FCC RF Test Report

APPLICANT	:	Motorola Mobility LLC
EQUIPMENT	:	Mobile Cellular Phone
BRAND NAME	:	Motorola
MODEL NAME	:	XT2165-1, XT2165-2
FCC ID	:	IHDT56ZP4
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System
TEST DATE(S)	:	Aug. 20, 2021 ~ Sep. 07, 2021

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

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

Reviewed by: Derreck Chen / Supervisor

Approved by: Eric Shih / Manager

ACCREDITED
Cert #5145.01

Sporton International (ShenZhen) Inc.

1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055

People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR170628-01C	Rev. 01	Initial issue of report	Sep. 16, 2021

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.2	15.247(b)	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	Conducted Band Edges	≤ 20dBc	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 3.26 dB at 2389.905 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 15.88 dB at 0.150 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

Motorola Mobility LLC
222 W, Merchandise Mart Plaza, Chicago IL 60654 USA

1.2 Manufacturer

Motorola Mobility LLC
222 W, Merchandise Mart Plaza, Chicago IL 60654 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	XT2165-1, XT2165-2
FCC ID	IHDT56ZP4
IMEI Code	Conducted: 355570490008623 Conduction: 355570490006130 Radiation: 357571280016279
HW Version	DVT2
SW Version	RRQ31.Q3-51
EUT Stage	Identical Prototype

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

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz
Maximum (Peak) Output Power to antenna	802.11b : 21.46 dBm (0.1400 W) 802.11g : 25.18 dBm (0.3296 W) 802.11n HT20 : 25.18 dBm (0.3296 W) 802.11n HT40 : 25.22 dBm (0.3327 W)
Antenna Type / Gain	FPC Antenna with gain -4.50 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 (Shenzhen) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International (Shenzhen) Inc.		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	CO01-SZ TH01-SZ	CN1256	421272

Test Firm	Sporton International (Shenzhen) Inc.		
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City Guangdong Province China 518103 TEL: +86-755-33202398		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH02-SZ	CN1256	421272

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH02-SZ	AUDIX	E3	6.2009-8-24a
2.	CO01-SZ	AUDIX	E3	6.120613b

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.

1.9 Specification of Accessory

Specification of Accessory				
AC Adapter 1	**Brand Name**	Motorola(AOHAI)	**Model Name**	MC-101
AC Adapter 2	**Brand Name**	Motorola(Salcomp)	**Model Name**	MC-101
AC Adapter 3	**Brand Name**	Motorola(Chenyang)	**Model Name**	MC-101
Battery	**Brand Name**	Motorola (Sunwoda)	**Model Name**	JK50
USB Cable 1	**Brand Name**	Motorola (Cabletech)	**Model Name**	SC18C49697
USB Cable 2	**Brand Name**	Motorola (Saibao)	**Model Name**	SC18C24367
USB Cable 3	**Brand Name**	Motorola (Luxshare)	**Model Name**	SC18C24368
USB Cable 4	**Brand Name**	Motorola (Saibao)	**Model Name**	SC18D22297
USB Cable 5	**Brand Name**	Motorola (Luxshare)	**Model Name**	SC18D22299
USB Cable 6	**Brand Name**	Motorola (Cabletech)	**Model Name**	SC18D22298

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.

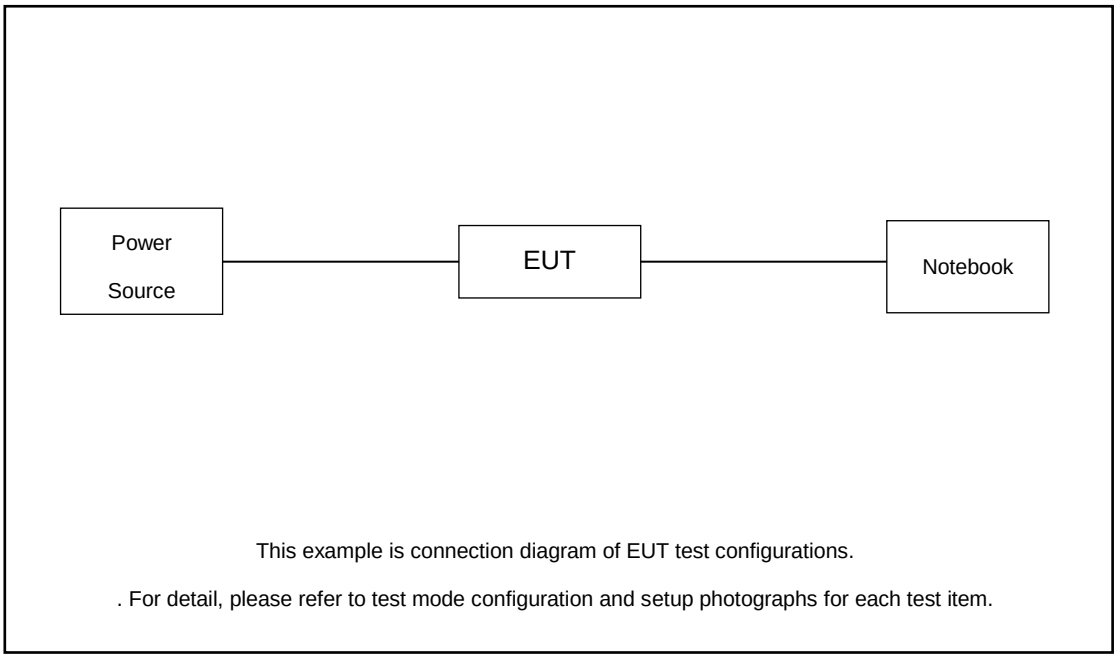
Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

Co-location
LTE Band 13 + 802.11n HT20 CH01

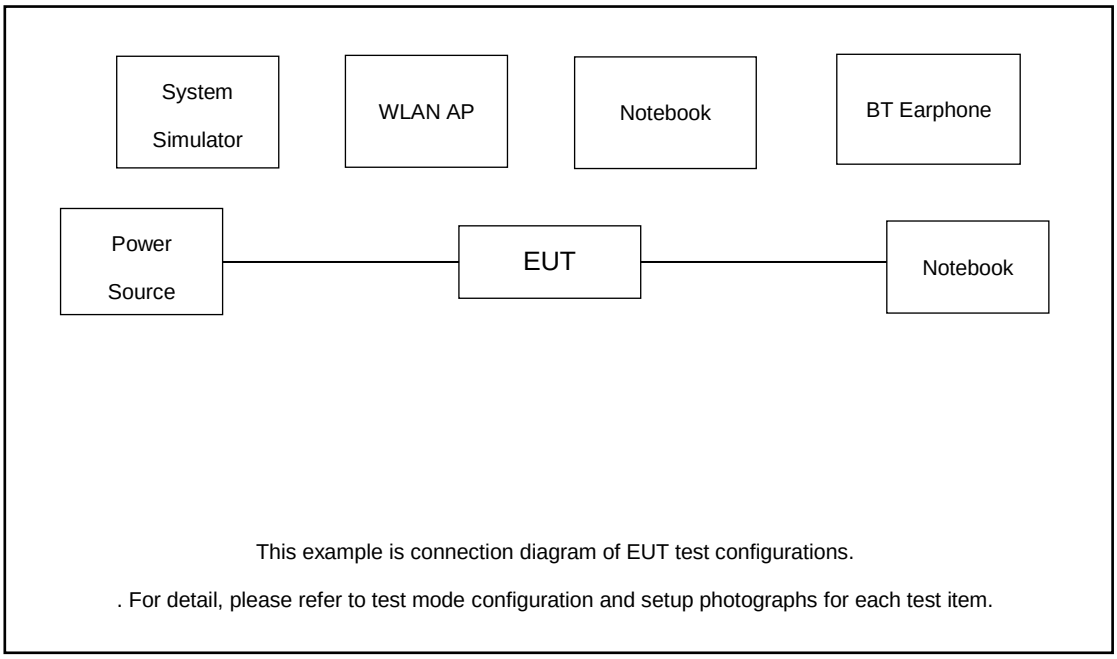
Test Cases	
AC Conducted Emission	Mode 1 :GSM850 Idle + Bluetooth Link + WLAN Link (2.4G) + USB Cable 2(Charging from Adapter 1) + Earphone + Battery
Remark: For Radiated Test Cases, The tests were performance with Adapter 1, Battery, Earphone and USB Cable 1.	

2.3 Connection Diagram of Test System

For Radiated Emission



For Conducted Emission



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
2.	WLAN AP	Dlink	DIR-820L	KA2IR820LA1	N/A	Unshielded,1.8m
3.	Notebook	Lenovo	E540	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Earphone	Samsung	EO-MG900	PYAHS-107W	N/A	N/A
5.	Earphone	Apple	N/A	N/A	N/A	N/A
6.	Earphone	Apple	MC690ZP/A	N/A	Shielded, 1.0m	N/A

2.5 EUT Operation Test Setup

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

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

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss 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 1.8 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 1.8 + 10 = 11.8 (dB)

3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

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

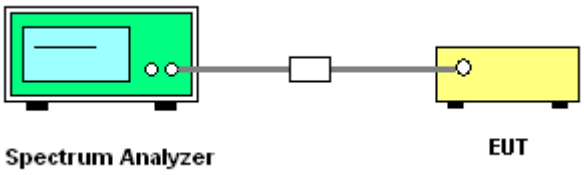
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

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

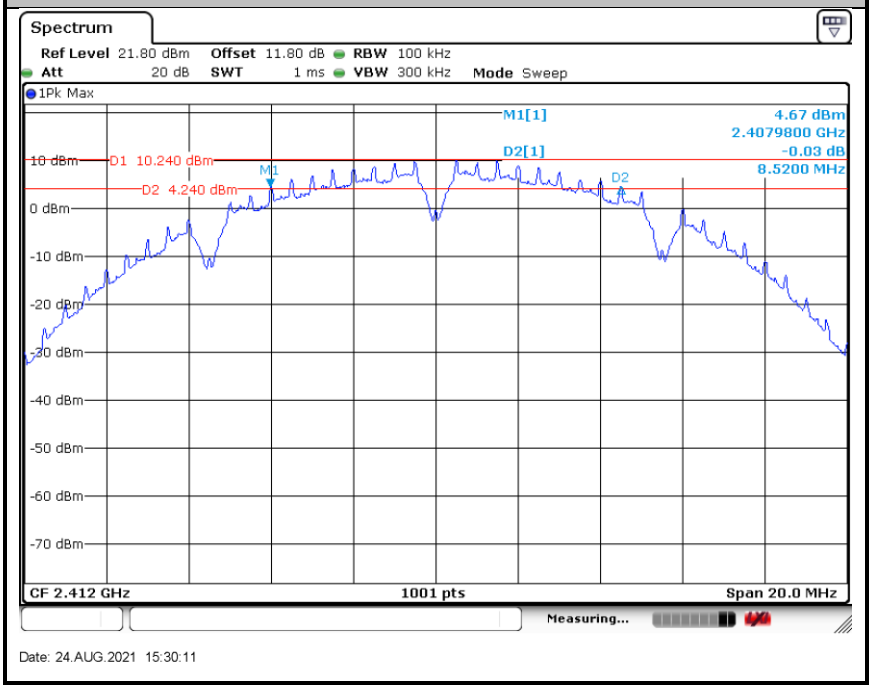
3.1.4 Test Setup



3.1.5 Test Result of 6dB Occupied Bandwidth

Please refer to Appendix A.

Minimum 6dB Bandwidth



3.2 Output Power Measurement

3.2.1 Limit of Output Power

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

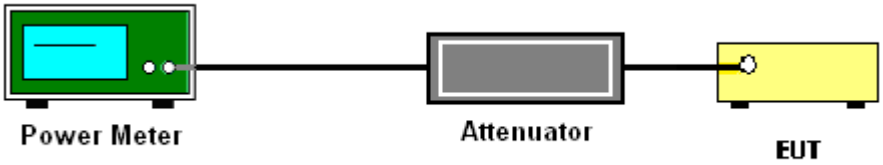
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of ANSI C63.10-2013 clause 11.9.1.3 PKPM1 Peak power meter or ANSI C63.10-2013 clause 11.9.2.3.2 Method AVGPM-G method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Please refer to Appendix A.

3.2.6 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.

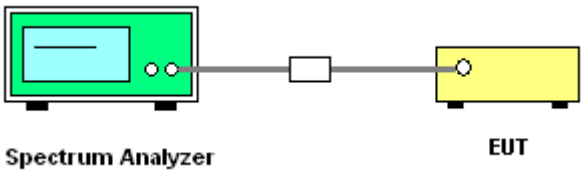
3.3.2 Measuring Instruments

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.

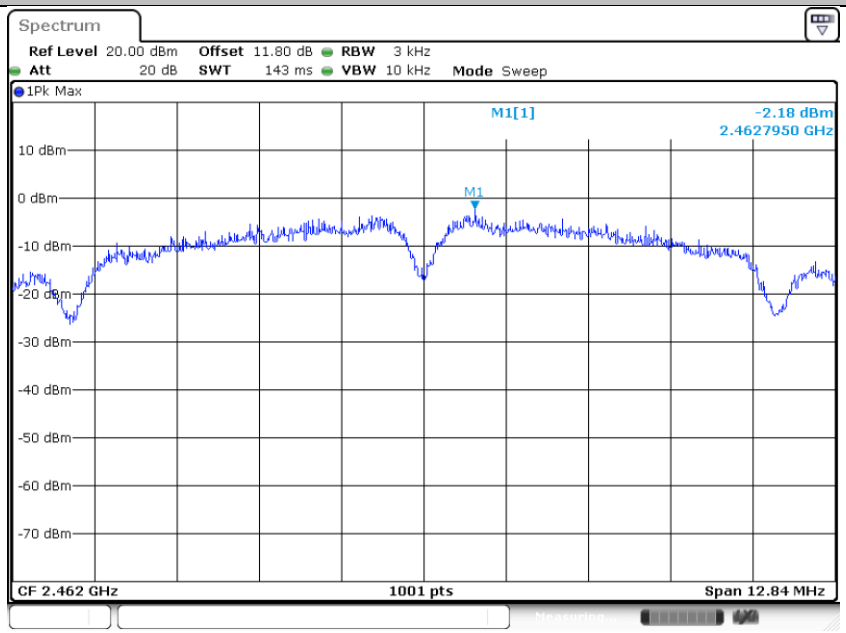
3.3.4 Test Setup



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.

