FCC RF Test Report

APPLICANT	:	Bullitt Group
EQUIPMENT	:	Rugged Smart Phone
BRAND NAME	:	CAT
MODEL NAME	:	S42
FCC ID	:	ZL5S42
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

The product was received on May 22, 2020 and testing was completed on Jun. 22, 2020. 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
FR052014-01C	Rev. 01	Initial issue of report	Jul. 10, 2020

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	-	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 3.16 dB at 30.000 MHz for Quasi-Peak
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 3.92 dB at 0.500 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
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

Bullitt Group
One Valpy, Valpy Street, Reading, Berkshire, England RG1 1AR

1.2 Manufacturer

Bullitt Group
One Valpy, Valpy Street, Reading, Berkshire, England RG1 1AR

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Rugged Smart Phone
Brand Name	CAT
Model Name	S42
FCC ID	ZL5S42
EUT supports Radios application	GSM/WCDMA/LTE/NFC WLAN 2.4GHz 802.11b/g/n HT20 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE FM Receiver and GNSS
IMEI Code	Conduction: 359145660001926/359145660005927 Radiation: 359145660001934/359145660005935 Conducted: N/A
HW Version	V1.0
SW Version	LTE_C01091.10_NE_S42G_0.030.00
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 Output Power to antenna	802.11b : 14.10 dBm (0.0257 W) 802.11g : 13.40 dBm (0.0219 W) 802.11n HT20 : 13.80 dBm (0.0240 W)
99% Occupied Bandwidth	802.11b : 12.84MHz 802.11g : 16.78MHz 802.11n HT20 : 17.68MHz
Antenna Type / Gain	IFA Antenna type with gain -1.50 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	No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse, Nanshan Shenzhen, 518055 People's Republic of China TEL: +86-755-33202398		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH03-SZ	CN1256	421272

1.7 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH03-SZ	AUDIX	E3	6.2009-8-24
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.

2 Test Configuration of Equipment Under Test

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

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

2.1 Carrier Frequency and Channel

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

2.2 Test Mode

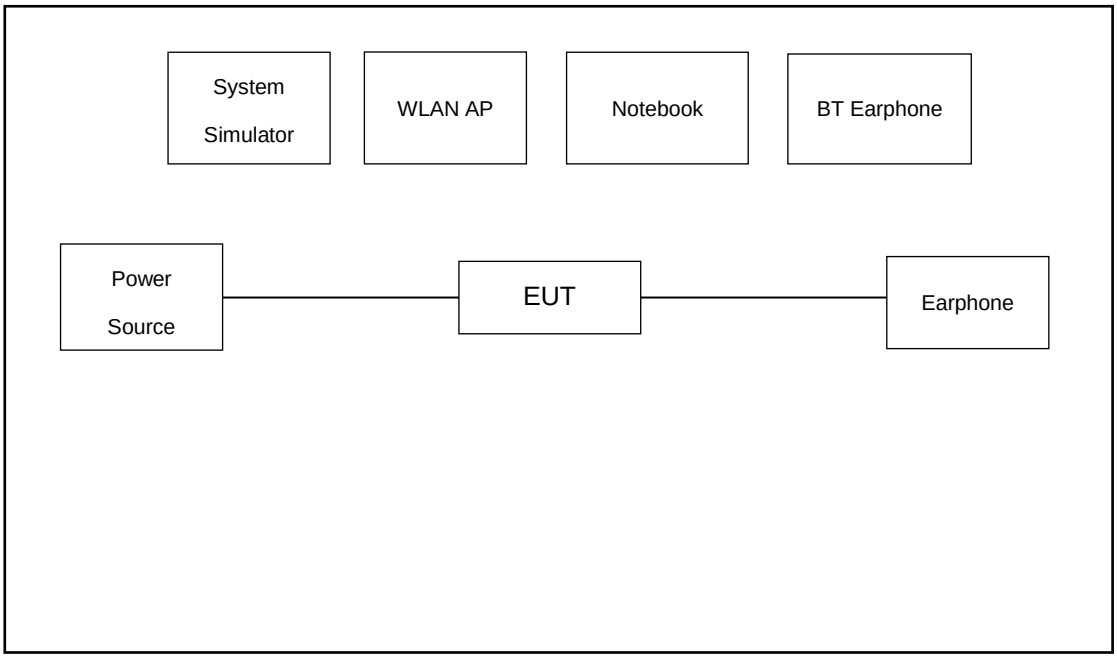
Final test modes are considering the modulation and worse data rates as below table.

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

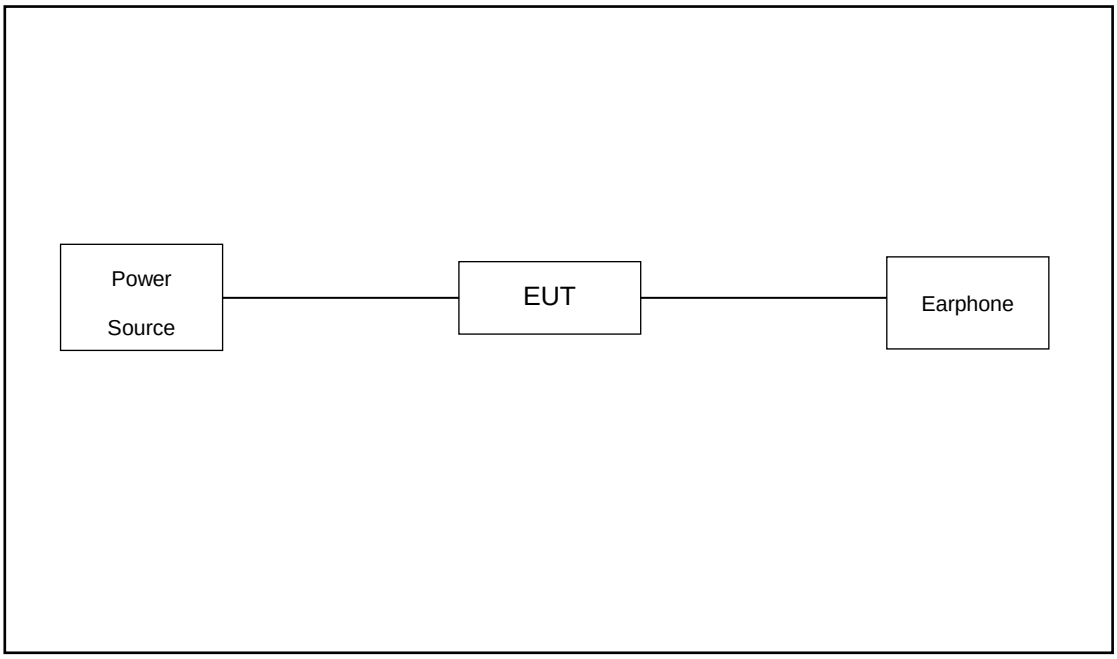
Test Cases	
AC Conducted Emission	Mode 1 :GSM 850 Idle + Bluetooth Link + WLAN Link (2.4G) + USB Cable1(Charging from Adapter) + Earphone1
Remark: For Radiated Test Cases, The tests were performed with Adapter1 , USB cable1, Battery and Earphone1	

2.3 Connection Diagram of Test System

For Conducted Emission:



For Radiated Emission:



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8m
2.	WLAN AP	D-Link	DIR-820L	KA2IR820LA1	N/A	Unshielded, 1.8m
3.	Bluetooth Earphone	Samsung	EO-MG900	N/A	N/A	N/A
4.	Notebook	Lenovo	E540	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m

2.5 EUT Operation Test Setup

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

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

2.6 Measurement Results Explanation Example

For all conducted test items:

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

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.30 dB and 10dB attenuator.

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

= 4.30 + 10 = 14.30 (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.

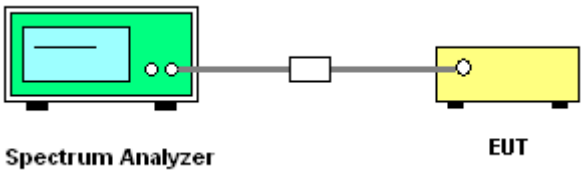
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

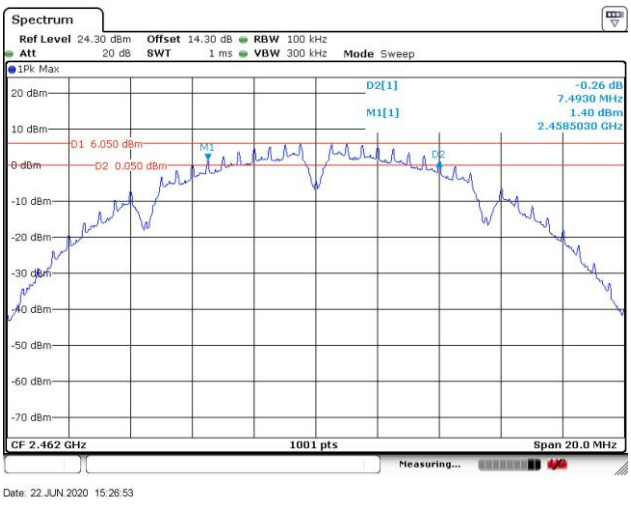
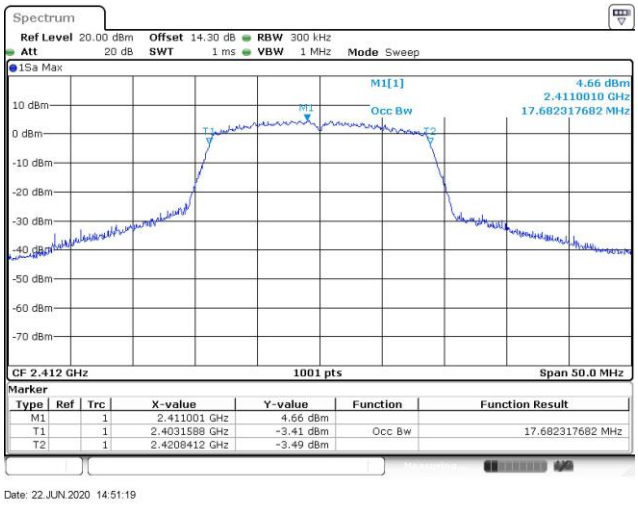
1. The testing follows ANSI C63.10-2013 clause 11.8
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement 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) = 300 kHz and set the Video bandwidth (VBW) = 1MHz.
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 output power is 30dBm. If transmitting antenna with directional gain greater than 6dBi is used, the 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.

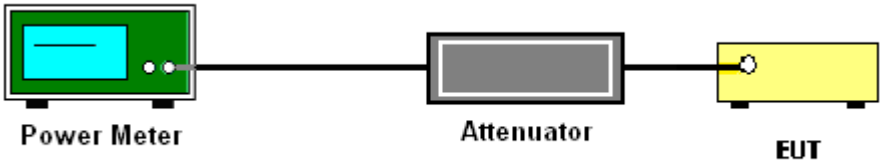
3.2.2 Measuring Instruments

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



3.3 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.

