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-MINI-1
FCC ID	:	2AC7Z-ESPS3MINI1
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System
TEST DATE(S)	:	Dec. 19, 2021 ~ Jan. 18, 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

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR1N0918B	Rev. 01	Initial issue of report	Feb. 14, 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 1.01 dB at 2389.95 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 10.23 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-MINI-1
FCC ID	2AC7Z-ESPS3MINI1
HW Version	V1.1
SW Version	v1.1.3.4
EUT Stage	Identical Prototype

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

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz
Maximum (Peak) Output Power to antenna	802.11b : 22.48 dBm (0.1770 W) 802.11g : 25.27 dBm (0.3365 W) 802.11n HT20 : 25.08 dBm (0.3221 W) 802.11n HT40 : 24.81 dBm (0.3027 W)
99% Occupied Bandwidth	802.11b : 13.19MHz 802.11g : 19.03MHz 802.11n HT20 : 19.18MHz 802.11n HT40 : 34.77MHz
Antenna Type / Gain	PCB Antenna type with gain 4.54 dBi
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 03CH02-KS TH01-KS	CN1257	314309

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH02-KS	AUDIX	E3	6.2009-8-24a
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 (Z plane) were recorded in this report.

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

2.1 Carrier Frequency and Channel

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

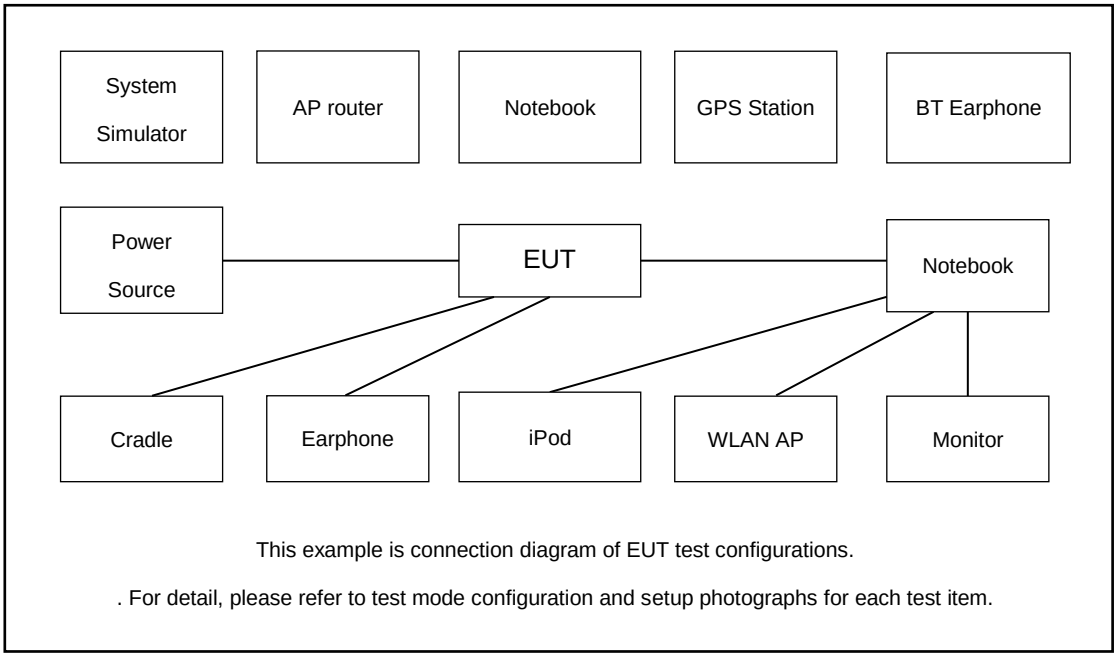
2.2 Test Mode

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

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

Test Cases	
AC Conducted Emission	WLAN(2.4G) Link + Test Jig Powered by Notebook

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	Lenovo	V130-15IKB005	N/A	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
2.	WLAN AP	D-link	DIR-655	KA21R655B1	N/A	Unshielded,1.8m

2.5 EUT Operation Test Setup

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

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

2.6 Measurement Results Explanation Example

For all conducted test items:

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

Example:

The spectrum analyzer offset is derived from RF cable loss.

Offset = RF cable loss

Following shows an offset computation example with cable loss 5.5dB.

Offset(dB) = RF cable loss(dB)

= 5.5 (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.

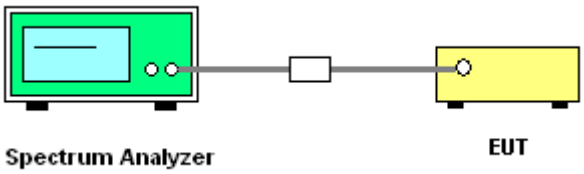
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

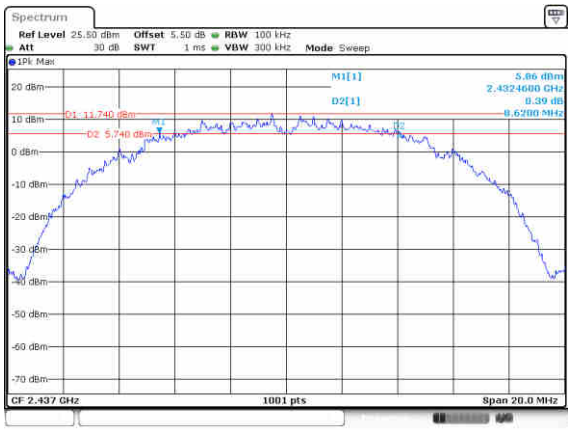
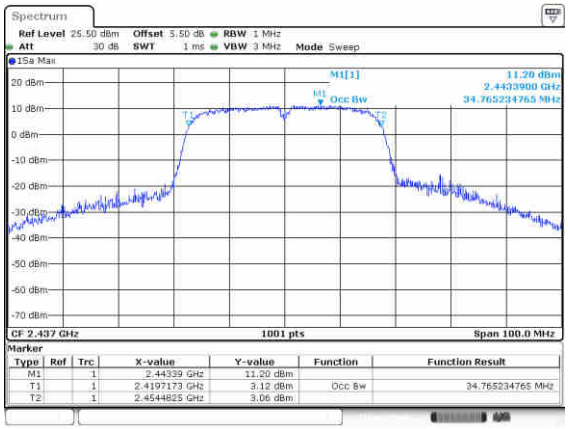
1. The testing follows ANSI C63.10-2013 clause 11.8
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement 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.

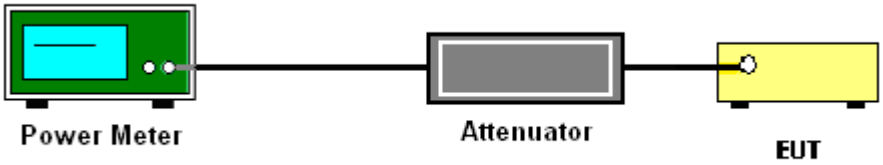
3.2.2 Measuring Instruments

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 11.9.2.3.2 Method AVGPM-G method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

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.

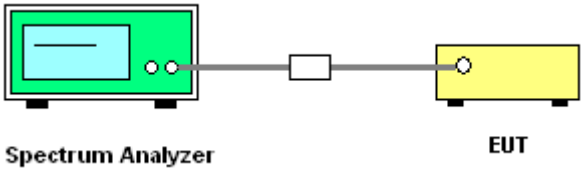
3.3.2 Measuring Instruments

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.

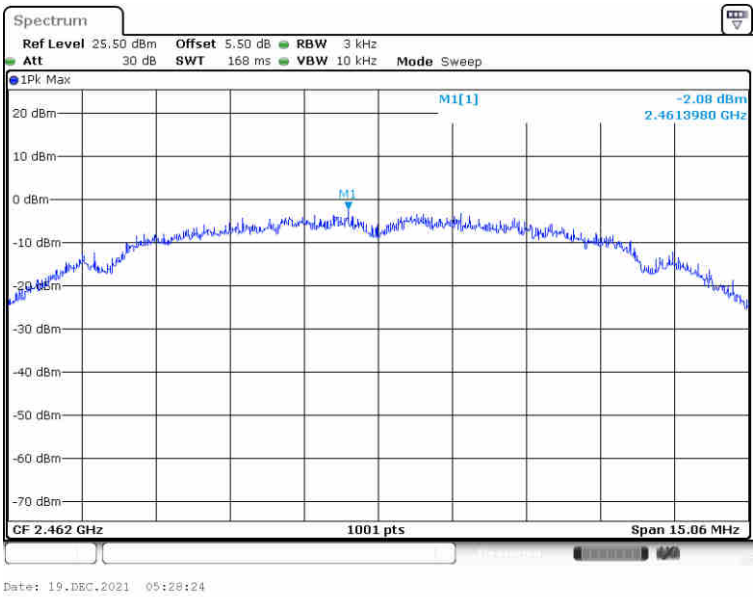
3.3.4 Test Setup



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.

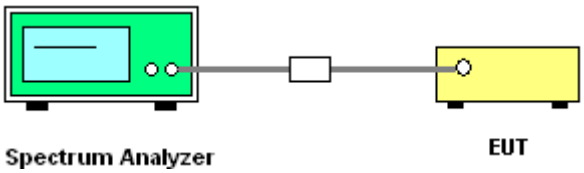
3.4.2 Measuring Instruments

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.

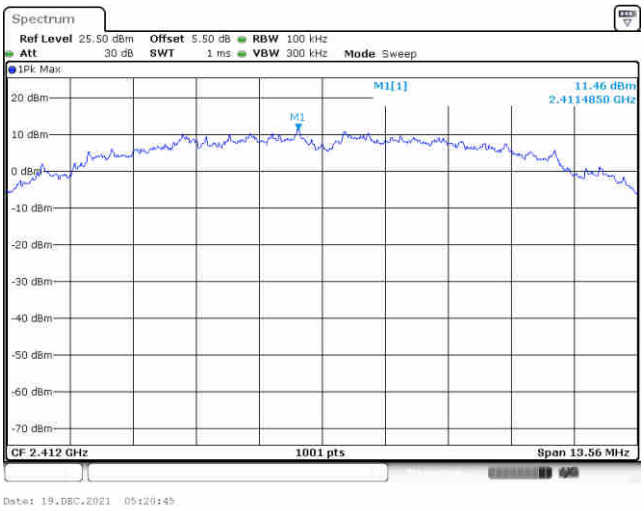
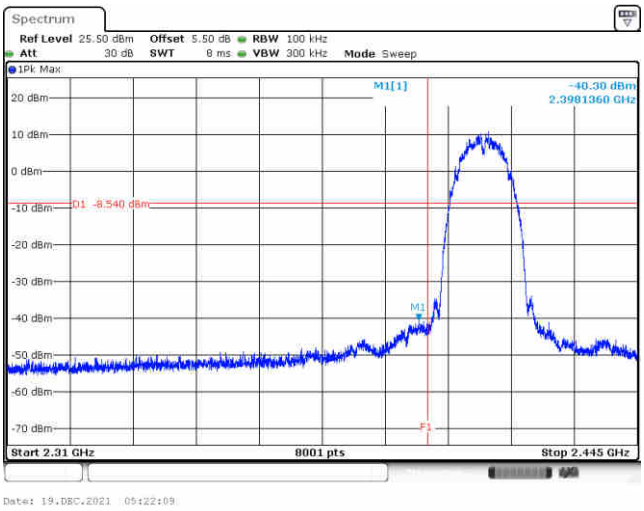
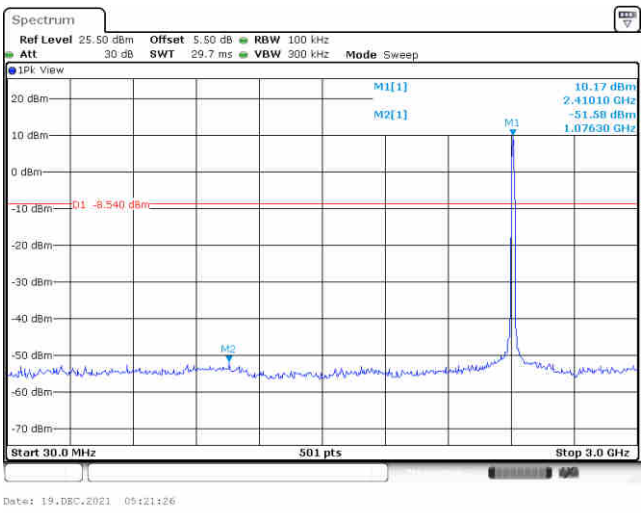
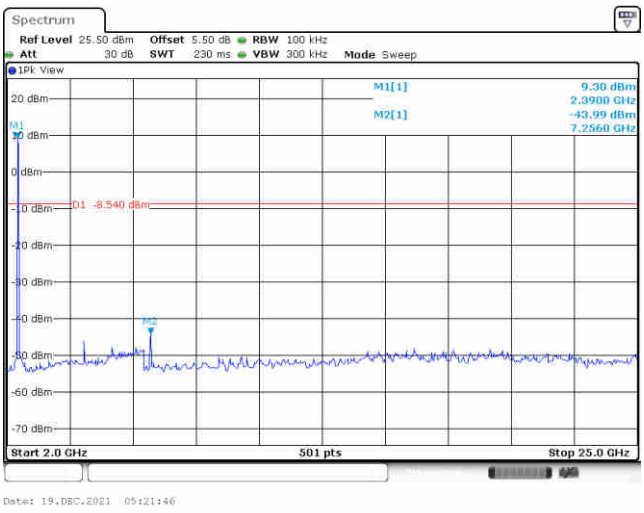
3.4.4 Test Setup



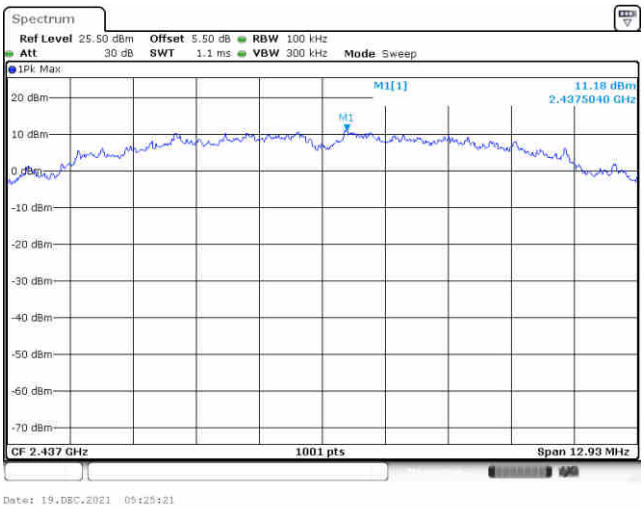
3.4.5 Test Result of Conducted Band Edges and Spurious Emission

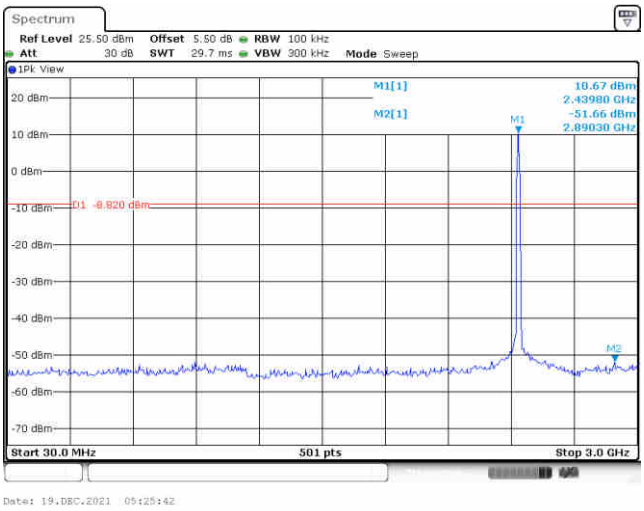
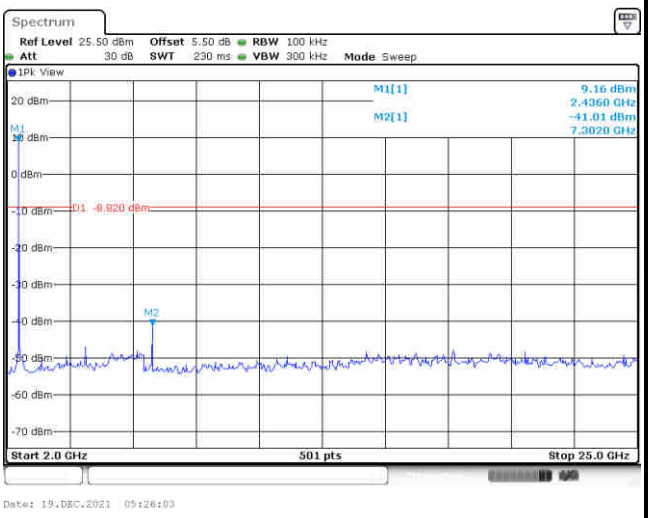
Test Engineer :	kid shi	**Temperature :**	21~25℃
		Relative Humidity :	51~54%

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

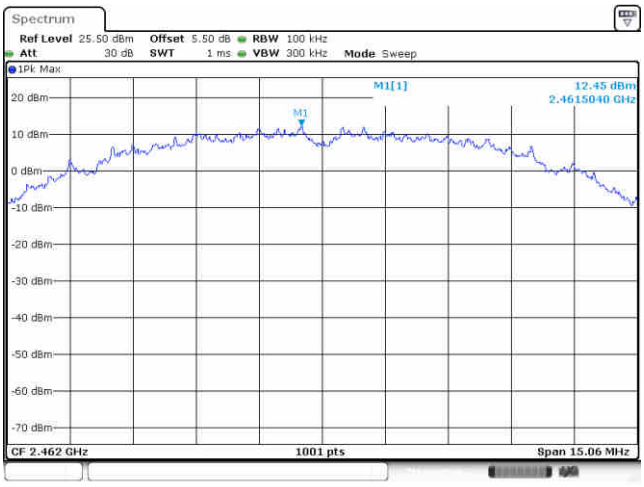
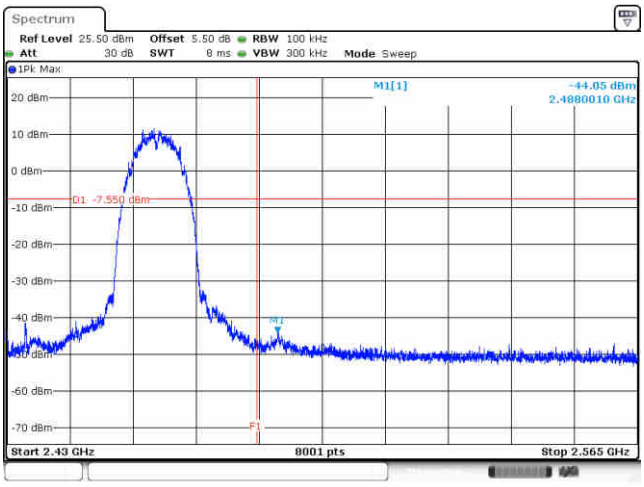
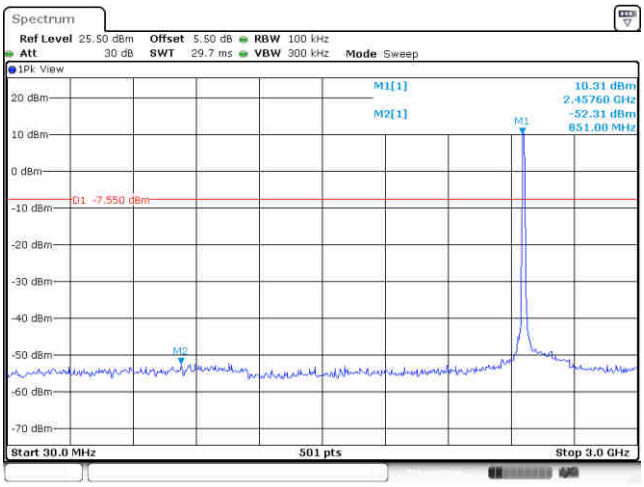
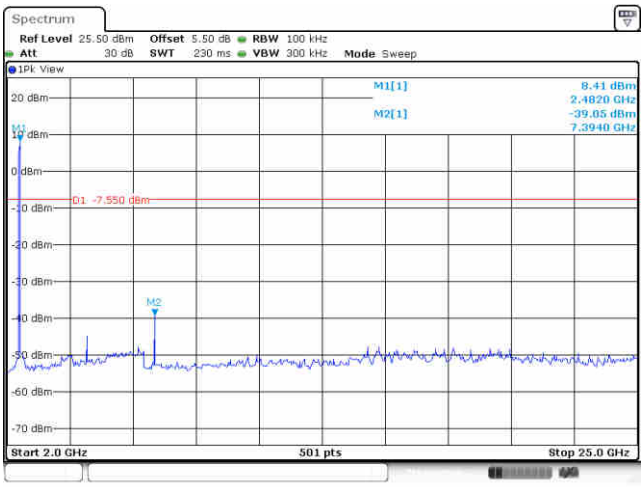
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11b	Test Channel :	06