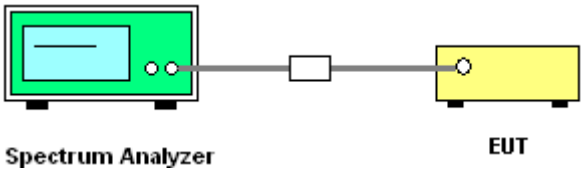
3.4.2 Measuring Instruments

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

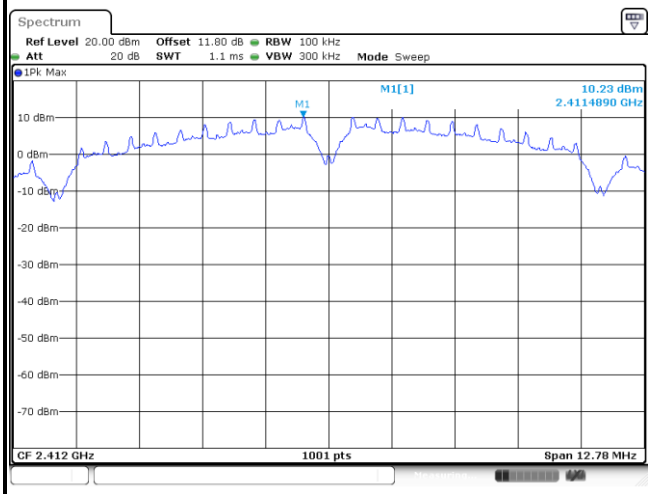


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

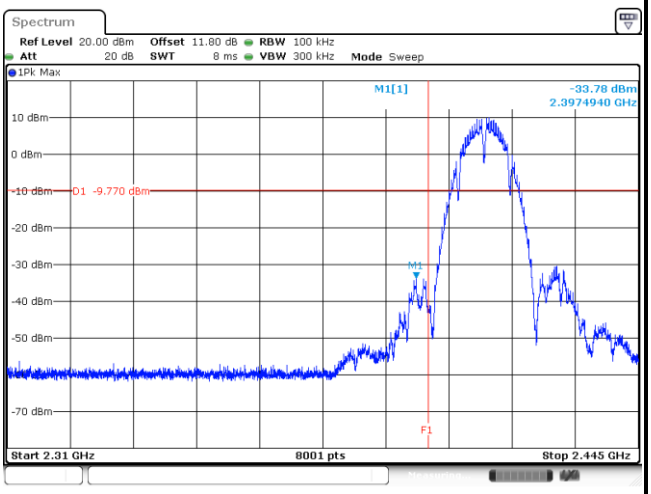
Test Engineer :	Ma Jie	**Temperature :**	24~26℃
		Relative Humidity :	50~53%

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

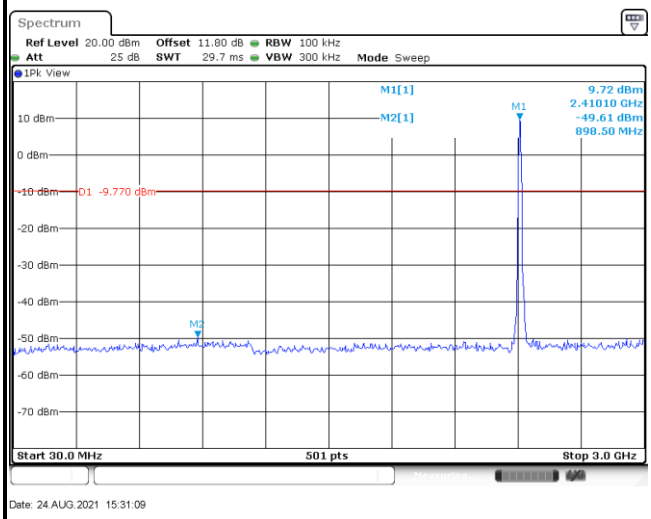
100kHz PSD reference Level



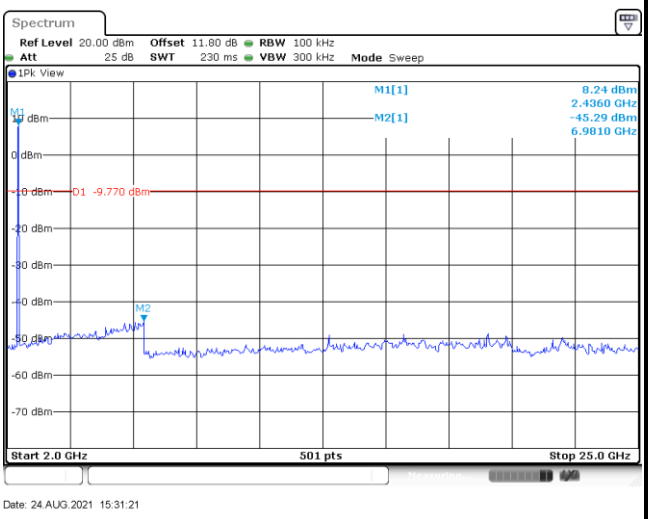
Channel Plot



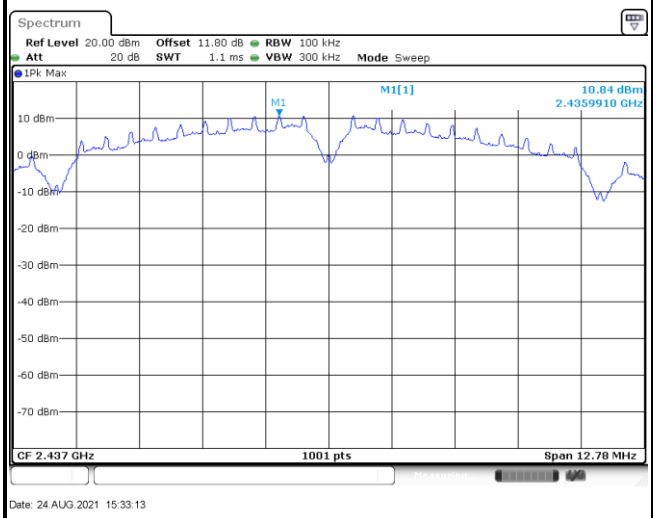
Spurious Emission 30MHz~3GHz

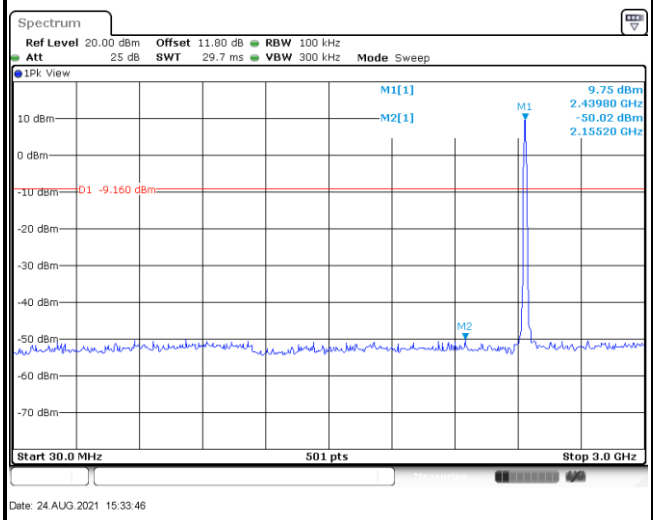
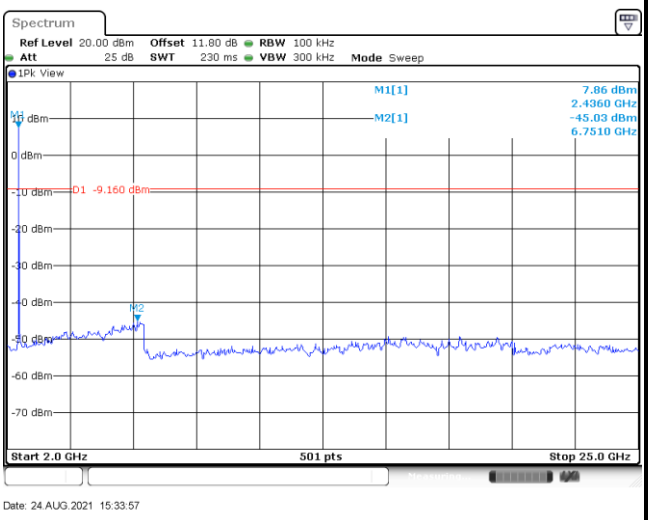


Spurious Emission 2GHz~25GHz

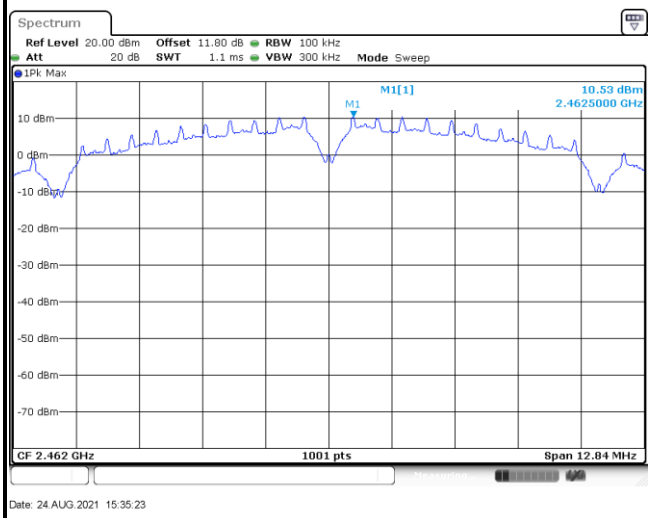
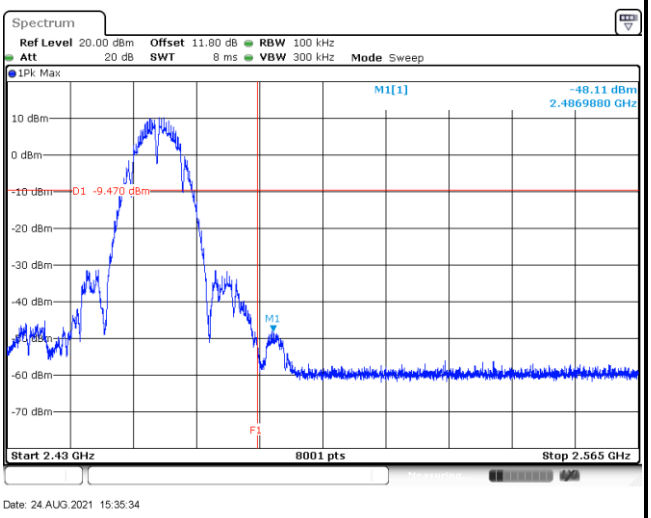
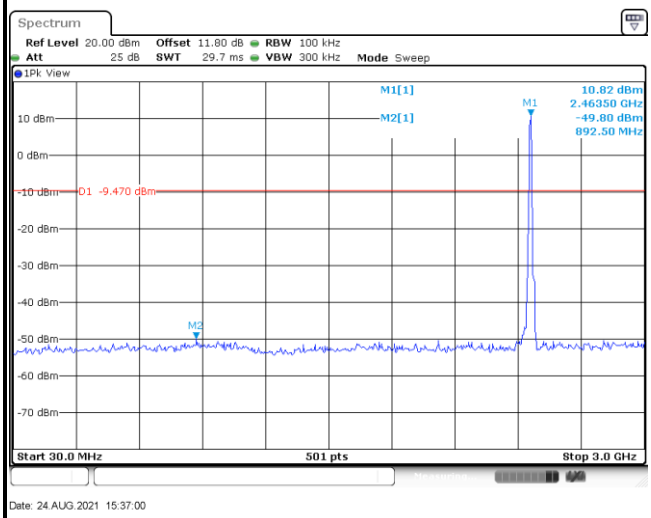
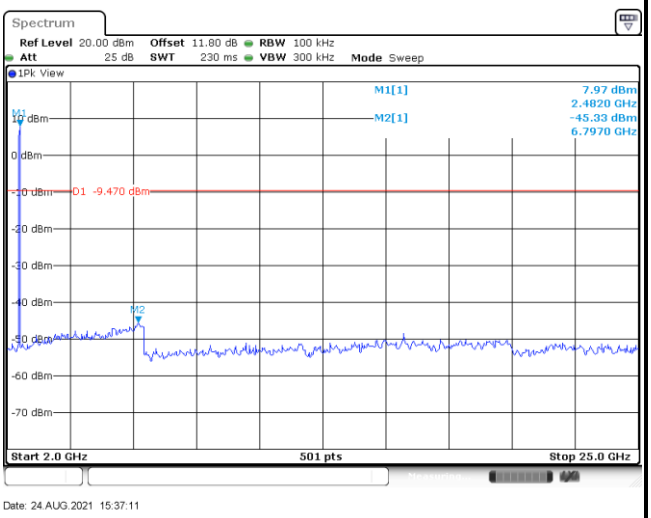