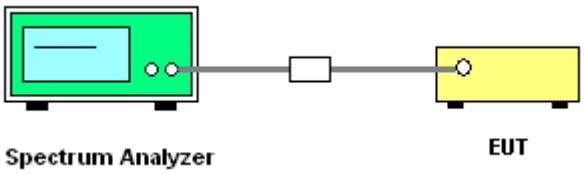
3.3.2 Measuring Instruments

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.

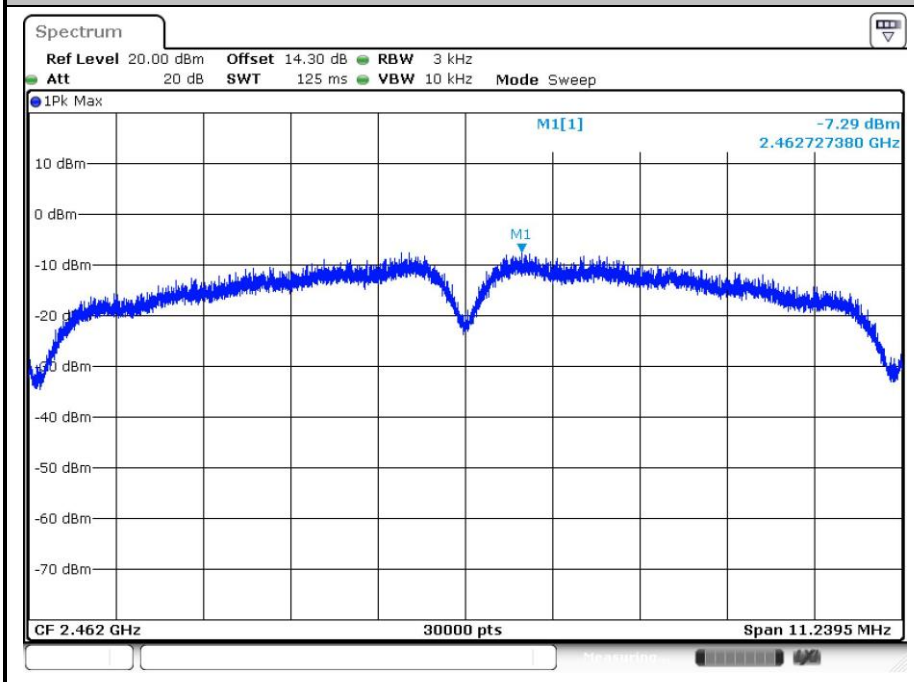
3.3.4 Test Setup



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.

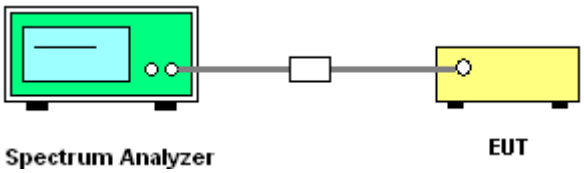
3.4.2 Measuring Instruments

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

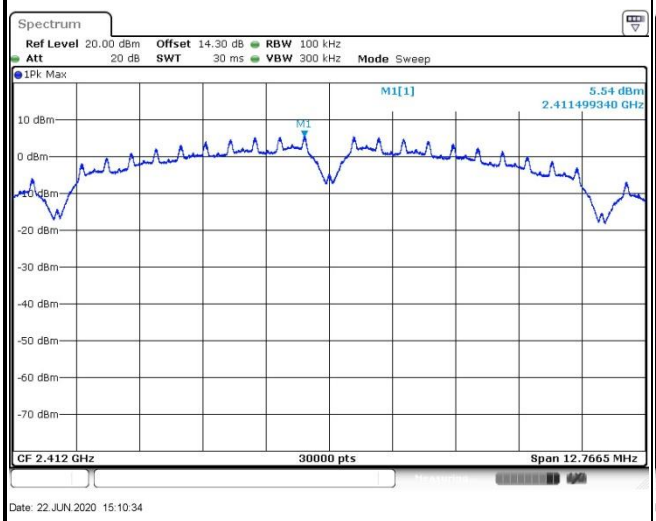


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

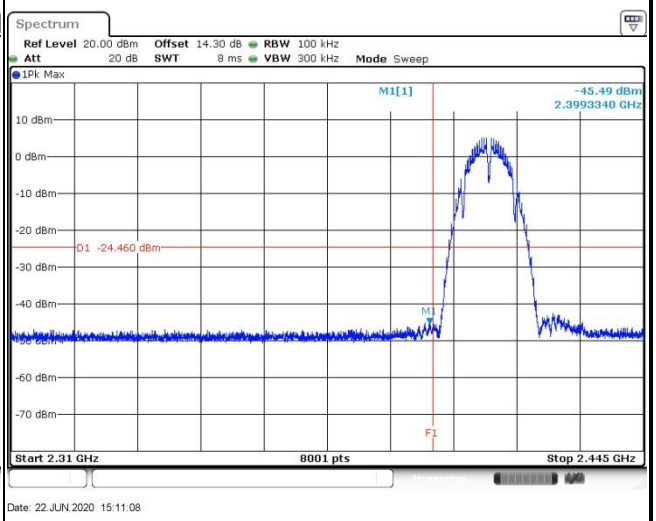
Test Engineer :	Zeng Meng Hui	**Temperature :**	21~25℃
		Relative Humidity :	51~54%

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

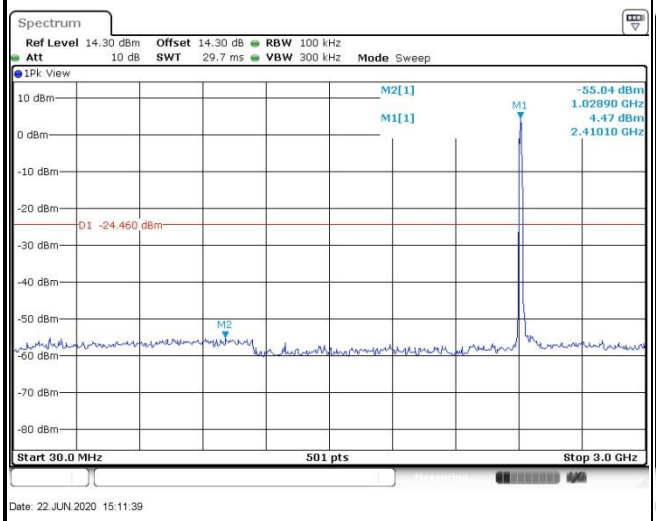
100kHz PSD reference Level



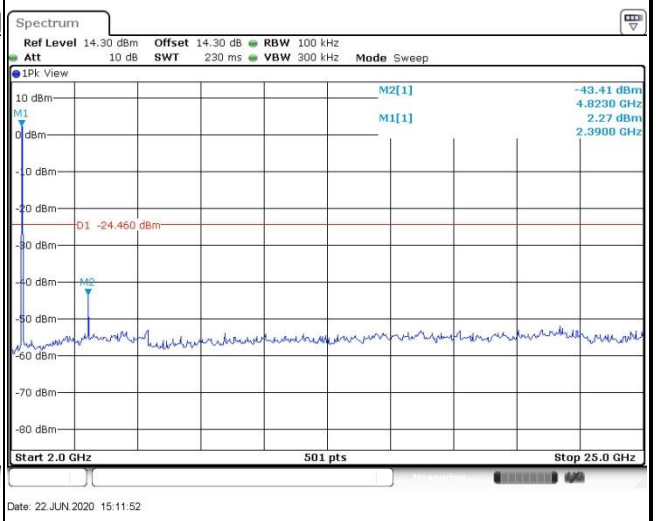
Channel Plot



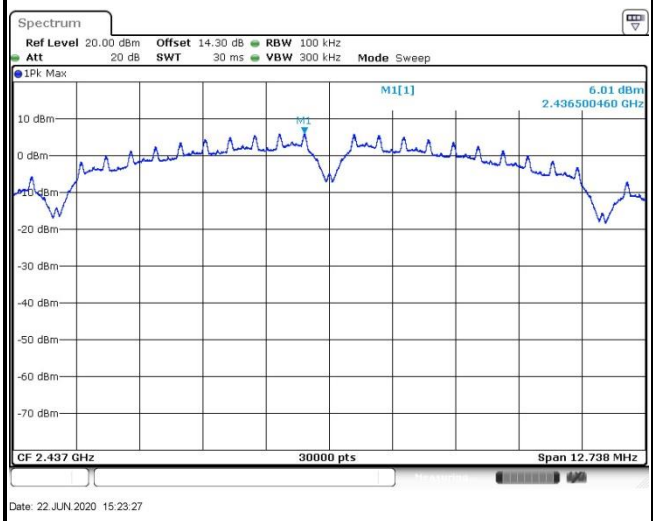
Spurious Emission 30MHz~3GHz

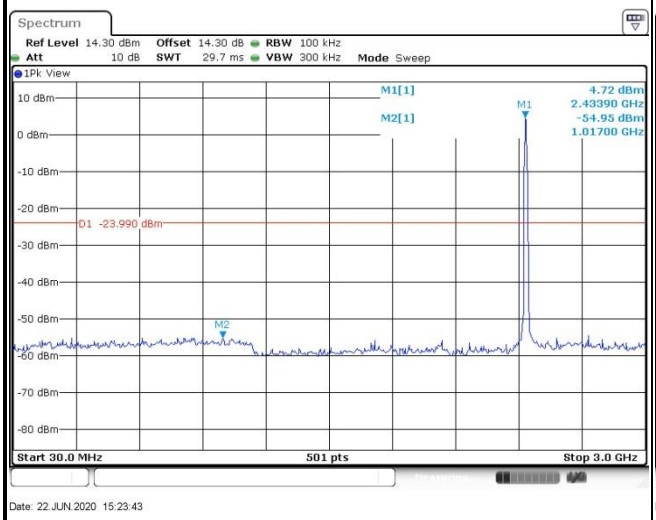
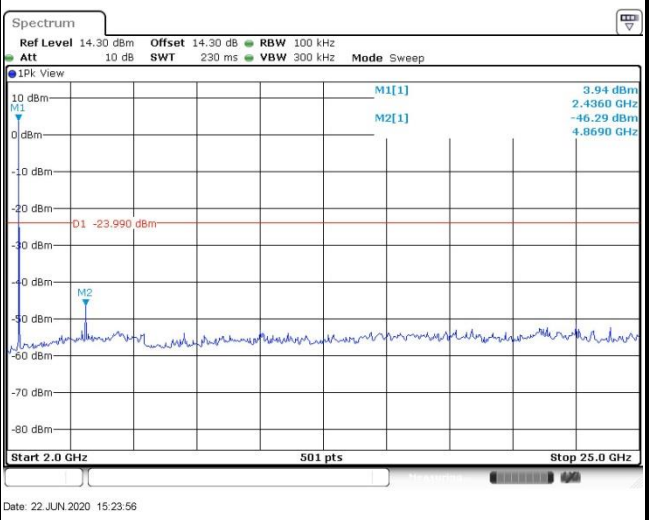


