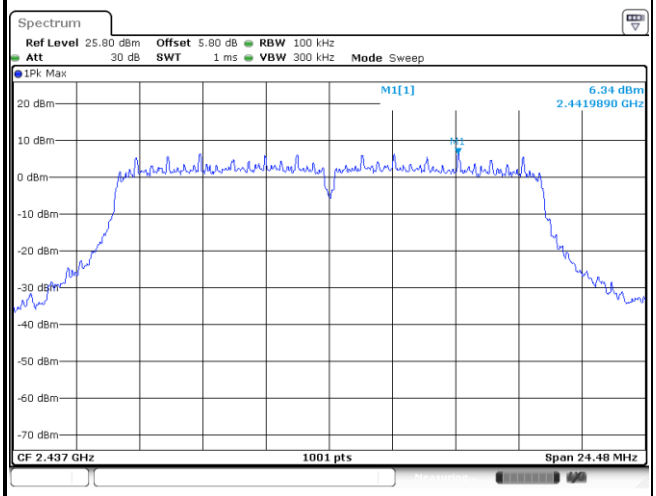
Test Mode :	802.11b	Test Channel :	11

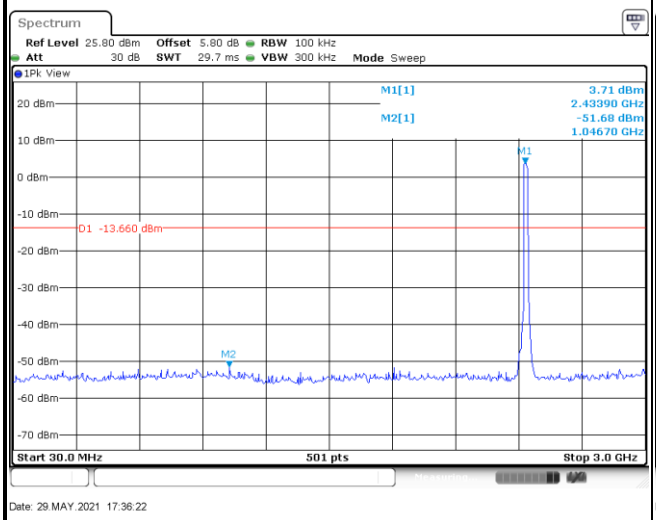
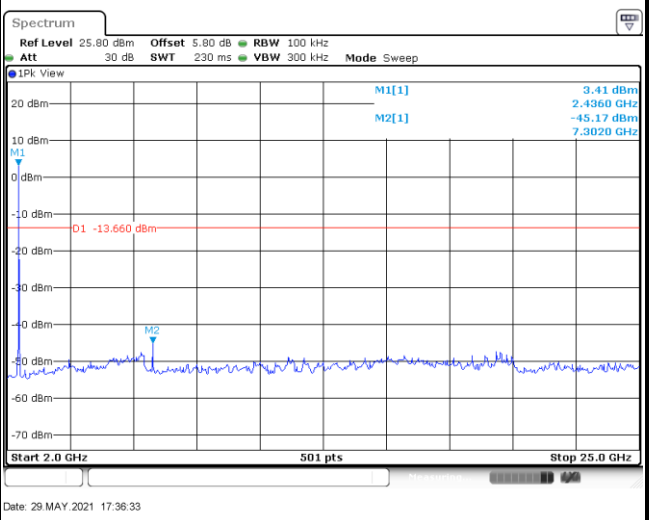
100kHz PSD reference Level	Channel Plot
	
Date: 29.MAY.2021 17:03:45	Date: 29.MAY.2021 17:04:03
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 29.MAY.2021 17:48:21	Date: 29.MAY.2021 17:48:55

Test Mode :	802.11g	Test Channel :	01

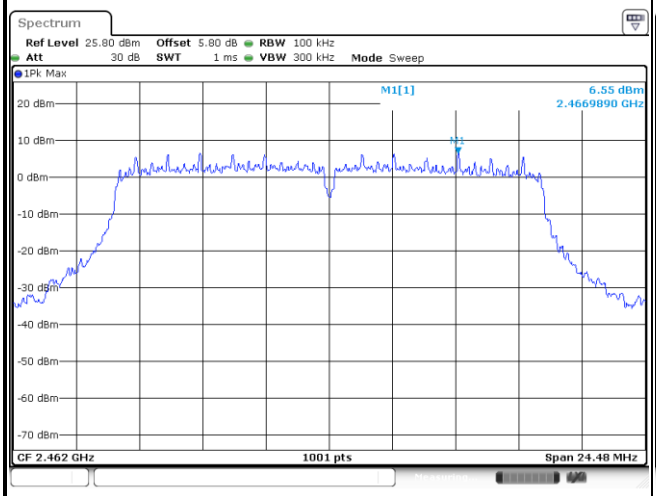
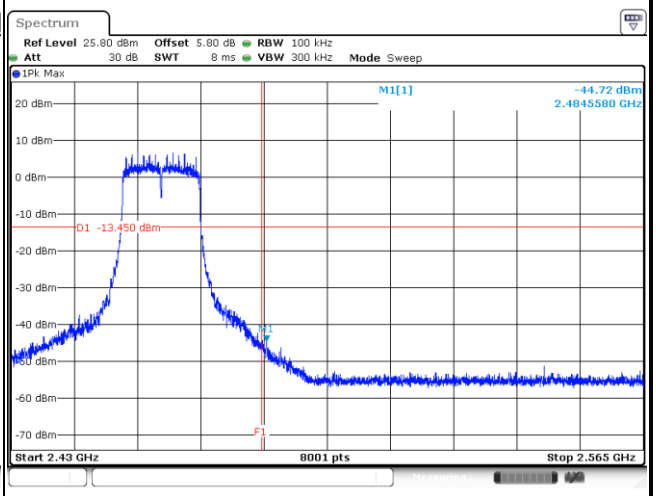
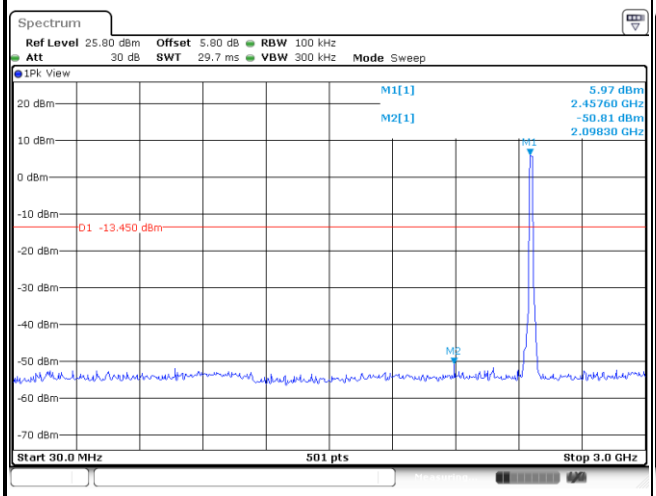
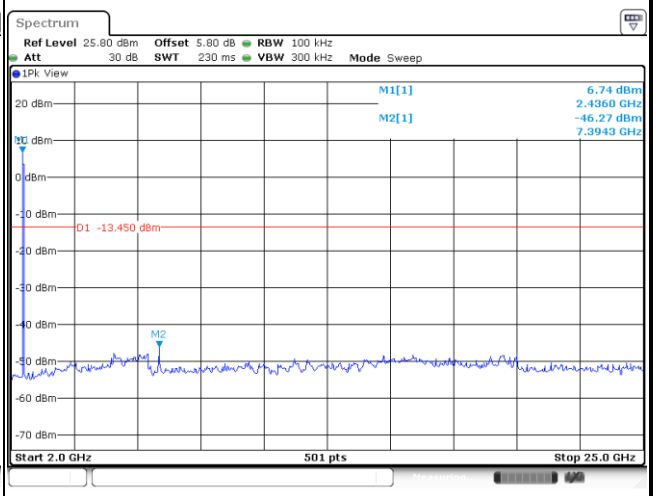
100kHz PSD reference Level	Channel Plot
	
Date: 29.MAY.2021 17:20:11	Date: 29.MAY.2021 17:20:30
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 29.MAY.2021 17:31:02	Date: 29.MAY.2021 17:31:14

Test Mode :	802.11g	Test Channel :	06

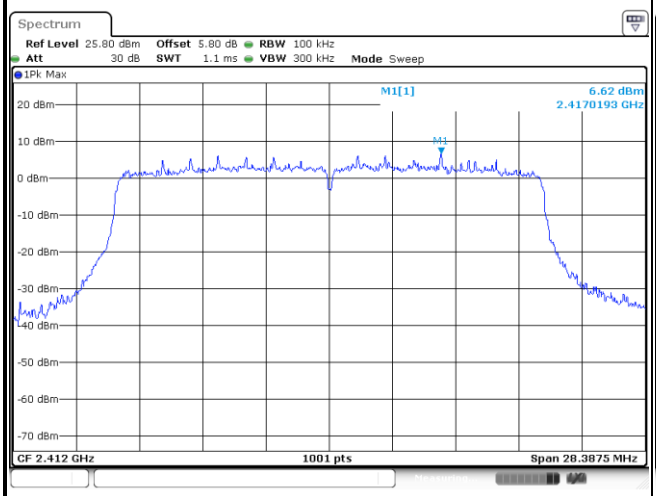
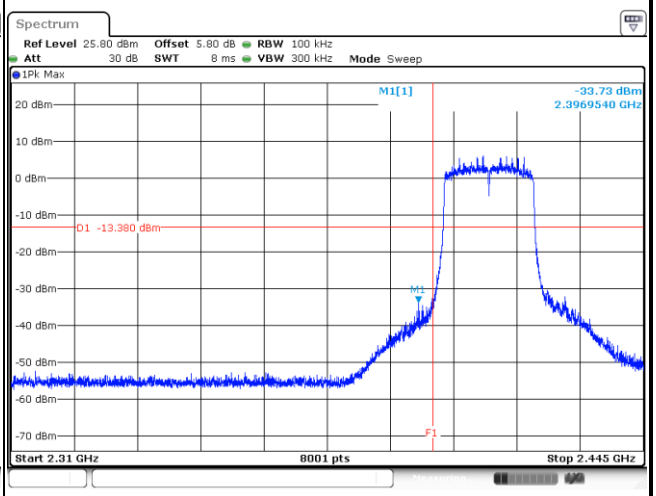
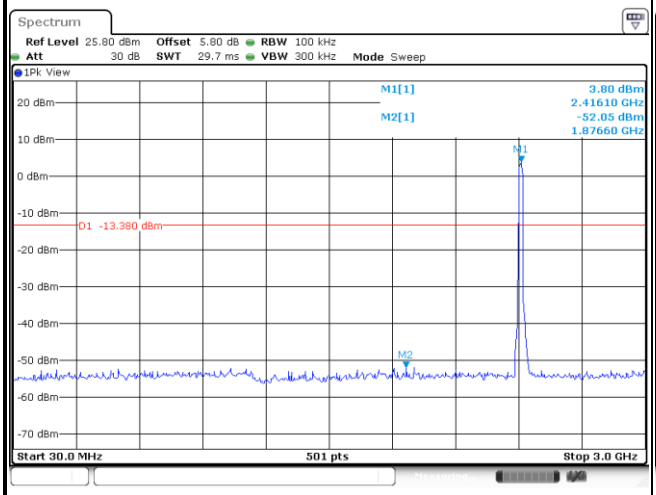
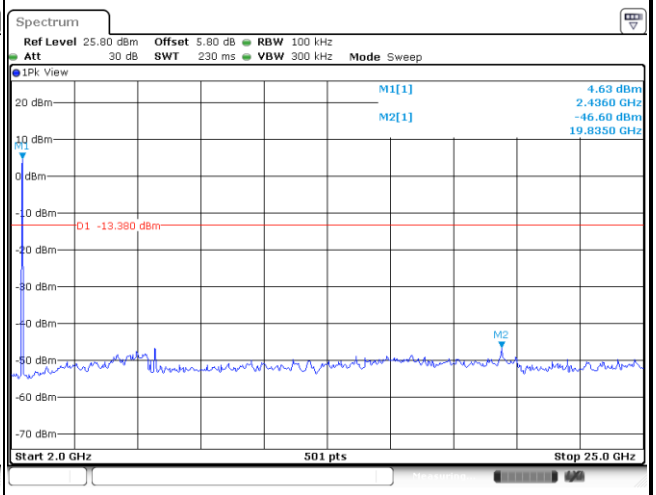
100kHz PSD reference Level	Channel Plot
	

Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

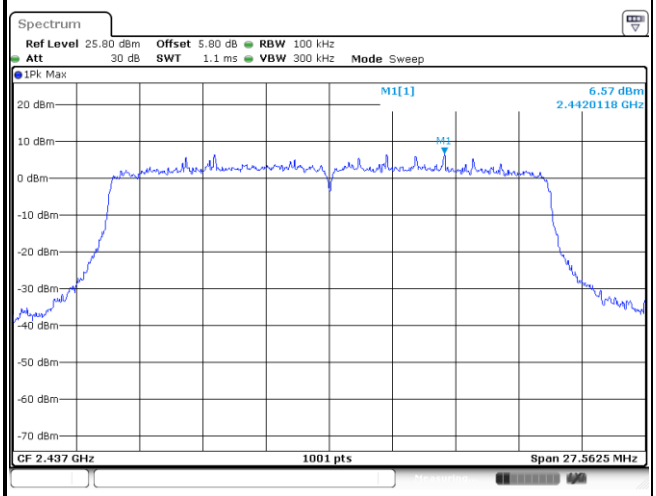
Test Mode :	802.11g	Test Channel :	11

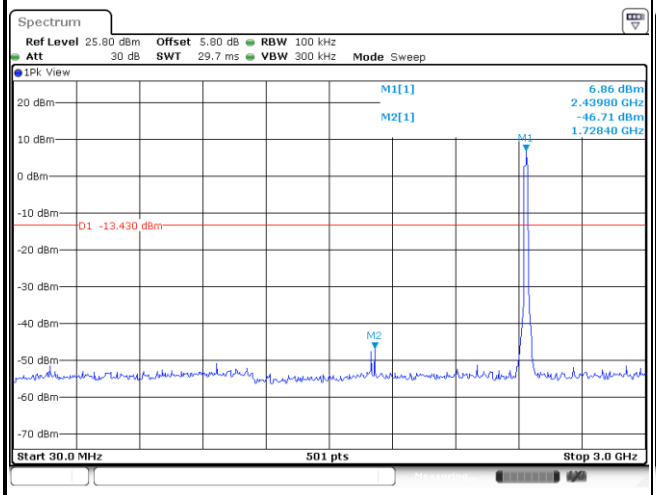
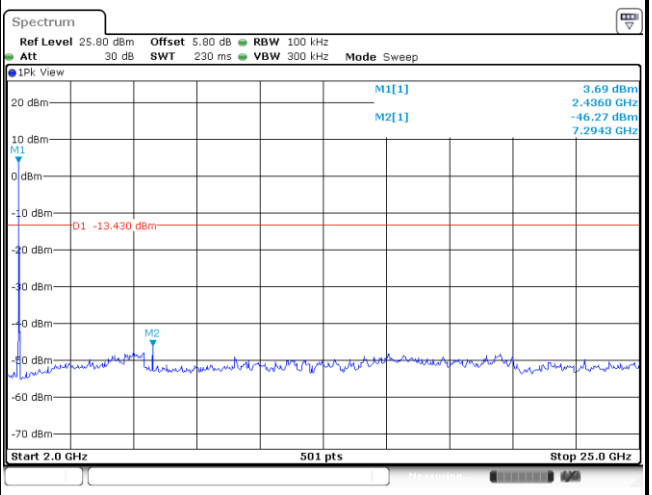
100kHz PSD reference Level	Channel Plot
	
Date: 29.MAY.2021 17:25:40	Date: 29.MAY.2021 17:25:59
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 29.MAY.2021 17:26:20	Date: 29.MAY.2021 17:26:40

Test Mode :	802.11ax HE20	Test Channel :	01

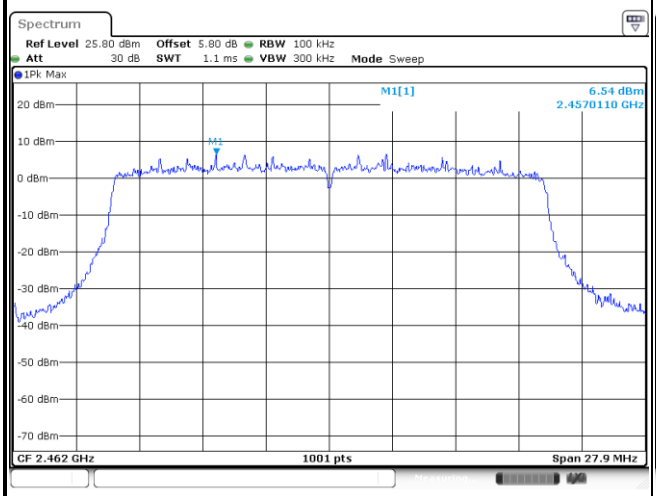
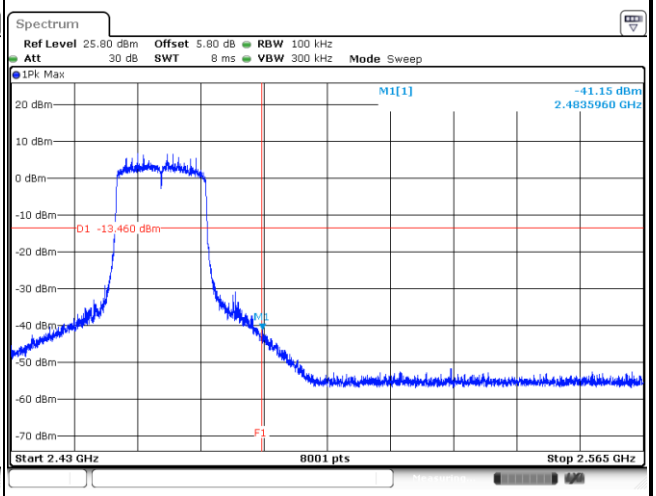
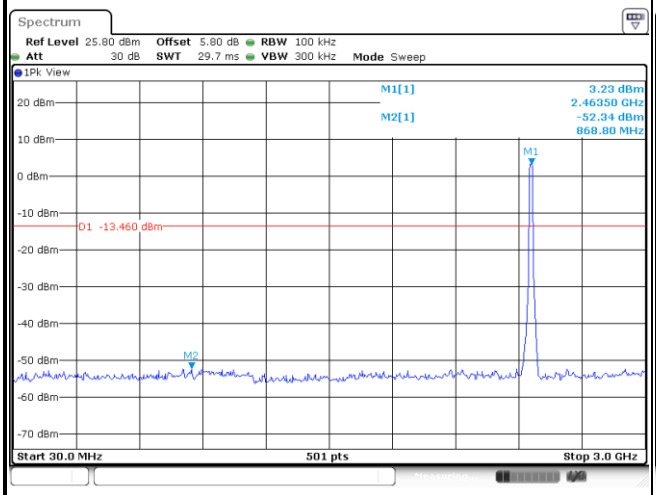
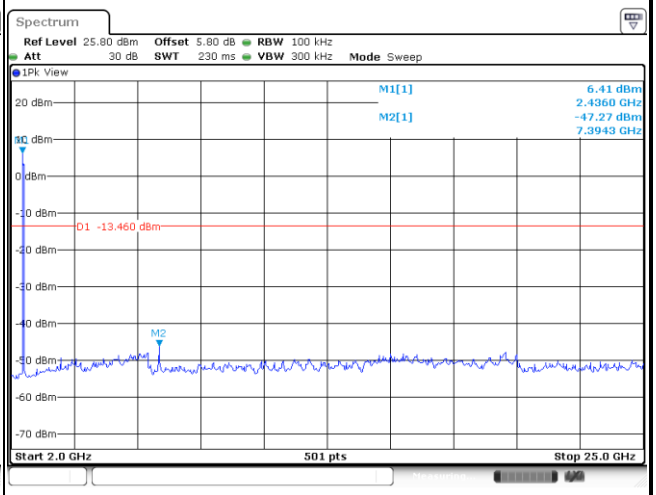
100kHz PSD reference Level	Channel Plot
	
Date: 29.MAY.2021 18:03:24	Date: 29.MAY.2021 18:03:43
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 29.MAY.2021 18:04:04	Date: 29.MAY.2021 18:04:24

Test Mode :	802.11ax HE20	Test Channel :	06

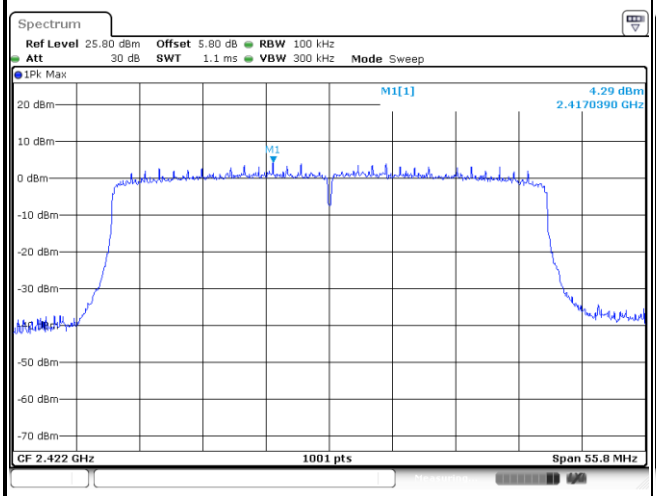
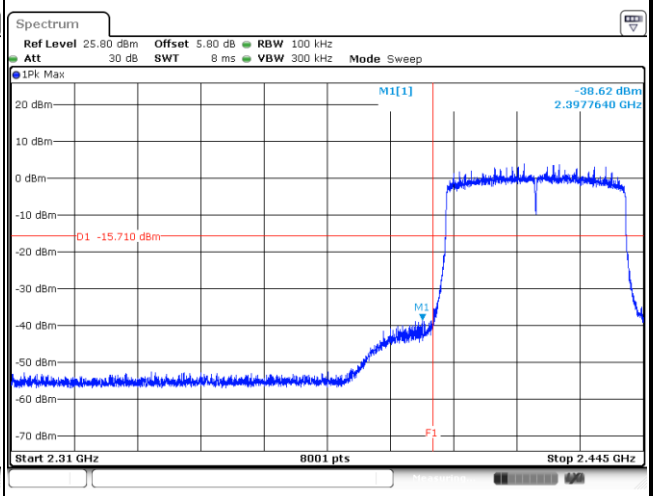
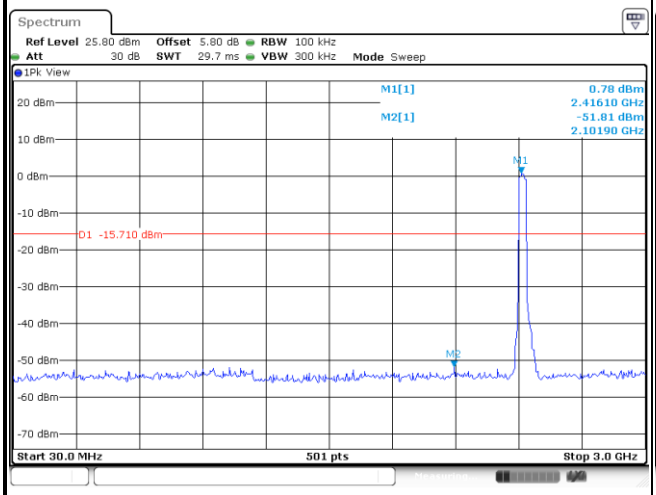
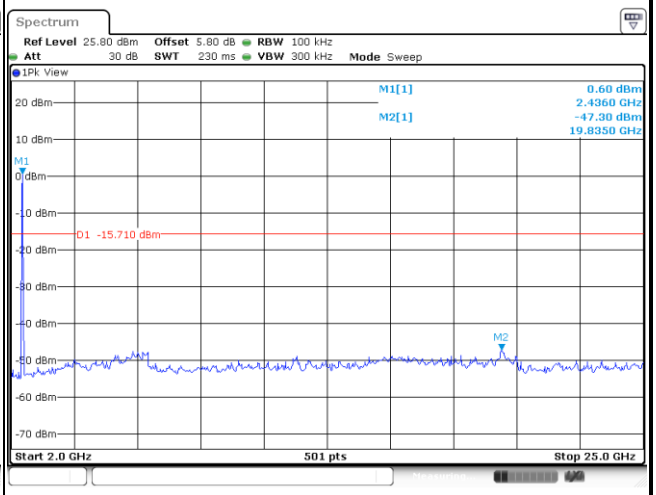
100kHz PSD reference Level	Channel Plot
	

Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

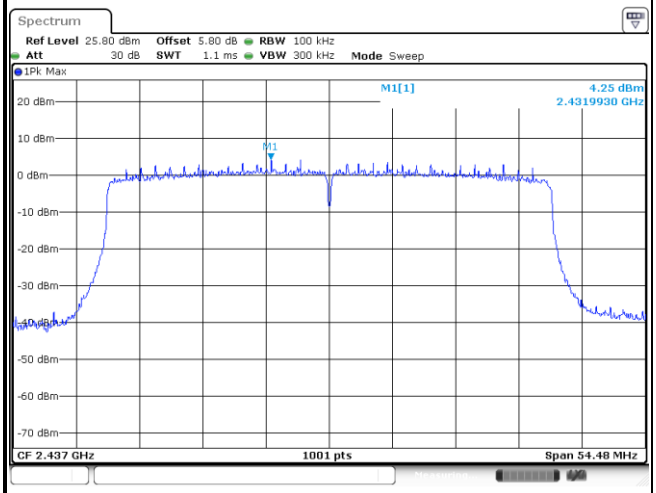
Test Mode :	802.11ax HE20	Test Channel :	11

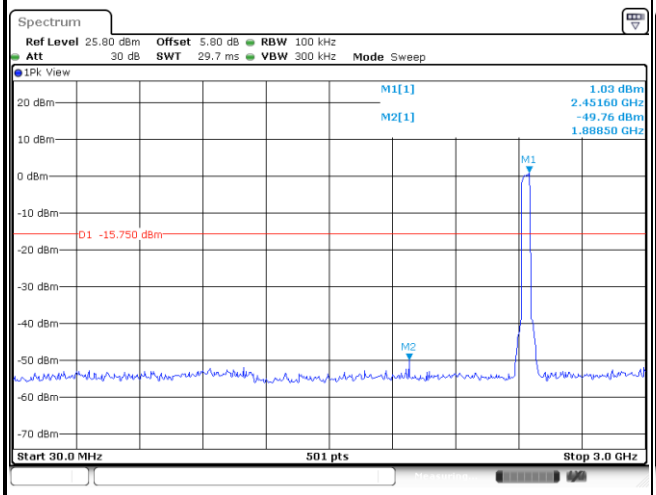
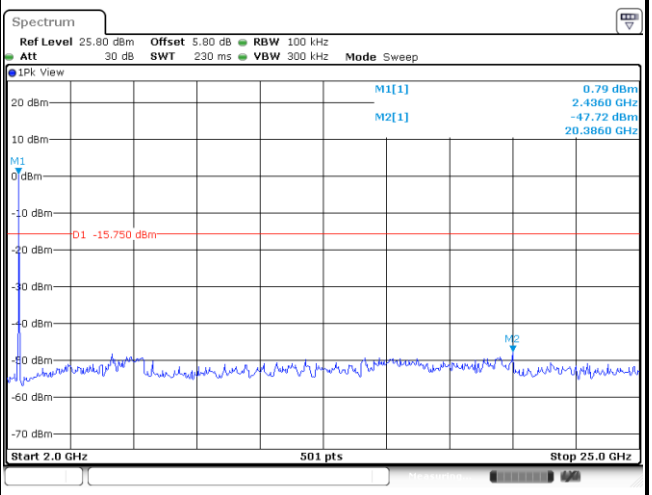
100kHz PSD reference Level	Channel Plot
	
Date: 29.MAY.2021 18:08:54	Date: 29.MAY.2021 18:09:13
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 29.MAY.2021 18:09:34	Date: 29.MAY.2021 18:09:54

Test Mode :	802.11ax HE40	Test Channel :	03

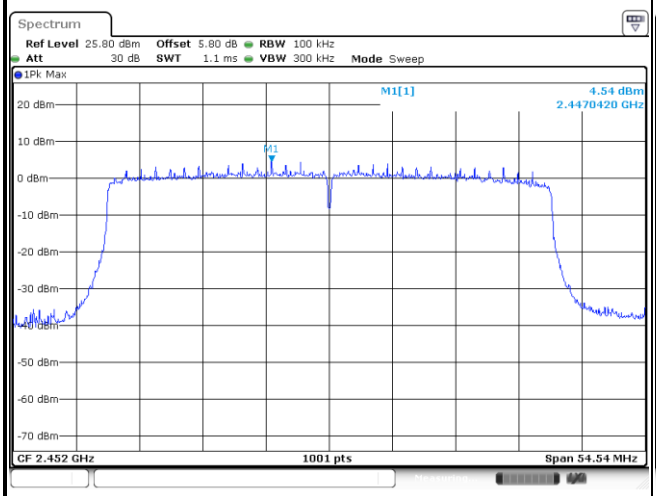
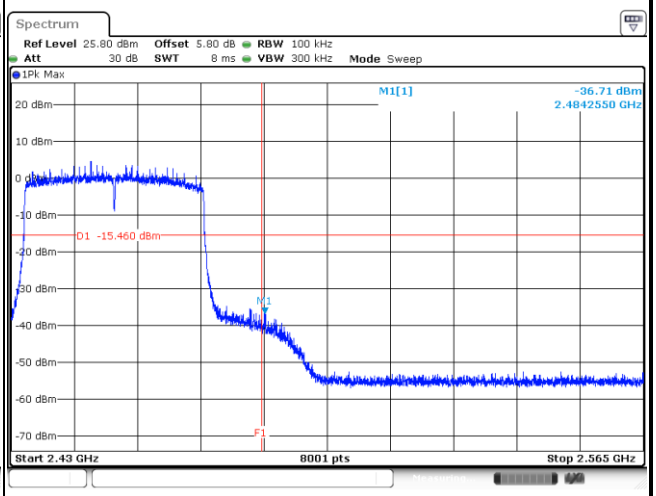
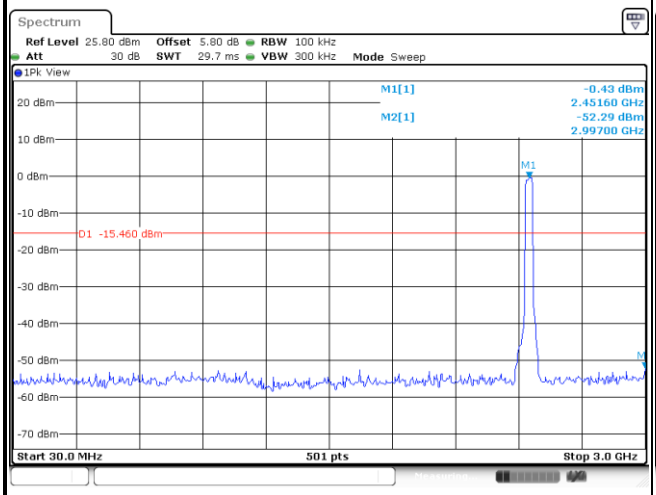
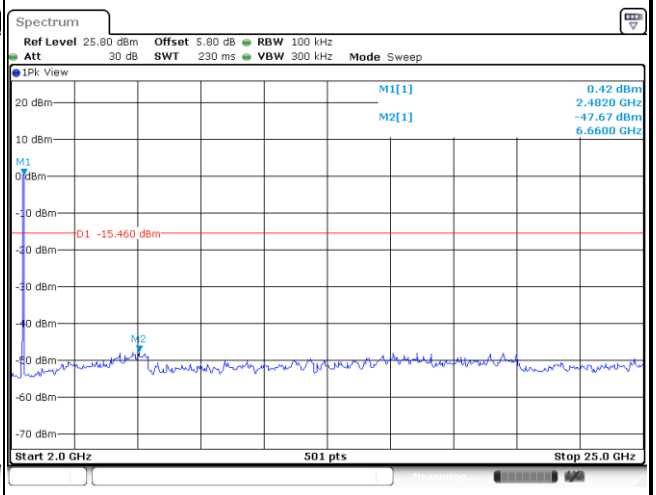
100kHz PSD reference Level	Channel Plot
	
Date: 30.MAY.2021 15:55:24	Date: 30.MAY.2021 15:55:43
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 30.MAY.2021 16:11:22	Date: 30.MAY.2021 16:11:42

Test Mode :	802.11ax HE40	Test Channel :	06

100kHz PSD reference Level	Channel Plot
	

Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

Test Mode :	802.11ax HE40	Test Channel :	09

100kHz PSD reference Level	Channel Plot
	
Date: 30.MAY.2021 16:00:55	Date: 30.MAY.2021 16:01:14
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 30.MAY.2021 16:04:48	Date: 30.MAY.2021 16:04:59

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.5.2 Measuring Instruments

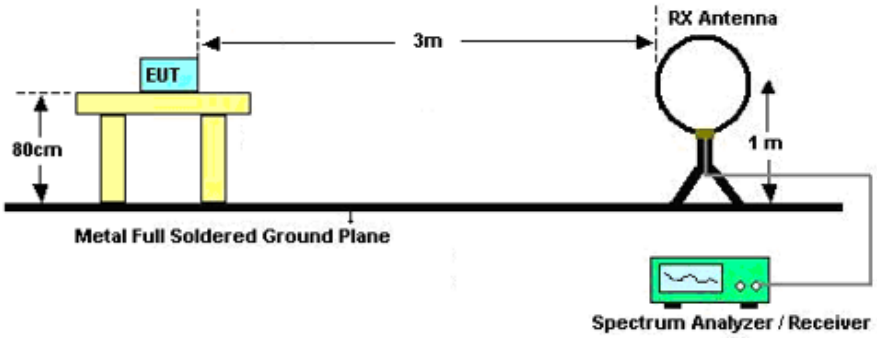
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

