FCC RF Test Report

APPLICANT	:	Espressif Systems (Shanghai) Co.,Ltd.
EQUIPMENT	:	2.4GHz Wi-Fi IoT Module
BRAND NAME	:	ESPRESSIF
MODEL NAME	:	ESP32-S2-SOLO-2U
FCC ID	:	2AC7Z-ESPS2SOLO2U
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System
TEST DATE(S)	:	Aug. 27, 2022 ~ Sep. 30, 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

Approved by: Jason Jia

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
FR262717	Rev. 01	Initial issue of report	Oct. 10, 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 1.08 dB at 2389.690 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 12.63 dB at 0.186 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 IoT Module
Brand Name	ESPRESSIF
Model Name	ESP32-S2-SOLO-2U
FCC ID	2AC7Z-ESPS2SOLO2U
HW Version	V1.0
SW Version	V1.1.3.0
EUT Stage	Production Unit

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

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz
Maximum (Peak) Output Power to antenna	802.11b : 15.99 dBm (0.0397 W) 802.11g : 25.58 dBm (0.3614 W) 802.11n HT20 : 25.67 dBm (0.3690 W) 802.11n HT40 : 24.51 dBm (0.2825 W)
99% Occupied Bandwidth	802.11b : 13.24MHz 802.11g : 18.38MHz 802.11n HT20 : 19.03MHz 802.11n HT40 : 36.86MHz
Antenna Type / Gain	External Antenna type with gain 2.33 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 03CH05-KS TH01-KS	CN1257	314309

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH05-KS	AUDIX	E3	6.2009-8-24
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 (Y plane) were recorded in this report.

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

2.1 Carrier Frequency and Channel

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

2.2 Test Mode

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

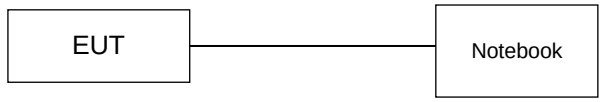
Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

Test Cases	
AC Conducted Emission	Mode 1 :WLAN TX(2.4G) + Notebook Charging

Remark:

1. For Radiated Test Cases, The tests were performed with Notebook.

2.3 Connection Diagram of Test System



This example is connection diagram of EUT test configurations.

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

2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	Lenovo	V130-14IKB004	N/A	N/A	shielded cable DC O/P 1.8m , Unshielded AC I/P cable 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, make EUT continuous transmit.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor 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 and attenuator factor.
Offset = RF cable loss + attenuator factor.
Following shows an offset computation example with cable loss 5.50 dB

Offset(dB) = RF cable loss(dB)
= 5.50 (dB)

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

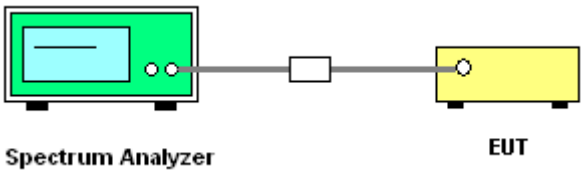
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

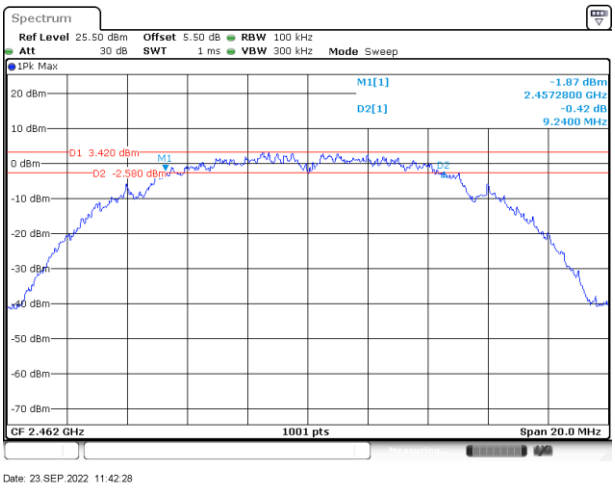
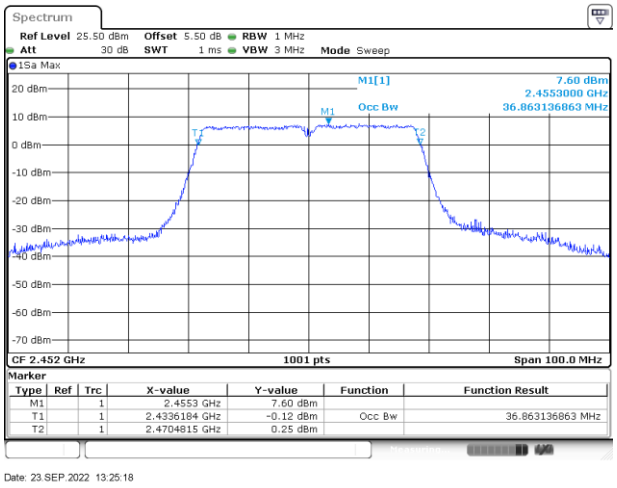
1. The testing follows ANSI C63.10-2013 clause 11.8
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 1MHz and set the Video bandwidth (VBW) = 3MHz.
6. Measure and record the results in the test report.

3.1.4 Test Setup



3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Please refer to Appendix A.

Minimum 6dB Bandwidth	Maximum 99% Occupied Bandwidth
	

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

3.2 Output Power Measurement

3.2.1 Limit of Output Power

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

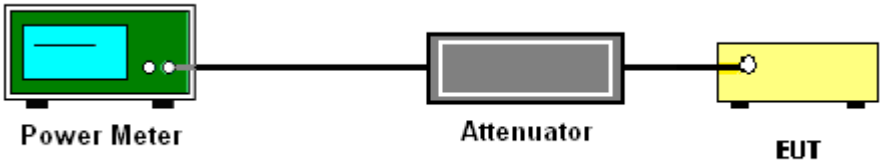
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of ANSI C63.10-2013 clause 11.9.1.3 PKPM1 Peak power meter or ANSI C63.10-2013 clause 11.9.2.3.1 Method AVGPM method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Please refer to Appendix A.

3.2.6 Test Result of Average Output Power (Reporting Only)

Please refer to Appendix A.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

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

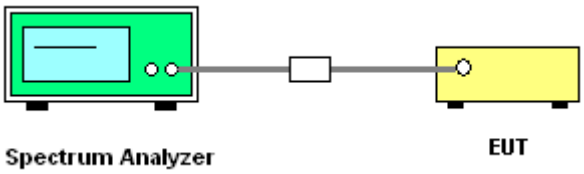
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

1. The testing follows Measurement Procedure of ANSI C63.10-2013 clause 11.10.2 Method PKPSD.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.

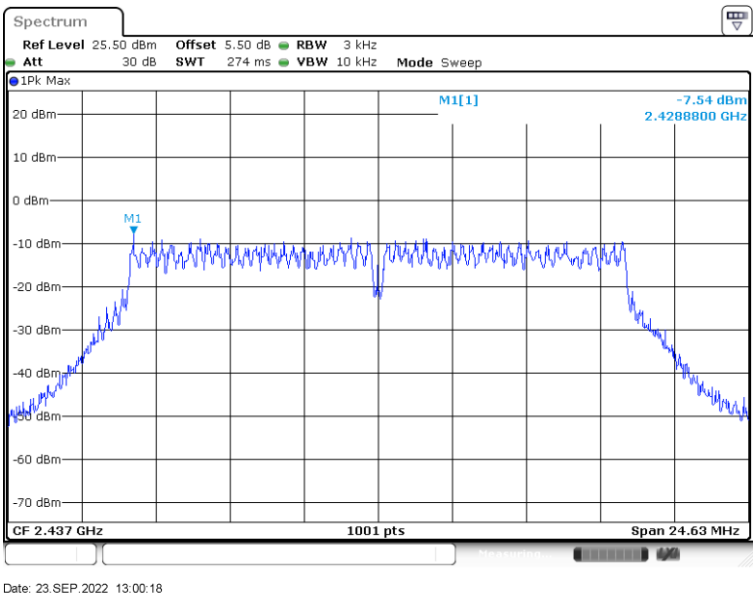
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Worst Case Power Density (dBm/3kHz)



3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission Measurement

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

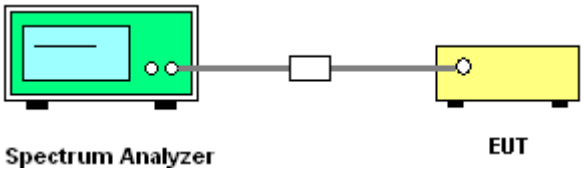
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

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

3.4.4 Test Setup

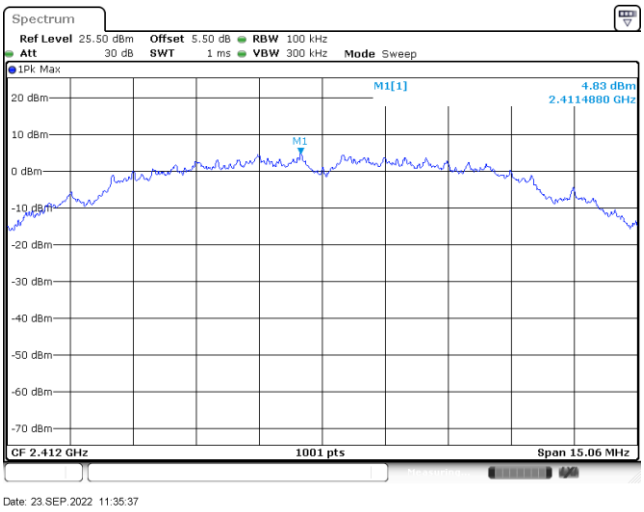
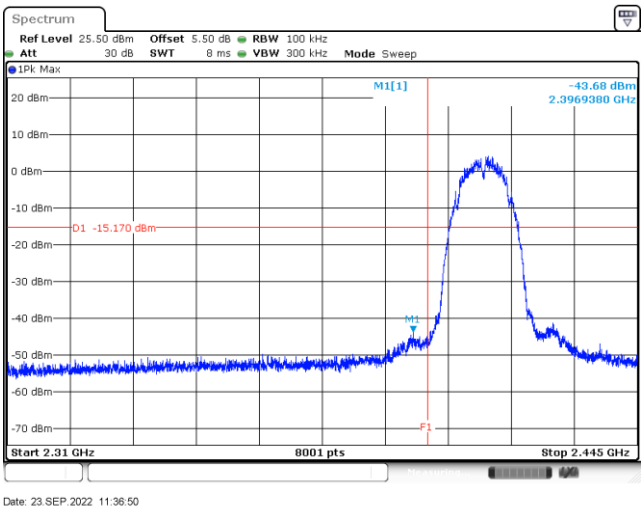
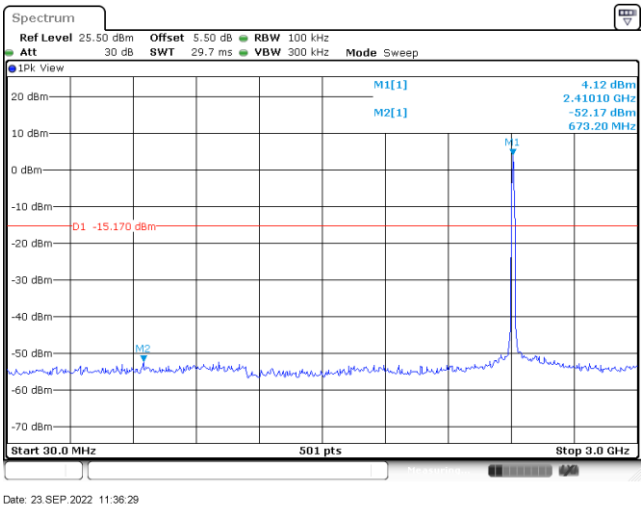
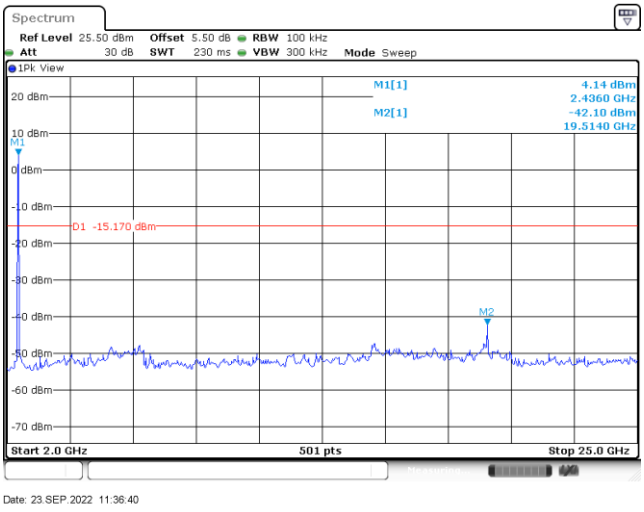


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

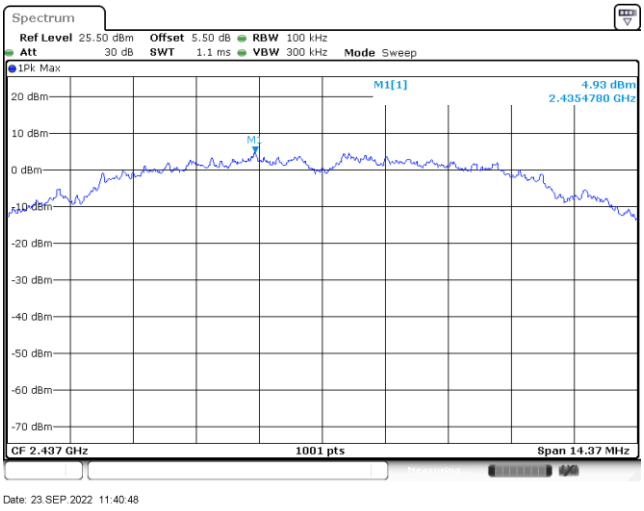
Test Engineer :	kib shi	**Temperature :**	21~25℃
		Relative Humidity :	51~54%

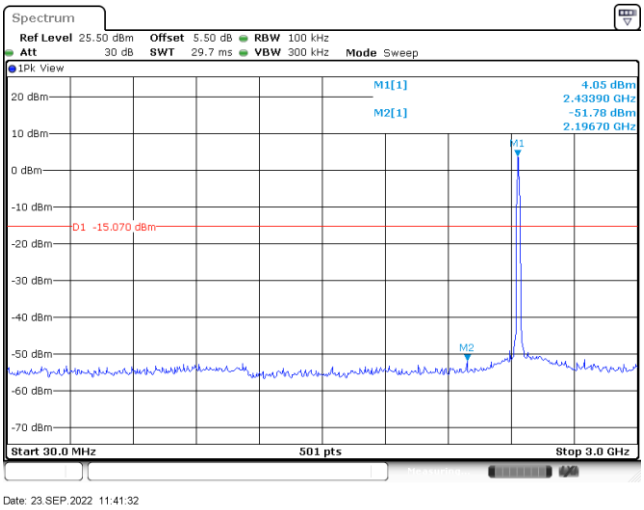
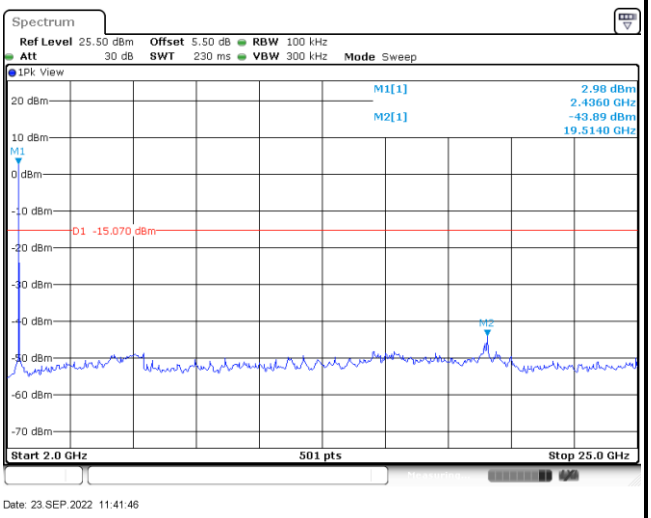
Number of TX = 1, Ant. 1 (Measured)

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

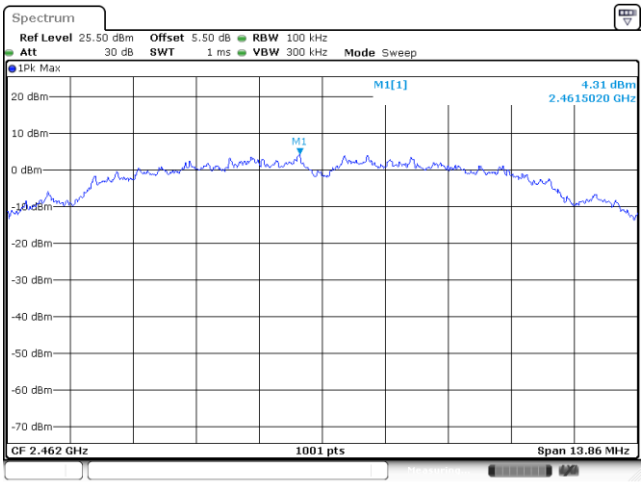
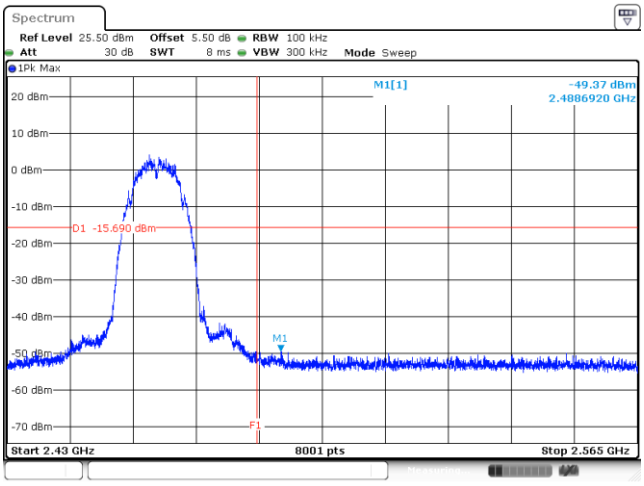
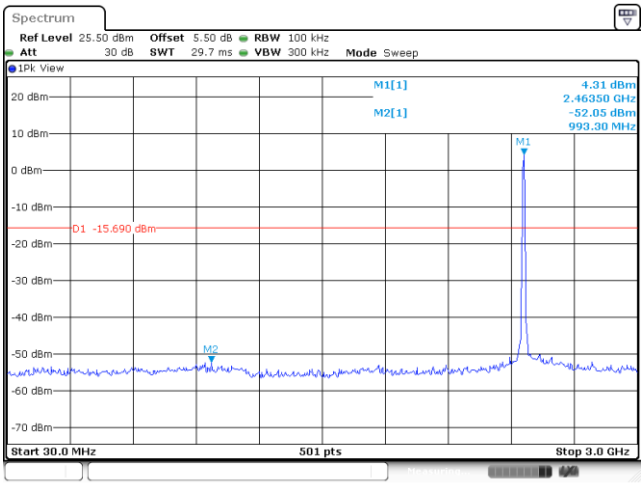
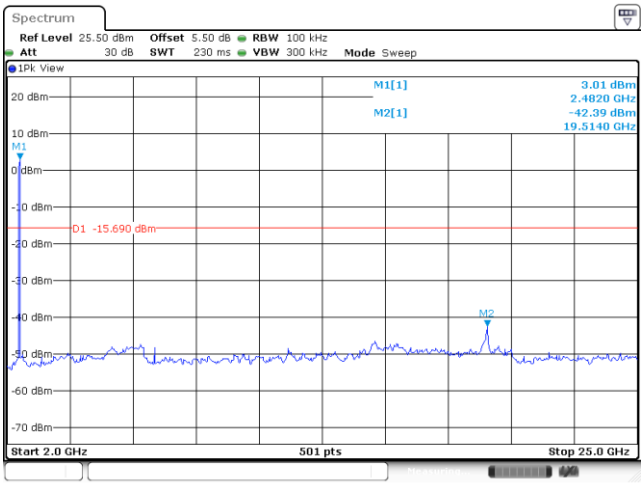
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11b	Test Channel :	06

