



# FCC RF Test Report

**APPLICANT** : ASUSTeK COMPUTER INC.  
**EQUIPMENT** : ASUS Phone(Mobile Phone)  
**BRAND NAME** : ASUS  
**MODEL NAME** : ASUS\_X00RD  
**FCC ID** : MSQX00RD  
**STANDARD** : FCC Part 15 Subpart C §15.247  
**CLASSIFICATION** : (DTS) Digital Transmission System

The product was received on Feb. 13, 2018 and testing was completed on May 17, 2018. We, Sporton International (Kunshan) 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 (Kunshan) Inc., the test report shall not be reproduced except in full.



Approved by: James Huang / Manager

**Sporton International (Kunshan) Inc.**  
No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335  
China



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### SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.1	-	99% Bandwidth	-	Pass	-
3.2	15.247(b)	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	-
3.4	15.247(d)	Conducted Band Edges	$\leq 20\text{dBc}$	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 7.58 dB at 2389.520 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 7.19 dB at 0.173 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-



# 1 General Description

## 1.1 Applicant

ASUSTeK COMPUTER INC.  
4F, No. 150, LI-TE RD., PEITOU, TAIPEI, TAIWAN

## 1.2 Manufacturer

ASUSTeK COMPUTER INC.  
4F, No. 150, LI-TE RD., PEITOU, TAIPEI, TAIWAN

## 1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	ASUS Phone(Mobile Phone)
Brand Name	ASUS
Model Name	ASUS_X00RD
FCC ID	MSQX00RD
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/LTE/ WLAN 2.4GHz 802.11b/g/n HT20/HT40 Bluetooth v3.0 + EDR/ Bluetooth v 4.0 LE/
IMEI Code	Conducted: 356291090051405/356291090051413 Conduction: 356291090051561/356291090051579 Radiation: 356291090051405/356291090051413
HW Version	W19MA1C1-2
SW Version	WW_Phone-15.00.1804.8-20180410
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	
<b>Tx/Rx Channel Frequency Range</b>	2412 MHz ~ 2462 MHz
<b>Maximum (Peak) Output Power to antenna</b>	802.11b : 19.18 dBm (0.0828 W) 802.11g : 22.59 dBm (0.1816 W) 802.11n HT20 : 21.26 dBm (0.1337 W) 802.11n HT40 : 21.53 dBm (0.1422 W)
<b>99% Occupied Bandwidth</b>	802.11b : 12.39MHz 802.11g : 19.08MHz 802.11n HT20 : 19.43MHz 802.11n HT40 : 37.26MHz
<b>Antenna Type / Gain</b>	PIFA Antenna with gain 1.80 dBi
<b>Type of Modulation</b>	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 (Kunshan) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0) and the FCC designation No. is CN5013.

<b>Test Site</b>	Sporton International (Kunshan) Inc.		
<b>Test Site Location</b>	No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China TEL : +86-512-57900158 FAX : +86-512-57900958		
<b>Test Site No.</b>	<b>Sporton Site No.</b>		<b>FCC Test Firm Registration No.</b>
	TH01-KS	CO01-KS	630927

Sporton International (Shenzhen) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600156-0) and the FCC designation No. is CN5019.

<b>Test Site</b>	Sporton International (Shenzhen) Inc.		
<b>Test Site Location</b>	No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse, Nanshan District Shenzhen City Guangdong Province 518055 China TEL: +86-755-3320-2398		
<b>Test Site No.</b>	<b>Sporton Site No.</b>		<b>FCC Test Firm Registration No.</b>
	03CH03-SZ		577730

**Note:** The test site complies with ANSI C63.4 2014 requirement.

### 1.7 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04
- 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

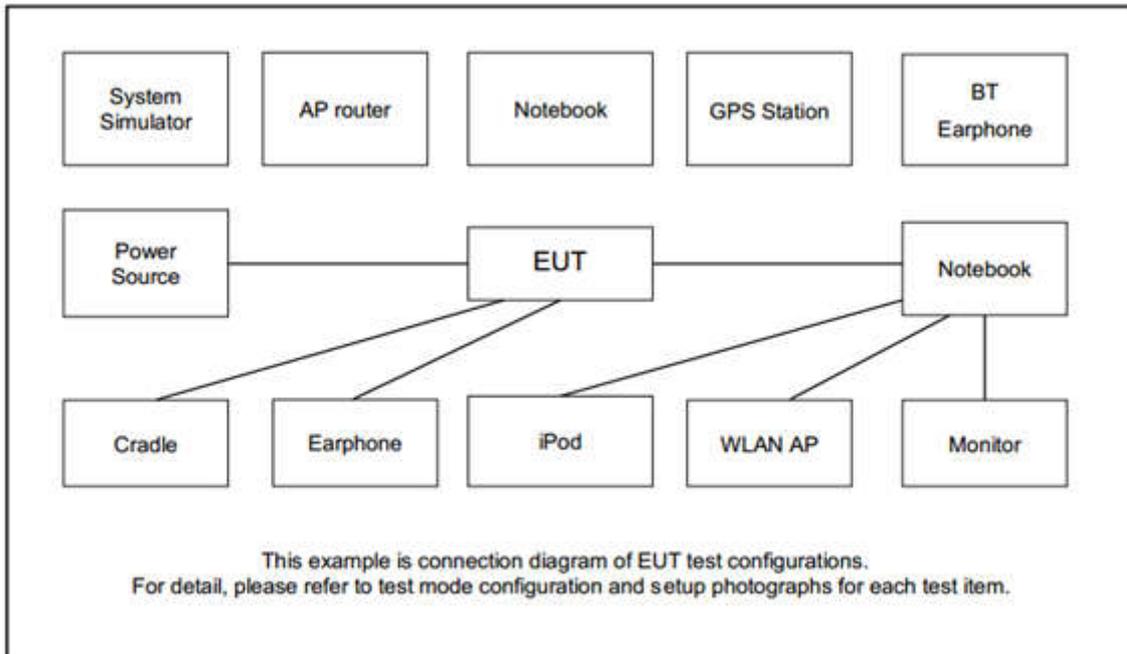
Final test modes are considering the modulation and worse data rates as below table.

### Single Antenna

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

Test Cases	
<b>AC Conducted Emission</b>	Mode 1 :GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable 2 (Charging from Adapter 2) + Earphone
<b>Remark:</b> For Radiated Test Cases, The tests were performed with Adapter 1, Battery, Earphone, USB Cable 1.	

## 2.3 Connection Diagram of Test System



## 2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	D-Link	DIR-855	KA2DIR855A2	N/A	Unshielded, 1.8 m
3.	Notebook	Lenovo	G480	N/A	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Earphone	Lenovo	LBH308	N/A	N/A	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/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.

*Offset = RF cable loss.*

Following shows an offset computation example with cable loss 5.2 dB.

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

= 5.2 (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.

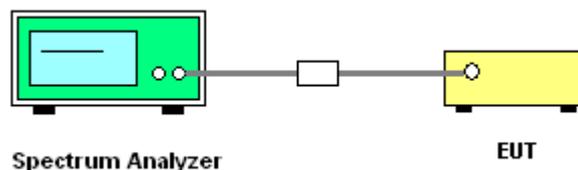
##### 3.1.2 Measuring Instruments

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

##### 3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v04.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 1MHz and set the Video bandwidth (VBW) = 3MHz.
6. Measure and record the results in the test report.

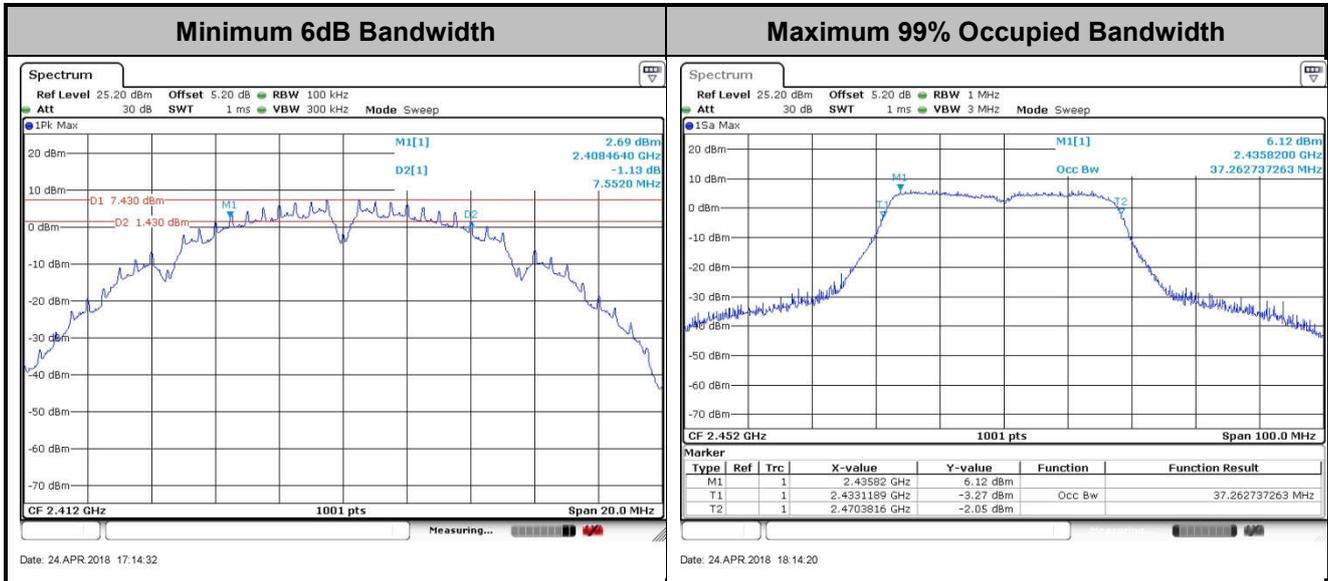
##### 3.1.4 Test Setup





### 3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Please refer to Appendix A.



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

## 3.2 Output Power Measurement

### 3.2.1 Limit of Output Power

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

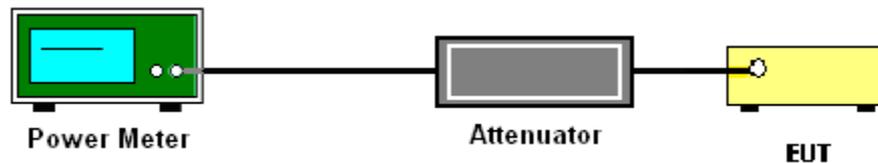
### 3.2.2 Measuring Instruments

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

### 3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v04 section 9.1.3 PKPM1 Peak power meter 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.

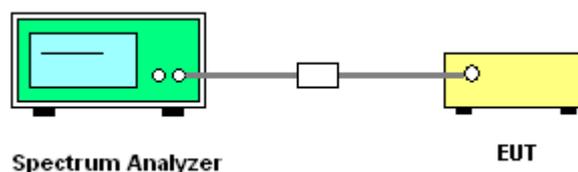
#### 3.3.2 Measuring Instruments

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

#### 3.3.3 Test Procedures

1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04
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.