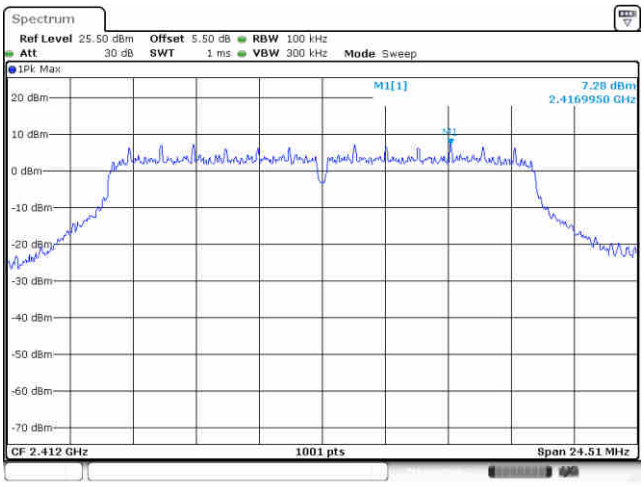
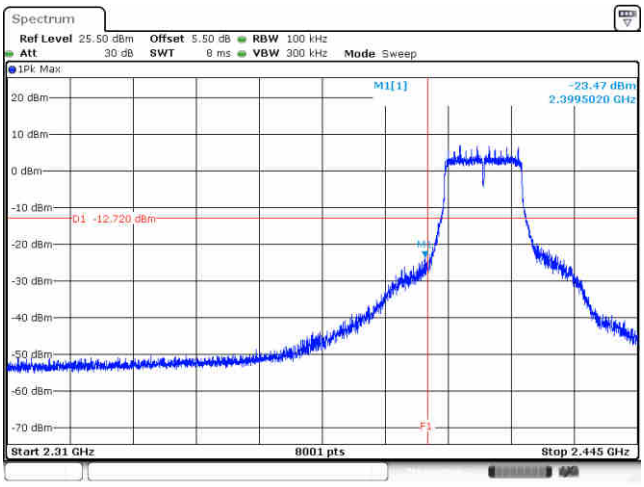
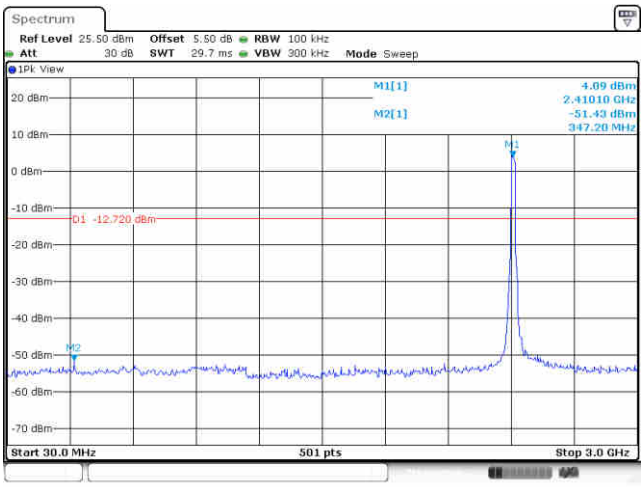
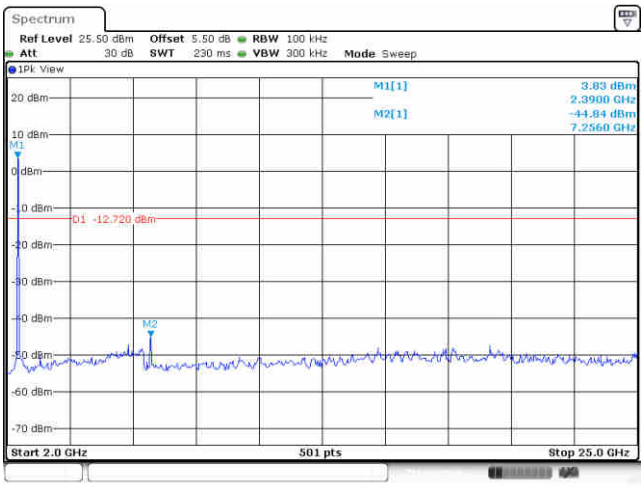
100kHz PSD reference Level	Channel Plot
	N/A

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

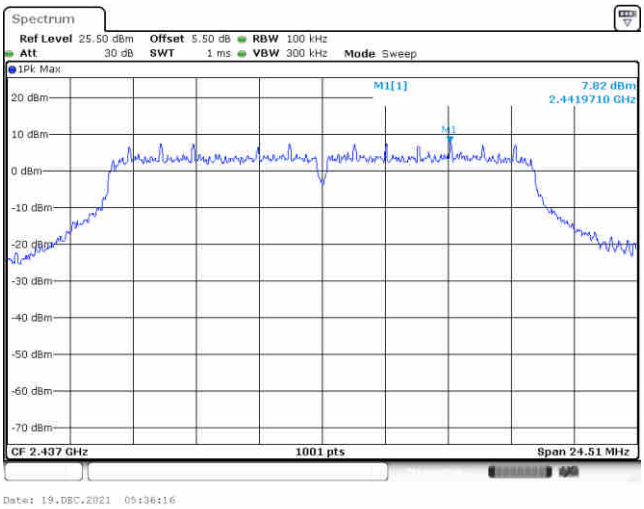
Test Mode :	802.11b	Test Channel :	11

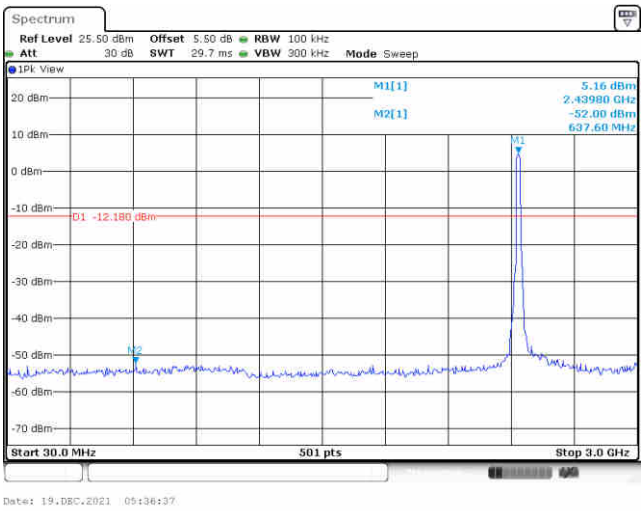
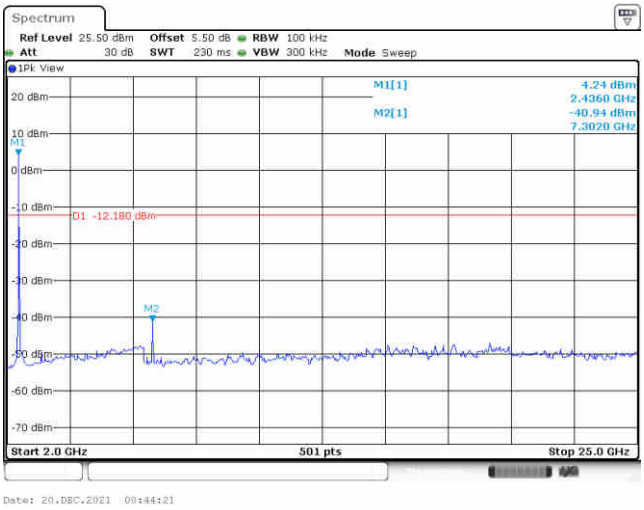
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11g	Test Channel :	01

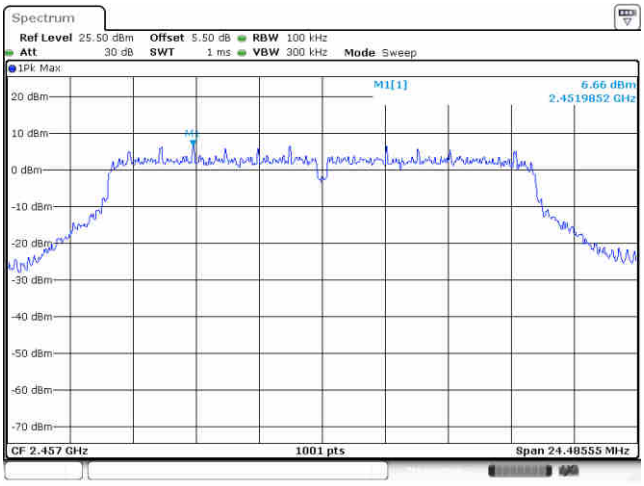
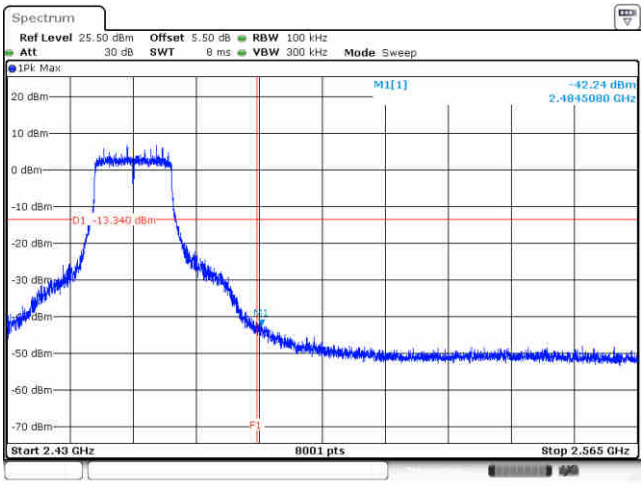
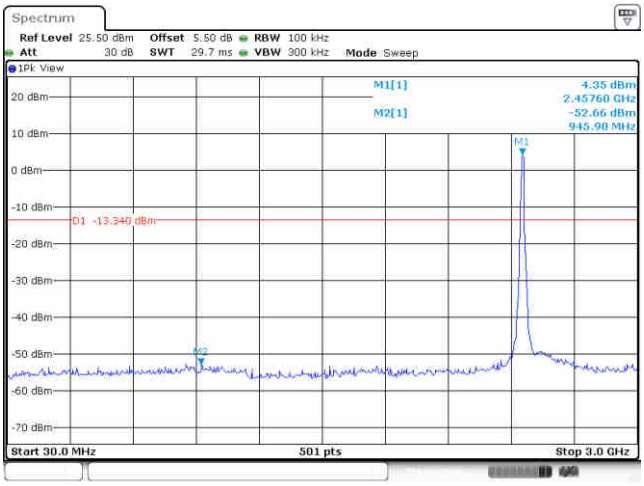
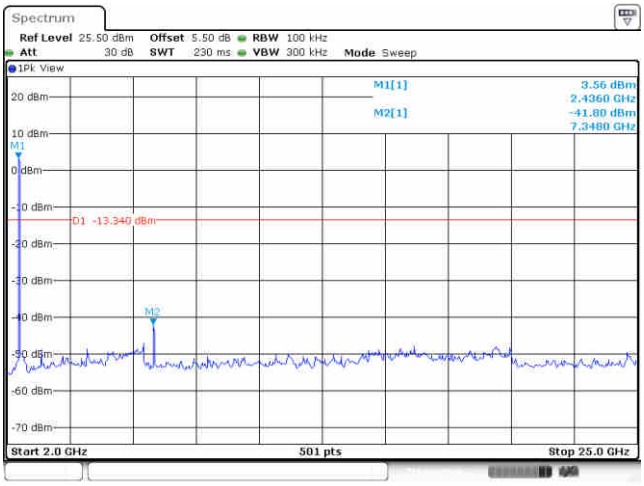
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11g	Test Channel :	06

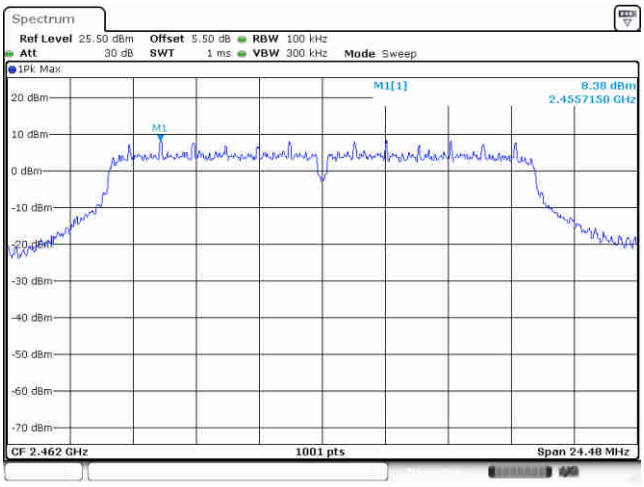
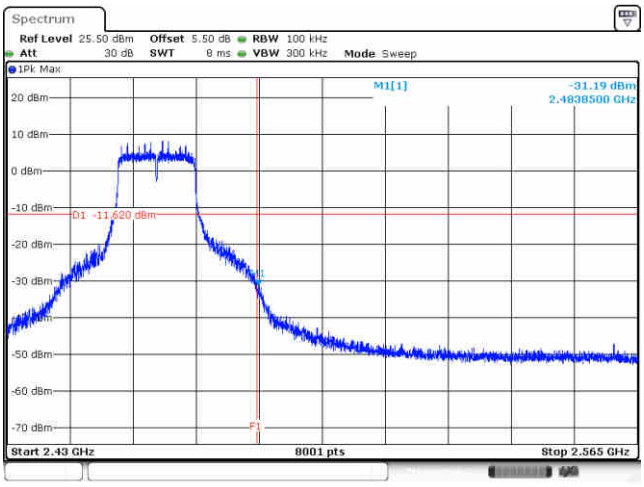
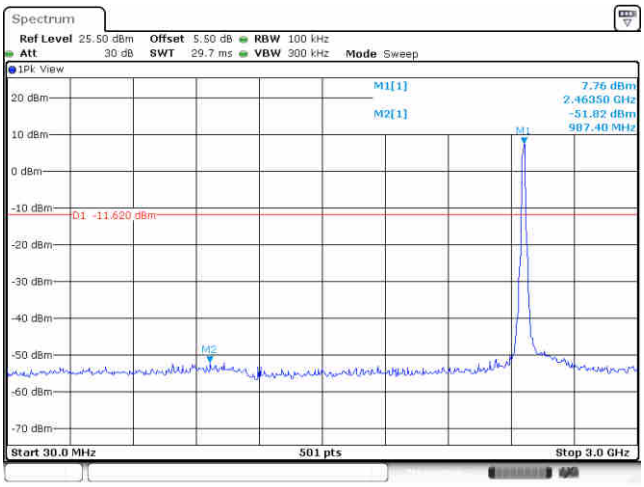
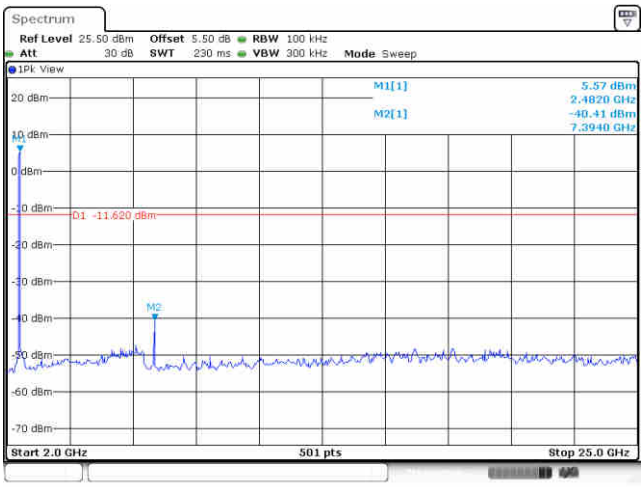
100kHz PSD reference Level	Channel Plot
	N/A

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

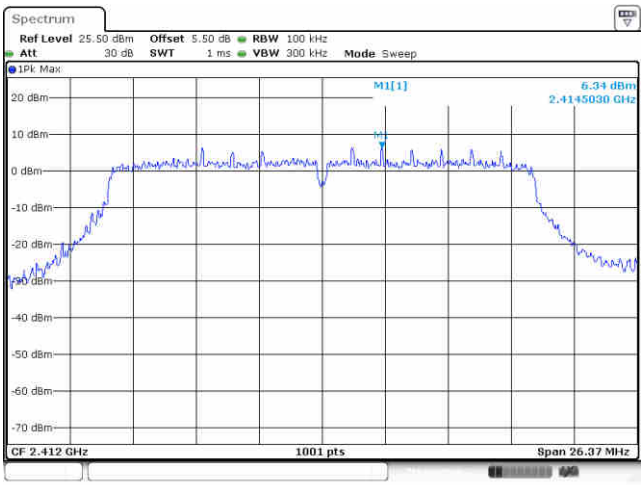
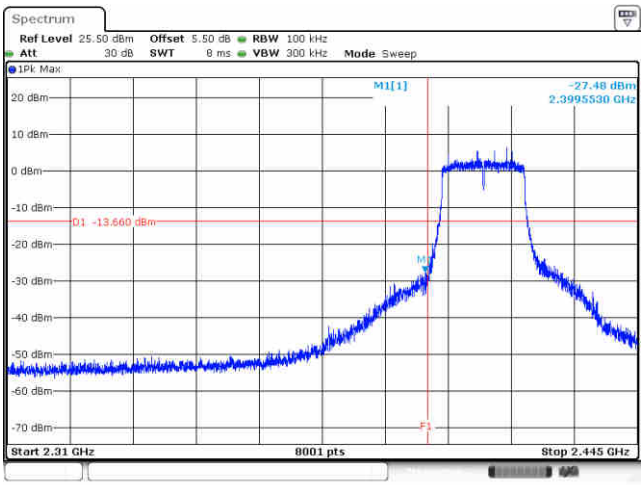
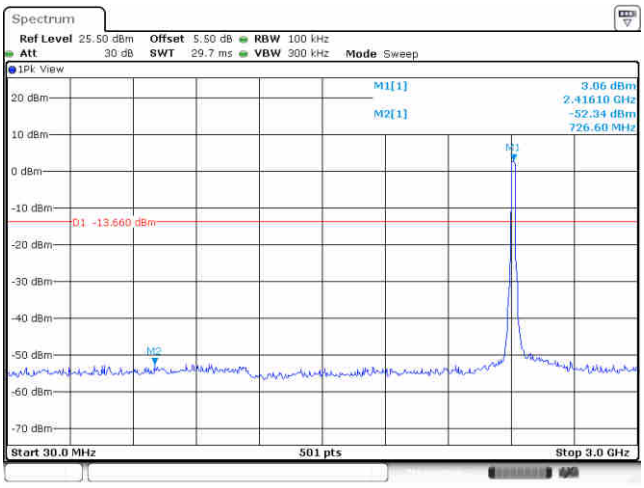
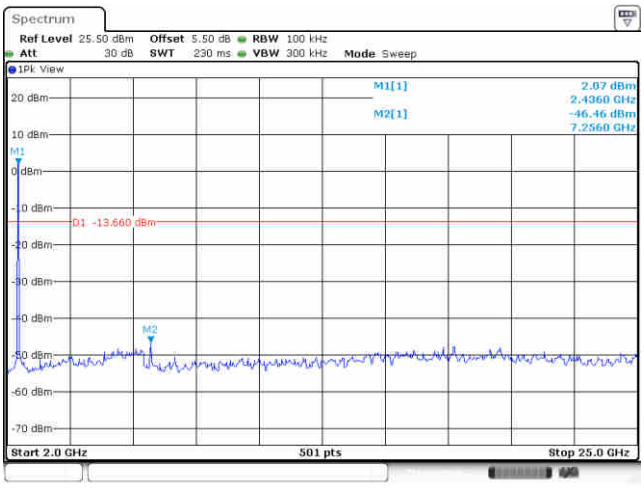
Test Mode :	802.11g	Test Channel :	10

100kHz PSD reference Level	Channel Plot
	
Date: 7.JAN.2022 09:26:19	Date: 7.JAN.2022 09:26:33
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 7.JAN.2022 09:27:18	Date: 7.JAN.2022 09:27:58

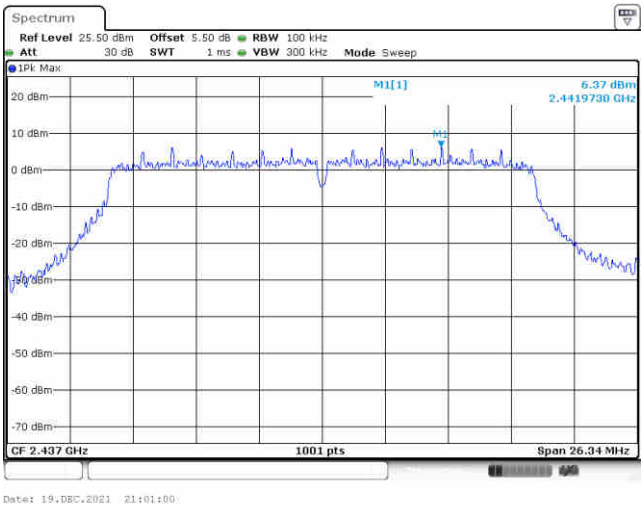
Test Mode :	802.11g	Test Channel :	11

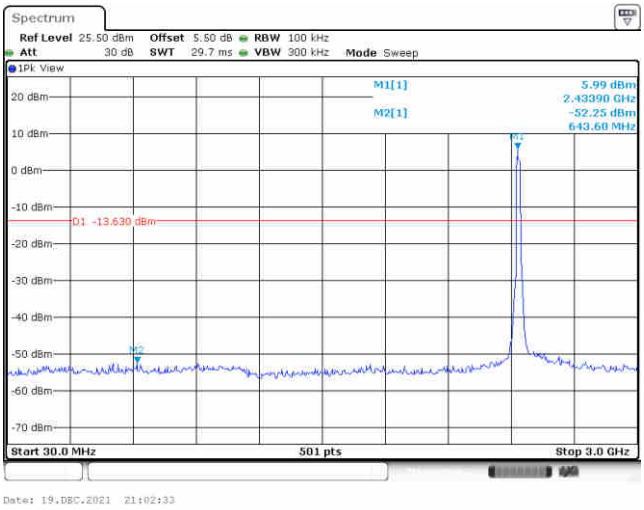
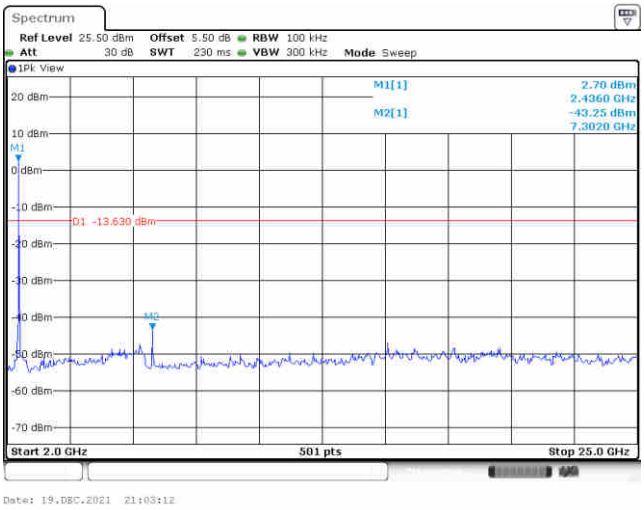
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11n HT20	Test Channel :	01