Test Mode :	802.11b	Test Channel :	06

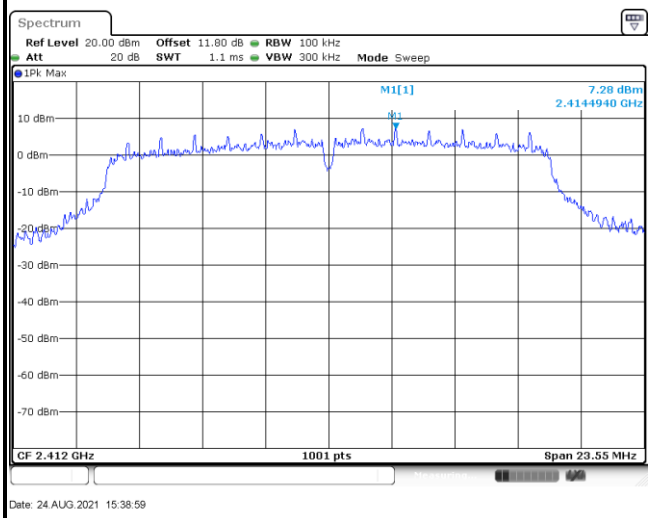
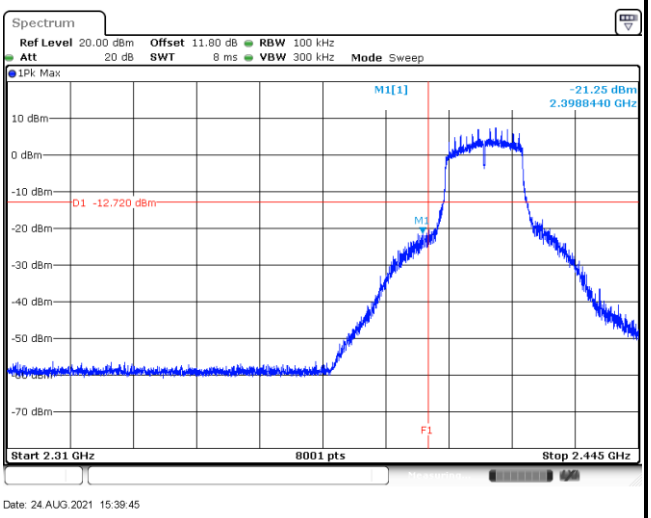
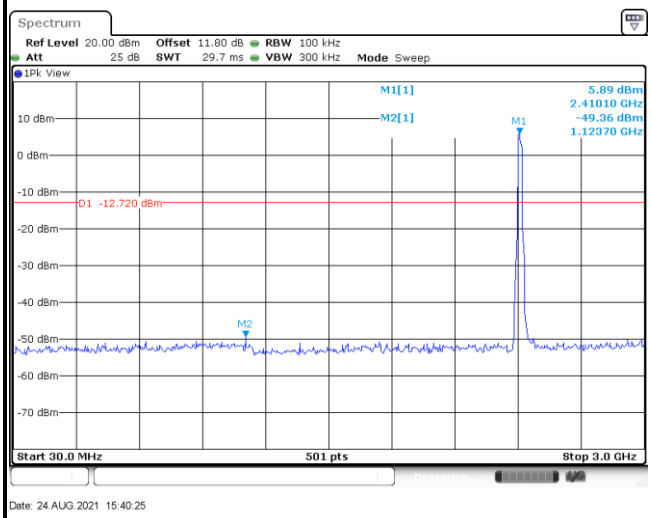
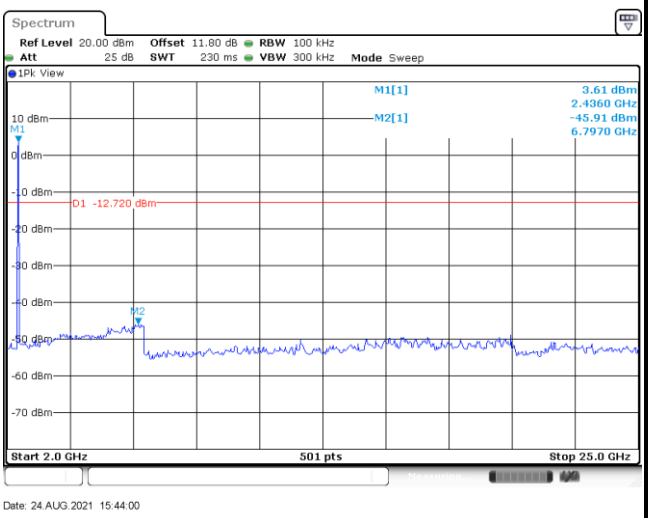
100kHz PSD reference Level	
	

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

Test Mode :	802.11b	Test Channel :	11

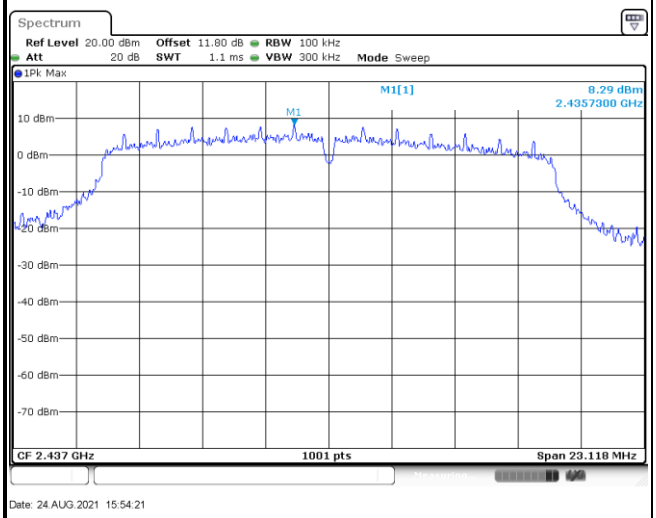
100kHz PSD reference Level	Channel Plot
	
Date: 24.AUG.2021 15:35:23	Date: 24.AUG.2021 15:35:34
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 24.AUG.2021 15:37:00	Date: 24.AUG.2021 15:37:11

Test Mode :	802.11g	Test Channel :	01

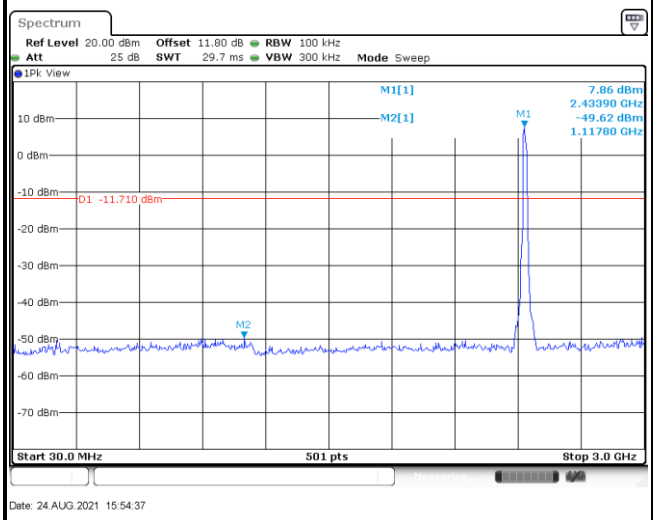
100kHz PSD reference Level	Channel Plot
	
Date: 24.AUG.2021 15:38:59	Date: 24.AUG.2021 15:39:45
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 24.AUG.2021 15:40:25	Date: 24.AUG.2021 15:44:00

Test Mode :	802.11g	Test Channel :	06

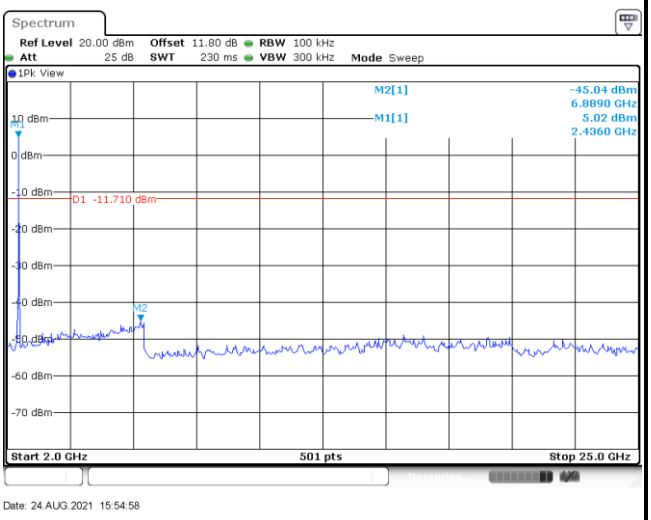
100kHz PSD reference Level



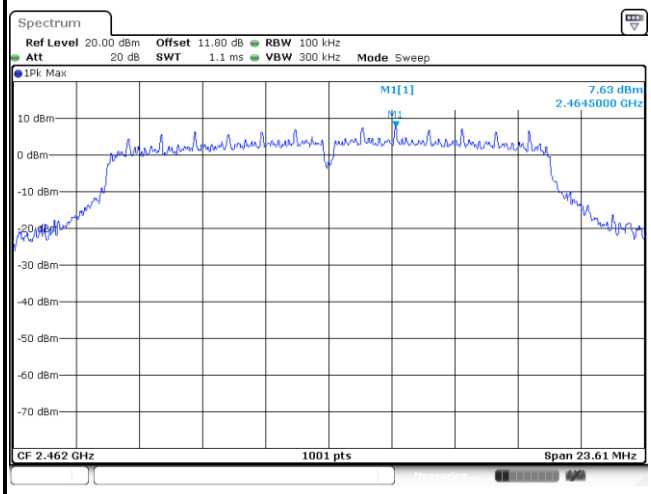
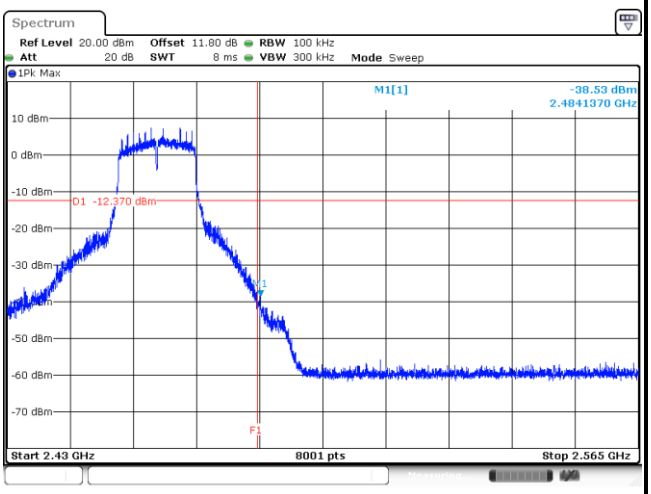
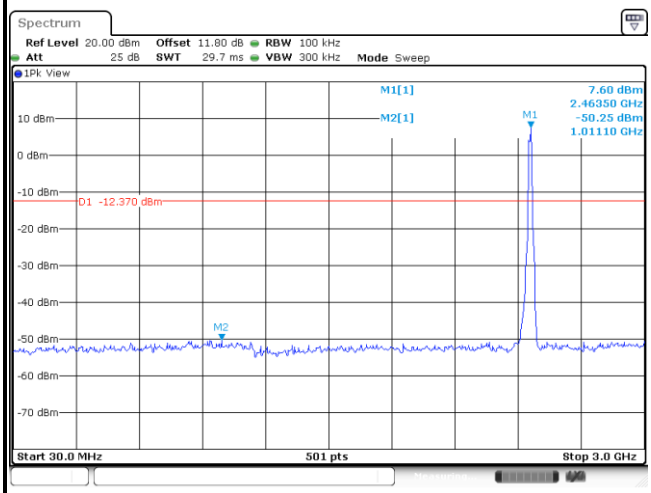
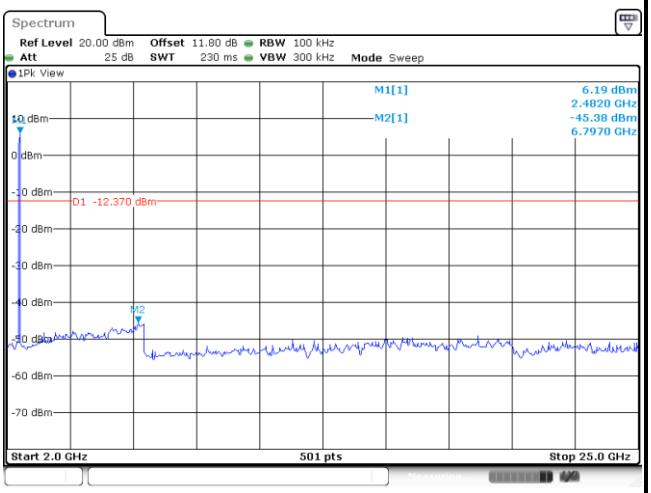
Spurious Emission 30MHz~3GHz



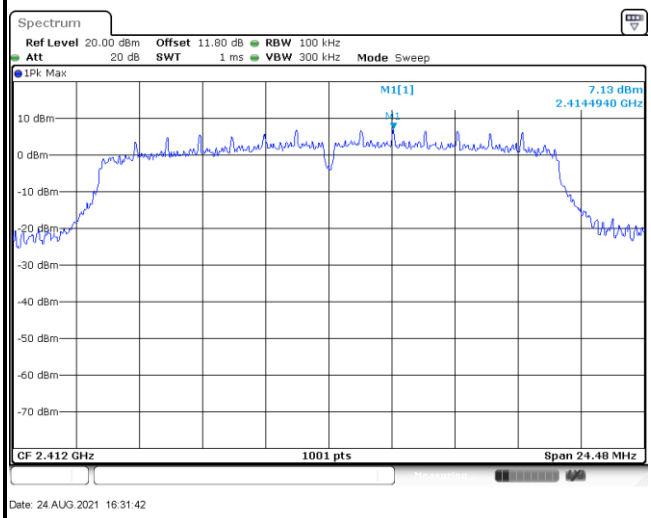
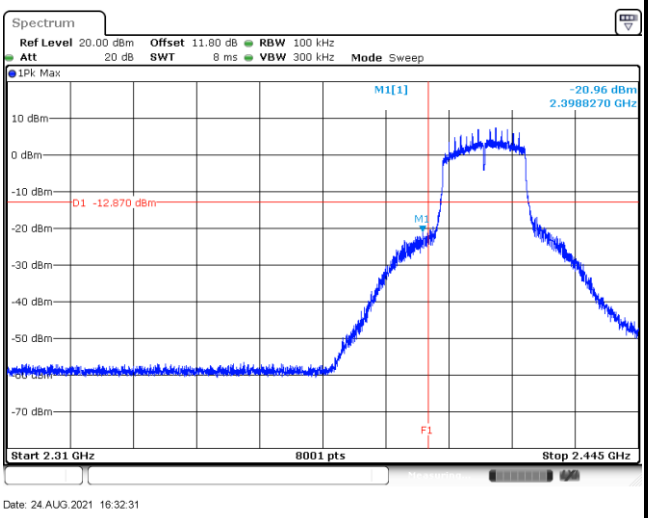
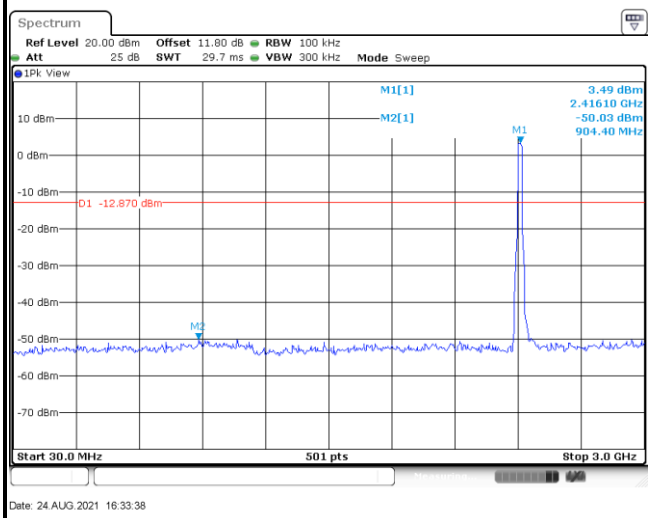
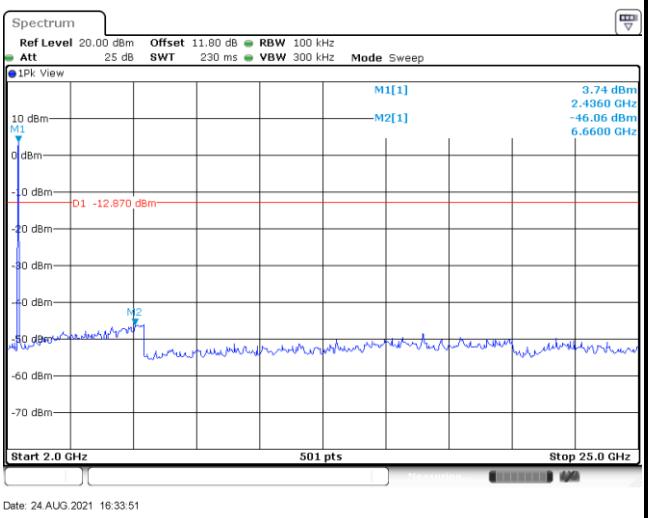
Spurious Emission 2GHz~25GHz