Spurious Emission 2GHz~25GHz

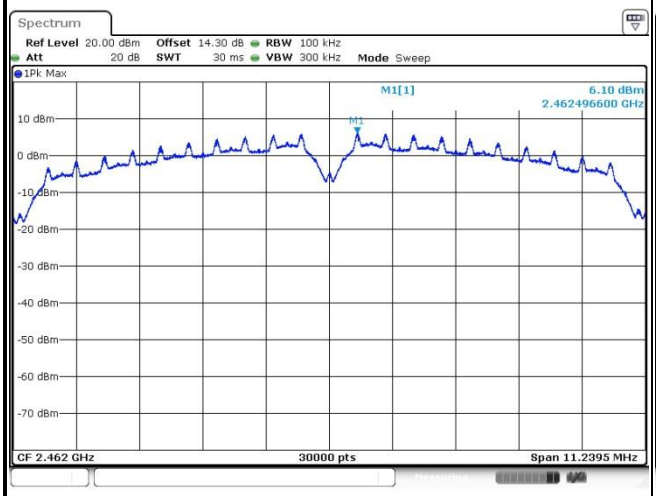
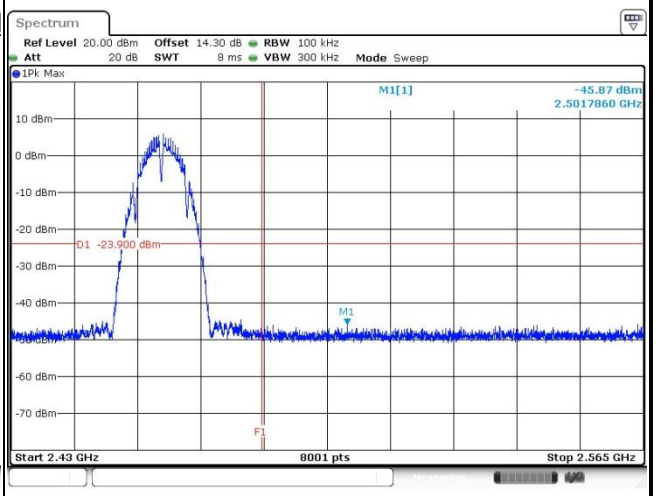
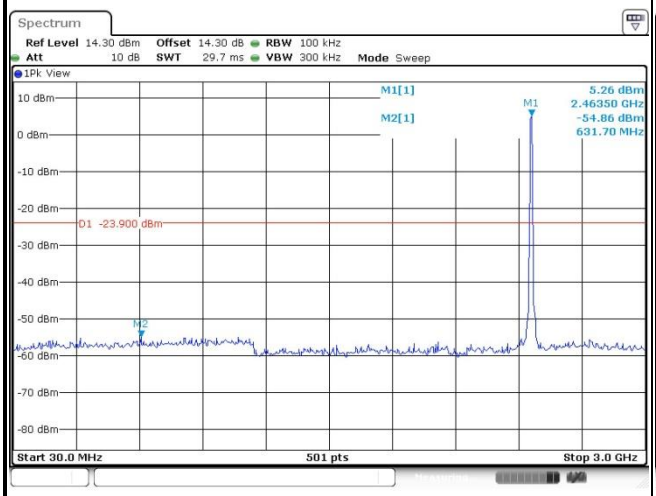
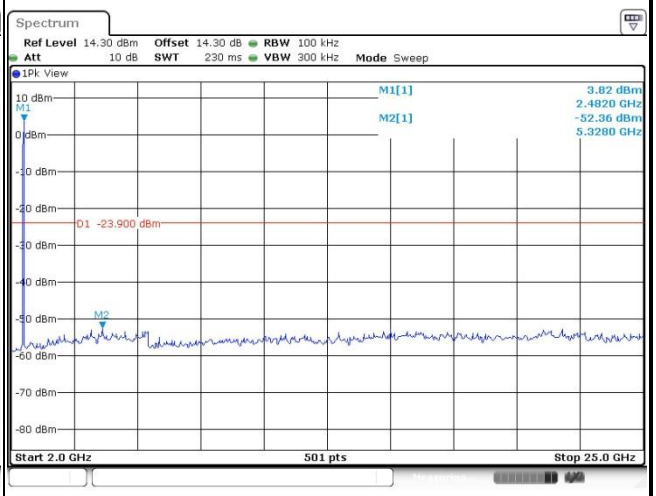


Test Mode :	802.11b	Test Channel :	06

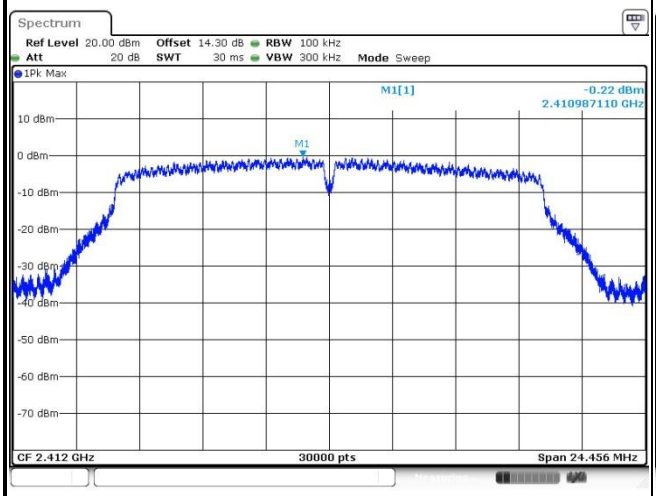
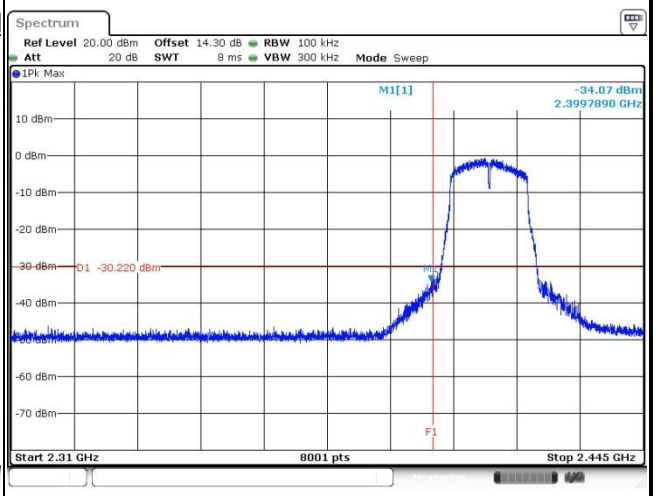
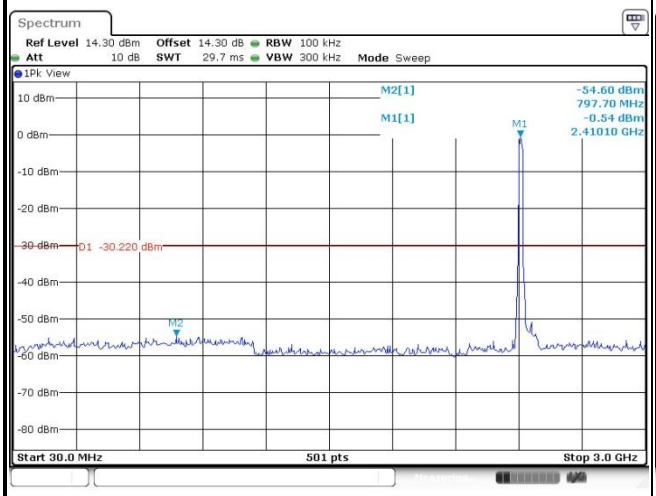
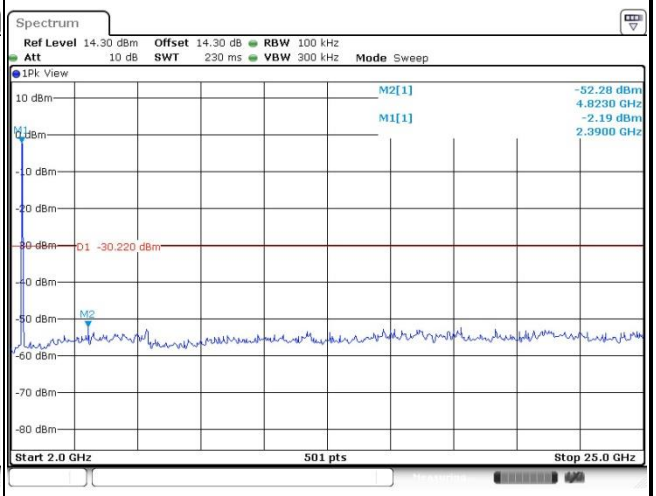
100kHz PSD reference Level	Channel Plot
	

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

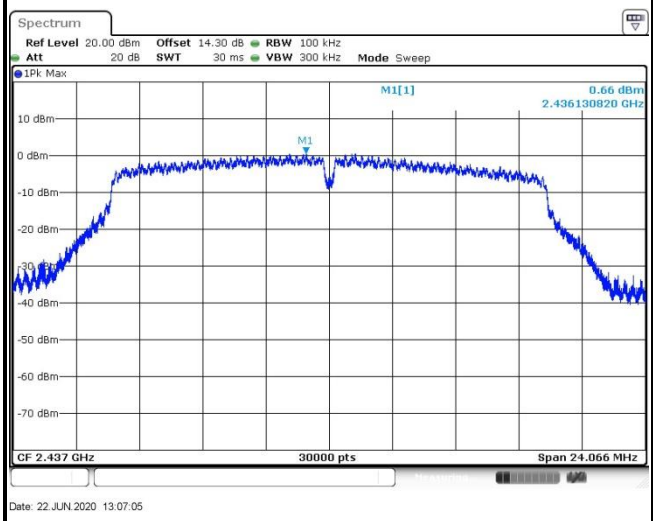
Test Mode :	802.11b	Test Channel :	11

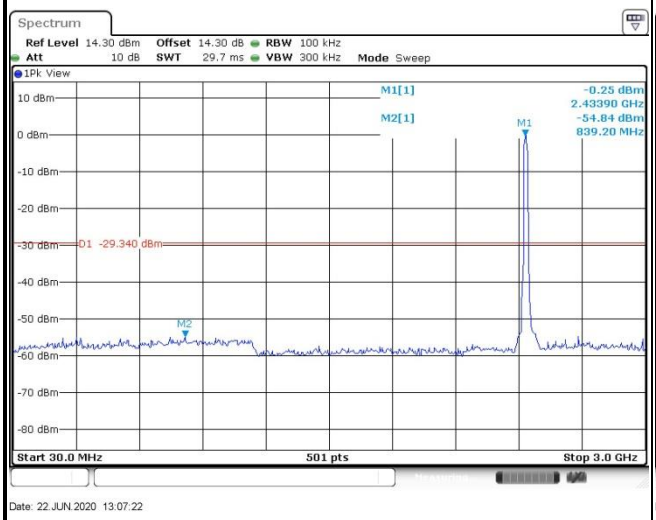
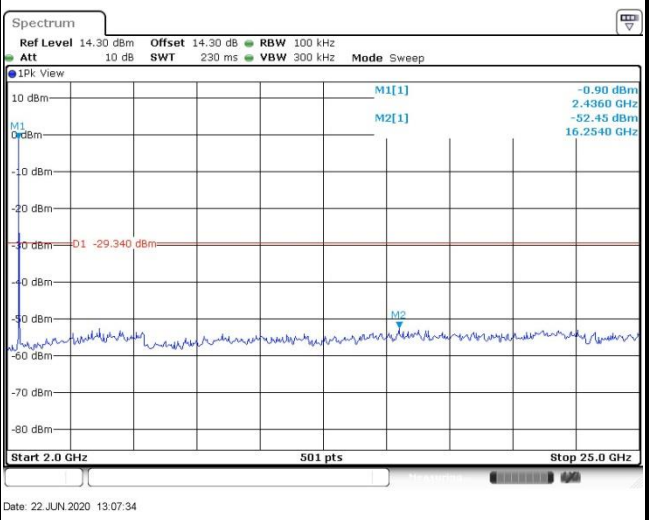
100kHz PSD reference Level	Channel Plot
	