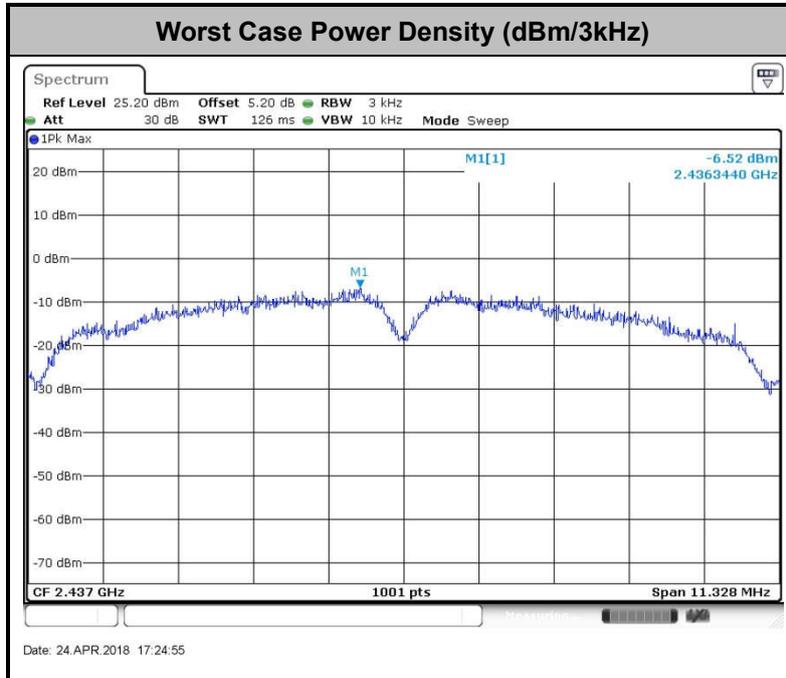
#### 3.3.4 Test Setup





### 3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.



## 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.

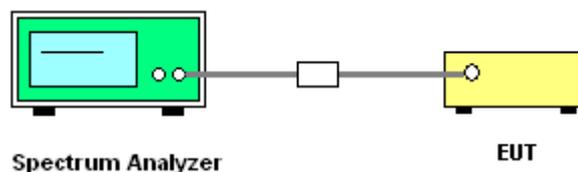
### 3.4.2 Measuring Instruments

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

### 3.4.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
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

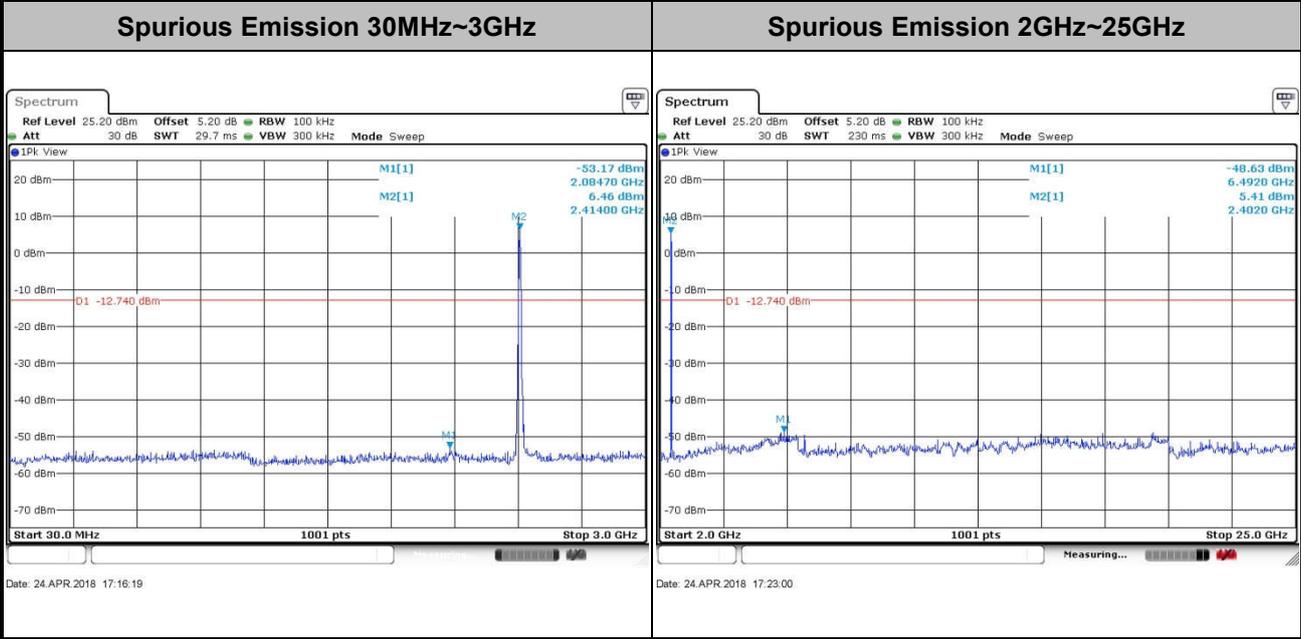
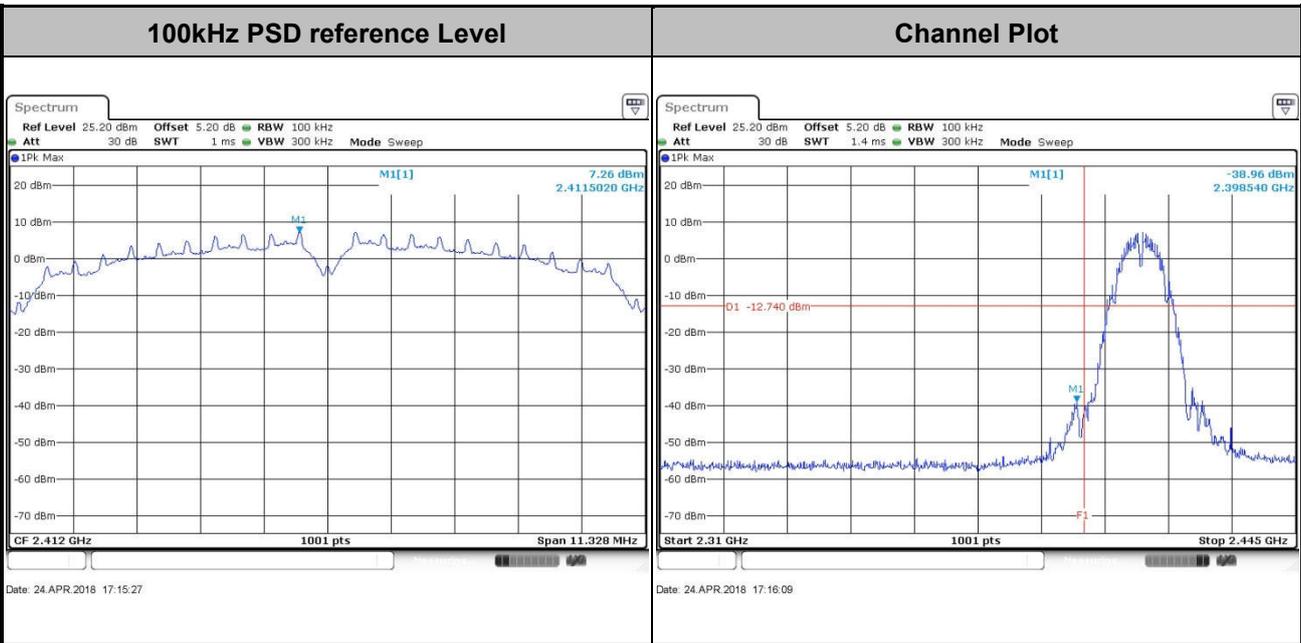




### 3.4.5 Test Result of Conducted Band Edges and Spurious Emission

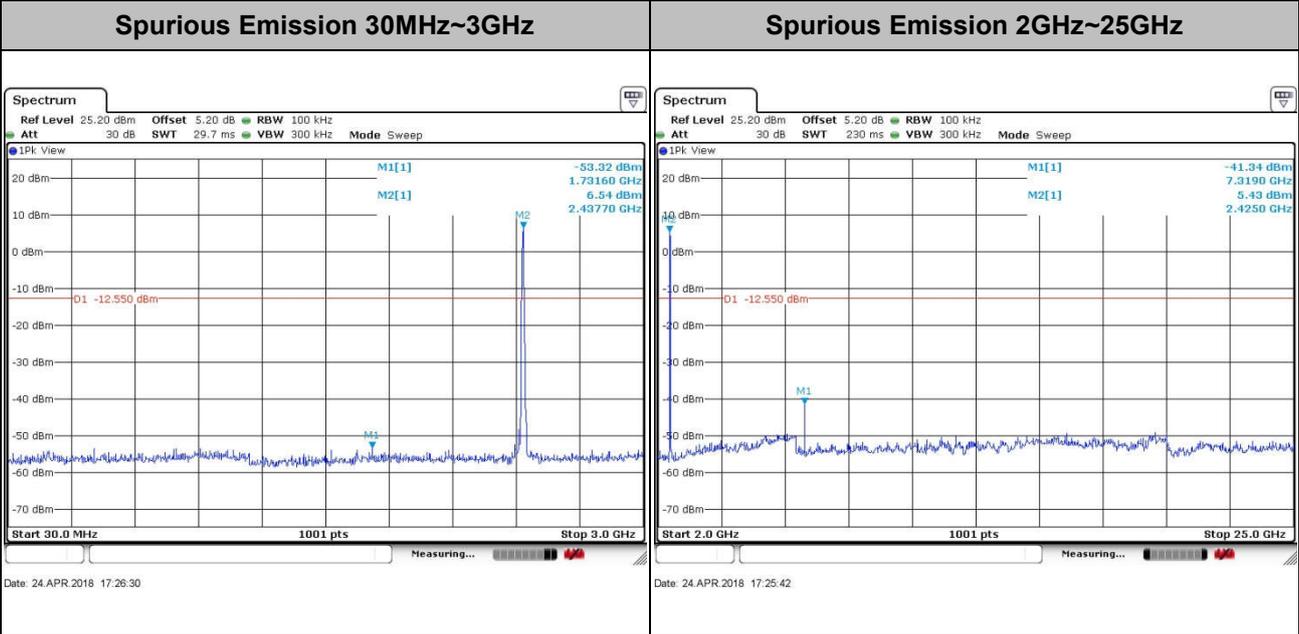
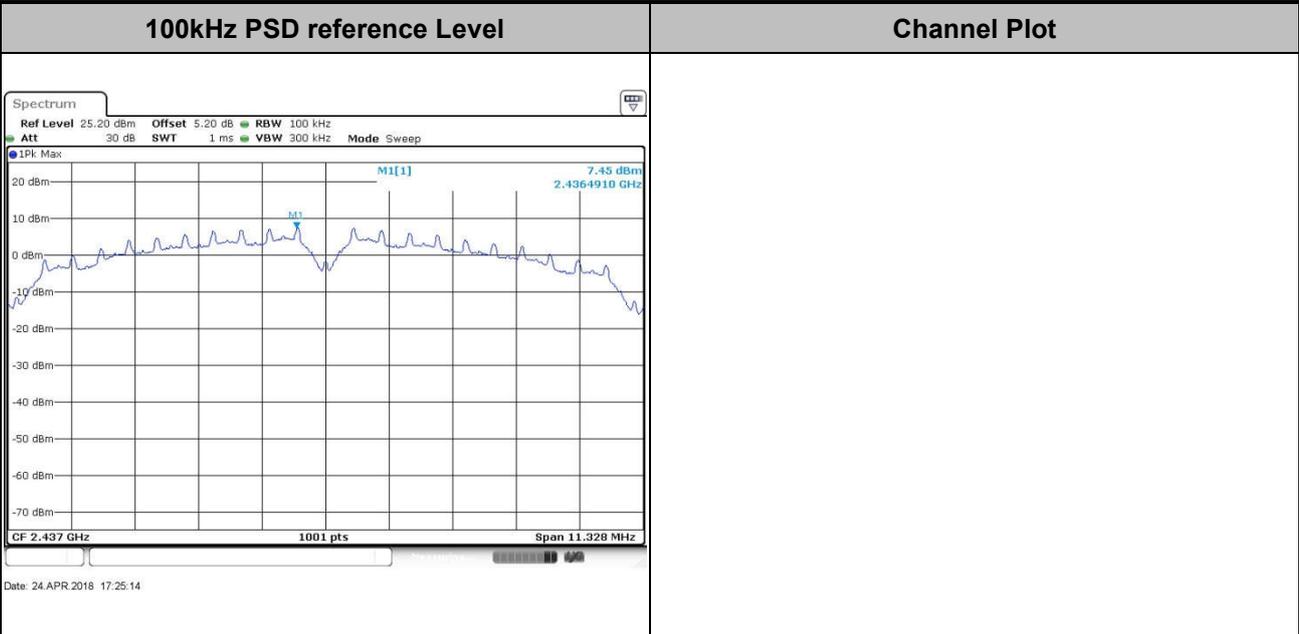
Test Engineer : Silent Hai	Temperature :	21~25°C
	Relative Humidity :	51~55%