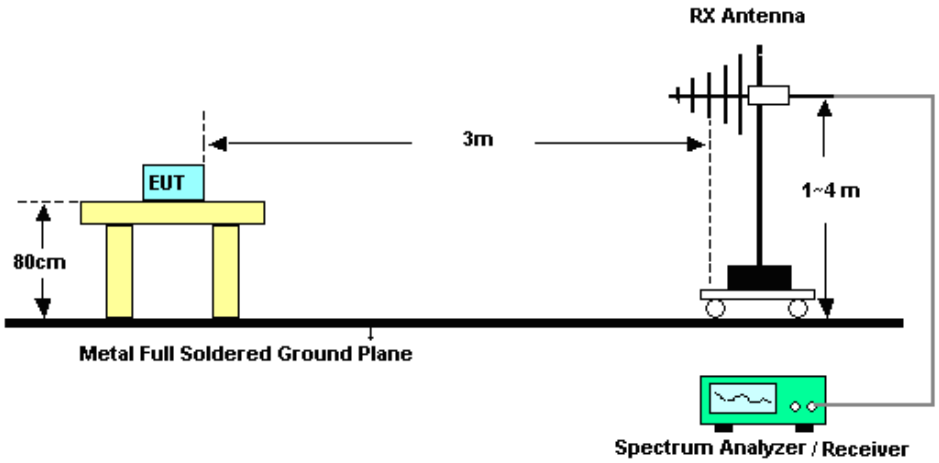
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than peak limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

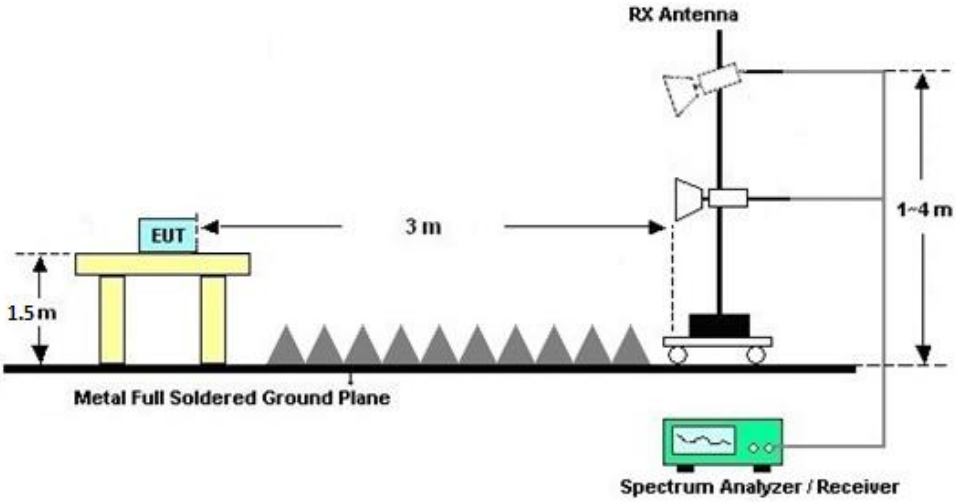
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated Spurious Emissions (9kHz ~ 30MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C.

3.5.7 Duty Cycle

Please refer to Appendix D.

3.5.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic or 40GHz, whichever is lower)

Please refer to Appendix C.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

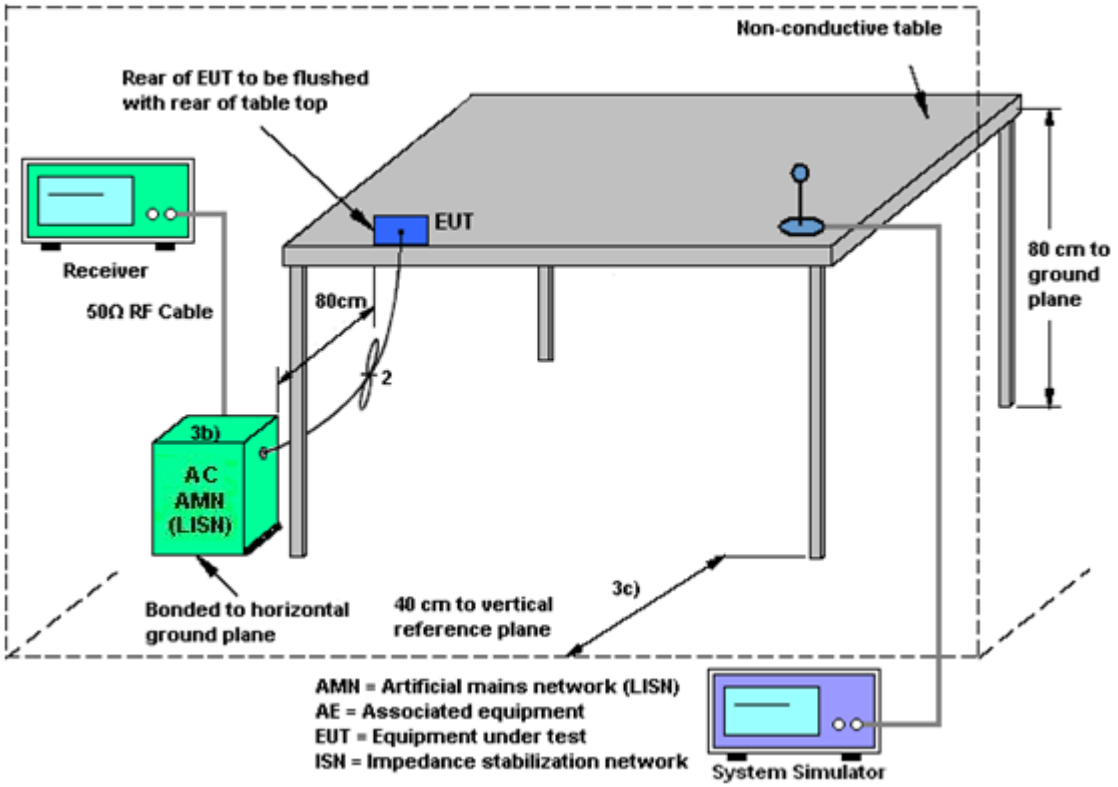
3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.6.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF bandwidth = 9kHz) with Maximum Hold Mode.

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting Antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached Antenna or of an Antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

<CDD Modes >

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

For power spectral density (PSD) measurements on all devices,

Array Gain = 10 log(N_{ANT}/N_{SS}=1) dB.

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$.

Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain;

The EUT supports CDD mode.

For power, the directional gain G_{ANT} is set equal to the antenna having the highest gain, i.e., F)2)f)i).

For PSD, the directional gain calculation is following F)2)f)ii) of KDB 662911 D01 v02r01.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain “DG” is calculated as following table.

<CDD Modes>

	Ant. 1 (dBi)	Ant. 2 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
2.4 GHz	-2.90	0.50	0.50	1.98	0.00	0.00

Power Limit Reduction = DG(Power) – 6dBi, (min = 0)

PSD Limit Reduction = DG(PSD) – 6dBi, (min = 0)

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Nov. 01, 2020	May 29, 2021~ May 30, 2021	Oct. 31, 2021	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 07, 2021	May 29, 2021~ May 30, 2021	Jan. 06, 2022	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 07, 2021	May 29, 2021~ May 30, 2021	Jan. 06, 2022	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY56400004	3Hz~8.5GHz;Max 30dBm	Oct. 17, 2020	Jun. 16, 2021	Oct. 16, 2021	Radiation (03CH05-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44G,MAX 30dB	Apr. 13, 2021	Jun. 16, 2021	Apr. 12, 2022	Radiation (03CH05-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 01, 2020	Jun. 16, 2021	Oct. 31, 2021	Radiation (03CH05-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	May 30, 2021	Jun. 16, 2021	May 29, 2022	Radiation (03CH05-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00218652	1GHz~18GHz	Apr. 24, 2021	Jun. 16, 2021	Apr. 23, 2022	Radiation (03CH05-KS)
SHF-EHF Horn	Com-power	AH-840	101115	18GHz~40GHz	Nov. 10, 2020	Jun. 16, 2021	Nov. 09, 2021	Radiation (03CH05-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Apr. 13, 2021	Jun. 16, 2021	Apr. 12, 2022	Radiation (03CH05-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 07, 2021	Jun. 16, 2021	Jan. 06, 2022	Radiation (03CH05-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2012228	1Ghz-18Ghz	Oct. 17, 2020	Jun. 16, 2021	Oct. 16, 2021	Radiation (03CH05-KS)
Amplifier	Keysight	83017A	MY53270316	500MHz~26.5GHz	Oct. 17, 2020	Jun. 16, 2021	Oct. 16, 2021	Radiation (03CH05-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Jun. 16, 2021	NCR	Radiation (03CH05-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jun. 16, 2021	NCR	Radiation (03CH05-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jun. 16, 2021	NCR	Radiation (03CH05-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 21, 2021	Jun. 04, 2021	Apr. 20, 2022	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 17, 2020	Jun. 04, 2021	Oct. 16, 2021	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	Apr. 13, 2021	Jun. 04, 2021	Apr. 12, 2022	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 17, 2020	Jun. 04, 2021	Oct. 16, 2021	Conduction (CO01-KS)

NCR: No Calibration Required

5 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.94dB**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.0dB**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.0dB**

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.0dB**

Appendix A. Conducted Test Results

Test Engineer:	Jiang Jun	Temperature:	19-21	°C
Test Date:	2021.5.29~2021.5.30	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2		
11b	1Mbps	2	1	2412	13.19	13.34	8.02	8.06	0.50	Pass
11b	1Mbps	2	6	2437	13.24	13.19	8.06	8.06	0.50	Pass
11b	1Mbps	2	11	2462	13.19	13.09	8.06	8.08	0.50	Pass
11g	6Mbps	2	1	2412	16.98	16.93	16.30	16.34	0.50	Pass
11g	6Mbps	2	6	2437	16.93	16.98	16.30	16.32	0.50	Pass
11g	6Mbps	2	11	2462	16.98	16.93	16.04	16.32	0.50	Pass
HE20	MCS0	2	1	2412	19.33	19.33	18.53	18.93	0.50	Pass
HE20	MCS0	2	6	2437	19.28	19.28	18.28	18.38	0.50	Pass
HE20	MCS0	2	11	2462	19.33	19.33	18.60	18.60	0.50	Pass
HE40	MCS0	2	3	2422	37.86	37.86	37.60	37.20	0.50	Pass
HE40	MCS0	2	6	2437	37.86	37.76	36.60	36.32	0.50	Pass
HE40	MCS0	2	9	2452	37.86	37.86	36.12	36.36	0.50	Pass