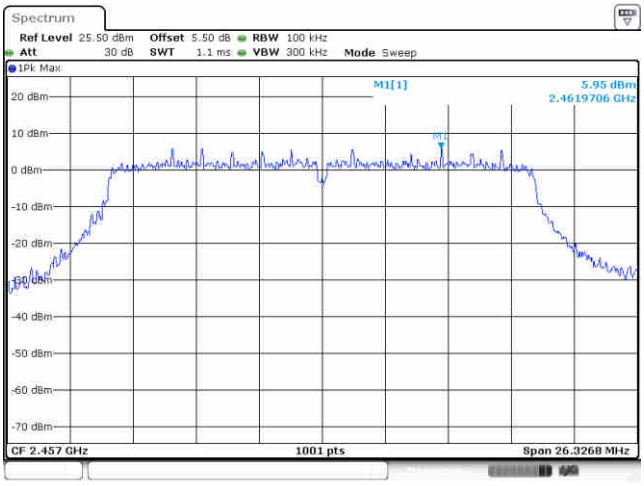
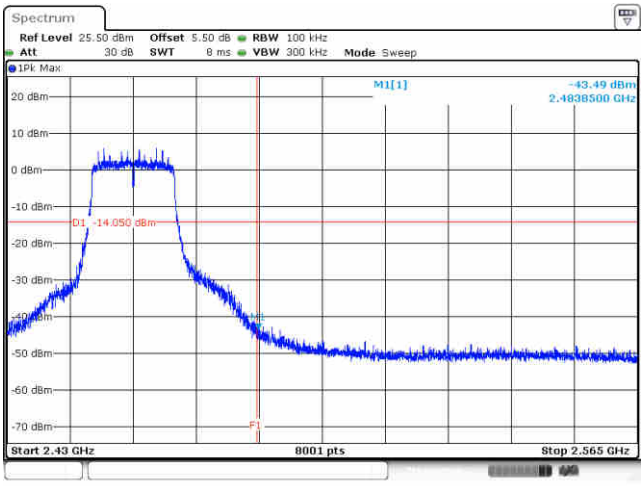
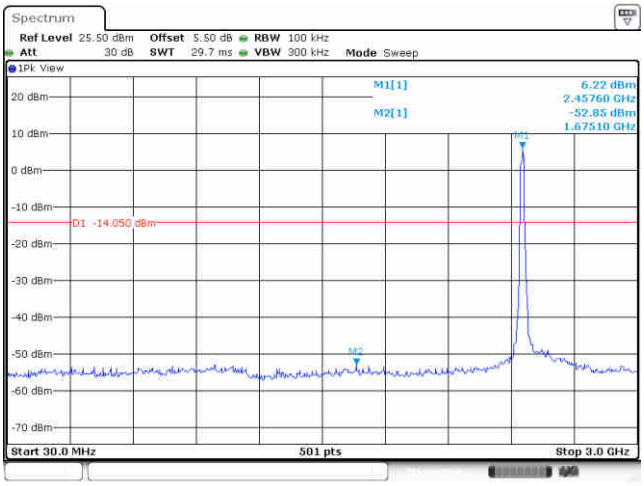
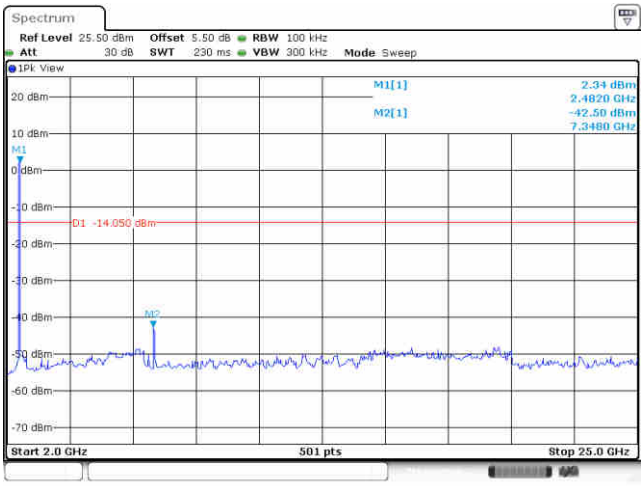
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11n HT20	Test Channel :	06

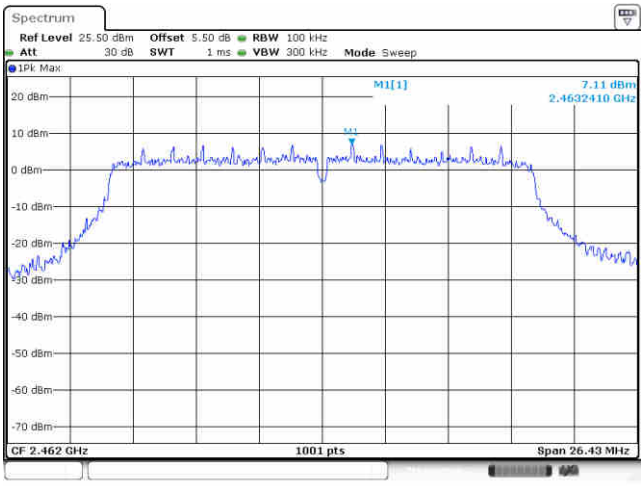
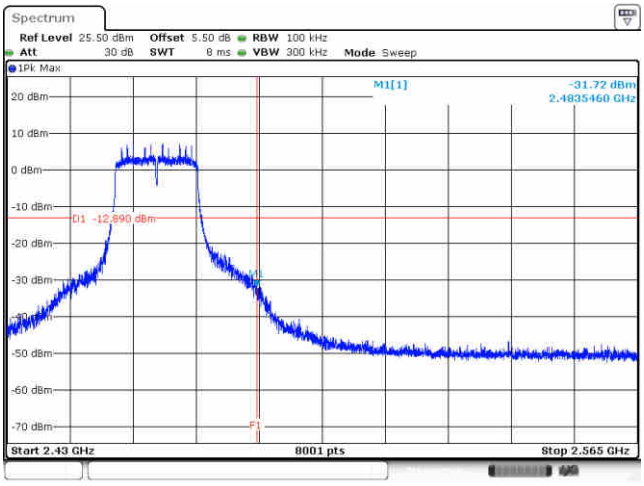
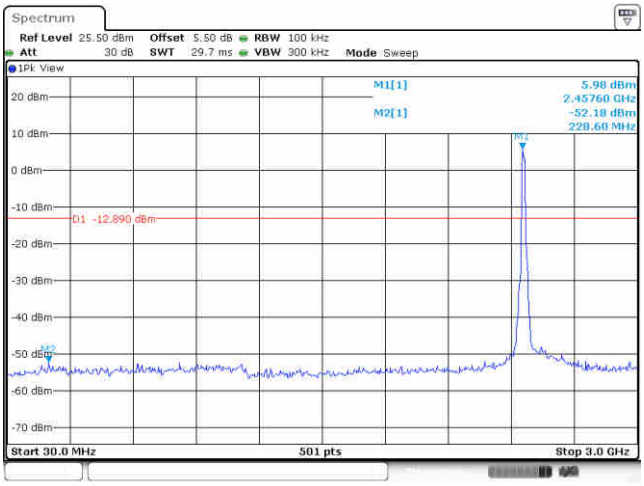
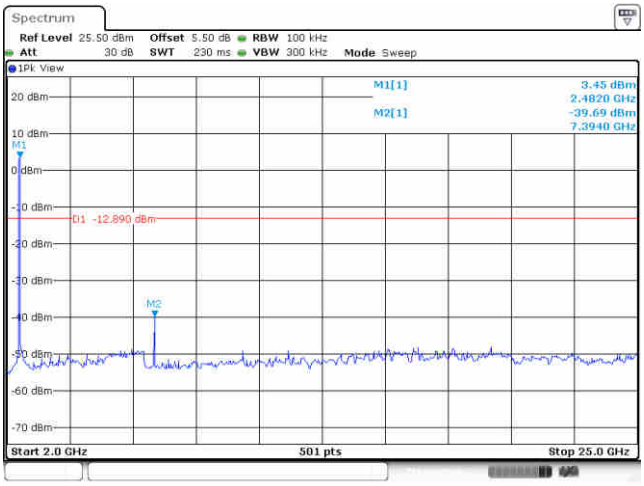
100kHz PSD reference Level	Channel Plot
	N/A

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

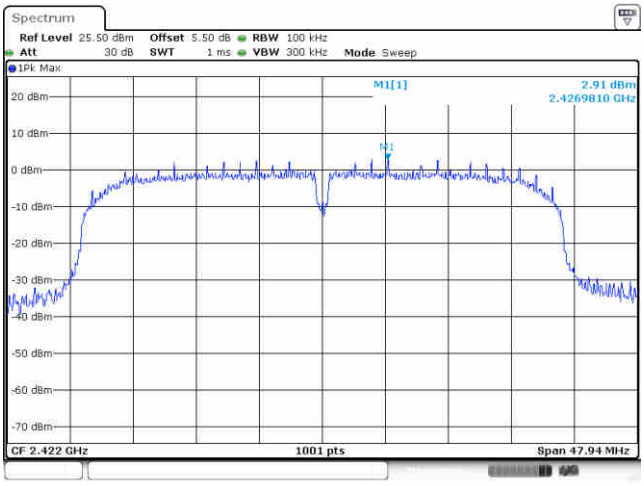
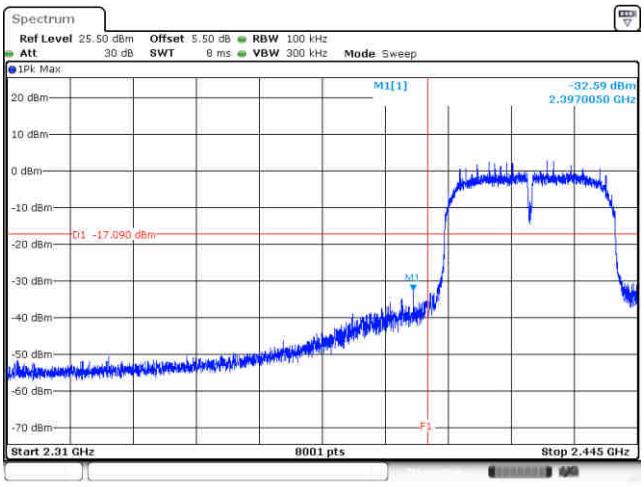
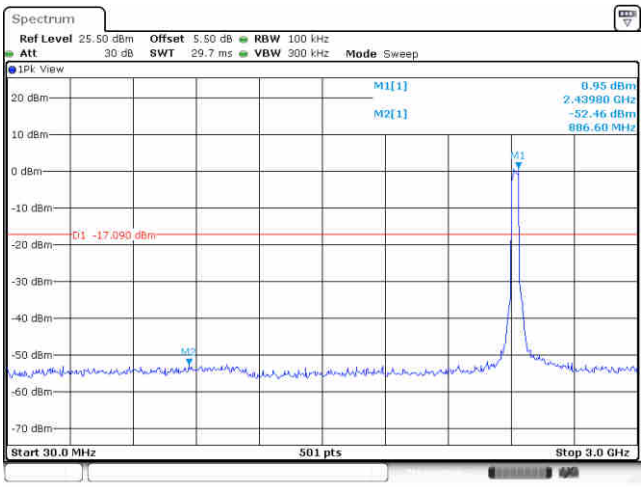
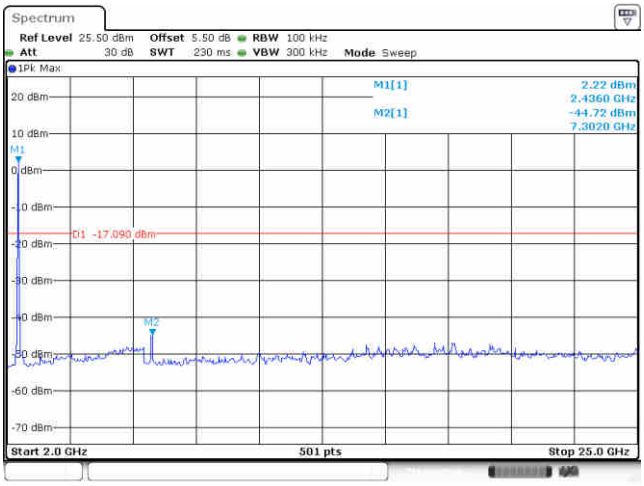
Test Mode :	802.11n HT20	Test Channel :	10

100kHz PSD reference Level	Channel Plot
	
Date: 7.JAN.2022 09:20:28	Date: 7.JAN.2022 09:20:45
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 7.JAN.2022 09:21:39	Date: 7.JAN.2022 09:21:51

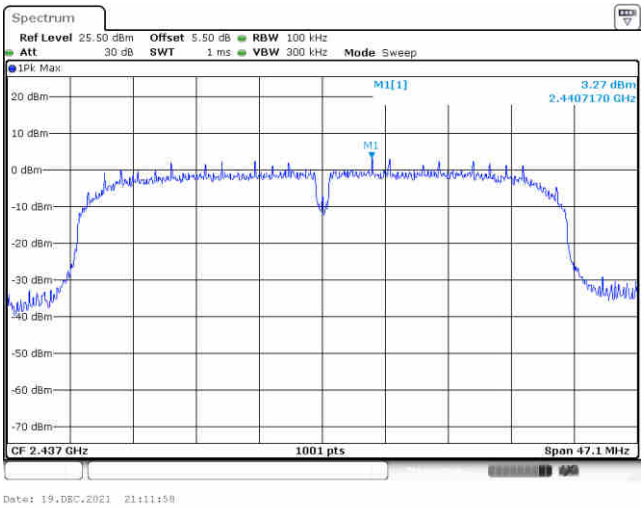
Test Mode :	802.11n HT20	Test Channel :	11

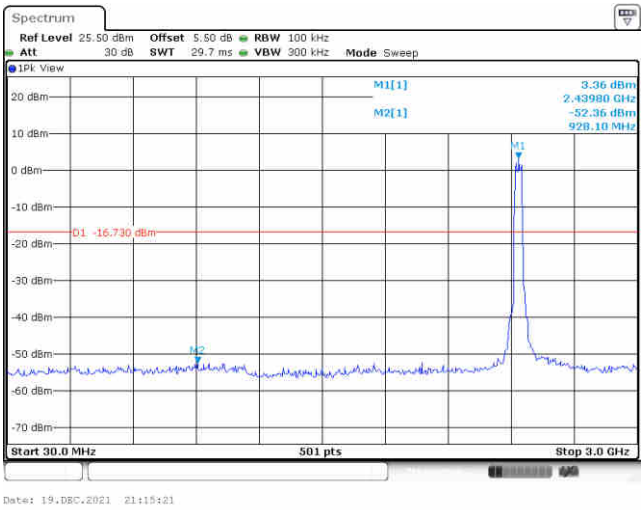
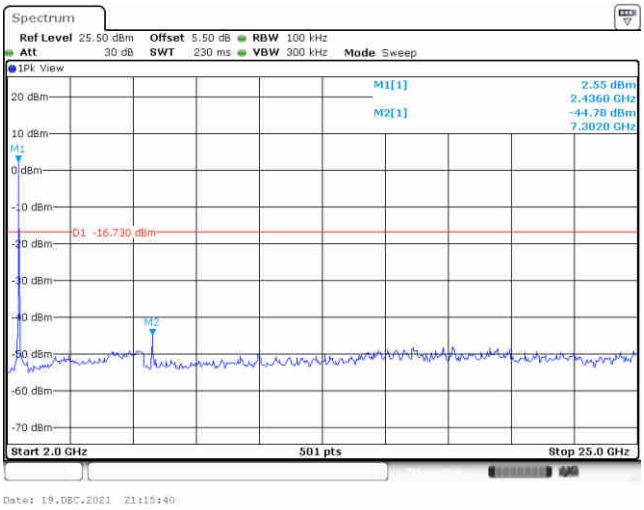
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11n HT40	Test Channel :	03

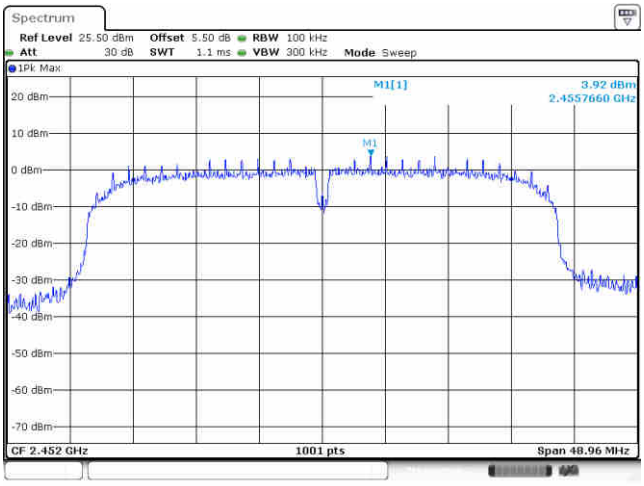
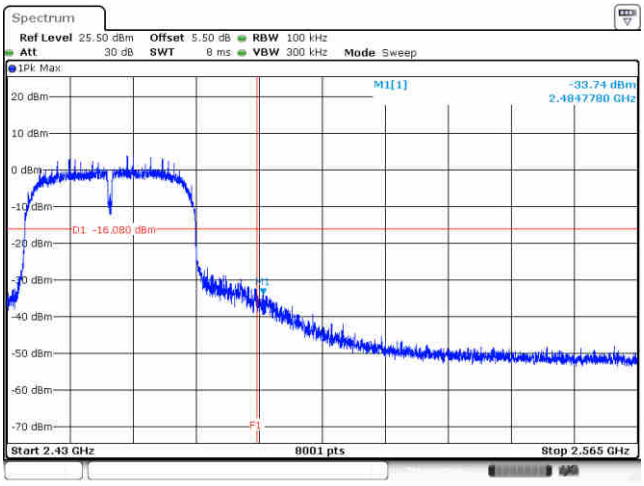
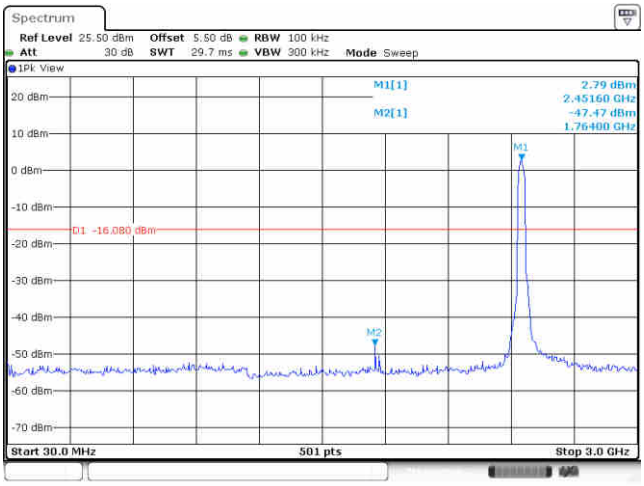
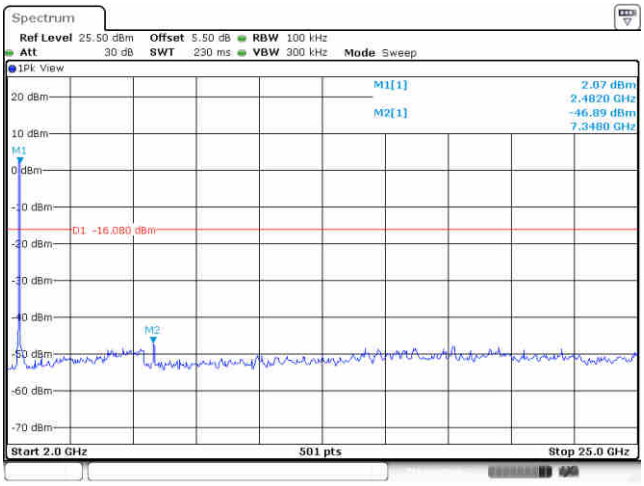
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11n HT40	Test Channel :	06

100kHz PSD reference Level	Channel Plot
	N/A

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

Test Mode :	802.11n HT40	Test Channel :	09

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

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

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

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

3.5.2 Measuring Instruments

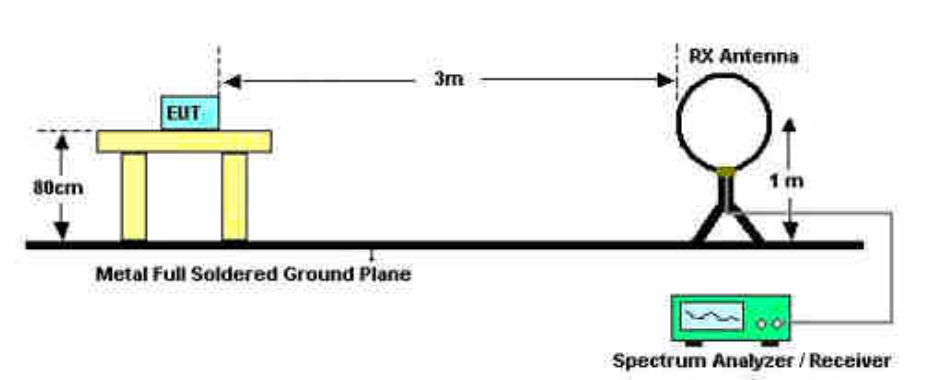
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

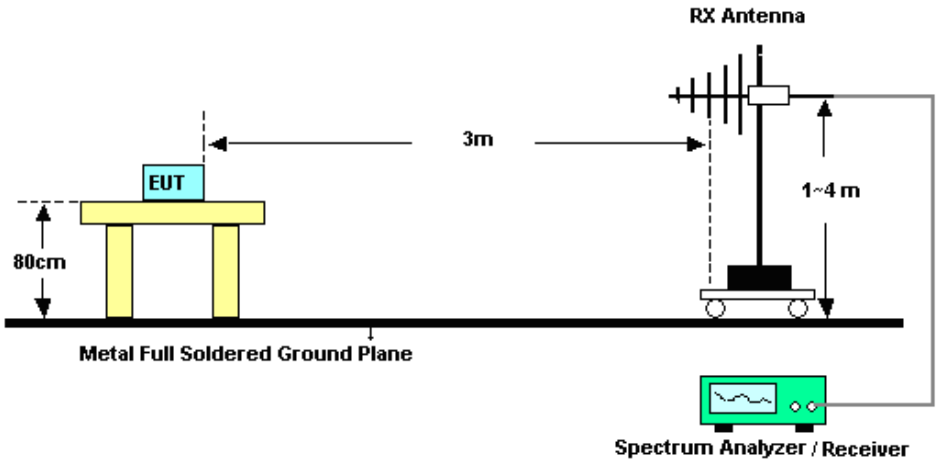
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better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

3.5.4 Test Setup

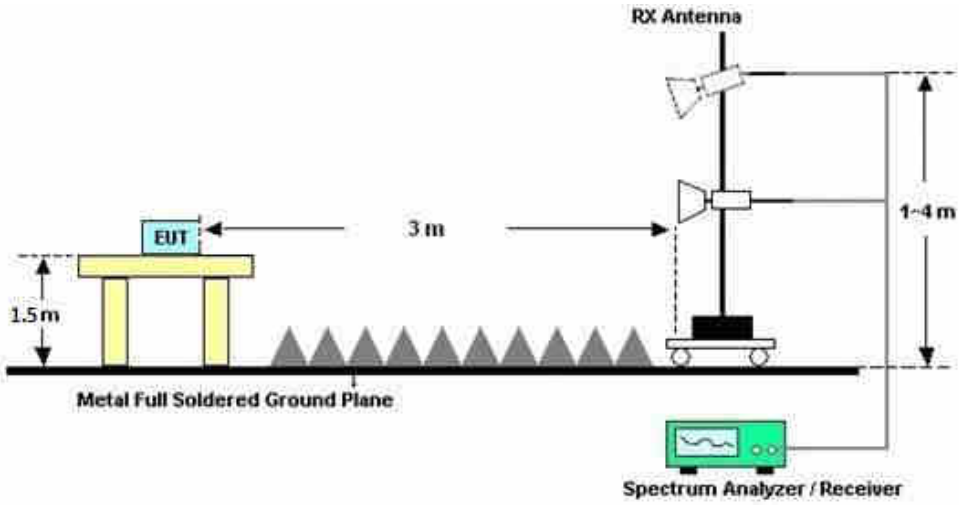
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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

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

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C.