Test Mode :	802.11b	Test Channel :	01
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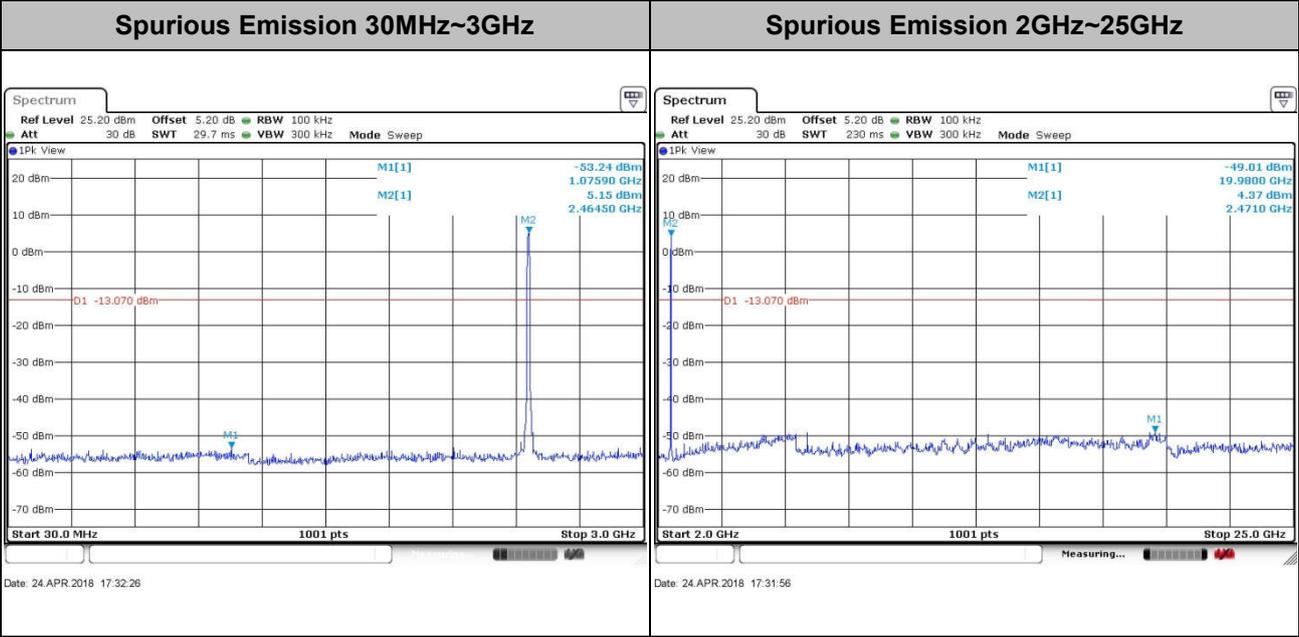
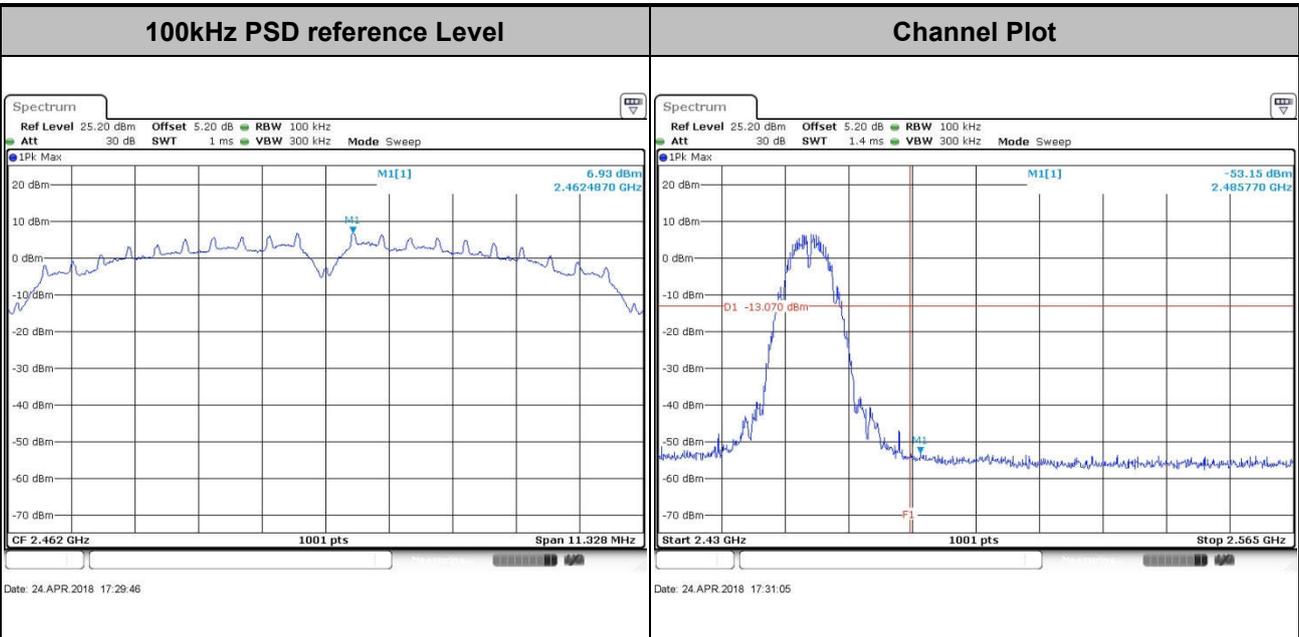


Test Mode :	802.11b	Test Channel :	06
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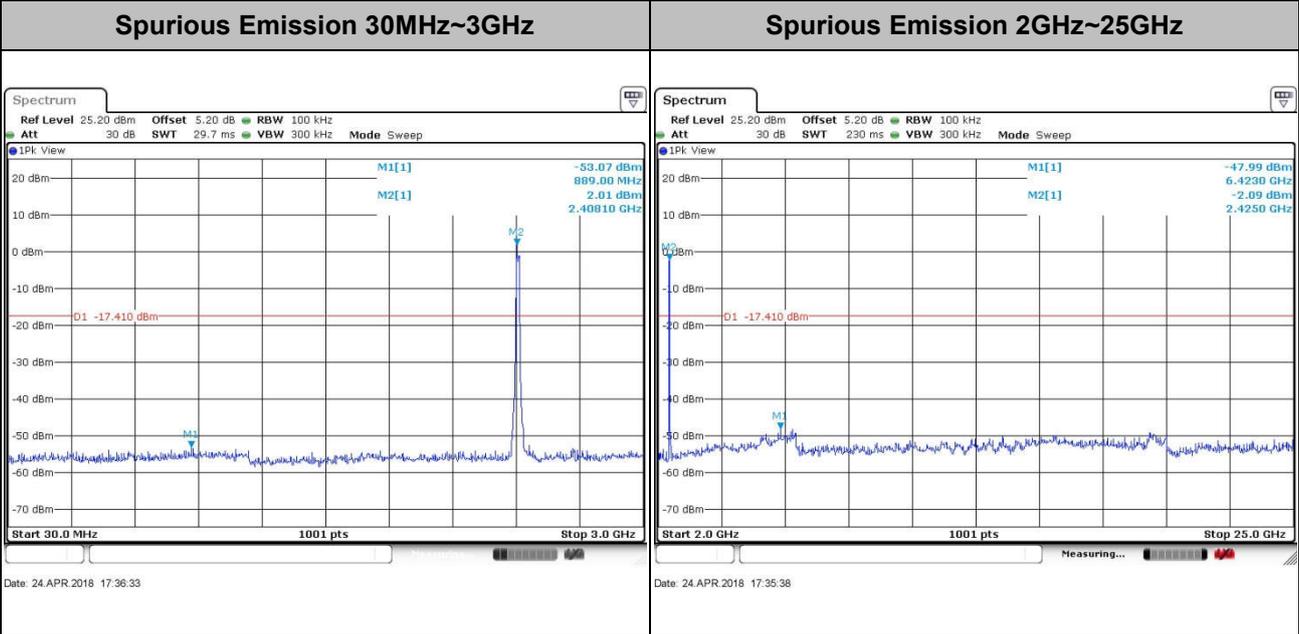
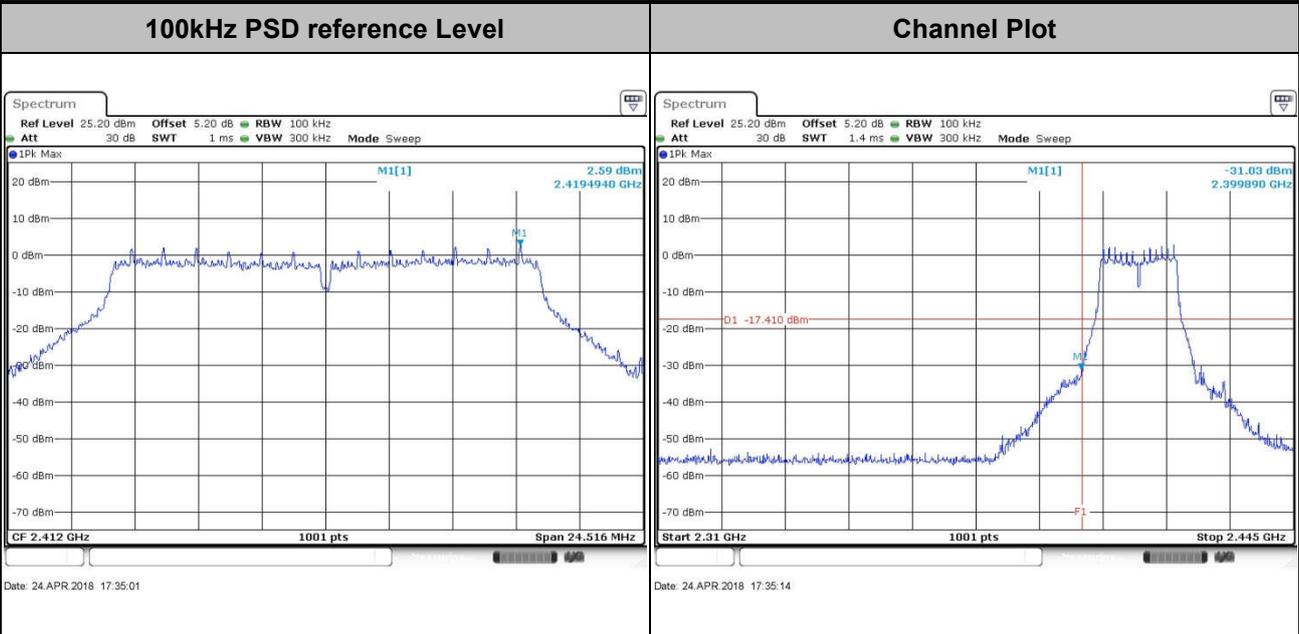


