FCC RF Test Report

APPLICANT	:	Espressif Systems (Shanghai) Co.,Ltd.
EQUIPMENT	:	2.4GHz Wi-Fi & BT IoT Module
BRAND NAME	:	ESPRESSIF
MODEL NAME	:	ESP32-S3-WROOM-1U
FCC ID	:	2AC7Z-ESPS3WROOM1U
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System
TEST DATE(S)	:	Mar. 04, 2022 ~ Mar. 10, 2022

We, Sporton International Inc. (Kunshan), 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 Inc. (Kunshan), the test report shall not be reproduced except in full.

Jason Jia

Reviewed by: Jason Jia / Supervisor

Alex wang

Approved by: Alex Wang / Manager

ACCREDITED
Cert #5145.02

Sporton International Inc. (Kunshan)
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 5
1.5 Modification of EUT 5
1.6 Testing Location 6
1.7 Test Software 6
1.8 Applicable Standards 6
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST **7**
2.1 Carrier Frequency and Channel 7
2.2 Test Mode 8
2.3 Connection Diagram of Test System 8
2.4 Support Unit used in test configuration and system 9
2.5 EUT Operation Test Setup 9
2.6 Measurement Results Explanation Example 9
3 TEST RESULT **10**
3.1 6dB and 99% Bandwidth Measurement 10
3.2 Output Power Measurement 12
3.3 Power Spectral Density Measurement 13
3.4 Conducted Band Edges and Spurious Emission Measurement 15
3.5 Radiated Band Edges and Spurious Emission Measurement 28
3.6 AC Conducted Emission Measurement 32
3.7 Antenna Requirements 34
4 LIST OF MEASURING EQUIPMENT **35**
5 UNCERTAINTY OF EVALUATION **36**
APPENDIX A. CONDUCTED TEST RESULTS
APPENDIX B. AC CONDUCTED EMISSION TEST RESULT
APPENDIX C. RADIATED SPURIOUS EMISSION
APPENDIX D. RADIATED SPURIOUS EMISSION PLOTS
APPENDIX E. DUTY CYCLE PLOTS
APPENDIX F. SETUP PHOTOGRAPHS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR1D1609B	Rev. 01	Initial issue of report	Mar. 28, 2022

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	-	Report Only	-
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 1.11 dB at 2389.950 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 8.23 dB at 0.153 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	15.203 & 15.247(b)	Pass	-

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

Espressif Systems (Shanghai) Co.,Ltd.
Suite 204, Block 2, 690 Bibo Road, Zhang Jiang Hi-Tech Park, Shanghai, China

1.2 Manufacturer

Espressif Systems (Shanghai) Co.,Ltd.
Suite 204, Block 2, 690 Bibo Road, Zhang Jiang Hi-Tech Park, Shanghai, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	2.4GHz Wi-Fi & BT IoT Module
Brand Name	ESPRESSIF
Model Name	ESP32-S3-WROOM-1U
FCC ID	2AC7Z-ESPS3WROOM1U
HW Version	V1.4
SW Version	v1.1.3.4
EUT Stage	Production Unit

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	802.11b : 18.41dBm (0.0693 W) 802.11g : 25.11dBm (0.3243 W) 802.11n HT20 : 24.55dBm (0.2851 W) 802.11n HT40 : 24.10dBm (0.2570 W)
99% Occupied Bandwidth	802.11b : 13.24MHz 802.11g : 18.33MHz 802.11n HT20 : 18.98MHz 802.11n HT40 : 34.97MHz
Antenna Type / Gain	IPEX Antenna type with gain 2.33dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.5 Modification of EUT

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

1.6 Testing Location

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

Test Firm	Sporton International Inc. (Kunshan)		
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 03CH07-KS TH01-KS	CN1257	314309

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH07-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
- 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 (X 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		

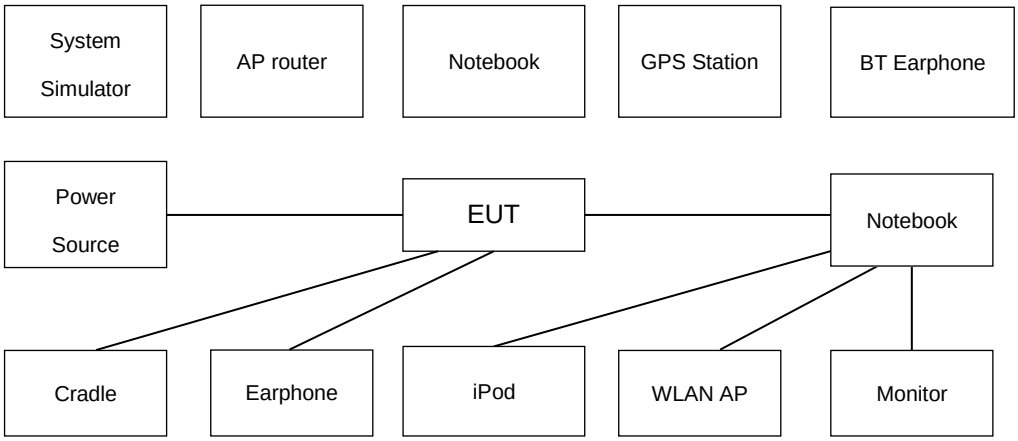
2.2 Test Mode

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

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

Test Cases	
AC Conducted Emission	Mode 1 :WLAN TX +NB Charging

2.3 Connection Diagram of Test System



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.	WLAN AP	D-link	DIR-655	KA21R655B1	N/A	Unshielded,1.8m
2.	Notebook	Lenovo	V130-15IKB005	N/A	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
3.	hard disk	N/A	N/A	N/A	N/A	N/A
4.	Antenna	N/A	N/A	N/A	N/A	N/A
5.	Test Jig	N/A	N/A	N/A	N/A	N/A

2.5 EUT Operation Test Setup

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

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 5.50dB.

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

= 5.50(dB)

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

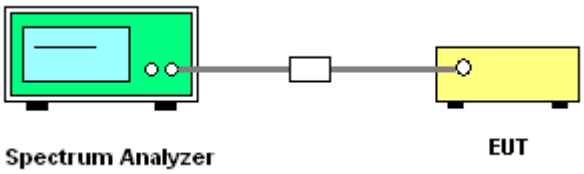
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

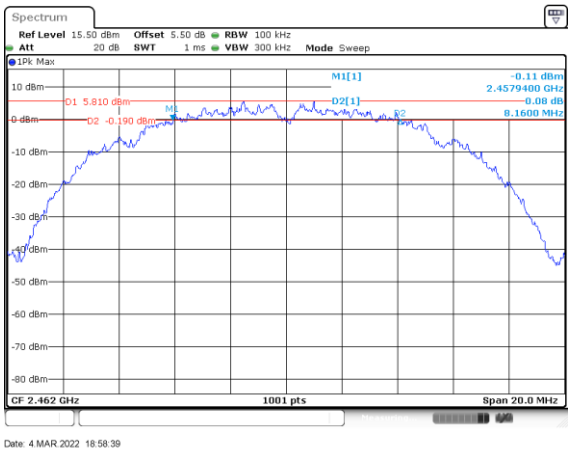
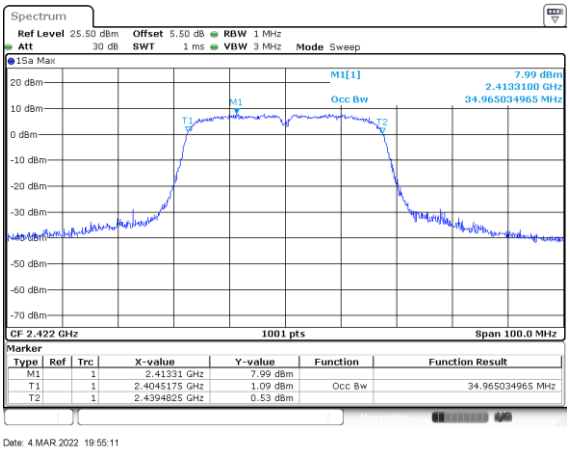
1. The testing follows ANSI C63.10-2013 clause 11.8
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement 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. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 1MHz and set the Video bandwidth (VBW) = 3MHz.
6. Measure and record the results in the test report.

3.1.4 Test Setup



3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Please refer to Appendix A.

Minimum 6dB Bandwidth	Maximum 99% Occupied 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.

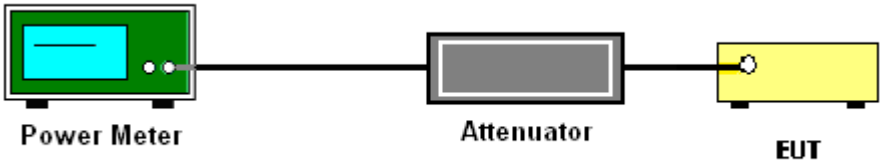
3.2.2 Measuring Instruments

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 11.9.2.3.1 Method AVGPM 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.

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.

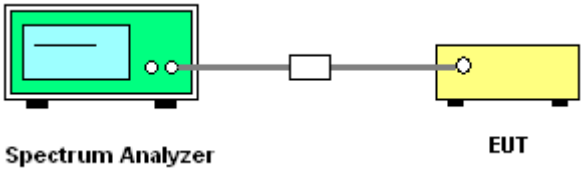
3.3.2 Measuring Instruments

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.

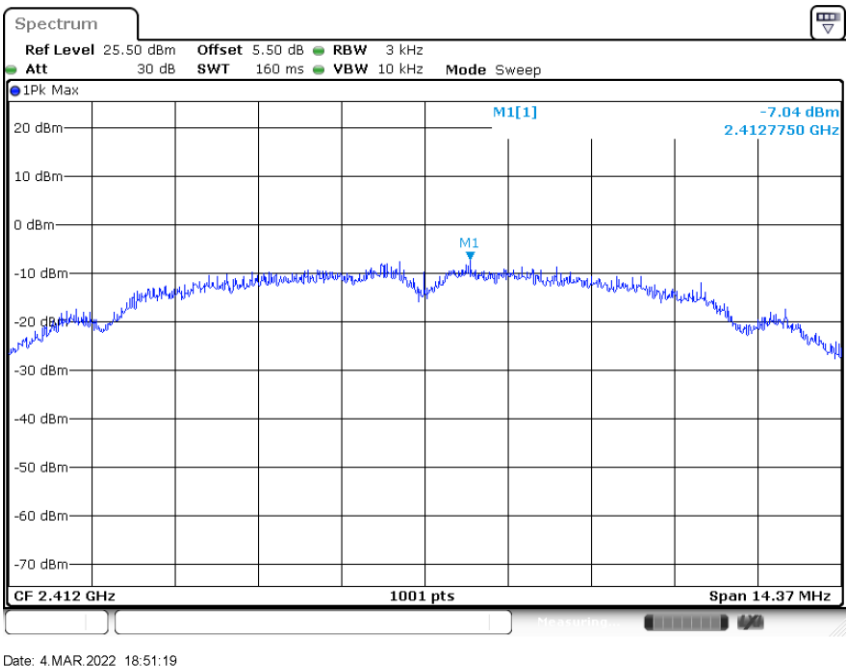
3.3.4 Test Setup



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.

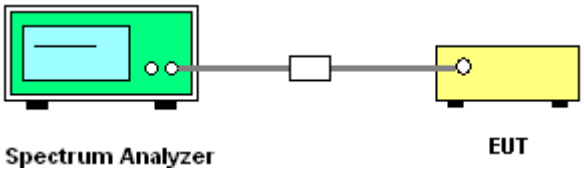
3.4.2 Measuring Instruments

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



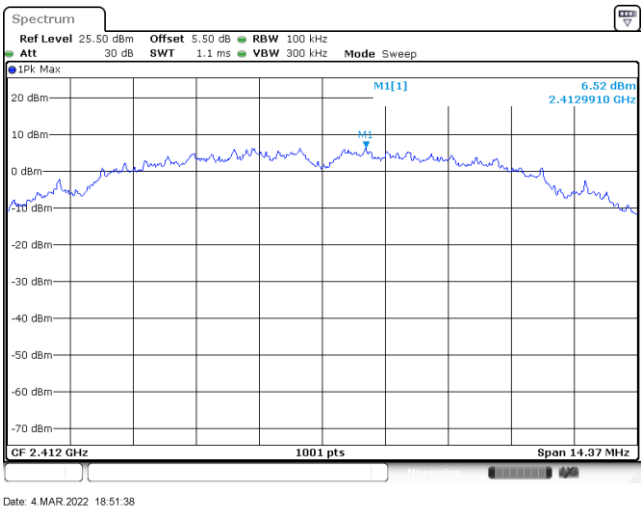
3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Engineer :	Jacob Zhang	**Temperature :**	21~25
		Relative Humidity :	51~54%

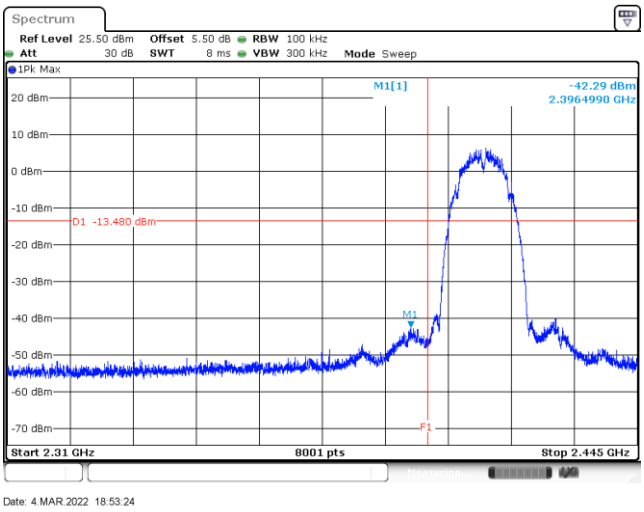
Number of TX = 1, Ant. 1 (Measured)

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

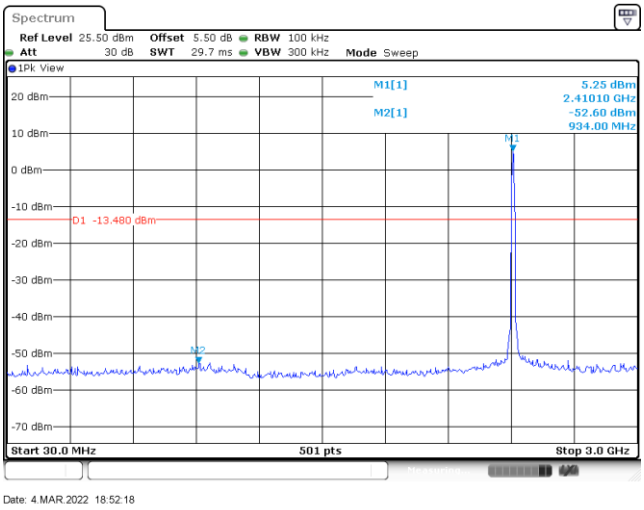
100kHz PSD reference Level



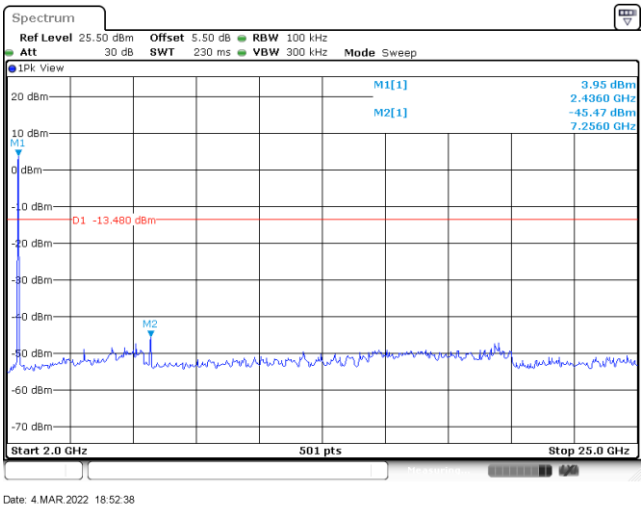
Channel Plot



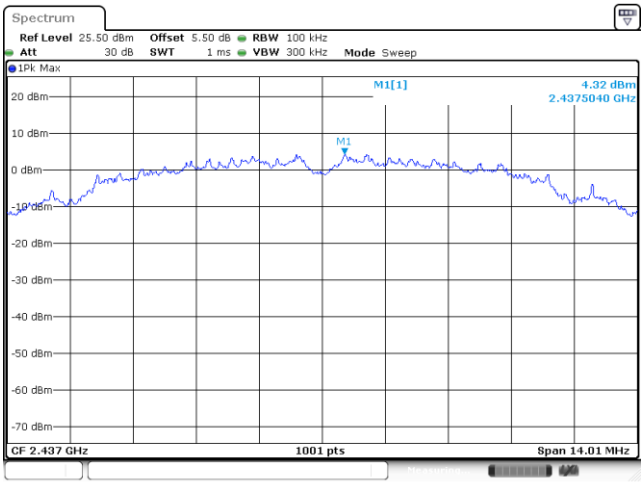
Spurious Emission 30MHz~3GHz

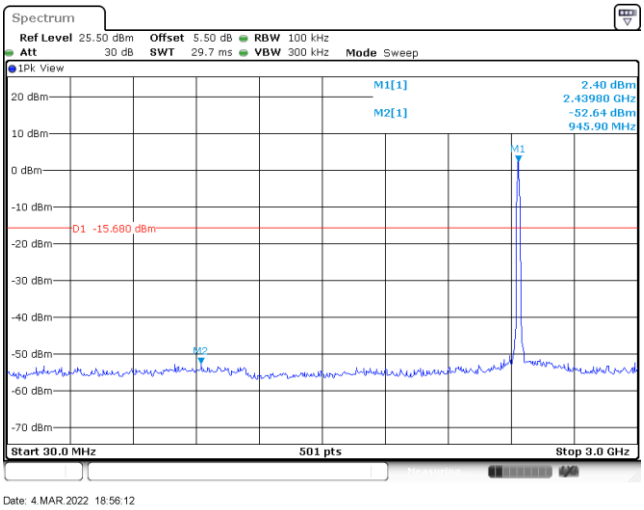
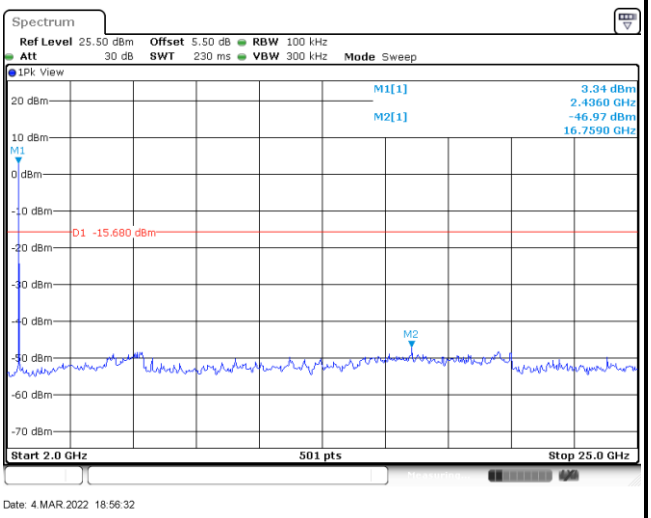