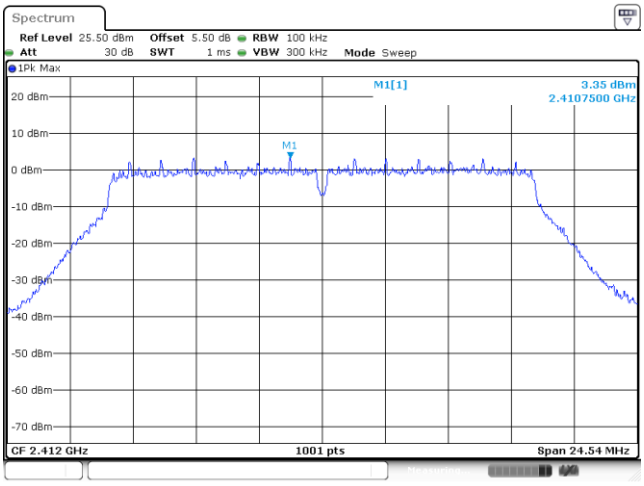
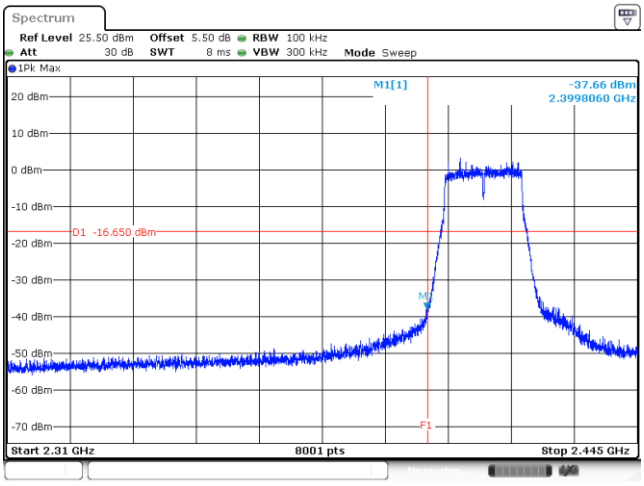
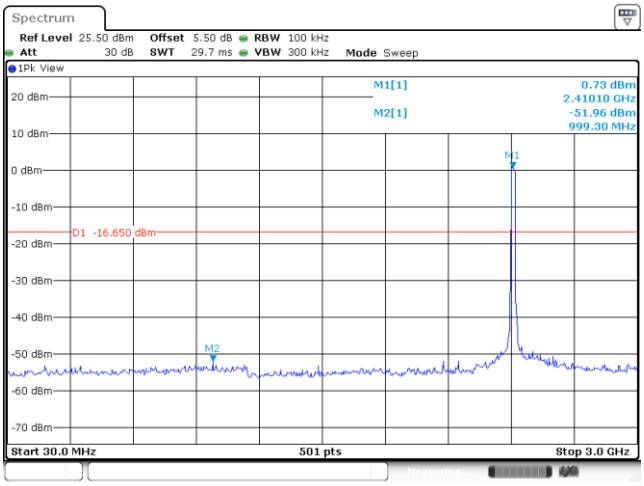
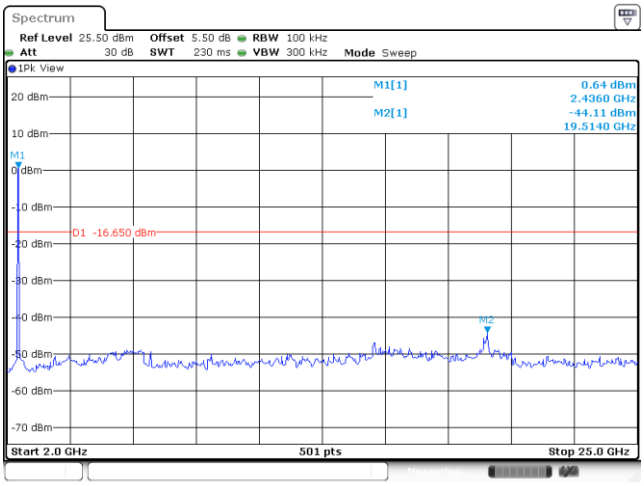
100kHz PSD reference Level	Channel Plot
	-

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

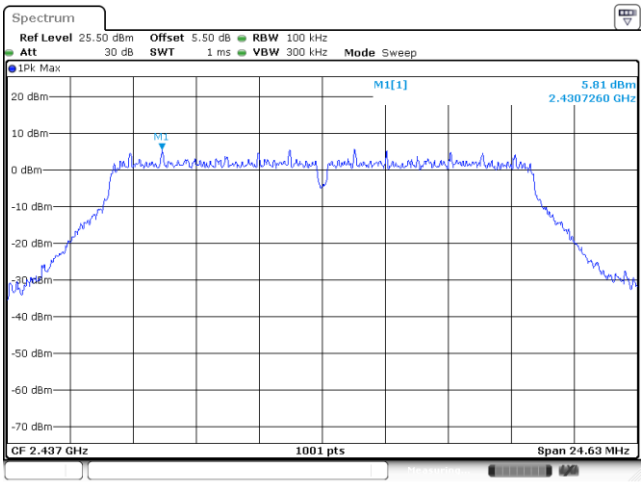
Test Mode :	802.11b	Test Channel :	11

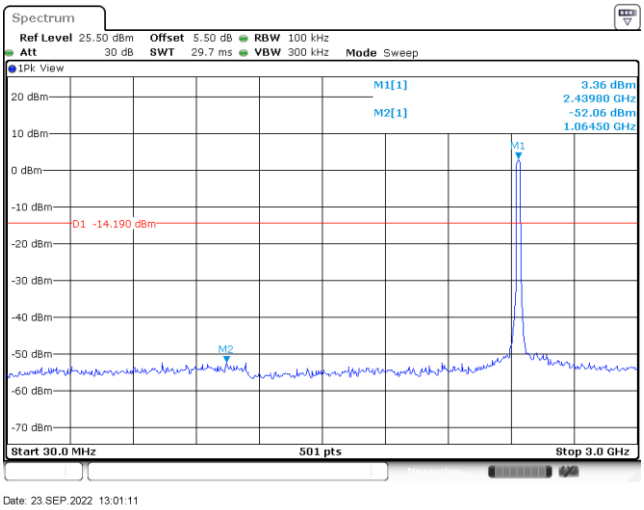
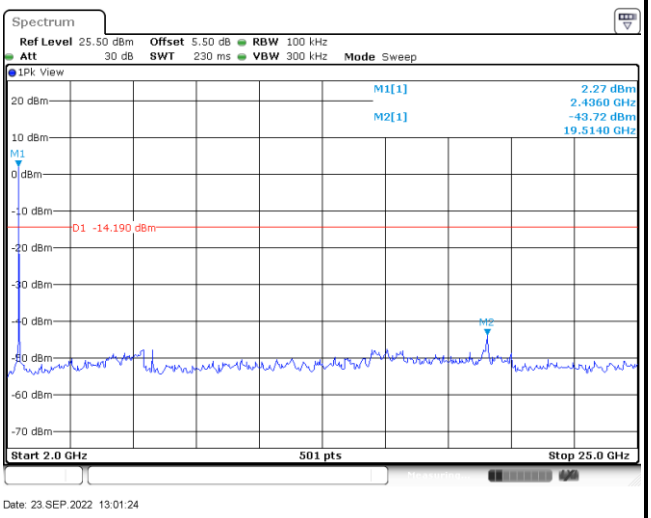
100kHz PSD reference Level	Channel Plot
	
Date: 23.SEP.2022 11:43:06	Date: 23.SEP.2022 12:52:42
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 23.SEP.2022 12:50:48	Date: 23.SEP.2022 12:52:31

Test Mode :	802.11g	Test Channel :	01

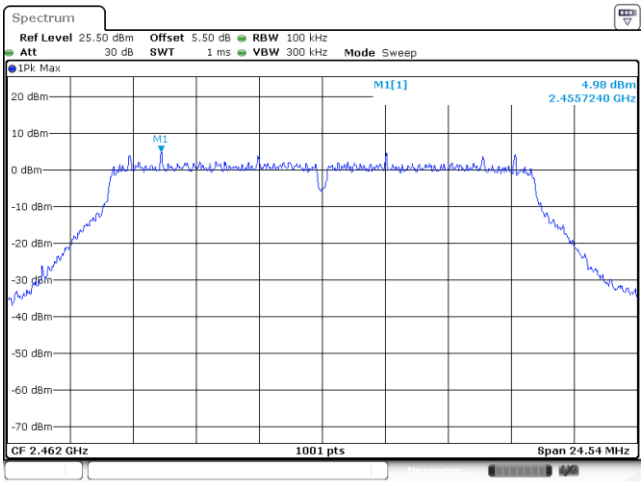
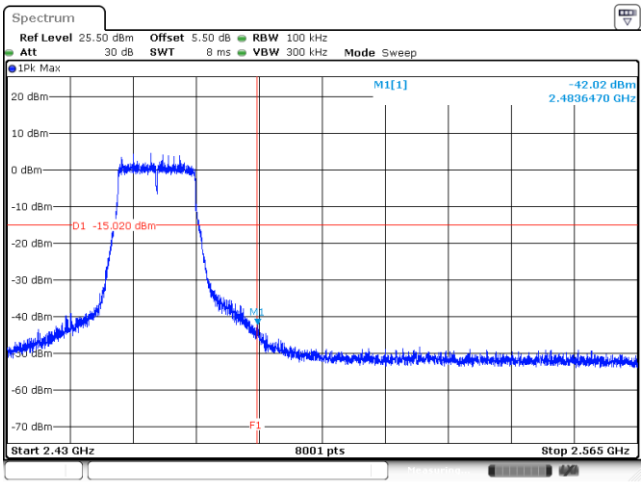
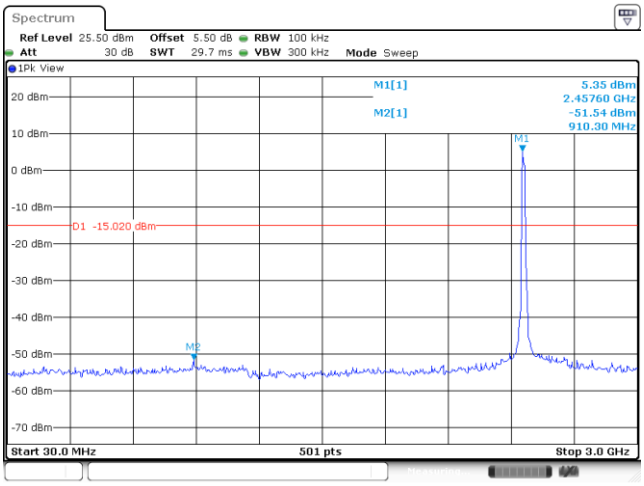
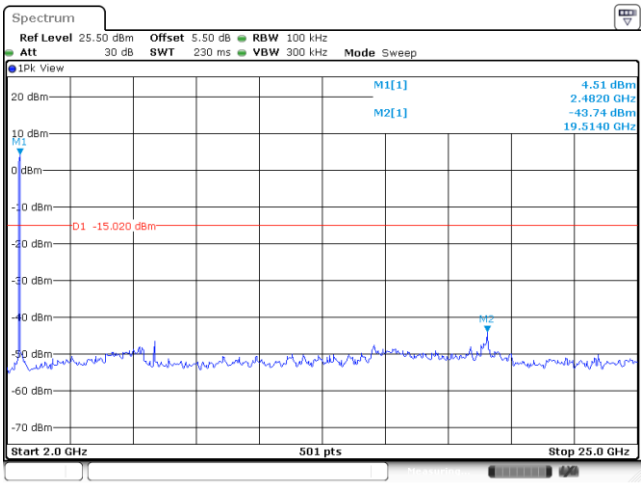
100kHz PSD reference Level	Channel Plot
	
Date: 23.SEP.2022 12:58:31	Date: 23.SEP.2022 12:58:53
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 23.SEP.2022 12:59:08	Date: 23.SEP.2022 12:59:19

Test Mode :	802.11g	Test Channel :	06

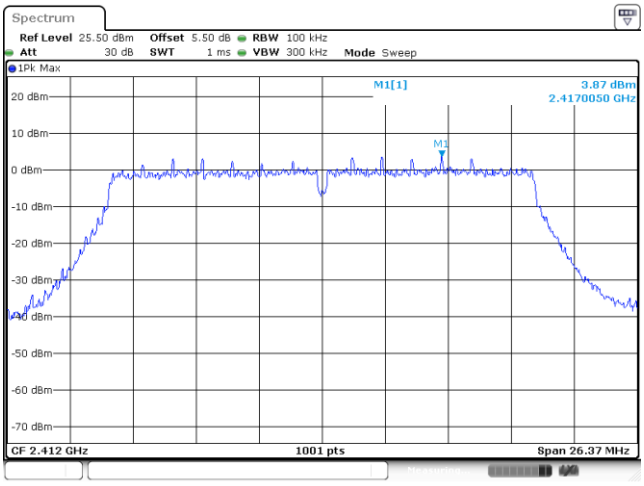
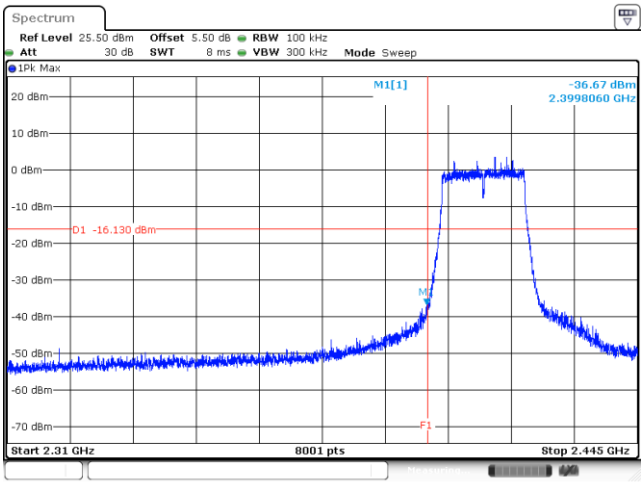
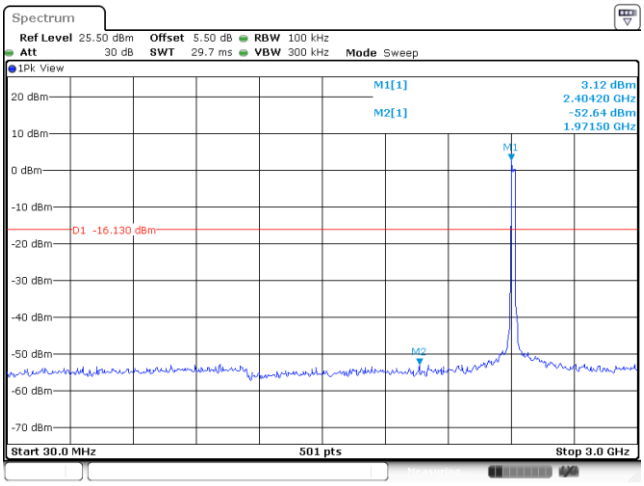
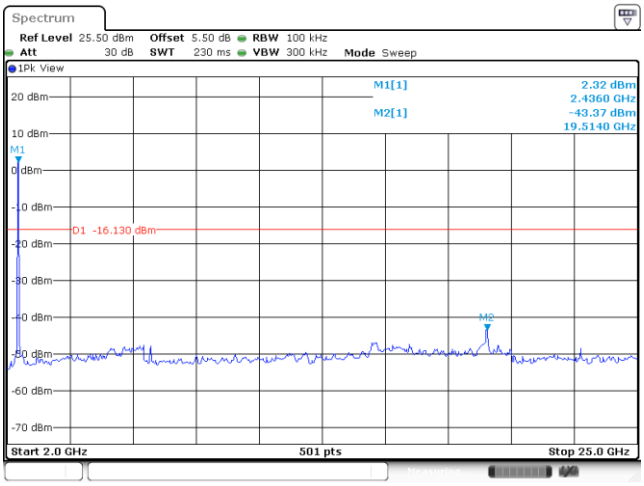
100kHz PSD reference Level	Channel Plot
	-

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

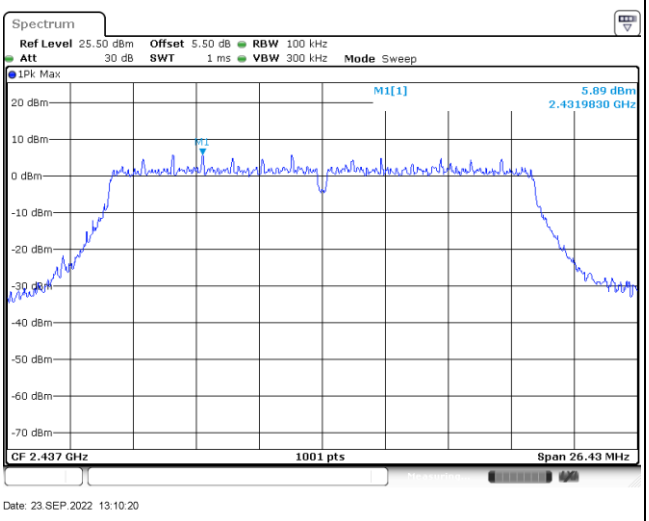
Test Mode :	802.11g	Test Channel :	11

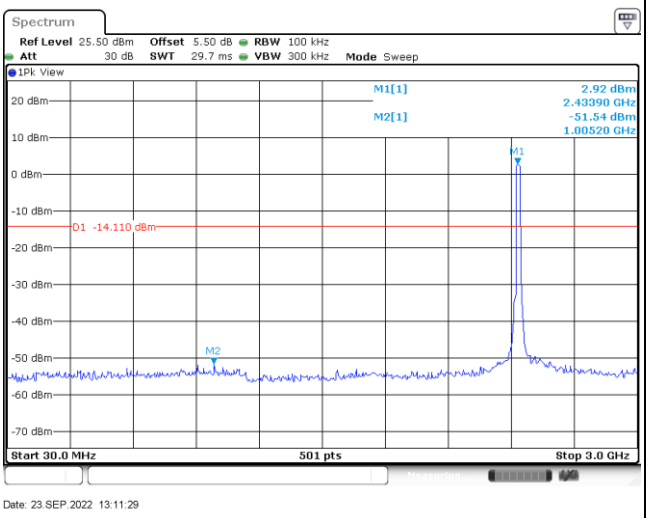
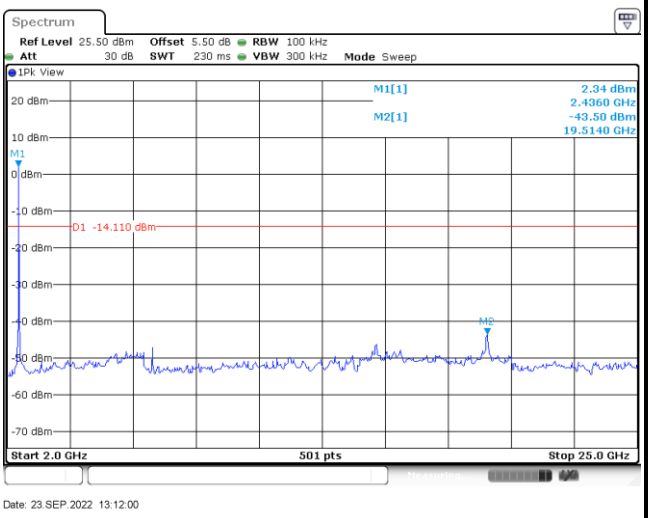
100kHz PSD reference Level	Channel Plot
	