Test Mode :	802.11b	Test Channel :	11
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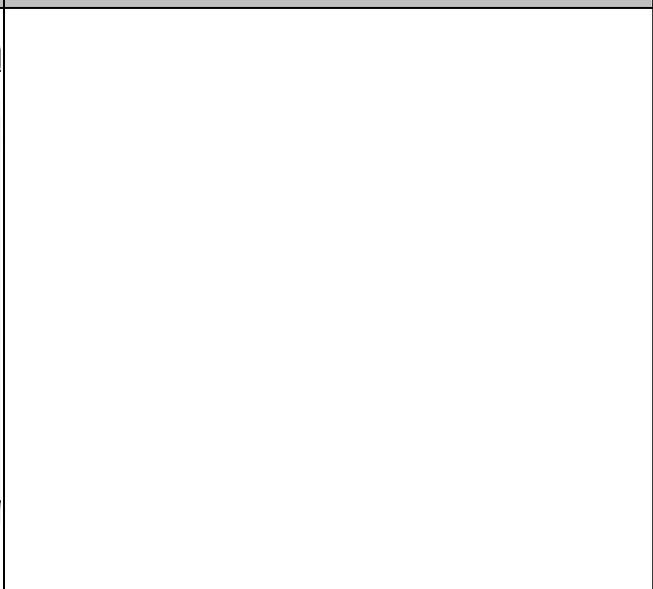
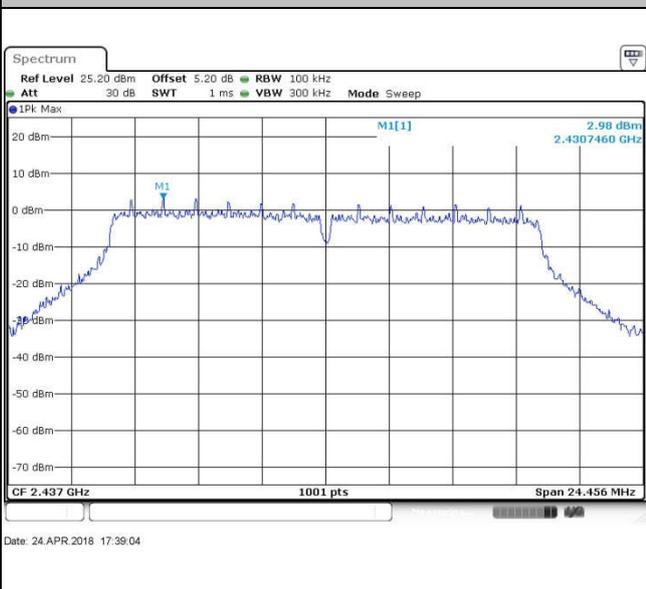
Test Mode : 802.11g Test Channel : 01



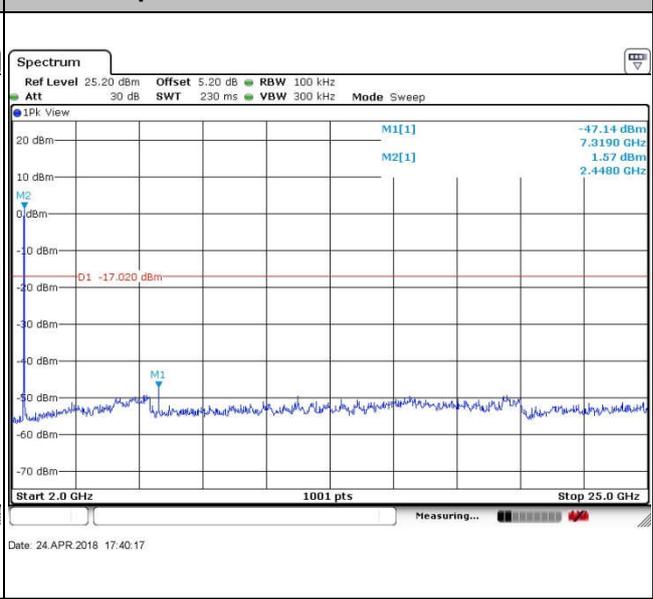
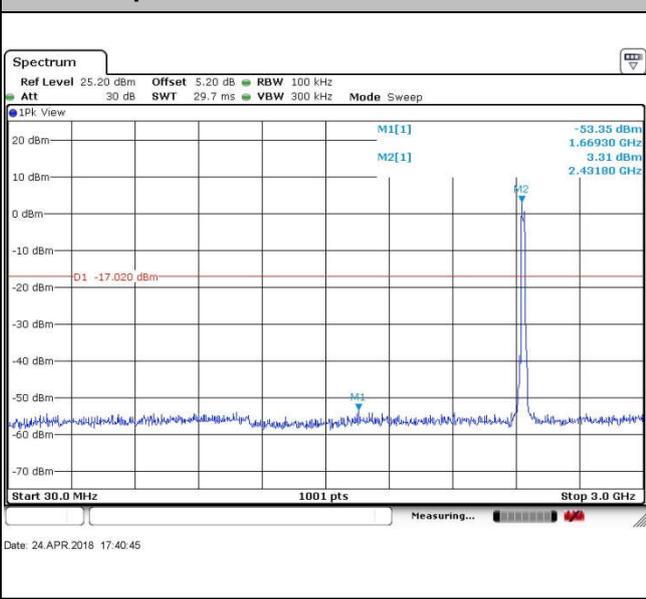


Test Mode :	802.11g	Test Channel :	06
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<b>100kHz PSD reference Level</b>	<b>Channel Plot</b>
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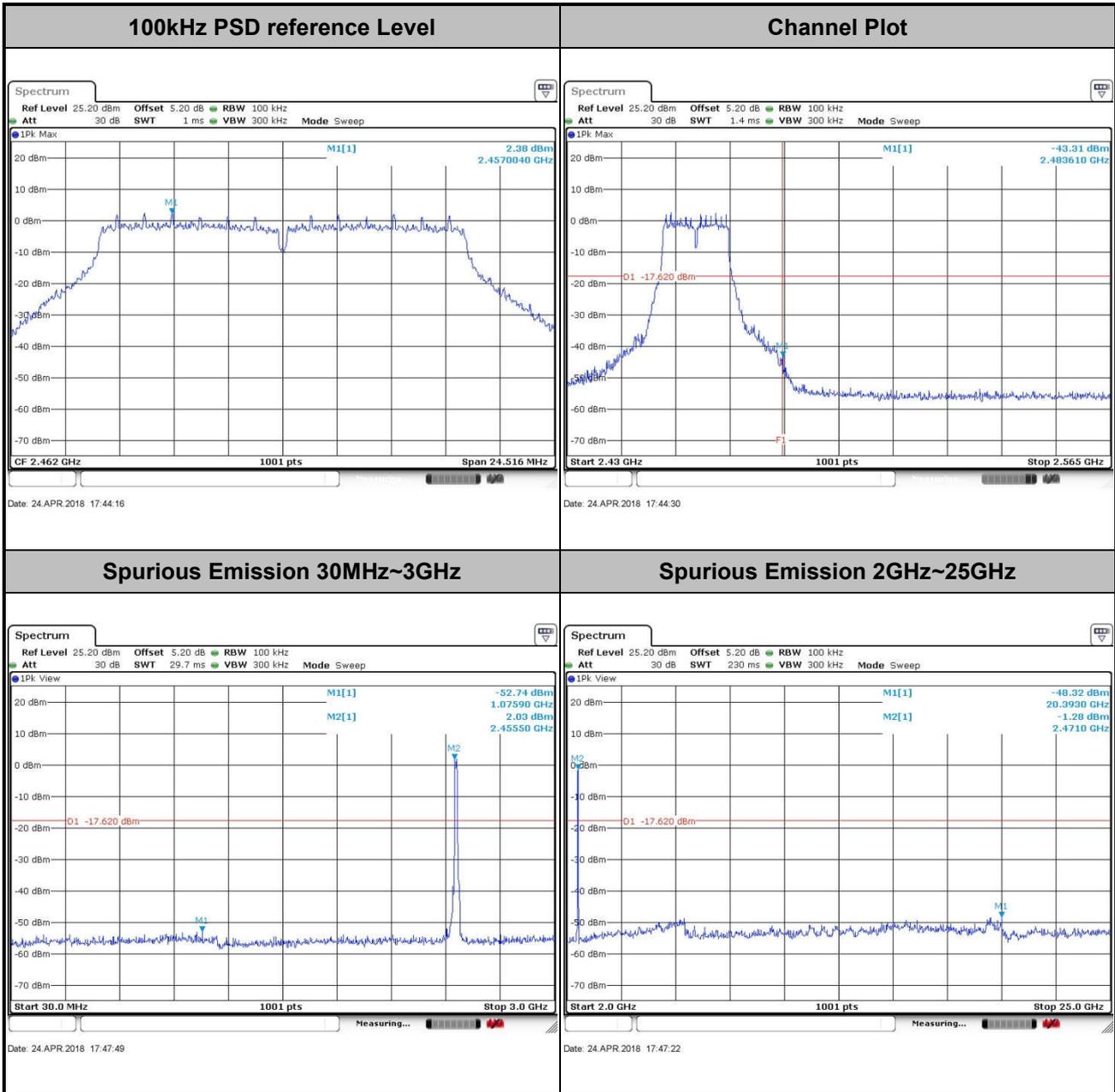