Spurious Emission 2GHz~25GHz

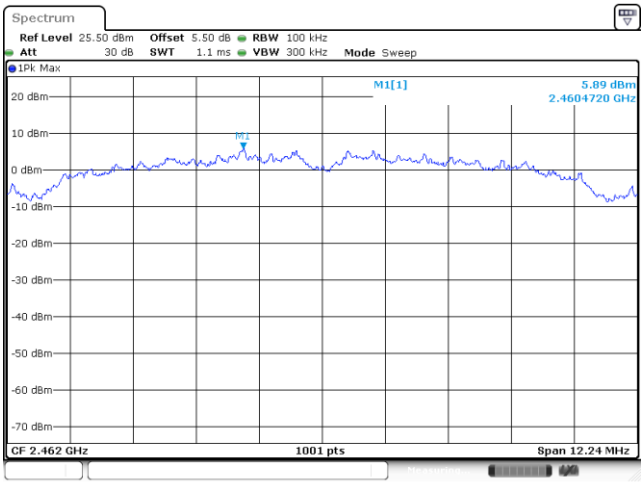
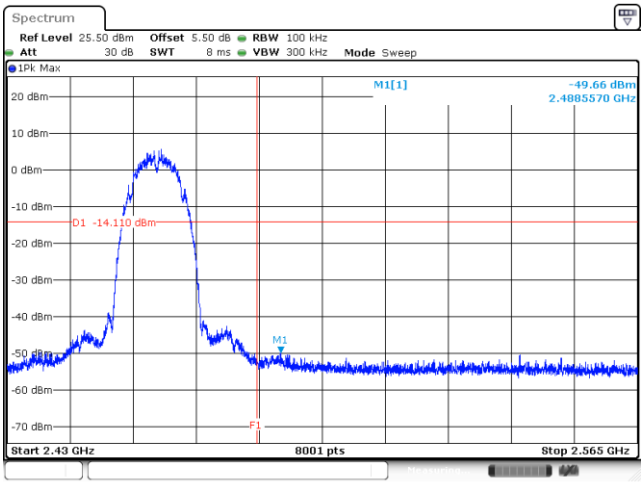
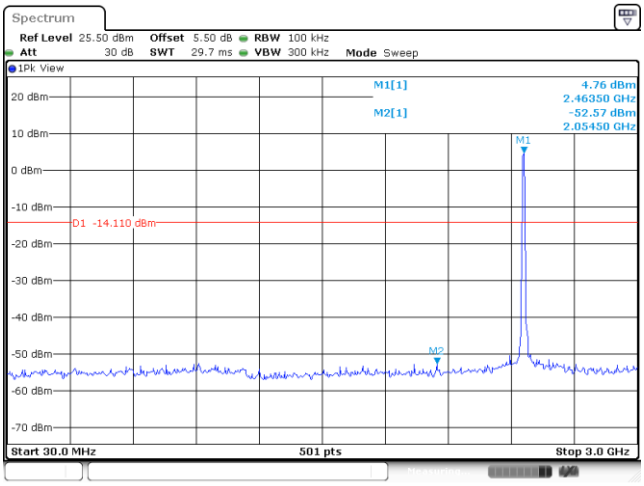
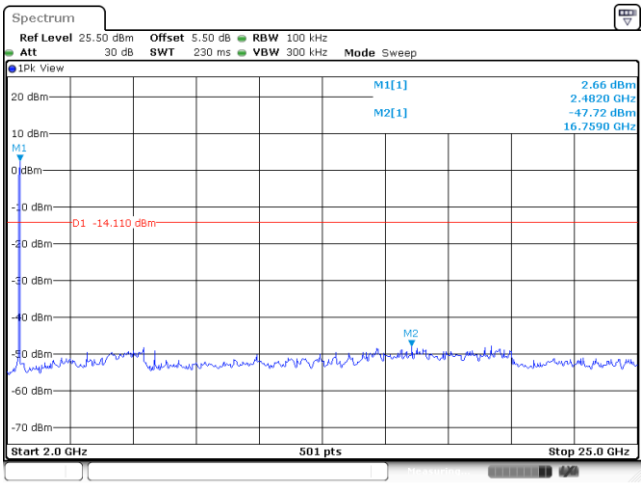


Test Mode :	802.11b	Test Channel :	06

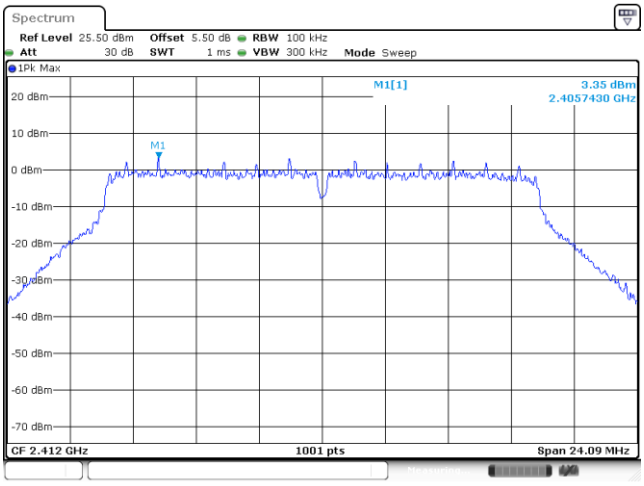
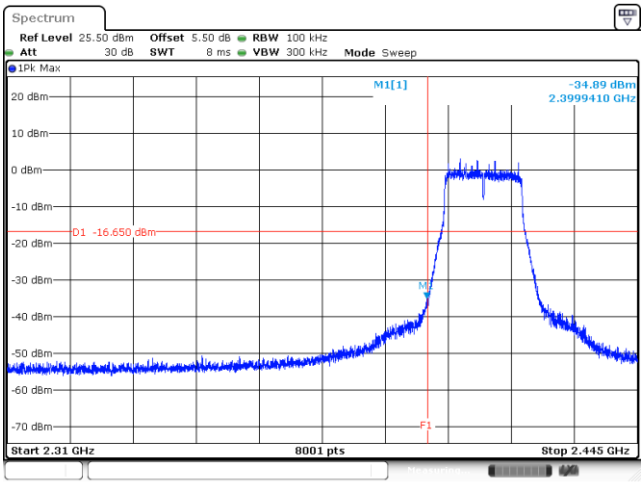
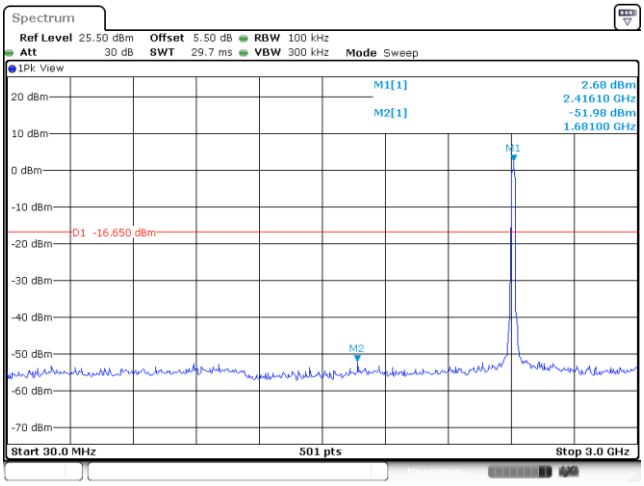
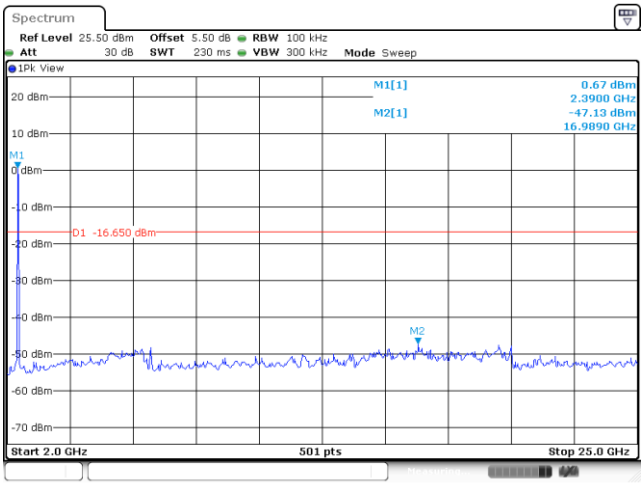
100kHz PSD reference Level	Channel Plot
	

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

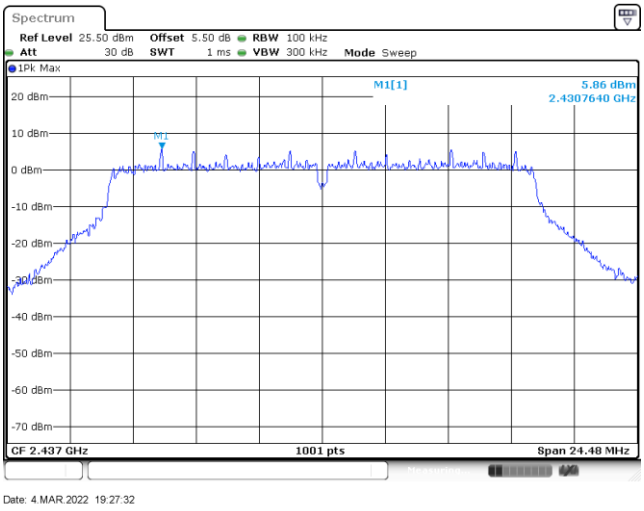
Test Mode :	802.11b	Test Channel :	11

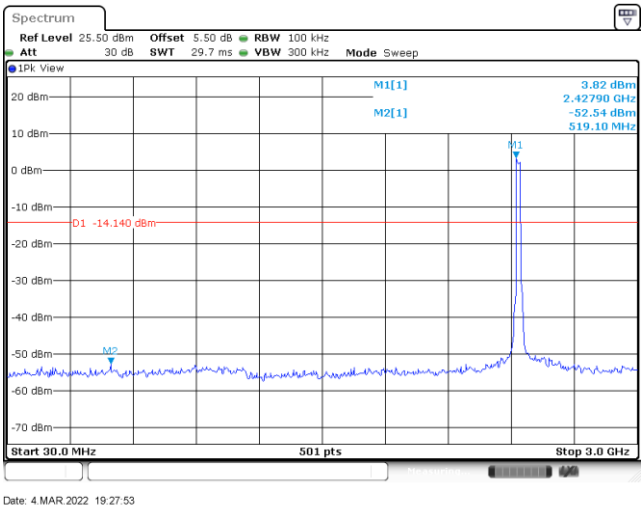
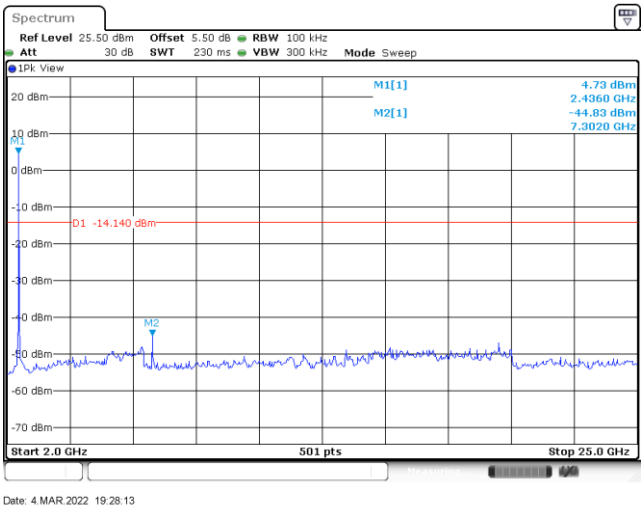
100kHz PSD reference Level	Channel Plot
	
Date: 4.MAR.2022 18:59:17	Date: 4.MAR.2022 19:15:02
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 4.MAR.2022 18:59:57	Date: 4.MAR.2022 19:00:17

Test Mode :	802.11g	Test Channel :	01

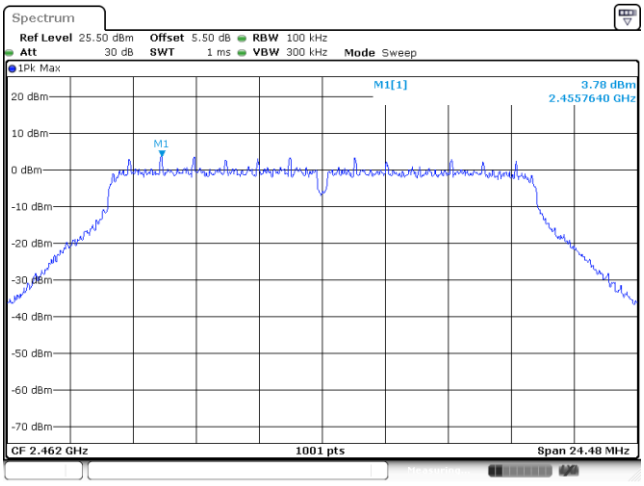
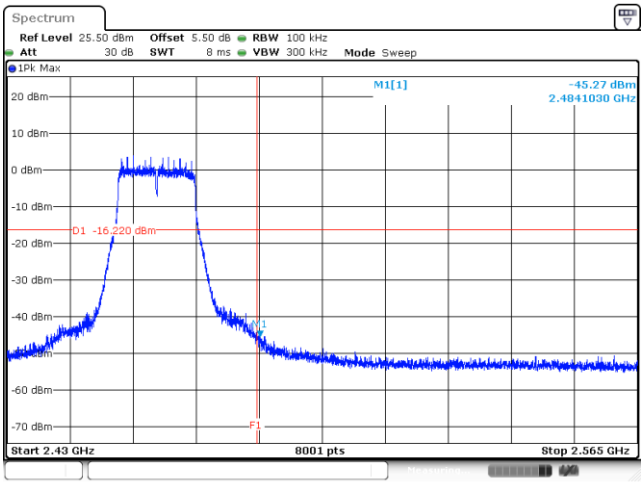
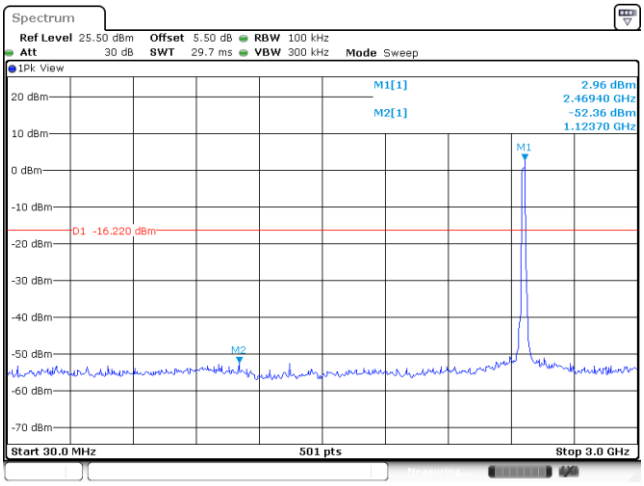
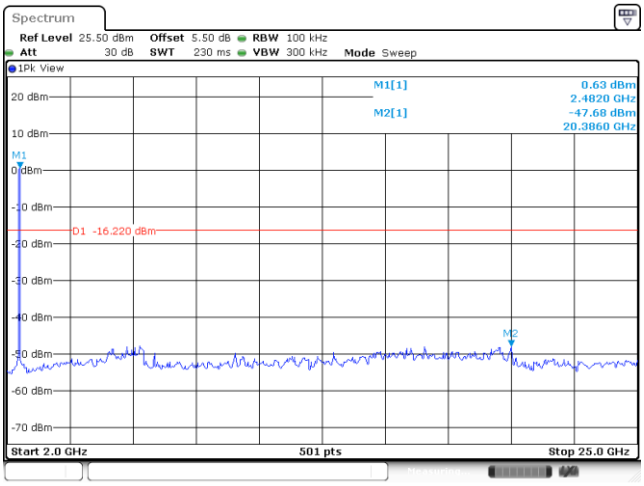
100kHz PSD reference Level	Channel Plot
	
Date: 4.MAR.2022 19:18:13	Date: 4.MAR.2022 19:18:32
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 4.MAR.2022 19:18:53	Date: 4.MAR.2022 19:19:13

Test Mode :	802.11g	Test Channel :	06

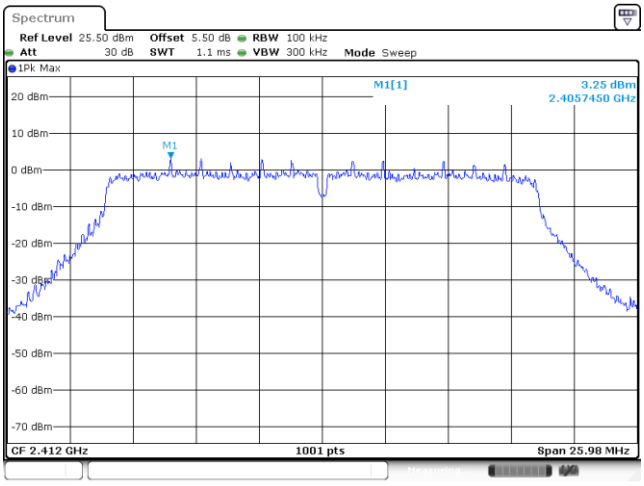
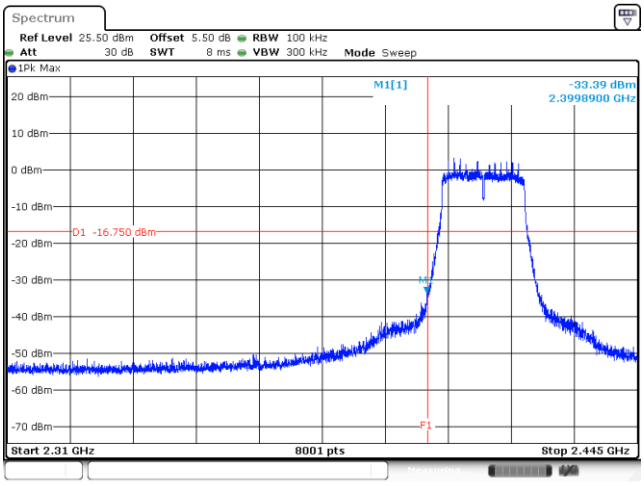
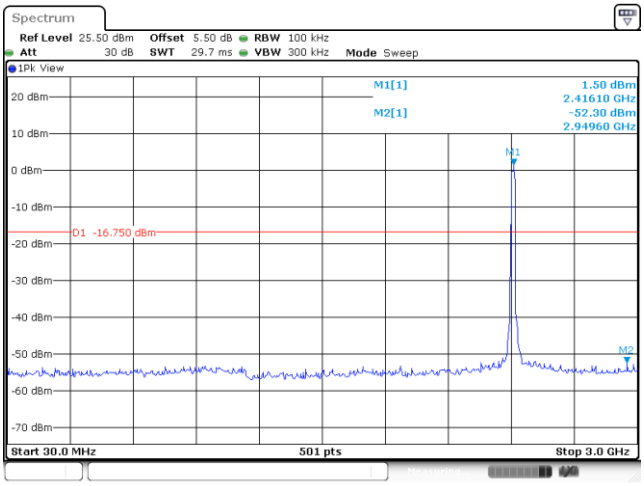
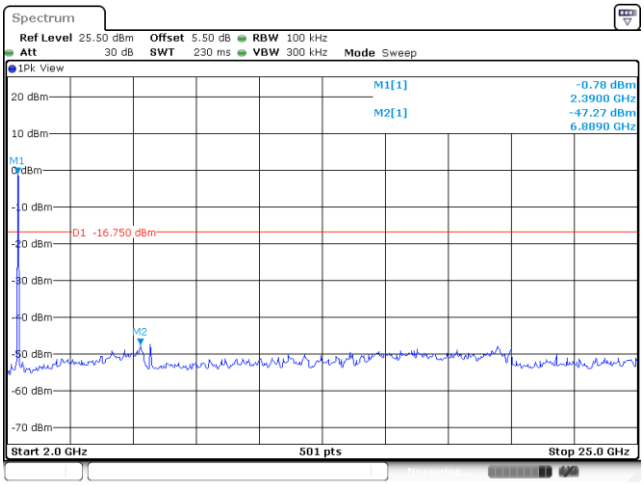
100kHz PSD reference Level	Channel Plot
	