Test Mode :	802.11g	Test Channel :	11

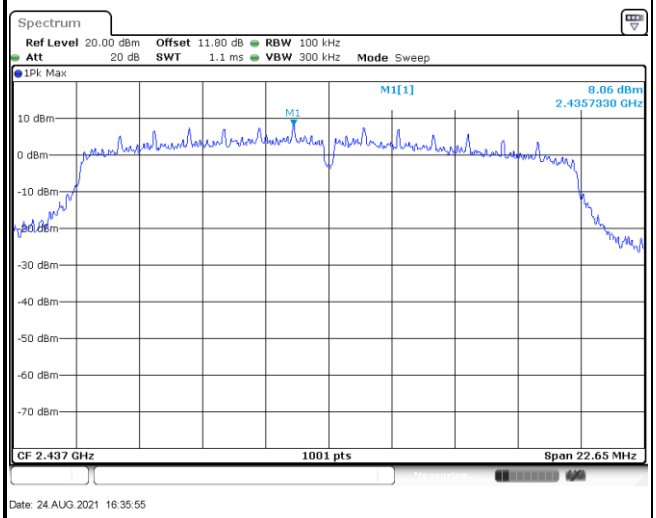
100kHz PSD reference Level	Channel Plot
	
Date: 24.AUG.2021 16:09:16	Date: 24.AUG.2021 16:09:27
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 24.AUG.2021 16:09:45	Date: 24.AUG.2021 16:09:56

Test Mode :	802.11n HT20	Test Channel :	01

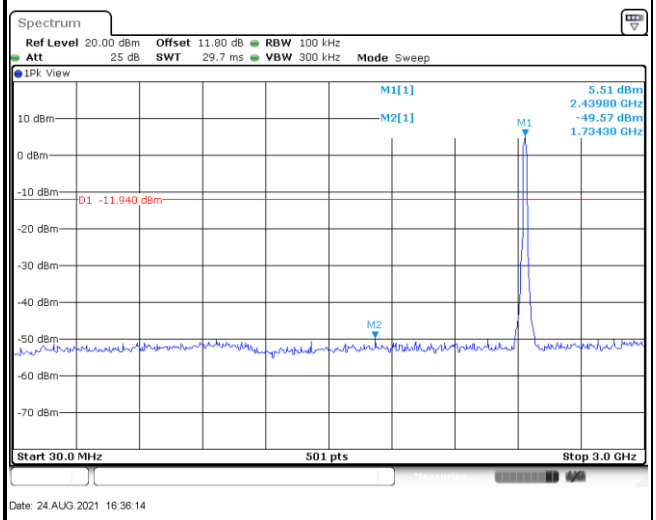
100kHz PSD reference Level	Channel Plot
	
Date: 24.AUG.2021 16:31:42	Date: 24.AUG.2021 16:32:31
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 24.AUG.2021 16:33:38	Date: 24.AUG.2021 16:33:51

Test Mode :	802.11n HT20	Test Channel :	06

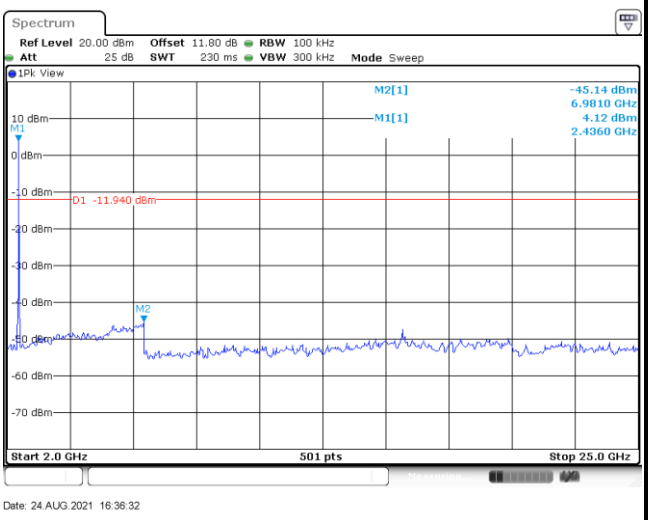
100kHz PSD reference Level



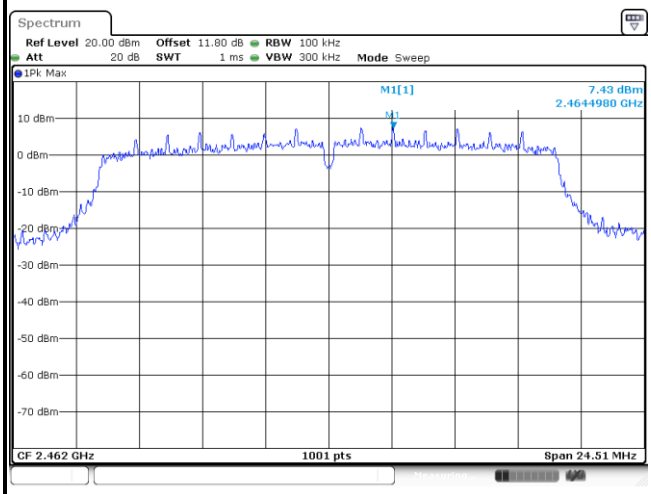
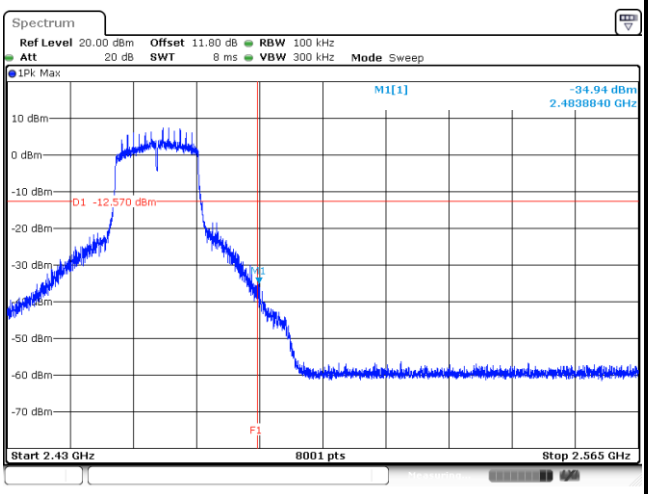
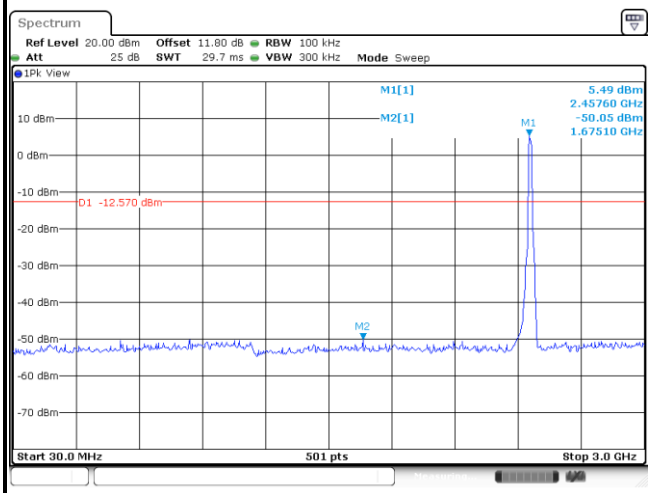
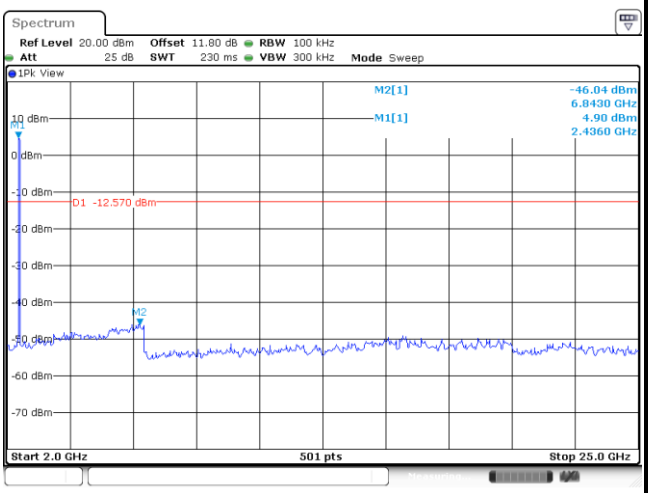
Spurious Emission 30MHz~3GHz



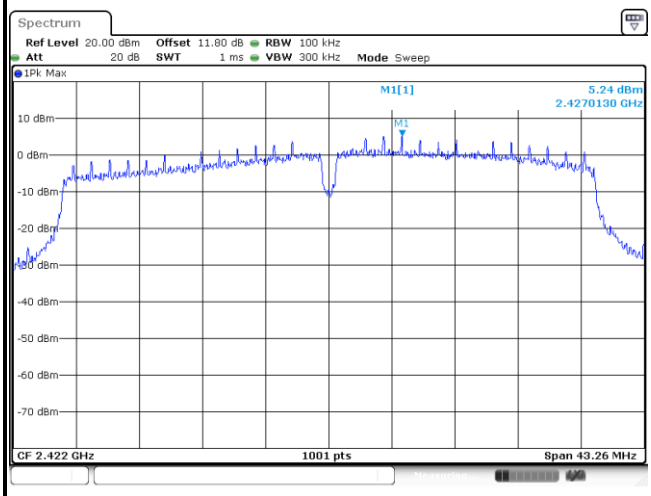
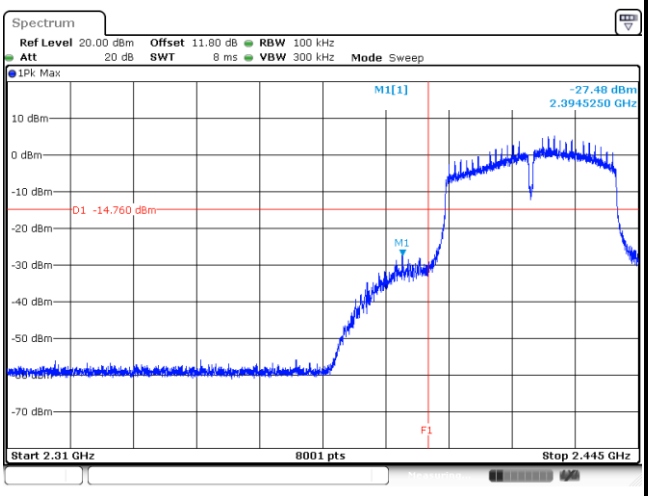
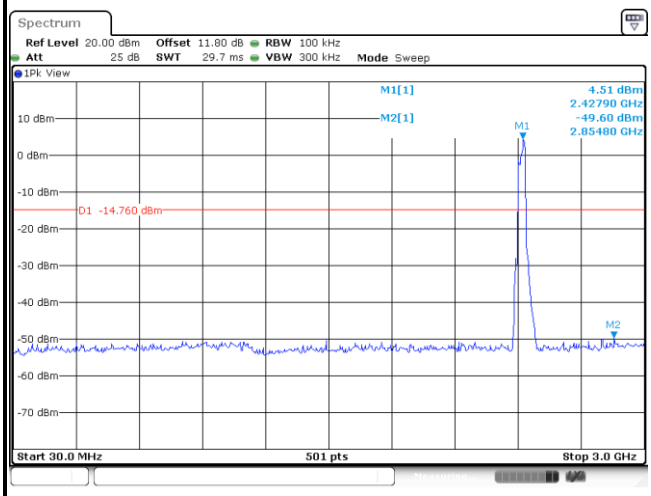
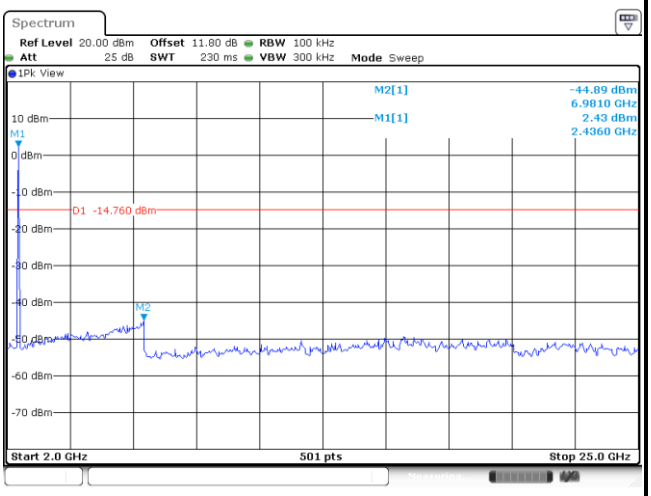
Spurious Emission 2GHz~25GHz