Date: 22.JUN.2020 15:29:01	Date: 22.JUN.2020 15:35:19
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 22.JUN.2020 15:36:41	Date: 22.JUN.2020 15:36:59

Test Mode :	802.11g	Test Channel :	01

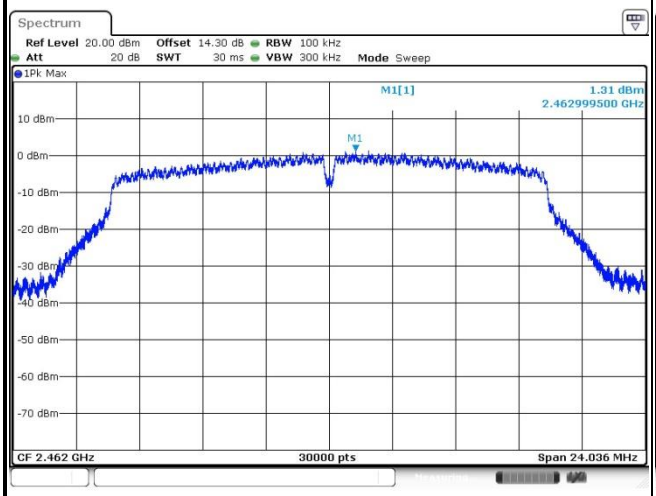
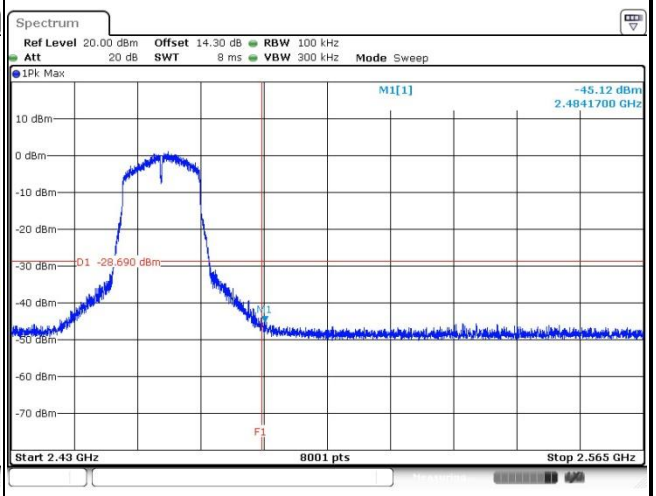
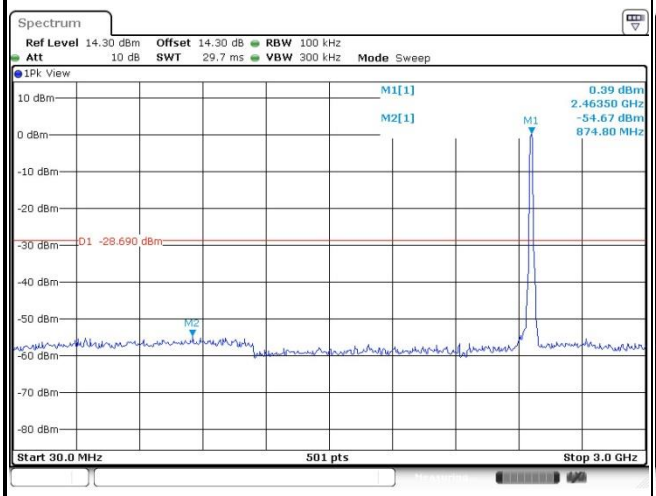
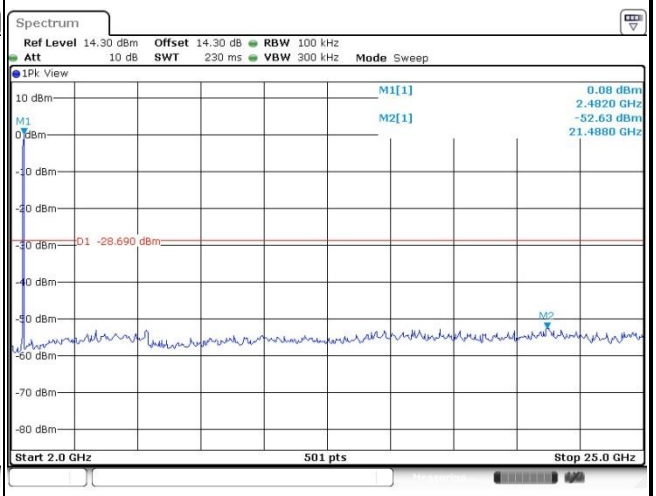
100kHz PSD reference Level	Channel Plot
	
Date: 22.JUN.2020 12:43:27	Date: 22.JUN.2020 12:43:53
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 22.JUN.2020 13:00:25	Date: 22.JUN.2020 13:00:45

Test Mode :	802.11g	Test Channel :	06

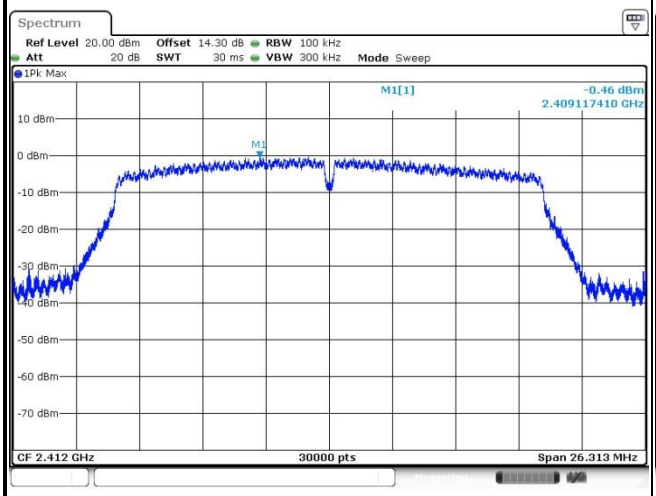
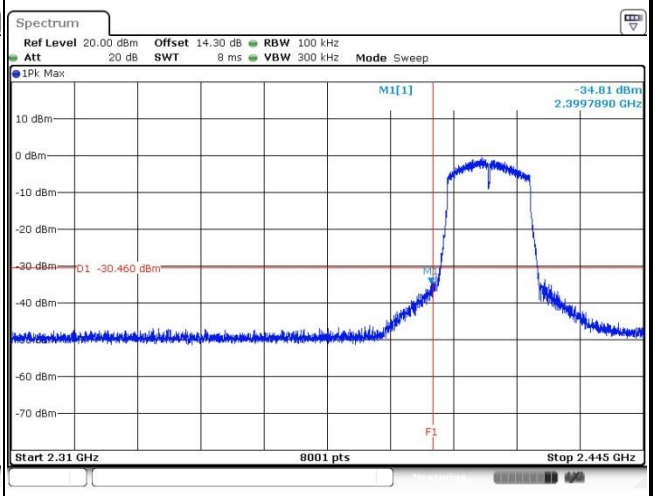
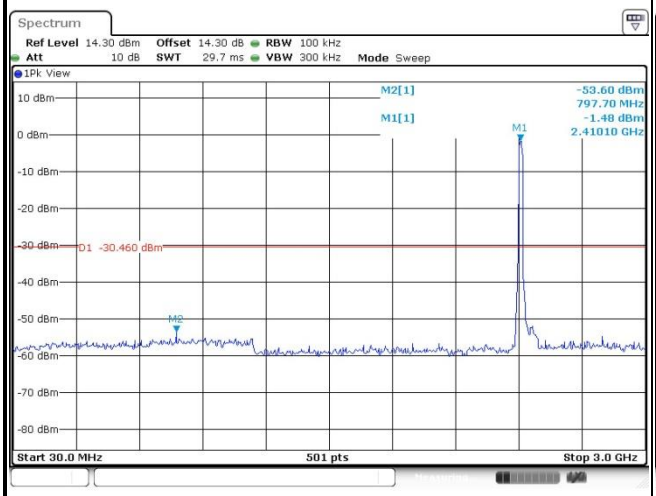
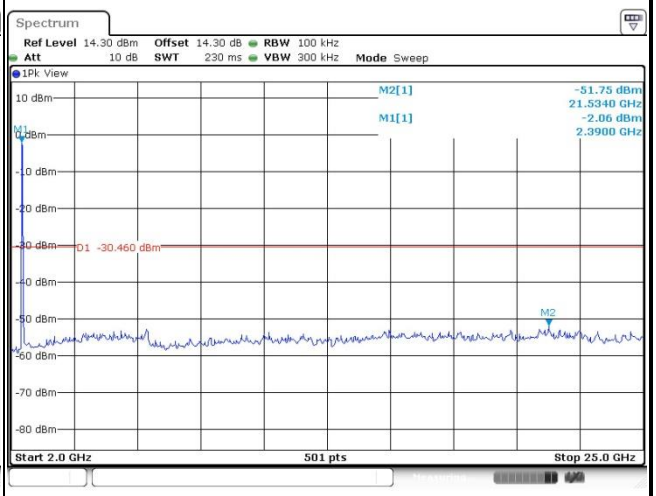
100kHz PSD reference Level	Channel Plot
	