Report Number : FR151502C

TEST RESULTS DATA
Peak Output Power

2.4GHz Band																		
Mod.	Data Rate	NTX	RU	CH.	Freq. (MHz)	Peak Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
						Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	2		1	2412	21.76	21.66	24.72	30.00		0.50		25.22		36.00		Pass
11b	1Mbps	2		6	2437	21.43	22.24	24.86	30.00		0.50		25.36		36.00		Pass
11b	1Mbps	2		11	2462	19.73	20.44	23.11	30.00		0.50		23.61		36.00		Pass
11g	6Mbps	2		1	2412	25.10	24.20	27.68	30.00		0.50		28.18		36.00		Pass
11g	6Mbps	2		6	2437	25.12	25.02	28.08	30.00		0.50		28.58		36.00		Pass
11g	6Mbps	2		11	2462	25.12	24.91	28.03	30.00		0.50		28.53		36.00		Pass
HT20	MCS0	2		1	2412	25.34	24.24	27.84	30.00		0.50		28.34		36.00		Pass
HT20	MCS0	2		6	2437	25.16	24.90	28.04	30.00		0.50		28.54		36.00		Pass
HT20	MCS0	2		11	2462	25.15	24.91	28.04	30.00		0.50		28.54		36.00		Pass
HT40	MCS0	2		3	2422	25.15	24.69	27.94	30.00		0.50		28.44		36.00		Pass
HT40	MCS0	2		6	2437	24.97	24.54	27.77	30.00		0.50		28.27		36.00		Pass
HT40	MCS0	2		9	2452	24.95	24.81	27.89	30.00		0.50		28.39		36.00		Pass
HE20	MCS0	2	Full	1	2412	24.26	24.76	27.53	30.00		0.50		28.03		36.00		Pass
HE20	MCS0	2	26	1	2412	17.81	17.97	20.90	30.00		0.50		21.40		36.00		Pass
HE20	MCS0	2	52	1	2412	19.98	20.37	23.19	30.00		0.50		23.69		36.00		Pass
HE20	MCS0	2	106	1	2412	22.48	22.62	25.56	30.00		0.50		26.06		36.00		Pass
HE20	MCS0	2	Full	6	2437	25.68	25.22	28.47	30.00		0.50		28.97		36.00		Pass
HE20	MCS0	2	26	6	2437	17.97	18.15	21.07	30.00		0.50		21.57		36.00		Pass
HE20	MCS0	2	52	6	2437	20.04	20.32	23.19	30.00		0.50		23.69		36.00		Pass
HE20	MCS0	2	106	6	2437	23.58	23.49	26.55	30.00		0.50		27.05		36.00		Pass
HE20	MCS0	2	Full	11	2462	25.03	24.92	27.99	30.00		0.50		28.49		36.00		Pass
HE20	MCS0	2	26	11	2462	17.81	18.06	20.95	30.00		0.50		21.45		36.00		Pass
HE20	MCS0	2	52	11	2462	19.92	20.28	23.11	30.00		0.50		23.61		36.00		Pass
HE20	MCS0	2	106	11	2462	22.61	22.75	25.69	30.00		0.50		26.19		36.00		Pass
HE40	MCS0	2	Full	3	2422	24.06	23.92	27.00	30.00		0.50		27.50		36.00		Pass
HE40	MCS0	2	242	3	2422	23.34	23.31	26.34	30.00		0.50		26.84		36.00		Pass
HE40	MCS0	2	Full	6	2437	25.44	24.76	28.12	30.00		0.50		28.62		36.00		Pass
HE40	MCS0	2	242	6	2437	24.07	24.01	27.05	30.00		0.50		27.55		36.00		Pass
HE40	MCS0	2	Full	9	2452	23.92	24.09	27.02	30.00		0.50		27.52		36.00		Pass
HE40	MCS0	2	242	9	2452	22.52	22.86	25.70	30.00		0.50		26.20		36.00		Pass

Note: Measured power (dBm) has offset with cable loss.

TEST RESULTS DATA
Average Output Power

2.4GHz Band										
Mod.	Data Rate	NTX	RU	CH.	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)		
						Ant 1	Ant 2	Ant 1	Ant 2	SUM
11b	1Mbps	2		1	2412	0.00	0.00	19.21	19.05	22.14
11b	1Mbps	2		6	2437	0.00	0.00	18.95	19.65	22.32
11b	1Mbps	2		11	2462	0.00	0.00	17.56	17.77	20.68
11g	6Mbps	2		1	2412	0.04	0.03	17.48	17.55	20.53
11g	6Mbps	2		6	2437	0.04	0.03	17.44	17.73	20.60
11g	6Mbps	2		11	2462	0.04	0.03	17.47	17.80	20.65
HT20	MCS0	2		1	2412	0.00	0.00	17.40	17.47	20.45
HT20	MCS0	2		6	2437	0.00	0.00	17.31	17.62	20.48
HT20	MCS0	2		11	2462	0.00	0.00	17.23	17.62	20.44
HT40	MCS0	2		3	2422	0.00	0.00	17.69	17.73	20.72
HT40	MCS0	2		6	2437	0.00	0.00	17.29	17.60	20.46
HT40	MCS0	2		9	2452	0.00	0.00	17.55	17.77	20.67
HE20	MCS0	2	Full	1	2412	0.00	0.00	16.25	16.23	19.25
HE20	MCS0	2	26	1	2412	0.49	0.49	6.82	7.18	9.93
HE20	MCS0	2	52	1	2412	0.53	0.53	9.08	9.15	12.13
HE20	MCS0	2	106	1	2412	0.60	0.59	12.07	12.23	15.16
HE20	MCS0	2	Full	6	2437	0.68	0.68	17.34	17.65	20.51
HE20	MCS0	2	26	6	2437	0.49	0.49	7.18	7.25	10.23
HE20	MCS0	2	52	6	2437	0.53	0.53	9.15	9.37	12.27
HE20	MCS0	2	106	6	2437	0.60	0.59	12.66	12.71	15.70
HE20	MCS0	2	Full	11	2462	0.68	0.68	16.56	16.88	19.73
HE20	MCS0	2	26	11	2462	0.49	0.49	6.83	7.08	9.97
HE20	MCS0	2	52	11	2462	0.53	0.53	8.92	9.17	12.06
HE20	MCS0	2	106	11	2462	0.60	0.59	11.83	12.16	15.01
HE40	MCS0	2	Full	3	2422	0.00	0.00	15.91	15.81	18.87
HE40	MCS0	2	242	3	2422	0.00	0.00	12.81	12.90	15.87
HE40	MCS0	2	Full	6	2437	0.00	0.00	17.28	17.65	20.48
HE40	MCS0	2	242	6	2437	0.00	0.00	13.48	13.69	16.60
HE40	MCS0	2	Full	9	2452	0.00	0.00	15.72	15.82	18.78
HE40	MCS0	2	242	9	2452	0.00	0.00	11.64	12.03	14.85

Note: Measured power (dBm) has offset with cable loss.

Report Number : FR151502C

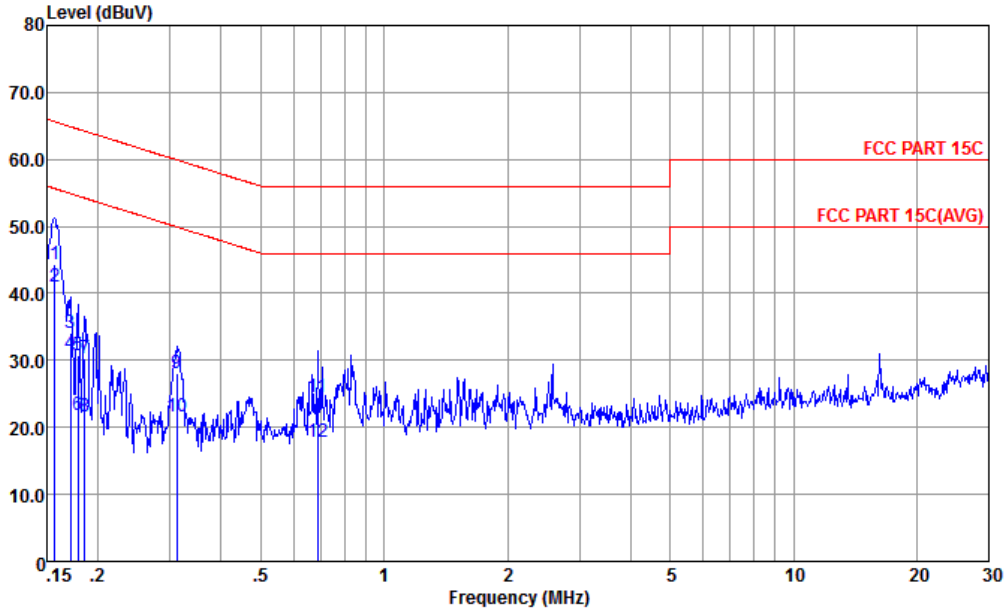
TEST RESULTS DATA
Peak Power Spectral Density

2.4GHz Band													
Mod.	Data Rate	NTX	RU	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail
						Ant 1	Ant 2	Worse + 3.01	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	2		1	2412	-4.27	-4.98	-1.26	1.98		8.00		Pass
11b	1Mbps	2		6	2437	-3.69	-4.69	-0.68	1.98		8.00		Pass
11b	1Mbps	2		11	2462	-5.06	-4.45	-1.44	1.98		8.00		Pass
11g	6Mbps	2		1	2412	-8.69	-8.23	-5.22	1.98		8.00		Pass
11g	6Mbps	2		6	2437	-8.69	-8.73	-5.68	1.98		8.00		Pass
11g	6Mbps	2		11	2462	-8.15	-8.35	-5.14	1.98		8.00		Pass
HE20	MCS0	2	Full	1	2412	-10.07	-9.77	-6.76	1.98		8.00		Pass
HE20	MCS0	2	26	1	2412	-10.89	-10.68	-7.67	1.98		8.00		Pass
HE20	MCS0	2	52	1	2412	-10.34	-10.59	-7.33	1.98		8.00		Pass
HE20	MCS0	2	106	1	2412	-10.25	-10.17	-7.16	1.98		8.00		Pass
HE20	MCS0	2	Full	6	2437	-9.02	-8.56	-5.55	1.98		8.00		Pass
HE20	MCS0	2	26	6	2437	-9.76	-9.77	-6.75	1.98		8.00		Pass
HE20	MCS0	2	52	6	2437	-10.17	-9.61	-6.60	1.98		8.00		Pass
HE20	MCS0	2	106	6	2437	-9.74	-9.66	-6.65	1.98		8.00		Pass
HE20	MCS0	2	Full	11	2462	-9.83	-9.61	-6.60	1.98		8.00		Pass
HE20	MCS0	2	26	11	2462	-10.29	-10.06	-7.05	1.98		8.00		Pass
HE20	MCS0	2	52	11	2462	-10.16	-9.86	-6.85	1.98		8.00		Pass
HE20	MCS0	2	106	11	2462	-9.99	-10.33	-6.98	1.98		8.00		Pass
HE40	MCS0	2	Full	3	2422	-12.73	-12.54	-9.53	1.98		8.00		Pass
HE40	MCS0	2	242	3	2422	-12.85	-13.07	-9.84	1.98		8.00		Pass
HE40	MCS0	2	Full	6	2437	-11.81	-10.92	-7.91	1.98		8.00		Pass
HE40	MCS0	2	242	6	2437	-12.25	-11.68	-8.67	1.98		8.00		Pass
HE40	MCS0	2	Full	9	2452	-12.91	-12.87	-9.86	1.98		8.00		Pass
HE40	MCS0	2	242	9	2452	-13.27	-12.88	-9.87	1.98		8.00		Pass

Measured power density (dBm) has offset with cable loss.