Test Mode :	802.11n HT20	Test Channel :	11

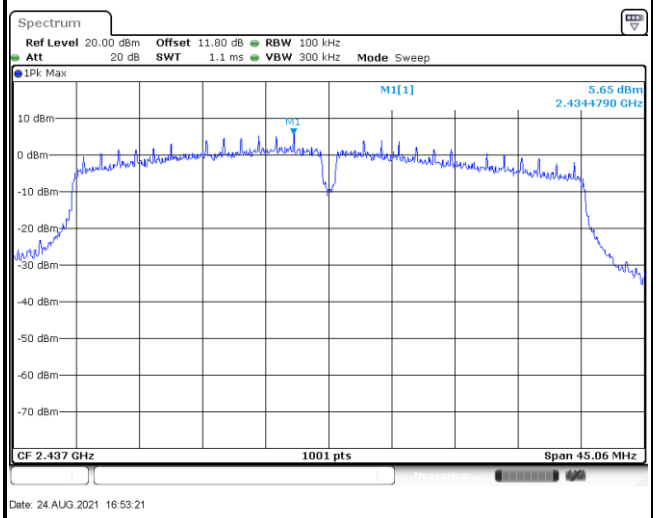
100kHz PSD reference Level	Channel Plot
	
Date: 24.AUG.2021 16:38:03	Date: 24.AUG.2021 16:38:19
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 24.AUG.2021 16:38:32	Date: 24.AUG.2021 16:38:55

Test Mode :	802.11n HT40	Test Channel :	03

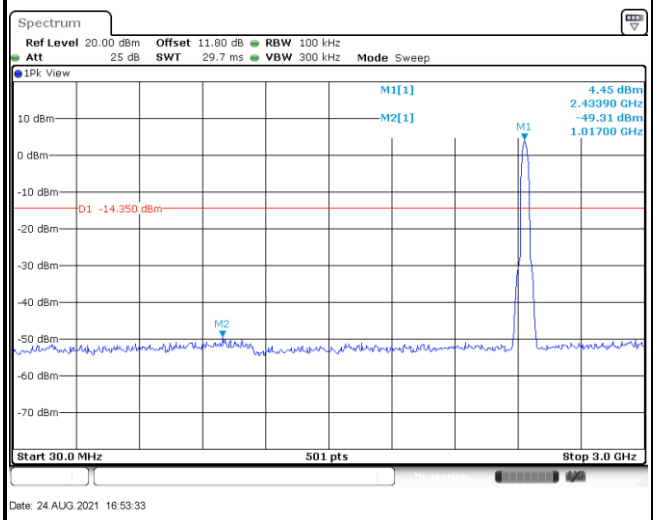
100kHz PSD reference Level	Channel Plot
	
Date: 24.AUG.2021 16:47:47	Date: 24.AUG.2021 16:48:14
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 24.AUG.2021 16:49:28	Date: 24.AUG.2021 16:49:46

Test Mode :	802.11n HT40	Test Channel :	06

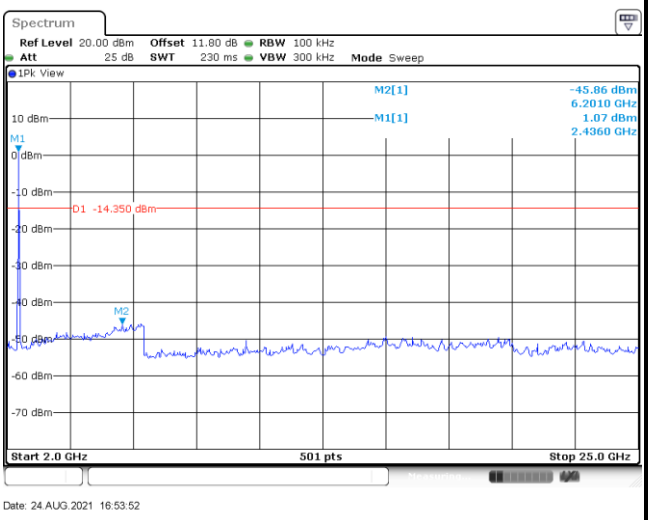
100kHz PSD reference Level



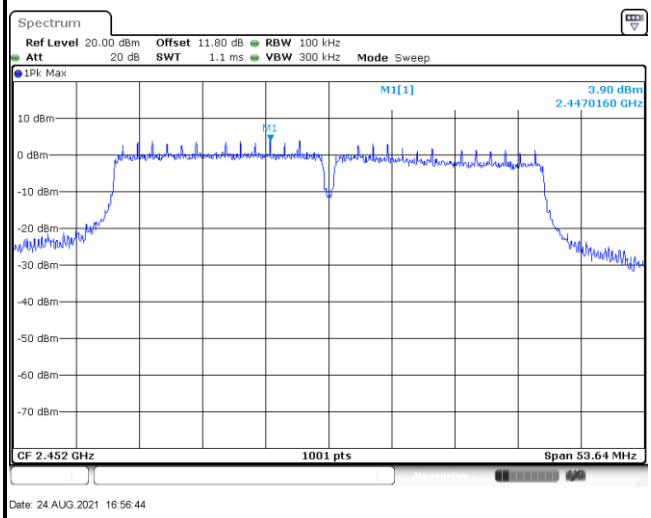
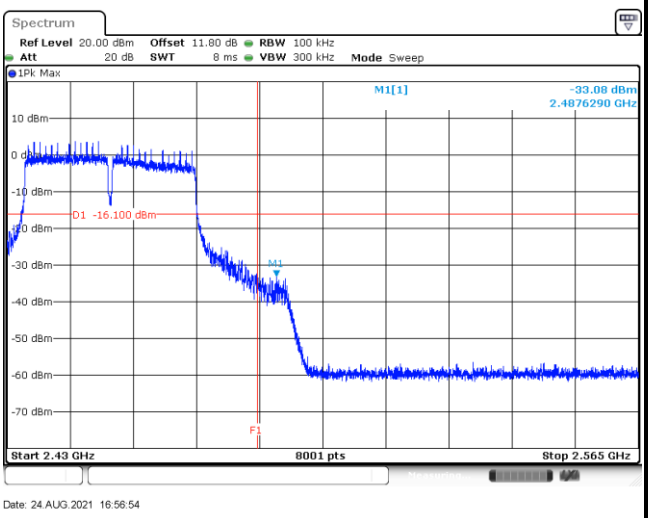
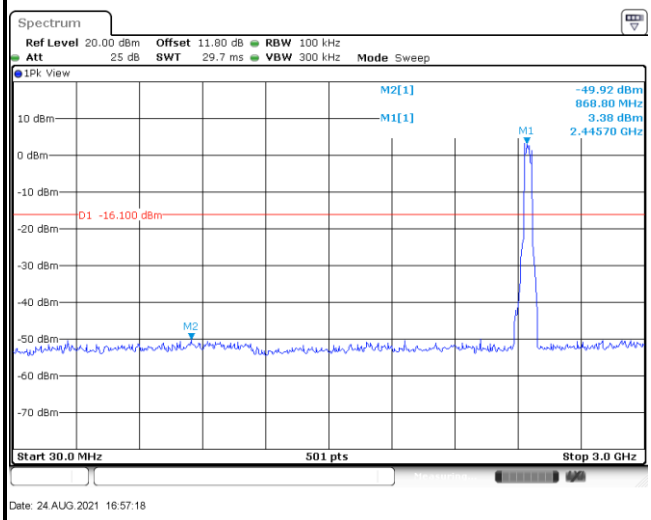
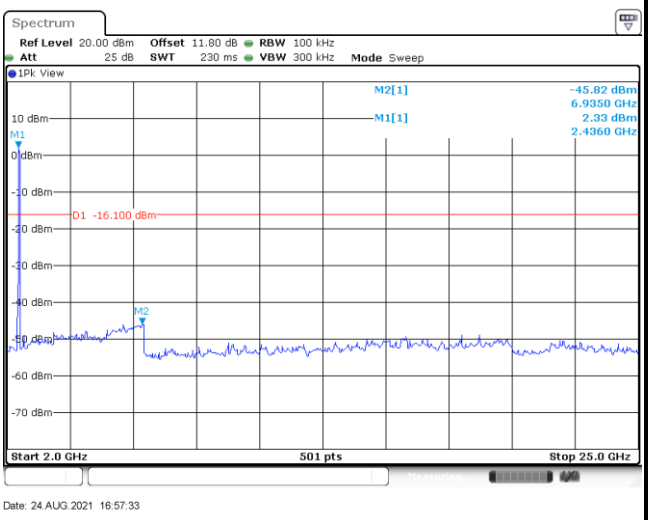
Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz



Test Mode :	802.11n HT40	Test Channel :	09

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

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

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

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

3.5.2 Measuring Instruments

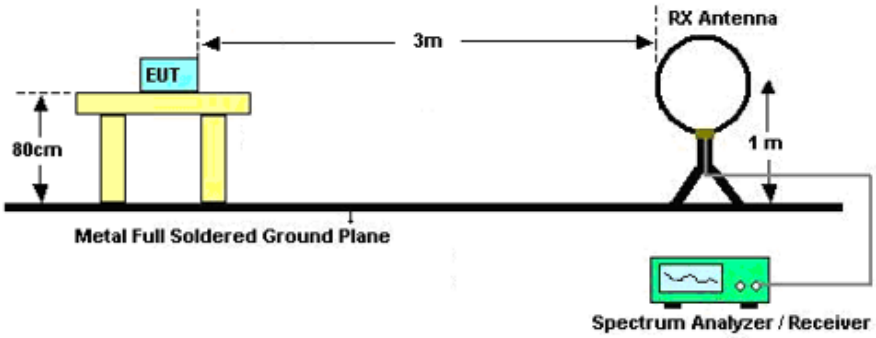
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

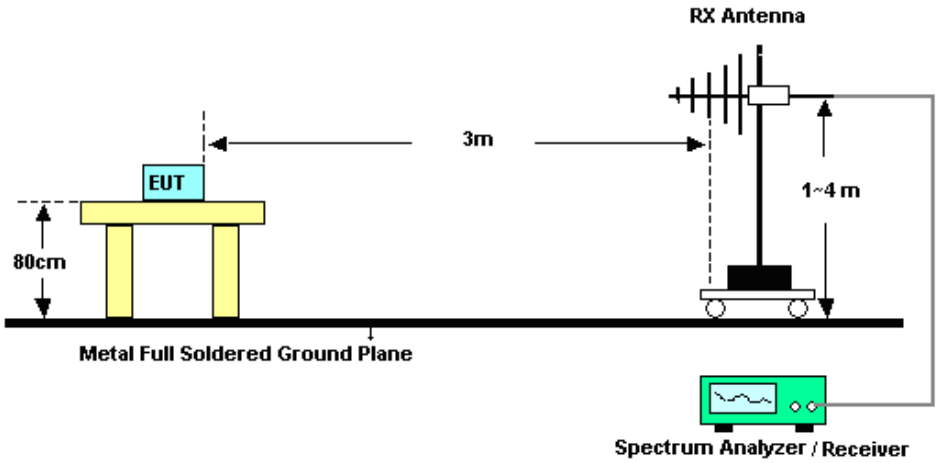
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better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

3.5.4 Test Setup

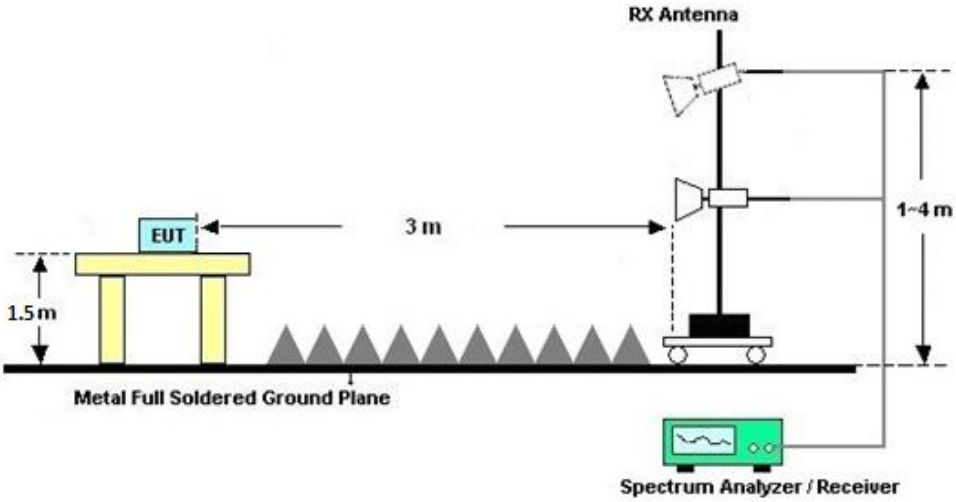
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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

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

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C.

3.5.7 Duty Cycle

Please refer to Appendix D.

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

Please refer to Appendix C.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

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

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

*Decreases with the logarithm of the frequency.