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

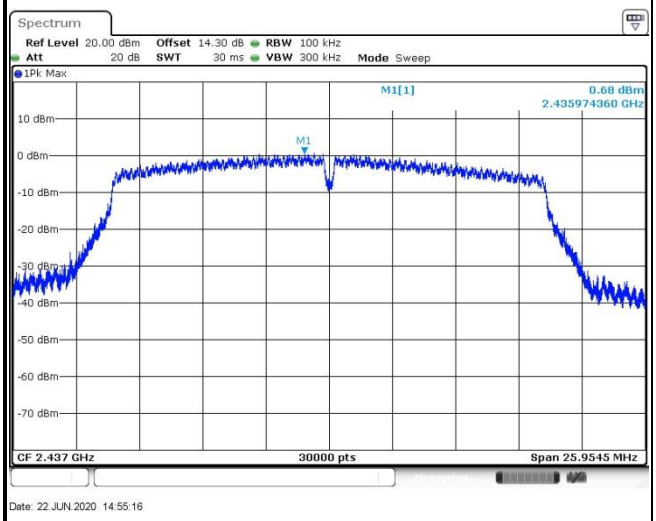
Test Mode :	802.11g	Test Channel :	11

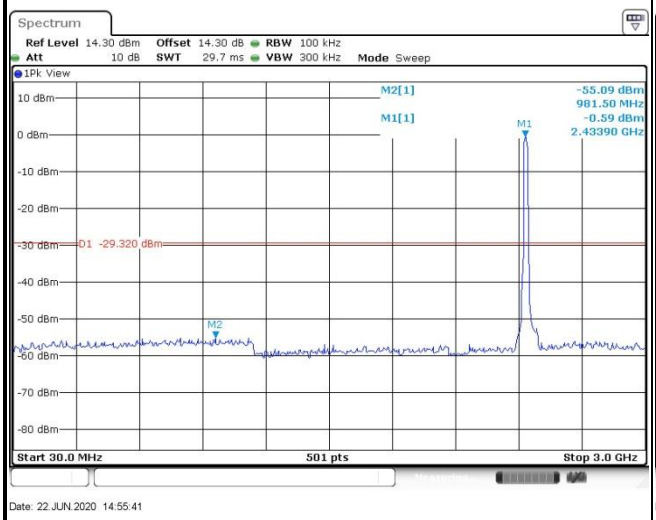
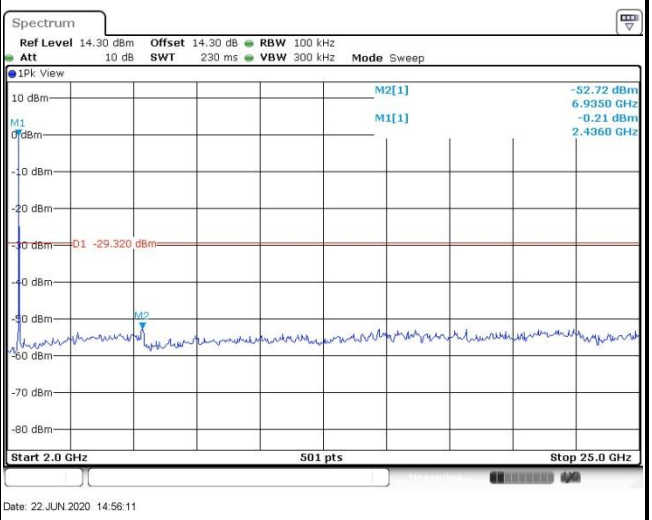
100kHz PSD reference Level	Channel Plot
	
Date: 22.JUN.2020 13:11:08	Date: 22.JUN.2020 14:43:56
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 22.JUN.2020 14:43:16	Date: 22.JUN.2020 14:43:28

Test Mode :	802.11n HT20	Test Channel :	01

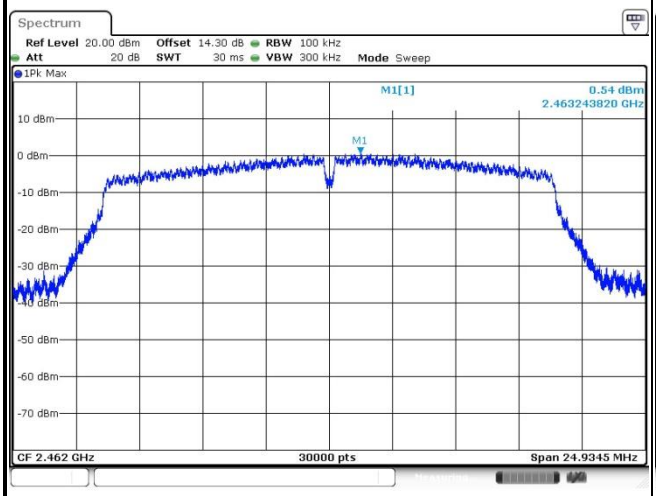
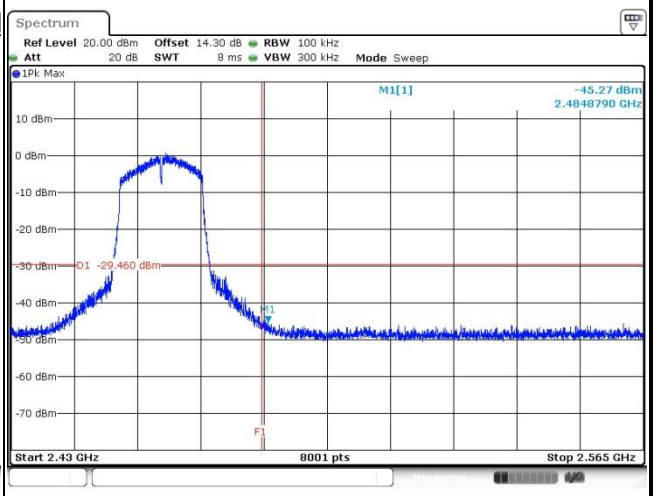
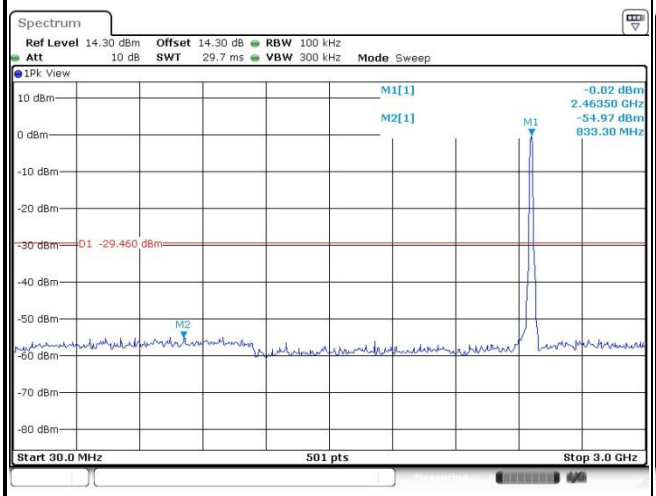
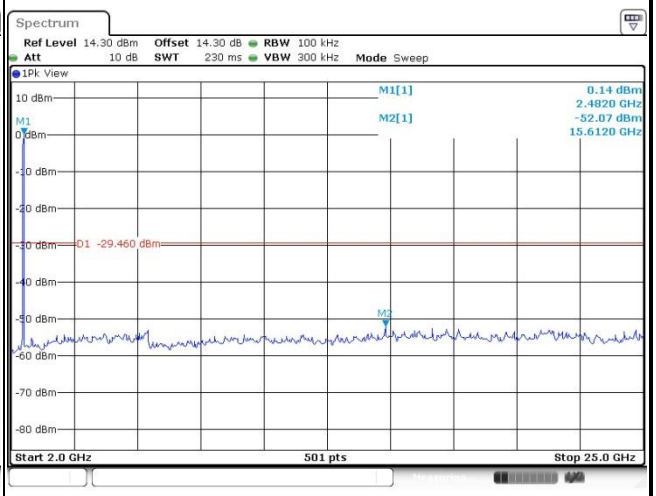
100kHz PSD reference Level	Channel Plot
	
Date: 22.JUN.2020 14:48:48	Date: 22.JUN.2020 14:49:37
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 22.JUN.2020 14:50:18	Date: 22.JUN.2020 14:50:31

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: 22.JUN.2020 15:04:50	Date: 22.JUN.2020 15:05:11
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 22.JUN.2020 15:05:31	Date: 22.JUN.2020 15:05:46

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

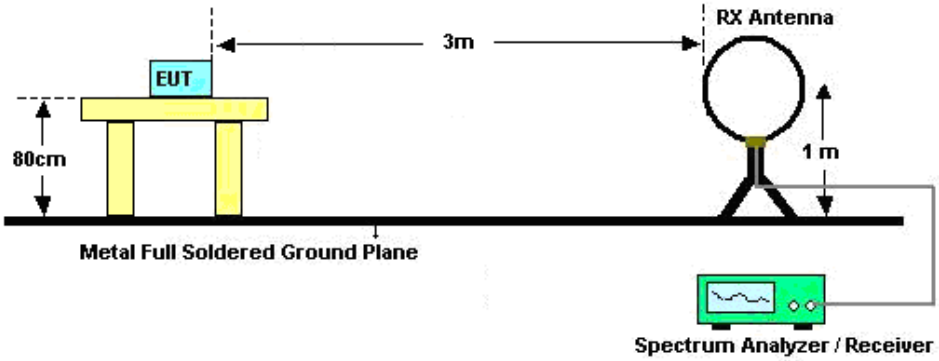
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

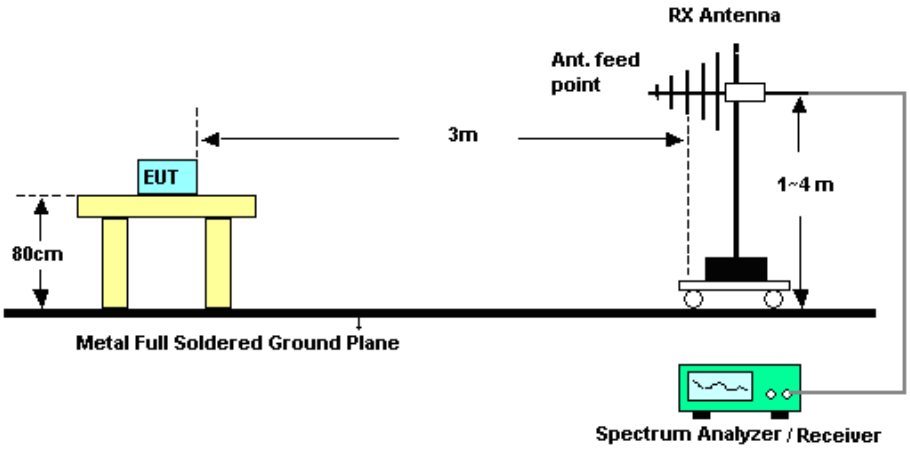
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better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

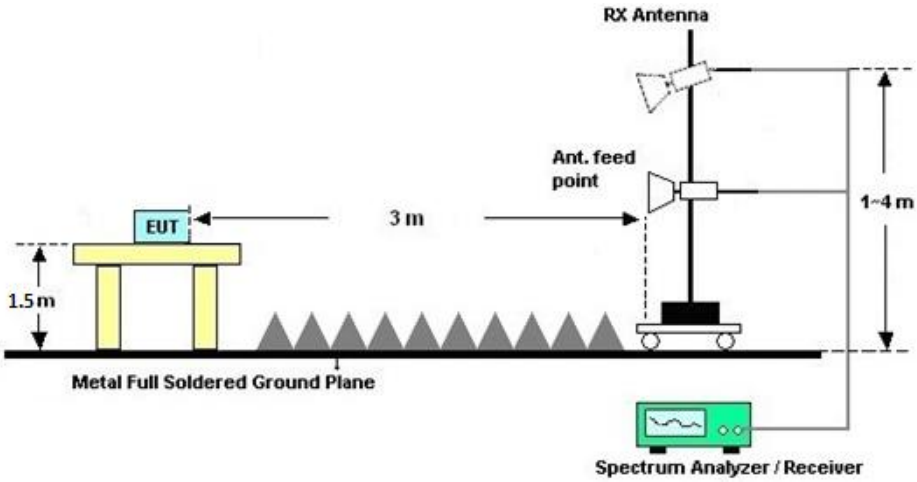
For radiated emissions below 30MHz



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)

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.