3.5.7 Duty Cycle

Please refer to Appendix D.

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

Please refer to Appendix C.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

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

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

*Decreases with the logarithm of the frequency.

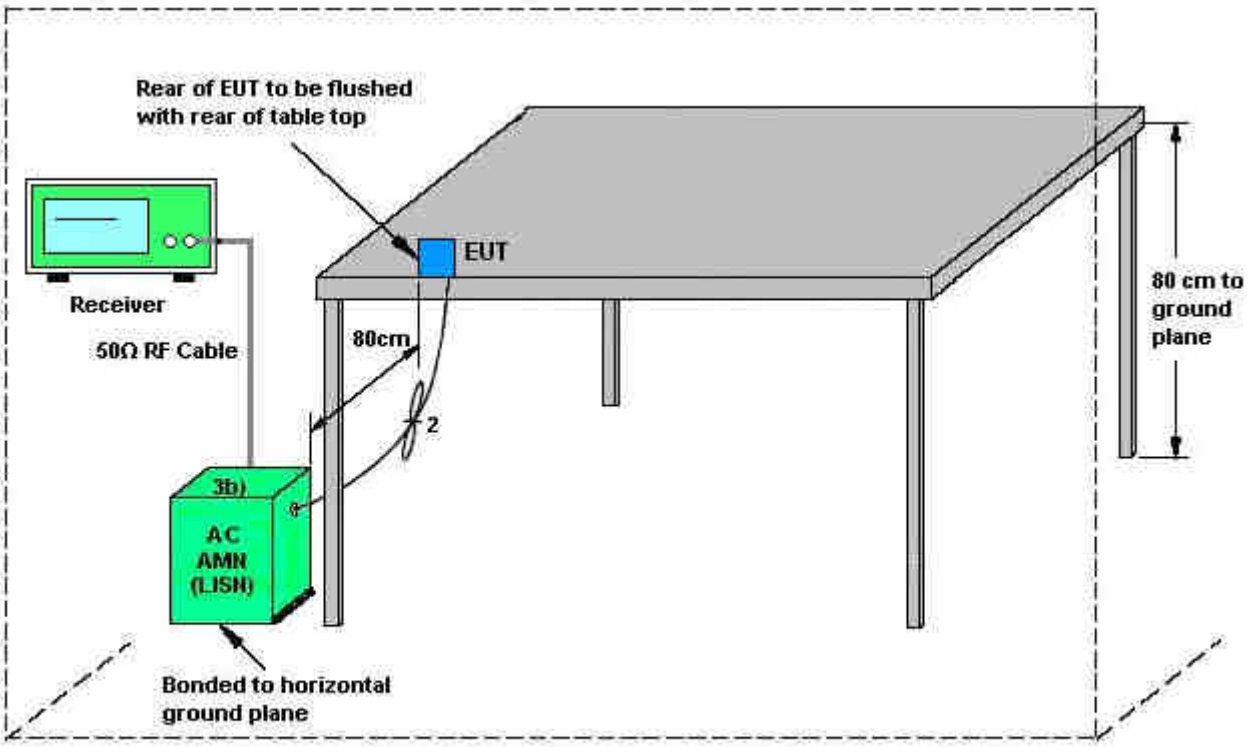
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

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

3.6.4 Test Setup



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

An embedded-in antenna design 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	Dec. 19, 2021~ Jan. 07, 2022	Oct. 13, 2022	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 07, 2021	Dec. 19, 2021~ Jan. 07, 2022	Jan. 06, 2023	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 07, 2021	Dec. 19, 2021~ Jan. 07, 2022	Jan. 06, 2023	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Max 30dBm	Oct. 16, 2021	Jan. 03, 2022	Oct. 15, 2022	Radiation (03CH02-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55370528	10Hz-44G,MAX 30dB	Oct. 16, 2021	Jan. 03, 2022	Oct. 15, 2022	Radiation (03CH02-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 30, 2021	Jan. 03, 2022	Oct. 29, 2022	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6111D	44483	30MHz-1GHz	Jan. 26, 2021	Jan. 03, 2022	Jan. 25, 2022	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Oct. 30, 2021	Jan. 03, 2022	Oct. 29, 2022	Radiation (03CH02-KS)
SHF-EHF Horn	Com-power	AH-840	101115	18GHz~40GHz	Nov. 05, 2021	Jan. 03, 2022	Nov. 04, 2022	Radiation (03CH02-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Jan. 06, 2021	Jan. 03, 2022	Jan. 05, 2022	Radiation (03CH02-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2025788	100MHz-18GHz	Jan. 06, 2021	Jan. 03, 2022	Jan. 05, 2022	Radiation (03CH02-KS)
Amplifier	Keysight	83017A	MY53270316	500MHz~26.5GHz	Oct. 16, 2021	Jan. 03, 2022	Oct. 15,2022	Radiation (03CH02-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 06, 2021	Jan. 03, 2022	Jan. 05, 2022	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	Jan. 03, 2022	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Jan. 03, 2022	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Jan. 03, 2022	NCR	Radiation (03CH02-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 21, 2021	Jan. 18, 2022	Apr. 20, 2022	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 14, 2021	Jan. 18, 2022	Oct. 13, 2022	Conduction (CO01-KS)
AC LISN	R&S	ENV216	100334	9kHz~30MHz	Apr. 13, 2021	Jan. 18, 2022	Apr. 12, 2022	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 14, 2021	Jan. 18, 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 (150kHz ~ 30MHz)

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))	**4.9dB**

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))	**5.1dB**

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

Appendix A. Conducted Test Results

A1. Conducted Test Results

Test Engineer:	kid shi	Temperature:	21~25	°C
Test Date:	2021/12/19~2022/1/07	Relative Humidity:	51~54	%

Report Number : FR1N0918B

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	13.14	-	9.04	-	0.50	Pass
11b	1Mbps	1	6	2437	13.19	-	8.62	-	0.50	Pass
11b	1Mbps	1	11	2462	13.14	-	10.04	-	0.50	Pass
11g	6Mbps	1	1	2412	18.68	-	16.34	-	0.50	Pass
11g	6Mbps	1	6	2437	18.83	-	16.34	-	0.50	Pass
11g	6Mbps	1	10	2457	18.63	-	16.32	-	0.50	Pass
11g	6Mbps	1	11	2462	19.03	-	16.32	-	0.50	Pass
HT20	MCS0	1	1	2412	19.13	-	17.58	-	0.50	Pass
HT20	MCS0	1	6	2437	19.13	-	17.56	-	0.50	Pass
HT20	MCS0	1	10	2457	19.13	-	17.55	-	0.50	Pass
HT20	MCS0	1	11	2462	19.18	-	17.62	-	0.50	Pass
HT40	MCS0	1	3	2422	34.67	-	31.96	-	0.50	Pass
HT40	MCS0	1	6	2437	34.77	-	31.40	-	0.50	Pass
HT40	MCS0	1	9	2452	34.57	-	32.64	-	0.50	Pass

Report Number : FR1N0918B

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	21.57	-		30.00	-	4.54	-	26.11	-	36.00	-	Pass
11b	1Mbps	1	6	2437	21.59	-		30.00	-	4.54	-	26.13	-	36.00	-	Pass
11b	1Mbps	1	11	2462	22.48	-		30.00	-	4.54	-	27.02	-	36.00	-	Pass
11g	6Mbps	1	1	2412	24.52	-		30.00	-	4.54	-	29.06	-	36.00	-	Pass
11g	6Mbps	1	6	2437	25.26	-		30.00	-	4.54	-	29.80	-	36.00	-	Pass
11g	6Mbps	1	10	2457	25.27	-		30.00	-	4.54	-	29.81	-	36.00	-	Pass
11g	6Mbps	1	11	2462	23.89	-		30.00	-	4.54	-	28.43	-	36.00	-	Pass
HT20	MCS0	1	1	2412	23.84	-		30.00	-	4.54	-	28.38	-	36.00	-	Pass
HT20	MCS0	1	6	2437	24.93	-		30.00	-	4.54	-	29.47	-	36.00	-	Pass
HT20	MCS0	1	10	2457	25.08	-		30.00	-	4.54	-	29.62	-	36.00	-	Pass
HT20	MCS0	1	11	2462	22.51	-		30.00	-	4.54	-	27.05	-	36.00	-	Pass
HT40	MCS0	1	3	2422	24.37	-		30.00	-	4.54	-	28.91	-	36.00	-	Pass
HT40	MCS0	1	6	2437	24.81	-		30.00	-	4.54	-	29.35	-	36.00	-	Pass
HT40	MCS0	1	9	2452	23.85	-		30.00	-	4.54	-	28.39	-	36.00	-	Pass

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

Report Number : FR1N0918B

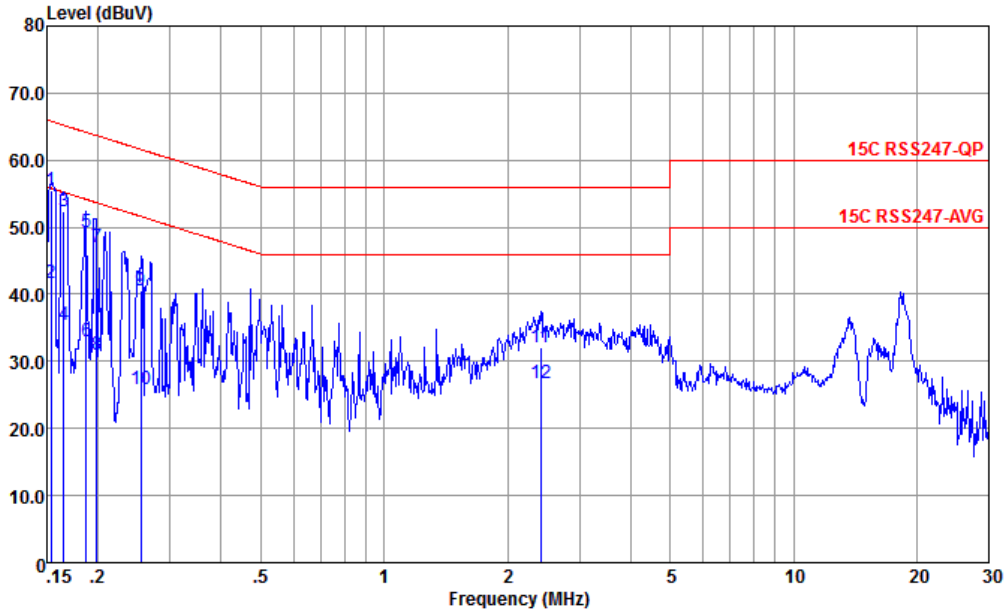
TEST RESULTS DATA
Peak Power Spectral Density

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	-3.70	-		4.54	-	8.00	-	Pass
11b	1Mbps	1	6	2437	-2.44	-		4.54	-	8.00	-	Pass
11b	1Mbps	1	11	2462	-2.08	-		4.54	-	8.00	-	Pass
11g	6Mbps	1	1	2412	-8.12	-		4.54	-	8.00	-	Pass
11g	6Mbps	1	6	2437	-6.47	-		4.54	-	8.00	-	Pass
11g	6Mbps	1	10	2457	-7.03	-		4.54	-	8.00	-	Pass
11g	6Mbps	1	11	2462	-10.33	-		4.54	-	8.00	-	Pass
HT20	MCS0	1	1	2412	-9.19	-		4.54	-	8.00	-	Pass
HT20	MCS0	1	6	2437	-6.74	-		4.54	-	8.00	-	Pass
HT20	MCS0	1	10	2457	-7.02	-		4.54	-	8.00	-	Pass
HT20	MCS0	1	11	2462	-11.52	-		4.54	-	8.00	-	Pass
HT40	MCS0	1	3	2422	-10.55	-		4.54	-	8.00	-	Pass
HT40	MCS0	1	6	2437	-9.86	-		4.54	-	8.00	-	Pass
HT40	MCS0	1	9	2452	-12.35	-		4.54	-	8.00	-	Pass

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

Appendix B. AC Conducted Emission Test Results

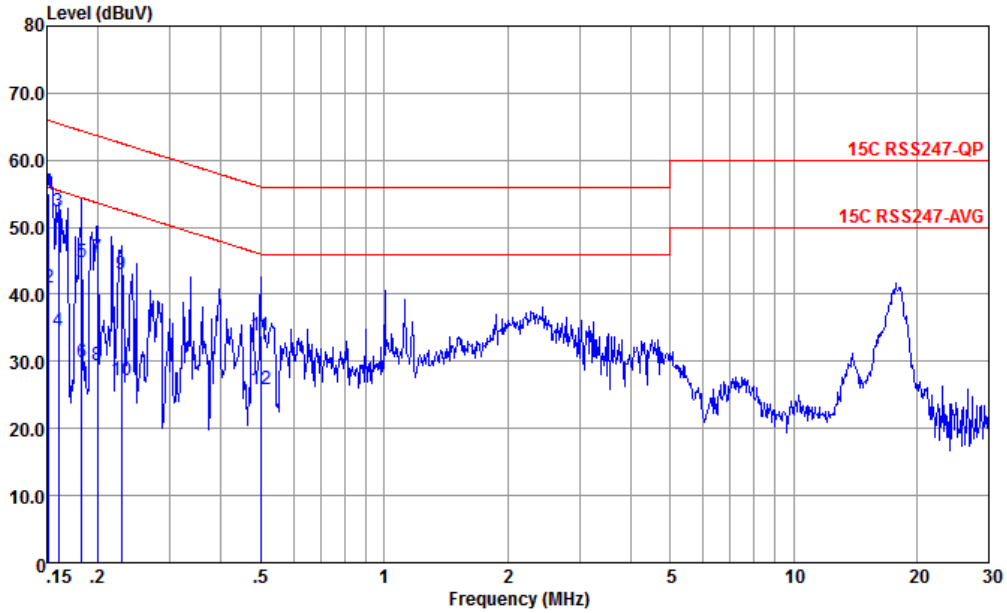
Test Engineer :	Amos Zhang	**Temperature :**	25.3~26.2℃
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line



Site : CO01-KS
Condition : 15C RSS247-QP 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	55.59	-10.23	65.82	45.10	0.02	10.47	QP
2	0.153	41.69	-14.13	55.82	31.20	0.02	10.47	Average
3	0.165	52.37	-12.84	65.21	41.90	0.03	10.44	QP
4	0.165	35.37	-19.84	55.21	24.90	0.03	10.44	Average
5	0.187	49.33	-14.82	64.15	38.90	0.04	10.39	QP
6	0.187	33.03	-21.12	54.15	22.60	0.04	10.39	Average
7	0.199	47.01	-16.66	63.67	36.60	0.04	10.37	QP
8	0.199	30.91	-22.76	53.67	20.50	0.04	10.37	Average
9	0.255	40.59	-21.01	61.60	30.20	0.06	10.33	QP
10	0.255	25.89	-25.71	51.60	15.50	0.06	10.33	Average
11	2.409	31.98	-24.02	56.00	21.61	0.14	10.23	QP
12	2.409	26.68	-19.32	46.00	16.31	0.14	10.23	Average

Test Engineer :	Amos Zhang	**Temperature :**	25.3~26.2℃
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral



Site : CO01-KS
Condition : 15C RSS247-QP LISN-060105-N NEUTRAL

		Freq MHz	Level dBuV	Over Limit dB	Limit Line dBuV	Read Level dBuV	LISN Factor dB	Cable Loss dB	Remark
1	*	0.152	55.09	-10.82	65.91	44.50	0.11	10.48	QP
2		0.152	41.09	-14.82	55.91	30.50	0.11	10.48	Average
3		0.160	52.46	-13.01	65.47	41.90	0.11	10.45	QP
4		0.160	34.46	-21.01	55.47	23.90	0.11	10.45	Average
5		0.182	44.70	-19.67	64.37	34.20	0.10	10.40	QP
6		0.182	29.80	-24.57	54.37	19.30	0.10	10.40	Average
7		0.200	45.37	-18.25	63.62	34.91	0.10	10.36	QP
8		0.200	29.36	-24.26	53.62	18.90	0.10	10.36	Average
9		0.228	42.95	-19.57	62.52	32.50	0.10	10.35	QP
10		0.228	27.25	-25.27	52.52	16.80	0.10	10.35	Average
11		0.499	33.85	-22.16	56.01	23.51	0.11	10.23	QP
12		0.499	25.84	-20.17	46.01	15.50	0.11	10.23	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%