<b>Spurious Emission 30MHz~3GHz</b>	<b>Spurious Emission 2GHz~25GHz</b>
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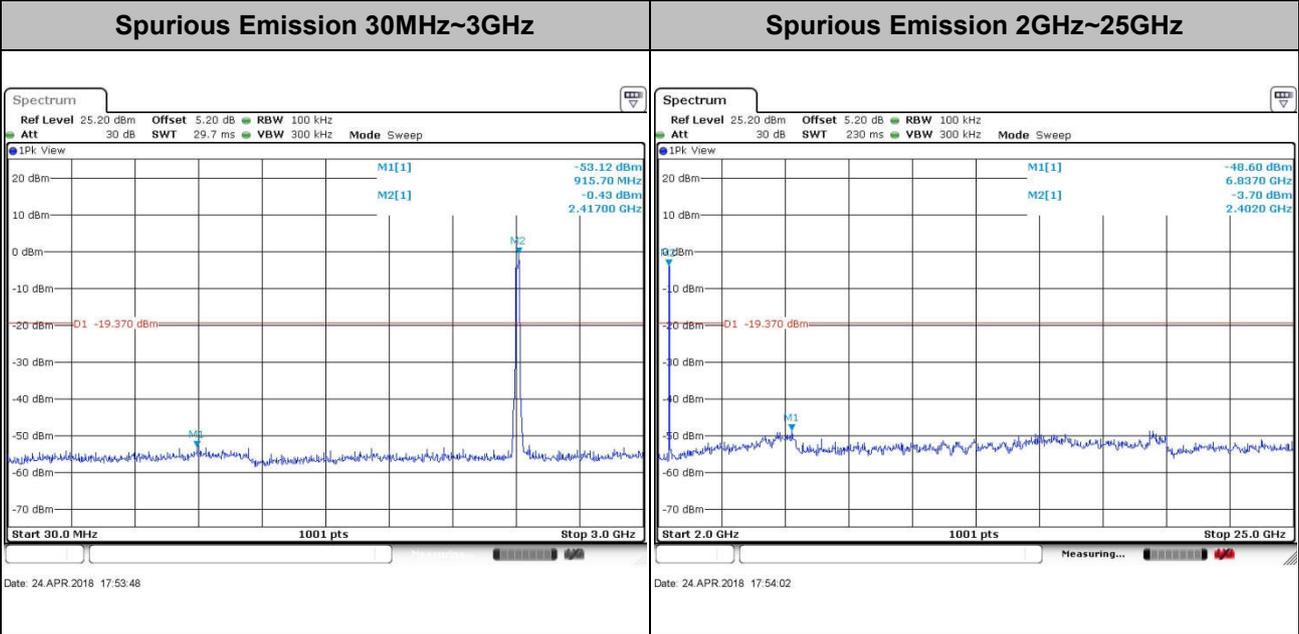
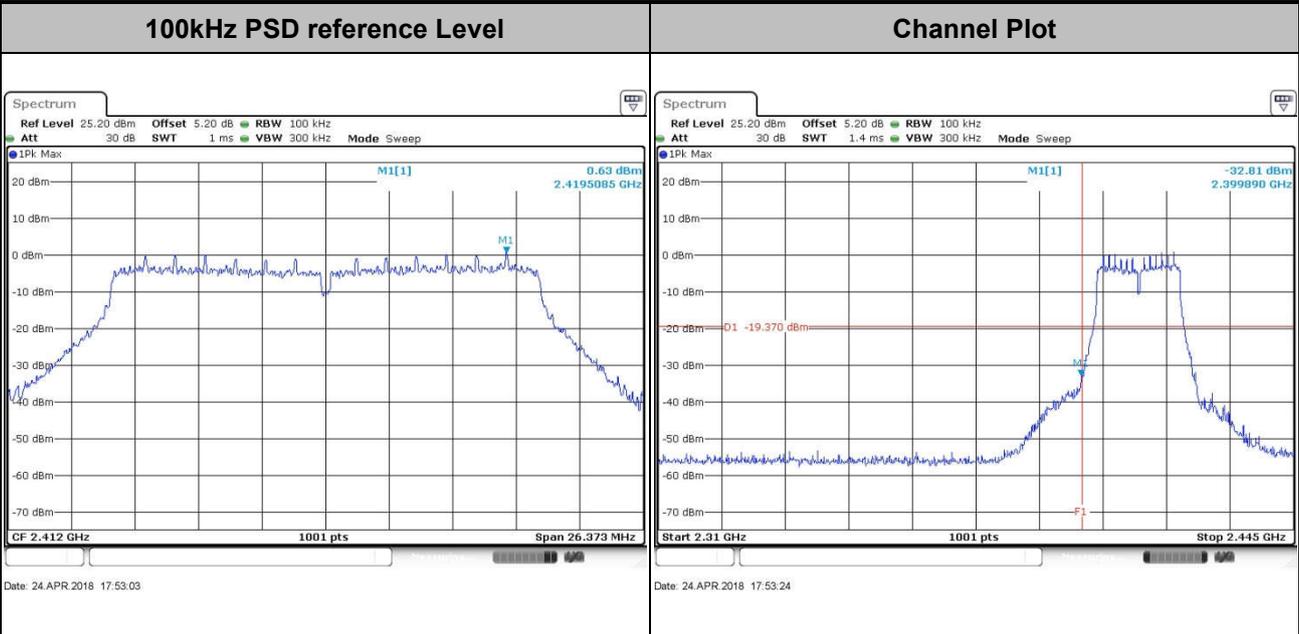


Test Mode :	802.11g	Test Channel :	11
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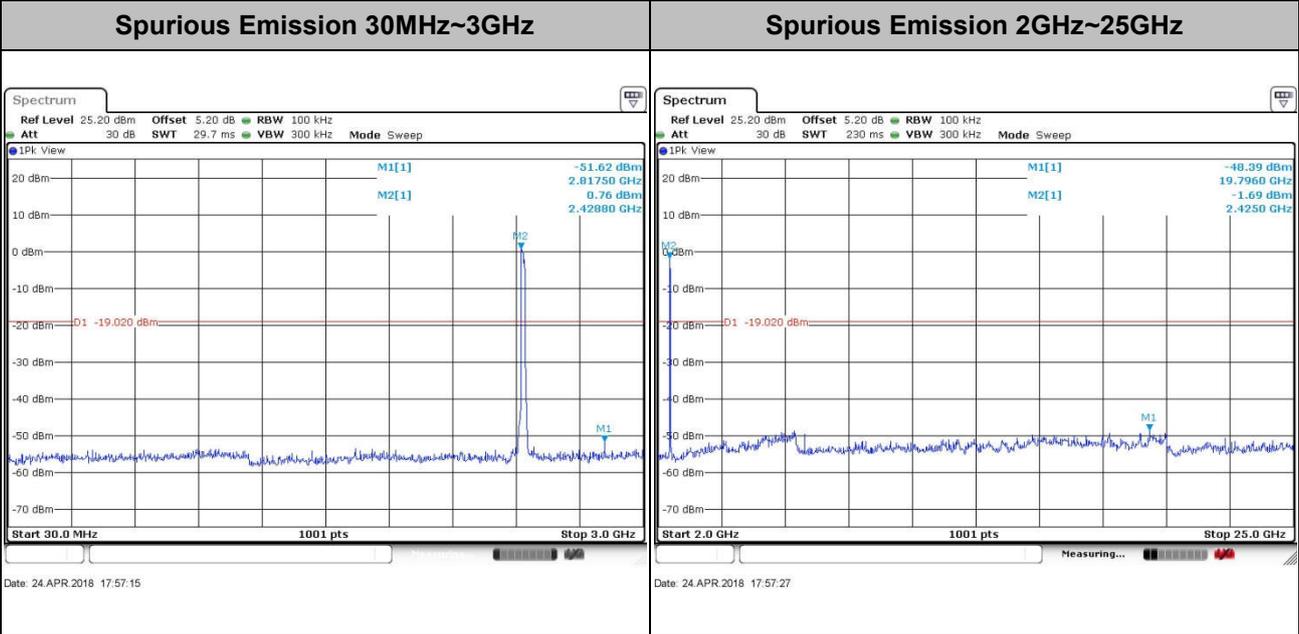
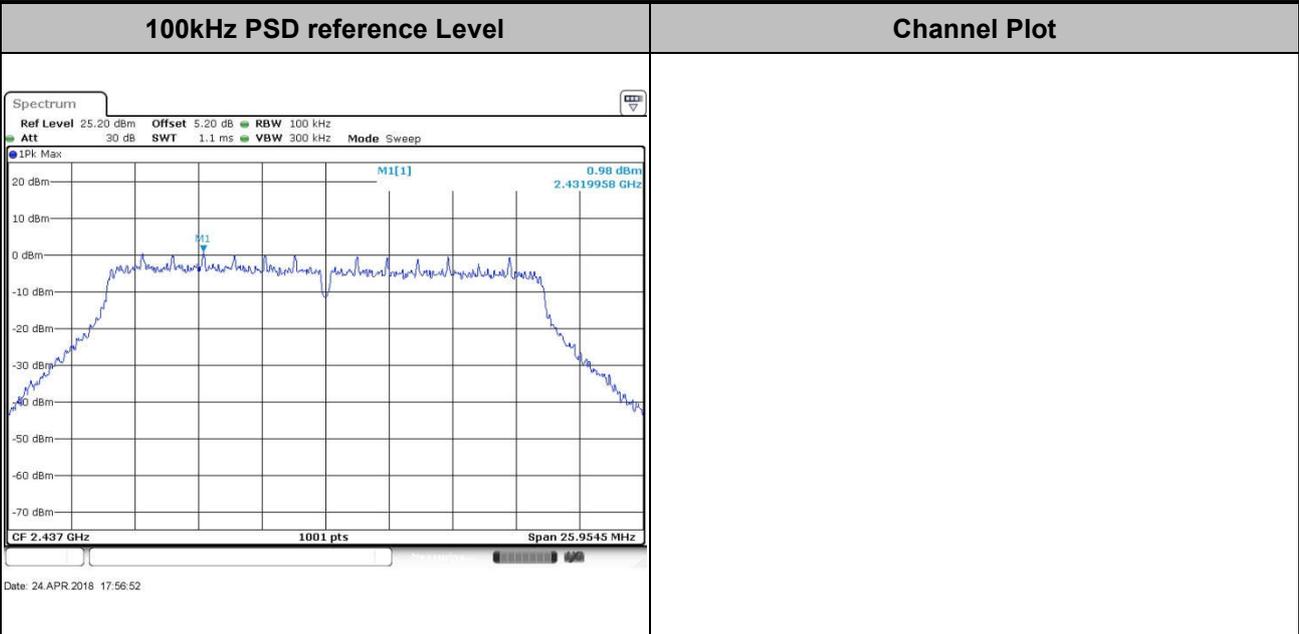