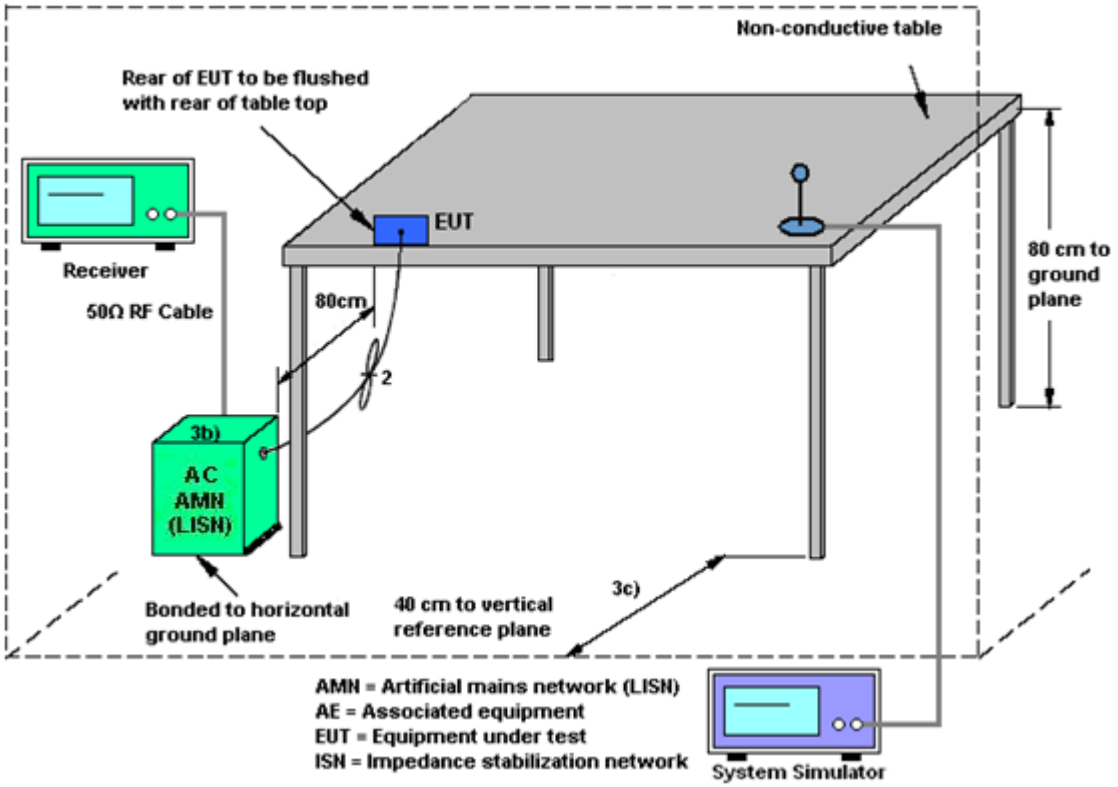
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

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

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.7 Antenna Requirements

3.7.1 Standard Applicable

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

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

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

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 08, 2021	Aug. 24, 2021	Apr. 07, 2022	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1207253	30MHz~40GHz	Dec. 25, 2020	Aug. 24, 2021	Dec. 24, 2021	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Dec. 25, 2020	Aug. 24, 2021	Dec. 24, 2021	Conducted (TH01-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Jul. 13, 2021	Sep. 07, 2021	Jul. 13, 2022	Radiation (03CH02-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jun. 22, 2020	Sep. 07, 2021	Jun. 21, 2022	Radiation (03CH02-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz-2GHz	Jul. 15, 2021	Sep. 07, 2021	Jul. 14, 2022	Radiation (03CH02-SZ)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00119436	1GHz~18GHz	Jul. 25, 2021	Sep. 07, 2021	Jul. 24, 2022	Radiation (03CH02-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 13, 2021	Sep. 07, 2021	Jul. 13, 2022	Radiation (03CH02-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Apr. 11, 2021	Sep. 07, 2021	Apr. 10, 2022	Radiation (03CH02-SZ)
LF Amplifier	Burgeon	BPA-530	102211	0.01~3000Mhz	Oct. 16, 2020	Sep. 07, 2021	Oct. 15, 2021	Radiation (03CH02-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 16, 2020	Sep. 07, 2021	Oct. 15, 2021	Radiation (03CH02-SZ)
HF Amplifier	KEYSIGHT	83017A	MY53270105	0.5GHz~26.5Ghz	Oct. 16, 2020	Sep. 07, 2021	Oct. 15, 2021	Radiation (03CH02-SZ)
AC Power Source	Chroma	61601	616010002470	N/A	NCR	Sep. 07, 2021	NCR	Radiation (03CH02-SZ)
Turn Table	Chaintek	T-200	N/A	0~360 degree	NCR	Sep. 07, 2021	NCR	Radiation (03CH02-SZ)
Antenna Mast	Chaintek	MBS-400	N/A	1 m~4 m	NCR	Sep. 07, 2021	NCR	Radiation (03CH02-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Mar. 08, 2021	Aug. 20, 2021	Mar. 07, 2022	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2 LISN	00103912	9kHz~30MHz	Dec. 25, 2020	Aug. 20, 2021	Dec. 24, 2021	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Oct. 15, 2020	Aug. 20, 2021	Oct. 14, 2021	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 14, 2021	Aug. 20, 2021	Jul. 13, 2022	Conduction (CO01-SZ)

NCR: No Calibration Required

5 Uncertainty of Evaluation

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.2dB**

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))	**5.1dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.1dB**

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

Appendix A. Conducted Test Results

Test Engineer:	Ma Jie	Temperature:	24~26	°C
Test Date:	2021/8/24	Relative Humidity:	50~53	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2		
11b	1Mbps	1	1	2412	13.44	-	8.52	-	0.50	Pass
11b	1Mbps	1	6	2437	13.29	-	8.52	-	0.50	Pass
11b	1Mbps	1	11	2462	13.69	-	8.56	-	0.50	Pass
11g	6Mbps	1	1	2412	18.53	-	15.70	-	0.50	Pass
11g	6Mbps	1	6	2437	18.18	-	15.41	-	0.50	Pass
11g	6Mbps	1	11	2462	18.48	-	15.74	-	0.50	Pass
HT20	MCS0	1	1	2412	19.38	-	16.32	-	0.50	Pass
HT20	MCS0	1	6	2437	19.03	-	15.10	-	0.50	Pass
HT20	MCS0	1	11	2462	19.43	-	16.34	-	0.50	Pass
HT40	MCS0	1	3	2422	36.16	-	28.84	-	0.50	Pass
HT40	MCS0	1	6	2437	36.36	-	30.04	-	0.50	Pass
HT40	MCS0	1	9	2452	37.76	-	35.76	-	0.50	Pass

TEST RESULTS DATA
Peak Output Power

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
					Ant 1	Ant 1	Ant 1	Ant 1	Ant 1	
11b	1Mbps	1	1	2412	20.76	30.00	-4.50	16.26	36.00	Pass
11b	1Mbps	1	6	2437	21.42	30.00	-4.50	16.92	36.00	Pass
11b	1Mbps	1	11	2462	21.46	30.00	-4.50	16.96	36.00	Pass
11g	6Mbps	1	1	2412	25.18	30.00	-4.50	20.68	36.00	Pass
11g	6Mbps	1	6	2437	25.16	30.00	-4.50	20.66	36.00	Pass
11g	6Mbps	1	11	2462	24.98	30.00	-4.50	20.48	36.00	Pass
HT20	MCS0	1	1	2412	25.16	30.00	-4.50	20.66	36.00	Pass
HT20	MCS0	1	6	2437	25.18	30.00	-4.50	20.68	36.00	Pass
HT20	MCS0	1	11	2462	24.97	30.00	-4.50	20.47	36.00	Pass
HT40	MCS0	1	3	2422	25.22	30.00	-4.50	20.72	36.00	Pass
HT40	MCS0	1	6	2437	25.08	30.00	-4.50	20.58	36.00	Pass
HT40	MCS0	1	9	2452	24.74	30.00	-4.50	20.24	36.00	Pass

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

TEST RESULTS DATA
Average Output Power

2.4GHz Band							
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)	DG (dBi)	EIRP Power (dBm)
					Ant 1	Ant 1	Ant 1
11b	1Mbps	1	1	2412	19.40	-4.50	14.90
11b	1Mbps	1	6	2437	19.60	-4.50	15.10
11b	1Mbps	1	11	2462	19.70	-4.50	15.20
11g	6Mbps	1	1	2412	18.30	-4.50	13.80
11g	6Mbps	1	6	2437	18.70	-4.50	14.20
11g	6Mbps	1	11	2462	16.90	-4.50	12.40
HT20	MCS0	1	1	2412	17.20	-4.50	12.70
HT20	MCS0	1	6	2437	17.90	-4.50	13.40
HT20	MCS0	1	11	2462	16.40	-4.50	11.90
HT40	MCS0	1	3	2422	16.60	-4.50	12.10
HT40	MCS0	1	6	2437	16.40	-4.50	11.90
HT40	MCS0	1	9	2452	14.90	-4.50	10.40

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

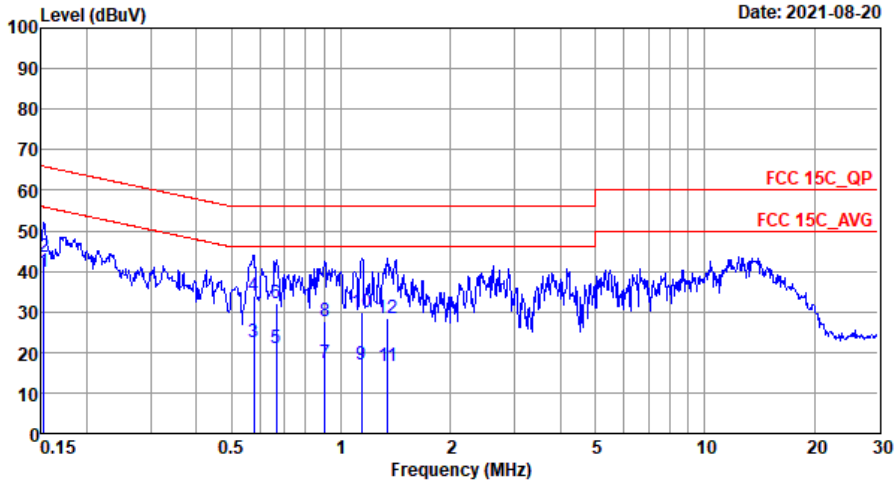
TEST RESULTS DATA
Peak Power Spectral Density

2.4GHz Band												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail
					Ant 1	Ant 2	Worse + 3.01	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412	-3.17	-	-	-4.50	-	8.00	-	Pass
11b	1Mbps	1	6	2437	-2.76	-	-	-4.50	-	8.00	-	Pass
11b	1Mbps	1	11	2462	-2.18	-	-	-4.50	-	8.00	-	Pass
11g	6Mbps	1	1	2412	-6.50	-	-	-4.50	-	8.00	-	Pass
11g	6Mbps	1	6	2437	-5.53	-	-	-4.50	-	8.00	-	Pass
11g	6Mbps	1	11	2462	-5.51	-	-	-4.50	-	8.00	-	Pass
HT20	MCS0	1	1	2412	-5.23	-	-	-4.50	-	8.00	-	Pass
HT20	MCS0	1	6	2437	-6.18	-	-	-4.50	-	8.00	-	Pass
HT20	MCS0	1	11	2462	-5.77	-	-	-4.50	-	8.00	-	Pass
HT40	MCS0	1	3	2422	-9.15	-	-	-4.50	-	8.00	-	Pass
HT40	MCS0	1	6	2437	-8.27	-	-	-4.50	-	8.00	-	Pass
HT40	MCS0	1	9	2452	-10.75	-	-	-4.50	-	8.00	-	Pass

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

Appendix B. AC Conducted Emission Test Results

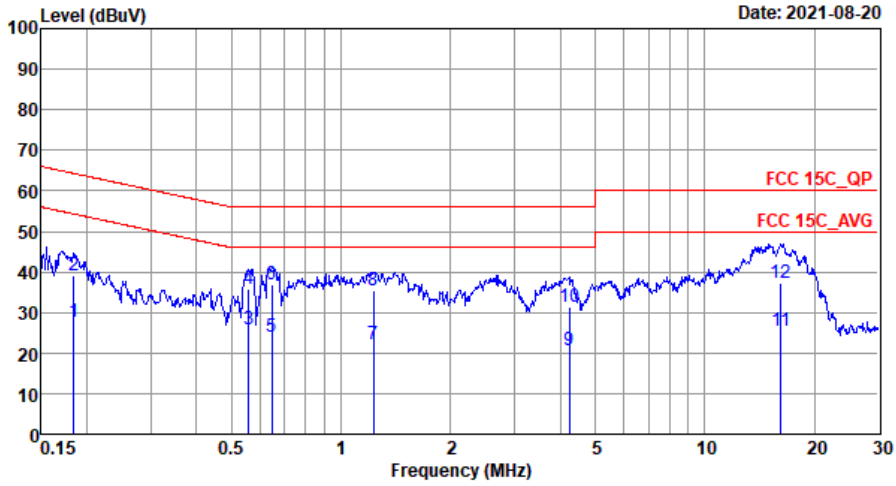
Test Engineer :	Xie YuQiang	**Temperature :**	22~25℃
		Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-SZ
Condition: FCC 15C_QP LISN_20201030_L LINE

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	*	0.15	39.99	-15.88	55.87	29.90	0.08	10.01	Average
2		0.15	43.39	-22.48	65.87	33.30	0.08	10.01	QP
3		0.58	22.34	-23.66	46.00	12.20	0.10	10.04	Average
4		0.58	34.04	-21.96	56.00	23.90	0.10	10.04	QP
5		0.66	21.04	-24.96	46.00	10.90	0.10	10.04	Average
6		0.66	32.14	-23.86	56.00	22.00	0.10	10.04	QP
7		0.90	17.22	-28.78	46.00	7.10	0.10	10.02	Average
8		0.90	27.52	-28.48	56.00	17.40	0.10	10.02	QP
9		1.14	16.93	-29.07	46.00	6.80	0.10	10.03	Average
10		1.14	29.93	-26.07	56.00	19.80	0.10	10.03	QP
11		1.34	16.75	-29.25	46.00	6.60	0.10	10.05	Average
12		1.34	28.55	-27.45	56.00	18.40	0.10	10.05	QP

Test Engineer :	Xie YuQiang	**Temperature :**	22~25℃
		Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-SZ
Condition: FCC 15C_QP LISN_20201030_N NEUTRAL