Date: 23.SEP.2022 13:02:44	Date: 23.SEP.2022 13:03:46
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 23.SEP.2022 13:03:59	Date: 23.SEP.2022 13:04:10

Test Mode :	802.11n HT20	Test Channel :	01

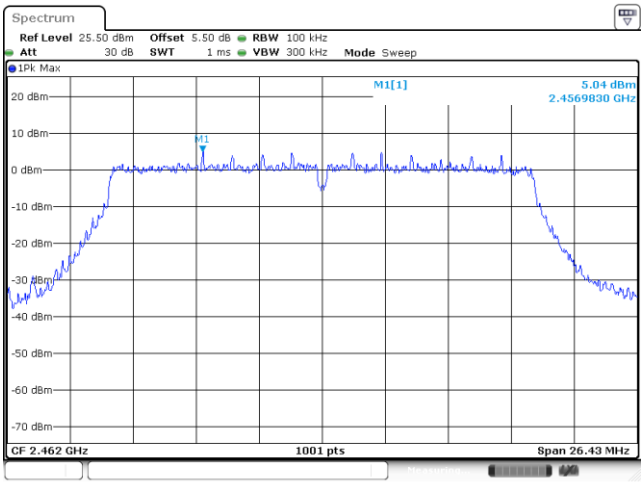
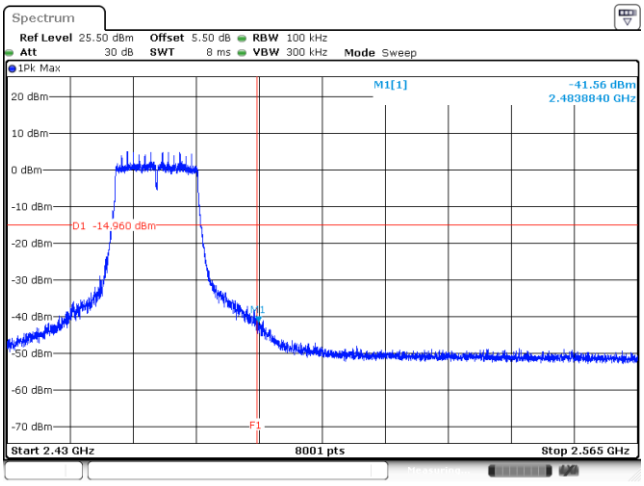
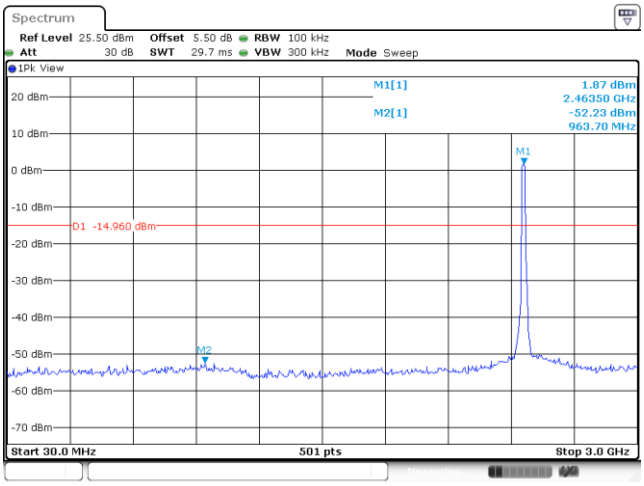
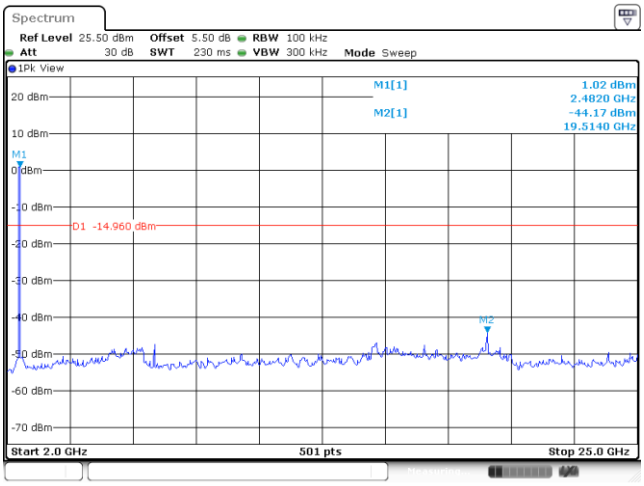
100kHz PSD reference Level	Channel Plot
	
Date: 23.SEP.2022 13:06:03	Date: 23.SEP.2022 13:06:24
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 23.SEP.2022 13:06:40	Date: 23.SEP.2022 13:07:55

Test Mode :	802.11n HT20	Test Channel :	06

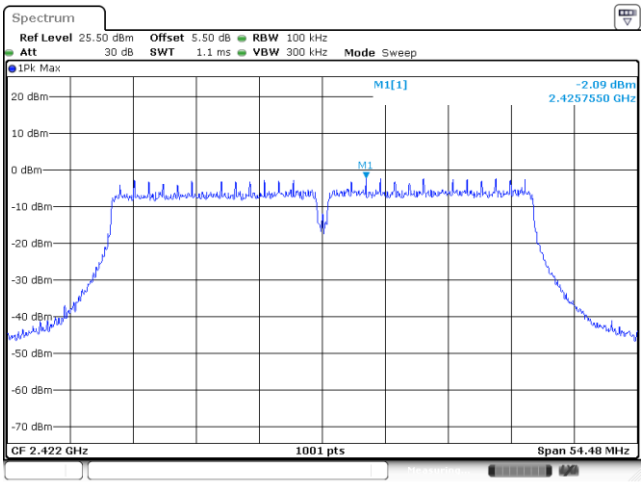
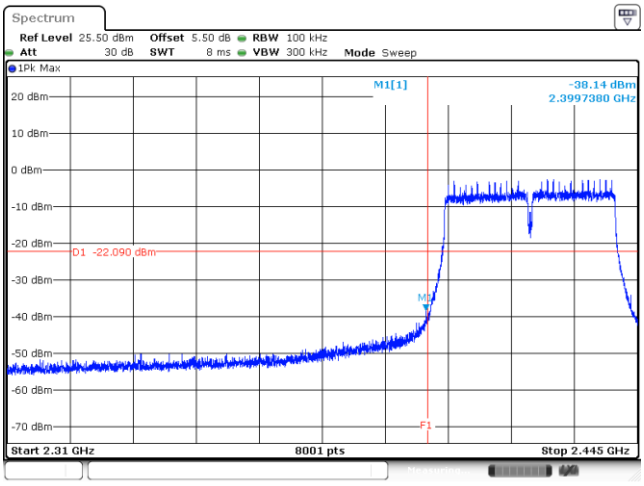
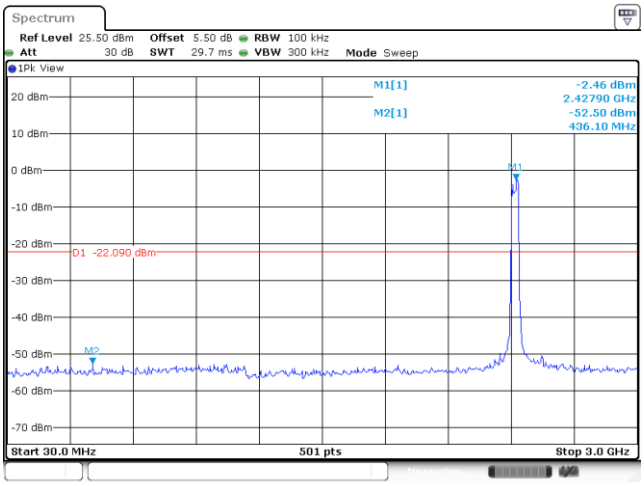
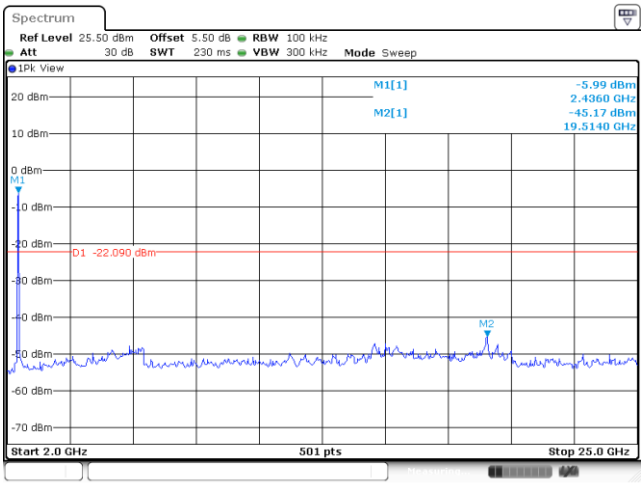
100kHz PSD reference Level	Channel Plot
	-

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

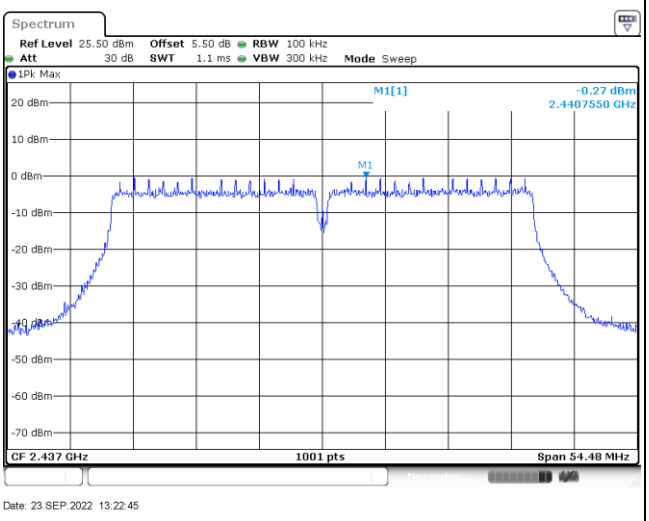
Test Mode :	802.11n HT20	Test Channel :	11

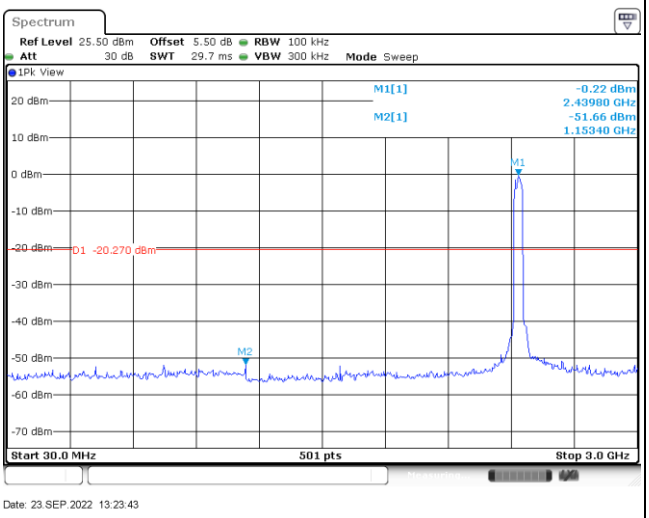
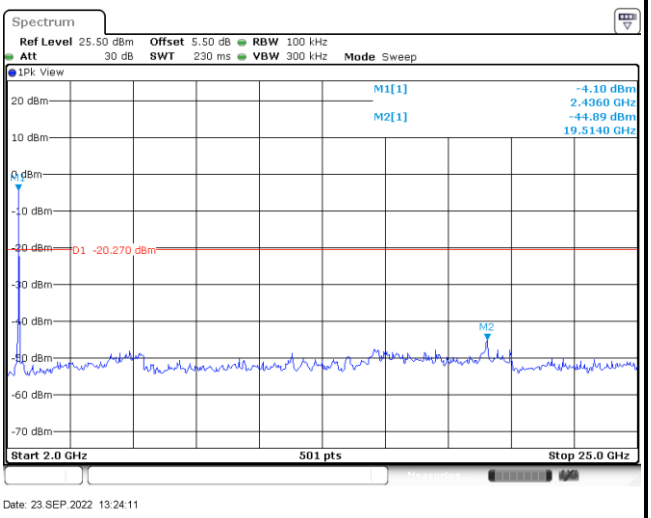
100kHz PSD reference Level	Channel Plot
	
Date: 23.SEP.2022 13:13:24	Date: 23.SEP.2022 13:14:16
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 23.SEP.2022 13:14:49	Date: 23.SEP.2022 13:16:10

Test Mode :	802.11n HT40	Test Channel :	03

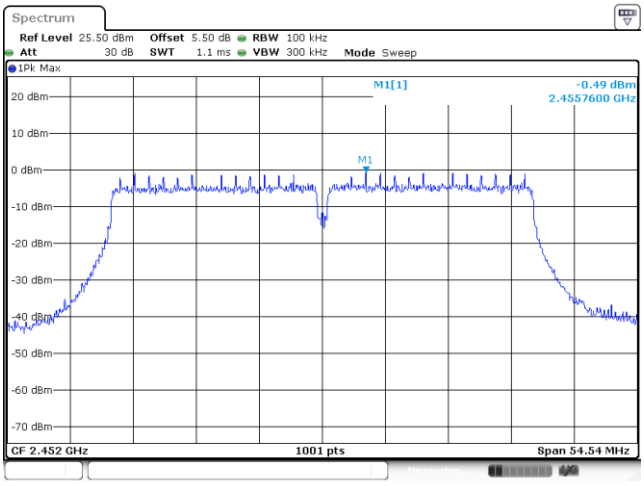
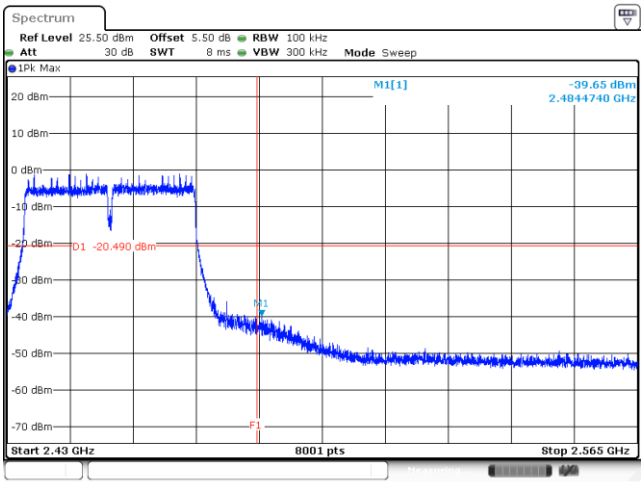
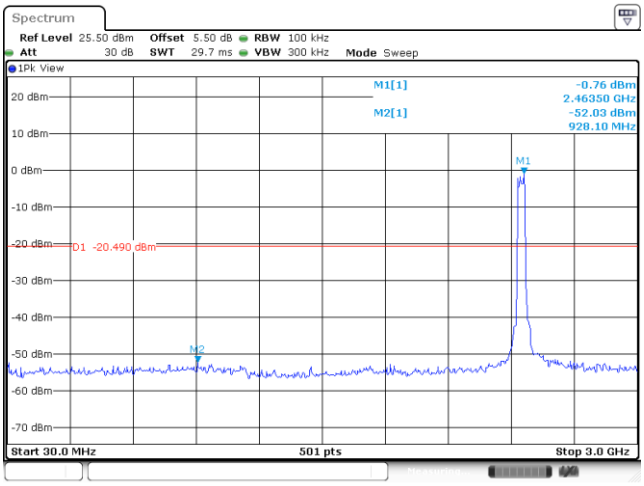
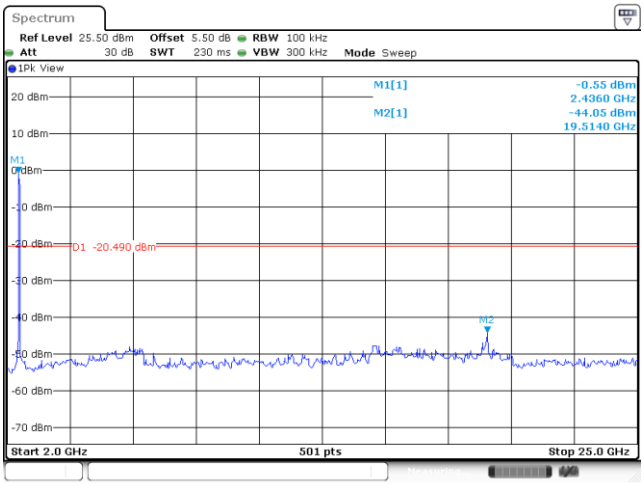
100kHz PSD reference Level	Channel Plot
	
Date: 23.SEP.2022 13:19:38	Date: 23.SEP.2022 13:20:08
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 23.SEP.2022 13:21:04	Date: 23.SEP.2022 13:21:16

Test Mode :	802.11n HT40	Test Channel :	06

100kHz PSD reference Level	Channel Plot
	-

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

Test Mode :	802.11n HT40	Test Channel :	09

100kHz PSD reference Level	Channel Plot
	
Date: 23.SEP.2022 13:25:10	Date: 23.SEP.2022 13:25:44
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 23.SEP.2022 13:26:33	Date: 23.SEP.2022 13:27:02

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

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

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

3.5.2 Measuring Instruments

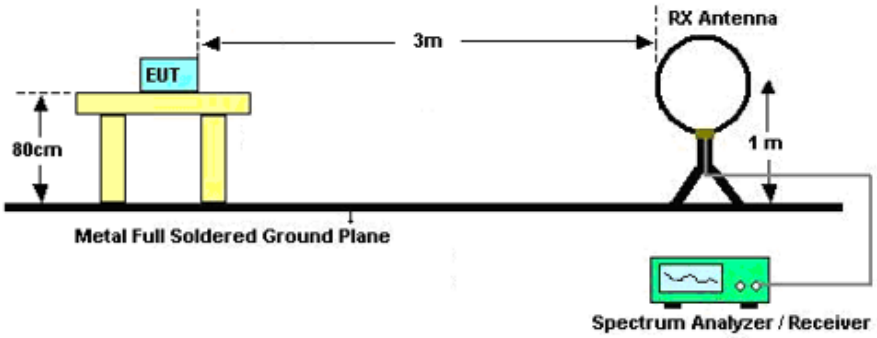
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