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

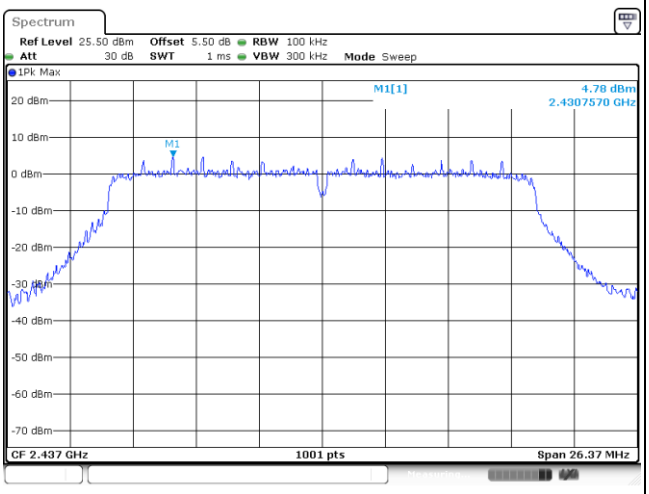
Test Mode :	802.11g	Test Channel :	11

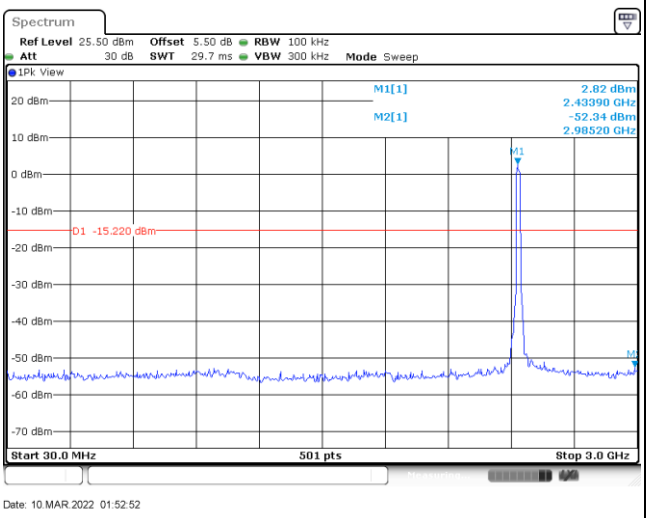
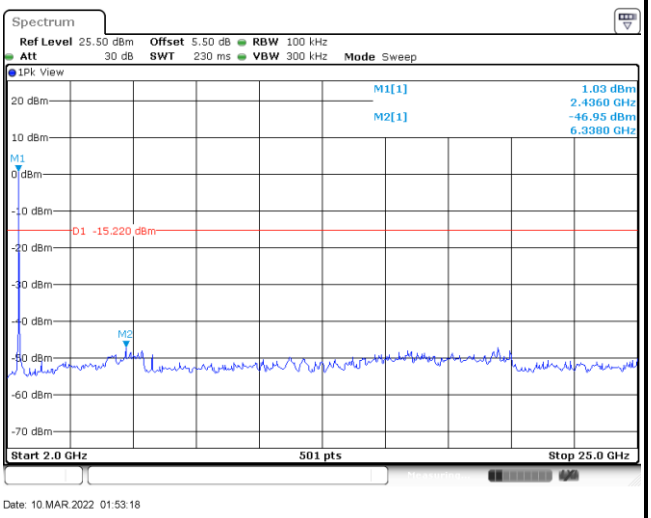
100kHz PSD reference Level	Channel Plot
	
Date: 4.MAR.2022 19:30:12	Date: 4.MAR.2022 19:30:31
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 4.MAR.2022 19:30:52	Date: 4.MAR.2022 19:31:12

Test Mode :	802.11n HT20	Test Channel :	01

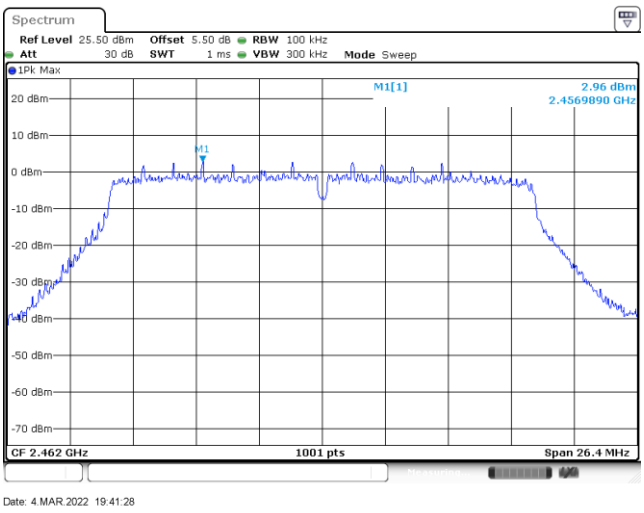
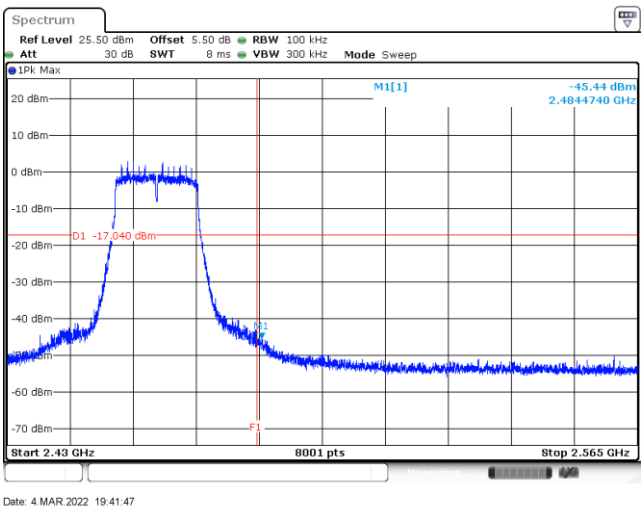
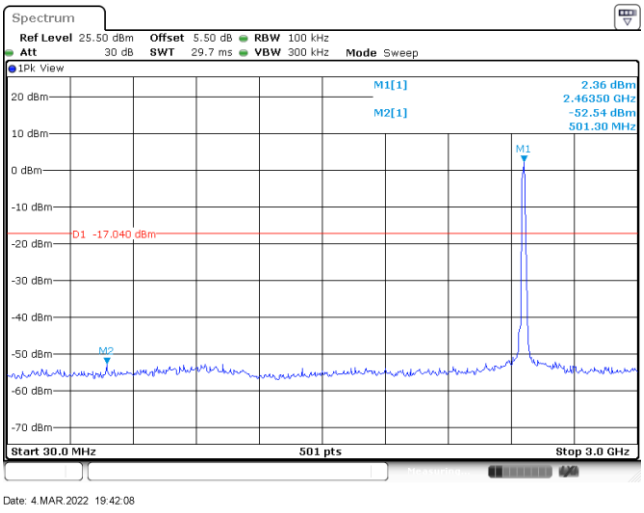
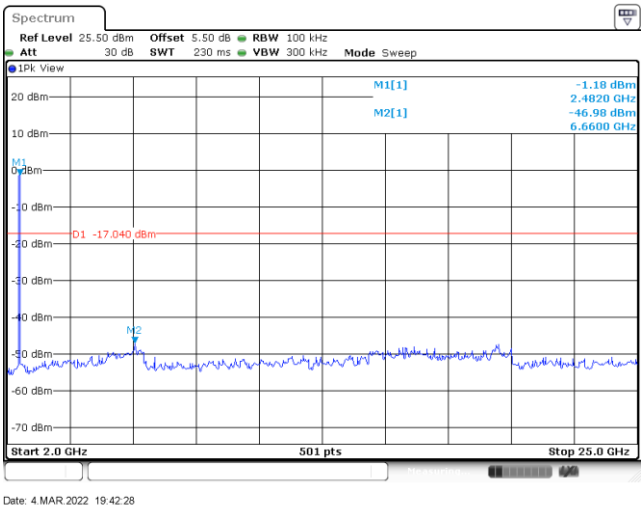
100kHz PSD reference Level	Channel Plot
	
Date: 4.MAR.2022 19:34:05	Date: 4.MAR.2022 19:34:24
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 4.MAR.2022 19:34:45	Date: 4.MAR.2022 19:35:05

Test Mode :	802.11n HT20	Test Channel :	06

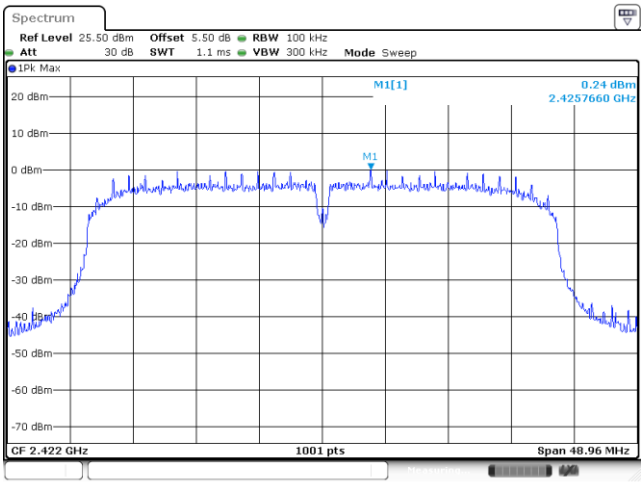
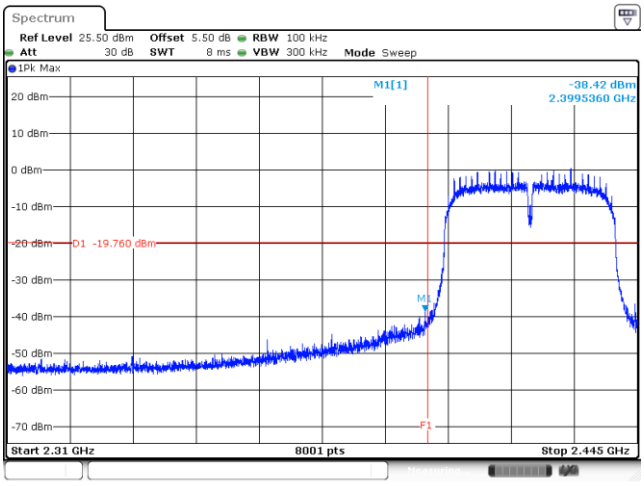
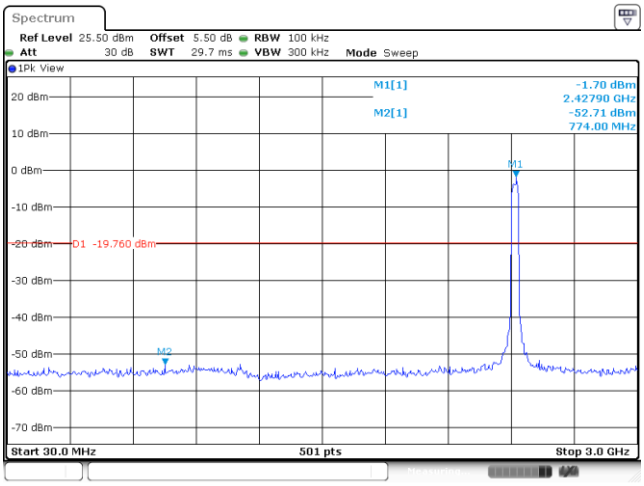
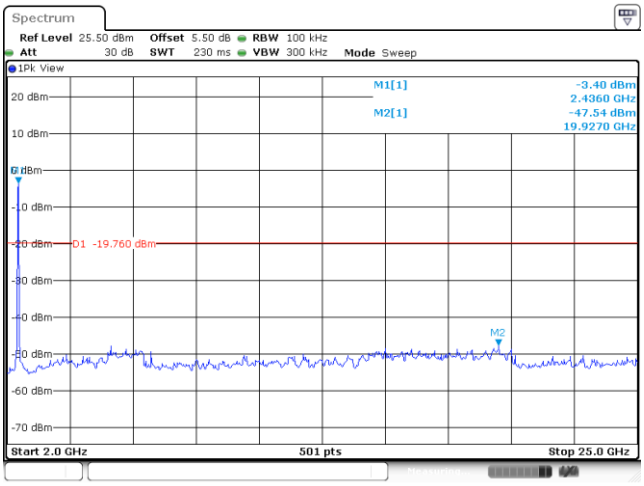
100kHz PSD reference Level	Channel Plot
	

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

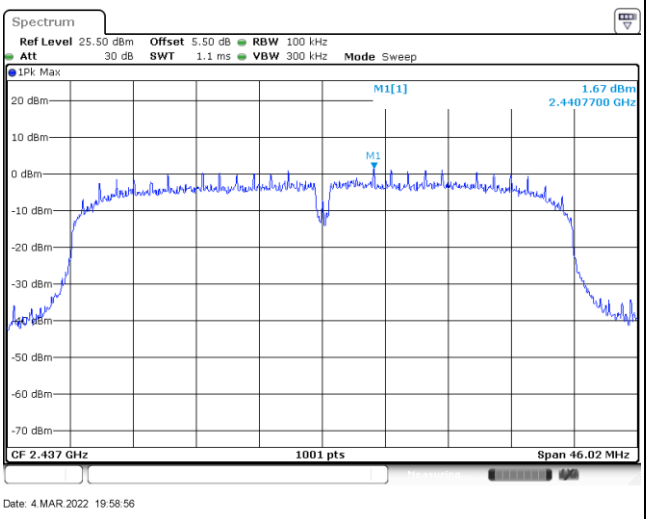
Test Mode :	802.11n HT20	Test Channel :	11

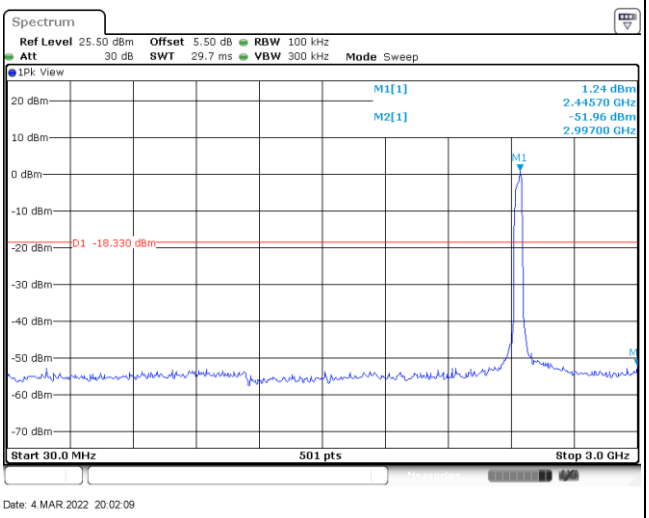
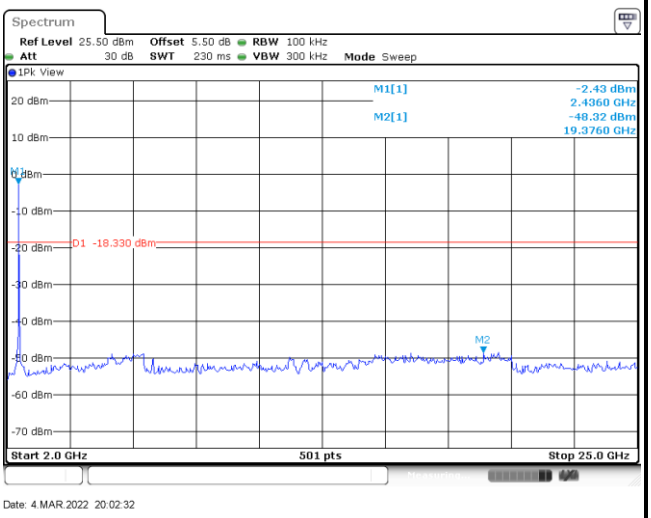
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

Test Mode :	802.11n HT40	Test Channel :	03

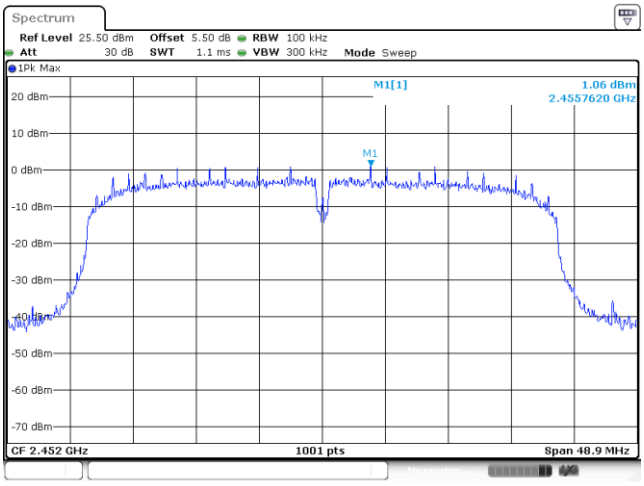
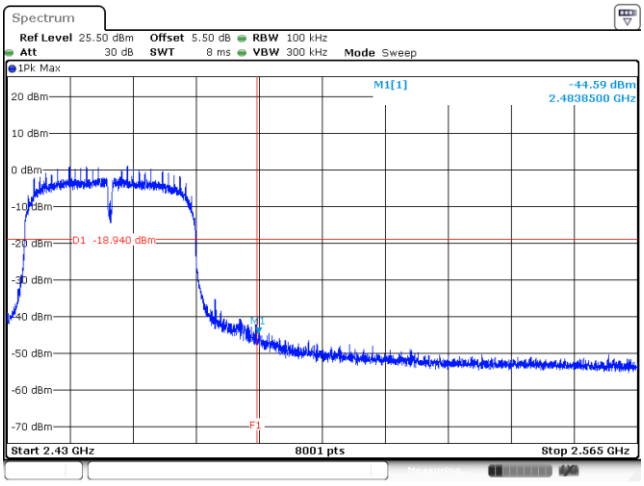
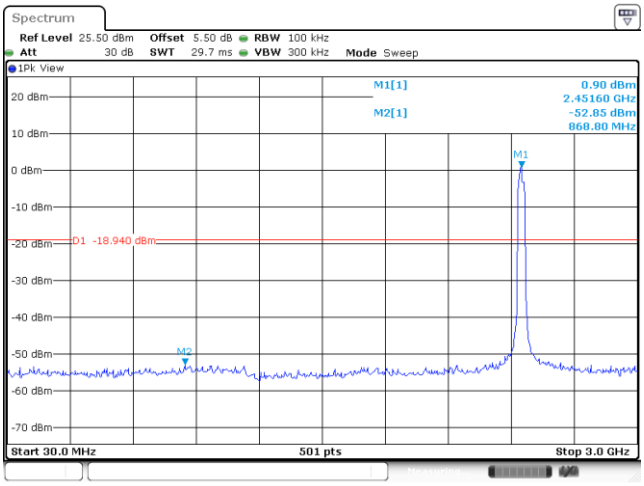
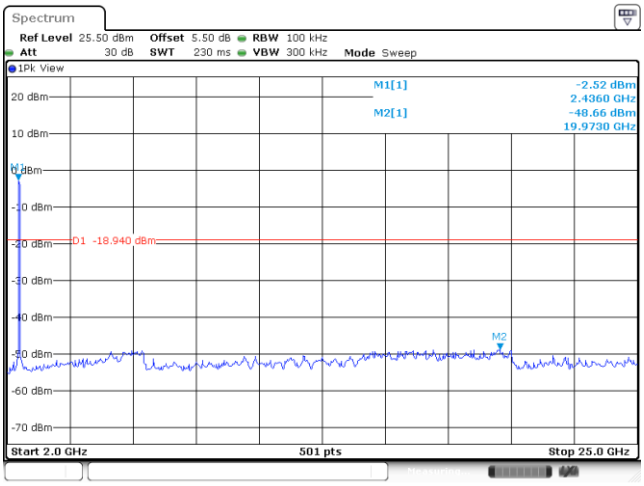
100kHz PSD reference Level	Channel Plot
	