Test Mode : 802.11n HT20 Test Channel : 01



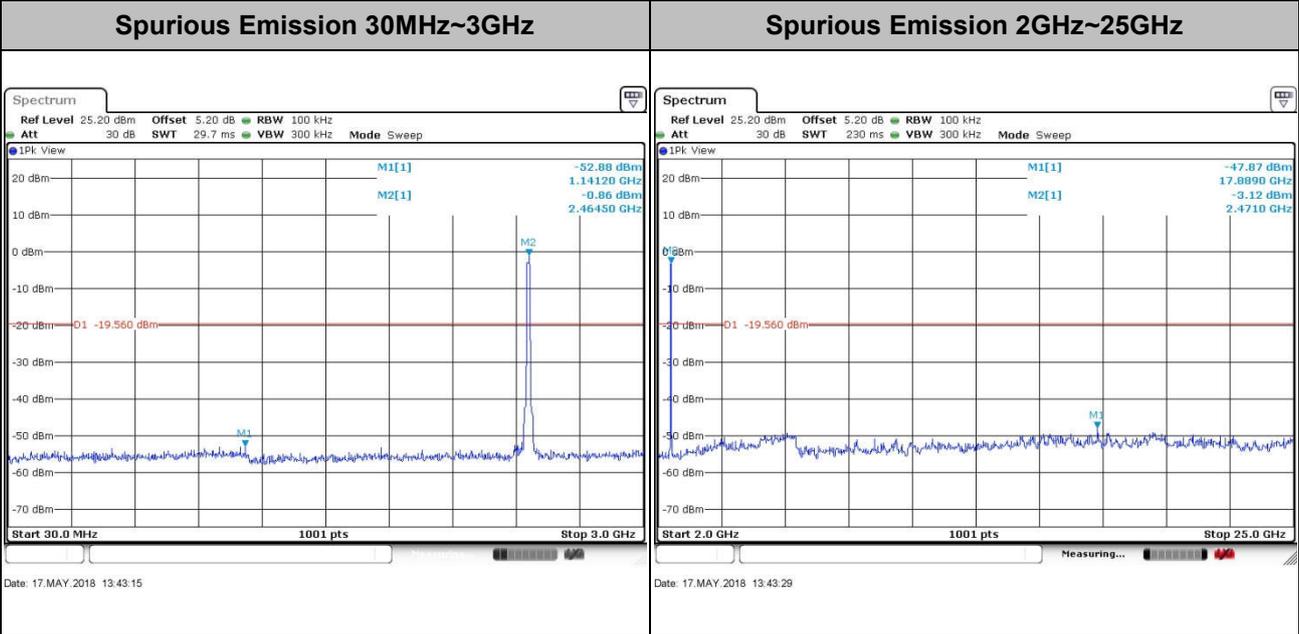
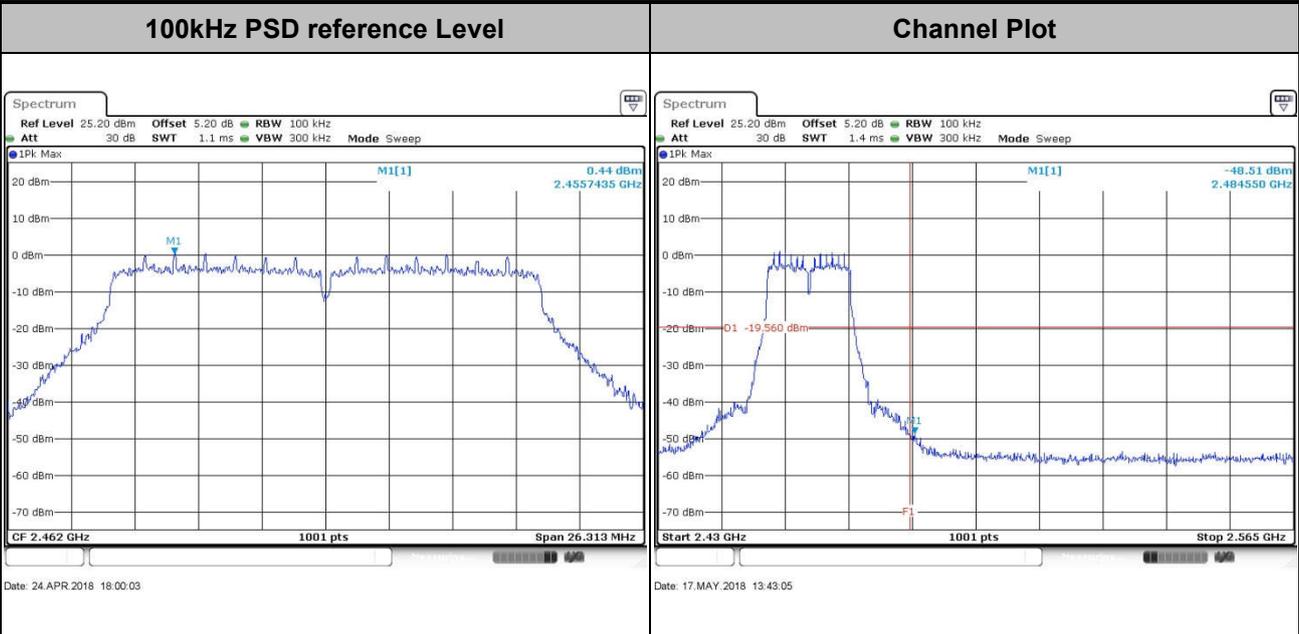


Test Mode :	802.11n HT20	Test Channel :	06
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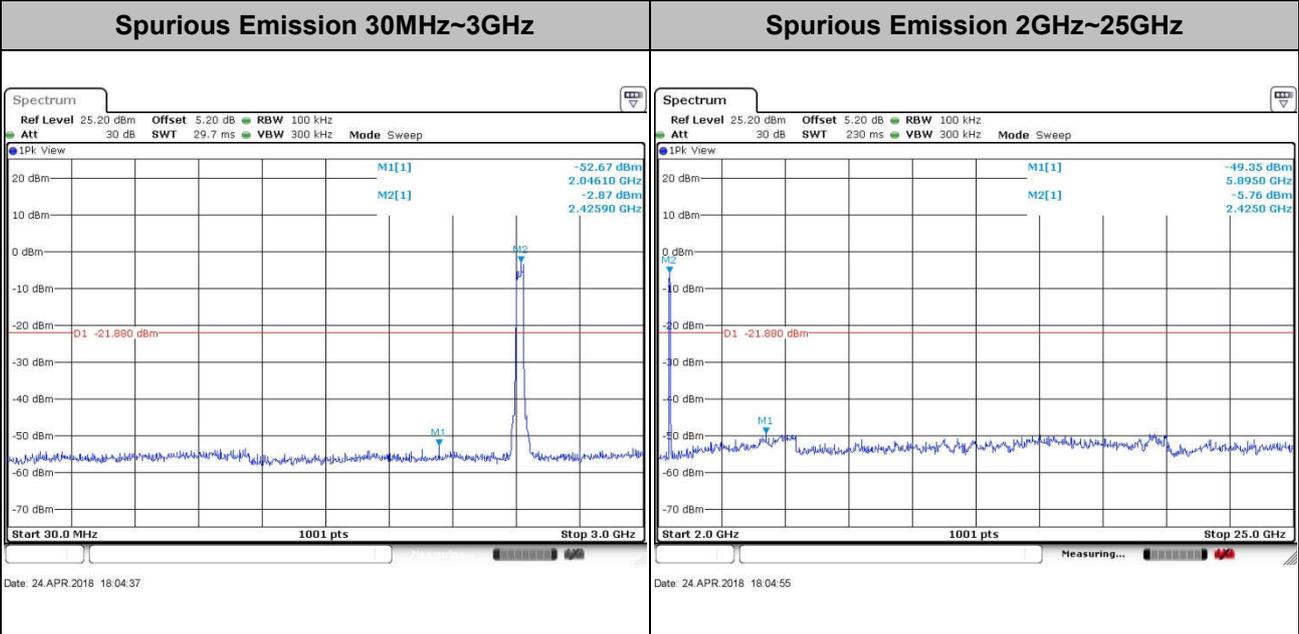
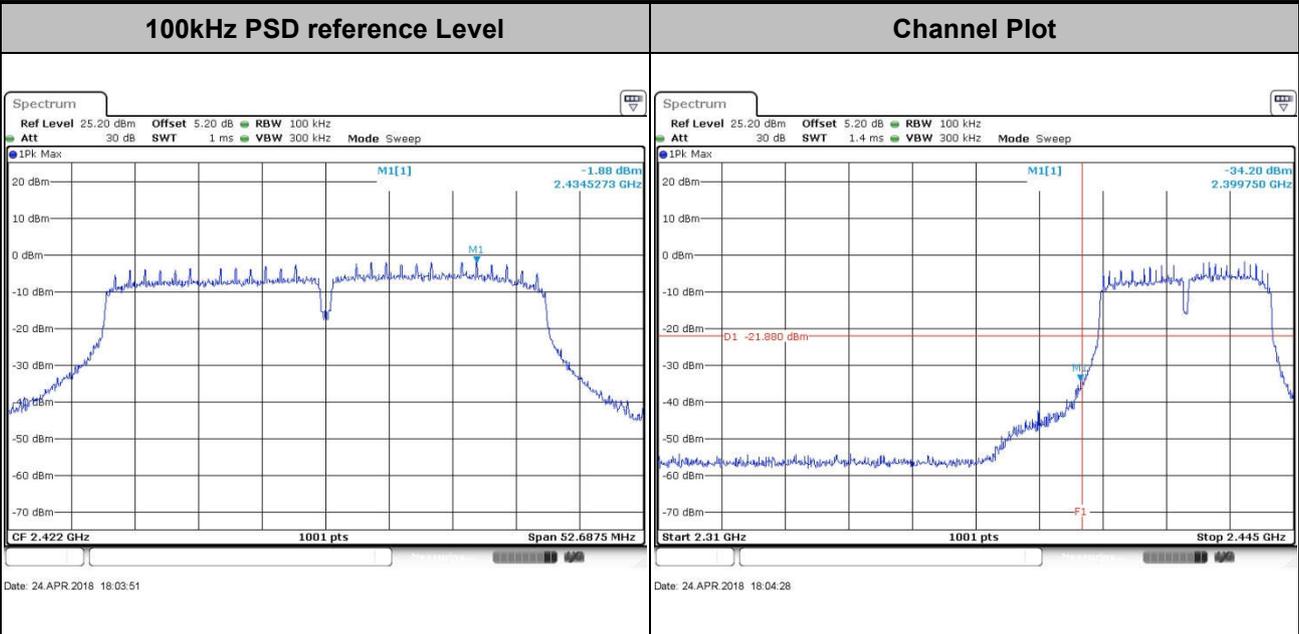