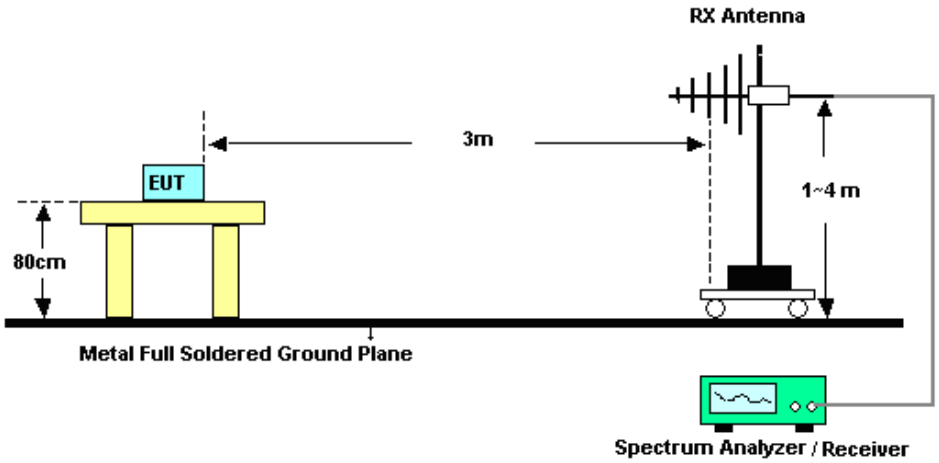
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better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

3.5.4 Test Setup

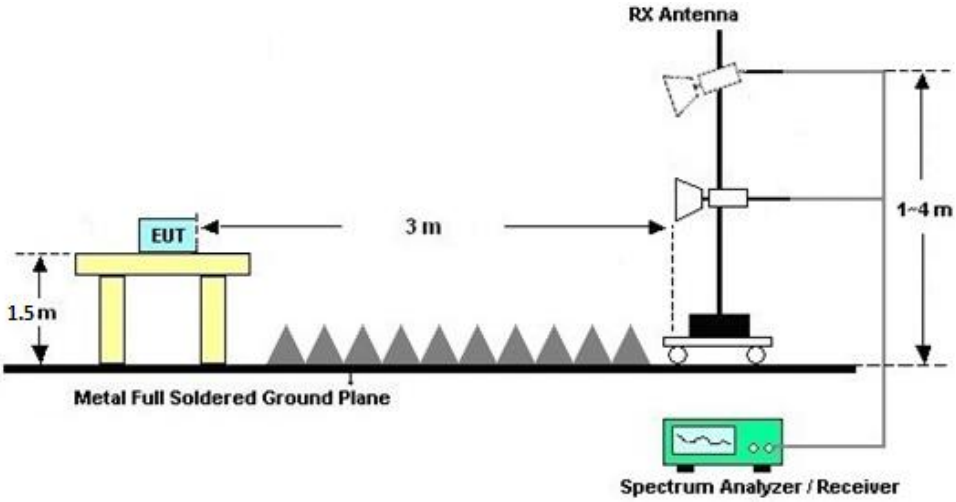
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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

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

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C & D.

3.5.7 Duty Cycle

Please refer to Appendix E.

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

Please refer to Appendix C & D.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

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

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

*Decreases with the logarithm of the frequency.

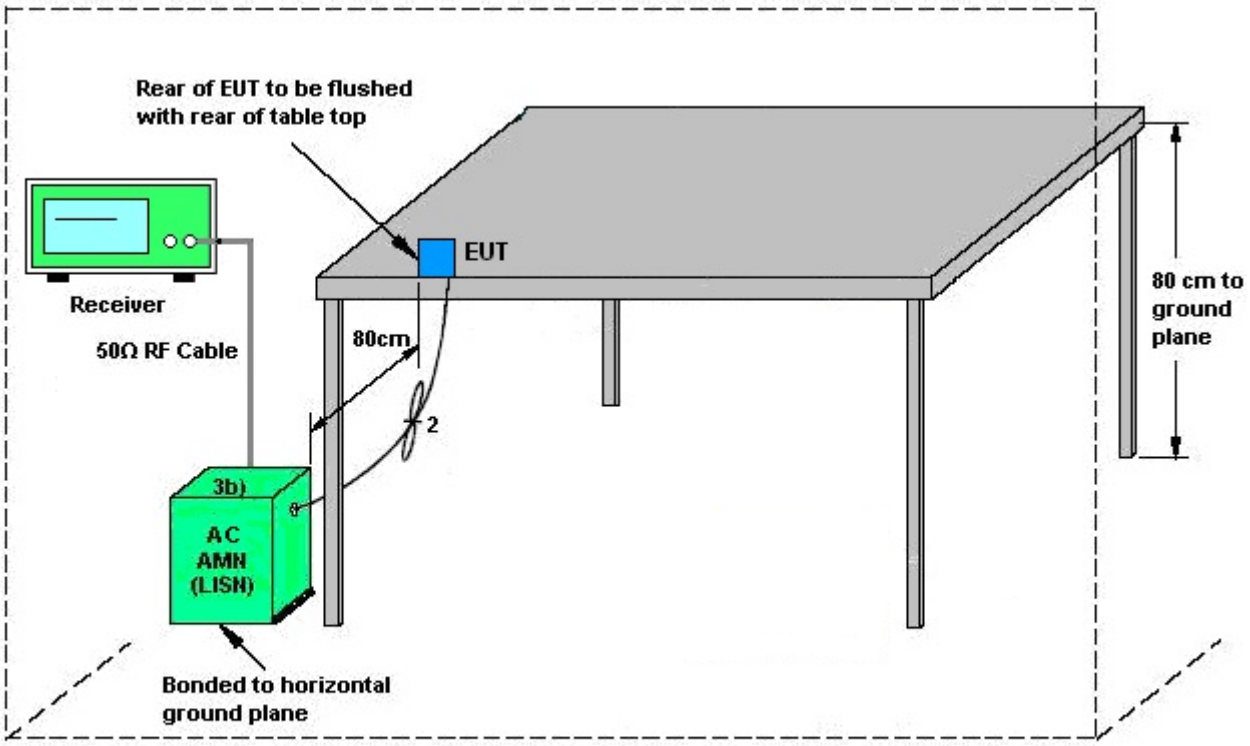
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

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

3.6.4 Test Setup



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

3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.7 Antenna Requirements

3.7.1 Standard Applicable

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

3.7.2 Antenna Anti-Replacement Construction

Non-standard antenna connector is used.

3.7.3 Antenna Gain

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

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 14, 2021	Sep. 22, 2022~ Sep. 23, 2022	Oct. 13, 2022	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 05, 2022	Sep. 22, 2022~ Sep. 23, 2022	Jan. 04, 2023	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 05, 2022	Sep. 22, 2022~ Sep. 23, 2022	Jan. 04, 2023	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY56400004	3Hz~8.5GHz;Max 30dBm	Oct. 16, 2021	Sep. 21, 2022~ Sep. 30, 2022	Oct. 15, 2022	Radiation (03CH05-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44G,MAX 30dB	Mar. 24, 2022	Sep. 21, 2022~ Sep. 30, 2022	Mar. 23, 2023	Radiation (03CH05-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 30, 2021	Sep. 21, 2022~ Sep. 30, 2022	Oct. 29, 2022	Radiation (03CH05-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	May. 24 ,2022	Sep. 21, 2022~ Sep. 30, 2022	May. 23, 2023	Radiation (03CH05-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Nov. 08, 2021	Sep. 21, 2022~ Sep. 30, 2022	Nov. 07, 2022	Radiation (03CH05-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2022	Sep. 21, 2022~ Sep. 30, 2022	Jan. 04, 2023	Radiation (03CH05-KS)
Amplifier	SONOMA	310N	380826	9KHz-1GHz	Jul. 11, 2022	Sep. 21, 2022~ Sep. 30, 2022	Jul. 10, 2023	Radiation (03CH05-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 05, 2022	Sep. 21, 2022~ Sep. 30, 2022	Jan. 04, 2023	Radiation (03CH05-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2012228	1Ghz-18Ghz	Oct. 16, 2021	Sep. 21, 2022~ Sep. 30, 2022	Oct. 15, 2022	Radiation (03CH05-KS)
Amplifier	Keysight	83017A	MY53270316	500MHz~26.5GHz	Oct. 16, 2021	Sep. 21, 2022~ Sep. 30, 2022	Oct. 15, 2022	Radiation (03CH05-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Sep. 21, 2022~ Sep. 30, 2022	NCR	Radiation (03CH05-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Sep. 21, 2022~ Sep. 30, 2022	NCR	Radiation (03CH05-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Sep. 21, 2022~ Sep. 30, 2022	NCR	Radiation (03CH05-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May. 24, 2022	Aug. 27, 2022~ Sep. 29, 2022	May. 23, 2023	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 14, 2021	Aug. 27, 2022~ Sep. 29, 2022	Oct. 13, 2022	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	May. 24, 2022	Aug. 27, 2022~ Sep. 29, 2022	May. 23, 2023	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 14, 2021	Aug. 27, 2022~ Sep. 29, 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))	**5.0dB**

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

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

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

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

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

Appendix A. Conducted Test Results

Report Number : FR262717

Appendix A TEST RESULT

Test Engineer:	kib shi	Temperature:	21~25	°C
Test Date:	2022/9/22	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
11b	1Mbps	1	1	2412	13.19	10.04	0.50	Pass
11b	1Mbps	1	6	2437	13.24	9.58	0.50	Pass
11b	1Mbps	1	11	2462	13.19	9.24	0.50	Pass
11g	6Mbps	1	1	2412	18.28	16.36	0.50	Pass
11g	6Mbps	1	6	2437	18.38	16.42	0.50	Pass
11g	6Mbps	1	11	2462	18.23	16.36	0.50	Pass
HT20	MCS0	1	1	2412	18.88	17.58	0.50	Pass
HT20	MCS0	1	6	2437	19.03	17.62	0.50	Pass
HT20	MCS0	1	11	2462	18.88	17.62	0.50	Pass
HT40	MCS0	1	3	2422	36.76	36.32	0.50	Pass
HT40	MCS0	1	6	2437	36.86	36.32	0.50	Pass
HT40	MCS0	1	9	2452	36.86	36.36	0.50	Pass

TEST RESULTS DATA
Peak Power Table

2.4GHz Band										
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
11b	1Mbps	1	1	2412	15.92	30.00	2.33	18.25	36.00	Pass
11b	1Mbps	1	6	2437	15.99	30.00	2.33	18.32	36.00	Pass
11b	1Mbps	1	11	2462	15.62	30.00	2.33	17.95	36.00	Pass
11g	6Mbps	1	1	2412	25.09	30.00	2.33	27.42	36.00	Pass
11g	6Mbps	1	6	2437	25.58	30.00	2.33	27.91	36.00	Pass
11g	6Mbps	1	11	2462	25.29	30.00	2.33	27.62	36.00	Pass
HT20	MCS0	1	1	2412	25.22	30.00	2.33	27.55	36.00	Pass
HT20	MCS0	1	6	2437	25.67	30.00	2.33	28.00	36.00	Pass
HT20	MCS0	1	11	2462	25.32	30.00	2.33	27.65	36.00	Pass
HT40	MCS0	1	3	2422	22.82	30.00	2.33	25.15	36.00	Pass
HT40	MCS0	1	6	2437	24.51	30.00	2.33	26.84	36.00	Pass
HT40	MCS0	1	9	2452	24.14	30.00	2.33	26.47	36.00	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

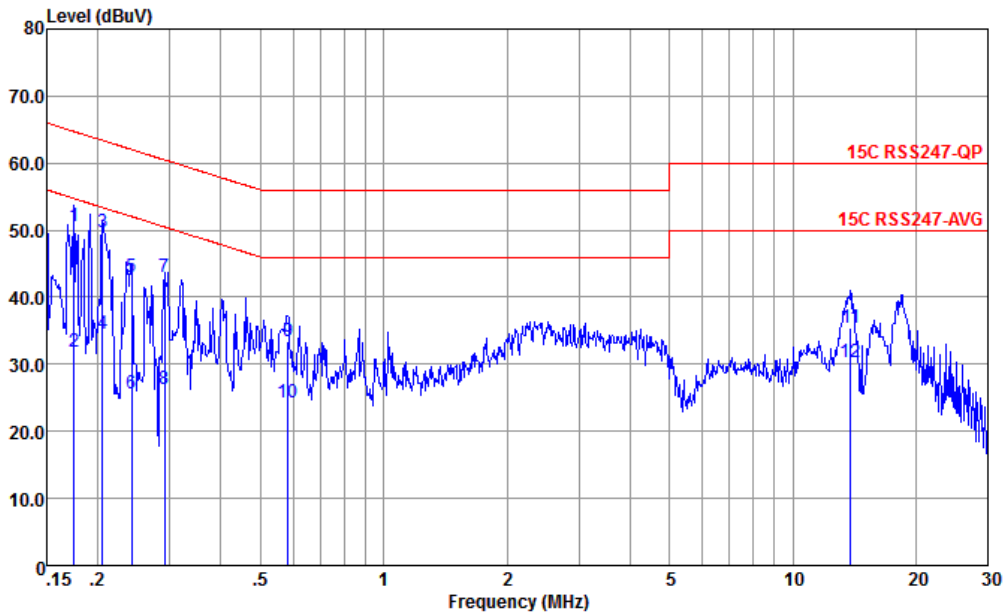
2.4GHz Band						
Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
11b	1Mbps	1	1	2412	0.00	13.08
11b	1Mbps	1	6	2437	0.00	13.09
11b	1Mbps	1	11	2462	0.00	12.56
11g	6Mbps	1	1	2412	0.07	15.10
11g	6Mbps	1	6	2437	0.07	17.14
11g	6Mbps	1	11	2462	0.07	15.87
HT20	MCS0	1	1	2412	0.07	15.02
HT20	MCS0	1	6	2437	0.07	17.31
HT20	MCS0	1	11	2462	0.07	15.87
HT40	MCS0	1	3	2422	0.18	11.89
HT40	MCS0	1	6	2437	0.18	14.14
HT40	MCS0	1	9	2452	0.18	13.69

TEST RESULTS DATA
Peak Power Density

2.4GHz Band								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
11b	1Mbps	1	1	2412	-8.66	2.33	8.00	Pass
11b	1Mbps	1	6	2437	-9.28	2.33	8.00	Pass
11b	1Mbps	1	11	2462	-10.10	2.33	8.00	Pass
11g	6Mbps	1	1	2412	-9.96	2.33	8.00	Pass
11g	6Mbps	1	6	2437	-7.54	2.33	8.00	Pass
11g	6Mbps	1	11	2462	-8.86	2.33	8.00	Pass
HT20	MCS0	1	1	2412	-10.64	2.33	8.00	Pass
HT20	MCS0	1	6	2437	-7.68	2.33	8.00	Pass
HT20	MCS0	1	11	2462	-8.25	2.33	8.00	Pass
HT40	MCS0	1	3	2422	-15.26	2.33	8.00	Pass
HT40	MCS0	1	6	2437	-14.33	2.33	8.00	Pass
HT40	MCS0	1	9	2452	-13.75	2.33	8.00	Pass

Appendix B. AC Conducted Emission Test Results

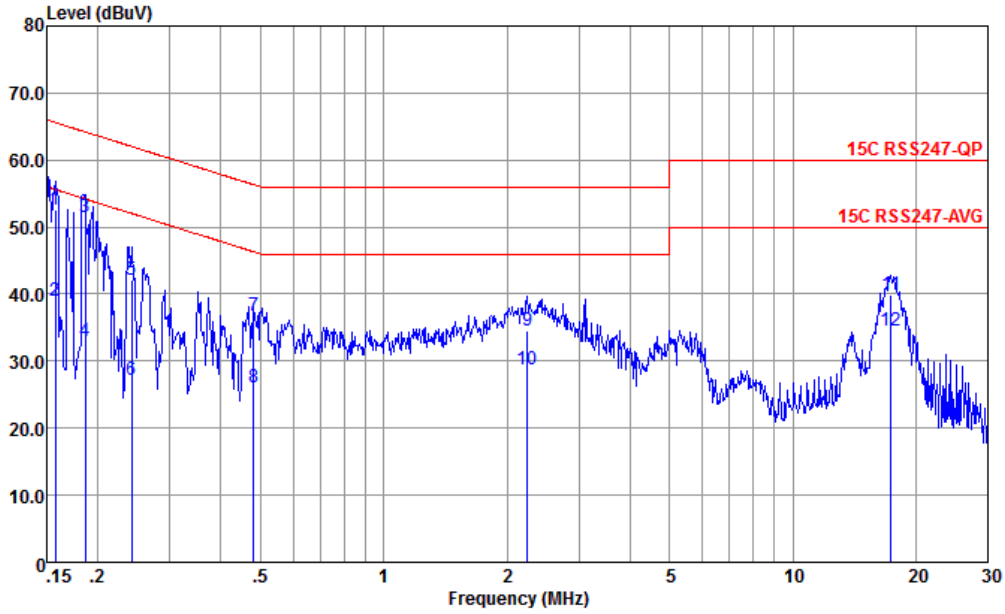
Test Engineer :	Amos Zhang	**Temperature :**	25.3~26.2℃
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



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

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.175	50.67	-14.05	64.72	40.21	0.04	10.42	QP
2		0.175	31.97	-22.75	54.72	21.51	0.04	10.42	Average
3	*	0.205	49.64	-13.76	63.40	39.20	0.02	10.42	QP
4		0.205	34.54	-18.86	53.40	24.10	0.02	10.42	Average
5		0.242	42.93	-19.11	62.04	32.50	0.04	10.39	QP
6		0.242	25.63	-26.41	52.04	15.20	0.04	10.39	Average
7		0.291	43.11	-17.39	60.50	32.70	0.06	10.35	QP
8		0.291	26.31	-24.19	50.50	15.90	0.06	10.35	Average
9		0.582	33.43	-22.57	56.00	23.30	-0.06	10.19	QP
10		0.582	24.23	-21.77	46.00	14.10	-0.06	10.19	Average
11		13.841	35.54	-24.46	60.00	24.60	-0.20	11.14	QP
12		13.841	30.24	-19.76	50.00	19.30	-0.20	11.14	Average

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



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

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.157	52.66	-12.94	65.60	42.20	0.03	10.43	QP
2		0.157	39.06	-16.54	55.60	28.60	0.03	10.43	Average
3	*	0.186	51.57	-12.63	64.20	41.10	0.05	10.42	QP
4		0.186	32.97	-21.23	54.20	22.50	0.05	10.42	Average
5		0.242	42.19	-19.85	62.04	31.80	0.00	10.39	QP
6		0.242	27.19	-24.85	52.04	16.80	0.00	10.39	Average
7		0.481	36.75	-19.57	56.32	26.60	-0.08	10.23	QP
8		0.481	26.05	-20.27	46.32	15.90	-0.08	10.23	Average
9		2.249	34.54	-21.46	56.00	24.60	-0.12	10.06	QP
10		2.249	28.84	-17.16	46.00	18.90	-0.12	10.06	Average
11		17.383	39.94	-20.06	60.00	28.90	-0.24	11.28	QP
12		17.383	34.54	-15.46	50.00	23.50	-0.24	11.28	Average