Appendix B. AC Conducted Emission Test Results

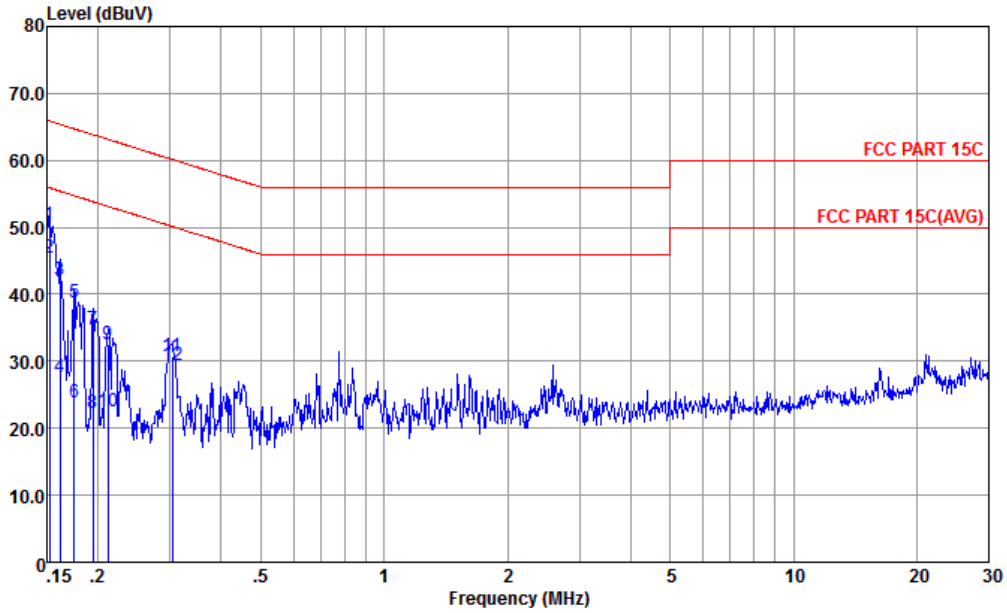
Test Engineer :	Amos Zhang	**Temperature :**	25.3~26.2℃
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-KS
Condition : FCC PART 15C TWO-LISN-CN02-L LINE

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.156	44.30	-21.35	65.65	24.20	9.64	10.46	QP
2 *	0.156	41.00	-14.65	55.65	20.90	9.64	10.46	Average
3	0.171	34.17	-30.73	64.90	14.10	9.64	10.43	QP
4	0.171	30.97	-23.93	54.90	10.90	9.64	10.43	Average
5	0.179	30.65	-33.90	64.55	10.60	9.64	10.41	QP
6	0.179	21.85	-32.70	54.55	1.80	9.64	10.41	Average
7	0.185	30.24	-34.00	64.24	10.21	9.64	10.39	QP
8	0.185	21.64	-32.60	54.24	1.61	9.64	10.39	Average
9	0.312	28.14	-31.79	59.93	8.20	9.64	10.30	QP
10	0.312	21.54	-28.39	49.93	1.60	9.64	10.30	Average
11	0.686	24.50	-31.50	56.00	4.60	9.66	10.24	QP
12	0.686	17.80	-28.20	46.00	-2.10	9.66	10.24	Average

Test Engineer :	Amos Zhang	**Temperature :**	25.3~26.2℃
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-KS
Condition : FCC PART 15C TWO-LISN-CN02-N NEUTRAL

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.152	50.37	-15.50	65.87	30.10	9.80	10.47	QP
2	*	0.152	45.37	-10.50	55.87	25.10	9.80	10.47	Average
3		0.162	42.17	-23.21	65.38	21.90	9.82	10.45	QP
4		0.162	27.57	-27.81	55.38	7.30	9.82	10.45	Average
5		0.175	38.87	-25.85	64.72	18.60	9.85	10.42	QP
6		0.175	23.77	-30.95	54.72	3.50	9.85	10.42	Average
7		0.194	34.76	-29.08	63.84	14.51	9.88	10.37	QP
8		0.194	22.36	-31.48	53.84	2.11	9.88	10.37	Average
9		0.212	32.44	-30.70	63.14	12.20	9.88	10.36	QP
10		0.212	22.44	-30.70	53.14	2.20	9.88	10.36	Average
11		0.303	30.69	-29.46	60.15	10.59	9.79	10.31	QP
12		0.303	29.39	-20.76	50.15	9.29	9.79	10.31	Average

Note:

1. Level(dBμV) = Read Level(dBμV) + LISN Factor(dB) + Cable Loss(dB)
2. Over Limit(dB) = Level(dBμV) – Limit Line(dBμV)

Appendix C. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2389.69	57.01	-16.99	74	48.87	32.2	7.59	31.65	282	148	P	H
		2388.78	45.58	-8.42	54	37.44	32.2	7.59	31.65	282	148	A	H
	*	2412	107.69	-	-	99.54	32.18	7.62	31.65	282	148	P	H
	*	2414	104.64	-	-	96.49	32.18	7.62	31.65	282	148	A	H
		2381.89	56.79	-17.21	74	48.73	32.15	7.56	31.65	303	271	P	V
		2387.35	45.16	-8.84	54	37.02	32.2	7.59	31.65	303	271	A	V
	*	2412	105.29	-	-	97.14	32.18	7.62	31.65	303	271	P	V
	*	2412	102.13	-	-	93.98	32.18	7.62	31.65	303	271	A	V
802.11b CH 11 2462MHz		2485.36	56.24	-17.76	74	47.97	32.12	7.73	31.58	270	32	P	H
		2486.98	45.28	-8.72	54	37.01	32.12	7.73	31.58	270	32	A	H
	*	2462	106.56	-	-	98.33	32.13	7.7	31.6	270	32	P	H
	*	2460	103.4	-	-	95.17	32.13	7.7	31.6	270	32	A	H
		2498.44	56.38	-17.62	74	48.08	32.1	7.76	31.56	101	30	P	V
		2486.68	44.8	-9.2	54	36.53	32.12	7.73	31.58	101	30	A	V
	*	2462	104.26	-	-	96.03	32.13	7.7	31.6	101	30	P	V
	*	2462	101.09	-	-	92.86	32.13	7.7	31.6	101	30	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz
WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	42.37	-31.63	74	57.04	34.31	11.06	60.04	300	0	P	H
		7236	51.08	-31.82	82.90	62.21	35.95	13.42	60.5	300	0	P	H
		4824	41.53	-32.47	74	56.2	34.31	11.06	60.04	300	360	P	V
		7236	52.03	-28.61	80.64	63.16	35.95	13.42	60.5	300	360	P	V
802.11b CH 06 2437MHz		4872	42.48	-31.52	74	57.13	34.34	11.04	60.03	300	0	P	H
		7308	48.78	-25.22	74	59.87	35.94	13.48	60.51	300	0	P	H
		4872	41.02	-32.98	74	55.67	34.34	11.04	60.03	300	360	P	V
		7308	48.24	-25.76	74	59.33	35.94	13.48	60.51	300	360	P	V
802.11b CH 11 2462MHz		4926	43.89	-30.11	74	58.52	34.36	11.03	60.02	300	0	P	H
		7386	52.74	-21.26	74	63.8	35.92	13.55	60.53	211	230	P	H
		7386	50.35	-3.65	54	61.41	35.92	13.55	60.53	211	230	A	H
		4926	44.08	-29.92	74	58.71	34.36	11.03	60.02	300	360	P	V
		7386	51.73	-22.27	74	62.79	35.92	13.55	60.53	278	179	P	V
		7386	48.19	-5.81	54	59.25	35.92	13.55	60.53	278	179	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz
WIFI 802.11g (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		2389.82	59.38	-14.62	74	51.24	32.2	7.59	31.65	283	139	P	H
		2389.95	49.82	-4.18	54	41.68	32.2	7.59	31.65	283	139	A	H
	*	2410	110.73	-	-	102.58	32.18	7.62	31.65	283	139	P	H
	*	2410	102.86	-	-	94.71	32.18	7.62	31.65	283	139	A	H
		2389.17	60.66	-13.34	74	52.52	32.2	7.59	31.65	121	107	P	V
		2389.95	50.31	-3.69	54	42.17	32.2	7.59	31.65	121	107	A	V
	*	2410	111.38	-	-	103.23	32.18	7.62	31.65	121	107	P	V
	*	2410	103.5	-	-	95.35	32.18	7.62	31.65	121	107	A	V
802.11g CH 11 2462MHz		2484.88	60.98	-13.02	74	52.71	32.12	7.73	31.58	272	138	P	H
		2483.98	47.47	-6.53	54	39.2	32.12	7.73	31.58	272	138	A	H
	*	2460	109.91	-	-	101.68	32.13	7.7	31.6	272	138	P	H
	*	2460	102.03	-	-	93.8	32.13	7.7	31.6	272	138	A	H
		2483.68	62.17	-11.83	74	53.9	32.12	7.73	31.58	216	105	P	V
		2483.5	49.99	-4.01	54	41.72	32.12	7.73	31.58	216	105	A	V
	*	2464	110.95	-	-	102.72	32.13	7.7	31.6	216	105	P	V
	*	2460	102.81	-	-	94.58	32.13	7.7	31.6	216	105	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz
WIFI 802.11g (Harmonic @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		4824	41.67	-32.33	74	56.34	34.31	11.06	60.04	300	0	P	H
		7236	50.67	-28.77	79.44	61.8	35.95	13.42	60.5	300	0	P	H
		4824	41.27	-32.73	74	55.94	34.31	11.06	60.04	300	360	P	V
		7236	49.8	-31.7	81.50	60.93	35.95	13.42	60.5	300	360	P	V
802.11g CH 06 2437MHz		4872	41.33	-32.67	74	55.98	34.34	11.04	60.03	300	0	P	H
		7308	47.31	-26.69	74	58.4	35.94	13.48	60.51	300	0	P	H
		4872	41.86	-32.14	74	56.51	34.34	11.04	60.03	300	360	P	V
		7308	47.22	-26.78	74	58.31	35.94	13.48	60.51	300	360	P	V
802.11g CH 11 2462MHz		4926	42.16	-31.84	74	56.79	34.36	11.03	60.02	300	0	P	H
		7386	50.96	-23.04	74	62.02	35.92	13.55	60.53	353	226	P	H
		7386	42.11	-11.89	54	53.17	35.92	13.55	60.53	353	226	A	H
		4926	41.84	-32.16	74	56.47	34.36	11.03	60.02	300	360	P	V
		7386	50.53	-23.47	74	61.59	35.92	13.55	60.53	300	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz
WIFI 802.11 ax HE20 Full (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ax HE20 Full CH 01 2412MHz		2389.3	62.33	-11.67	74	54.19	32.2	7.59	31.65	285	44	P	H
		2389.95	50.1	-3.9	54	41.96	32.2	7.59	31.65	285	44	A	H
	*	2410	110.27	-	-	102.12	32.18	7.62	31.65	285	44	P	H
	*	2410	100.14	-	-	91.99	32.18	7.62	31.65	285	44	A	H
		2386.96	62.93	-11.07	74	54.79	32.2	7.59	31.65	142	96	P	V
		2389.04	48.93	-5.07	54	40.79	32.2	7.59	31.65	142	96	A	V
	*	2418	112.06	-	-	103.89	32.18	7.62	31.63	142	96	P	V
	*	2408	102.19	-	-	94.04	32.18	7.62	31.65	142	96	A	V
8802.11ax HE20 Full CH 11 2462MHz		2486.62	59.94	-14.06	74	51.67	32.12	7.73	31.58	271	143	P	H
		2485.36	47.38	-6.62	54	39.11	32.12	7.73	31.58	271	143	A	H
	*	2458	111.62	-	-	103.39	32.13	7.7	31.6	271	143	P	H
	*	2458	101.3	-	-	93.07	32.13	7.7	31.6	271	143	A	H
		2483.92	64.64	-9.36	74	56.37	32.12	7.73	31.58	218	96	P	V
		2483.5	49.98	-4.02	54	41.71	32.12	7.73	31.58	218	96	A	V
	*	2456	113.08	-	-	104.85	32.13	7.7	31.6	218	96	P	V
	*	2456	102.45	-	-	94.22	32.13	7.7	31.6	218	96	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz
WIFI 802.11 ax HE20 Full (Harmonic @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ax		4824	41.03	-32.97	74	55.7	34.31	11.06	60.04	300	0	P	H
HE20 Full		7236	47.41	-30.05	77.46	58.54	35.95	13.42	60.5	300	0	P	H
CH 01		4824	41.64	-32.36	74	56.31	34.31	11.06	60.04	300	360	P	V
2412MHz		7236	47.65	-30.23	77.88	58.78	35.95	13.42	60.5	300	360	P	V
802.11ax		4872	41.23	-32.77	74	55.88	34.34	11.04	60.03	300	0	P	H
HE20 Full		7308	49.45	-24.55	74	60.54	35.94	13.48	60.51	300	0	P	H
CH 06		4872	41.65	-32.35	74	56.3	34.34	11.04	60.03	300	360	P	V
2437MHz		7308	47.88	-26.12	74	58.97	35.94	13.48	60.51	300	360	P	V
802.11ax		4926	41.5	-32.5	74	56.13	34.36	11.03	60.02	300	0	P	H
HE20 Full		7386	46.6	-27.4	74	57.66	35.92	13.55	60.53	300	0	P	H
CH 11		4926	42.73	-31.27	74	57.36	34.36	11.03	60.02	300	360	P	V
2462MHz		7386	48.16	-25.84	74	59.22	35.92	13.55	60.53	300	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz
WIFI 802.11ax HE20 Partial 26 (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ax HE20 Partial 26/0 CH 01 2412MHz		2389.95	68.31	-5.69	74	60.17	32.2	7.59	31.65	346	56	P	H
		2389.95	46.27	-7.73	54	38.13	32.2	7.59	31.65	346	56	A	H
		2404	115.39	-	-	107.24	32.18	7.62	31.65	346	56	P	H
		2404	106.34	-	-	98.19	32.18	7.62	31.65	346	56	A	H
		2389.3	59.04	-14.96	74	50.9	32.2	7.59	31.65	100	271	P	V
		2389.82	45.12	-8.88	54	36.98	32.2	7.59	31.65	100	271	A	V
		2404	115.91	-	-	107.76	32.18	7.62	31.65	100	271	P	V
		2404	106.87	-	-	98.72	32.18	7.62	31.65	100	271	A	V
802.11ax HE20 Partial 26/8 CH 11 2462MHz		2483.68	69.66	-4.34	74	61.39	32.12	7.73	31.58	293	40	P	H
		2483.5	45.79	-8.21	54	37.52	32.12	7.73	31.58	293	40	A	H
		2470	117.56	-	-	109.33	32.13	7.7	31.6	293	40	P	H
		2470	108.47	-	-	100.24	32.13	7.7	31.6	293	40	A	H
		2484.1	64.04	-9.96	74	55.77	32.12	7.73	31.58	246	115	P	V
		2483.5	45.05	-8.95	54	36.78	32.12	7.73	31.58	246	115	A	V
		2472	114.2	-	-	105.95	32.12	7.73	31.6	246	115	P	V
		2470	105.48	-	-	97.25	32.13	7.7	31.6	246	115	A	V
Remark	3. No other spurious found. 4. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz
WIFI 802.11ax HE20 Partial 52 (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ax HE20 Partial 52/37 CH 01 2412MHz		2389.82	63.27	-10.73	74	55.13	32.2	7.59	31.65	383	57	P	H
		2389.95	45.94	-8.06	54	37.8	32.2	7.59	31.65	383	57	A	H
		2406	118.35	-	-	110.2	32.18	7.62	31.65	383	57	P	H
		2406	108.66	-	-	100.51	32.18	7.62	31.65	383	57	A	H
		2389.82	62.69	-11.31	74	54.55	32.2	7.59	31.65	100	115	P	V
		2389.95	45.63	-8.37	54	37.49	32.2	7.59	31.65	100	115	A	V
		2406	115.55	-	-	107.4	32.18	7.62	31.65	100	115	P	V
		2406	107.41	-	-	99.26	32.18	7.62	31.65	100	115	A	V
802.11ax HE20 Partial 52/40 CH 11 2462MHz		2483.5	69.36	-4.64	74	61.09	32.12	7.73	31.58	331	42	P	H
		2483.5	45.81	-8.19	54	37.54	32.12	7.73	31.58	331	42	A	H
		2468	117.81	-	-	109.58	32.13	7.7	31.6	331	42	P	H
		2468	108.04	-	-	99.81	32.13	7.7	31.6	331	42	A	H
		2483.5	67.43	-6.57	74	59.16	32.12	7.73	31.58	102	64	P	V
		2483.68	45.31	-8.69	54	37.04	32.12	7.73	31.58	102	64	A	V
		2468	116.77	-	-	108.54	32.13	7.7	31.6	102	64	P	V
		2468	106.54	-	-	98.31	32.13	7.7	31.6	102	64	A	V