Date: 4.MAR.2022 19:54:02	Date: 4.MAR.2022 19:54:21
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 4.MAR.2022 19:54:42	Date: 4.MAR.2022 19:55:03

Test Mode :	802.11n HT40	Test Channel :	06

100kHz PSD reference Level	Channel Plot
	

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

Test Mode :	802.11n HT40	Test Channel :	09

100kHz PSD reference Level	Channel Plot
	
Date: 4.MAR.2022 20:04:02	Date: 4.MAR.2022 20:04:21
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 4.MAR.2022 20:06:34	Date: 4.MAR.2022 20:06:57

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

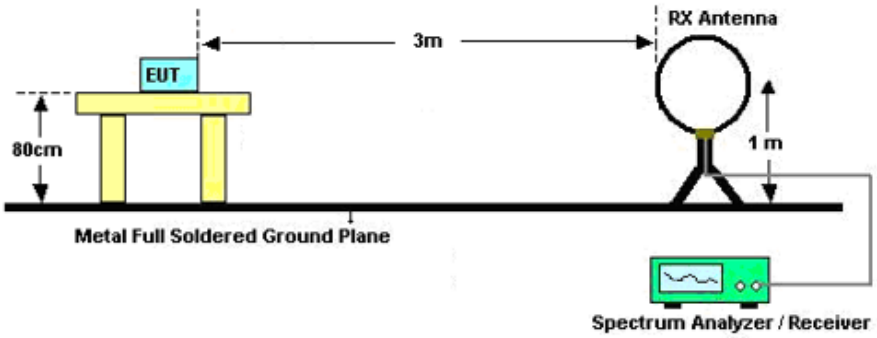
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

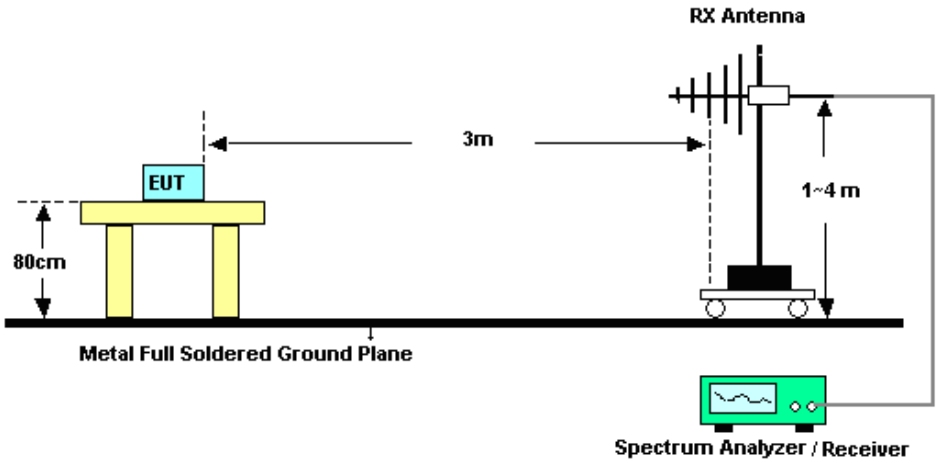
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better 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

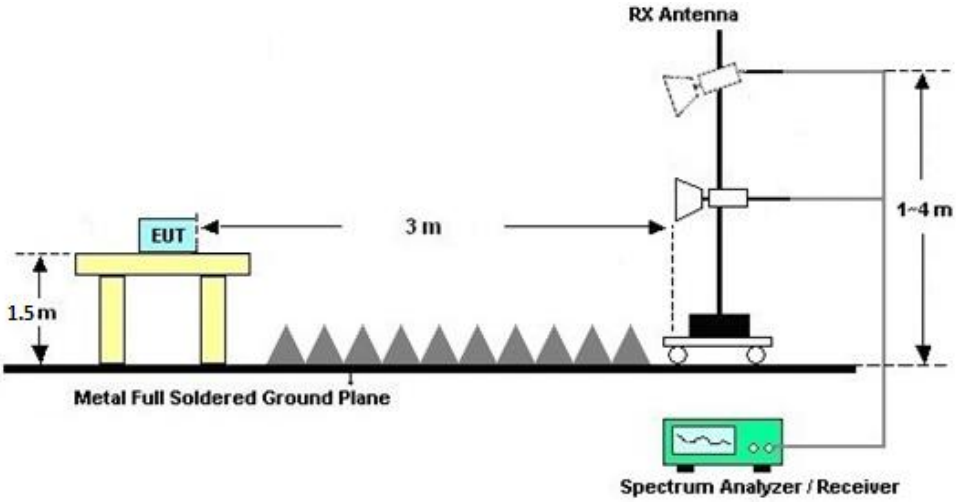
For radiated emissions below 30MHz



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&D.

3.5.7 Duty Cycle

Please refer to Appendix E.

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

Please refer to Appendix C&D.

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.

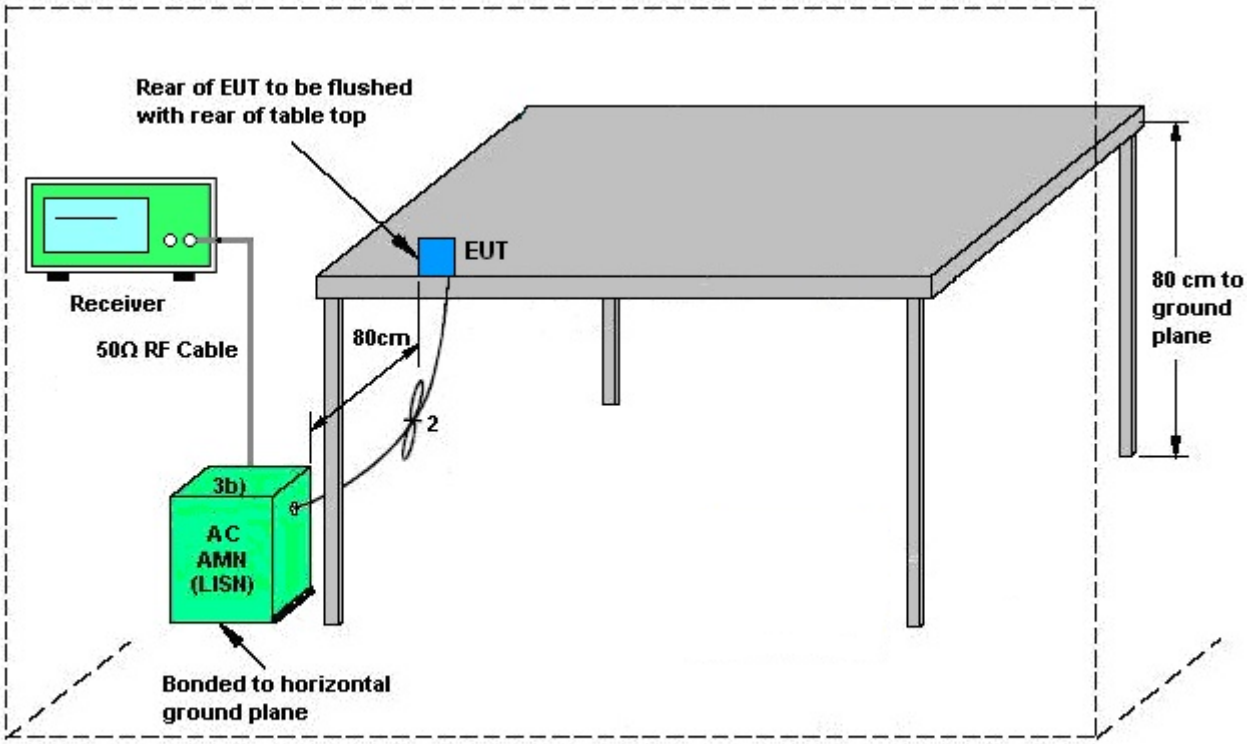
3.6.2 Measuring Instruments

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



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

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

Non-standard antenna connector is used.

3.7.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

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	Oct. 14, 2021	Mar. 04, 2022~ Mar. 10, 2022	Oct. 13, 2022	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 05, 2022	Mar. 04, 2022~ Mar. 10, 2022	Jan. 04, 2023	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 05, 2022	Mar. 04, 2022~ Mar. 10, 2022	Jan. 04, 2023	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Max 30dBm	Oct. 16, 2021	Mar. 10, 2022	Oct. 15, 2022	Radiation (03CH07-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55370528	10Hz-44G,MAX 30dB	Oct. 16, 2021	Mar. 10, 2022	Oct. 15, 2022	Radiation (03CH07-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 30, 2021	Mar. 10, 2022	Oct. 29, 2022	Radiation (03CH07-KS)
Bilog Antenna	TeseQ	CBL6111D	44483	30MHz-1GHz	Dec. 22, 2021	Mar. 10, 2022	Dec. 21, 2022	Radiation (03CH07-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Oct. 30, 2021	Mar. 10, 2022	Oct. 29, 2022	Radiation (03CH07-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2025788	1Ghz-18Ghz	Jul. 30, 2021	Mar. 10, 2022	Jul. 29, 2023	Radiation (03CH07-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2022	Mar. 10, 2022	Jan. 04, 2023	Radiation (03CH07-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Apr. 13, 2021	Mar. 10, 2022	Apr. 12, 2022	Radiation (03CH07-KS)
Amplifier	Keysight	83017A	MY53270316	500MHz~26.5GHz	Oct. 16, 2021	Mar. 10, 2022	Oct. 15, 2022	Radiation (03CH07-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 05, 2022	Mar. 10, 2022	Jan. 04, 2023	Radiation (03CH07-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	Mar. 10, 2022	NCR	Radiation (03CH07-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Mar. 10, 2022	NCR	Radiation (03CH07-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Mar. 10, 2022	NCR	Radiation (03CH07-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 21, 2021	Mar. 05, 2022	Apr. 20, 2022	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 14, 2021	Mar. 05, 2022	Oct. 13, 2022	Conduction (CO01-KS)
AC LISN	R&S	ENV216	100334	9kHz~30MHz	Oct. 14, 2021	Mar. 05, 2022	Oct. 13, 2022	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 14, 2021	Mar. 05, 2022	Oct. 13, 2022	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**

---------- THE END ----------

Appendix A. Conducted Test Results

A1. Conducted Test Results

Test Engineer:	Jacob Zhang	Temperature:	21~25	°C
Test Date:	2022/3/4~2022/3/10	Relative Humidity:	51~54	%

Report Number : FR1D1609B

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band Single Antenna										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant1	Ant2	Ant1	Ant2		
11b	1Mbps	1	1	2412	13.24	-	9.58	-	0.50	Pass
11b	1Mbps	1	6	2437	13.19	-	9.34	-	0.50	Pass
11b	1Mbps	1	11	2462	13.19	-	8.16	-	0.50	Pass
11g	6Mbps	1	1	2412	18.33	-	16.06	-	0.50	Pass
11g	6Mbps	1	6	2437	18.23	-	16.32	-	0.50	Pass
11g	6Mbps	1	11	2462	18.28	-	16.32	-	0.50	Pass
HT20	MCS0	1	1	2412	18.98	-	17.32	-	0.50	Pass
HT20	MCS0	1	6	2437	18.88	-	17.18	-	0.50	Pass
HT20	MCS0	1	11	2462	18.98	-	17.60	-	0.50	Pass
HT40	MCS0	1	3	2422	34.97	-	32.64	-	0.50	Pass
HT40	MCS0	1	6	2437	34.77	-	30.68	-	0.50	Pass
HT40	MCS0	1	9	2452	34.77	-	32.60	-	0.50	Pass

Report Number : FR1D1609B

TEST RESULTS DATA
Peak Output Power

2.4GHz Band Single Antenna																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant1	Ant2	SUM	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	
11b	1Mbps	1	1	2412	18.41	-		30.00	-	2.33	-	20.74	-	36.00	-	Pass
11b	1Mbps	1	6	2437	15.73	-		30.00	-	2.33	-	18.06	-	36.00	-	Pass
11b	1Mbps	1	11	2462	16.93	-		30.00	-	2.33	-	19.26	-	36.00	-	Pass
11g	6Mbps	1	1	2412	23.28	-		30.00	-	2.33	-	25.61	-	36.00	-	Pass
11g	6Mbps	1	6	2437	25.11	-		30.00	-	2.33	-	27.44	-	36.00	-	Pass
11g	6Mbps	1	11	2462	23.78	-		30.00	-	2.33	-	26.11	-	36.00	-	Pass
HT20	MCS0	1	1	2412	23.44	-		30.00	-	2.33	-	25.77	-	36.00	-	Pass
HT20	MCS0	1	6	2437	24.55	-		30.00	-	2.33	-	26.88	-	36.00	-	Pass
HT20	MCS0	1	11	2462	23.45	-		30.00	-	2.33	-	25.78	-	36.00	-	Pass
HT40	MCS0	1	3	2422	23.31	-		30.00	-	2.33	-	25.64	-	36.00	-	Pass
HT40	MCS0	1	6	2437	24.10	-		30.00	-	2.33	-	26.43	-	36.00	-	Pass
HT40	MCS0	1	9	2452	24.02	-		30.00	-	2.33	-	26.35	-	36.00	-	Pass

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

Report Number : FR1D1609B

TEST RESULTS DATA
Average Output Power

2.4GHz Band Single Antenna																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power with duty factor (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant1	Ant2	SUM	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	
11b	1Mbps	1	1	2412	15.41	-		30.00	-	2.33	-	17.74	-	36.00	-	Pass
11b	1Mbps	1	6	2437	12.82	-		30.00	-	2.33	-	15.15	-	36.00	-	Pass
11b	1Mbps	1	11	2462	13.93	-		30.00	-	2.33	-	16.26	-	36.00	-	Pass
11g	6Mbps	1	1	2412	14.53	-		30.00	-	2.33	-	16.86	-	36.00	-	Pass
11g	6Mbps	1	6	2437	17.24	-		30.00	-	2.33	-	19.57	-	36.00	-	Pass
11g	6Mbps	1	11	2462	14.85	-		30.00	-	2.33	-	17.18	-	36.00	-	Pass
HT20	MCS0	1	1	2412	14.58	-		30.00	-	2.33	-	16.91	-	36.00	-	Pass
HT20	MCS0	1	6	2437	16.28	-		30.00	-	2.33	-	18.61	-	36.00	-	Pass
HT20	MCS0	1	11	2462	14.45	-		30.00	-	2.33	-	16.78	-	36.00	-	Pass
HT40	MCS0	1	3	2422	13.98	-		30.00	-	2.33	-	16.31	-	36.00	-	Pass
HT40	MCS0	1	6	2437	14.69	-		30.00	-	2.33	-	17.02	-	36.00	-	Pass
HT40	MCS0	1	9	2452	14.57	-		30.00	-	2.33	-	16.90	-	36.00	-	Pass

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

Report Number : FR1D1609B

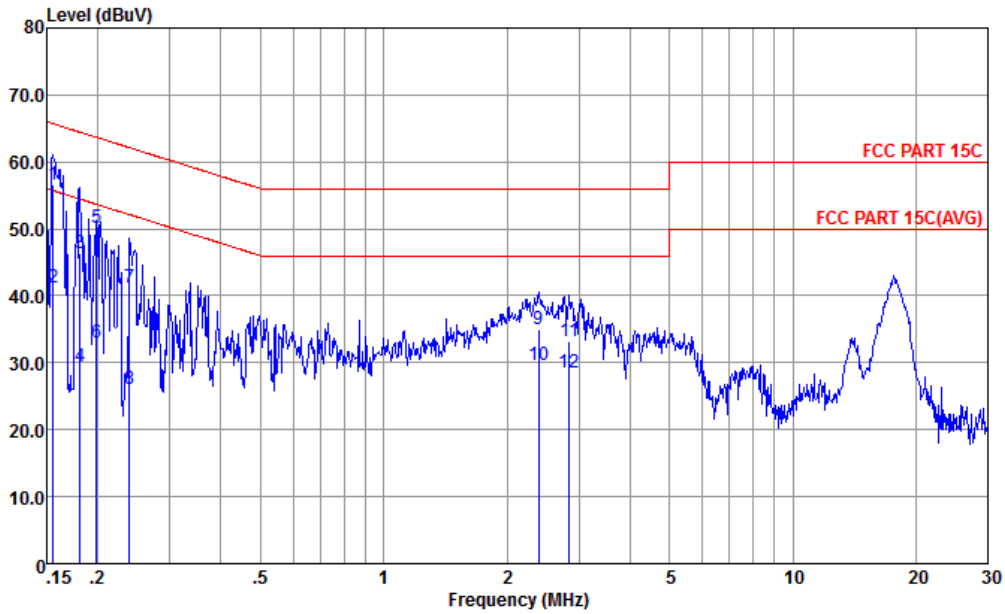
TEST RESULTS DATA
Peak Power Spectral Density

2.4GHz Band Single Antenna												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail
					Ant1	Ant2	Worse + 3.01	Ant1	Ant2	Ant1	Ant2	
11b	1Mbps	1	1	2412	-7.04	-		2.33	-	8.00	-	Pass
11b	1Mbps	1	6	2437	-9.04	-		2.33	-	8.00	-	Pass
11b	1Mbps	1	11	2462	-7.80	-		2.33	-	8.00	-	Pass
11g	6Mbps	1	1	2412	-10.45	-		2.33	-	8.00	-	Pass
11g	6Mbps	1	6	2437	-8.66	-		2.33	-	8.00	-	Pass
11g	6Mbps	1	11	2462	-10.53	-		2.33	-	8.00	-	Pass
HT20	MCS0	1	1	2412	-10.26	-		2.33	-	8.00	-	Pass
HT20	MCS0	1	6	2437	-8.70	-		2.33	-	8.00	-	Pass
HT20	MCS0	1	11	2462	-10.44	-		2.33	-	8.00	-	Pass
HT40	MCS0	1	3	2422	-13.20	-		2.33	-	8.00	-	Pass
HT40	MCS0	1	6	2437	-11.81	-		2.33	-	8.00	-	Pass
HT40	MCS0	1	9	2452	-12.16	-		2.33	-	8.00	-	Pass