Note:

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

Appendix C. Radiated Spurious Emission

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

Channel	Power setting
11b CH01	22
11b CH06	23
11b CH11	27
11g CH01	7
11g CH06	0
11g CH11	6
11n20 CH01	7
11n20 CH06	0
11n20 CH11	5
11n40 CH03	21
11n40 CH06	13
11n40 CH09	15

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2380.46	48.55	-25.45	74	46.01	32.31	7.1	36.87	300	205	P	H
		2372.53	37.76	-16.24	54	35.25	32.31	7.07	36.87	300	205	A	H
	*	2412	98.91	-	-	96.24	32.39	7.13	36.85	300	205	P	H
	*	2412	91.6	-	-	88.93	32.39	7.13	36.85	300	205	A	H
		2386.44	56	-18	74	53.36	32.4	7.1	36.86	228	227	P	V
		2386.18	45.85	-8.15	54	43.21	32.4	7.1	36.86	228	227	A	V
	*	2410	109.91	-	-	107.24	32.39	7.13	36.85	228	227	P	V
	*	2412	102.71	-	-	100.04	32.39	7.13	36.85	228	227	A	V
802.11b CH 11 2462MHz		2488.42	47.79	-26.21	74	45.02	32.33	7.25	36.81	302	118	P	H
		2489.02	37.01	-16.99	54	34.24	32.33	7.25	36.81	302	118	A	H
	*	2460	90.77	-	-	88.02	32.36	7.22	36.83	302	118	P	H
	*	2462	83.61	-	-	80.86	32.36	7.22	36.83	302	118	A	H
		2486.62	53.78	-20.22	74	51.01	32.34	7.25	36.82	100	89	P	V
		2487.88	43.11	-10.89	54	40.34	32.33	7.25	36.81	100	89	A	V
	*	2460	107.5	-	-	104.75	32.36	7.22	36.83	100	89	P	V
	*	2462	100.11	-	-	97.36	32.36	7.22	36.83	100	89	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	47.4	-26.6	74	68.53	34	10.25	65.38	300	0	P	H
		4830	54.08	-19.92	74	75.21	34	10.25	65.38	118	150	P	V
		4830	50.79	-3.21	54	71.92	34	10.25	65.38	118	150	A	V
802.11b CH 06 2437MHz		4875	47.11	-26.89	74	68.24	34	10.29	65.42	300	0	P	H
		7305	42.58	-31.42	74	60.01	35.76	12.72	65.91	300	0	P	H
		4875	52.63	-21.37	74	73.76	34	10.29	65.42	121	155	P	V
		4875	50.59	-3.41	54	71.72	34	10.29	65.42	121	155	A	V
		7305	42.38	-31.62	74	59.81	35.76	12.72	65.91	100	0	P	V
802.11b CH 11 2462MHz		4920	49.4	-24.6	74	70.51	34	10.34	65.45	300	0	P	H
		7380	42.06	-31.94	74	59.66	35.78	12.73	66.11	300	0	P	H
		4920	52.8	-21.2	74	73.91	34	10.34	65.45	118	156	P	V
		4920	50.7	-3.3	54	71.81	34	10.34	65.45	118	156	A	V
		7380	41.8	-32.2	74	59.4	35.78	12.73	66.11	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		2389.04	52.35	-21.65	74	49.71	32.4	7.1	36.86	299	222	P	H
		2386.31	39.19	-14.81	54	36.55	32.4	7.1	36.86	299	222	A	H
	*	2406	100.05	-	-	97.38	32.39	7.13	36.85	299	222	P	H
	*	2408	91.96	-	-	89.29	32.39	7.13	36.85	299	222	A	H
		2389.82	67.92	-6.08	74	65.28	32.4	7.1	36.86	296	302	P	V
		2389.95	52.53	-1.47	54	49.89	32.4	7.1	36.86	296	302	A	V
	*	2416	110.35	-	-	107.65	32.39	7.16	36.85	296	302	P	V
	*	2412	102.37	-	-	99.7	32.39	7.13	36.85	296	302	A	V
802.11g CH 11 2462MHz		2483.74	51.11	-22.89	74	48.34	32.34	7.25	36.82	233	352	P	H
		2483.5	38.27	-15.73	54	35.5	32.34	7.25	36.82	233	352	A	H
	*	2456	97.24	-	-	94.49	32.36	7.22	36.83	233	352	P	H
	*	2456	89.39	-	-	86.64	32.36	7.22	36.83	233	352	A	H
		2483.56	70.61	-3.39	74	67.84	32.34	7.25	36.82	246	60	P	V
		2483.5	52.51	-1.49	54	49.74	32.34	7.25	36.82	246	60	A	V
	*	2458	108.72	-	-	105.97	32.36	7.22	36.83	246	60	P	V
	*	2456	101.56	-	-	98.81	32.36	7.22	36.83	246	60	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	47.93	-26.07	74	69.06	34	10.25	65.38	300	0	P	H
		4830	54.86	-19.14	74	75.99	34	10.25	65.38	120	150	P	V
		4830	46.12	-7.88	54	67.25	34	10.25	65.38	120	150	A	V
802.11g CH 06 2437MHz		4875	49.57	-24.43	74	70.7	34	10.29	65.42	300	0	P	H
		7320	47.96	-26.04	74	66.2	35.77	12.72	66.73	300	0	P	H
		4875	56.17	-17.83	74	77.3	34	10.29	65.42	121	155	P	V
		4875	49.07	-4.93	54	70.2	34	10.29	65.42	121	155	A	V
		7305	54.27	-19.73	74	71.7	35.76	12.72	65.91	334	134	P	V
		7305	40.07	-13.93	54	57.5	35.76	12.72	65.91	334	134	A	V
802.11g CH 11 2462MHz		4920	50.63	-23.37	74	71.74	34	10.34	65.45	120	30	P	H
		4920	41.78	-12.22	54	62.89	34	10.34	65.45	120	30	A	H
		7380	47.88	-26.12	74	65.48	35.78	12.73	66.11	300	0	P	H
		4920	56.99	-17.01	74	78.1	34	10.34	65.45	117	16	P	V
		4920	47.59	-6.41	54	68.7	34	10.34	65.45	117	16	A	V
		7380	49.88	-24.12	74	67.48	35.78	12.73	66.11	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		2384.88	53.89	-20.11	74	51.35	32.31	7.1	36.87	300	223	P	H
		2385.4	38.88	-15.12	54	36.34	32.31	7.1	36.87	300	223	A	H
	*	2410	99.32	-	-	96.65	32.39	7.13	36.85	300	223	P	H
	*	2408	91.18	-	-	88.51	32.39	7.13	36.85	300	223	A	H
		2389.82	66.78	-7.22	74	64.14	32.4	7.1	36.86	291	304	P	V
		2389.95	52.48	-1.52	54	49.84	32.4	7.1	36.86	291	304	A	V
	*	2418	109.73	-	-	107.03	32.39	7.16	36.85	291	304	P	V
	*	2410	101.68	-	-	99.01	32.39	7.13	36.85	291	304	A	V
802.11n HT20 CH 11 2462MHz		2483.5	53.45	-20.55	74	50.68	32.34	7.25	36.82	233	351	P	H
		2483.5	39.19	-14.81	54	36.42	32.34	7.25	36.82	233	351	A	H
	*	2460	96.74	-	-	93.99	32.36	7.22	36.83	233	351	P	H
	*	2458	89.53	-	-	86.78	32.36	7.22	36.83	233	351	A	H
		2483.8	69.11	-4.89	74	66.34	32.34	7.25	36.82	304	47	P	V
		2483.5	52.3	-1.7	54	49.53	32.34	7.25	36.82	304	47	A	V
	*	2460	109.18	-	-	106.43	32.36	7.22	36.83	304	47	P	V
	*	2460	101.12	-	-	98.37	32.36	7.22	36.83	304	47	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	46.95	-27.05	74	68.08	34	10.25	65.38	300	0	P	H
		4830	54.78	-19.22	74	75.91	34	10.25	65.38	100	13	P	V
		4830	45.35	-8.65	54	66.48	34	10.25	65.38	100	13	A	V
802.11n HT20 CH 06 2437MHz		4875	50.18	-23.82	74	71.31	34	10.29	65.42	100	230	P	H
		4875	42.46	-11.54	54	63.59	34	10.29	65.42	100	230	A	H
		7305	51.23	-22.77	74	69.43	35.76	12.72	66.68	252	43	P	H
		7305	42.22	-11.78	54	60.42	35.76	12.72	66.68	252	43	A	H
		4875	56.14	-17.86	74	77.27	34	10.29	65.42	100	153	P	V
		4875	48.25	-5.75	54	69.38	34	10.29	65.42	100	153	A	V
		7305	51.92	-22.08	74	69.35	35.76	12.72	65.91	100	200	P	V
		7305	39.13	-14.87	54	56.56	35.76	12.72	65.91	100	200	A	V
802.11n HT20 CH 11 2462MHz		4920	49.63	-24.37	74	70.74	34	10.34	65.45	300	0	P	H
		7380	48.93	-25.07	74	66.53	35.78	12.73	66.11	300	0	P	H
		4920	56.53	-17.47	74	77.64	34	10.34	65.45	144	155	P	V
		4920	47.39	-6.61	54	68.5	34	10.34	65.45	144	155	A	V
		7380	49.05	-24.95	74	66.65	35.78	12.73	66.11	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 03 2422MHz		2376.3	49.72	-24.28	74	47.21	32.31	7.07	36.87	261	211	P	H
		2376.43	38.81	-15.19	54	36.3	32.31	7.07	36.87	261	211	A	H
		2497.18	48.66	-25.34	74	45.86	32.33	7.28	36.81	261	211	P	H
		2490.46	37.91	-16.09	54	35.14	32.33	7.25	36.81	261	211	A	H
	*	2408	91.73	-	-	89.06	32.39	7.13	36.85	261	211	P	H
	*	2410	83.39	-	-	80.72	32.39	7.13	36.85	261	211	A	H
		2386.57	63.61	-10.39	74	60.97	32.4	7.1	36.86	264	314	P	V
		2387.74	52.3	-1.7	54	49.66	32.4	7.1	36.86	264	314	A	V
		2487.1	52.01	-21.99	74	49.24	32.34	7.25	36.82	264	314	P	V
		2483.98	42.41	-11.59	54	39.64	32.34	7.25	36.82	264	314	A	V
	*	2408	101.85	-	-	99.18	32.39	7.13	36.85	264	314	P	V
	*	2404	94.22	-	-	91.55	32.39	7.13	36.85	264	314	A	V
802.11n HT40 CH 06 2437MHz		2386.05	56.42	-17.58	74	53.78	32.4	7.1	36.86	239	346	P	H
		2389.69	43.22	-10.78	54	40.58	32.4	7.1	36.86	239	346	A	H
		2483.62	49.85	-24.15	74	47.08	32.34	7.25	36.82	239	346	P	H
		2483.86	38.91	-15.09	54	36.14	32.34	7.25	36.82	239	346	A	H
	*	2420	93.6	-	-	90.91	32.38	7.16	36.85	239	346	P	H
	*	2420	85.97	-	-	83.28	32.38	7.16	36.85	239	346	A	H
		2385.79	66.93	-7.07	74	64.29	32.4	7.1	36.86	200	313	P	V
		2389.69	52.92	-1.08	54	50.28	32.4	7.1	36.86	200	313	A	V
		2483.8	61.31	-12.69	74	58.54	32.34	7.25	36.82	200	313	P	V
		2483.5	49.29	-4.71	54	46.52	32.34	7.25	36.82	200	313	A	V
	*	2424	106.57	-	-	103.88	32.38	7.16	36.85	200	313	P	V
	*	2426	98.19	-	-	95.5	32.38	7.16	36.85	200	313	A	V

802.11n HT40 CH 09 2452MHz		2386.96	50.48	-23.52	74	47.84	32.4	7.1	36.86	284	205	P	H
		2389.69	38.88	-15.12	54	36.24	32.4	7.1	36.86	284	205	A	H
		2491.78	51.8	-22.2	74	49	32.33	7.28	36.81	284	205	P	H
		2489.44	39.24	-14.76	54	36.47	32.33	7.25	36.81	284	205	A	H
	*	2438	92.77	-	-	90.05	32.37	7.19	36.84	284	205	P	H
	*	2434	85.46	-	-	82.77	32.38	7.16	36.85	284	205	A	H
		2385.92	60.15	-13.85	74	57.51	32.4	7.1	36.86	171	185	P	V
		2389.69	48.14	-5.86	54	45.5	32.4	7.1	36.86	171	185	A	V
		2483.5	67.76	-6.24	74	64.99	32.34	7.25	36.82	171	185	P	V
		2483.56	52.41	-1.59	54	49.64	32.34	7.25	36.82	171	185	A	V
	*	2436	104.59	-	-	101.87	32.38	7.19	36.85	171	185	P	V
	*	2434	97.08	-	-	94.39	32.38	7.16	36.85	171	185	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 03 2422MHz		4845	41.93	-32.07	74	63.07	34	10.25	65.39	300	0	P	H
		7260	42.22	-31.78	74	59.51	35.75	12.72	65.76	300	0	P	H
		4845	46.24	-27.76	74	67.38	34	10.25	65.39	100	0	P	V
		7260	42.06	-31.94	74	59.35	35.75	12.72	65.76	100	0	P	V
802.11n HT40 CH 06 2437MHz		4875	43.81	-30.19	74	64.94	34	10.29	65.42	300	0	P	H
		7305	42.36	-31.64	74	59.79	35.76	12.72	65.91	300	0	P	H
		4875	51.29	-22.71	74	72.42	34	10.29	65.42	122	155	P	V
		4875	42.85	-11.15	54	63.98	34	10.29	65.42	122	155	A	V
		7305	42.8	-31.2	74	60.23	35.76	12.72	65.91	100	0	P	V
802.11n HT40 CH 09 2452MHz		4905	44.96	-29.04	74	66.06	34	10.34	65.44	300	0	P	H
		7350	41.81	-32.19	74	59.38	35.77	12.72	66.06	300	0	P	H
		4905	50.58	-23.42	74	71.68	34	10.34	65.44	100	157	P	V
		4905	41.02	-12.98	54	62.12	34	10.34	65.44	100	157	A	V
		7350	42.02	-31.98	74	59.59	35.77	12.72	66.06	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

Emission below 1GHz

2.4GHz WIFI 802.11n 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		30	26.06	-13.94	40	33.8	24.57	0.71	33.02	-	-	P	H
		240.49	21.91	-24.09	46	34.48	17.84	2.37	32.78	-	-	P	H
		320.03	30.81	-15.19	46	41.18	19.77	2.72	32.86	-	-	P	H
		480.08	28.54	-17.46	46	35	23.17	3.35	32.98	-	-	P	H
		653.71	23.93	-22.07	46	27.76	25.22	3.9	32.95	-	-	P	H
		846.74	27.21	-18.79	46	28.6	26.57	4.44	32.4	-	-	P	H
		37.76	26.08	-13.92	40	37.8	20.35	0.85	32.92	-	-	P	V
		239.52	22	-24	46	34.64	17.78	2.36	32.78	-	-	P	V
		320.03	28.51	-17.49	46	38.88	19.77	2.72	32.86	-	-	P	V
		480.08	24.74	-21.26	46	31.2	23.17	3.35	32.98	-	-	P	V
		640.13	27.73	-18.27	46	31.67	25.17	3.86	32.97	-	-	P	V
		874.87	27.7	-18.3	46	28.65	26.63	4.52	32.1	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

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

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

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

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

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

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

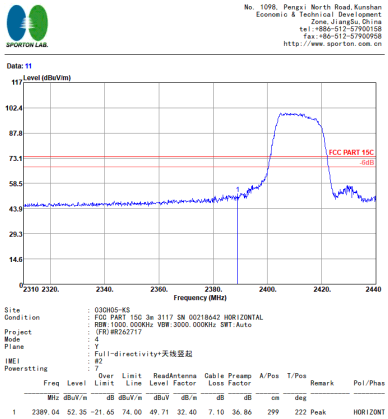
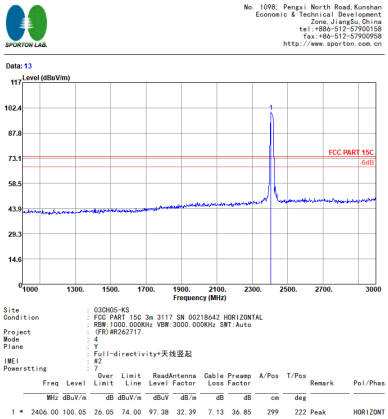
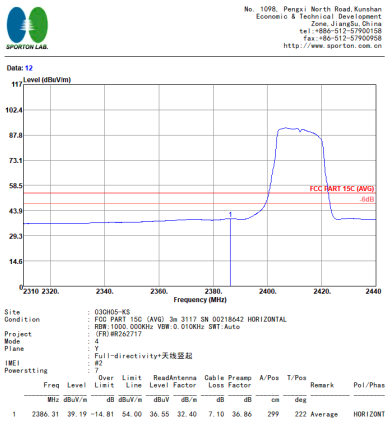
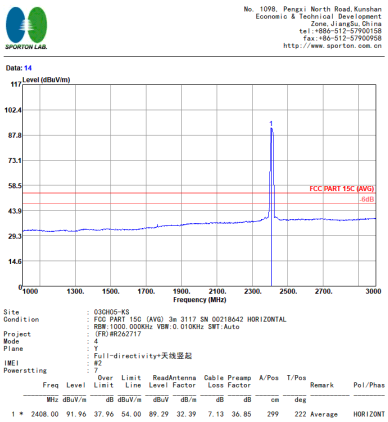
Appendix D. Radiated Spurious Emission Plots

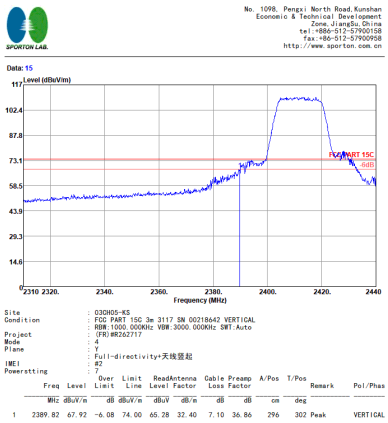
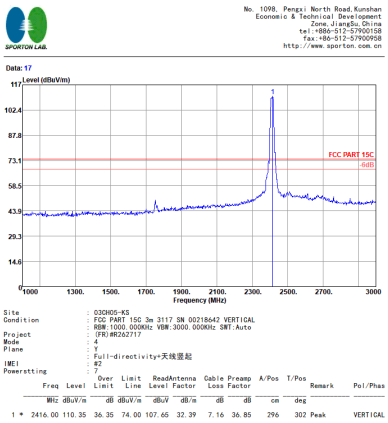
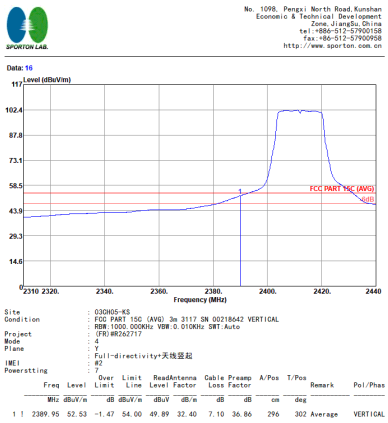
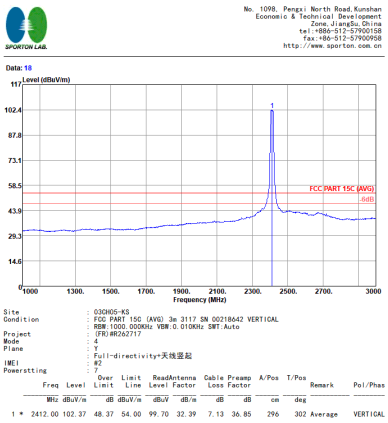
Note symbol