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.18	27.80	-26.48	54.28	17.70	0.08	10.02	Average
2		0.18	39.00	-25.28	64.28	28.90	0.08	10.02	QP
3		0.56	25.75	-20.25	46.00	15.60	0.10	10.05	Average
4		0.56	35.65	-20.35	56.00	25.50	0.10	10.05	QP
5		0.64	24.14	-21.86	46.00	14.00	0.10	10.04	Average
6	*	0.64	37.04	-18.96	56.00	26.90	0.10	10.04	QP
7		1.23	22.04	-23.96	46.00	11.90	0.10	10.04	Average
8		1.23	35.34	-20.66	56.00	25.20	0.10	10.04	QP
9		4.25	20.79	-25.21	46.00	10.50	0.03	10.26	Average
10		4.25	31.29	-24.71	56.00	21.00	0.03	10.26	QP
11		16.23	25.32	-24.68	50.00	14.40	0.56	10.36	Average
12		16.23	37.32	-22.68	60.00	26.40	0.56	10.36	QP

Note:

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

Appendix C. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable 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		2388.54	51.25	-22.75	74	47.28	31.7	5.55	33.28	334	9	P	H
		2389.065	41.26	-12.74	54	37.29	31.7	5.55	33.28	334	9	A	H
	*	2412	106.71	-	-	102.6	31.8	5.57	33.26	334	9	P	H
	*	2412	103.78	-	-	99.67	31.8	5.57	33.26	334	9	A	H
		2389.275	52.68	-21.32	74	48.71	31.7	5.55	33.28	149	288	P	V
		2389.17	40.74	-13.26	54	36.77	31.7	5.55	33.28	149	288	A	V
	*	2412	105.99	-	-	101.88	31.8	5.57	33.26	149	288	P	V
	*	2412	103.07	-	-	98.96	31.8	5.57	33.26	149	288	A	V
802.11b CH 06 2437MHz		2370.34	50.46	-23.54	74	46.51	31.7	5.53	33.28	319	0	P	H
		2388.4	40.96	-13.04	54	36.99	31.7	5.55	33.28	319	0	A	H
	*	2437	105.48	-	-	101.11	32	5.61	33.24	319	0	P	H
	*	2437	102.34	-	-	97.97	32	5.61	33.24	319	0	A	H
		2494.26	51.44	-22.56	74	46.86	32.1	5.68	33.2	319	0	P	H
		2485.65	40.88	-13.12	54	36.37	32.07	5.66	33.22	319	0	A	H
		2345.14	51.67	-22.33	74	47.77	31.7	5.49	33.29	166	226	P	V
		2388.4	40.54	-13.46	54	36.57	31.7	5.55	33.28	166	226	A	V
	*	2437	105.04	-	-	100.67	32	5.61	33.24	166	226	P	V
	*	2437	101.83	-	-	97.46	32	5.61	33.24	166	226	A	V
		2484.04	51.98	-22.02	74	47.47	32.07	5.66	33.22	166	226	P	V
		2485.58	41.05	-12.95	54	36.54	32.07	5.66	33.22	166	226	A	V

802.11b CH 11 2462MHz	*	2462	106.03	-	-	101.59	32.03	5.64	33.23	255	27	P	H
	*	2462	102.97	-	-	98.53	32.03	5.64	33.23	255	27	A	H
		2486.4	51.76	-22.24	74	47.25	32.07	5.66	33.22	255	27	P	H
		2486.4	41.62	-12.38	54	37.11	32.07	5.66	33.22	255	27	A	H
	*	2462	105.27	-	-	100.83	32.03	5.64	33.23	130	323	P	V
	*	2462	102.21	-	-	97.77	32.03	5.64	33.23	130	323	A	V
		2489.08	51.29	-22.71	74	46.73	32.1	5.68	33.22	130	323	P	V
		2486.6	41.08	-12.92	54	36.57	32.07	5.66	33.22	130	323	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)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	52.37	-21.63	74	59.12	33.8	8.71	49.26	189	153	P	H
		4824	49.61	-4.39	54	56.36	33.8	8.71	49.26	189	153	A	H
		4824	51.36	-22.64	74	58.11	33.8	8.71	49.26	189	86	P	V
		4824	48.1	-5.9	54	54.85	33.8	8.71	49.26	189	86	A	V
802.11b CH 06 2437MHz		4874	49.06	-24.94	74	67.51	31.88	7.19	57.52	113	276	P	H
		4874	44.14	-9.86	54	62.59	31.88	7.19	57.52	113	276	A	H
		7311	46.17	-27.83	74	59.45	36.88	8.76	58.92	174	189	P	H
		4874	50.53	-23.47	74	68.98	31.88	7.19	57.52	101	260	P	V
		4874	46.47	-7.53	54	64.92	31.88	7.19	57.52	101	260	A	V
		7311	47.57	-26.43	74	60.85	36.88	8.76	58.92	187	196	P	V
802.11b CH 11 2462MHz		4924	50.2	-23.8	74	68.53	32	7.22	57.55	113	278	P	H
		4924	46.27	-7.73	54	64.6	32	7.22	57.55	113	278	A	H
		7386	46.7	-27.3	74	59.5	37.21	8.95	58.96	189	217	P	H
		4924	50.72	-23.28	74	69.05	32	7.22	57.55	100	262	P	V
		4924	46.99	-7.01	54	65.32	32	7.22	57.55	100	262	A	V
		7386	47.17	-26.83	74	59.97	37.21	8.95	58.96	189	217	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)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		2389.8	62.65	-11.35	74	58.66	31.7	5.55	33.26	292	7	P	H
		2389.905	49.91	-4.09	54	45.92	31.7	5.55	33.26	292	7	A	H
	*	2412	108.13	-	-	104.02	31.8	5.57	33.26	292	7	P	H
	*	2412	100.69	-	-	96.58	31.8	5.57	33.26	292	7	A	H
		2389.59	58.82	-15.18	74	54.85	31.7	5.55	33.28	148	345	P	V
		2389.905	48.18	-5.82	54	44.19	31.7	5.55	33.26	148	345	A	V
	*	2412	106.09	-	-	101.98	31.8	5.57	33.26	148	345	P	V
	*	2412	98.26	-	-	94.15	31.8	5.57	33.26	148	345	A	V
802.11g CH 06 2437MHz		2389.52	54.41	-19.59	74	50.44	31.7	5.55	33.28	130	157	P	H
		2389.8	43.04	-10.96	54	39.05	31.7	5.55	33.26	130	157	A	H
	*	2437	106.3	-	-	101.93	32	5.61	33.24	130	157	P	H
	*	2437	98.7	-	-	94.33	32	5.61	33.24	130	157	A	H
		2484.39	52.22	-21.78	74	47.71	32.07	5.66	33.22	130	157	P	H
		2483.62	43.04	-10.96	54	38.53	32.07	5.66	33.22	130	157	A	H
		2387.98	51.76	-22.24	74	47.79	31.7	5.55	33.28	126	289	P	V
		2388.4	42.41	-11.59	54	38.44	31.7	5.55	33.28	126	289	A	V
	*	2437	106.34	-	-	101.97	32	5.61	33.24	126	289	P	V
	*	2437	98.76	-	-	94.39	32	5.61	33.24	126	289	A	V
		2486.91	54.19	-19.81	74	49.68	32.07	5.66	33.22	126	289	P	V
		2483.51	43.69	-10.31	54	39.18	32.07	5.66	33.22	126	289	A	V

802.11g CH 11 2462MHz	*	2462	106.14	-	-	101.7	32.03	5.64	33.23	187	356	P	H
	*	2462	99.02	-	-	94.58	32.03	5.64	33.23	187	356	A	H
		2483.72	62.08	-11.92	74	57.57	32.07	5.66	33.22	187	356	P	H
		2483.52	49.21	-4.79	54	44.7	32.07	5.66	33.22	187	356	A	H
	*	2462	106.22	-	-	101.78	32.03	5.64	33.23	312	288	P	V
	*	2462	97.81	-	-	93.37	32.03	5.64	33.23	312	288	A	V
		2483.64	62.57	-11.43	74	58.06	32.07	5.66	33.22	312	288	P	V
		2483.68	49.55	-4.45	54	45.04	32.07	5.66	33.22	312	288	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)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		4824	45.63	-28.37	74	52.38	33.8	8.71	49.26	189	153	P	H
		4824	45.54	-28.46	74	52.29	33.8	8.71	49.26	241	321	P	V
802.11g CH 06 2437MHz		4874	52.85	-21.15	74	59.33	33.73	8.79	49	157	135	P	H
		4874	43.19	-10.81	54	49.67	33.73	8.79	49	157	135	A	H
		7311	46.11	-27.89	74	51.11	35.72	11.09	51.81	145	198	P	H
		4874	50.57	-23.43	74	57.05	33.73	8.79	49	196	163	P	V
		4874	39.58	-14.42	54	46.06	33.73	8.79	49	130	15	A	V
		7311	44.5	-29.5	74	49.5	35.72	11.09	51.81	193	191	P	V
802.11g CH 11 2462MHz		4924	45.43	-28.57	74	51.57	33.7	8.9	48.74	164	245	P	H
		7386	43.76	-30.24	74	48.82	35.76	11.08	51.9	124	245	P	H
		4924	44.95	-29.05	74	51.09	33.7	8.9	48.74	142	85	P	V
		7386	43.86	-30.14	74	48.92	35.76	11.08	51.9	124	246	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)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		2389.695	63.54	-10.46	74	59.57	31.7	5.55	33.28	332	9	P	H
		2389.905	50.74	-3.26	54	46.75	31.7	5.55	33.26	332	9	A	H
	*	2412	106.26	-	-	102.15	31.8	5.57	33.26	332	9	P	H
	*	2412	99.83	-	-	95.72	31.8	5.57	33.26	332	9	A	H
		2388.96	59.38	-14.62	74	55.41	31.7	5.55	33.28	131	287	P	V
		2389.905	47.68	-6.32	54	43.69	31.7	5.55	33.26	131	287	A	V
	*	2412	105.5	-	-	101.39	31.8	5.57	33.26	131	287	P	V
	*	2412	97.95	-	-	93.84	31.8	5.57	33.26	131	287	A	V
802.11n HT20 CH 06 2437MHz		2389.8	53.8	-20.2	74	49.81	31.7	5.55	33.26	104	158	P	H
		2389.94	42.86	-11.14	54	38.87	31.7	5.55	33.26	104	158	A	H
	*	2437	106.44	-	-	102.07	32	5.61	33.24	104	158	P	H
	*	2437	99.04	-	-	94.67	32	5.61	33.24	104	158	A	H
		2483.51	55.06	-18.94	74	50.55	32.07	5.66	33.22	104	158	P	H
		2483.62	43.39	-10.61	54	38.88	32.07	5.66	33.22	104	158	A	H
		2388.54	52.6	-21.4	74	48.63	31.7	5.55	33.28	105	284	P	V
		2389.66	42.43	-11.57	54	38.46	31.7	5.55	33.28	105	284	A	V
	*	2437	106.19	-	-	101.82	32	5.61	33.24	105	284	P	V
	*	2437	98.87	-	-	94.5	32	5.61	33.24	105	284	A	V
		2486.42	54.88	-19.12	74	50.37	32.07	5.66	33.22	105	284	P	V
		2483.51	43	-11	54	38.49	32.07	5.66	33.22	105	284	A	V

802.11n HT20 CH 11 2462MHz	*	2462	105.29	-	-	100.85	32.03	5.64	33.23	101	161	P	H
	*	2462	97.68	-	-	93.24	32.03	5.64	33.23	101	161	A	H
		2484.2	63.6	-10.4	74	59.09	32.07	5.66	33.22	101	161	P	H
		2483.52	49.33	-4.67	54	44.82	32.07	5.66	33.22	101	161	A	H
	*	2462	105.14	-	-	100.7	32.03	5.64	33.23	101	286	P	V
	*	2462	97.57	-	-	93.13	32.03	5.64	33.23	101	286	A	V
		2483.64	61.75	-12.25	74	57.24	32.07	5.66	33.22	101	286	P	V
		2483.68	48.23	-5.77	54	43.72	32.07	5.66	33.22	101	286	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)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		4824	44.7	-29.3	74	51.45	33.8	8.71	49.26	154	264	P	H
		4824	45.64	-28.36	74	52.39	33.8	8.71	49.26	124	245	P	V
802.11n HT20 CH 06 2437MHz		4874	52.33	-21.67	74	58.81	33.73	8.79	49	147	144	P	H
		4874	42.21	-11.79	54	48.69	33.73	8.79	49	147	144	A	H
		7311	44.36	-29.64	74	49.36	35.72	11.09	51.81	124	256	P	H
		4874	51.23	-22.77	74	57.71	33.73	8.79	49	192	172	P	V
		4874	41.19	-12.81	54	47.67	33.73	8.79	49	192	172	A	V
		7311	44.08	-29.92	74	49.08	35.72	11.09	51.81	142	235	P	V
802.11n HT20 CH 11 2462MHz		4924	44.76	-29.24	74	50.9	33.7	8.9	48.74	124	264	P	H
		7386	43.95	-30.05	74	49.01	35.76	11.08	51.9	214	254	P	H
		4924	44.54	-29.46	74	50.68	33.7	8.9	48.74	124	245	P	V
		7386	45.6	-28.4	74	50.66	35.76	11.08	51.9	124	234	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)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 03 2422MHz		2389.8	60.78	-13.22	74	62.26	27.27	4.91	33.66	105	86	P	H
		2389.8	49.41	-4.59	54	50.89	27.27	4.91	33.66	105	86	A	H
	*	2422	101.5	-	-	102.86	27.35	4.94	33.65	105	86	P	H
	*	2422	93.82	-	-	95.18	27.35	4.94	33.65	105	86	A	H
		2484.88	50.77	-23.23	74	51.94	27.46	4.99	33.62	105	86	P	H
		2484.46	41.88	-12.12	54	43.05	27.46	4.99	33.62	105	86	A	H
		2389.66	61.32	-12.68	74	62.8	27.27	4.91	33.66	201	78	P	V
		2389.8	50.2	-3.8	54	51.68	27.27	4.91	33.66	201	78	A	V
	*	2422	99.26	-	-	100.62	27.35	4.94	33.65	201	78	P	V
	*	2422	94.63	-	-	95.99	27.35	4.94	33.65	201	78	A	V
		2490.34	49.95	-24.05	74	51.04	27.5	5.01	33.6	201	78	P	V
		2493.28	41.59	-12.41	54	42.68	27.5	5.01	33.6	201	78	A	V
802.11n HT40 CH 06 2437MHz		2389.94	60.61	-13.39	74	56.62	31.7	5.55	33.26	130	171	P	H
		2389.94	49.04	-4.96	54	45.05	31.7	5.55	33.26	130	171	A	H
	*	2437	103.26	-	-	98.89	32	5.61	33.24	130	171	P	H
	*	2437	93.67	-	-	89.3	32	5.61	33.24	130	171	A	H
		2483.51	62.82	-11.18	74	58.31	32.07	5.66	33.22	130	171	P	H
		2483.51	49.97	-4.03	54	45.46	32.07	5.66	33.22	130	171	A	H
		2388.82	60.29	-13.71	74	56.32	31.7	5.55	33.28	136	288	P	V
		2389.94	49.39	-4.61	54	45.4	31.7	5.55	33.26	136	288	A	V
	*	2437	100.4	-	-	96.03	32	5.61	33.24	136	288	P	V
	*	2437	92.68	-	-	88.31	32	5.61	33.24	136	288	A	V
		2483.9	62.94	-11.06	74	58.43	32.07	5.66	33.22	136	288	P	V
		2483.76	49.88	-4.12	54	45.37	32.07	5.66	33.22	136	288	A	V