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

Appendix B. AC Conducted Emission Test Results

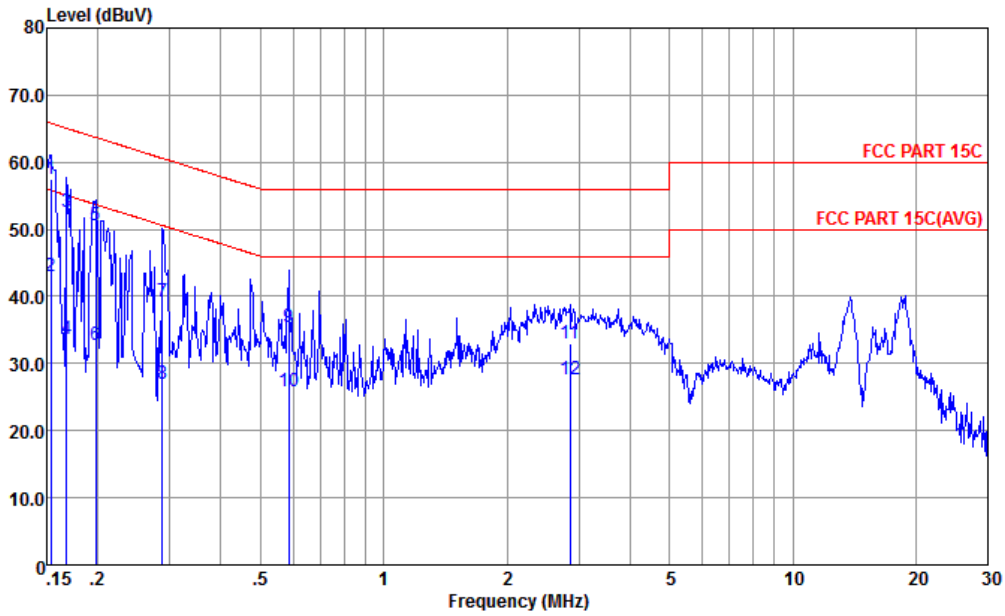
Test Engineer :	Amos Zhang	**Temperature :**	25.3~26.2℃
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-KS
Condition : FCC PART 15C LISN-060105-N NEUTRAL

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	*	0.156	56.67	-9.02	65.69	46.09	0.11	10.47	QP
2		0.156	41.17	-14.52	55.69	30.59	0.11	10.47	Average
3		0.181	46.41	-18.05	64.46	35.91	0.10	10.40	QP
4		0.181	29.31	-25.15	54.46	18.81	0.10	10.40	Average
5		0.199	50.07	-13.60	63.67	39.60	0.10	10.37	QP
6		0.199	33.07	-20.60	53.67	22.60	0.10	10.37	Average
7		0.239	41.24	-20.89	62.13	30.80	0.10	10.34	QP
8		0.239	26.04	-26.09	52.13	15.60	0.10	10.34	Average
9		2.396	34.98	-21.02	56.00	24.61	0.14	10.23	QP
10		2.396	29.68	-16.32	46.00	19.31	0.14	10.23	Average
11		2.839	33.19	-22.81	56.00	22.80	0.15	10.24	QP
12		2.839	28.59	-17.41	46.00	18.20	0.15	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 LISN-060105-L LINE

	Freq MHz	Level dBuV	Over Limit dB	Limit Line dBuV	Read Level dBuV	LISN Factor dB	Cable Loss dB	Remark
1 *	0.153	57.59	-8.23	65.82	47.10	0.02	10.47	QP
2	0.153	43.09	-12.73	55.82	32.60	0.02	10.47	Average
3	0.168	52.56	-12.52	65.08	42.10	0.03	10.43	QP
4	0.168	33.66	-21.42	55.08	23.20	0.03	10.43	Average
5	0.198	50.61	-13.10	63.71	40.20	0.04	10.37	QP
6	0.198	32.71	-21.00	53.71	22.30	0.04	10.37	Average
7	0.288	39.18	-21.41	60.59	28.80	0.07	10.31	QP
8	0.288	26.98	-23.61	50.59	16.60	0.07	10.31	Average
9	0.585	35.54	-20.46	56.00	25.20	0.10	10.24	QP
10	0.585	25.94	-20.06	46.00	15.60	0.10	10.24	Average
11	2.854	32.99	-23.01	56.00	22.60	0.15	10.24	QP
12	2.854	27.59	-18.41	46.00	17.20	0.15	10.24	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

Test Engineer :	Henzy LI	**Temperature :**	22~23°C
		Relative Humidity :	41~42%

Channel	Power setting
11b CH01	17
11b CH06	28
11b CH11	26
11g CH01	18
11g CH06	5
11g CH11	18
11n20 CH01	14
11n20 CH06	5
11n20 CH11	17
11n40 CH03	13
11n40 CH06	8
11n40 CH09	12

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant.	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		2386.18	59.26	-14.74	74	56.14	32.88	7.1	36.86	269	110	P	H
		2386.05	49.48	-4.52	54	46.36	32.88	7.1	36.86	269	110	A	H
	*	2412	115.31	-	-	112.13	32.9	7.13	36.85	269	110	P	H
	*	2412	106.61	-	-	103.43	32.9	7.13	36.85	269	110	A	H
		2385.27	53.83	-20.17	74	50.74	32.86	7.1	36.87	391	161	P	V
		2386.18	44.27	-9.73	54	41.15	32.88	7.1	36.86	391	161	A	V
	*	2412	106.11	-	-	102.93	32.9	7.13	36.85	391	161	P	V
	*	2410	98.63	-	-	95.45	32.9	7.13	36.85	391	161	A	V
802.11b CH 11 2462MHz		2484.46	57.61	-16.39	74	54.2	32.98	7.25	36.82	292	115	P	H
		2487.64	47.61	-6.39	54	44.17	33	7.25	36.81	292	115	A	H
	*	2462	112.67	-	-	109.32	32.96	7.22	36.83	292	115	P	H
	*	2464	105	-	-	101.65	32.96	7.22	36.83	292	115	A	H
		2488.3	51.94	-22.06	74	48.5	33	7.25	36.81	295	227	P	V
		2487.64	41.02	-12.98	54	37.58	33	7.25	36.81	295	227	A	V
	*	2462	104.8	-	-	101.45	32.96	7.22	36.83	295	227	P	V
	*	2464	96.82	-	-	93.47	32.96	7.22	36.83	295	227	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	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		4830	55.84	-18.16	74	76.77	34.2	10.25	65.38	106	119	P	H
		4830	52.25	-1.75	54	73.18	34.2	10.25	65.38	106	119	A	H
		4830	52.29	-21.71	74	73.22	34.2	10.25	65.38	338	111	P	V
		4830	48.66	-5.34	54	69.59	34.2	10.25	65.38	338	111	A	V
802.11b CH 06 2437MHz		4875	55.7	-18.3	74	76.6	34.23	10.29	65.42	100	121	P	H
		4875	52.37	-1.63	54	73.27	34.23	10.29	65.42	100	121	A	H
		7305	43.09	-30.91	74	60.42	35.86	12.72	65.91	300	0	P	H
		4875	51.1	-22.9	74	72	34.23	10.29	65.42	328	253	P	V
		4875	48.69	-5.31	54	69.59	34.23	10.29	65.42	328	253	A	V
		7305	43.23	-30.77	74	60.56	35.86	12.72	65.91	100	0	P	V
802.11b CH 11 2462MHz		4920	55.85	-18.15	74	76.7	34.26	10.34	65.45	100	219	P	H
		4920	52.3	-1.7	54	73.15	34.26	10.34	65.45	100	219	A	H
		7380	42.8	-31.2	74	60.3	35.88	12.73	66.11	300	0	P	H
		4920	51.2	-22.8	74	72.05	34.26	10.34	65.45	285	169	P	V
		4920	49.4	-4.6	54	70.25	34.26	10.34	65.45	285	169	A	V
		7380	42.46	-31.54	74	59.96	35.88	12.73	66.11	100	0	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 802.11g (Band Edge @ 3m)

WIFI Ant. 1	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		2389.3	67.56	-6.44	74	64.44	32.88	7.1	36.86	132	83	P	H
		2389.95	52.89	-1.11	54	49.77	32.88	7.1	36.86	132	83	A	H
	*	2406	111.53	-	-	108.35	32.9	7.13	36.85	132	83	P	H
	*	2406	103.46	-	-	100.28	32.9	7.13	36.85	132	83	A	H
		2389.95	61.98	-12.02	74	58.86	32.88	7.1	36.86	344	340	P	V
		2389.95	45.39	-8.61	54	42.27	32.88	7.1	36.86	344	340	A	V
	*	2408	105.56	-	-	102.38	32.9	7.13	36.85	344	340	P	V
	*	2406	97.63	-	-	94.45	32.9	7.13	36.85	344	340	A	V
802.11g CH 11 2462MHz		2483.5	70.6	-3.4	74	67.19	32.98	7.25	36.82	128	79	P	H
		2483.5	52.72	-1.28	54	49.31	32.98	7.25	36.82	128	79	A	H
	*	2462	111.95	-	-	108.6	32.96	7.22	36.83	128	79	P	H
	*	2460	103.72	-	-	100.37	32.96	7.22	36.83	128	79	A	H
		2483.5	61.73	-12.27	74	58.32	32.98	7.25	36.82	381	309	P	V
		2483.5	45.08	-8.92	54	41.67	32.98	7.25	36.82	381	309	A	V
	*	2468	102.66	-	-	99.31	32.96	7.22	36.83	381	309	P	V
	*	2468	94.27	-	-	90.92	32.96	7.22	36.83	381	309	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	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		4830	54.92	-19.08	74	75.85	34.2	10.25	65.38	107	77	P	H
		4830	44.88	-9.12	54	65.81	34.2	10.25	65.38	107	77	A	H
		4830	48.68	-25.32	74	69.61	34.2	10.25	65.38	100	0	P	V
802.11g CH 06 2437MHz		4875	61.86	-12.14	74	82.76	34.23	10.29	65.42	115	43	P	H
		4875	50.6	-3.4	54	71.5	34.23	10.29	65.42	115	43	A	H
		7305	50.03	-23.97	74	70.36	35.86	12.72	65.91	300	0	P	H
		9750	49.65	-39.75	89.40	64.9	36.81	14.99	67.05	300	0	P	H
		4875	58.77	-15.23	74	79.67	34.23	10.29	65.42	385	21	P	V
		4875	48.99	-5.01	54	69.89	34.23	10.29	65.42	385	21	A	V
		7320	50.57	-23.43	74	67.94	35.87	12.72	65.96	100	0	P	V
		9735	50.53	-33.6	84.13	65.79	36.79	14.98	67.03	100	0	P	V
802.11g CH 11 2462MHz		4920	57.29	-16.71	74	78.14	34.26	10.34	65.45	138	44	P	H
		4920	47.1	-6.9	54	67.95	34.26	10.34	65.45	138	44	A	H
		7380	47.35	-26.65	74	64.85	35.88	12.73	66.11	300	0	P	H
		4920	57.93	-16.07	74	78.78	34.26	10.34	65.45	400	22	P	V
		4920	48.2	-5.8	54	69.05	34.26	10.34	65.45	400	22	A	V
		7380	45.23	-28.77	74	62.73	35.88	12.73	66.11	100	0	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 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 1	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)
802.11n HT20 CH 01 2412MHz		2389.56	67.77	-6.23	74	64.65	32.88	7.1	36.86	132	100	P	H
		2389.95	52.77	-1.23	54	49.65	32.88	7.1	36.86	132	100	A	H
	*	2408	111.57	-	-	108.39	32.9	7.13	36.85	132	100	P	H
	*	2408	103.69	-	-	100.51	32.9	7.13	36.85	132	100	A	H
		2385.01	57.9	-16.1	74	54.81	32.86	7.1	36.87	302	67	P	V
		2389.95	42.14	-11.86	54	39.02	32.88	7.1	36.86	302	67	A	V
	*	2418	102.38	-	-	99.17	32.9	7.16	36.85	302	67	P	V
	*	2418	94.67	-	-	91.46	32.9	7.16	36.85	302	67	A	V
802.11n HT20 CH 11 2462MHz		2483.56	67.95	-6.05	74	64.54	32.98	7.25	36.82	382	295	P	H
		2483.5	52.33	-1.67	54	48.92	32.98	7.25	36.82	382	295	A	H
	*	2460	111.29	-	-	107.94	32.96	7.22	36.83	382	295	P	H
	*	2460	103.16	-	-	99.81	32.96	7.22	36.83	382	295	A	H
		2483.86	54.81	-19.19	74	51.4	32.98	7.25	36.82	381	5	P	V
		2483.5	41.53	-12.47	54	38.12	32.98	7.25	36.82	381	5	A	V
	*	2456	104.77	-	-	101.42	32.96	7.22	36.83	381	5	P	V
	*	2456	96.98	-	-	93.63	32.96	7.22	36.83	381	5	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 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1	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)
802.11n HT20 CH 01 2412MHz		4830	55.75	-18.25	74	76.68	34.2	10.25	65.38	100	76	P	H
		4830	44.24	-9.76	54	65.17	34.2	10.25	65.38	100	76	A	H
		4830	47.37	-26.63	74	68.3	34.2	10.25	65.38	100	0	P	V
		4830	47.37	-26.63	74	68.3	34.2	10.25	65.38	100	0	P	V
802.11n HT20 CH 06 2437MHz		4875	60.83	-13.17	74	81.73	34.23	10.29	65.42	148	51	P	H
		4875	50.52	-3.48	54	71.42	34.23	10.29	65.42	148	51	A	H
		7305	49.46	-24.54	74	66.79	35.86	12.72	65.91	300	0	P	H
		9750	47.85	-41.9	89.75	63.1	36.81	14.99	67.05	300	0	P	H
		4875	60.17	-13.83	74	81.07	34.23	10.29	65.42	341	27	P	V
		4875	49.79	-4.21	54	70.69	34.23	10.29	65.42	341	27	A	V
		7305	47.91	-26.09	74	65.24	35.86	12.72	65.91	100	0	P	V
		9750	49	-33.62	82.62	64.25	36.81	14.99	67.05	100	0	P	V
802.11n HT20 CH 11 2462MHz		4920	59.65	-14.35	74	80.5	34.26	10.34	65.45	100	125	P	H
		4920	49.19	-4.81	54	70.04	34.26	10.34	65.45	100	125	A	H
		7380	43.38	-30.62	74	60.88	35.88	12.73	66.11	300	0	P	H
		4920	49.62	-24.38	74	70.47	34.26	10.34	65.45	100	0	P	V
		7380	43.18	-30.82	74	60.68	35.88	12.73	66.11	100	0	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 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 1	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)
802.11n HT40 CH 03 2422MHz		2388.91	67.62	-6.38	74	64.5	32.88	7.1	36.86	127	84	P	H
		2389.95	52.66	-1.34	54	49.54	32.88	7.1	36.86	127	84	A	H
		2484.04	55.14	-18.86	74	51.73	32.98	7.25	36.82	127	84	P	H
		2483.56	44.1	-9.9	54	40.69	32.98	7.25	36.82	127	84	A	H
	*	2430	108.92	-	-	105.69	32.92	7.16	36.85	127	84	P	H
	*	2424	100.54	-	-	97.31	32.92	7.16	36.85	127	84	A	H
		2388.91	56.89	-17.11	74	53.77	32.88	7.1	36.86	387	4	P	V
		2389.82	43.67	-10.33	54	40.55	32.88	7.1	36.86	387	4	A	V
		2484.82	50.81	-23.19	74	47.4	32.98	7.25	36.82	387	4	P	V
		2491.42	39.51	-14.49	54	36.07	33	7.25	36.81	387	4	A	V
	*	2428	102.47	-	-	99.24	32.92	7.16	36.85	387	4	P	V
	*	2432	94.68	-	-	91.45	32.92	7.16	36.85	387	4	A	V
802.11n HT40 CH 06 2437MHz		2389.82	67.6	-6.4	74	64.48	32.88	7.1	36.86	129	98	P	H
		2389.95	52.46	-1.54	54	49.34	32.88	7.1	36.86	129	98	A	H
		2483.86	66.01	-7.99	74	62.6	32.98	7.25	36.82	129	98	P	H
		2483.5	50.97	-3.03	54	47.56	32.98	7.25	36.82	129	98	A	H
	*	2434	110.17	-	-	106.94	32.92	7.16	36.85	129	98	P	H
	*	2436	101.96	-	-	98.7	32.92	7.19	36.85	129	98	A	H
		2385.4	58.9	-15.1	74	55.81	32.86	7.1	36.87	378	5	P	V
		2388.78	43.83	-10.17	54	40.71	32.88	7.1	36.86	378	5	A	V
		2484.76	56.59	-17.41	74	53.18	32.98	7.25	36.82	378	5	P	V
		2483.5	42.22	-11.78	54	38.81	32.98	7.25	36.82	378	5	A	V
	*	2446	105.88	-	-	102.59	32.94	7.19	36.84	378	5	P	V
	*	2438	97.44	-	-	94.15	32.94	7.19	36.84	378	5	A	V

802.11n HT40 CH 09 2452MHz		2364.99	53.52	-20.48	74	50.5	32.83	7.07	36.88	332	96	P	H
		2389.95	42.28	-11.72	54	39.16	32.88	7.1	36.86	332	96	A	H
		2483.68	70	-4	74	66.59	32.98	7.25	36.82	332	96	P	H
		2483.5	52.22	-1.78	54	48.81	32.98	7.25	36.82	332	96	A	H
	*	2456	108.98	-	-	105.63	32.96	7.22	36.83	332	96	P	H
	*	2456	100.48	-	-	97.13	32.96	7.22	36.83	332	96	A	H
		2387.61	50.09	-23.91	74	46.97	32.88	7.1	36.86	380	4	P	V
		2389.82	38.99	-15.01	54	35.87	32.88	7.1	36.86	380	4	A	V
		2483.62	61.03	-12.97	74	57.62	32.98	7.25	36.82	380	4	P	V
		2483.5	43.56	-10.44	54	40.15	32.98	7.25	36.82	380	4	A	V
	*	2448	103.45	-	-	100.16	32.94	7.19	36.84	380	4	P	V
	*	2450	95.19	-	-	91.9	32.94	7.19	36.84	380	4	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 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 1	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)
802.11n HT40 CH 03 2422MHz		4845	48.84	-25.16	74	69.77	34.21	10.25	65.39	300	0	P	H
		7260	43	-31	74	60.19	35.85	12.72	65.76	300	0	P	H
		4845	48.35	-25.65	74	69.28	34.21	10.25	65.39	100	0	P	V
		7260	42.58	-31.42	74	59.77	35.85	12.72	65.76	100	0	P	V
802.11n HT40 CH 06 2437MHz		4875	56.14	-17.86	74	77.04	34.23	10.29	65.42	100	285	P	H
		4875	45.67	-8.33	54	66.57	34.23	10.29	65.42	100	285	A	H
		7305	44.13	-29.87	74	61.46	35.86	12.72	65.91	300	0	P	H
		4890	55.86	-18.14	74	76.73	34.24	10.32	65.43	386	29	P	V
		4890	45.54	-8.46	54	66.41	34.24	10.32	65.43	386	29	A	V
		7305	44.5	-29.5	74	61.83	35.86	12.72	65.91	100	0	P	V
802.11n HT40 CH 09 2452MHz		4905	54.74	-19.26	74	75.59	34.25	10.34	65.44	154	45	P	H
		4905	44.27	-9.73	54	65.12	34.25	10.34	65.44	154	45	A	H
		7356	43.09	-30.91	74	60.55	35.87	12.73	66.06	300	0	P	H
		4905	54.99	-19.01	74	75.84	34.25	10.34	65.44	356	30	P	V
		4905	44	-10	54	64.85	34.25	10.34	65.44	356	30	A	V
		7350	42.91	-31.09	74	60.38	35.87	12.72	66.06	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

Emission below 1GHz

2.4GHz WIFI 802.11g (LF)

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		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11g LF		239.52	16.76	-29.24	46	28.76	18.74	2.36	33.1	-	-	P	H
		320.03	19.22	-26.78	46	28.72	20.68	2.72	32.9	-	-	P	H
		444.19	22.78	-23.22	46	28.77	23.5	3.22	32.71	-	-	P	H
		502.39	26.05	-19.95	46	30.86	24.55	3.43	32.79	-	-	P	H
		600.36	26.35	-19.65	46	29.61	25.5	3.74	32.5	-	-	P	H
		803.09	29.22	-16.78	46	30.48	26.92	4.33	32.51	-	-	P	H
		166.77	15.14	-28.36	43.5	28.97	17.1	1.97	32.9	-	-	P	V
		239.52	18.8	-27.2	46	30.8	18.74	2.36	33.1	-	-	P	V
		299.66	20.05	-25.95	46	30.11	20.2	2.64	32.9	-	-	P	V
		393.75	21.89	-24.11	46	29.12	22.55	3.03	32.81	-	-	P	V
		551.86	24.41	-21.59	46	27.54	25.88	3.59	32.6	-	-	P	V
		780.78	27.86	-18.14	46	29.42	26.75	4.27	32.58	-	-	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	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(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”.