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

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

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

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

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http://www.sporton.com.cn

Data: 15

Site : 03CH05-KS
Condition : FCC PART 15C 3m 3117 SN 00218642 VERTICAL
: RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Project : (FR)#R262717
Mode : 4
Plane : Y
: Full-directivity+天线竖起
IMEI : #2
Powerstting : 7

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	Preamp Loss	A/Pos Factor	T/Pos	Remark	Pol/Phas
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	2389.82	67.92	-6.08	74.00	65.28	32.40	7.10	36.86	296	302 Peak	VERTICAL

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Data: 17

Site : 03CH05-KS
Condition : FCC PART 15C 3m 3117 SN 00218642 VERTICAL
: RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Project : (FR)#R262717
Mode : 4
Plane : Y
: Full-directivity+天线竖起
IMEI : #2
Powerstting : 7

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	Preamp Loss	A/Pos Factor	T/Pos	Remark	Pol/Phas
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 *	2416.00	110.35	36.35	74.00	107.65	32.39	7.16	36.85	296	302 Peak	VERTICAL

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Data: 16

Site : 03CH05-KS
Condition : FCC PART 15C (AVG) 3m 3117 SN 00218642 VERTICAL
: RBW:1000.000KHz VBW:0.010KHz SWT:Auto
Project : (FR)#R262717
Mode : 4
Plane : Y
: Full-directivity+天线竖起
IMEI : #2
Powerstting : 7

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	Preamp Loss	A/Pos Factor	T/Pos	Remark	Pol/Phas
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 !	2389.95	52.53	-1.47	54.00	49.89	32.40	7.10	36.86	296	302 Average	VERTICAL

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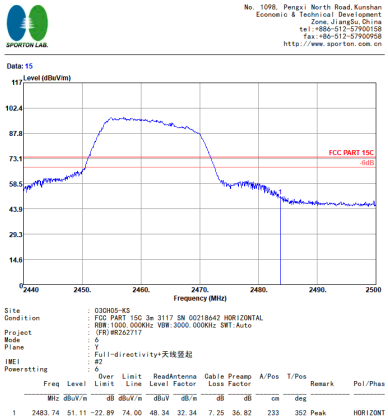
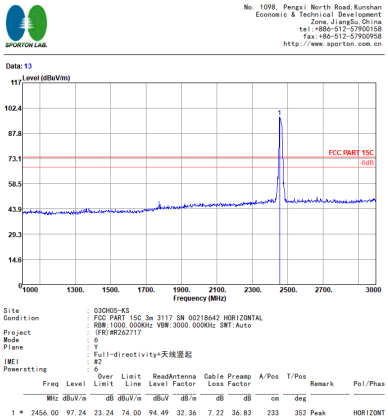
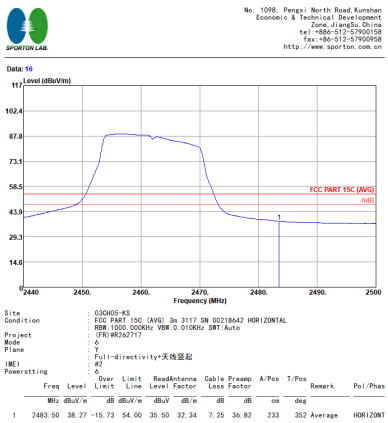
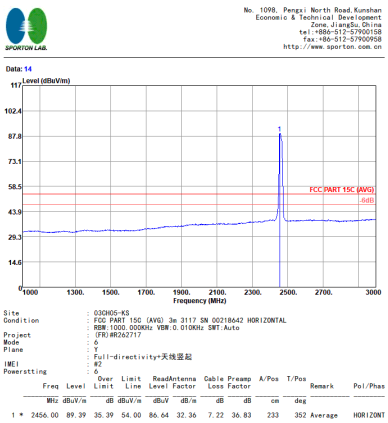
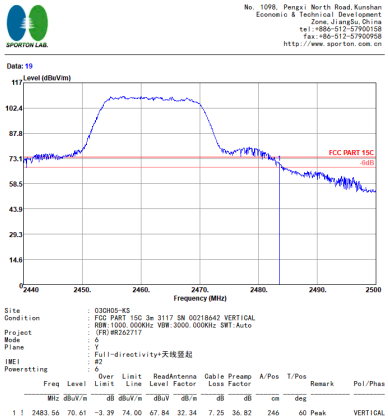
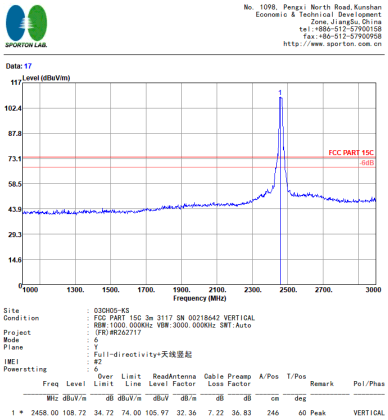
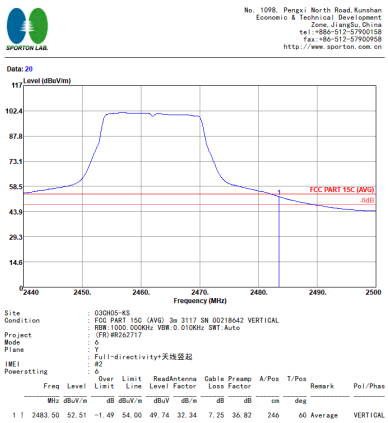
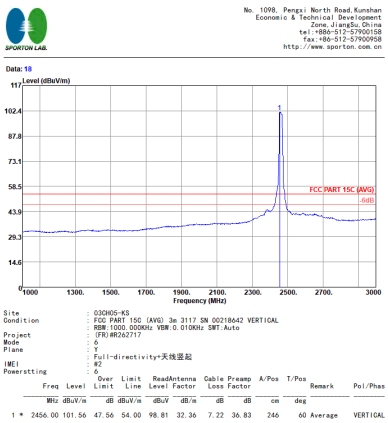
Data: 18

Site : 03CH05-KS
Condition : FCC PART 15C (AVG) 3m 3117 SN 00218642 VERTICAL
: RBW:1000.000KHz VBW:0.010KHz SWT:Auto
Project : (FR)#R262717
Mode : 4
Plane : Y
: Full-directivity+天线竖起
IMEI : #2
Powerstting : 7

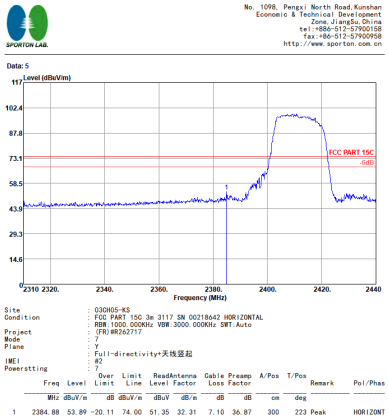
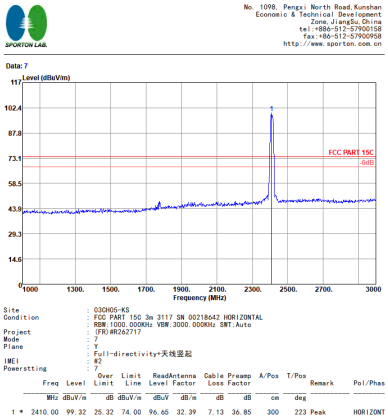
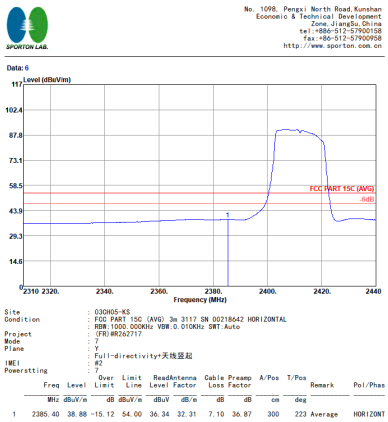
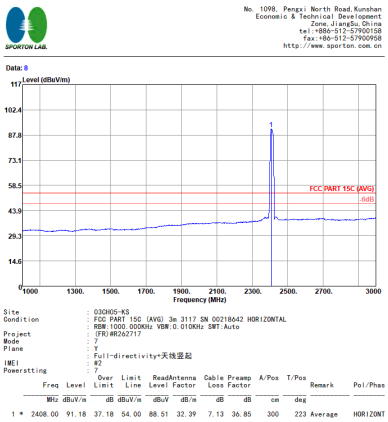
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	Preamp Loss	A/Pos Factor	T/Pos	Remark	Pol/Phas
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 *	2412.00	102.37	48.37	54.00	99.70	32.39	7.13	36.85	296	302 Average	VERTICAL

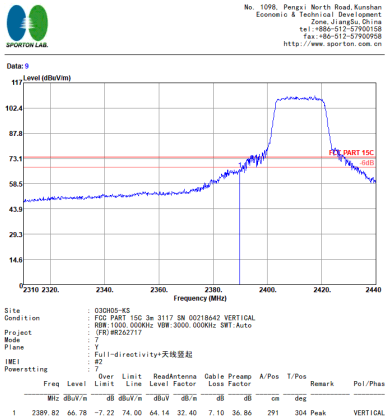
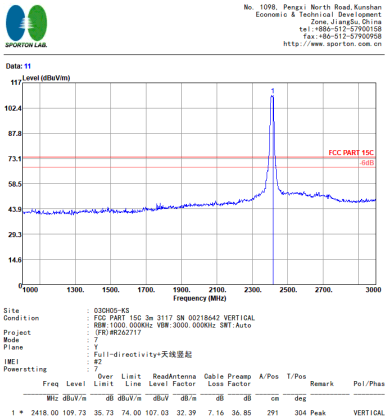
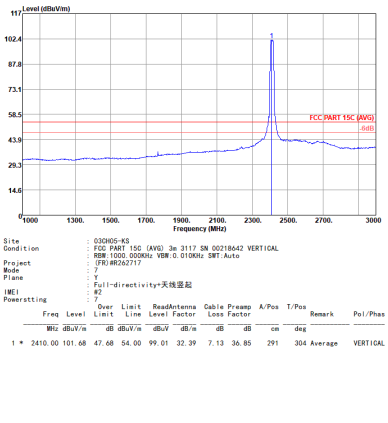
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH11 2462MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

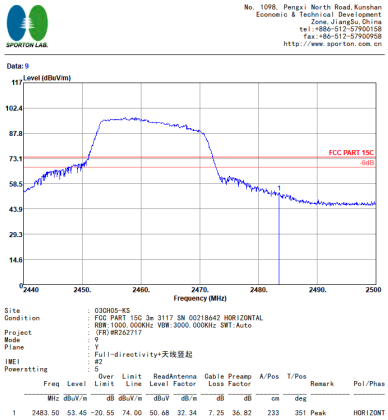
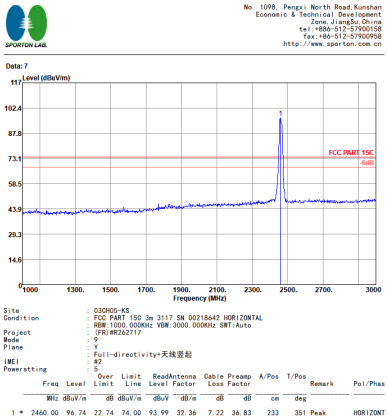
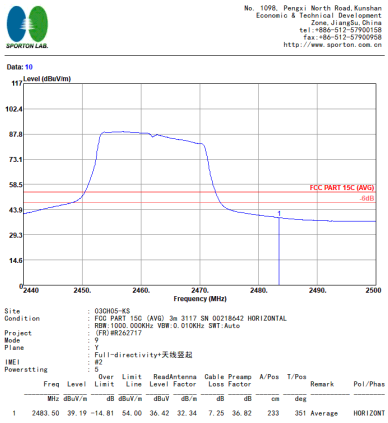
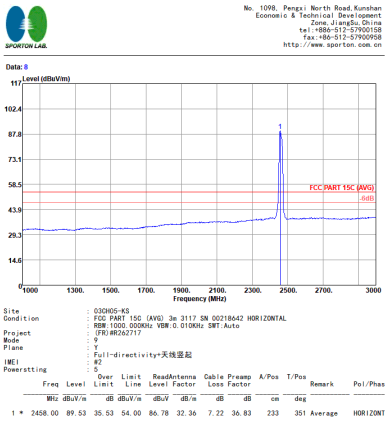
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH11 2462MHz	
1	Vertical	Fundamental
Peak		
Avg.		

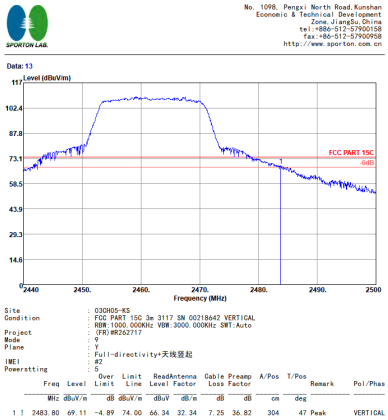
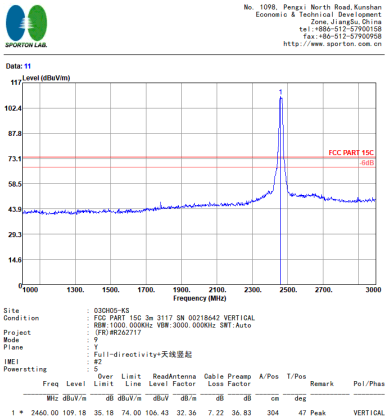
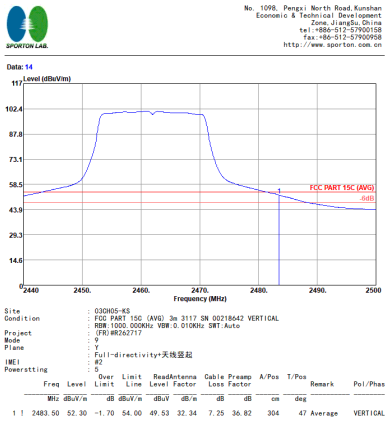
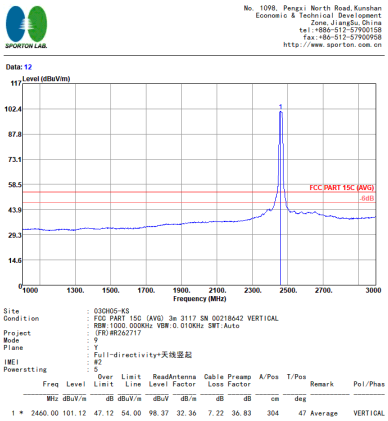
2.4GHz 2400~2483.5MHz

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.		

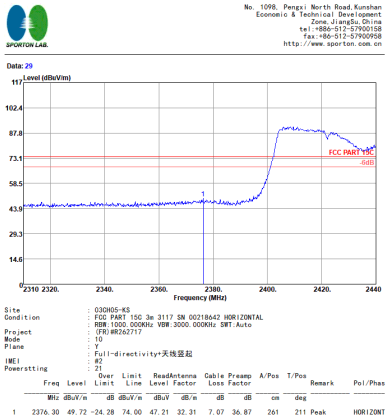
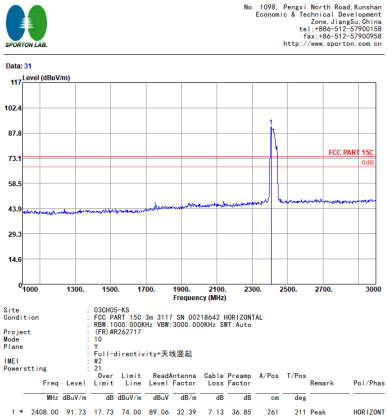
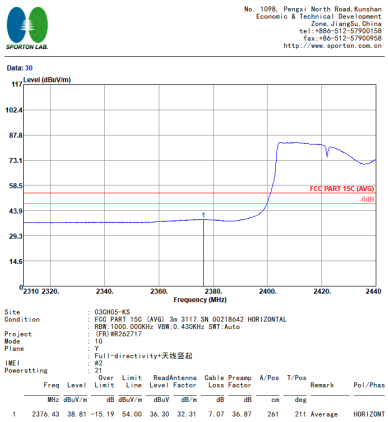
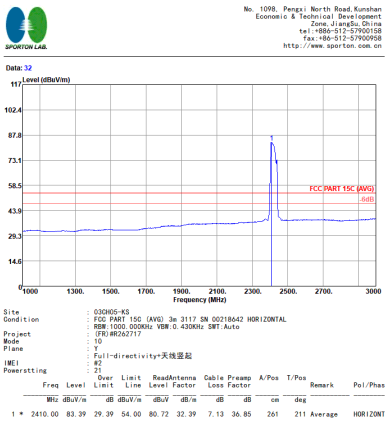
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH01 2412MHz	
1	Vertical	Fundamental
Peak	 No. 1098, Pengxi North Road,Kunshan Economic & Technical Development Zone,JiangSu,China tel:+886-512-57900158 fax:+86-512-57900958 http://www.sporton.com.cn Data: 9 Level (dBuV/m) FCC PART 15C -6dB Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C 3m 3117 SN 00218642 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)#R262717 Mode : 7 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powerstting : 7 Freq Level Over Limit Limit ReadAntenna Level 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 2389.82 66.78 -7.22 74.00 64.14 32.40 7.10 36.86 291 304 Peak VERTICAL	 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: 11 Level (dBuV/m) FCC PART 15C -6dB Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C 3m 3117 SN 00218642 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)#R262717 Mode : 7 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powerstting : 7 Freq Level Over Limit Limit ReadAntenna Level 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 * 2418.00 109.73 35.73 74.00 107.03 32.39 7.16 36.85 291 304 Peak VERTICAL
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: 10 Level (dBuV/m) FCC PART 15C (AVG) -20dB Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C (AVG) 3m 3117 SN 00218642 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto Project : (FR)#R262717 Mode : 7 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powerstting : 7 Freq Level Over Limit Limit ReadAntenna Level 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 ! 2389.95 52.48 -1.52 54.00 49.84 32.40 7.10 36.86 291 304 Average VERTICAL	 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: 12 Level (dBuV/m) FCC PART 15C (AVG) -6dB Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C (AVG) 3m 3117 SN 00218642 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto Project : (FR)#R262717 Mode : 7 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powerstting : 7 Freq Level Over Limit Limit ReadAntenna Level 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 * 2410.00 101.68 47.68 54.00 99.01 32.39 7.13 36.85 291 304 Average VERTICAL