802.11n HT40 CH 09 2452MHz		2389.8	50.29	-23.71	74	51.77	27.27	4.91	33.66	140	91	P	H
		2389.1	41.42	-12.58	54	42.9	27.27	4.91	33.66	140	91	A	H
	*	2452	101.95	-	-	103.23	27.39	4.96	33.63	140	91	P	H
	*	2452	94.41	-	-	95.69	27.39	4.96	33.63	140	91	A	H
		2484.46	64.46	-9.54	74	65.63	27.46	4.99	33.62	140	91	P	H
		2484.25	50.39	-3.61	54	51.56	27.46	4.99	33.62	140	91	A	H
		2370.48	50.03	-23.97	74	51.6	27.23	4.88	33.68	149	198	P	V
		2389.94	41.49	-12.51	54	42.97	27.27	4.91	33.66	149	198	A	V
	*	2452	96.47	-	-	97.75	27.39	4.96	33.63	149	198	P	V
	*	2452	89.11	-	-	90.39	27.39	4.96	33.63	149	198	A	V
		2483.55	61.22	-12.78	74	62.39	27.46	4.99	33.62	149	198	P	V
		2483.69	47.22	-6.78	54	48.39	27.46	4.99	33.62	149	198	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)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n		4844	43.65	-30.35	74	58.6	33.8	8.74	57.49	196	332	P	H
HT40		7266	46.77	-27.23	74	58.77	35.71	11.19	58.9	266	302	P	H
CH 03		4844	44.58	-29.42	74	59.53	33.8	8.74	57.49	150	350	P	V
2422MHz		7266	47.03	-26.97	74	59.03	35.71	11.19	58.9	200	360	P	V
802.11n		4874	45.23	-28.77	74	51.71	33.73	8.79	49	163	209	P	H
HT40		7311	45.06	-28.94	74	50.06	35.72	11.09	51.81	136	196	P	H
CH 06		4874	45.35	-28.65	74	51.83	33.73	8.79	49	165	230	P	V
2437MHz		7311	44.1	-29.9	74	49.1	35.72	11.09	51.81	186	323	P	V
802.11n		4904	44.88	-29.12	74	59.85	33.7	8.86	57.53	185	99	P	H
HT40		7356	46.27	-27.73	74	58.39	35.74	11.08	58.94	136	306	P	H
CH 09		4904	44.41	-29.59	74	59.38	33.7	8.86	57.53	150	360	P	V
2452MHz		7356	46.87	-27.13	74	58.99	35.74	11.08	58.94	165	335	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz WIFI 802.11n HT20 (LF)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable 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 HT20 LF		30	22.75	-17.25	40	29.42	25.2	0.53	32.4	-	-	P	H
		148.34	28.4	-15.1	43.5	42.16	17.2	1.24	32.2	-	-	P	H
		285.11	28.42	-17.58	46	39.49	18.9	1.76	31.73	-	-	P	H
		576.11	27.89	-18.11	46	30.09	26.08	2.51	30.79	-	-	P	H
		720.64	29.22	-16.78	46	30.17	27.18	2.8	30.93	-	-	P	H
		957.32	32.64	-13.36	46	29.7	31.14	3.24	31.44	115	134	P	H
		45.52	32.81	-7.19	40	47.95	16.6	0.66	32.4	116	142	P	V
		150.28	22.72	-20.78	43.5	36.57	17.1	1.25	32.2	-	-	P	V
		281.23	25.37	-20.63	46	36.63	18.74	1.74	31.74	-	-	P	V
		569.32	27.69	-18.31	46	29.75	26.26	2.5	30.82	-	-	P	V
		765.26	29.66	-16.34	46	29.55	28.4	2.88	31.17	-	-	P	V
		966.05	32.89	-21.11	54	29.68	31.3	3.26	31.35	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

For Co-location:

2.4GHz 2400~2483.5MHz

WIFI 802.11n20 (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable 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)
802.11n20 CH 01 2412MHz & LTE Band 13		2389.695	62.11	-11.89	74	58.14	31.7	5.55	33.28	332	9	P	H
		2389.905	50.14	-3.86	54	46.15	31.7	5.55	33.26	332	9	A	H
	*	2412	105.91	-	-	101.8	31.8	5.57	33.26	332	9	P	H
	*	2412	99.23	-	-	95.12	31.8	5.57	33.26	332	9	A	H
		2388.96	61.38	-12.62	74	57.41	31.7	5.55	33.28	131	287	P	V
		2389.905	47.99	-6.01	54	44	31.7	5.55	33.26	131	287	A	V
	*	2412	104.57	-	-	100.46	31.8	5.57	33.26	131	287	P	V
	*	2412	97.25	-	-	93.14	31.8	5.57	33.26	131	287	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 802.11n20 (Harmonic @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable 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)
802.11n20 CH 01 2412MHz & LTE Band 13		1559.5	47.42	-26.58	74	67.43	28.1	4.43	52.54	332	9	P	H
		2339.25	40.79	-33.21	74	56.33	31.7	5.49	52.73	188	9	P	H
		3119	38.81	-35.19	74	51.81	32.95	6.45	52.4	200	0	A	H
		4824	44.5	-29.5	74	51.25	33.8	8.71	49.26	154	264	P	H
		1559.5	48.1	-25.9	74	68.11	28.1	4.43	52.54	131	84	P	V
		2339.25	38.39	-35.61	74	53.93	31.7	5.49	52.73	178	84	P	V
		3119	38.96	-35.04	74	51.96	32.95	6.45	52.4	200	79	P	V
		4824	45.37	-28.63	74	52.12	33.8	8.71	49.26	124	73	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average 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	Cable	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. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

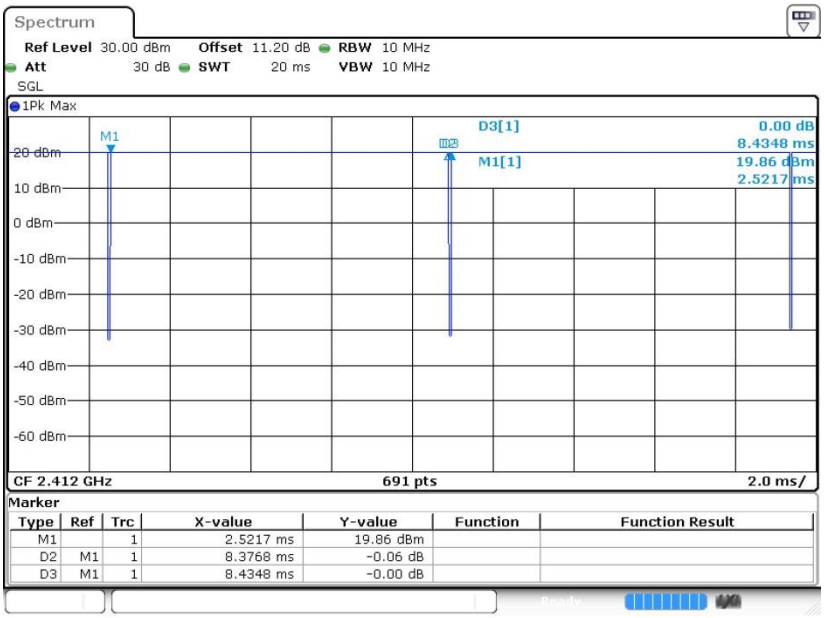
= -10.46(dB)

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

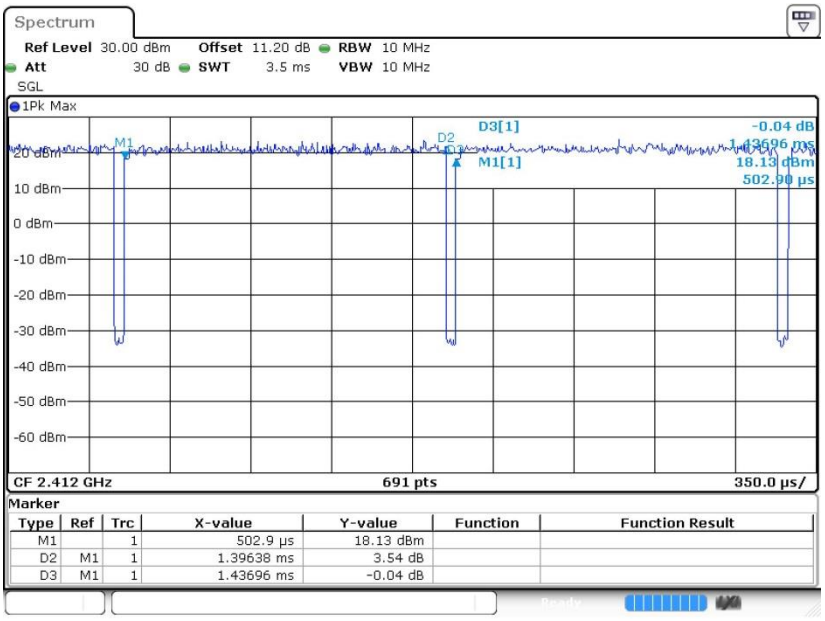
Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	99.31	-	-	10Hz
802.11g	97.18	1.396	0.716	1KHz
802.11n HT20	96.61	1.300	0.769	1KHz
802.11n HT40	93.50	0.646	1.547	3KHz

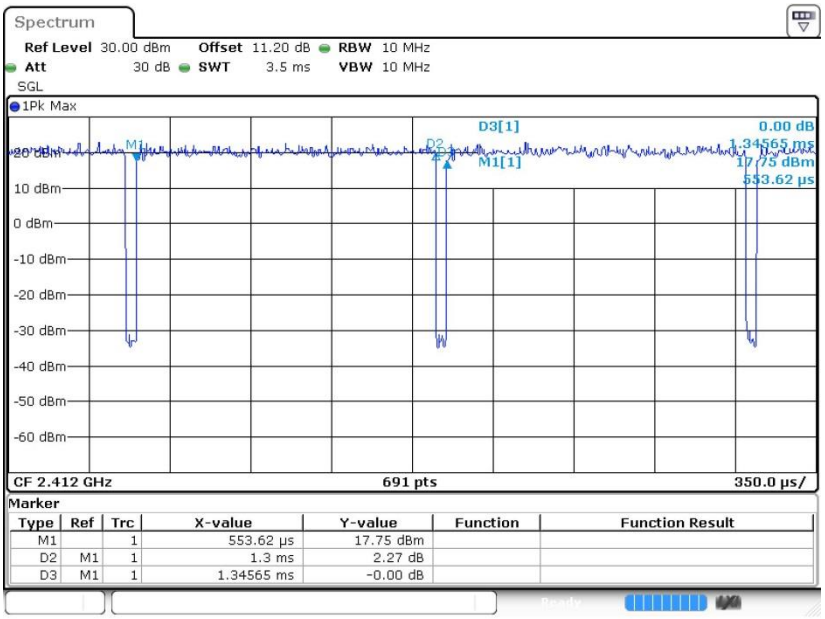
802.11b



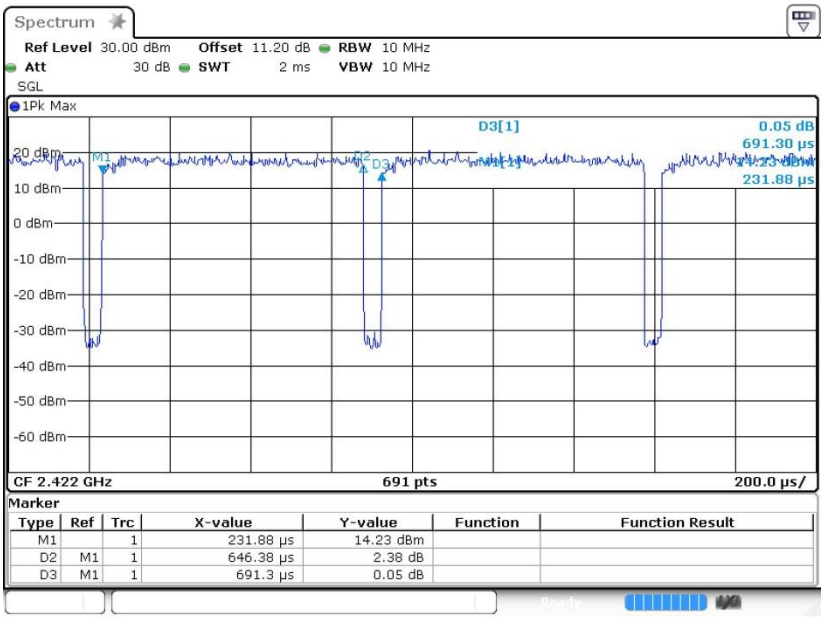
802.11g



802.11n HT20



802.11n HT40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Att 30 dB SWT 2 ms VBW 10 MHz
SGL
1Pk Max
D3[1]
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691.30 µs
231.88 µs
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
CF 2.422 GHz
691 pts
200.0 µs/
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 231.88 µs 14.23 dBm
D2 M1 1 646.38 µs 2.38 dB
D3 M1 1 691.3 µs 0.05 dB