Test Mode : 802.11n HT20 Test Channel : 11



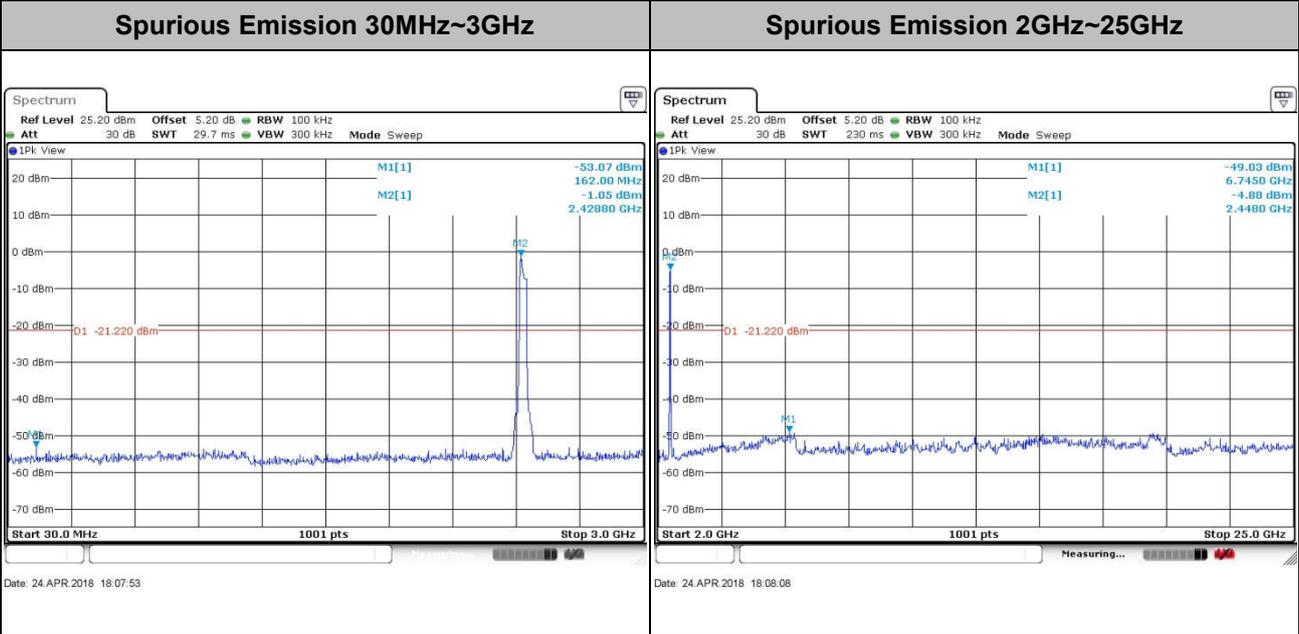
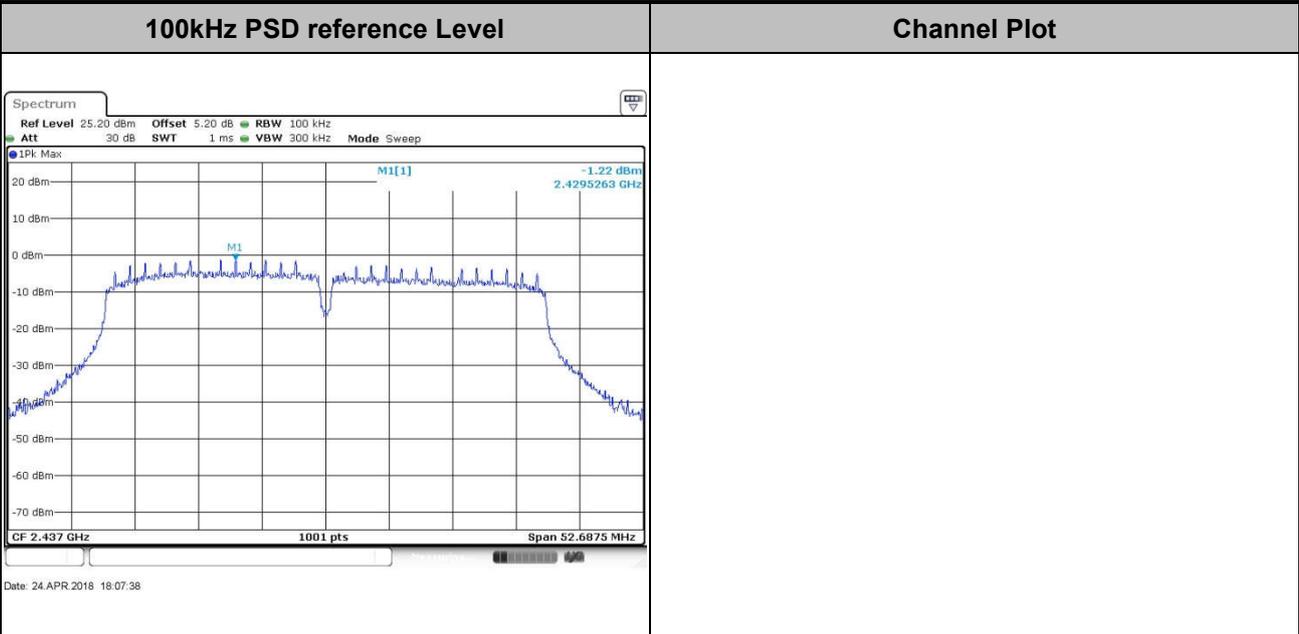


Test Mode : 802.11n HT40      Test Channel : 03



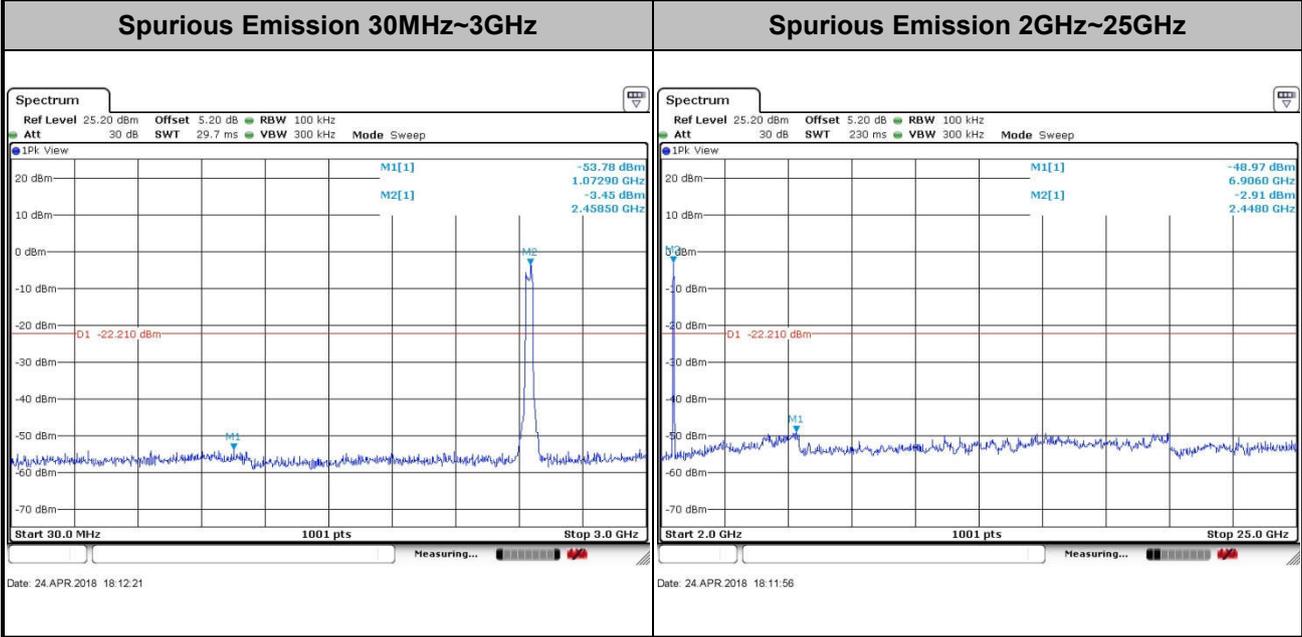
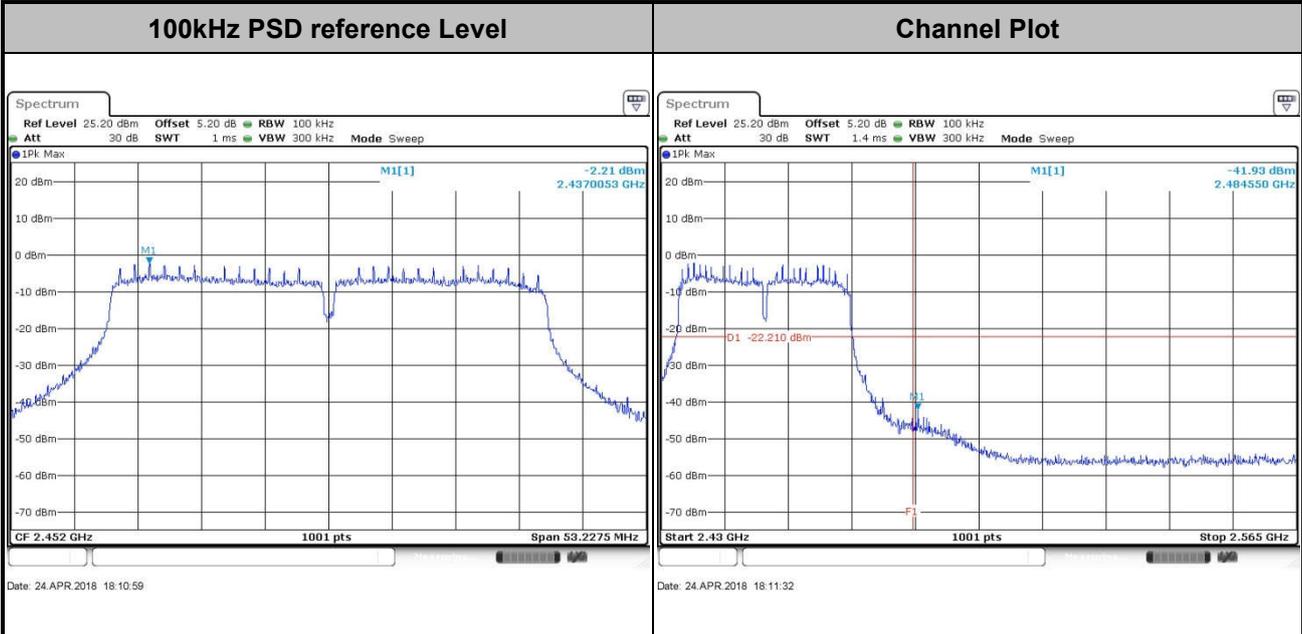


Test Mode :	802.11n HT40	Test Channel :	06
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Test Mode : 802.11n HT40      Test Channel : 09