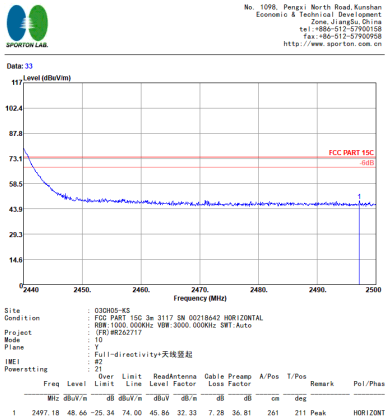
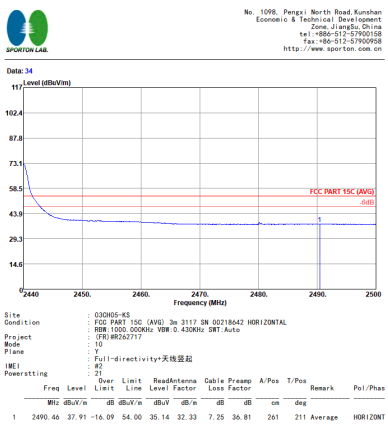
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH11 2462MHz	
1	Horizontal	Fundamental
Peak	 No. 1098, Pengxi North Road,Kunshan Economic & Technical Development Zone,JiangSu,China tel:+886-512-57900158 fax:+86-512-57900958 http://www.sporton.com.cn Data: 9 Level (dBuV/m) FCC PART 15C -6dB Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C 3m 3117 SN 00218642 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)#R262717 Mode : 9 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powerstting : 5 Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss Factor Preamp Factor A/Pos Remark T/Pos Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 2483.50 53.45 -20.55 74.00 50.68 32.34 7.25 36.82 233 351 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: 7 Level (dBuV/m) FCC PART 15C -6dB Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C 3m 3117 SN 00218642 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)#R262717 Mode : 9 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powerstting : 5 Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss Factor Preamp Factor A/Pos Remark T/Pos Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 * 2460.00 96.74 22.74 74.00 93.99 32.36 7.22 36.83 233 351 Peak HORIZONT
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: 10 Level (dBuV/m) FCC PART 15C (AVG) -6dB Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C (AVG) 3m 3117 SN 00218642 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto Project : (FR)#R262717 Mode : 9 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powerstting : 5 Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss Factor Preamp Factor A/Pos Remark T/Pos Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 2483.50 39.19 -14.81 54.00 36.42 32.34 7.25 36.82 233 351 Average 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: 8 Level (dBuV/m) FCC PART 15C (AVG) -6dB Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C (AVG) 3m 3117 SN 00218642 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto Project : (FR)#R262717 Mode : 9 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powerstting : 5 Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss Factor Preamp Factor A/Pos Remark T/Pos Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 * 2458.00 89.53 35.53 54.00 86.78 32.36 7.22 36.83 233 351 Average HORIZONT

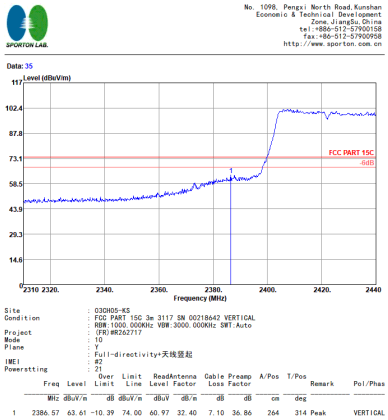
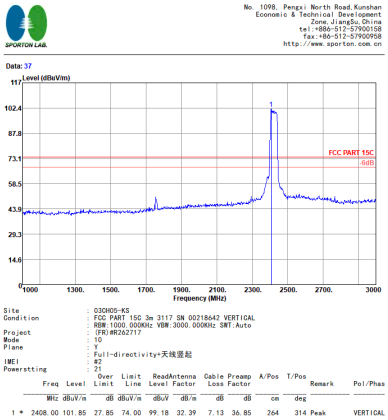
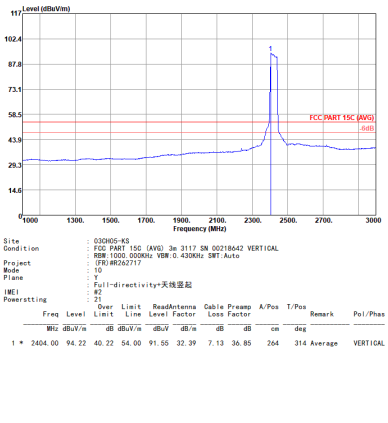
WIFI	2.4GHz 2400~2483.5MHz Fundamental @ 3m	
ANT	802.11n HT20 CH11 2462MHz	
1	Vertical	Fundamental
Peak	 Site : 03CH05-KS Condition : FCC PART 15C 3m 3117 SN 00218642 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)#R262717 Mode : 9 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powerstting : 5 Freq Level Over Limit Limit ReadAntenna Level Cable Factor Loss Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 ! 2483.80 69.11 -4.89 74.00 66.34 32.34 7.25 36.82 304 47 Peak VERTICAL	 Site : 03CH05-KS Condition : FCC PART 15C 3m 3117 SN 00218642 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)#R262717 Mode : 9 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powerstting : 5 Freq Level Over Limit Limit ReadAntenna Level Cable Factor Loss Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 * 2460.00 109.18 35.18 74.00 106.43 32.36 7.22 36.83 304 47 Peak VERTICAL
Avg.	 Site : 03CH05-KS Condition : FCC PART 15C (AVG) 3m 3117 SN 00218642 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto Project : (FR)#R262717 Mode : 9 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powerstting : 5 Freq Level Over Limit Limit ReadAntenna Level Cable Factor Loss Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 ! 2483.50 52.30 -1.70 54.00 49.53 32.34 7.25 36.82 304 47 Average VERTICAL	 Site : 03CH05-KS Condition : FCC PART 15C (AVG) 3m 3117 SN 00218642 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto Project : (FR)#R262717 Mode : 9 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powerstting : 5 Freq Level Over Limit Limit ReadAntenna Level Cable Factor Loss Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 * 2460.00 101.12 47.12 54.00 98.37 32.36 7.22 36.83 304 47 Average VERTICAL

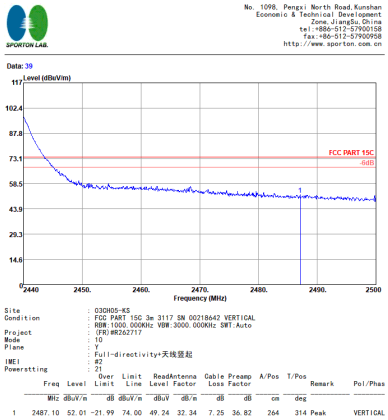
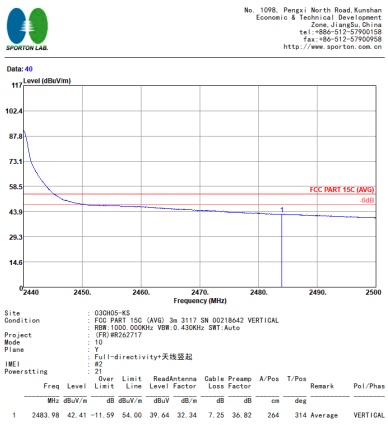
2.4GHz 2400~2483.5MHz

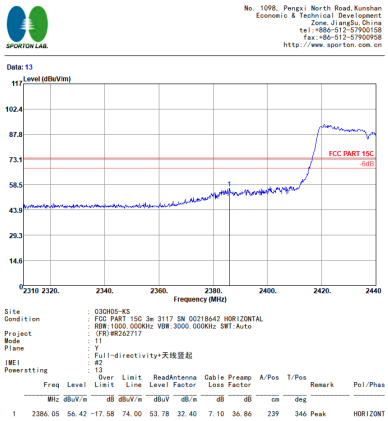
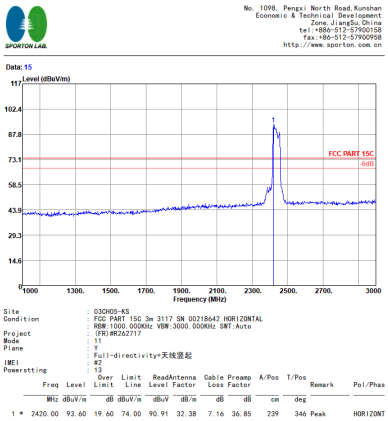
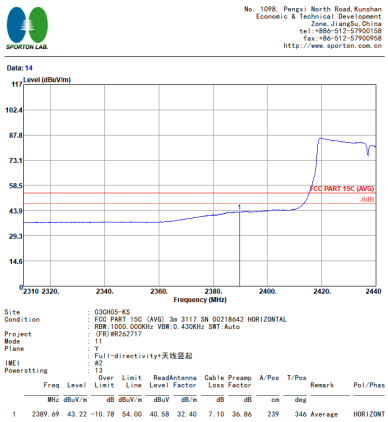
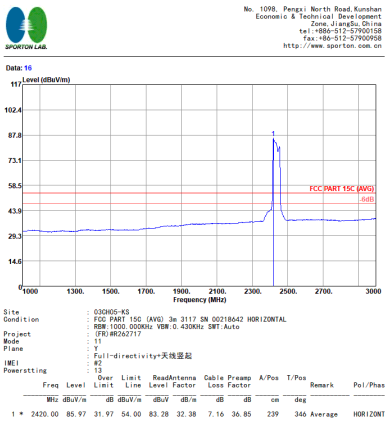
WIFI 802.11n HT40 (Band Edge @ 3m)

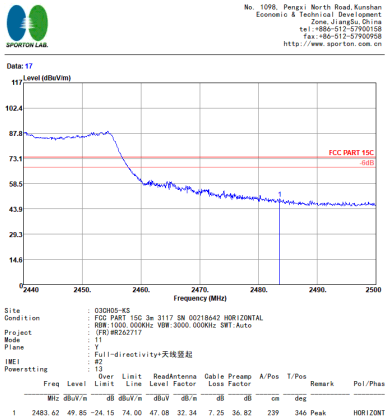
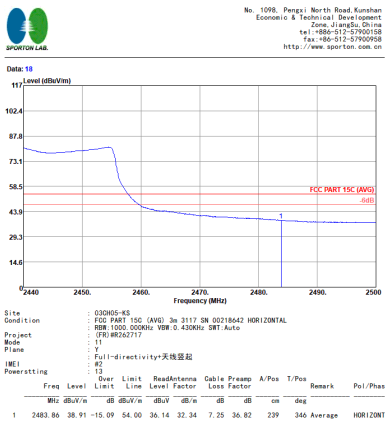
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		

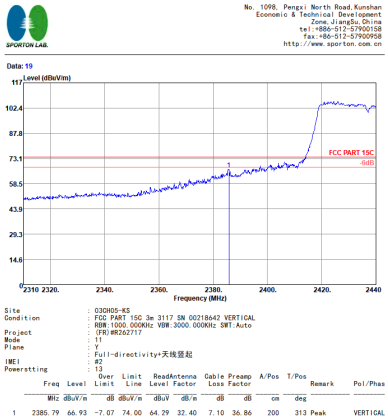
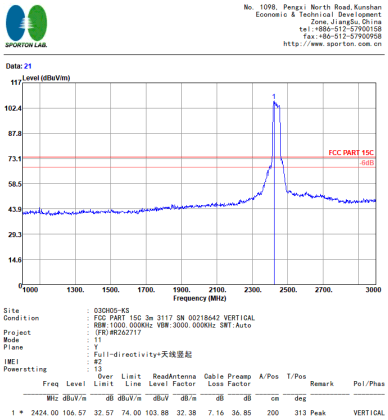
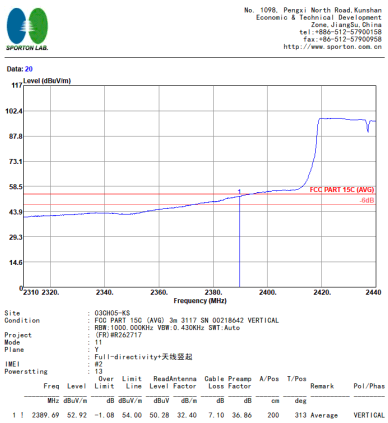
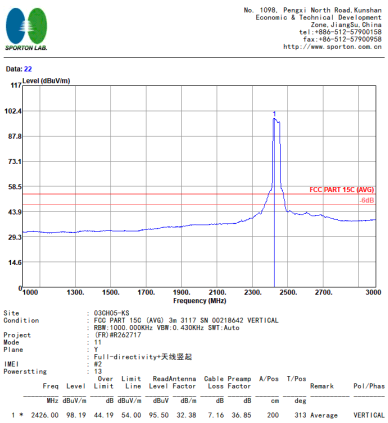
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - R	
1	Horizontal	Fundamental
Peak		Left Blank
Avg.		Left Blank

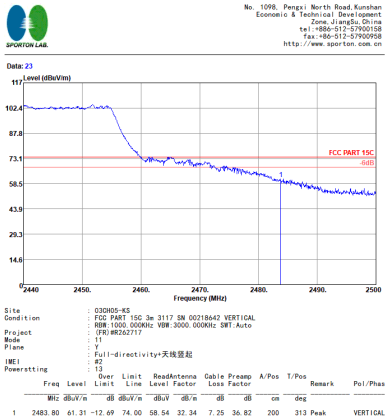
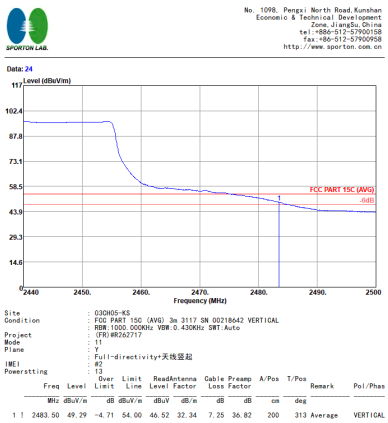
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - L	
1	Vertical	Fundamental
Peak	 No. 1098, Pengxi North Road,Kunshan Economic & Technical Development Zone,JiangSu,China tel:+886-512-57900158 fax:+86-512-57900958 http://www.sporton.com.cn Data: 35 Level (dBuV/m) FCC PART 15C -6dB Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C 3m 3117 SN 00218642 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)#R262717 Mode : 10 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powerstting : 21 Freq Level Over Limit Limit ReadAntenna Level 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 2386.57 63.61 -10.39 74.00 60.97 32.40 7.10 36.86 264 314 Peak VERTICAL	 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: 37 Level (dBuV/m) FCC PART 15C -6dB Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C 3m 3117 SN 00218642 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)#R262717 Mode : 10 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powerstting : 21 Freq Level Over Limit Limit ReadAntenna Level 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 * 2408.00 101.85 27.85 74.00 99.18 32.39 7.13 36.85 264 314 Peak VERTICAL
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: 36 Level (dBuV/m) FCC PART 15C (AVG) -6dB Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C (AVG) 3m 3117 SN 00218642 VERTICAL : RBW:1000.000KHz VBW:0.430KHz SWT:Auto Project : (FR)#R262717 Mode : 10 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powerstting : 21 Freq Level Over Limit Limit ReadAntenna Level 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 ! 2387.74 52.30 -1.70 54.00 49.66 32.40 7.10 36.86 264 314 Average VERTICAL	 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: 38 Level (dBuV/m) FCC PART 15C (AVG) -6dB Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C (AVG) 3m 3117 SN 00218642 VERTICAL : RBW:1000.000KHz VBW:0.430KHz SWT:Auto Project : (FR)#R262717 Mode : 10 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powerstting : 21 Freq Level Over Limit Limit ReadAntenna Level 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 * 2404.00 94.22 40.22 54.00 91.55 32.39 7.13 36.85 264 314 Average VERTICAL

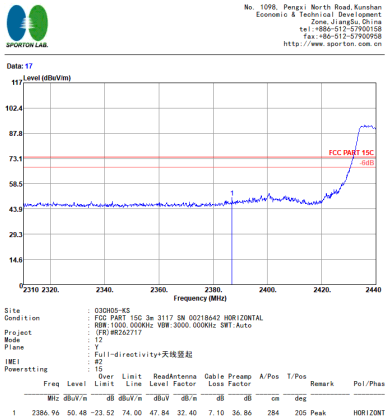
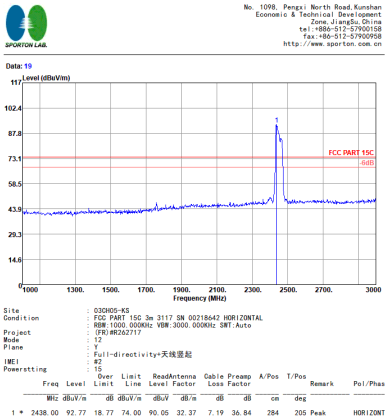
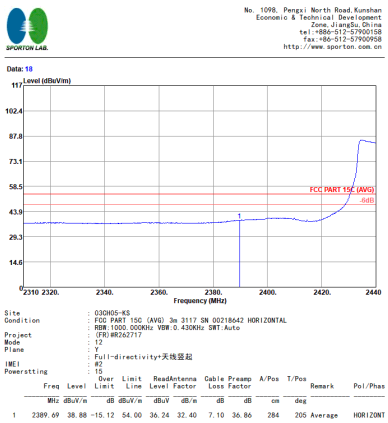
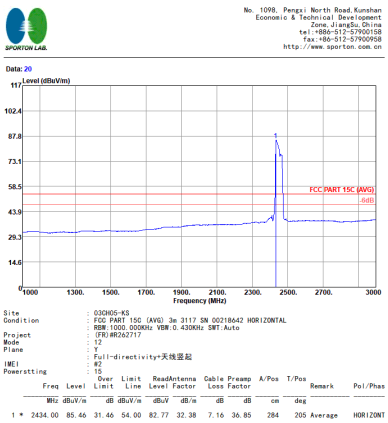
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

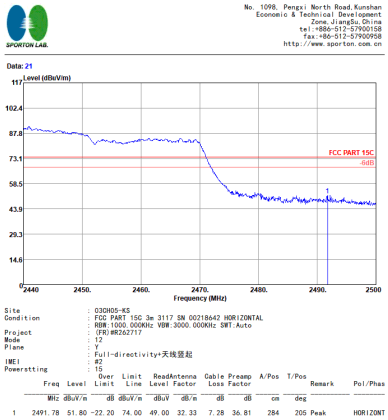
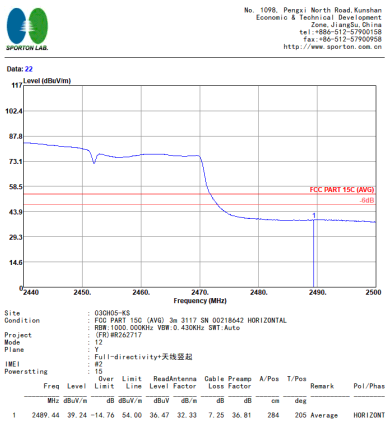
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH06 2437MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		