2.4GHz 2400~2483.5MHz
WIFI 802.11ax HE20 Partial 106 (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ax HE20 Partial 106/53 CH 01 2412MHz		2389.56	62.72	-11.28	74	54.58	32.2	7.59	31.65	348	52	P	H
		2389.95	47.32	-6.68	54	39.18	32.2	7.59	31.65	348	52	A	H
		2408	115.6	-	-	107.45	32.18	7.62	31.65	348	52	P	H
		2408	107.09	-	-	98.94	32.18	7.62	31.65	348	52	A	H
		2389.95	61.5	-12.5	74	53.36	32.2	7.59	31.65	116	95	P	V
		2389.95	46.43	-7.57	54	38.29	32.2	7.59	31.65	116	95	A	V
		2406	115.37	-	-	107.22	32.18	7.62	31.65	116	95	P	V
		2408	106.61	-	-	98.46	32.18	7.62	31.65	116	95	A	V
802.11ax HE20 Partial 106/54 CH 11 2462MHz		2483.68	68.82	-5.18	74	60.55	32.12	7.73	31.58	261	45	P	H
		2483.5	46.76	-7.24	54	38.49	32.12	7.73	31.58	261	45	A	H
		2466	114.9	-	-	106.67	32.13	7.7	31.6	261	45	P	H
		2468	104.47	-	-	96.24	32.13	7.7	31.6	261	45	A	H
		2483.5	69.07	-4.93	74	60.8	32.12	7.73	31.58	103	82	P	V
		2483.5	46.62	-7.38	54	38.35	32.12	7.73	31.58	103	82	A	V
		2466	114.81	-	-	106.58	32.13	7.7	31.6	103	82	P	V
		2466	105.65	-	-	97.42	32.13	7.7	31.6	103	82	A	V

2.4GHz 2400~2483.5MHz
WIFI 802.11 ax HE40 Full (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ax HE40 Full CH 03 2422MHz		2389.04	60.8	-13.2	74	52.66	32.2	7.59	31.65	259	35	P	H
		2389.82	50.7	-3.3	54	42.56	32.2	7.59	31.65	259	35	A	H
		2490.52	56.3	-17.7	74	48.02	32.1	7.76	31.58	259	35	P	H
		2484.28	44.78	-9.22	54	36.51	32.12	7.73	31.58	259	35	A	H
	*	2420	106.45	-	-	98.27	32.17	7.64	31.63	259	35	P	H
	*	2420	95.79	-	-	87.61	32.17	7.64	31.63	259	35	A	H
		2388.91	60.95	-13.05	74	52.81	32.2	7.59	31.65	100	124	P	V
		2388.78	50.32	-3.68	54	42.18	32.2	7.59	31.65	100	124	A	V
		2485.3	55.83	-18.17	74	47.56	32.12	7.73	31.58	100	124	P	V
		2484.82	44.83	-9.17	54	36.56	32.12	7.73	31.58	100	124	A	V
	*	2418	106.52	-	-	98.35	32.18	7.62	31.63	100	124	P	V
	*	2418	96.88	-	-	88.71	32.18	7.62	31.63	100	124	A	V
802.11ax HE40 Full CH 06 2437MHz		2388.91	56.63	-17.37	74	48.49	32.2	7.59	31.65	308	144	P	H
		2387.61	45.89	-8.11	54	37.75	32.2	7.59	31.65	308	144	A	H
		2487.46	56.89	-17.11	74	48.62	32.12	7.73	31.58	308	144	P	H
		2483.5	46.48	-7.52	54	38.21	32.12	7.73	31.58	308	144	A	H
	*	2434	110.56	-	-	102.38	32.17	7.64	31.63	308	144	P	H
	*	2434	99.04	-	-	90.86	32.17	7.64	31.63	308	144	A	H
		2386.18	57.25	-16.75	74	49.11	32.2	7.59	31.65	108	122	P	V
		2385.79	46.15	-7.85	54	38.01	32.2	7.59	31.65	108	122	A	V
		2486.32	56.91	-17.09	74	48.64	32.12	7.73	31.58	108	122	P	V
		2483.5	45.65	-8.35	54	37.38	32.12	7.73	31.58	108	122	A	V
	*	2432	109	-	-	100.82	32.17	7.64	31.63	108	122	P	V
	*	2432	98.29	-	-	90.11	32.17	7.64	31.63	108	122	A	V