Band		Power setting
11b Tx	CH01	0
11b Tx	CH06	0
11b Tx	CH11	0
11g Tx	CH01	4
11g Tx	CH06	0
11g Tx	CH10	0
11g Tx	CH11	16
11n(20M) Tx	CH01	6
11n(20M) Tx	CH06	0
11n(20M) Tx	CH10	0
11n(20M) Tx	CH11	20
11n(40M) Tx	CH03	2
11n(40M) Tx	CH06	0
11n(40M) Tx	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		2387.48	57.79	-16.21	74	57.05	30.5	7.1	36.86	354	0	P	H
		2385.92	46.6	-7.4	54	45.86	30.5	7.1	36.86	354	0	A	H
	*	2412	112.56	-	-	111.71	30.57	7.13	36.85	354	0	P	H
	*	2412	105.28	-	-	104.43	30.57	7.13	36.85	354	0	A	H
		2385.66	59.86	-14.14	74	59.12	30.5	7.1	36.86	103	312	P	V
		2385.92	48.76	-5.24	54	48.02	30.5	7.1	36.86	103	312	A	V
	*	2412	113.33	-	-	112.48	30.57	7.13	36.85	103	312	P	V
	*	2410	106.22	-	-	105.37	30.57	7.13	36.85	103	312	A	V
802.11b CH 11 2462MHz		2483.56	58.7	-15.3	74	57.41	30.86	7.25	36.82	378	354	P	H
		2488.48	48.26	-5.74	54	46.89	30.93	7.25	36.81	378	354	A	H
	*	2462	114.81	-	-	113.63	30.79	7.22	36.83	378	354	P	H
	*	2462	107.6	-	-	106.42	30.79	7.22	36.83	378	354	A	H
		2488.84	59.06	-14.94	74	57.69	30.93	7.25	36.81	138	314	P	V
		2488.6	49.02	-4.98	54	47.65	30.93	7.25	36.81	138	314	A	V
	*	2462	114.73	-	-	113.55	30.79	7.22	36.83	138	314	P	V
	*	2462	107.79	-	-	106.61	30.79	7.22	36.83	138	314	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	54.01	-19.99	74	74.53	34.61	10.25	65.38	104	212	P	H
		4830	47.85	-6.15	54	68.37	34.61	10.25	65.38	104	212	A	H
		7230	50.55	-34.97	85.52	66.78	36.71	12.71	65.65	300	0	P	H
		9645	49.62	-35.9	85.52	63.86	37.79	14.94	66.97	300	0	P	H
	*	4830	53.19	-20.81	74	73.71	34.61	10.25	65.38	296	138	P	V
		4830	46.77	-7.23	54	67.29	34.61	10.25	65.38	296	138	A	V
		7230	50.12	-36	86.12	66.35	36.71	12.71	65.65	100	0	P	V
		9645	52.82	-33.3	86.12	67.06	37.79	14.94	66.97	100	0	P	V
802.11b CH 06 2437MHz	*	4875	53.36	-20.64	74	73.8	34.69	10.29	65.42	100	215	P	H
		4875	47.89	-6.11	54	68.33	34.69	10.29	65.42	100	215	A	H
		7311	53.62	-20.38	74	70.13	36.68	12.72	65.91	107	236	P	H
		7311	44.67	-9.33	54	61.18	36.68	12.72	65.91	107	236	A	H
		9750	51.3	-32.64	83.94	65.45	37.91	14.99	67.05	300	0	P	H
		4875	52.87	-21.13	74	73.31	34.69	10.29	65.42	347	137	P	V
	*	4875	46.77	-7.23	54	67.21	34.69	10.29	65.42	347	137	A	V
		7305	54.42	-19.58	74	70.93	36.68	12.72	65.91	100	295	P	V
		7305	46.18	-7.82	54	62.69	36.68	12.72	65.91	100	295	A	V
		9750	53.47	-33.47	86.94	67.62	37.91	14.99	67.05	100	0	P	V
802.11b CH 11 2462MHz	*	4920	54.83	-19.17	74	75.17	34.77	10.34	65.45	106	216	P	H
		4920	48.5	-5.5	54	68.84	34.77	10.34	65.45	106	216	A	H
		7380	54.51	-19.49	74	71.24	36.65	12.73	66.11	238	311	P	H
		7380	46.51	-7.49	54	63.24	36.65	12.73	66.11	238	311	A	H
		9840	53.43	-32.98	86.41	67.5	38.01	15.03	67.11	300	0	P	H
		4920	54.47	-19.53	74	74.81	34.77	10.34	65.45	100	145	P	V
	*	4920	47.57	-6.43	54	67.91	34.77	10.34	65.45	100	145	A	V
		7380	54.72	-19.28	74	71.45	36.65	12.73	66.11	100	294	P	V
		7380	46.65	-7.35	54	63.38	36.65	12.73	66.11	100	294	A	V
		9840	54.99	-32.81	87.80	69.06	38.01	15.03	67.11	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		2389.95	70.64	-3.36	74	69.9	30.5	7.1	36.86	354	356	P	H
		2389.95	52.82	-1.18	54	52.08	30.5	7.1	36.86	354	356	A	H
	*	2412	109.77	-	-	108.92	30.57	7.13	36.85	354	356	P	H
	*	2410	101.24	-	-	100.39	30.57	7.13	36.85	354	356	A	H
		2389.82	71.12	-2.88	74	70.38	30.5	7.1	36.86	130	214	P	V
		2389.95	52.71	-1.29	54	51.97	30.5	7.1	36.86	130	214	A	V
	*	2412	109.28	-	-	108.43	30.57	7.13	36.85	130	214	P	V
	*	2410	101.57	-	-	100.72	30.57	7.13	36.85	130	214	A	V
802.11g CH 10 2457MHz		2483.5	61.77	-12.23	74	60.48	30.86	7.25	36.82	384	223	P	H
		2483.5	48.29	-5.71	54	47	30.86	7.25	36.82	384	223	A	H
	*	2452	108.96	-	-	107.9	30.71	7.19	36.84	384	223	P	H
	*	2452	101.16	-	-	100.1	30.71	7.19	36.84	384	223	A	H
		2483.56	66.28	-7.72	74	64.99	30.86	7.25	36.82	112	222	P	V
		2483.5	52.09	-1.91	54	50.8	30.86	7.25	36.82	112	222	A	V
	*	2458	112.11	-	-	110.93	30.79	7.22	36.83	112	222	P	V
	*	2456	103.83	-	-	102.65	30.79	7.22	36.83	112	222	A	V
802.11g CH 11 2462MHz		2483.5	69.39	-4.61	74	68.1	30.86	7.25	36.82	377	9	P	H
		2483.5	50.97	-3.03	54	49.68	30.86	7.25	36.82	377	9	A	H
		2456	108.31	-	-	107.13	30.79	7.22	36.83	377	9	P	H
		2456	100.4	-	-	99.22	30.79	7.22	36.83	377	9	A	H
		2483.56	71.65	-2.35	74	70.36	30.86	7.25	36.82	124	313	P	V
		2483.5	52.77	-1.23	54	51.48	30.86	7.25	36.82	124	313	A	V
		2468	108.73	-	-	107.55	30.79	7.22	36.83	124	313	P	V
		2468	101.03	-	-	99.85	30.79	7.22	36.83	124	313	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	48.07	-25.93	74	63.25	34.61	10.25	60.04	300	0	P	H
		4830	47.21	-26.79	74	62.39	34.61	10.25	60.04	100	0	P	V
802.11g CH 06 2437MHz		4875	47.38	-26.62	74	62.43	34.69	10.29	60.03	300	0	P	H
		7320	56.32	-17.68	74	67.45	36.67	12.72	60.52	241	310	P	H
		7320	46.37	-7.63	54	57.5	36.67	12.72	60.52	241	310	A	H
		4875	47.39	-26.61	74	62.44	34.69	10.29	60.03	100	0	P	V
		7305	56.82	-17.18	74	67.93	36.68	12.72	60.51	100	283	P	V
		7305	45.18	-8.82	54	56.29	36.68	12.72	60.51	100	283	A	V
802.11g CH 10 2457MHz		4914	49.93	-24.07	74	70.29	34.74	10.34	65.44	300	0	P	H
		7365	54.95	-19.05	74	71.62	36.66	12.73	66.06	269	235	P	H
		7365	43.27	-10.73	54	59.94	36.66	12.73	66.06	269	235	A	H
		4914	48.3	-25.7	74	68.66	34.74	10.34	65.44	100	0	P	V
		7365	54.94	-19.06	74	71.61	36.66	12.73	66.06	100	277	P	V
		7365	43.98	-10.02	54	60.65	36.66	12.73	66.06	100	277	A	V
802.11g CH 11 2462MHz		4920	47.87	-26.13	74	62.78	34.77	10.34	60.02	300	0	P	H
		7380	48.52	-25.48	74	59.67	36.65	12.73	60.53	300	0	P	H
		4920	46.5	-27.5	74	61.41	34.77	10.34	60.02	100	0	P	V
		7380	47.87	-26.13	74	59.02	36.65	12.73	60.53	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		2389.82	68.27	-5.73	74	67.53	30.5	7.1	36.86	354	0	P	H
		2389.95	51.31	-2.69	54	50.57	30.5	7.1	36.86	354	0	A	H
	*	2414	108.05	-	-	107.2	30.57	7.13	36.85	354	0	P	H
	*	2410	99.96	-	-	99.11	30.57	7.13	36.85	354	0	A	H
		2389.95	69.68	-4.32	74	68.94	30.5	7.1	36.86	102	210	P	V
		2389.95	52.76	-1.24	54	52.02	30.5	7.1	36.86	102	210	A	V
	*	2410	108.6	-	-	107.75	30.57	7.13	36.85	102	210	P	V
	*	2410	100.54	-	-	99.69	30.57	7.13	36.85	102	210	A	V
802.11n HT20 CH 10 2457MHz		2483.74	63.42	-10.58	74	62.13	30.86	7.25	36.82	342	221	P	H
		2483.5	49.18	-4.82	54	47.89	30.86	7.25	36.82	342	221	A	H
		2464	108.31	-	-	107.13	30.79	7.22	36.83	342	221	P	H
		2464	100.23	-	-	99.05	30.79	7.22	36.83	342	221	A	H
		2483.5	65.35	-8.65	74	64.06	30.86	7.25	36.82	110	222	P	V
		2483.5	51.11	-2.89	54	49.82	30.86	7.25	36.82	110	222	A	V
		2454	111.11	-	-	109.93	30.79	7.22	36.83	110	222	P	V
		2456	102.65	-	-	101.47	30.79	7.22	36.83	110	222	A	V
802.11n HT20 CH 11 2462MHz		2483.62	66.06	-7.94	74	64.77	30.86	7.25	36.82	379	360	P	H
		2483.5	50.83	-3.17	54	49.54	30.86	7.25	36.82	379	360	A	H
	*	2460	107.77	-	-	106.59	30.79	7.22	36.83	379	360	P	H
	*	2456	98.9	-	-	97.72	30.79	7.22	36.83	379	360	A	H
		2483.62	68.25	-5.75	74	66.96	30.86	7.25	36.82	111	314	P	V
		2483.5	52.96	-1.04	54	51.67	30.86	7.25	36.82	111	314	A	V
	*	2458	107.04	-	-	105.86	30.79	7.22	36.83	111	314	P	V
	*	2456	99.38	-	-	98.2	30.79	7.22	36.83	111	314	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	46.67	-27.33	74	61.85	34.61	10.25	60.04	300	0	P	H
		4830	45.31	-28.69	74	60.49	34.61	10.25	60.04	100	0	P	V
802.11n HT20 CH 06 2437MHz		4875	48.79	-25.21	74	63.84	34.69	10.29	60.03	300	0	P	H
		7320	53.18	-20.82	74	64.31	36.67	12.72	60.52	273	239	P	H
		7320	41.85	-12.15	54	52.98	36.67	12.72	60.52	273	239	A	H
		4875	46.3	-27.7	74	61.35	34.69	10.29	60.03	100	0	P	V
		7305	53.36	-20.64	74	64.47	36.68	12.72	60.51	100	282	P	V
		7305	42.82	-11.18	54	53.93	36.68	12.72	60.51	100	282	A	V
802.11n HT20 CH 10 2457MHz		4914	46.92	-27.08	74	67.28	34.74	10.34	65.44	300	0	P	H
		7365	52.49	-21.51	74	69.16	36.66	12.73	66.06	100	229	P	H
		7365	40.51	-13.49	54	57.18	36.66	12.73	66.06	100	229	A	H
		4914	47.15	-26.85	74	67.51	34.74	10.34	65.44	100	0	P	V
		7365	53.43	-20.57	74	70.1	36.66	12.73	66.06	100	277	P	V
		7365	42.03	-11.97	54	58.7	36.66	12.73	66.06	100	277	A	V
802.11n HT20 CH 11 2462MHz		4920	48.2	-25.8	74	63.11	34.77	10.34	60.02	300	0	P	H
		7386	45.77	-28.23	74	56.93	36.64	12.73	60.53	300	0	P	H
		4920	44.5	-29.5	74	59.41	34.77	10.34	60.02	100	0	P	V
		7386	46.45	-27.55	74	57.61	36.64	12.73	60.53	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		2389.95	65.33	-8.67	74	64.59	30.5	7.1	36.86	350	360	P	H
		2389.95	49.25	-4.75	54	48.51	30.5	7.1	36.86	350	360	A	H
		2485.06	53.75	-20.25	74	52.46	30.86	7.25	36.82	350	360	P	H
		2483.5	43.04	-10.96	54	41.75	30.86	7.25	36.82	350	360	A	H
	*	2430	105.27	-	-	104.32	30.64	7.16	36.85	350	360	P	H
	*	2424	96.73	-	-	95.78	30.64	7.16	36.85	350	360	A	H
		2389.56	69.62	-4.38	74	68.88	30.5	7.1	36.86	137	313	P	V
		2389.95	52.99	-1.01	54	52.25	30.5	7.1	36.86	137	313	A	V
		2499.52	55.86	-18.14	74	54.46	30.93	7.28	36.81	137	313	P	V
		2496.1	44.97	-9.03	54	43.57	30.93	7.28	36.81	137	313	A	V
	*	2430	106.72	-	-	105.77	30.64	7.16	36.85	137	313	P	V
	*	2424	98.41	-	-	97.46	30.64	7.16	36.85	137	313	A	V
802.11n HT40 CH 06 2437MHz		2389.69	56.84	-17.16	74	56.1	30.5	7.1	36.86	302	357	P	H
		2389.95	43.35	-10.65	54	42.61	30.5	7.1	36.86	302	357	A	H
		2483.68	61.66	-12.34	74	60.37	30.86	7.25	36.82	302	357	P	H
		2483.5	48.23	-5.77	54	46.94	30.86	7.25	36.82	302	357	A	H
	*	2446	106.68	-	-	105.62	30.71	7.19	36.84	302	357	P	H
	*	2446	98.2	-	-	97.14	30.71	7.19	36.84	302	357	A	H
		2389.95	63.8	-10.2	74	63.06	30.5	7.1	36.86	100	310	P	V
		2389.95	49.22	-4.78	54	48.48	30.5	7.1	36.86	100	310	A	V
		2483.56	64.13	-9.87	74	62.84	30.86	7.25	36.82	100	310	P	V
		2483.5	49.71	-4.29	54	48.42	30.86	7.25	36.82	100	310	A	V
	*	2436	108.18	-	-	107.2	30.64	7.19	36.85	100	310	P	V
	*	2434	100.28	-	-	99.33	30.64	7.16	36.85	100	310	A	V

802.11n HT40 CH 09 2452MHz		2383.19	50.11	-23.89	74	49.4	30.48	7.1	36.87	390	360	P	H
		2389.95	39.97	-14.03	54	39.23	30.5	7.1	36.86	390	360	A	H
		2483.62	64.6	-9.4	74	63.31	30.86	7.25	36.82	390	360	P	H
		2483.5	49.15	-4.85	54	47.86	30.86	7.25	36.82	390	360	A	H
	*	2450	103.78	-	-	102.72	30.71	7.19	36.84	390	360	P	H
	*	2450	96.1	-	-	95.04	30.71	7.19	36.84	390	360	A	H
		2389.69	52.74	-21.26	74	52	30.5	7.1	36.86	104	311	P	V
		2389.95	41.51	-12.49	54	40.77	30.5	7.1	36.86	104	311	A	V
		2483.5	67.96	-6.04	74	66.67	30.86	7.25	36.82	104	311	P	V
		2483.5	52.45	-1.55	54	51.16	30.86	7.25	36.82	104	311	A	V
	*	2454	104.39	-	-	103.21	30.79	7.22	36.83	104	311	P	V
	*	2454	96.57	-	-	95.39	30.79	7.22	36.83	104	311	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		4845	43.78	-30.22	74	64.29	34.63	10.25	65.39	300	0	P	H
HT40		7260	45.2	-28.8	74	61.54	36.7	12.72	65.76	300	0	P	H
CH 03		4845	43.35	-30.65	74	63.86	34.63	10.25	65.39	100	0	P	V
2422MHz		7260	46.01	-27.99	74	62.35	36.7	12.72	65.76	100	0	P	V
802.11n		4890	45.35	-28.65	74	60.34	34.71	10.32	60.02	300	0	P	H
HT40		7320	48.61	-25.39	74	59.74	36.67	12.72	60.52	300	0	P	H
CH 06		4875	44.29	-29.71	74	59.34	34.69	10.29	60.03	100	0	P	V
2437MHz		7305	49.18	-24.82	74	60.29	36.68	12.72	60.51	100	0	P	V
802.11n		4905	42.77	-31.23	74	63.13	34.74	10.34	65.44	300	0	P	H
HT40		7350	44.33	-29.67	74	61.01	36.66	12.72	66.06	300	0	P	H
CH 09		4905	42.41	-31.59	74	62.77	34.74	10.34	65.44	100	0	P	V
2452MHz		7350	43.75	-30.25	74	60.43	36.66	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.												

Emission below 1GHz

2.4GHz WIFI 802.11n HT40 (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 802.11n HT40 LF		34.85	19.52	-20.48	40	28.66	22.3	0.76	32.2	-	-	P	H
		166.77	27.91	-15.59	43.5	42.53	15.6	1.88	32.1	-	-	P	H
		216.24	30.87	-15.13	46	46.03	14.88	2.09	32.13	-	-	P	H
		359.8	27.7	-18.3	46	36.62	20.5	2.8	32.22	-	-	P	H
		498.51	33.1	-12.9	46	38.58	23.77	3.14	32.39	-	-	P	H
		640.13	27.92	-18.08	46	30.13	26.3	3.71	32.22	-	-	P	H
		60.07	19.11	-20.89	40	38.34	11.8	1.07	32.1	-	-	P	V
		167.74	23.5	-20	43.5	38.22	15.5	1.88	32.1	-	-	P	V
		408.3	25.5	-20.5	46	32.7	22.06	3.02	32.28	-	-	P	V
		498.51	35.49	-10.51	46	40.97	23.77	3.14	32.39	-	-	P	V
		640.13	35.54	-10.46	46	37.75	26.3	3.71	32.22	-	-	P	V
		880.69	29.32	-16.68	46	28.14	29.06	4.4	32.28	-	-	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”.

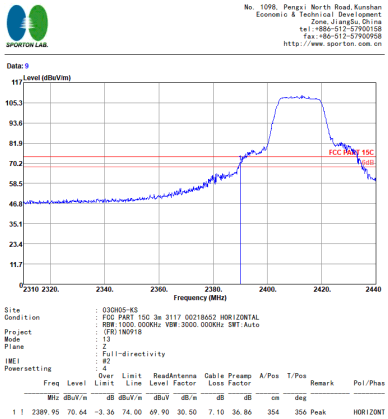
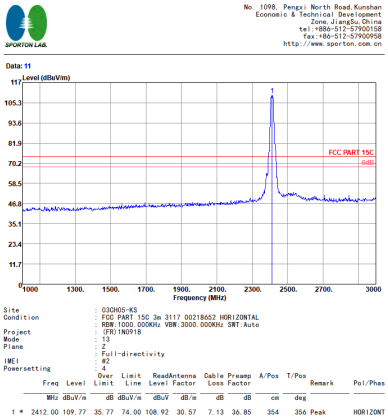
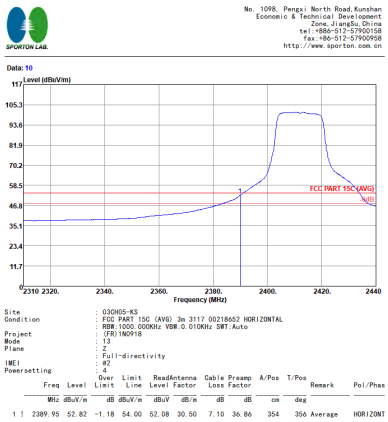
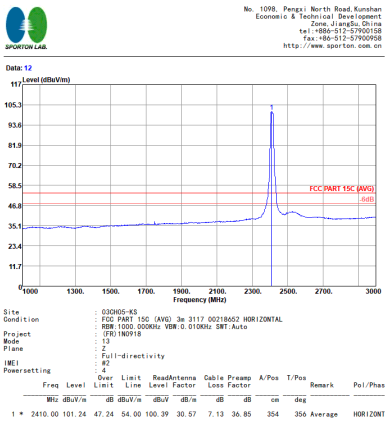
Appendix D. Radiated Spurious Emission Plots

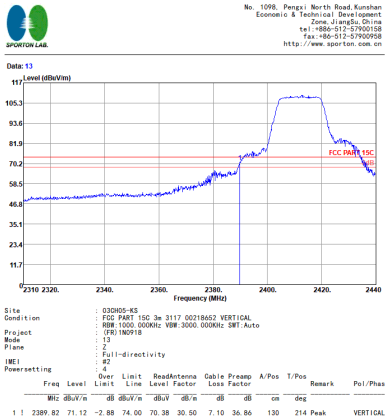
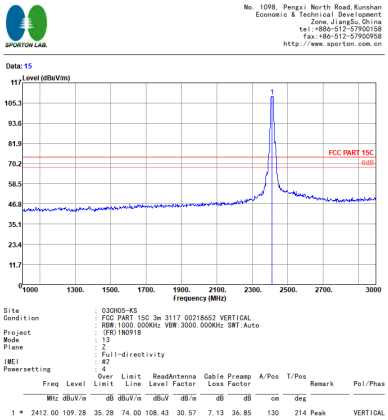
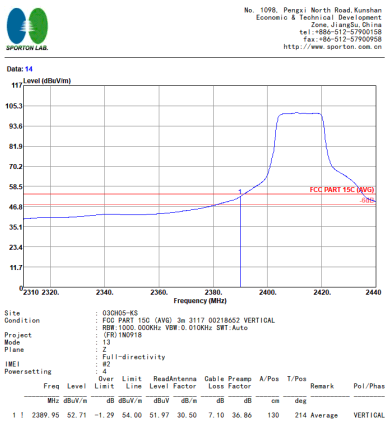
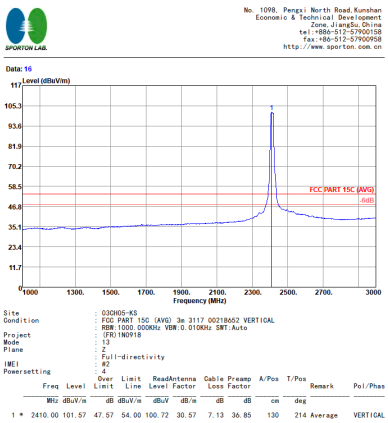
Note symbol

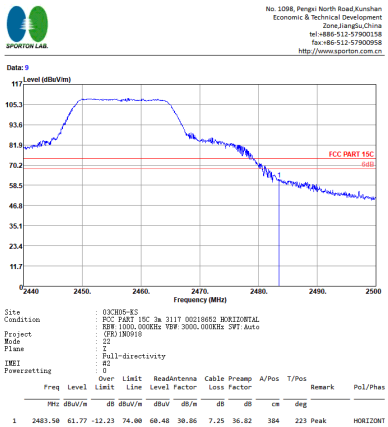
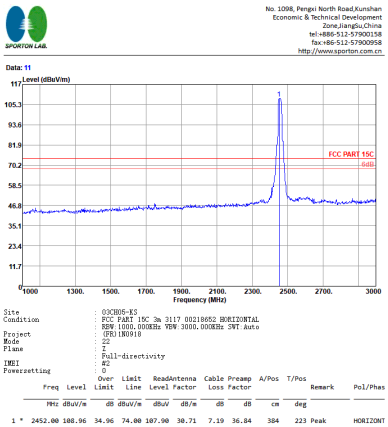
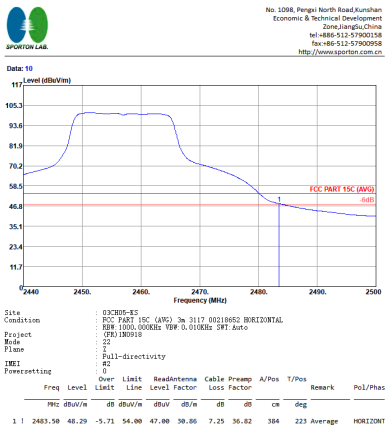
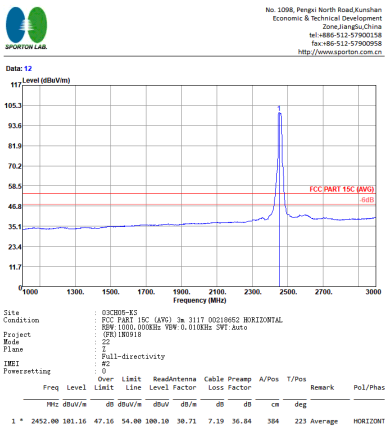
-L	**Low channel location**
-R	**High channel location**
Only the worst case Radiated Spurious Emission Plots are shown.	