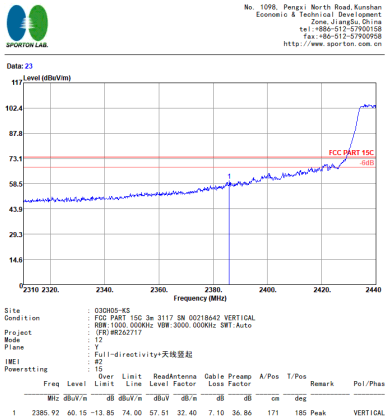
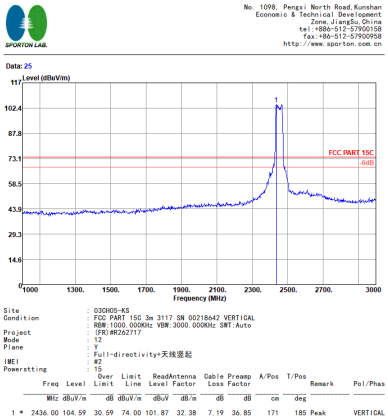
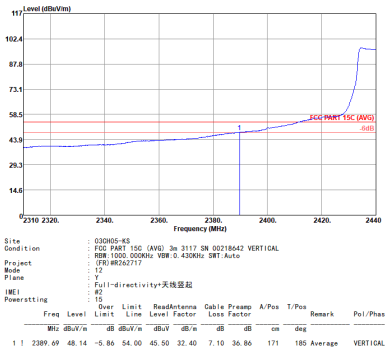
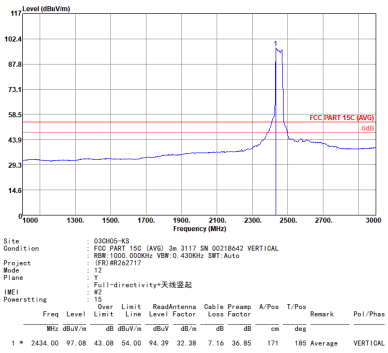
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH06 2437MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

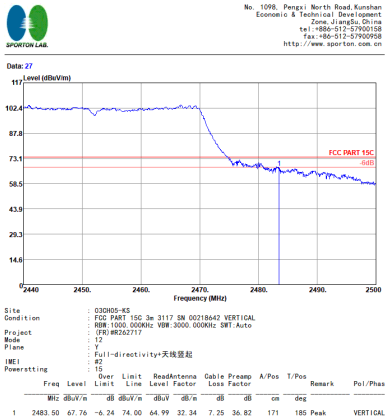
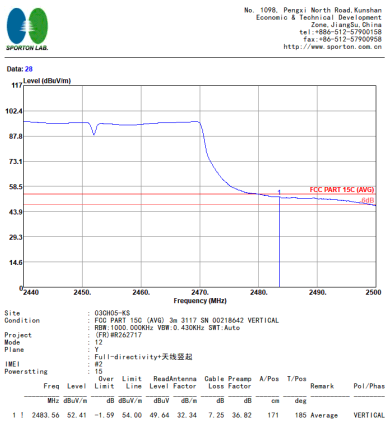
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH06 2437MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		

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

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

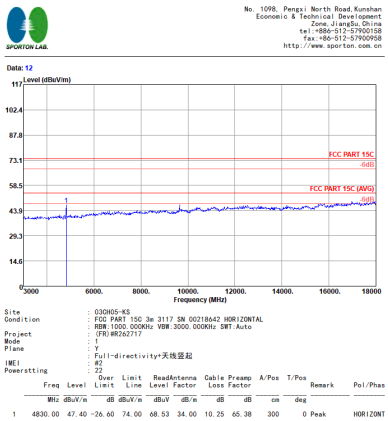
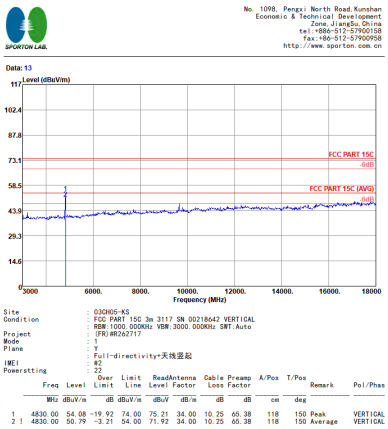
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

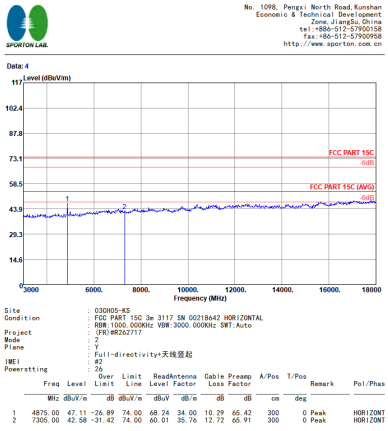
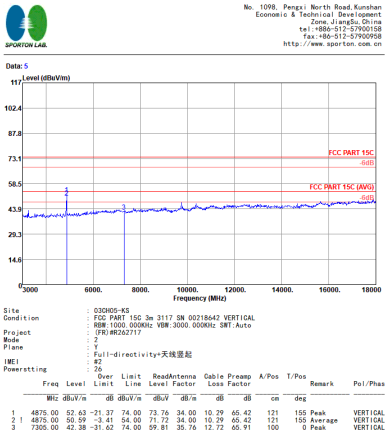
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - L	
1	Vertical	Fundamental
Peak	 No. 1098, Pengxi North Road,Kunshan Economic & Technical Development Zone,JiangSu,China tel:+886-512-57900158 fax:+86-512-57900958 http://www.sporton.com.cn Data: 23 Level (dBuV/m) FCC PART 15C -6dB Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C 3m 3117 SN 00218642 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)#R262717 Mode : 12 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powerstting : 15 Freq Level Over Limit Limit ReadAntenna Level Cable Factor Loss Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 2385.92 60.15 -13.85 74.00 57.51 32.40 7.10 36.86 171 185 Peak VERTICAL	 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: 25 Level (dBuV/m) FCC PART 15C -6dB Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C 3m 3117 SN 00218642 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)#R262717 Mode : 12 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powerstting : 15 Freq Level Over Limit Limit ReadAntenna Level Cable Factor Loss Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 * 2436.00 104.59 30.59 74.00 101.87 32.38 7.19 36.85 171 185 Peak VERTICAL
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: 24 Level (dBuV/m) FCC PART 15C (AVG) -6dB Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C (AVG) 3m 3117 SN 00218642 VERTICAL : RBW:1000.000KHz VBW:0.430KHz SWT:Auto Project : (FR)#R262717 Mode : 12 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powerstting : 15 Freq Level Over Limit Limit ReadAntenna Level Cable Factor Loss Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 ! 2389.69 48.14 -5.86 54.00 45.50 32.40 7.10 36.86 171 185 Average VERTICAL	 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: 26 Level (dBuV/m) FCC PART 15C (AVG) -6dB Frequency (MHz) Site : 03CH05-KS Condition : FCC PART 15C (AVG) 3m 3117 SN 00218642 VERTICAL : RBW:1000.000KHz VBW:0.430KHz SWT:Auto Project : (FR)#R262717 Mode : 12 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powerstting : 15 Freq Level Over Limit Limit ReadAntenna Level Cable Factor Loss Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 * 2434.00 97.08 43.08 54.00 94.39 32.38 7.16 36.85 171 185 Average VERTICAL

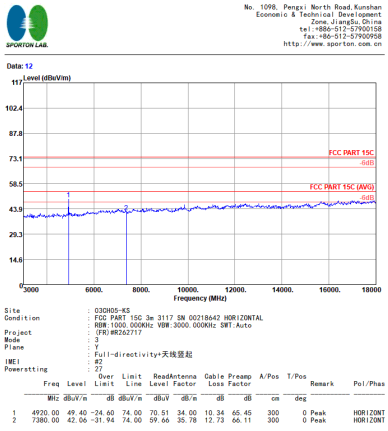
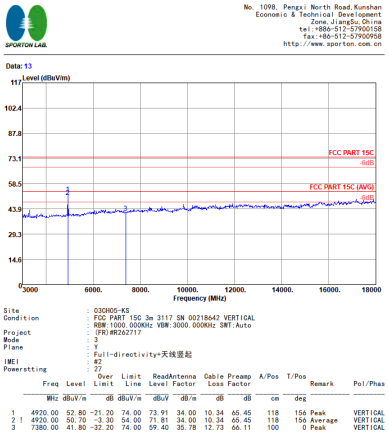
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

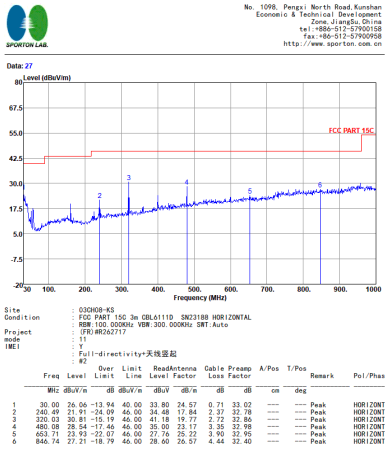
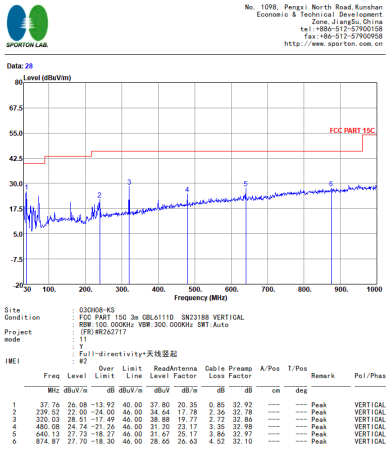
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH01 2412MHz	
1	Horizontal	Vertical
Peak Avg.			

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: 4 Level (dBuV/m) 117 102.4 87.8 73.1 58.5 43.9 29.3 14.6 0 3000 6000. 8000. 10000. 12000. 14000. 16000. 18000 Frequency (MHz) FCC PART 15C -6dB FCC PART 15C (AVG) -6dB Site : 03CH05-KS Condition : FCC PART 15C 3m 3117 SN 00218642 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)#R262717 Mode : 2 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powersetting : 26 Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss Factor Preamp Factor A/Pos Remark T/Pos Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 4875.00 47.11 -26.89 74.00 68.24 34.00 10.29 65.42 300 0 Peak HORIZONT 2 7305.00 42.58 -31.42 74.00 60.01 35.76 12.72 65.91 300 0 Peak HORIZONT	 No. 1098, Pengxi North Road,Kunshan Economic & Technical Development Zone,JiangSu,China tel:+886-512-57900158 fax:+86-512-57900958 http://www.sporton.com.cn Data: 5 Level (dBuV/m) 117 102.4 87.8 73.1 58.5 43.9 29.3 14.6 0 3000 6000. 8000. 10000. 12000. 14000. 16000. 18000 Frequency (MHz) FCC PART 15C -6dB FCC PART 15C (AVG) -6dB Site : 03CH05-KS Condition : FCC PART 15C 3m 3117 SN 00218642 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)#R262717 Mode : 2 Plane : Y : Full-directivity+天线竖起 IMEI : #2 Powersetting : 26 Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss Factor Preamp Factor A/Pos Remark T/Pos Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 4875.00 52.63 -21.37 74.00 73.76 34.00 10.29 65.42 121 155 Peak VERTICAL 2 ! 4875.00 50.59 -3.41 54.00 71.72 34.00 10.29 65.42 121 155 Average VERTICAL 3 7305.00 42.38 -31.62 74.00 59.81 35.76 12.72 65.91 100 0 Peak VERTICAL

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH11 2462MHz	
1	Horizontal	Vertical
Peak Avg.			

Emission below 1GHz

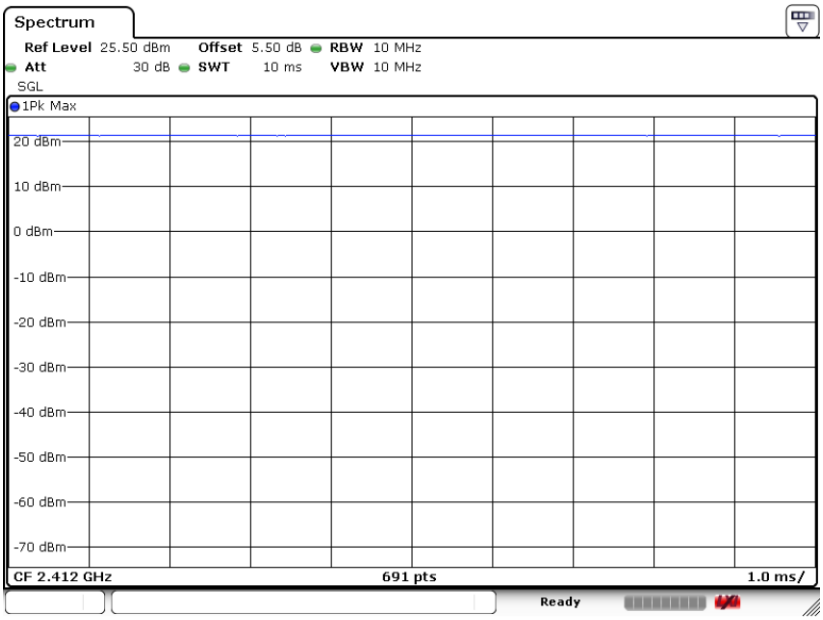
2.4GHz WIFI 802.11n HT40 (LF)

WIFI	2.4GHz 2400~2483.5MHz	
ANT	802.11n HT40 LF	
1	Horizontal	Vertical
QP / Peak		

Appendix E. Duty Cycle Plots

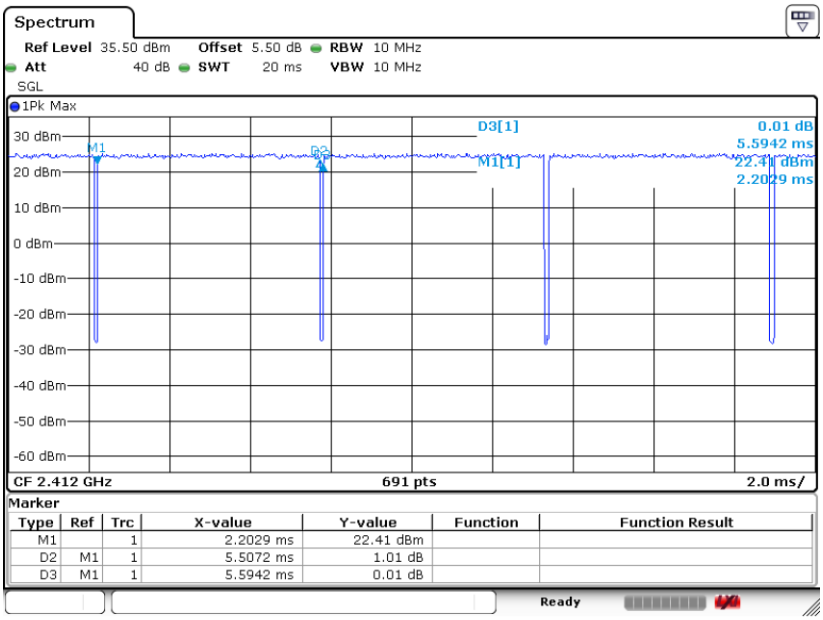
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	100	-	-	10Hz
802.11g	98.44	-	-	10Hz
802.11n HT20	98.32	-	-	10Hz
802.11n HT40	96.05	2.464	0.406	0.43kHz

802.11b



Date: 23.SEP.2022 19:37:02

802.11g

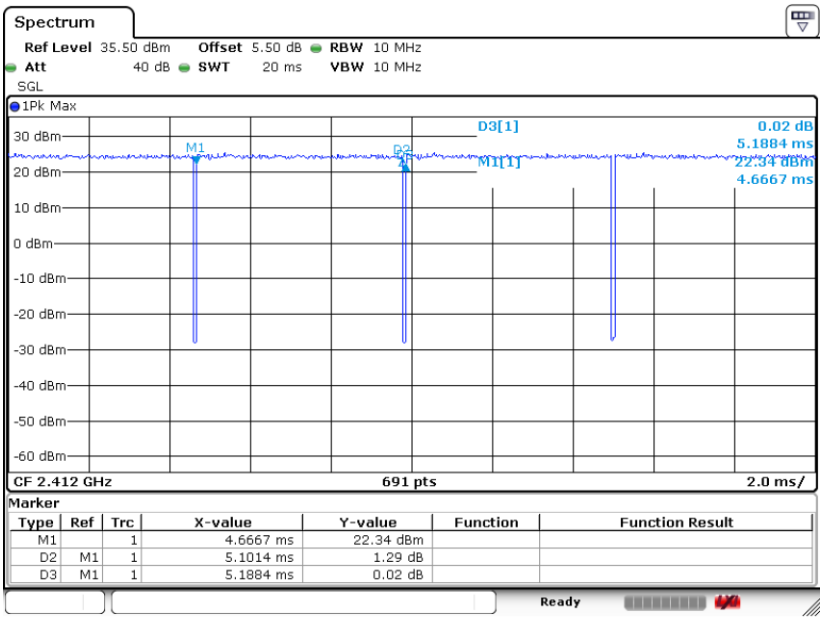


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.2029 ms	22.41 dBm		
D2	M1	1	5.5072 ms	1.01 dB		
D3	M1	1	5.5942 ms	0.01 dB		

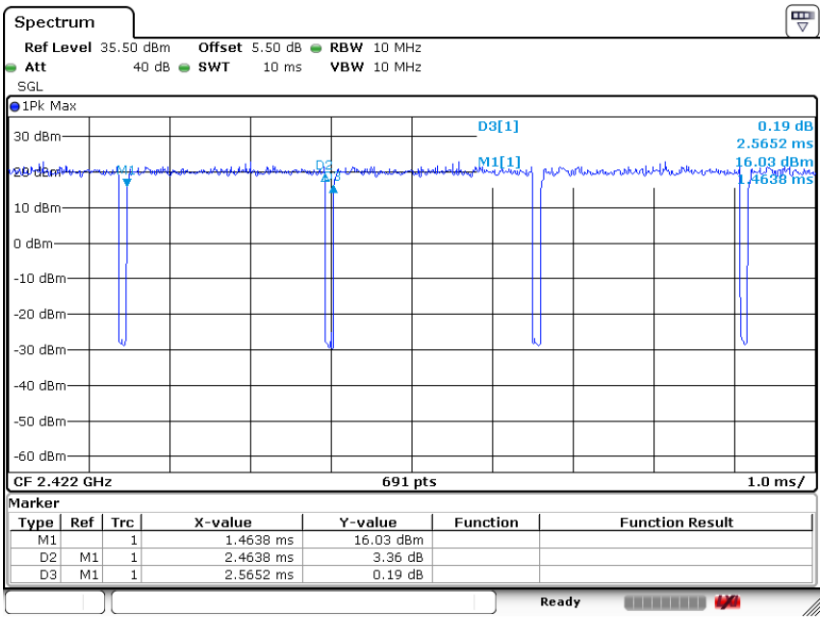
Date: 23.SEP.2022 19:50:11

802.11n HT20



Date: 23.SEP.2022 20:02:34

802.11n HT40



Date: 23.SEP.2022 20:21:12