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ax HE40 Full CH 09 2452MHz		2375.26	56.4	-17.6	74	48.35	32.15	7.56	31.66	308	146	P	H
		2389.95	45.07	-8.93	54	36.93	32.2	7.59	31.65	308	146	A	H
		2485.42	60.49	-13.51	74	52.22	32.12	7.73	31.58	308	146	P	H
		2486.2	48.93	-5.07	54	40.66	32.12	7.73	31.58	308	146	A	H
	*	2448	107.17	-	-	98.96	32.15	7.67	31.61	308	146	P	H
	*	2448	98.33	-	-	90.12	32.15	7.67	31.61	308	146	A	H
		2353.03	56	-18	74	48.03	32.11	7.53	31.67	122	123	P	V
		2388.91	45.08	-8.92	54	36.94	32.2	7.59	31.65	122	123	A	V
		2483.74	61.91	-12.09	74	53.64	32.12	7.73	31.58	122	123	P	V
		2484.22	50.78	-3.22	54	42.51	32.12	7.73	31.58	122	123	A	V
	*	2456	107.25	-	-	99.02	32.13	7.7	31.6	122	123	P	V
	*	2458	96.89	-	-	88.66	32.13	7.7	31.6	122	123	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz
WIFI 802.11 ax HE40 Full (Harmonic @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ax		4842	41.55	-32.45	74	56.21	34.32	11.05	60.03	300	0	P	H
HE40 Full		7266	44.91	-29.09	74	56.03	35.94	13.45	60.51	300	0	P	H
CH 03		4842	41.99	-32.01	74	56.65	34.32	11.05	60.03	300	360	P	V
2422MHz		7266	45.3	-28.7	74	56.42	35.94	13.45	60.51	300	360	P	V
802.11ax		4872	43.06	-30.94	74	57.71	34.34	11.04	60.03	300	0	P	H
HE40 Full		7308	44.44	-29.56	74	55.53	35.94	13.48	60.51	300	0	P	H
CH 06		4872	41.27	-32.73	74	55.92	34.34	11.04	60.03	300	360	P	V
2437MHz		7308	43.41	-30.59	74	54.5	35.94	13.48	60.51	300	360	P	V
802.11ax		4902	41.4	-32.6	74	56.04	34.35	11.03	60.02	300	0	P	H
HE40 Full		7356	43.92	-30.08	74	54.99	35.93	13.52	60.52	300	0	P	H
CH 09		4902	41.68	-32.32	74	56.32	34.35	11.03	60.02	300	360	P	V
2452MHz		7356	43.63	-30.37	74	54.7	35.93	13.52	60.52	300	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz
WIFI 802.11ax HE40 Partial 242 (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ax HE40 Partial 242/61 CH 03 2422MHz		2388.65	62.02	-11.98	74	53.88	32.2	7.59	31.65	301	55	P	H
		2388.91	49.28	-4.72	54	41.14	32.2	7.59	31.65	301	55	A	H
		2495.44	55.6	-18.4	74	47.3	32.1	7.76	31.56	301	55	P	H
		2487.76	44.8	-9.2	54	36.52	32.1	7.76	31.58	301	55	A	H
		2418	110.58	-	-	102.41	32.18	7.62	31.63	301	55	P	H
		2418	100.96	-	-	92.79	32.18	7.62	31.63	301	55	A	H
		2387.87	63.91	-10.09	74	55.77	32.2	7.59	31.65	100	97	P	V
		2388.26	49.35	-4.65	54	41.21	32.2	7.59	31.65	100	97	A	V
		2484.1	57.18	-16.82	74	48.91	32.12	7.73	31.58	100	97	P	V
		2488.3	45.01	-8.99	54	36.73	32.1	7.76	31.58	100	97	A	V
		2416	110.76	-	-	102.59	32.18	7.62	31.63	100	97	P	V
		2416	101.78	-	-	93.61	32.18	7.62	31.63	100	97	A	V
802.11ax HE40 Partial 242/62 CH 09 2452MHz		2386.96	56.61	-17.39	74	48.47	32.2	7.59	31.65	329	57	P	H
		2389.95	44.81	-9.19	54	36.67	32.2	7.59	31.65	329	57	A	H
		2484.4	69.21	-4.79	74	60.94	32.12	7.73	31.58	329	57	P	H
		2483.8	50.17	-3.83	54	41.9	32.12	7.73	31.58	329	57	A	H
		2458	110.25	-	-	102.02	32.13	7.7	31.6	329	57	P	H
		2458	100.35	-	-	92.12	32.13	7.7	31.6	329	57	A	H
		2385.01	56.15	-17.85	74	48.09	32.15	7.56	31.65	117	80	P	V
		2389.69	44.78	-9.22	54	36.64	32.2	7.59	31.65	117	80	A	V
		2484.1	69.81	-4.19	74	61.54	32.12	7.73	31.58	117	80	P	V
		2483.8	50.97	-3.03	54	42.7	32.12	7.73	31.58	117	80	A	V
		2456	110.96	-	-	102.73	32.13	7.7	31.6	117	80	P	V
		2456	101.21	-	-	92.98	32.13	7.7	31.6	117	80	A	V

Emission below 1GHz

2.4GHz WIFI 802.11ax HE40 (LF)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
2.4GHz 802.11ax HE40 LF		30	22.85	-17.15	40	29.34	25.5	0.71	32.7	-	-	P	H
		148.34	20.43	-23.07	43.5	33.87	17.52	1.84	32.8	-	-	P	H
		184.23	26.25	-17.25	43.5	40.52	16.68	2.06	33.01	-	-	P	H
		214.3	27.6	-15.9	43.5	41.28	17.19	2.23	33.1	100	0	P	H
		331.67	23.34	-22.66	46	32.51	20.96	2.77	32.9	-	-	P	H
		611.03	25.98	-20.02	46	29.16	25.59	3.77	32.54	-	-	P	H
		35.82	32.56	-7.44	40	42.22	22.3	0.76	32.72	100	360	P	V
		56.19	26.99	-13.01	40	45.01	14.04	1.12	33.18	-	-	P	V
		56.19	26.99	-13.01	40	45.01	14.04	1.12	33.18	-	-	P	V
		161.92	20.13	-23.37	43.5	33.84	17.22	1.94	32.87	-	-	P	V
		213.33	26.84	-16.66	43.5	40.59	17.13	2.22	33.1	-	-	P	V
		882.63	27.2	-18.8	46	27.86	27.33	4.54	32.53	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

A calculation example for radiated spurious emission is shown as below:

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =

Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

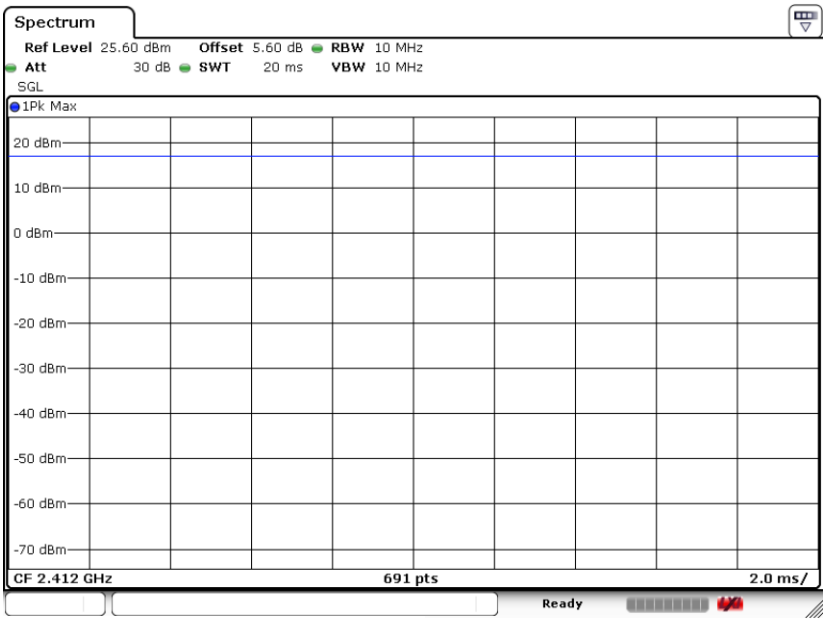
= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is "PASS".

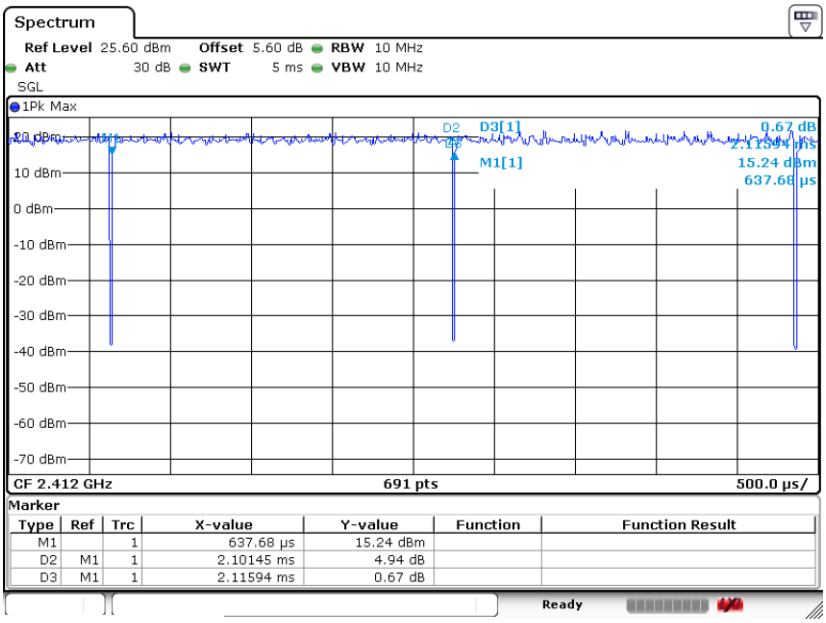
Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	100	-	-	10Hz
802.11g	99.32	-	-	10Hz
802.11ax HE20	100	-	-	10Hz
802.11ax HE40	100	-	-	10Hz

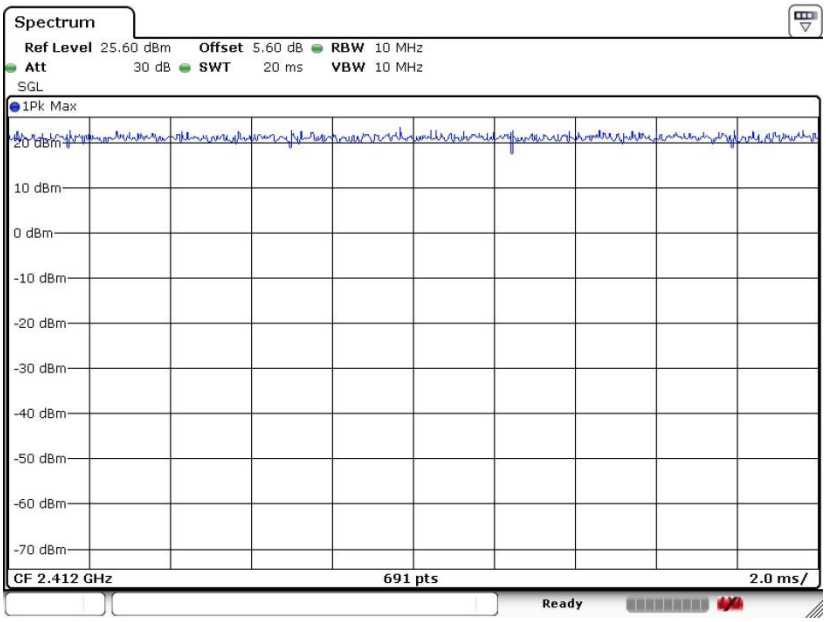
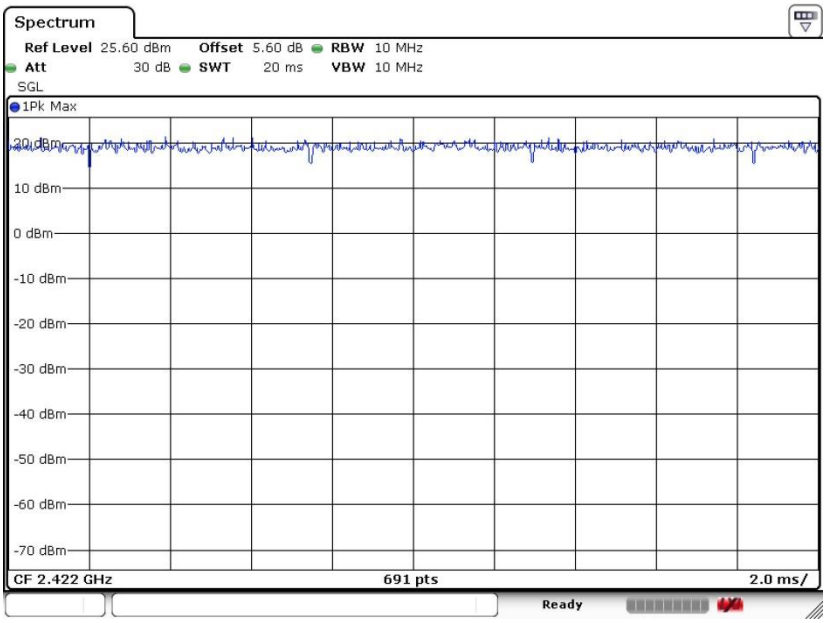
802.11b



802.11g



802.11ax HE20



802.11ax HE40