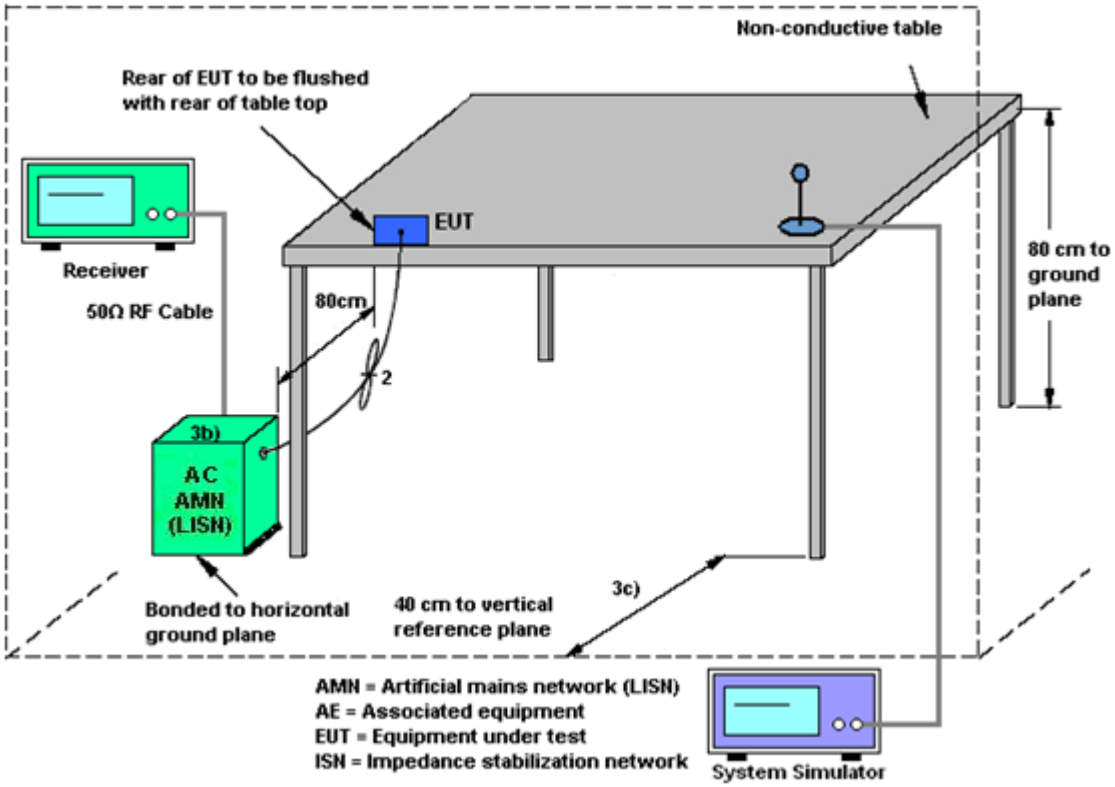
3.6.2 Measuring Instruments

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. 16, 2020	Jun. 22, 2020	Apr. 15, 2021	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1207253	30MHz~40GHz	Dec. 26, 2019	Jun. 22, 2020	Dec. 25, 2020	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Dec. 26, 2019	Jun. 22, 2020	Dec. 25, 2020	Conducted (TH01-SZ)
EMI Test Receiver&SA	KEYSIGHT	N9038A	MY54450083	20Hz~8.4GHz	Apr. 17, 2020	Jun. 20, 2020	Apr. 16, 2021	Radiation (03CH03-SZ)
EXA Spectrum Anaiyzer	KEYSIGHT	N9010A	MY55150246	10Hz~44GHz;	Apr. 17, 2020	Jun. 20, 2020	Apr. 16, 2021	Radiation (03CH03-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 28, 2020	Jun. 20, 2020	May 27, 2021	Radiation (03CH03-SZ)
Bilog Antenna	TeseQ	CBL6112D	35408	30MHz-2GHz	Apr. 17, 2020	Jun. 20, 2020	Apr. 16, 2021	Radiation (03CH03-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1355	1GHz~18GHz	Apr. 01, 2020	Jun. 20, 2020	Mar. 31, 2021	Radiation (03CH03-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 22, 2019	Jun. 20, 2020	Jul. 21, 2020	Radiation (03CH03-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Apr. 17, 2020	Jun. 20, 2020	Apr. 16, 2021	Radiation (03CH03-SZ)
Amplifier	Burgeon	BPA-530	102210	0.01Hz ~3000MHz	Oct. 18, 2019	Jun. 20, 2020	Oct. 17, 2020	Radiation (03CH03-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 18, 2019	Jun. 20, 2020	Oct. 17, 2020	Radiation (03CH03-SZ)
Amplifier	Agilent Technologies	83017A	MY39501302	500MHz~26.5GHz	Dec. 23, 2019	Jun. 20, 2020	Dec. 22, 2020	Radiation (03CH03-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	NCR	Jun. 20, 2020	NCR	Radiation (03CH03-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jun. 20, 2020	NCR	Radiation (03CH03-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Jun. 20, 2020	NCR	Radiation (03CH03-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Dec. 26, 2019	Jun. 02, 2020	Dec. 25, 2020	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103912	9kHz~30MHz	Oct. 17, 2019	Jun. 02, 2020	Oct. 16, 2020	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Oct. 17, 2019	Jun. 02, 2020	Oct. 16, 2020	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 23, 2019	Jun. 02, 2020	Jul. 22, 2020	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 (150kHz ~ 30MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.7 dB**

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.9 dB**

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

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

Appendix A. Conducted Test Results

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Zeng Meng Hui	Temperature:	21~25	°C
Test Date:	2020/6/22	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
					Ant 1	Ant 1		
11b	1Mbps	1	1	2412	12.84	8.51	0.50	Pass
11b	1Mbps	1	6	2437	12.69	8.49	0.50	Pass
11b	1Mbps	1	11	2462	12.59	7.49	0.50	Pass
11g	6Mbps	1	1	2412	16.78	16.30	0.50	Pass
11g	6Mbps	1	6	2437	16.53	16.04	0.50	Pass
11g	6Mbps	1	11	2462	16.53	16.02	0.50	Pass
HT20	MCS0	1	1	2412	17.68	17.54	0.50	Pass
HT20	MCS0	1	6	2437	17.63	17.30	0.50	Pass
HT20	MCS0	1	11	2462	17.58	16.62	0.50	Pass

TEST RESULTS DATA
Average Output Power

2.4GHz Band																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412	13.70	-	-	30.00	-	-1.50	-	12.20	-	36.00	-	Pass
11b	1Mbps	1	6	2437	14.10	-		30.00	-	-1.50	-	12.60	-	36.00	-	Pass
11b	1Mbps	1	11	2462	13.90	-		30.00	-	-1.50	-	12.40	-	36.00	-	Pass
11g	6Mbps	1	1	2412	13.00	-		30.00	-	-1.50	-	11.50	-	36.00	-	Pass
11g	6Mbps	1	6	2437	13.40	-		30.00	-	-1.50	-	11.90	-	36.00	-	Pass
11g	6Mbps	1	11	2462	13.30	-		30.00	-	-1.50	-	11.80	-	36.00	-	Pass
HT20	MCS0	1	1	2412	12.80	-		30.00	-	-1.50	-	11.30	-	36.00	-	Pass
HT20	MCS0	1	6	2437	13.80	-		30.00	-	-1.50	-	12.30	-	36.00	-	Pass
HT20	MCS0	1	11	2462	13.60	-		30.00	-	-1.50	-	12.10	-	36.00	-	Pass

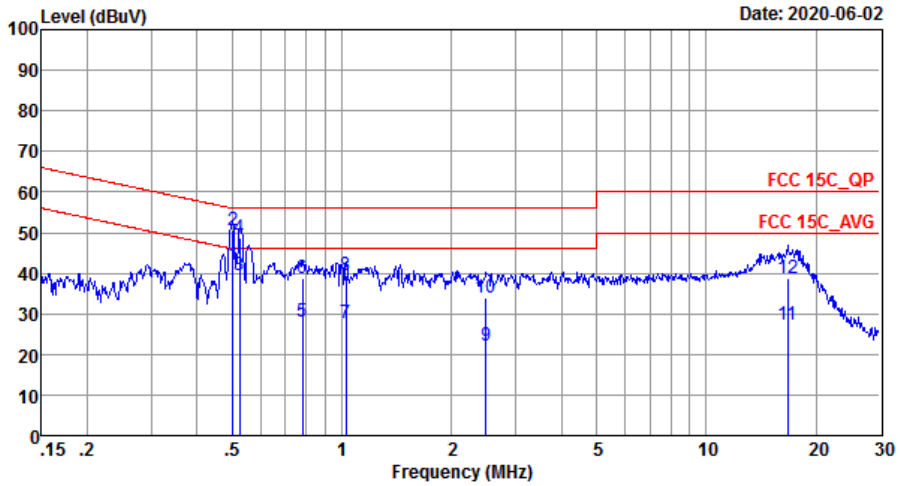
TEST RESULTS DATA
Peak Power Spectral Density

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 1	Ant 1	
11b	1Mbps	1	1	2412	-7.97	-1.50	8.00	Pass
11b	1Mbps	1	6	2437	-7.44	-1.50	8.00	Pass
11b	1Mbps	1	11	2462	-7.29	-1.50	8.00	Pass
11g	6Mbps	1	1	2412	-11.44	-1.50	8.00	Pass
11g	6Mbps	1	6	2437	-10.78	-1.50	8.00	Pass
11g	6Mbps	1	11	2462	-9.92	-1.50	8.00	Pass
HT20	MCS0	1	1	2412	-11.06	-1.50	8.00	Pass
HT20	MCS0	1	6	2437	-10.16	-1.50	8.00	Pass
HT20	MCS0	1	11	2462	-9.29	-1.50	8.00	Pass