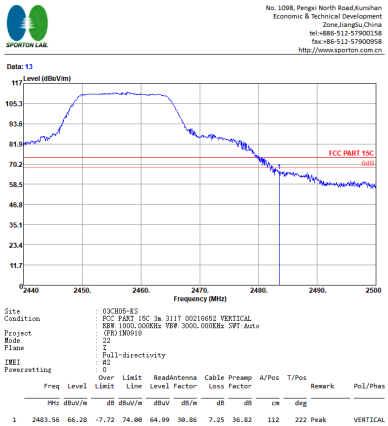
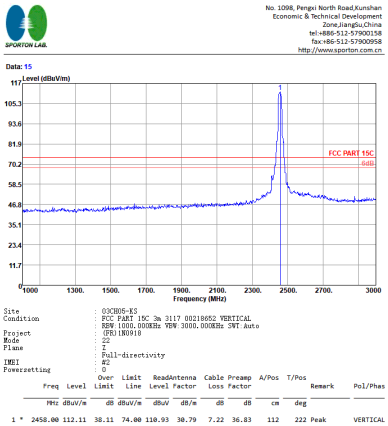
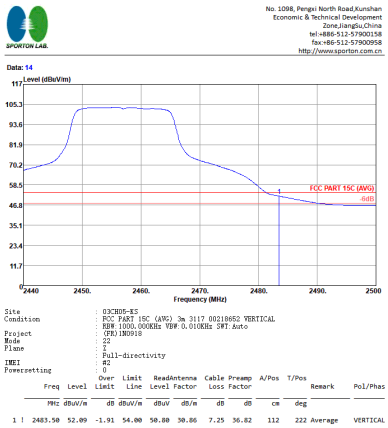
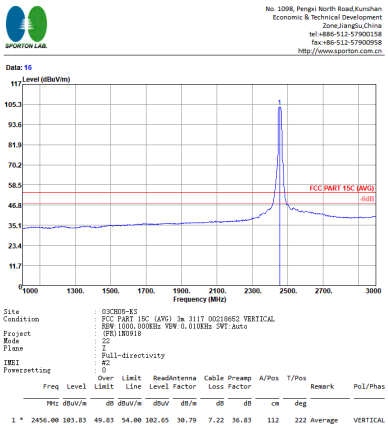
2.4GHz 2400~2483.5MHz

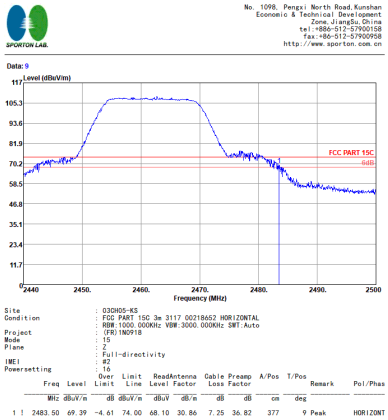
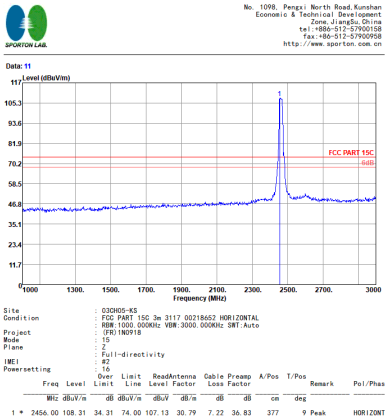
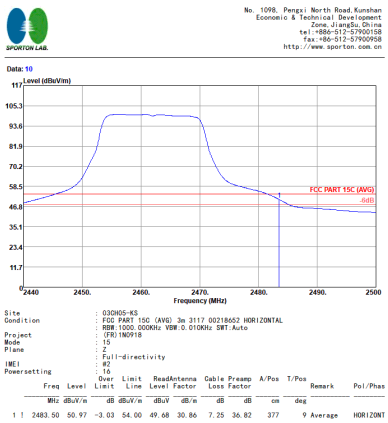
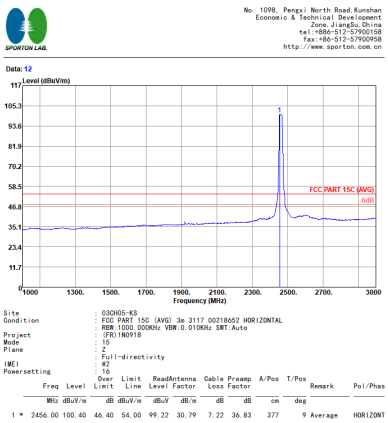
WIFI 802.11g (Band Edge @ 3m)

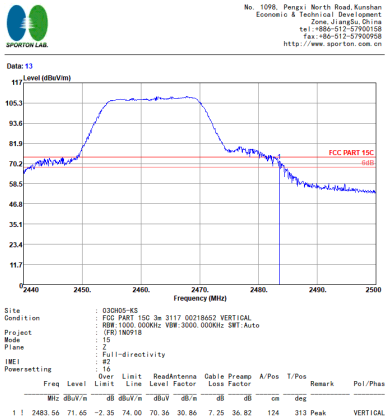
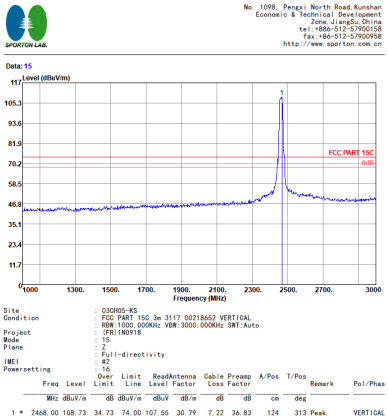
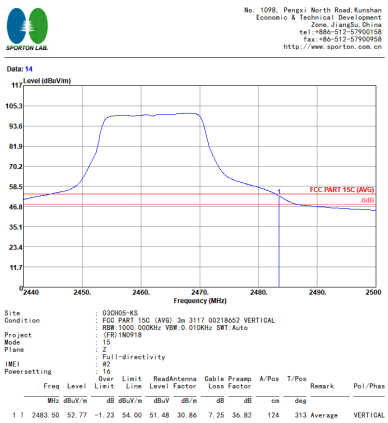
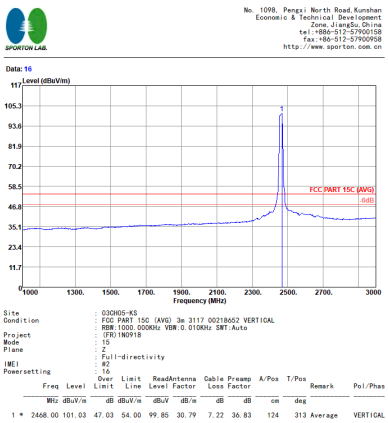
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH01 2412MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

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 CH10 2457MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		

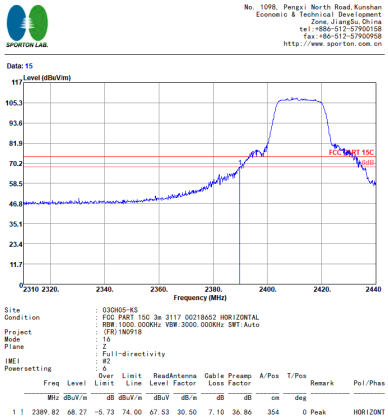
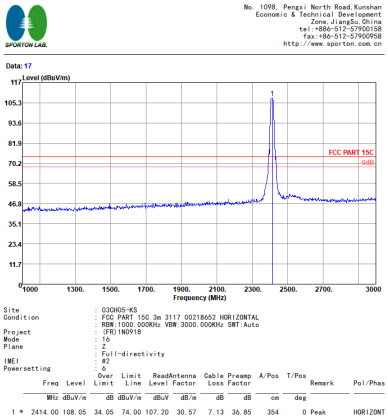
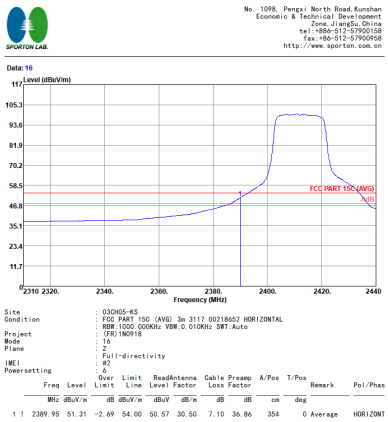
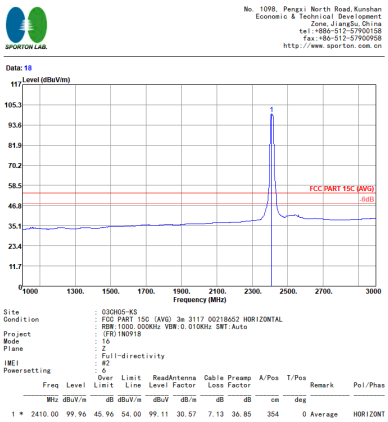
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH10 2457MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		

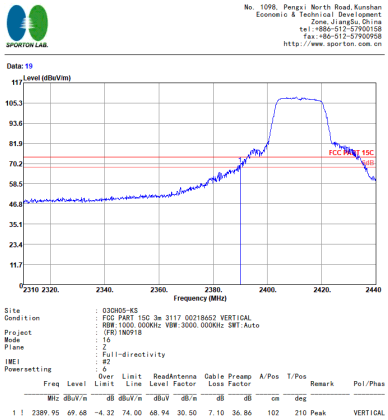
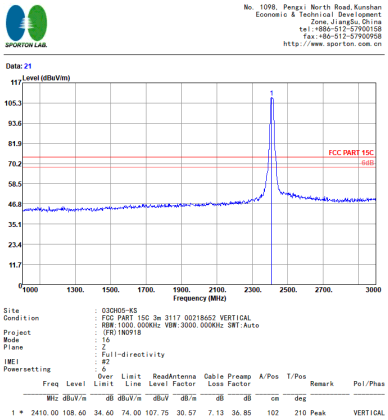
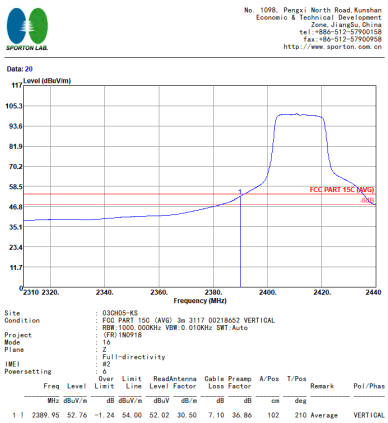
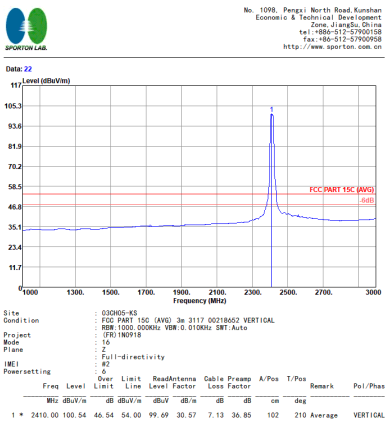
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH11 2462MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

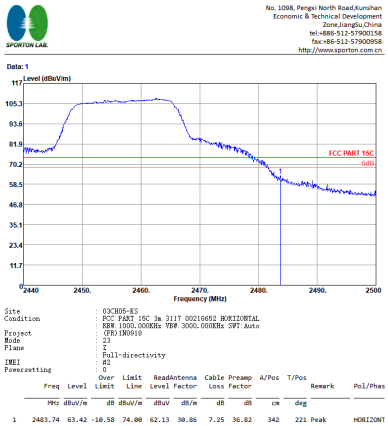
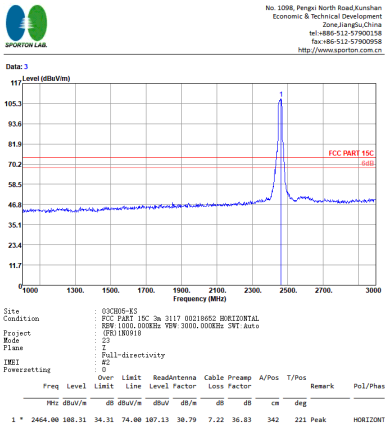
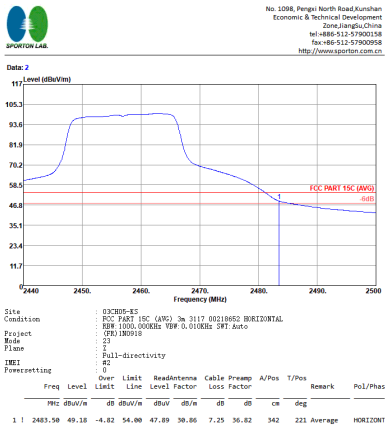
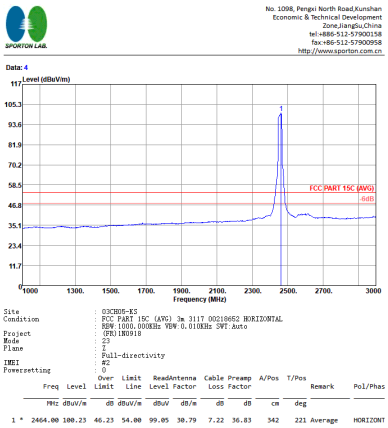
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH11 2462MHz	
1	Vertical	Fundamental
Peak		
Avg.		

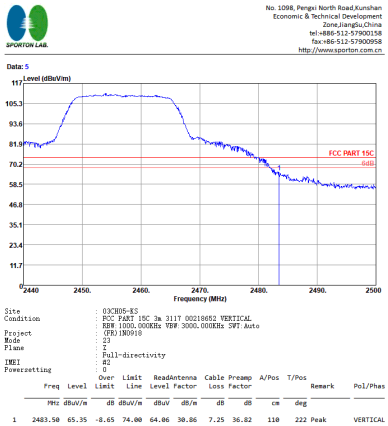
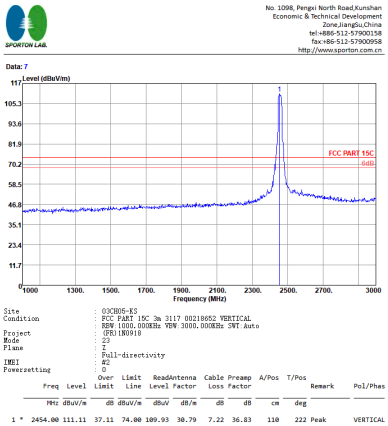
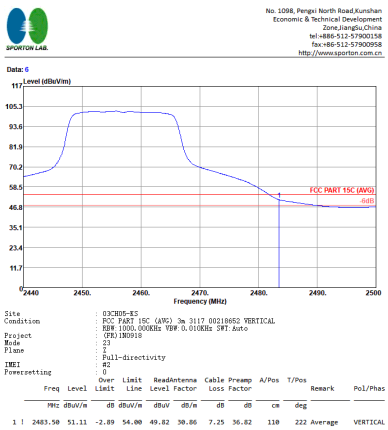
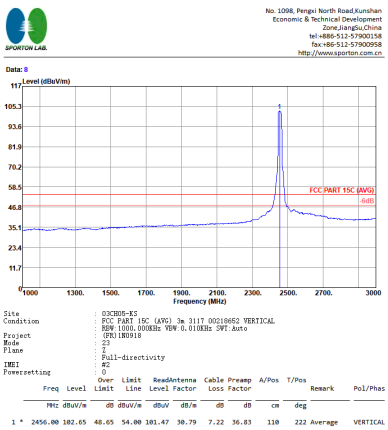
2.4GHz 2400~2483.5MHz

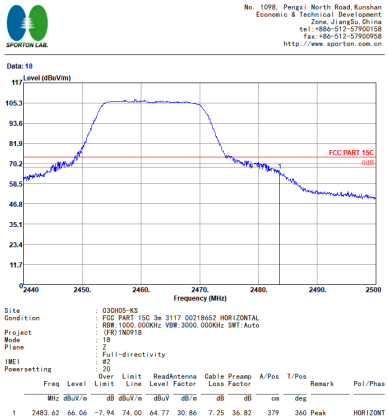
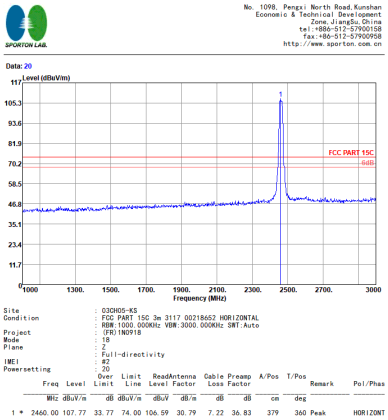
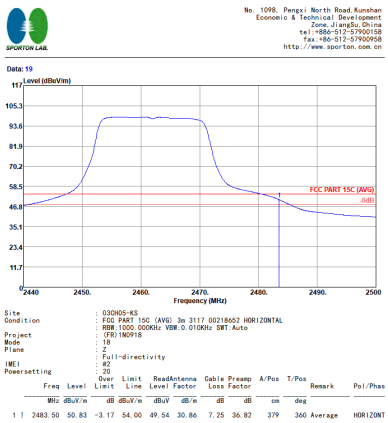
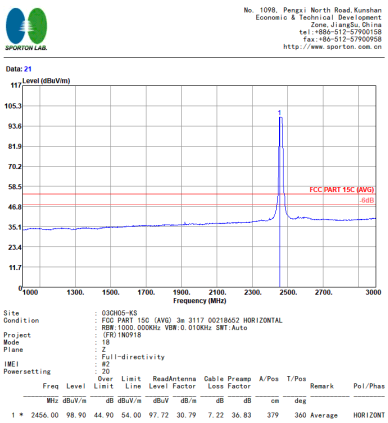
WIFI 802.11n HT20 (Band Edge @ 3m)

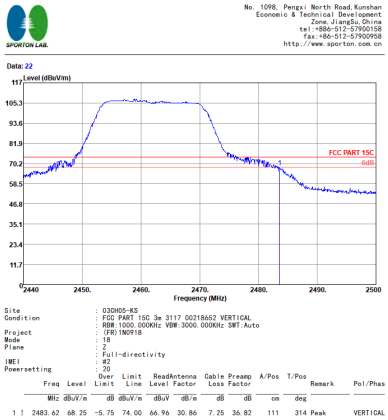
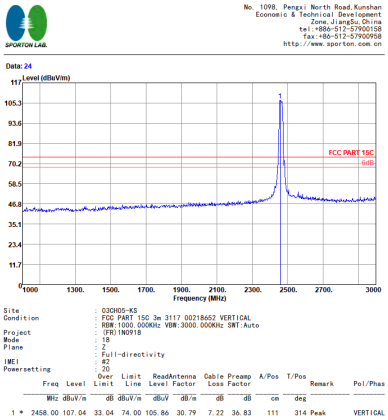
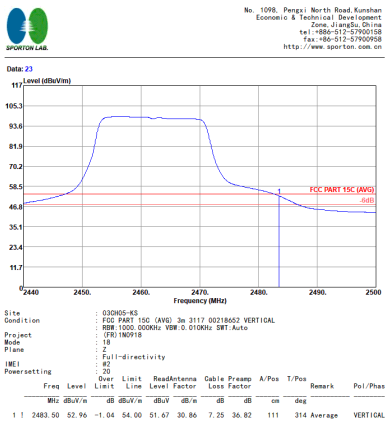
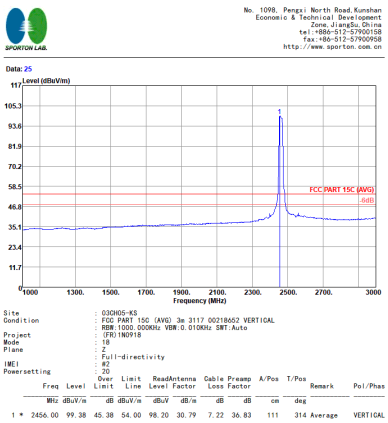
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH01 2412MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

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 CH10 2457MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		

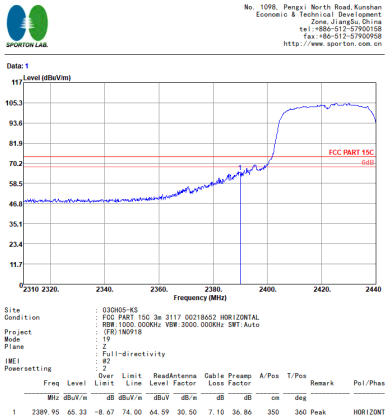
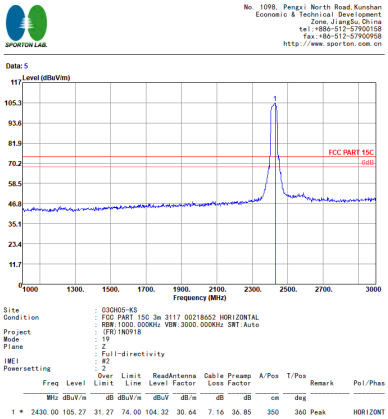
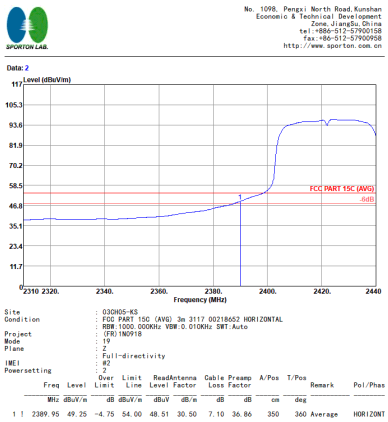
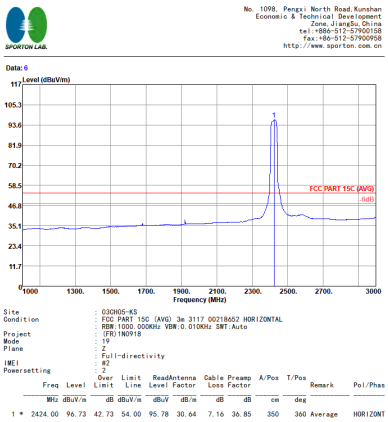
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH10 2457MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		