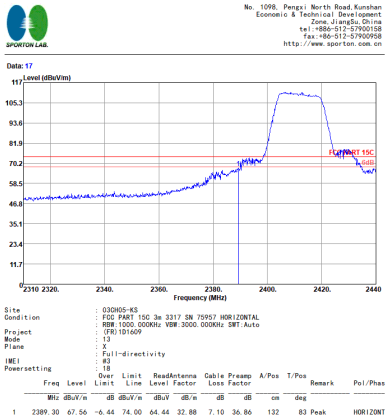
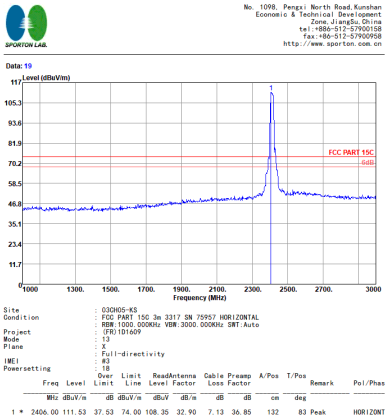
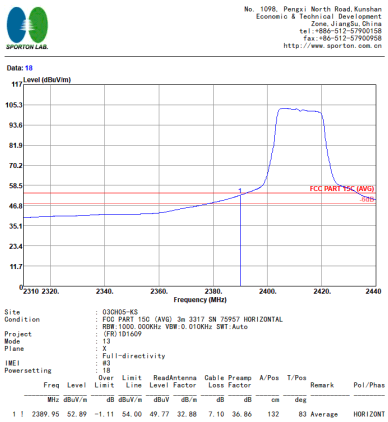
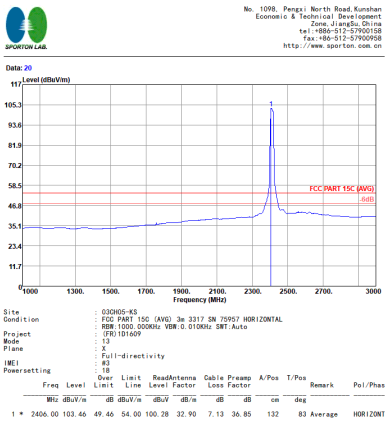
Appendix D. Radiated Spurious Emission Plots

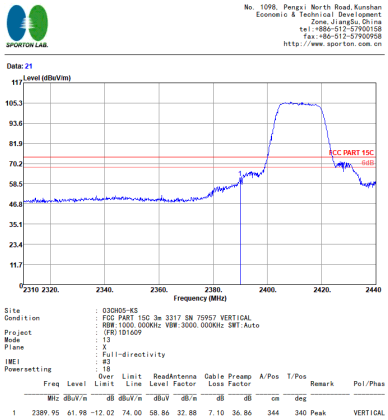
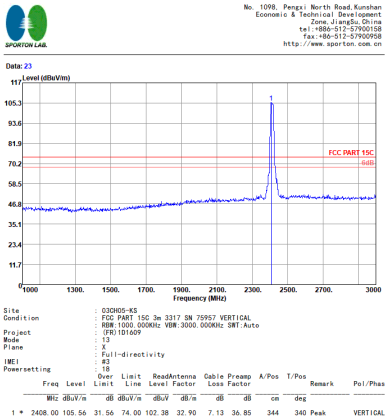
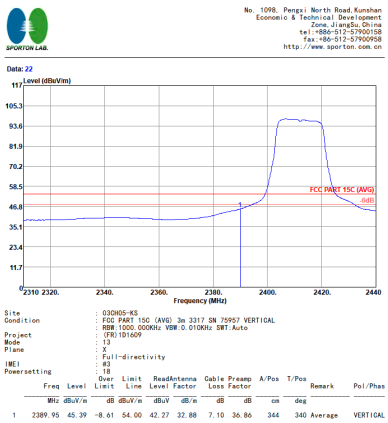
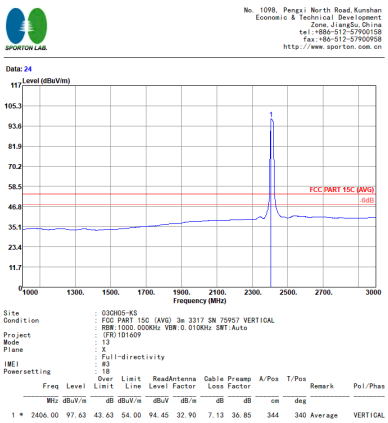
Note symbol

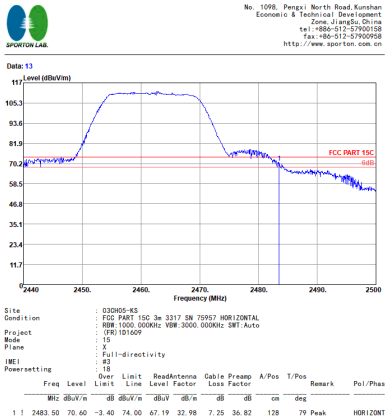
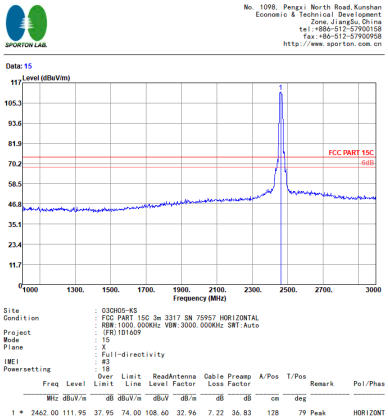
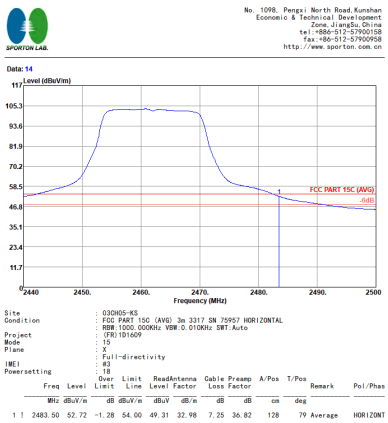
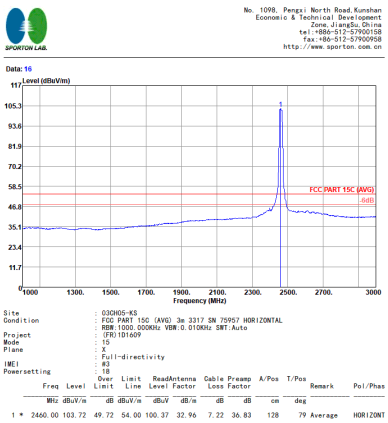
-L	**Low channel location**
-R	**High channel location**

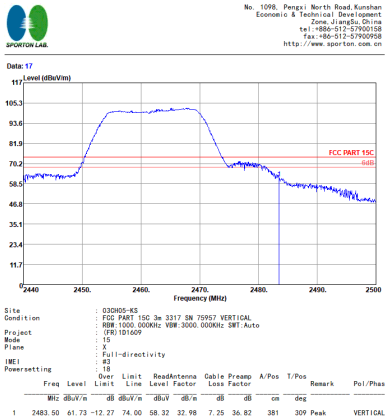
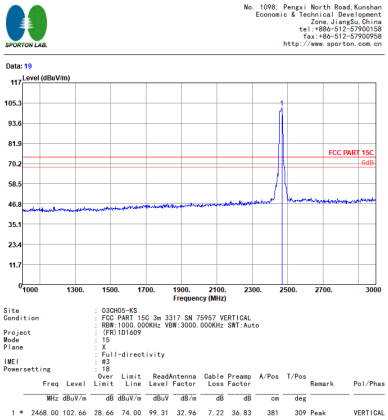
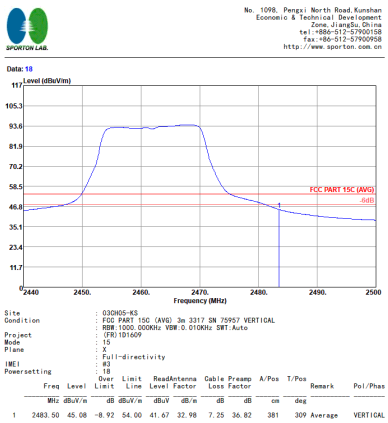
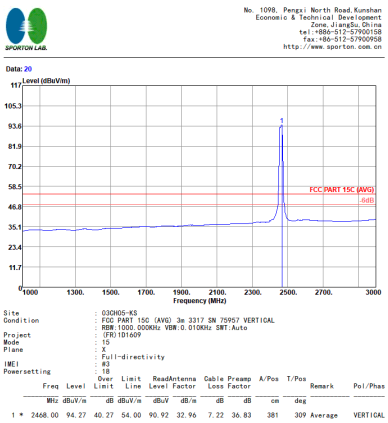
2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH01 2412MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

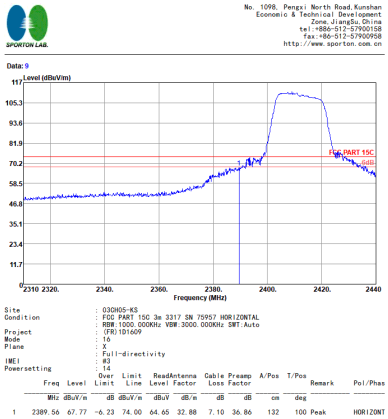
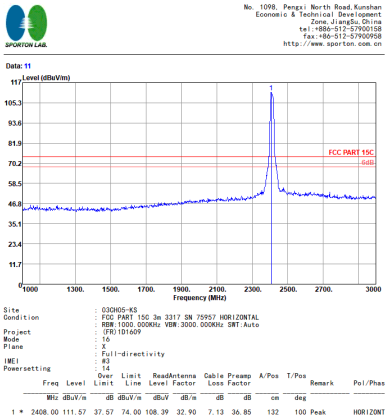
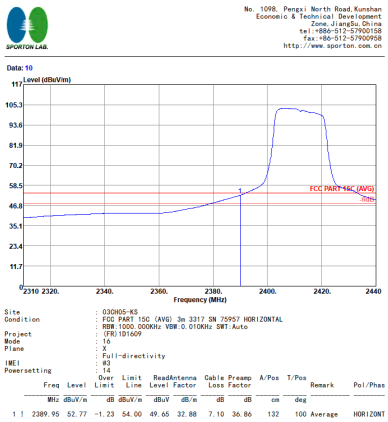
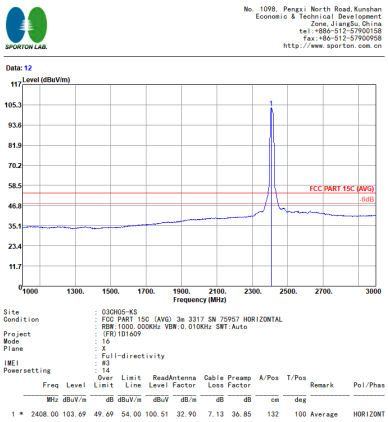
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH01 2412MHz	
1	Vertical	Fundamental
Peak		
Avg.		

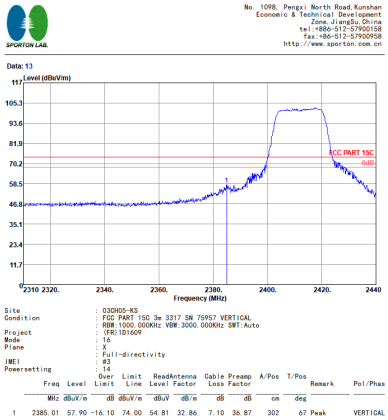
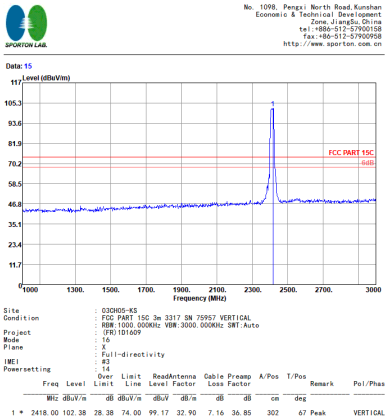
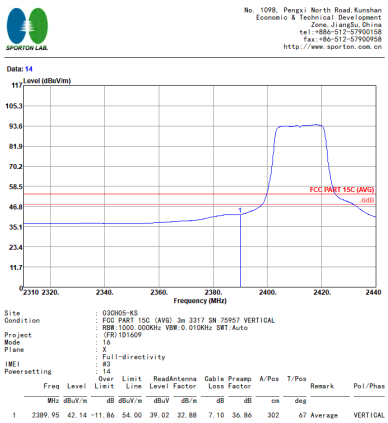
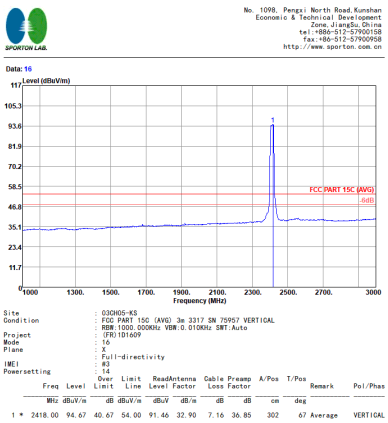
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH11 2462MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

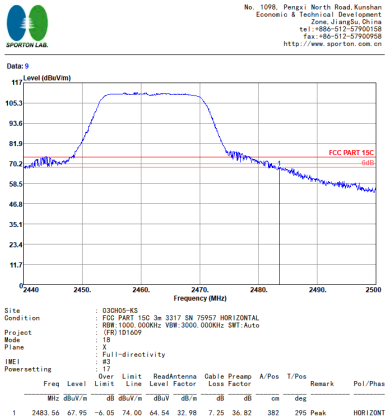
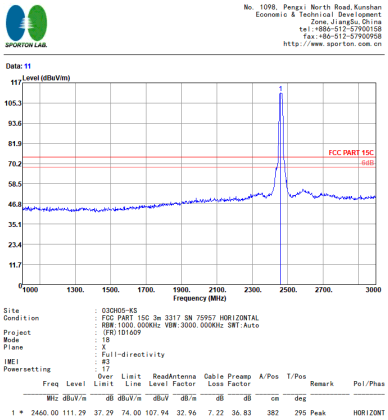
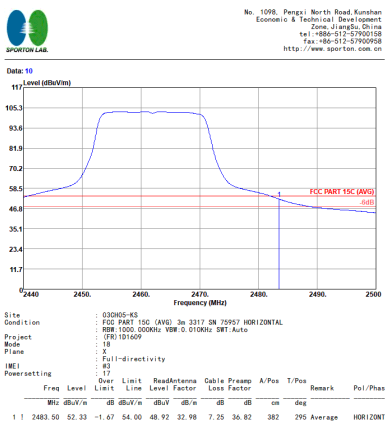
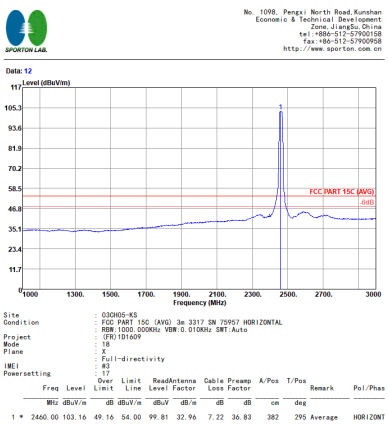
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH11 2462MHz	
1	Vertical	Fundamental
Peak		
Avg.		

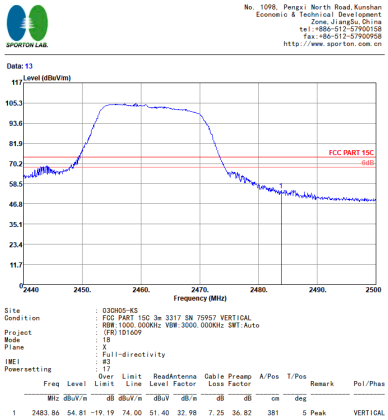
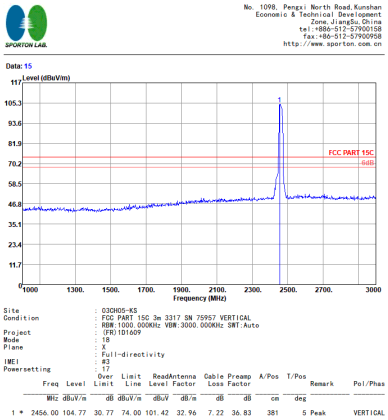
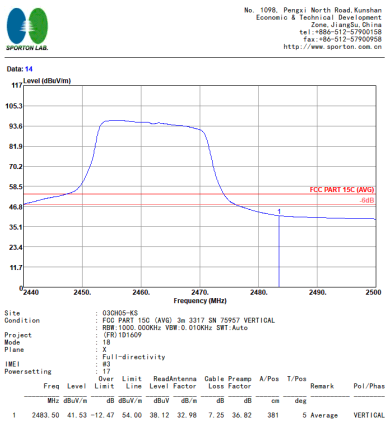
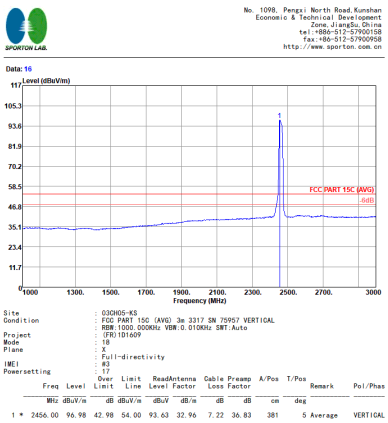
2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH01 2412MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

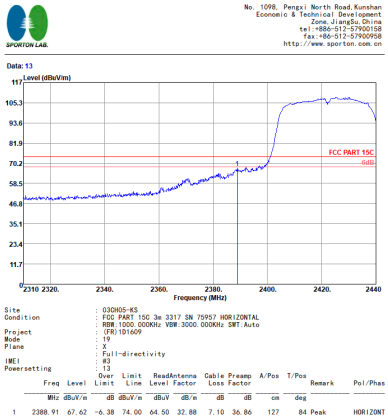
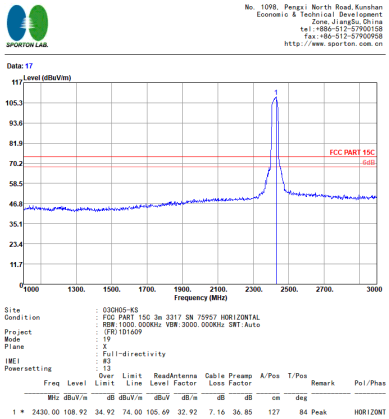
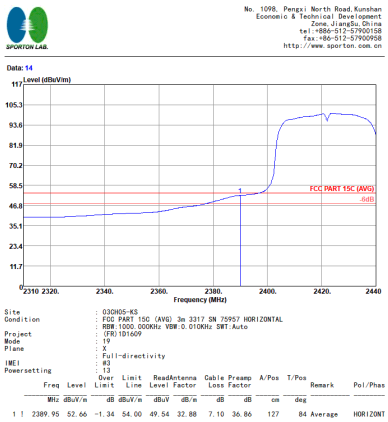
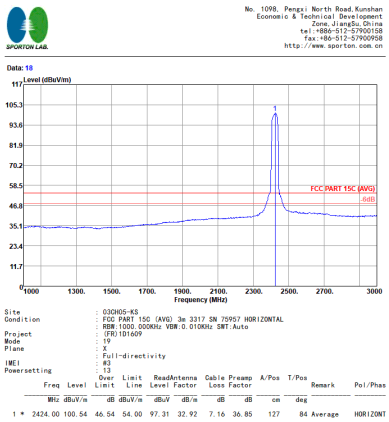
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH01 2412MHz	
1	Vertical	Fundamental
Peak		
Avg.		