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

Appendix B. AC Conducted Emission Test Results

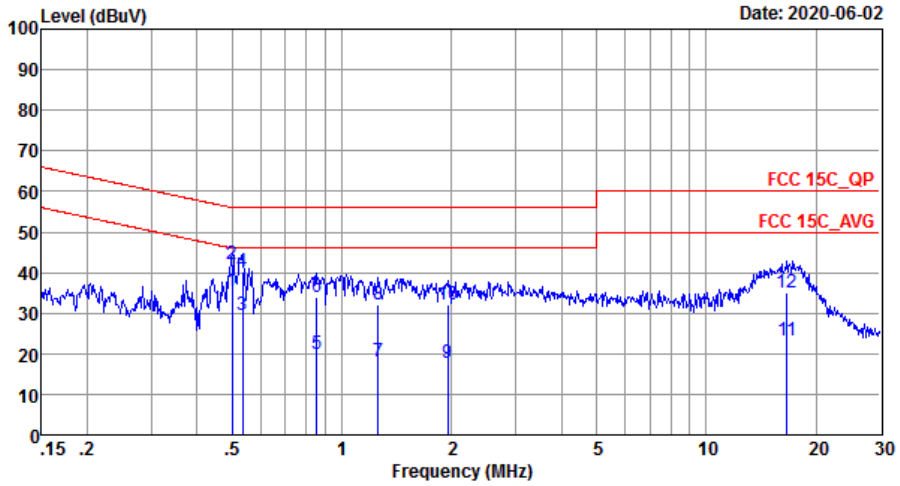
Test Engineer :	Doom Wu	**Temperature :**	22~25℃
		Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line



Site : CO01-SZ
Condition: FCC 15C_QP LISN_20190719_L LINE

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	*	0.50	42.08	-3.92	46.00	32.00	0.02	10.06	Average
2		0.50	50.48	-5.52	56.00	40.40	0.02	10.06	QP
3		0.52	39.58	-6.42	46.00	29.50	0.02	10.06	Average
4		0.52	48.88	-7.12	56.00	38.80	0.02	10.06	QP
5		0.78	28.20	-17.80	46.00	18.11	0.03	10.06	Average
6		0.78	38.60	-17.40	56.00	28.51	0.03	10.06	QP
7		1.03	27.52	-18.48	46.00	17.40	0.07	10.05	Average
8		1.03	39.32	-16.68	56.00	29.20	0.07	10.05	QP
9		2.49	22.21	-23.79	46.00	12.00	0.14	10.07	Average
10		2.49	34.01	-21.99	56.00	23.80	0.14	10.07	QP
11		16.75	27.30	-22.70	50.00	16.20	0.81	10.29	Average
12		16.75	38.70	-21.30	60.00	27.60	0.81	10.29	QP

Test Engineer :	Doom Wu	**Temperature :**	22~25℃
		Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral



Site : CO01-SZ
Condition: FCC 15C_QP LISN_20190719_N NEUTRAL

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	*	0.50	35.28	-10.73	46.01	25.20	0.02	10.06	Average
2		0.50	42.08	-13.93	56.01	32.00	0.02	10.06	QP
3		0.53	29.48	-16.52	46.00	19.40	0.02	10.06	Average
4		0.53	40.28	-15.72	56.00	30.20	0.02	10.06	QP
5		0.85	19.90	-26.10	46.00	9.80	0.04	10.06	Average
6		0.85	33.90	-22.10	56.00	23.80	0.04	10.06	QP
7		1.26	18.20	-27.80	46.00	8.10	0.05	10.05	Average
8		1.26	32.20	-23.80	56.00	22.10	0.05	10.05	QP
9		1.95	17.80	-28.20	46.00	7.70	0.05	10.05	Average
10		1.95	32.20	-23.80	56.00	22.10	0.05	10.05	QP
11		16.66	23.11	-26.89	50.00	12.40	0.42	10.29	Average
12		16.66	35.01	-24.99	60.00	24.30	0.42	10.29	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		2351.58	51.49	-22.51	74	52.45	27.85	4.78	33.59	298	303	P	H
		2390	40.27	-13.73	54	41.21	27.8	4.82	33.56	298	303	A	H
	*	2412	100.86	-	-	101.83	27.77	4.82	33.56	298	303	P	H
	*	2412	99.15	-	-	100.12	27.77	4.82	33.56	298	303	A	H
		2386.55	50.56	-23.44	74	51.52	27.8	4.82	33.58	167	252	P	V
		2390	40.28	-13.72	54	41.22	27.8	4.82	33.56	167	252	A	V
	*	2412	102.55	-	-	103.52	27.77	4.82	33.56	167	252	P	V
	*	2412	100.86	-	-	101.83	27.77	4.82	33.56	167	252	A	V
802.11b CH 06 2437MHz		2330.16	50	-24	74	50.94	27.91	4.75	33.6	100	307	P	H
		2389.94	39.82	-14.18	54	40.76	27.8	4.82	33.56	100	307	A	H
	*	2437	100.47	-	-	101.44	27.71	4.86	33.54	100	307	P	H
	*	2437	98.67	-	-	99.64	27.71	4.86	33.54	100	307	A	H
		2490.69	50.21	-23.79	74	51.19	27.63	4.9	33.51	100	307	P	H
		2486.98	39.77	-14.23	54	40.72	27.66	4.9	33.51	100	307	A	H
		2311.82	50.47	-23.53	74	51.4	27.94	4.75	33.62	192	238	P	V
		2389.8	39.82	-14.18	54	40.76	27.8	4.82	33.56	192	238	A	V
	*	2437	102.78	-	-	103.75	27.71	4.86	33.54	192	238	P	V
	*	2437	101.03	-	-	102	27.71	4.86	33.54	192	238	A	V
		2486.42	50.45	-23.55	74	51.4	27.66	4.9	33.51	192	238	P	V
		2485.72	39.92	-14.08	54	40.87	27.66	4.9	33.51	192	238	A	V

802.11b CH 11 2462MHz	*	2462	101.36	-	-	102.34	27.69	4.86	33.53	286	303	P	H
	*	2462	99.81	-	-	100.79	27.69	4.86	33.53	286	303	A	H
		2486.92	50.12	-23.88	74	51.07	27.66	4.9	33.51	286	303	P	H
		2487.68	40.02	-13.98	54	41	27.63	4.9	33.51	286	303	A	H
	*	2462	102.88	-	-	103.86	27.69	4.86	33.53	126	225	P	V
	*	2462	101.08	-	-	102.06	27.69	4.86	33.53	126	225	A	V
		2487.68	50.18	-23.82	74	51.16	27.63	4.9	33.51	126	225	P	V
		2486.84	40.21	-13.79	54	41.16	27.66	4.9	33.51	126	225	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	49.78	-24.22	74	68.61	31.12	7.53	57.48	145	274	P	H
		4824	51.35	-22.65	74	70.18	31.12	7.53	57.48	228	266	P	V
		4824	47.98	-6.02	54	66.81	31.12	7.53	57.48	228	266	A	V
802.11b CH 06 2437MHz		4874	49.01	-24.99	74	67.78	31.17	7.58	57.52	100	247	P	H
		7311	45.79	-28.21	74	59.62	36.03	9.06	58.92	174	100	P	H
		4874	49.52	-24.48	74	68.29	31.17	7.58	57.52	203	265	P	V
		7311	45.41	-28.59	74	59.24	36.03	9.06	58.92	120	106	P	V
802.11b CH 11 2462MHz		4924	48.89	-25.11	74	67.55	31.22	7.67	57.55	111	210	P	H
		7386	45.77	-28.23	74	59.4	36.29	9.04	58.96	145	274	P	H
		4924	49.36	-24.64	74	68.02	31.22	7.67	57.55	340	268	P	V
		7386	44.95	-29.05	74	58.58	36.29	9.04	58.96	166	210	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		2389.91	49.97	-24.03	74	50.91	27.8	4.82	33.56	263	311	P	H
		2390	40.93	-13.07	54	41.87	27.8	4.82	33.56	263	311	A	H
	*	2412	99.36	-	-	100.33	27.77	4.82	33.56	263	311	P	H
	*	2412	93.27	-	-	94.24	27.77	4.82	33.56	263	311	A	H
		2389.905	52.06	-21.94	74	53	27.8	4.82	33.56	167	266	P	V
		2390	42.63	-11.37	54	43.57	27.8	4.82	33.56	167	266	A	V
	*	2412	103.4	-	-	104.37	27.77	4.82	33.56	167	266	P	V
	*	2412	97.08	-	-	98.05	27.77	4.82	33.56	167	266	A	V
802.11g CH 06 2437MHz		2329.6	50.29	-23.71	74	51.23	27.91	4.75	33.6	254	304	P	H
		2389.94	39.64	-14.36	54	40.58	27.8	4.82	33.56	254	304	A	H
	*	2437	101.02	-	-	101.99	27.71	4.86	33.54	254	304	P	H
	*	2437	94.42	-	-	95.39	27.71	4.86	33.54	254	304	A	H
		2483.9	50.45	-23.55	74	51.4	27.66	4.9	33.51	254	304	P	H
		2486.7	40.34	-13.66	54	41.29	27.66	4.9	33.51	254	304	A	H
		2386.3	50.15	-23.85	74	51.11	27.8	4.82	33.58	166	269	P	V
		2389.66	40.12	-13.88	54	41.08	27.8	4.82	33.58	166	269	A	V
	*	2437	103.46	-	-	104.43	27.71	4.86	33.54	166	269	P	V
	*	2437	96.62	-	-	97.59	27.71	4.86	33.54	166	269	A	V
		2484.25	51.65	-22.35	74	52.6	27.66	4.9	33.51	166	269	P	V
		2486.77	40.99	-13.01	54	41.94	27.66	4.9	33.51	166	269	A	V