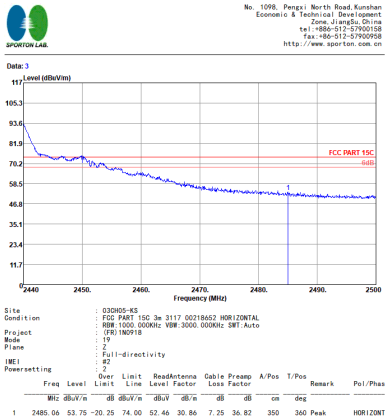
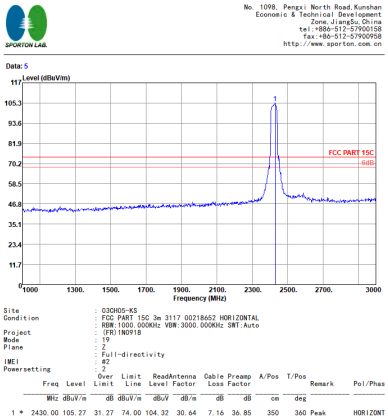
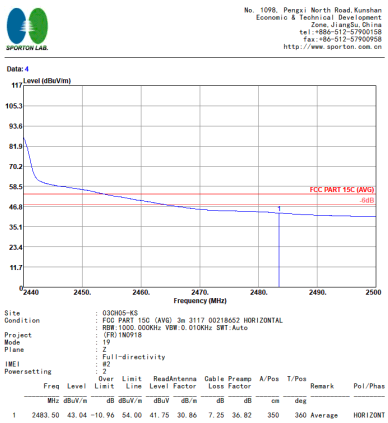
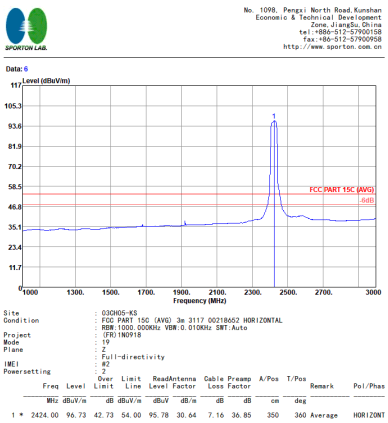
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH11 2462MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

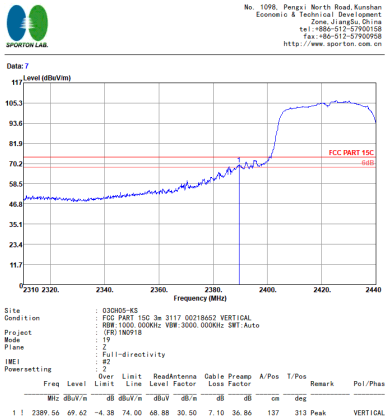
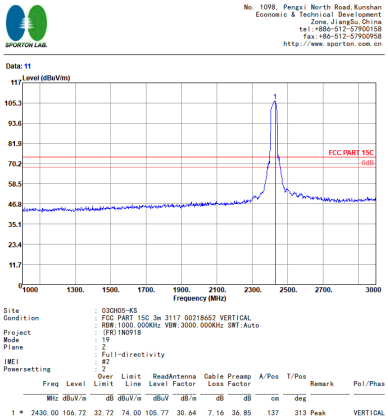
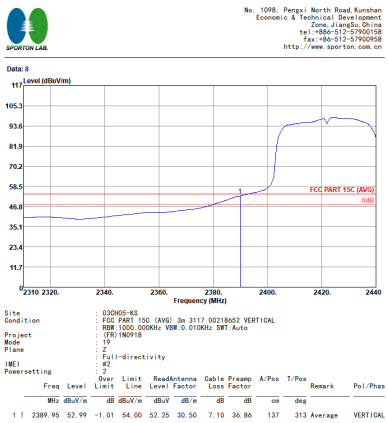
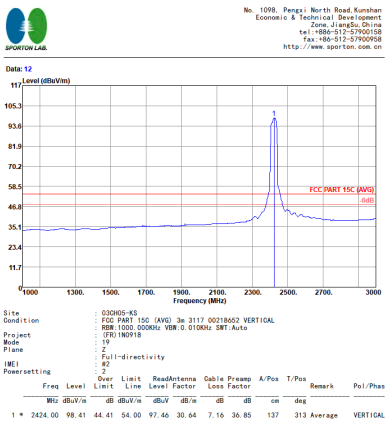
WIFI	2.4GHz 2400~2483.5MHz Fundamental @ 3m	
ANT	802.11n HT20 CH11 2462MHz	
1	Vertical	Fundamental
Peak		
Avg.		

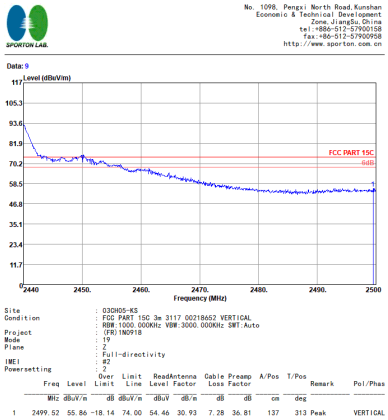
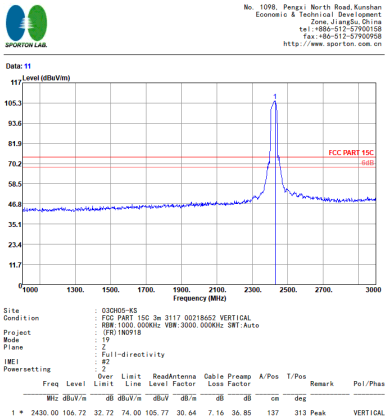
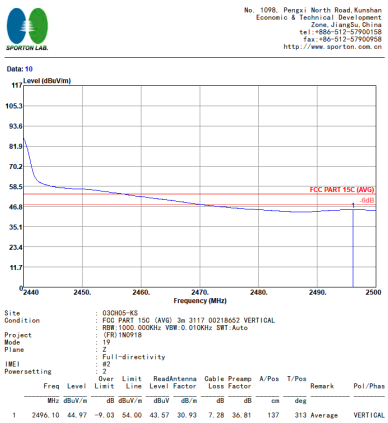
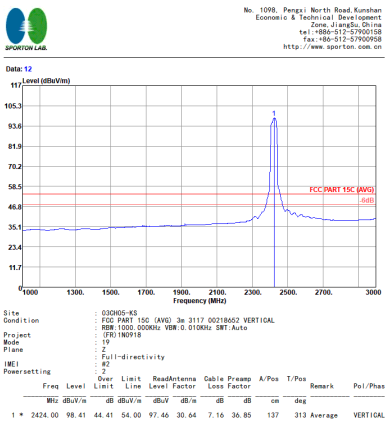
2.4GHz 2400~2483.5MHz

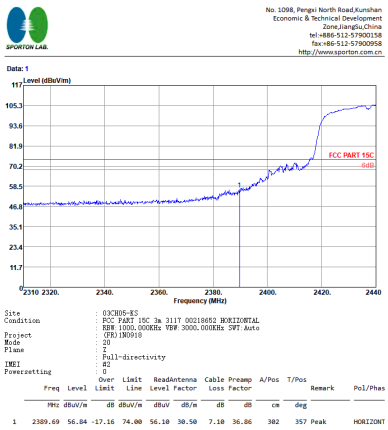
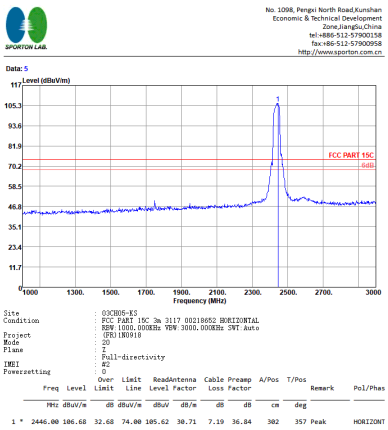
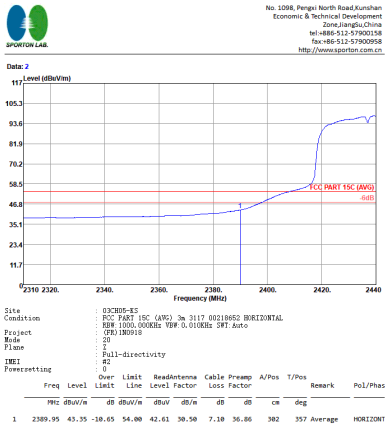
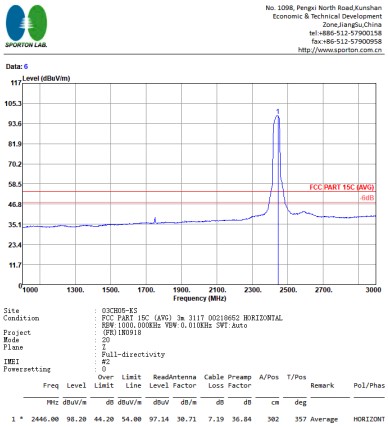
WIFI 802.11n HT40 (Band Edge @ 3m)

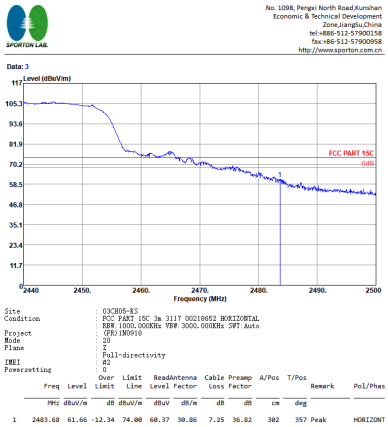
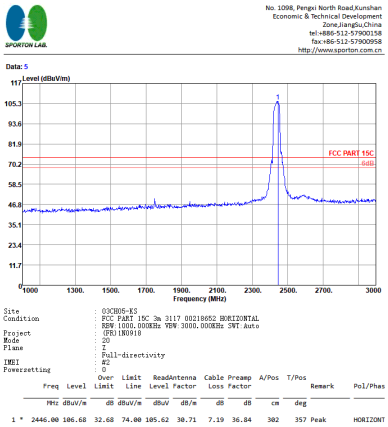
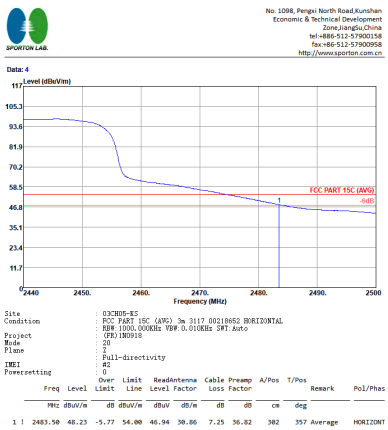
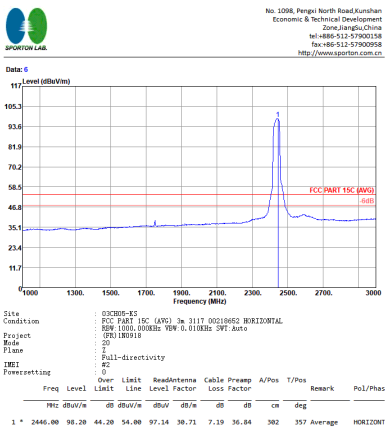
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		

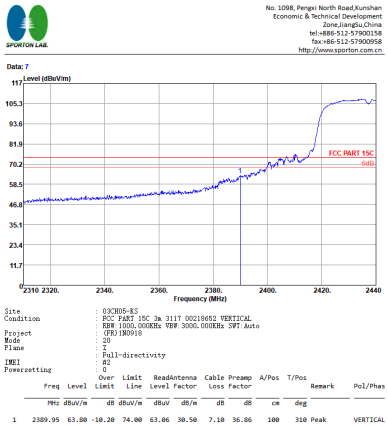
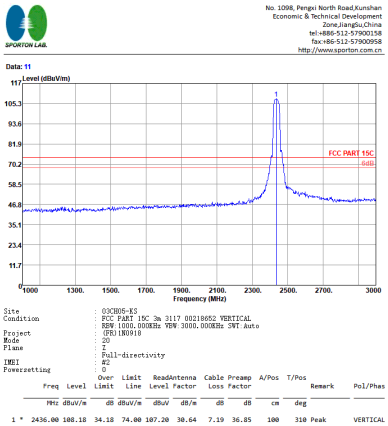
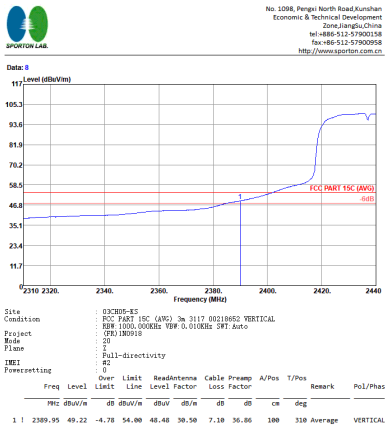
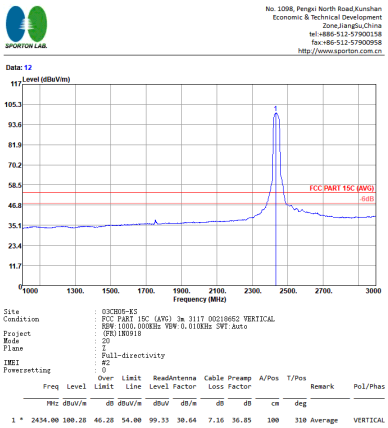
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - R	
1	Horizontal	Fundamental
Peak		
Avg.		

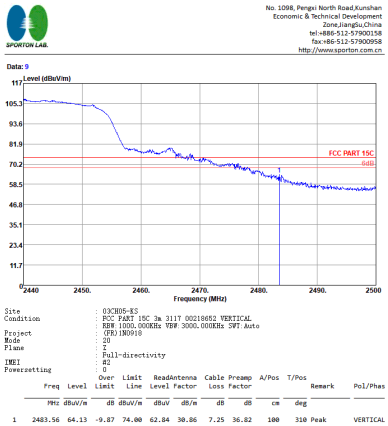
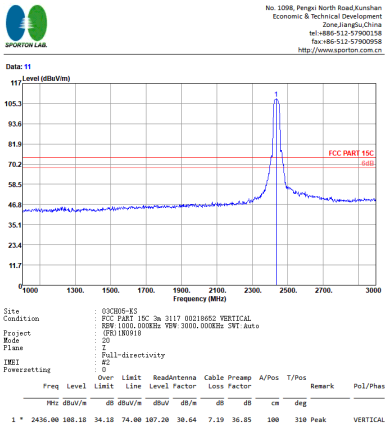
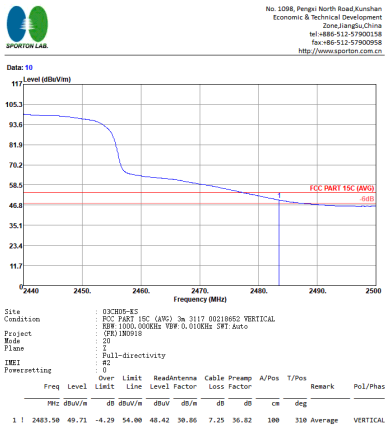
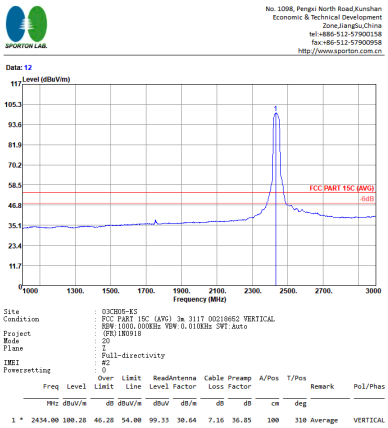
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		

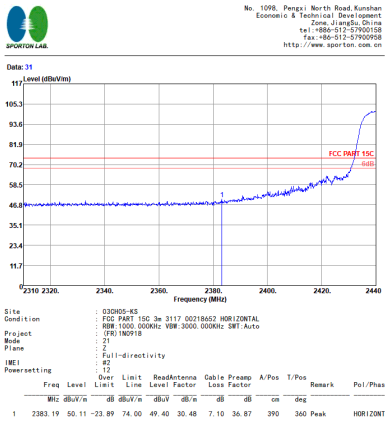
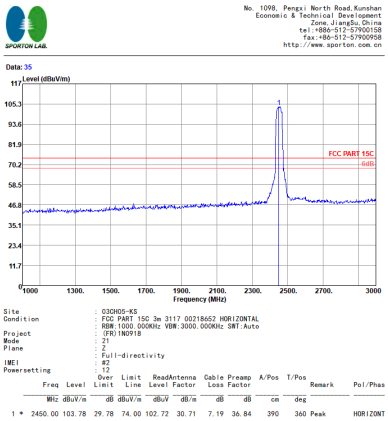
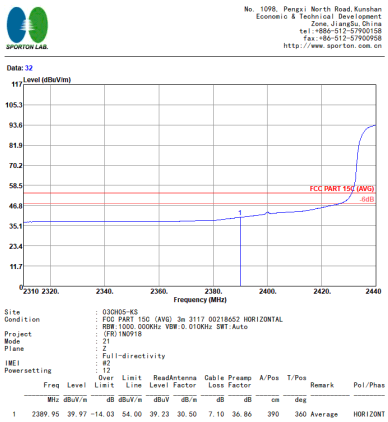
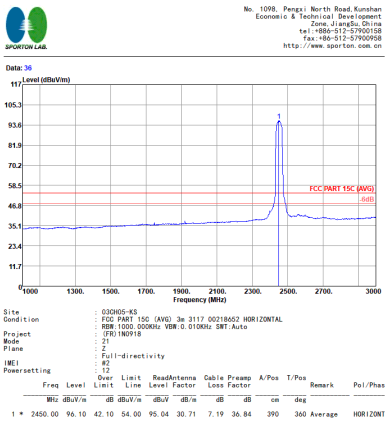
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - R	
1	Vertical	Fundamental
Peak		
Avg.		

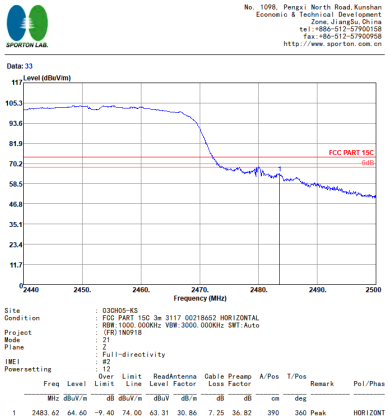
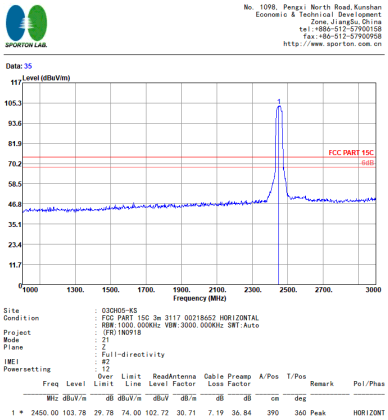
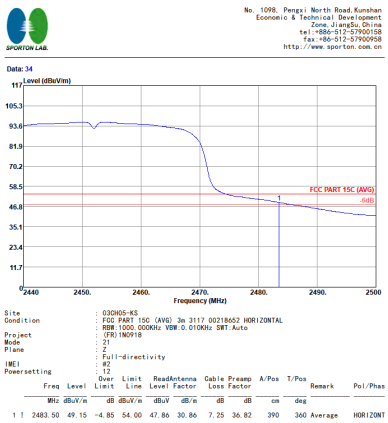
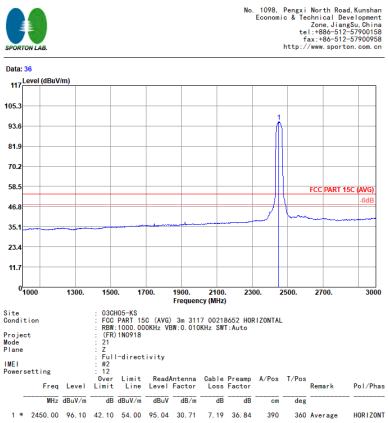
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH06 2437MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		

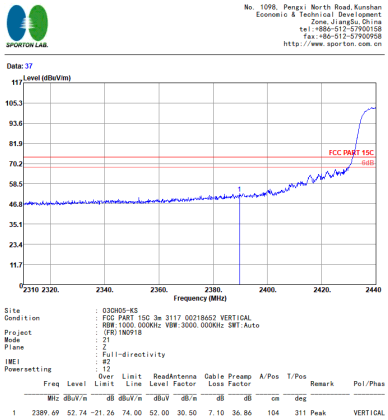
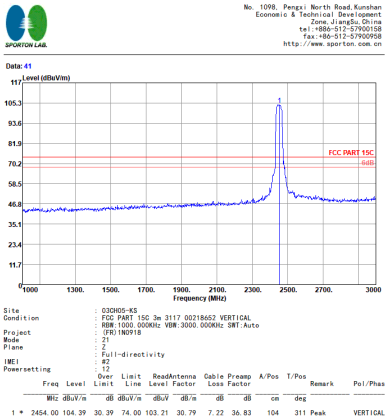
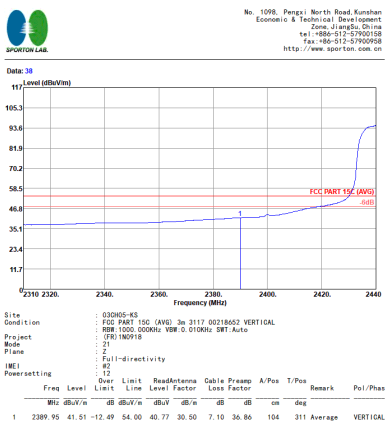
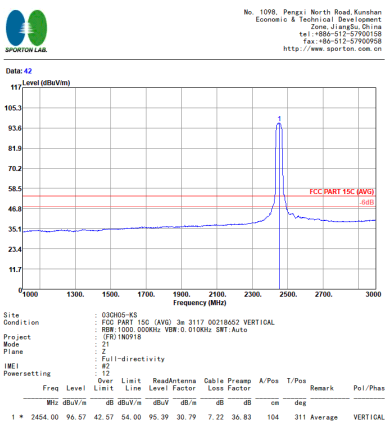
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH06 2437MHz - R	
1	Horizontal	Fundamental
Peak		
Avg.		