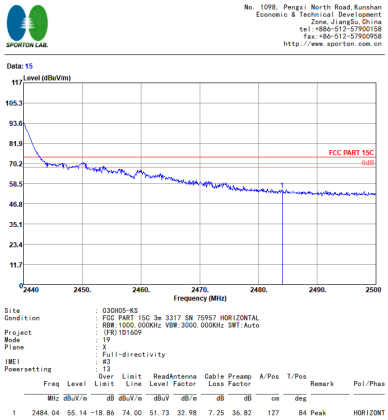
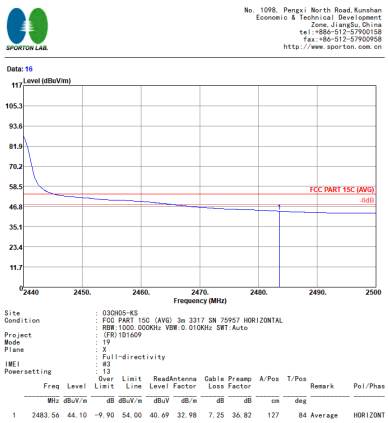
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH11 2462MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

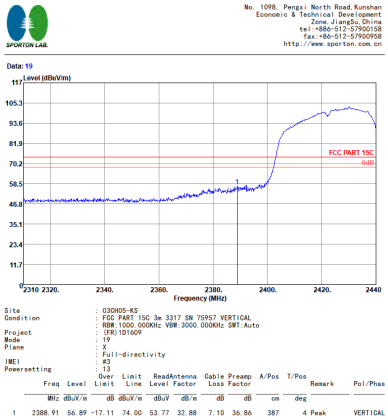
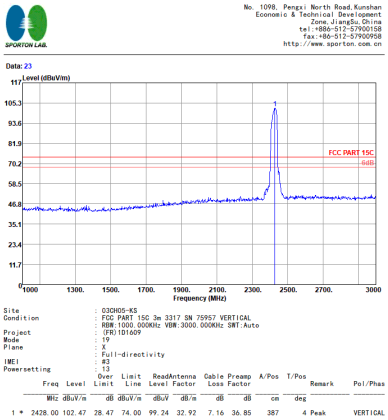
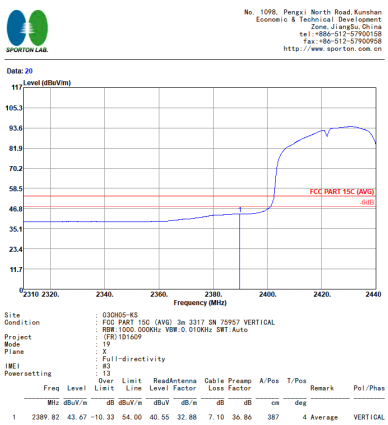
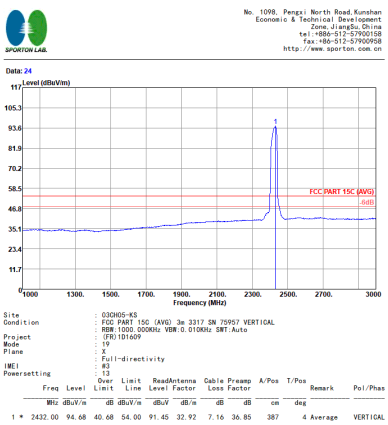
WIFI	2.4GHz 2400~2483.5MHz Fundamental @ 3m	
ANT	802.11n HT20 CH11 2462MHz	
1	Vertical	Fundamental
Peak		
Avg.		

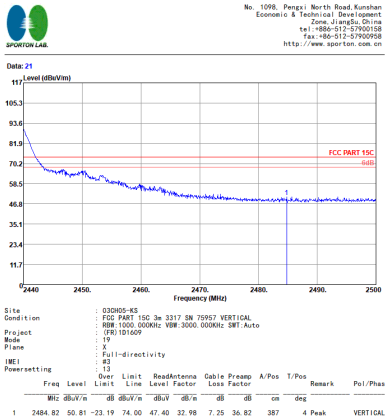
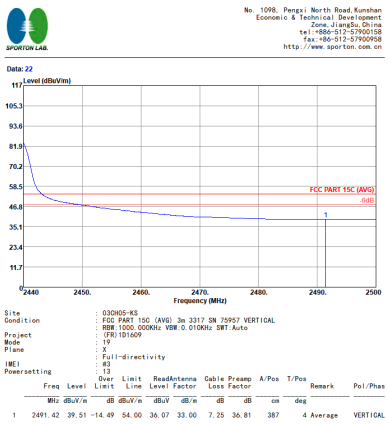
2.4GHz 2400~2483.5MHz

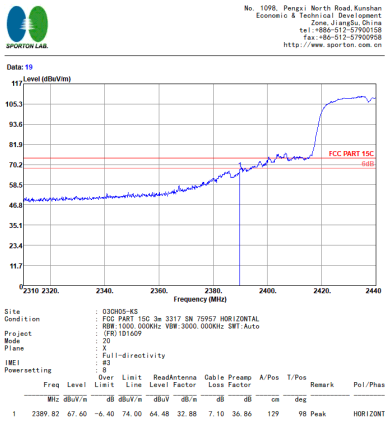
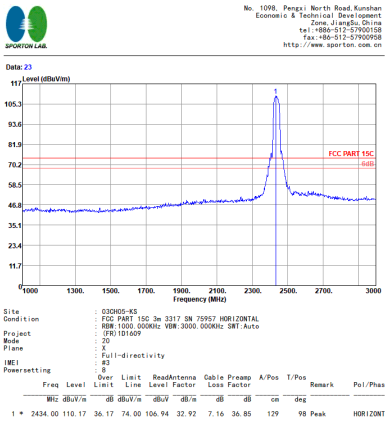
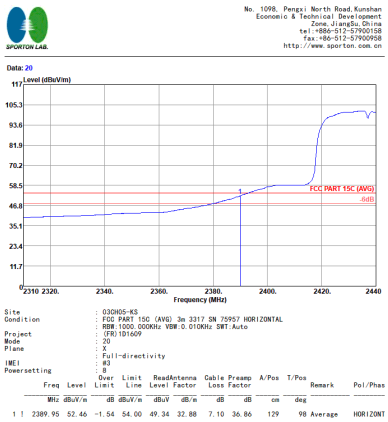
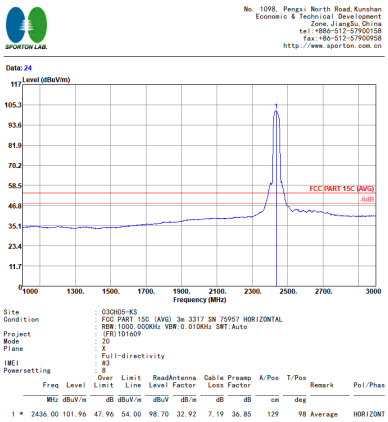
WIFI 802.11n HT40 (Band Edge @ 3m)

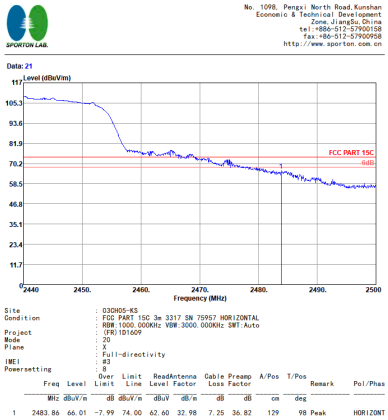
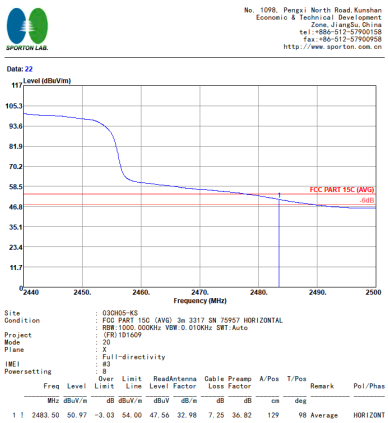
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		

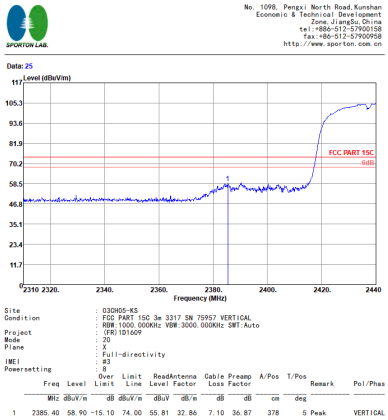
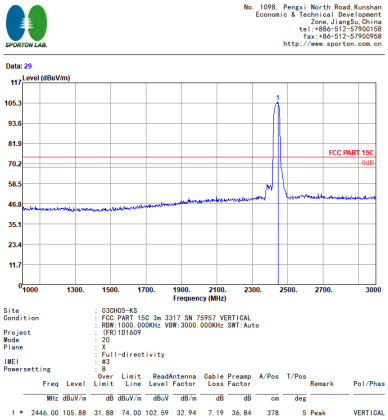
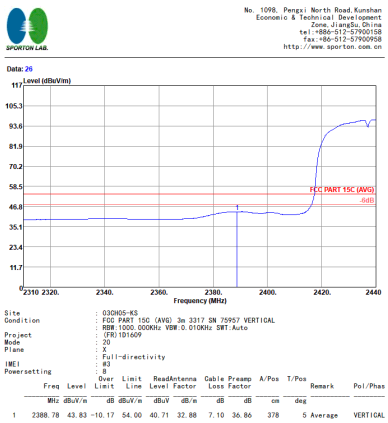
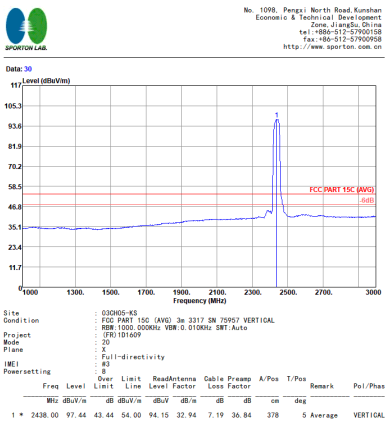
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - R	
1	Horizontal	Fundamental
Peak		Left Blank
Avg.		Left Blank

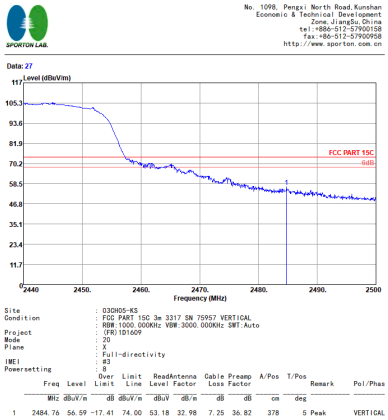
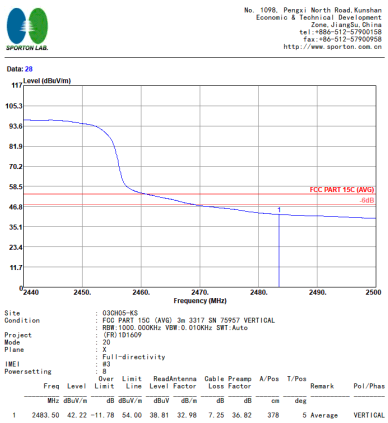
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		

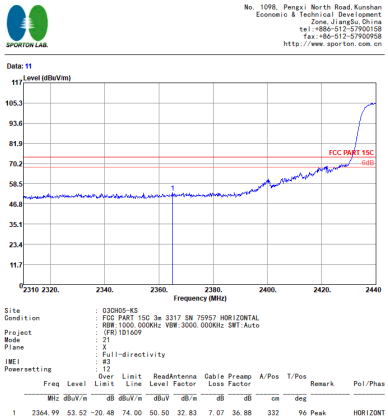
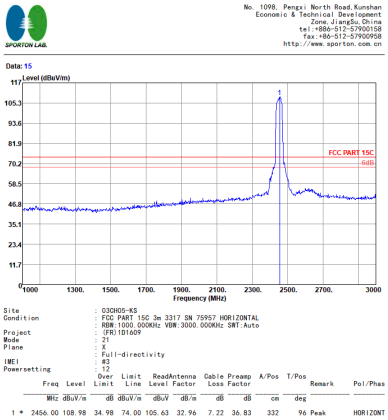
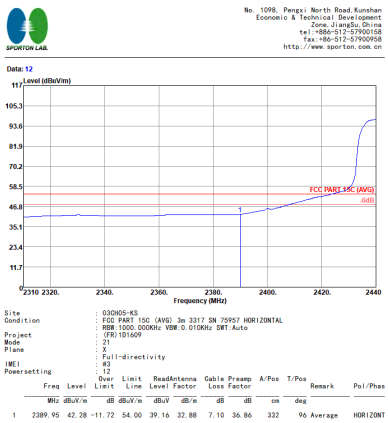
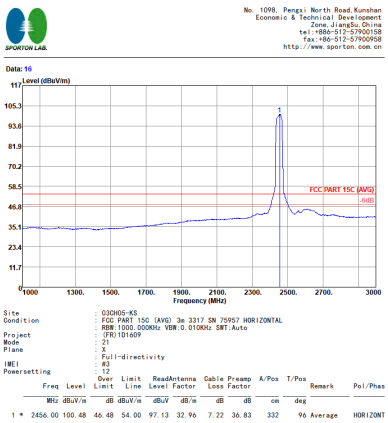
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

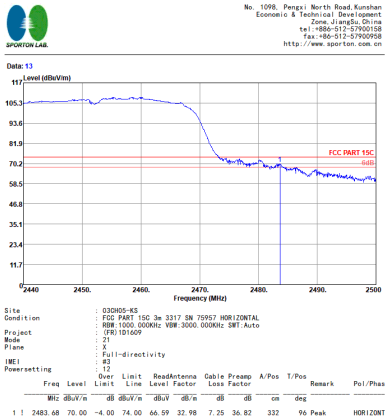
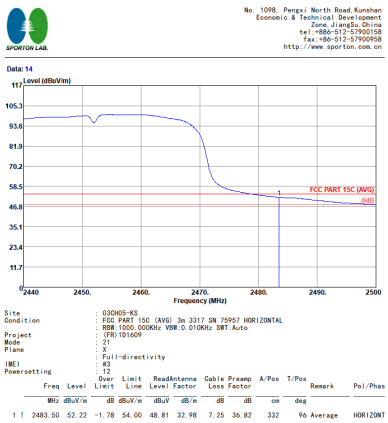
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH06 2437MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		

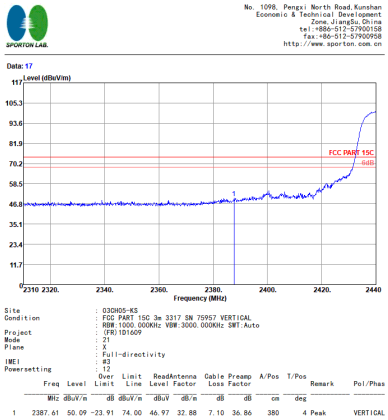
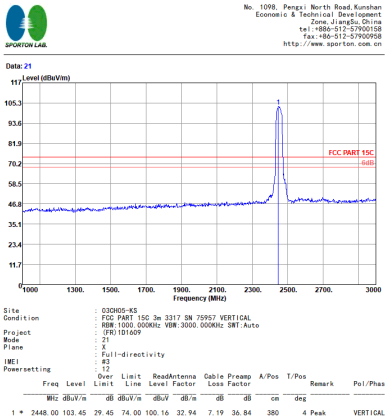
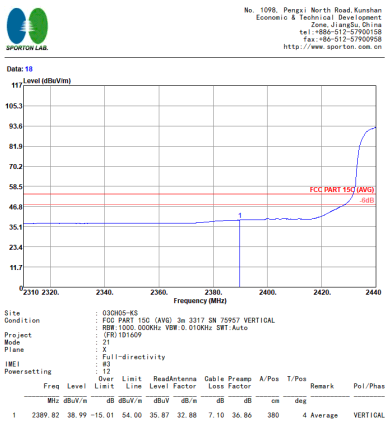
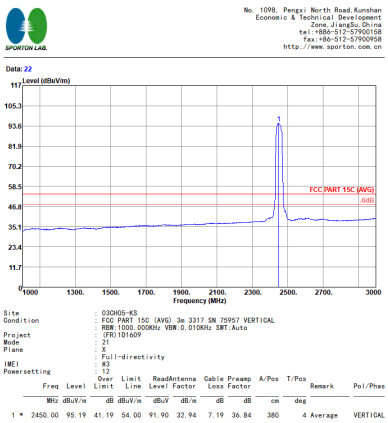
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH06 2437MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

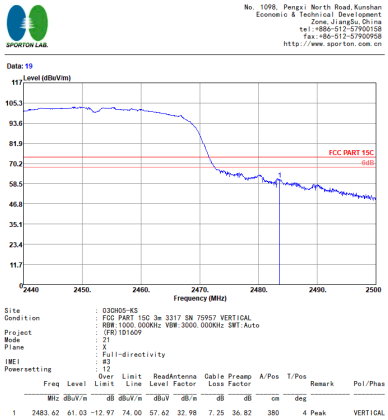
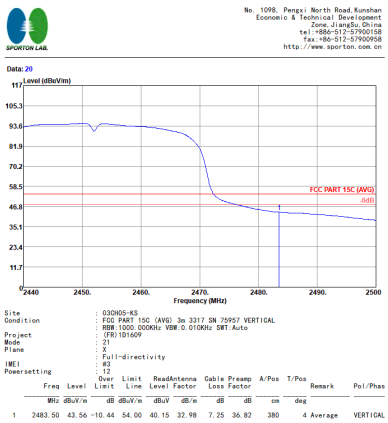
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH06 2437MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH06 2437MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		