802.11g CH 11 2462MHz	*	2462	102.55	-	-	103.53	27.69	4.86	33.53	281	307	P	H
	*	2462	96.4	-	-	97.38	27.69	4.86	33.53	281	307	A	H
		2483.52	60.3	-13.7	74	61.25	27.66	4.9	33.51	281	307	P	H
		2483.52	45.1	-8.9	54	46.05	27.66	4.9	33.51	281	307	A	H
	*	2462	104.36	-	-	105.34	27.69	4.86	33.53	184	256	P	V
	*	2462	97.87	-	-	98.85	27.69	4.86	33.53	184	256	A	V
		2484.12	62.1	-11.9	74	63.05	27.66	4.9	33.51	184	256	P	V
		2483.52	46.67	-7.33	54	47.62	27.66	4.9	33.51	184	256	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	40.45	-33.55	74	59.28	31.12	7.53	57.48	145	274	P	H
		4824	41.48	-32.52	74	60.31	31.12	7.53	57.48	191	220	P	V
802.11g CH 06 2437MHz		4874	38.78	-35.22	74	57.55	31.17	7.58	57.52	112	229	P	H
		7311	45.74	-28.26	74	59.57	36.03	9.06	58.92	174	100	P	H
		4874	39.35	-34.65	74	58.12	31.17	7.58	57.52	156	360	P	V
		7311	45.12	-28.88	74	58.95	36.03	9.06	58.92	120	106	P	V
802.11g CH 11 2462MHz		4924	40.72	-33.28	74	59.38	31.22	7.67	57.55	133	180	P	H
		7386	45.85	-28.15	74	59.48	36.29	9.04	58.96	145	274	P	H
		4924	40.1	-33.9	74	58.76	31.22	7.67	57.55	156	360	P	V
		7386	45.07	-28.93	74	58.7	36.29	9.04	58.96	166	210	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		2389.69	56.92	-17.08	74	57.88	27.8	4.82	33.58	261	301	P	H
		2390	42.88	-11.12	54	43.82	27.8	4.82	33.56	261	301	A	H
	*	2412	102.41	-	-	103.38	27.77	4.82	33.56	261	301	P	H
	*	2412	95.07	-	-	96.04	27.77	4.82	33.56	261	301	A	H
		2389.59	56.3	-17.7	74	57.26	27.8	4.82	33.58	167	264	P	V
		2390	44.43	-9.57	54	45.37	27.8	4.82	33.56	167	264	A	V
	*	2412	103.43	-	-	104.4	27.77	4.82	33.56	167	264	P	V
	*	2412	96.99	-	-	97.96	27.77	4.82	33.56	167	264	A	V
802.11n HT20 CH 06 2437MHz		2319.1	51.05	-22.95	74	51.99	27.91	4.75	33.6	227	307	P	H
		2389.94	39.98	-14.02	54	40.92	27.8	4.82	33.56	227	307	A	H
	*	2437	102.58	-	-	103.55	27.71	4.86	33.54	227	307	P	H
	*	2437	95.87	-	-	96.84	27.71	4.86	33.54	227	307	A	H
		2486.56	51.9	-22.1	74	52.85	27.66	4.9	33.51	227	307	P	H
		2485.79	40.61	-13.39	54	41.56	27.66	4.9	33.51	227	307	A	H
		2388.12	50.42	-23.58	74	51.38	27.8	4.82	33.58	164	262	P	V
		2389.94	40.58	-13.42	54	41.52	27.8	4.82	33.56	164	262	A	V
	*	2437	105.22	-	-	106.19	27.71	4.86	33.54	164	262	P	V
	*	2437	98.2	-	-	99.17	27.71	4.86	33.54	164	262	A	V
		2486.63	52.56	-21.44	74	53.51	27.66	4.9	33.51	164	262	P	V
		2486.42	41.81	-12.19	54	42.76	27.66	4.9	33.51	164	262	A	V

802.11n HT20 CH 11 2462MHz	*	2462	101.86	-	-	102.84	27.69	4.86	33.53	253	306	P	H
	*	2462	95.67	-	-	96.65	27.69	4.86	33.53	253	306	A	H
		2484.04	64.18	-9.82	74	65.13	27.66	4.9	33.51	253	306	P	H
		2483.52	45.27	-8.73	54	46.22	27.66	4.9	33.51	253	306	A	H
	*	2462	103.14	-	-	104.12	27.69	4.86	33.53	150	290	P	V
	*	2462	96.26	-	-	97.24	27.69	4.86	33.53	150	290	A	V
		2483.88	59.4	-14.6	74	60.35	27.66	4.9	33.51	150	290	P	V
		2483.56	44.86	-9.14	54	45.81	27.66	4.9	33.51	150	290	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	39.82	-34.18	74	58.65	31.12	7.53	57.48	145	274	P	H
		4824	40.95	-33.05	74	59.78	31.12	7.53	57.48	191	220	P	V
802.11n HT20 CH 06 2437MHz		4874	39.5	-34.5	74	58.27	31.17	7.58	57.52	112	229	P	H
		7311	44.83	-29.17	74	58.66	36.03	9.06	58.92	174	100	P	H
		4874	38.93	-35.07	74	57.7	31.17	7.58	57.52	156	360	P	V
		7311	45.5	-28.5	74	59.33	36.03	9.06	58.92	120	106	P	V
802.11n HT20 CH 11 2462MHz		4924	39.83	-34.17	74	58.49	31.22	7.67	57.55	133	180	P	H
		7386	44.79	-29.21	74	58.42	36.29	9.04	58.96	145	274	P	H
		4924	41.48	-32.52	74	60.14	31.22	7.67	57.55	156	360	P	V
		7386	44.8	-29.2	74	58.43	36.29	9.04	58.96	166	210	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 802.11b (LF)

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)
2.4GHz 802.11b LF		30	25.2	-14.8	40	32.38	24.7	0.52	32.4	100	18	P	H
		105.66	27.16	-16.34	43.5	40.97	17.41	0.98	32.2	-	-	P	H
		278.32	22.74	-23.26	46	34.03	18.85	1.6	31.74	-	-	P	H
		393.75	24.61	-21.39	46	32.61	21.55	1.9	31.45	-	-	P	H
		652.74	27.58	-18.42	46	31.01	24.9	2.47	30.8	-	-	P	H
		969.93	29.19	-24.81	54	30.31	27.2	3	31.32	-	-	P	H
		30	36.84	-3.16	40	44.02	24.7	0.52	32.4	120	55	QP	V
		55.22	36.59	-3.41	40	54.88	13.4	0.71	32.4	-	-	P	V
		104.69	31.48	-12.02	43.5	45.34	17.36	0.98	32.2	-	-	P	V
		153.19	20.9	-22.6	43.5	35.37	16.53	1.19	32.19	-	-	P	V
		769.14	27.82	-18.18	46	30.51	25.83	2.66	31.18	-	-	P	V
		892.33	28.98	-17.02	46	31.1	26.48	2.88	31.48	-	-	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	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)

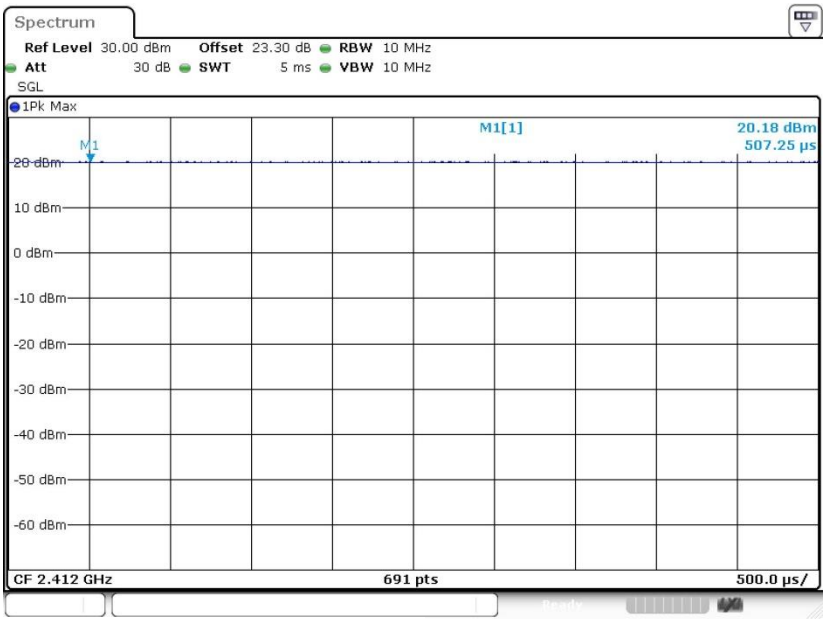
= -10.46(dB)

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

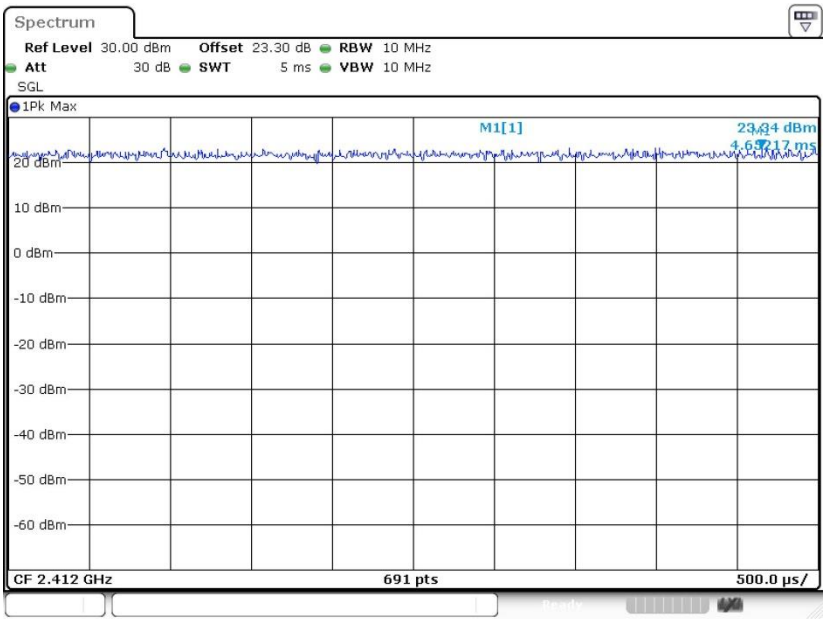
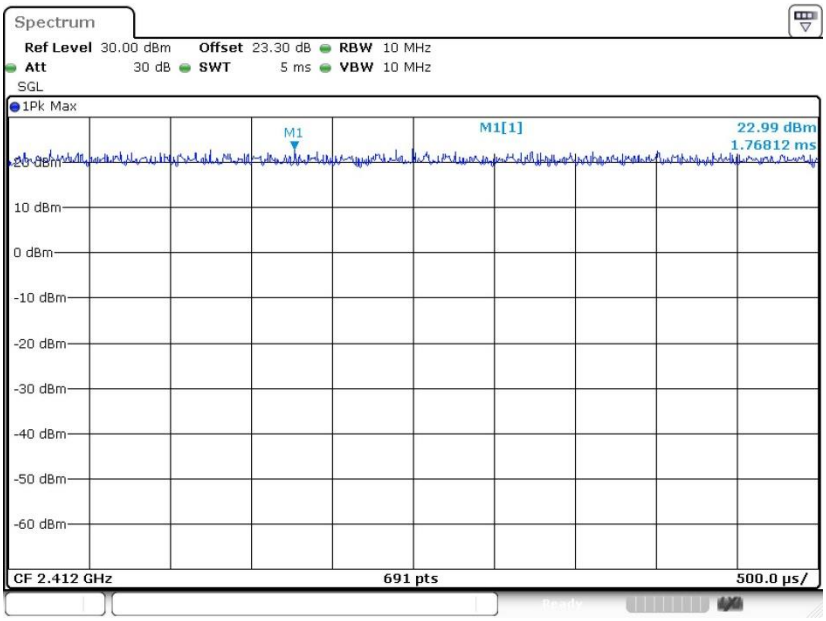
Appendix D. Duty Cycle Plots

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

802.11b



802.11g



802.11n HT20