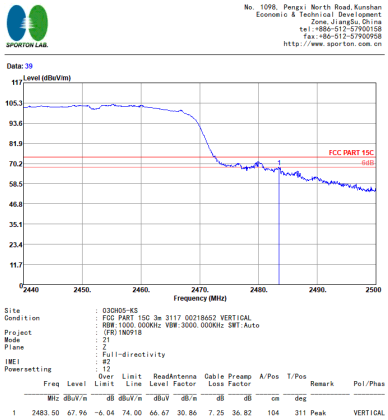
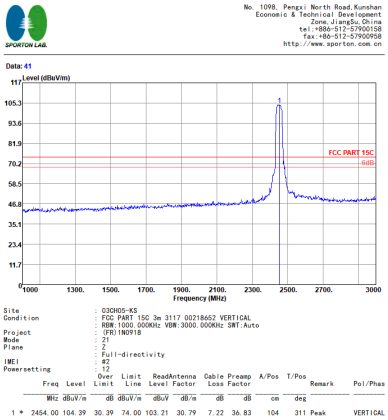
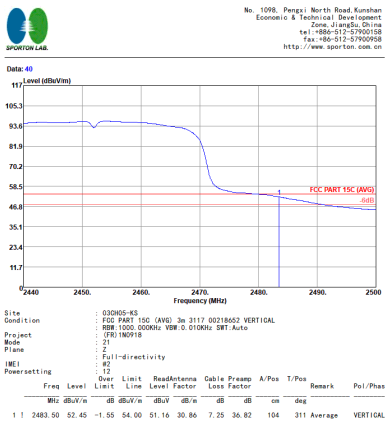
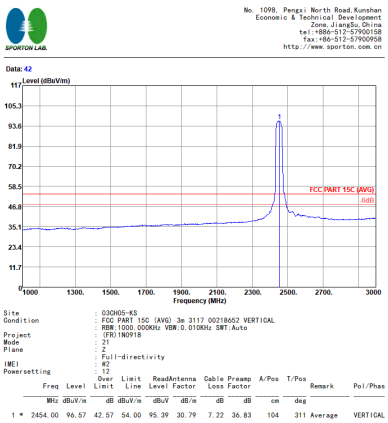
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH06 2437MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH06 2437MHz - R	
1	Vertical	Fundamental
Peak	 Site : 03CH05-KS Condition : FCC PART 15C 3m 3117 00218652 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)1N0918 Mode : 20 Plane : Z : Full-directivity IMEI : #2 Powersetting : 0 1 2483.56 64.13 -9.87 74.00 62.84 30.86 7.25 36.82 100 310 Peak VERTICAL	 Site : 03CH05-KS Condition : FCC PART 15C 3m 3117 00218652 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)1N0918 Mode : 20 Plane : Z : Full-directivity IMEI : #2 Powersetting : 0 1 * 2436.00 108.18 34.18 74.00 107.20 30.64 7.19 36.85 100 310 Peak VERTICAL
Avg.	 Site : 03CH05-KS Condition : FCC PART 15C (AVG) 3m 3117 00218652 VERTICAL RBW:1000.000KHz VBW:0.010KHz SWT:Auto Project : (FR)1N0918 Mode : 20 Plane : Z : Full-directivity IMEI : #2 Powersetting : 0 1 2483.50 49.71 -4.29 54.00 48.42 30.86 7.25 36.82 100 310 Average VERTICAL	 Site : 03CH05-KS Condition : FCC PART 15C (AVG) 3m 3117 00218652 VERTICAL RBW:1000.000KHz VBW:0.010KHz SWT:Auto Project : (FR)1N0918 Mode : 20 Plane : Z : Full-directivity IMEI : #2 Powersetting : 0 1 * 2434.00 100.28 46.28 54.00 99.33 30.64 7.16 36.85 100 310 Average VERTICAL

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

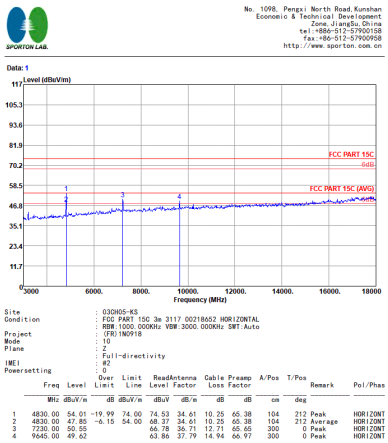
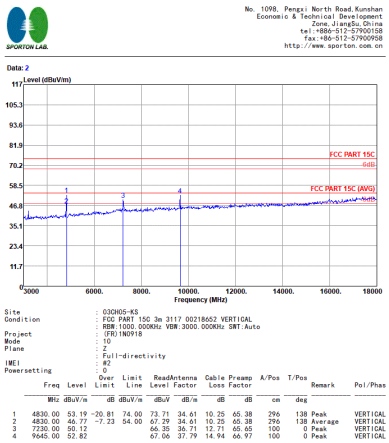
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - R	
1	Horizontal	Fundamental
Peak		
Avg.		

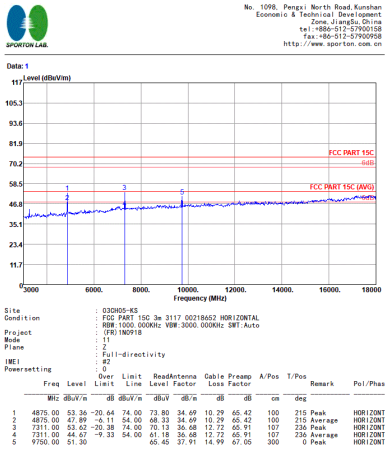
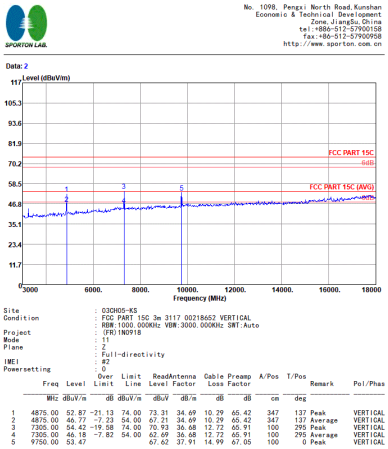
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		

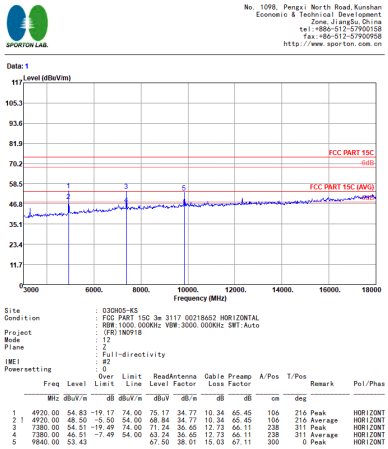
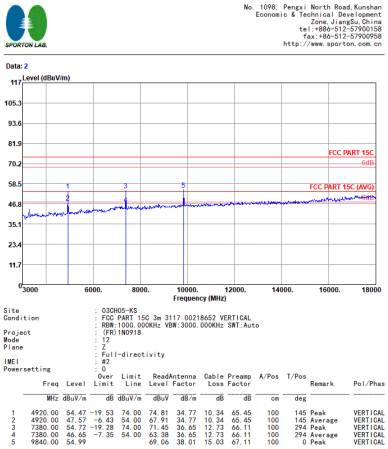
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - R	
1	Vertical	Fundamental
Peak		
Avg.		

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

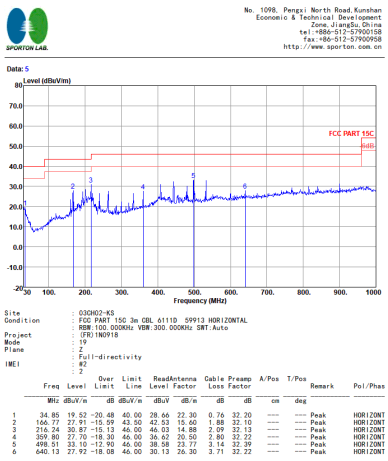
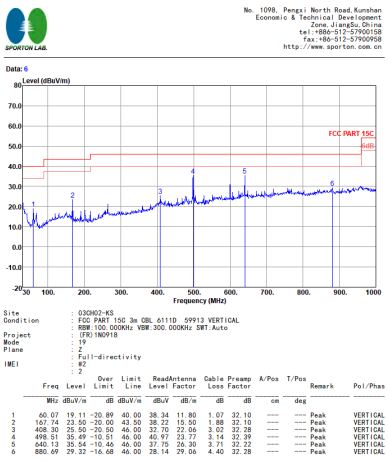
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH01 2412MHz	
1	Horizontal	Vertical
Peak Avg.		

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: 1 Level (dBuV/m) FCC PART 15C 6dB FCC PART 15C (AVG) Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C 3m 3117 00218652 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)1N0918 Mode : 11 Plane : Z : Full-directivity IMEI : #2 Powersetting : 0 Freq Level Over Limit Limit Line 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 4875.00 53.36 -20.64 74.00 73.80 34.69 10.29 65.42 100 215 Peak HORIZONT 2 4875.00 47.89 -6.11 54.00 68.33 34.69 10.29 65.42 100 215 Average HORIZONT 3 7311.00 53.62 -20.38 74.00 70.13 36.68 12.72 65.91 107 236 Peak HORIZONT 4 7311.00 44.67 -9.33 54.00 61.18 36.68 12.72 65.91 107 236 Average HORIZONT 5 9750.00 51.30 65.45 37.91 14.99 67.05 300 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: 2 Level (dBuV/m) FCC PART 15C 6dB FCC PART 15C (AVG) Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C 3m 3117 00218652 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)1N0918 Mode : 11 Plane : Z : Full-directivity IMEI : #2 Powersetting : 0 Freq Level Over Limit Limit Line 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 4875.00 52.87 -21.13 74.00 73.31 34.69 10.29 65.42 347 137 Peak VERTICAL 2 4875.00 46.77 -7.23 54.00 67.21 34.69 10.29 65.42 347 137 Average VERTICAL 3 7305.00 54.42 -19.58 74.00 70.93 36.68 12.72 65.91 100 295 Peak VERTICAL 4 7305.00 46.18 -7.82 54.00 62.69 36.68 12.72 65.91 100 295 Average VERTICAL 5 9750.00 53.47 67.62 37.91 14.99 67.05 100 0 Peak VERTICAL

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH11 2462MHz	
1	Horizontal	Vertical
Peak Avg.	 Data: 1 Level (dBuV/m) FCC PART 15C FCC PART 15C (AVG) Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C 3m 3117 00218652 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)1N0918 Mode : 12 Plane : Z : Full-directivity IMEI : #2 Powersetting : 0 Freq Level Over Limit Limit Line 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 4920.00 54.83 -19.17 74.00 75.17 34.77 10.34 65.45 106 216 Peak HORIZONT 2 ! 4920.00 48.50 -5.50 54.00 68.84 34.77 10.34 65.45 106 216 Average HORIZONT 3 7380.00 54.51 -19.49 74.00 71.24 36.65 12.73 66.11 238 311 Peak HORIZONT 4 7380.00 46.51 -7.49 54.00 63.24 36.65 12.73 66.11 238 311 Average HORIZONT 5 9840.00 53.43 67.50 38.01 15.03 67.11 300 0 Peak HORIZONT	 Data: 2 Level (dBuV/m) FCC PART 15C FCC PART 15C (AVG) Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C 3m 3117 00218652 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)1N0918 Mode : 12 Plane : Z : Full-directivity IMEI : #2 Powersetting : 0 Freq Level Over Limit Limit Line 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 4920.00 54.47 -19.53 74.00 74.81 34.77 10.34 65.45 100 145 Peak VERTICAL 2 4920.00 47.57 -6.43 54.00 67.91 34.77 10.34 65.45 100 145 Average VERTICAL 3 7380.00 54.72 -19.28 74.00 71.45 36.65 12.73 66.11 100 294 Peak VERTICAL 4 7380.00 46.65 -7.35 54.00 63.38 36.65 12.73 66.11 100 294 Average VERTICAL 5 9840.00 54.99 69.06 38.01 15.03 67.11 100 0 Peak VERTICAL

Emission below 1GHz

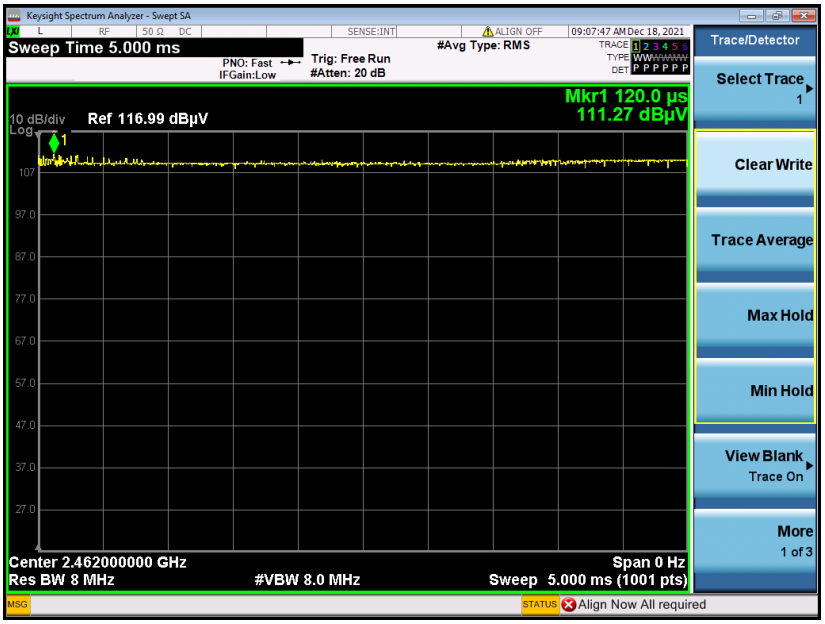
2.4GHz WIFI 802.11n HT40 (LF)

WIFI	2.4GHz 2400~2483.5MHz	
ANT	802.11n HT40 LF	
1	Horizontal	Vertical
QP / Peak	 Site : 03CH02-KS Condition : FCC PART 15C 3m CBL 6111D 59913 HORIZONTAL : RBW:100.000KHz VBW:300.000KHz SWT:Auto Project : (FR)1N0918 Mode : 19 Plane : Z : Full-directivity IMEI : #2 : 2 Data: 5 Level (dBuV/m) / Frequency (MHz) / FCC PART 15C / -6dB Freq Level Over Limit Limit Read Level Antenna Factor Cable Loss Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 34.85 19.52 -20.48 40.00 28.66 22.30 0.76 32.20 --- --- Peak HORIZONT 2 166.77 27.91 -15.59 43.50 42.53 15.60 1.88 32.10 --- --- Peak HORIZONT 3 216.24 30.87 -15.13 46.00 46.03 14.88 2.09 32.13 --- --- Peak HORIZONT 4 359.80 27.70 -18.30 46.00 36.62 20.50 2.80 32.22 --- --- Peak HORIZONT 5 498.51 33.10 -12.90 46.00 38.58 23.77 3.14 32.39 --- --- Peak HORIZONT 6 640.13 27.92 -18.08 46.00 30.13 26.30 3.71 32.22 --- --- Peak HORIZONT	 Site : 03CH02-KS Condition : FCC PART 15C 3m CBL 6111D 59913 VERTICAL : RBW:100.000KHz VBW:300.000KHz SWT:Auto Project : (FR)1N0918 Mode : 19 Plane : Z : Full-directivity IMEI : #2 : 2 Data: 6 Level (dBuV/m) / Frequency (MHz) / FCC PART 15C / -6dB Freq Level Over Limit Limit Read Level Antenna Factor Cable Loss Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 60.07 19.11 -20.89 40.00 38.34 11.80 1.07 32.10 --- --- Peak VERTICAL 2 167.74 23.50 -20.00 43.50 38.22 15.50 1.88 32.10 --- --- Peak VERTICAL 3 408.30 25.50 -20.50 46.00 32.70 22.06 3.02 32.28 --- --- Peak VERTICAL 4 498.51 35.49 -10.51 46.00 40.97 23.77 3.14 32.39 --- --- Peak VERTICAL 5 640.13 35.54 -10.46 46.00 37.75 26.30 3.71 32.22 --- --- Peak VERTICAL 6 880.69 29.32 -16.68 46.00 28.14 29.06 4.40 32.28 --- --- Peak VERTICAL

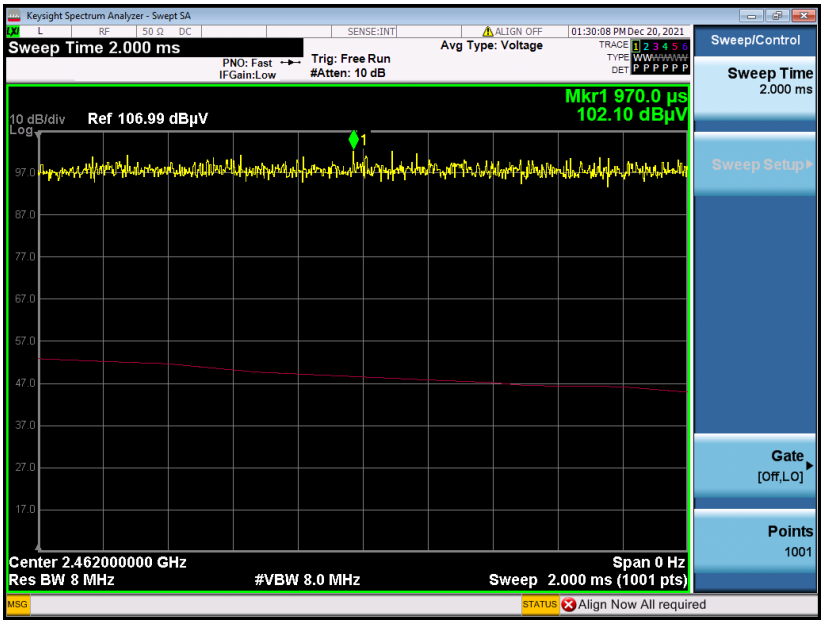
Appendix E. Duty Cycle Plots

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	98.7179	-	-	10Hz

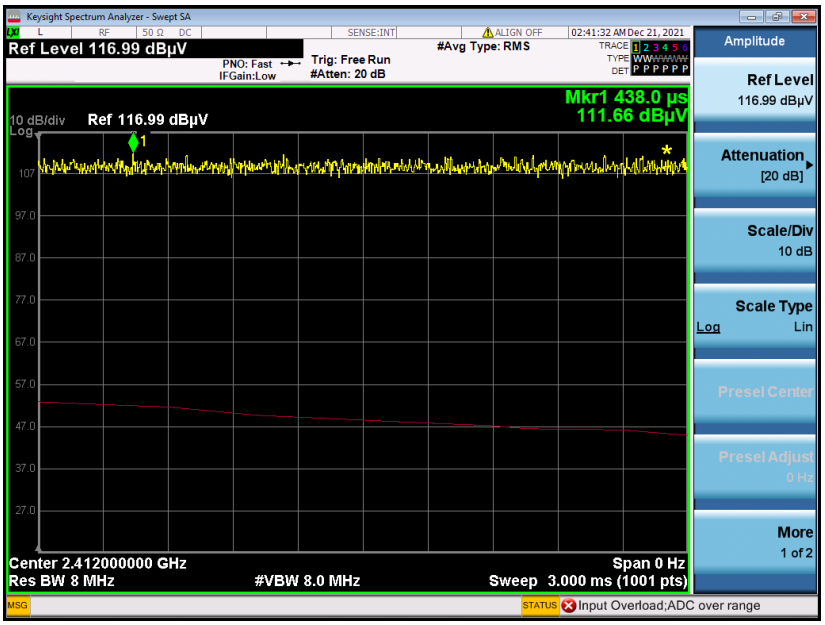
802.11b



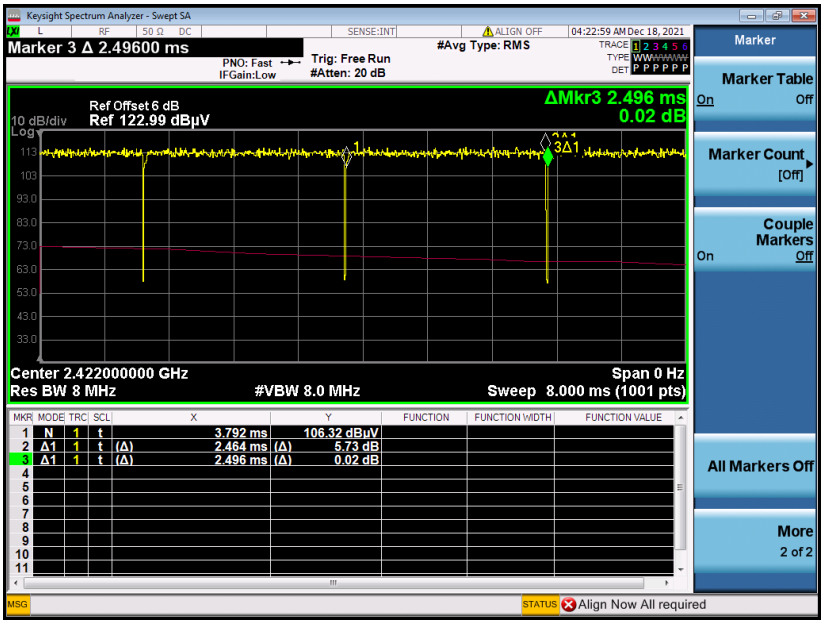
802.11g



802.11n HT20



802.11n HT40


Keysight Spectrum Analyzer - Swept SA
Marker 3 Δ 2.49600 ms
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
#Avg Type: RMS
04:22:59 AM Dec 18, 2021
Ref Offset 6 dB
10 dB/div
Ref 122.99 dBμV
ΔMkr3 2.496 ms
0.02 dB
Center 2.422000000 GHz
Res BW 8 MHz
#VBW 8.0 MHz
Span 0 Hz
Sweep 8.000 ms (1001 pts)
1 N 1 t 3.792 ms 106.32 dBμV
2 Δ1 1 t (Δ) 2.464 ms (Δ) 5.73 dB
3 Δ1 1 t (Δ) 2.496 ms (Δ) 0.02 dB
Marker
Marker Table
On Off
Marker Count
[Off]
Couple Markers
On Off
All Markers Off
More
2 of 2
Align Now All required