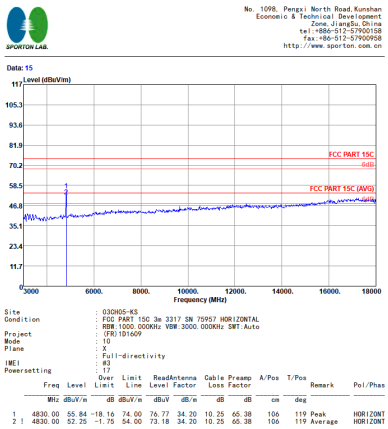
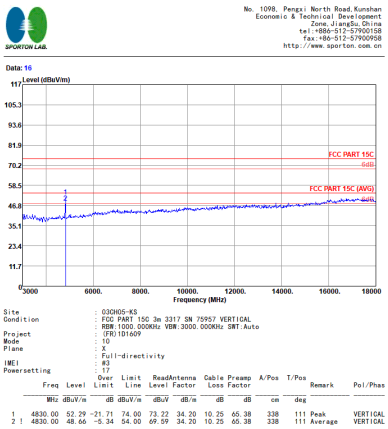
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

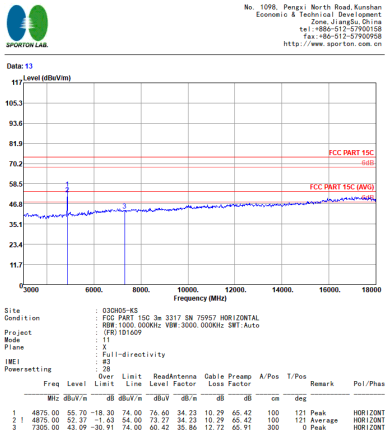
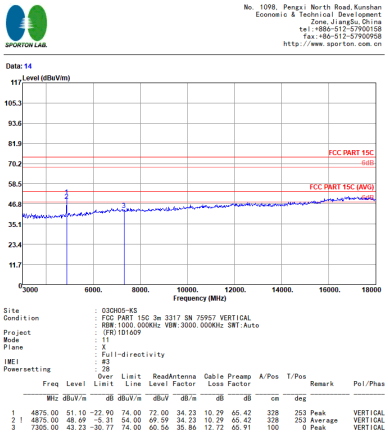
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		

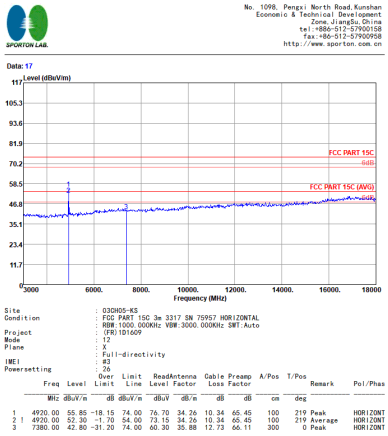
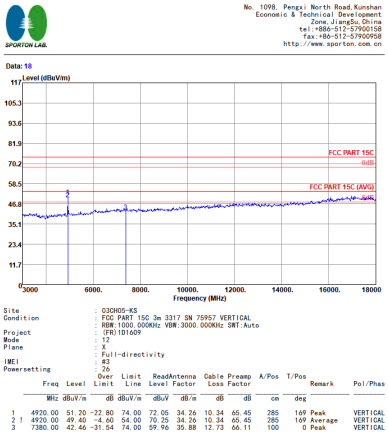
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

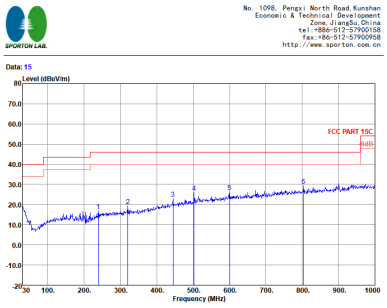
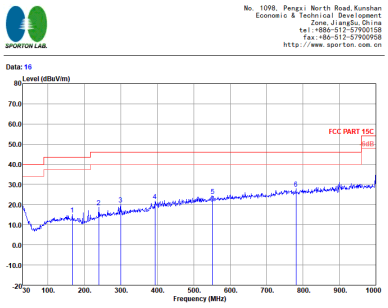
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH01 2412MHz	
1	Horizontal	Vertical
Peak Avg.	 No. 1098, Pengxi North Road,Kunshan Economic & Technical Development Zone,JiangSu,China tel:+86-512-57900158 fax:+86-512-57900958 http://www.sporton.com.cn Data: 15 Level (dBuV/m) FCC PART 15C FCC PART 15C (AVG) Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C 3m 3317 SN 75957 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)1D1609 Mode : 10 Plane : X : Full-directivity IMEI : #3 Powersetting : 17 Freq Level Over Limit Limit Limit ReadAntenna Level Cable Factor Preamp Loss Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 4830.00 55.84 -18.16 74.00 76.77 34.20 10.25 65.38 106 119 Peak HORIZONT 2 ! 4830.00 52.25 -1.75 54.00 73.18 34.20 10.25 65.38 106 119 Average HORIZONT	 No. 1098, Pengxi North Road,Kunshan Economic & Technical Development Zone,JiangSu,China tel:+86-512-57900158 fax:+86-512-57900958 http://www.sporton.com.cn Data: 16 Level (dBuV/m) FCC PART 15C FCC PART 15C (AVG) Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C 3m 3317 SN 75957 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)1D1609 Mode : 10 Plane : X : Full-directivity IMEI : #3 Powersetting : 17 Freq Level Over Limit Limit Limit ReadAntenna Level Cable Factor Preamp Loss Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 4830.00 52.29 -21.71 74.00 73.22 34.20 10.25 65.38 338 111 Peak VERTICAL 2 ! 4830.00 48.66 -5.34 54.00 69.59 34.20 10.25 65.38 338 111 Average VERTICAL

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH06 2437MHz	
1	Horizontal	Vertical
Peak Avg.	 No. 1098, Pengxi North Road,Kunshan Economic & Technical Development Zone,JiangSu,China tel:+886-512-57900158 fax:+86-512-57900958 http://www.sporton.com.cn Data: 13 Level (dBuV/m) 117 105.3 93.6 81.9 70.2 58.5 46.8 35.1 23.4 11.7 0 3000 6000. 8000. 10000. 12000. 14000. 16000. 18000 Frequency (MHz) FCC PART 15C -6dB FCC PART 15C (AVG) -6dB Site : 03CH05-KS Condition : FCC PART 15C 3m 3317 SN 75957 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)1D1609 Mode : 11 Plane : X : Full-directivity IMEI : #3 Powersetting : 28 Freq Level Over Limit Limit Line ReadAntenna Level Cable Factor Preamp Loss Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dBuV dB/m dB dB cm deg 1 4875.00 55.70 -18.30 74.00 76.60 34.23 10.29 65.42 100 121 Peak HORIZONT 2 ! 4875.00 52.37 -1.63 54.00 73.27 34.23 10.29 65.42 100 121 Average HORIZONT 3 7305.00 43.09 -30.91 74.00 60.42 35.86 12.72 65.91 300 0 Peak HORIZONT	 No. 1098, Pengxi North Road,Kunshan Economic & Technical Development Zone,JiangSu,China tel:+886-512-57900158 fax:+86-512-57900958 http://www.sporton.com.cn Data: 14 Level (dBuV/m) 117 105.3 93.6 81.9 70.2 58.5 46.8 35.1 23.4 11.7 0 3000 6000. 8000. 10000. 12000. 14000. 16000. 18000 Frequency (MHz) FCC PART 15C -6dB FCC PART 15C (AVG) -6dB Site : 03CH05-KS Condition : FCC PART 15C 3m 3317 SN 75957 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)1D1609 Mode : 11 Plane : X : Full-directivity IMEI : #3 Powersetting : 28 Freq Level Over Limit Limit Line ReadAntenna Level Cable Factor Preamp Loss Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dBuV dB/m dB dB cm deg 1 4875.00 51.10 -22.90 74.00 72.00 34.23 10.29 65.42 328 253 Peak VERTICAL 2 ! 4875.00 48.69 -5.31 54.00 69.59 34.23 10.29 65.42 328 253 Average VERTICAL 3 7305.00 43.23 -30.77 74.00 60.56 35.86 12.72 65.91 100 0 Peak VERTICAL

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH11 2462MHz	
1	Horizontal	Vertical
Peak Avg.	 No. 1098, Pengxi North Road,Kunshan Economic & Technical Development Zone,JiangSu,China tel:+886-512-57900158 fax:+86-512-57900958 http://www.sporton.com.cn Data: 17 Level (dBuV/m) 117 105.3 93.6 81.9 70.2 58.5 46.8 35.1 23.4 11.7 0 FCC PART 15C 6dB FCC PART 15C (AVG) 6dB 3000 6000. 8000. 10000. 12000. 14000. 16000. 18000 Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C 3m 3317 SN 75957 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)1D1609 Mode : 12 Plane : X : Full-directivity IMEI : #3 Powersetting : 26 Freq Level Over Limit Limit Line ReadAntenna Level Cable Factor Preamp Loss Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dBuV dB/m dB dB cm deg 1 4920.00 55.85 -18.15 74.00 76.70 34.26 10.34 65.45 100 219 Peak HORIZONT 2 ! 4920.00 52.30 -1.70 54.00 73.15 34.26 10.34 65.45 100 219 Average HORIZONT 3 7380.00 42.80 -31.20 74.00 60.30 35.88 12.73 66.11 300 0 Peak HORIZONT	 No. 1098, Pengxi North Road,Kunshan Economic & Technical Development Zone,JiangSu,China tel:+886-512-57900158 fax:+86-512-57900958 http://www.sporton.com.cn Data: 18 Level (dBuV/m) 117 105.3 93.6 81.9 70.2 58.5 46.8 35.1 23.4 11.7 0 FCC PART 15C 6dB FCC PART 15C (AVG) 6dB 3000 6000. 8000. 10000. 12000. 14000. 16000. 18000 Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C 3m 3317 SN 75957 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)1D1609 Mode : 12 Plane : X : Full-directivity IMEI : #3 Powersetting : 26 Freq Level Over Limit Limit Line ReadAntenna Level Cable Factor Preamp Loss Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dBuV dB/m dB dB cm deg 1 4920.00 51.20 -22.80 74.00 72.05 34.26 10.34 65.45 285 169 Peak VERTICAL 2 ! 4920.00 49.40 -4.60 54.00 70.25 34.26 10.34 65.45 285 169 Average VERTICAL 3 7380.00 42.46 -31.54 74.00 59.96 35.88 12.73 66.11 100 0 Peak VERTICAL

Emission below 1GHz

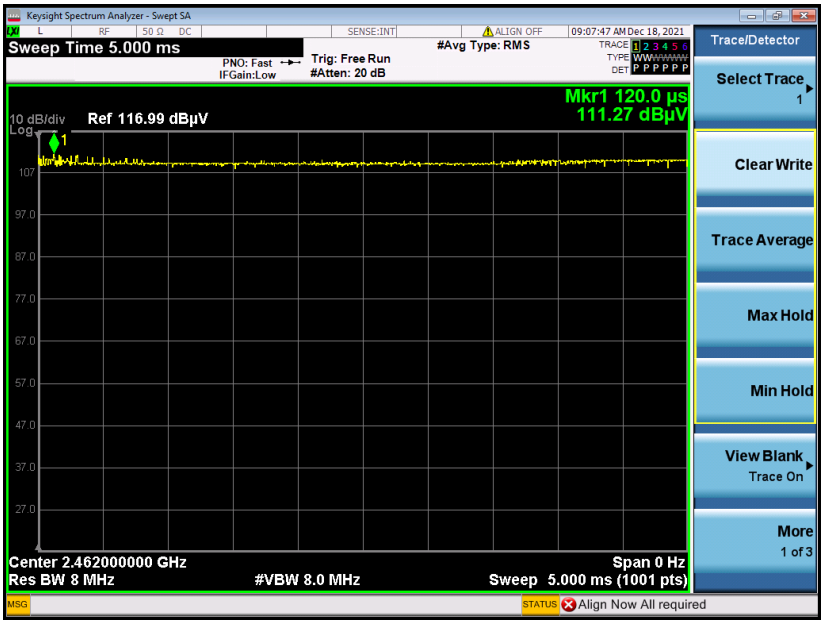
2.4GHz WIFI 802.11g (LF)

WIFI	2.4GHz 2400~2483.5MHz	
ANT	802.11g LF	
1	Horizontal	Vertical
QP / Peak	 Site : 03CH07-KS Condition : FCC PART 15C 3m CBL6111D SN23188 HORIZONTAL : RBW:100.000KHz VBW:300.000KHz SWT:Auto Project : (FR)1D1609 Mode : 13 Plane : X : Full-directivity IMEI : #3 Freq Level Over Limit Limit ReadAntenna Level Factor Cable Loss Factor Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 239.53 16.76 -29.24 46.00 28.76 18.74 2.36 33.10 --- --- Peak HORIZONT 2 320.03 19.22 -26.78 46.00 28.72 20.68 2.72 32.90 --- --- Peak HORIZONT 3 444.19 22.78 -23.22 46.00 28.77 23.50 3.22 32.71 --- --- Peak HORIZONT 4 502.39 26.05 -19.95 46.00 30.86 24.55 3.43 32.79 --- --- Peak HORIZONT 5 600.36 26.35 -19.65 46.00 29.61 25.50 3.74 32.50 --- --- Peak HORIZONT 6 803.09 29.22 -16.78 46.00 30.48 26.92 4.33 32.51 --- --- Peak HORIZONT	 Site : 03CH07-KS Condition : FCC PART 15C 3m CBL6111D SN23188 VERTICAL : RBW:100.000KHz VBW:300.000KHz SWT:Auto Project : (FR)1D1609 Mode : 13 Plane : X : Full-directivity IMEI : #3 Freq Level Over Limit Limit ReadAntenna Level Factor Cable Loss Factor Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 166.77 15.14 -28.36 43.50 28.97 17.10 1.97 32.90 --- --- Peak VERTICAL 2 239.52 18.80 -27.20 46.00 30.80 18.74 2.36 33.10 --- --- Peak VERTICAL 3 299.66 20.05 -25.95 46.00 30.11 20.20 2.64 32.90 --- --- Peak VERTICAL 4 393.75 21.89 -24.11 46.00 29.12 22.55 3.03 32.81 --- --- Peak VERTICAL 5 551.86 24.41 -21.59 46.00 27.54 25.88 3.59 32.60 --- --- Peak VERTICAL 6 780.78 27.86 -18.14 46.00 29.42 26.75 4.27 32.58 --- --- Peak VERTICAL

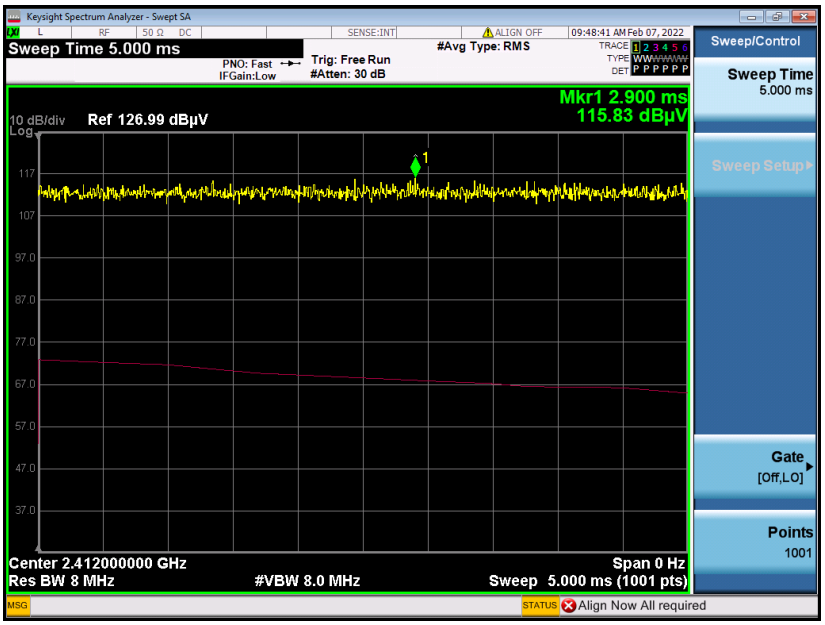
Appendix E. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	100	-	-	10Hz
802.11g	100	-	-	10Hz
802.11n HT20	100	-	-	10Hz
802.11n HT40	100	-	-	10Hz

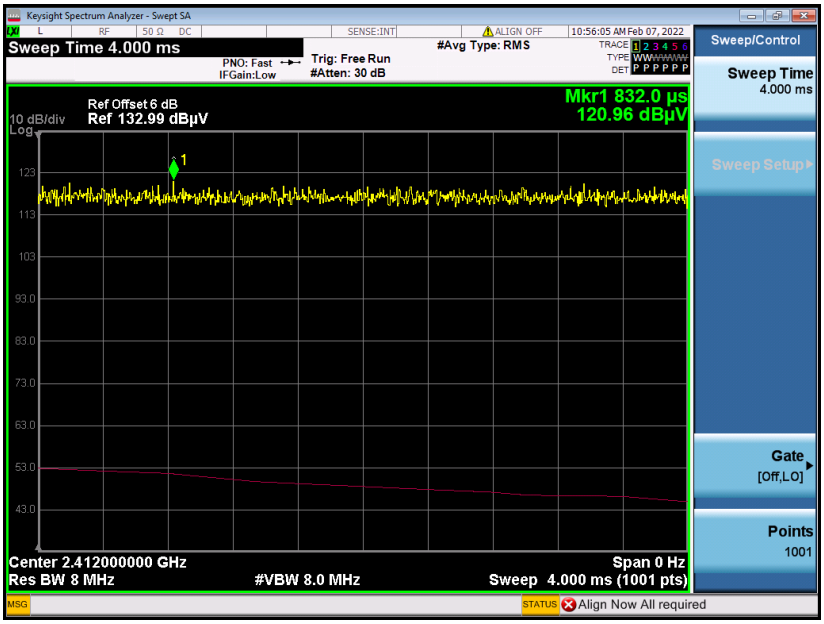
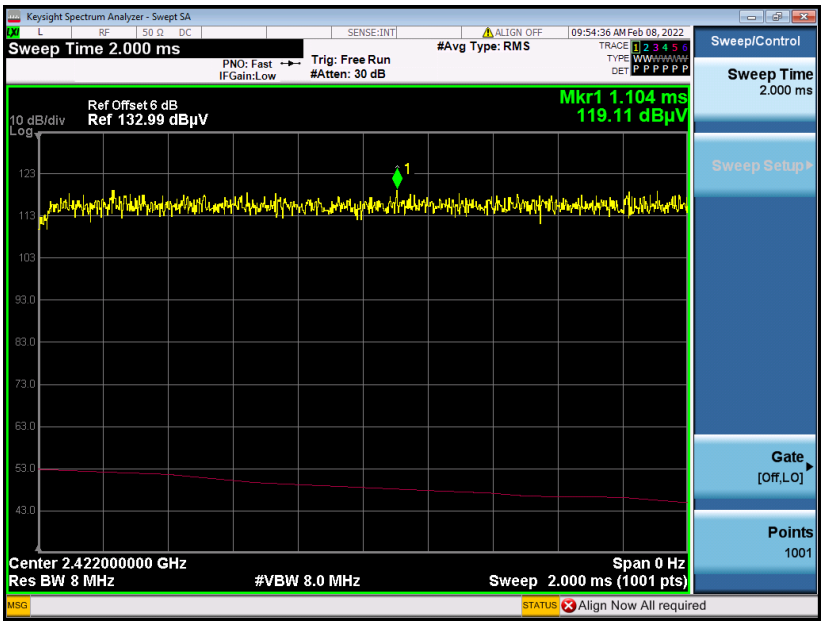
802.11b



802.11g



802.11n HT20



802.11n HT40