### 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.

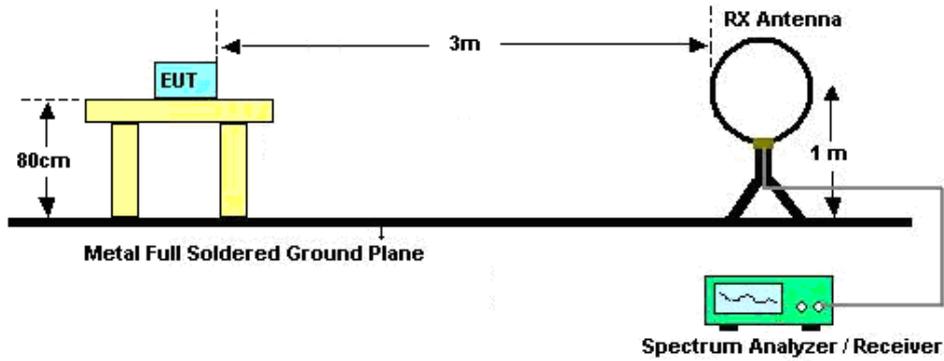


### 3.5.3 Test Procedures

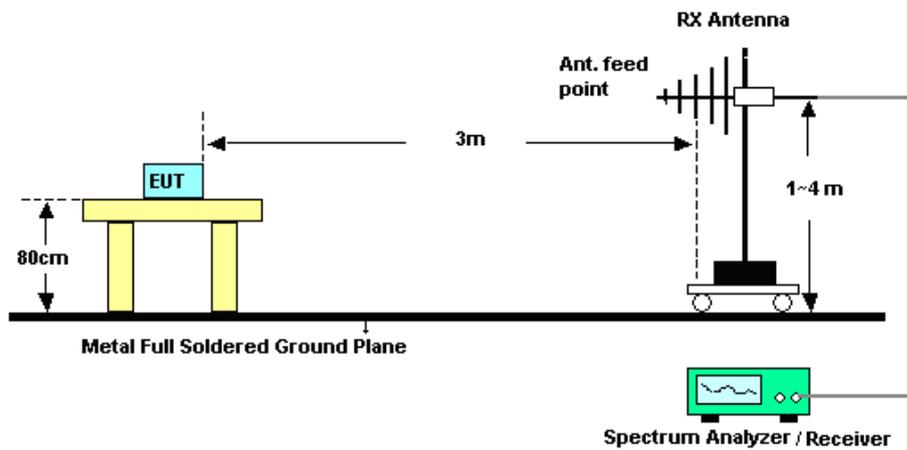
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test 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  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold;
  - (3) Set RBW = 1 MHz, VBW= 3MHz for  $f \geq 1$  GHz for peak measurement.  
For average measurement:
    - VBW = 10 Hz, when duty cycle is no less than 98 percent.
    - VBW  $\geq 1/T$ , 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

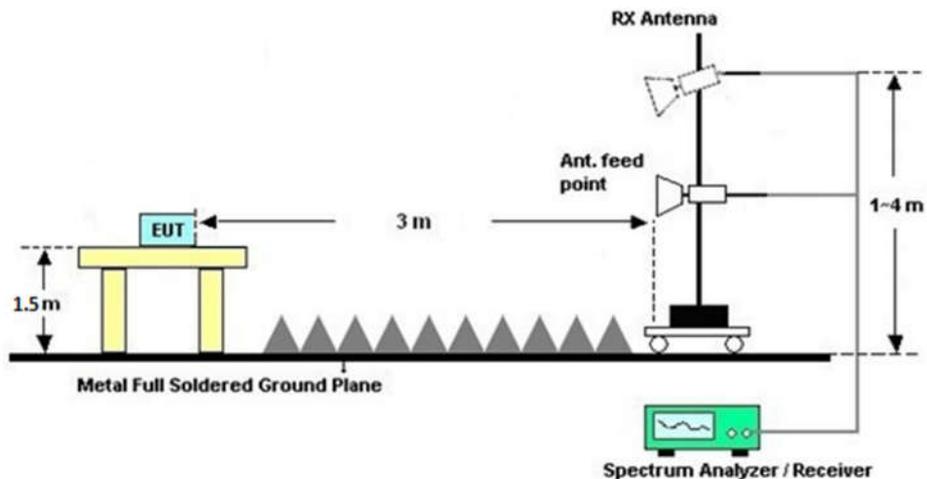
For radiated emissions below 30MHz



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 ~ 10<sup>th</sup> 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.

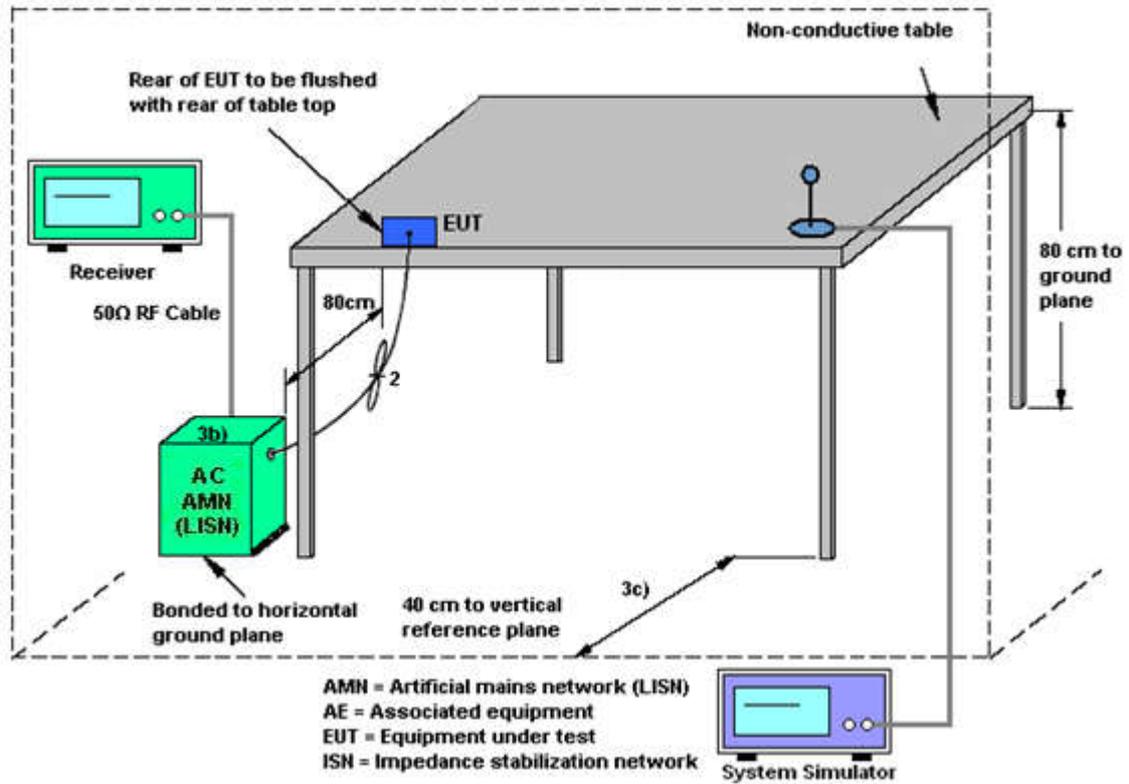
#### 3.6.2 Measuring Instruments

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	101040	10Hz~40GHz	Aug. 08, 2017	Apr. 20, 2018~ May 17, 2018	Aug. 07, 2018	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 18, 2018	Apr. 20, 2018~ May 17, 2018	Jan. 17, 2019	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 18, 2018	Apr. 20, 2018~ May 17, 2018	Jan. 17, 2019	Conducted (TH01-KS)
EMI Test Receiver&SA	KEYSIGHT	N9038A	MY54450083	20Hz~8.4GHz	Apr. 19, 2018	May 10, 2018	Apr. 18, 2019	Radiation (03CH03-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150246	10Hz~44GHz;	Apr. 19, 2018	May 10, 2018	Apr. 18, 2019	Radiation (03CH03-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 14, 2017	May 10, 2018	May 13, 2018	Radiation (03CH03-SZ)
Bilog Antenna	TeseQ	CBL6112D	35408	30MHz~2GHz	May 14, 2017	May 10, 2018	May 13, 2018	Radiation (03CH03-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1355	1GHz~18GHz	Jul. 09, 2017	May 10, 2018	Jul. 08, 2018	Radiation (03CH03-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 18, 2017	May 10, 2018	Jul. 17, 2018	Radiation (03CH03-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18GHz~40GHz	Jun. 16, 2017	May 10, 2018	Jun. 15, 2018	Radiation (03CH03-SZ)
Amplifier	Burgeon	BPA-530	102210	0.01Hz~3000MHz	Oct. 19, 2017	May 10, 2018	Oct. 18, 2018	Radiation (03CH03-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 19, 2017	May 10, 2018	Oct. 18, 2018	Radiation (03CH03-SZ)
Amplifier	Agilent Technologies	83017A	MY39501302	500MHz~26.5GHz	Dec. 27, 2017	May 10, 2018	Dec. 26, 2018	Radiation (03CH03-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	NCR	May 10, 2018	NCR	Radiation (03CH03-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	May 10, 2018	NCR	Radiation (03CH03-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	May 10, 2018	NCR	Radiation (03CH03-SZ)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 19, 2018	Apr. 25, 2018	Apr. 18, 2019	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 13, 2017	Apr. 25, 2018	Oct. 12, 2018	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 13, 2017	Apr. 25, 2018	Oct. 12, 2018	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000811	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2017	Apr. 25, 2018	Oct. 11, 2018	Conduction (CO01-KS)

NCR: No Calibration Required



## 5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	2.3dB
-------------------------------------------------------------------------	-------

### 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% ( $U = 2Uc(y)$ )	4.8dB
-------------------------------------------------------------------------	-------

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.6dB
-------------------------------------------------------------------------	-------



## **Appendix A. conducted test results**

**A1 - DTS Part**

Test Engineer:	Silent Hai	Temperature:	21~25	°C
Test Date:	2018/4/20~2018/5/17	Relative Humidity:	51~55	%

**TEST RESULTS DATA**  
**6dB and 99% Occupied Bandwidth**

2.4GHz Band								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
11b	1Mbps	1	1	2412	12.39	7.55	0.50	Pass
11b	1Mbps	1	6	2437	12.19	7.55	0.50	Pass
11b	1Mbps	1	11	2462	12.14	7.55	0.50	Pass
11g	6Mbps	1	1	2412	19.08	16.34	0.50	Pass
11g	6Mbps	1	6	2437	18.48	16.30	0.50	Pass
11g	6Mbps	1	11	2462	18.43	16.34	0.50	Pass
HT20	MCS0	1	1	2412	19.43	17.58	0.50	Pass
HT20	MCS0	1	6	2437	19.28	17.30	0.50	Pass
HT20	MCS0	1	11	2462	19.33	17.54	0.50	Pass
HT40	MCS0	1	3	2422	36.66	35.13	0.50	Pass
HT40	MCS0	1	6	2437	36.36	35.13	0.50	Pass
HT40	MCS0	1	9	2452	37.26	35.49	0.50	Pass

**TEST RESULTS DATA**  
**Peak Power Table**

2.4GHz Band										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
11b	1Mbps	1	1	2412	18.44	30.00	1.80	20.24	36.00	Pass
11b	1Mbps	1	6	2437	19.18	30.00	1.80	20.98	36.00	Pass
11b	1Mbps	1	11	2462	18.34	30.00	1.80	20.14	36.00	Pass
11g	6Mbps	1	1	2412	22.28	30.00	1.80	24.08	36.00	Pass
11g	6Mbps	1	6	2437	22.59	30.00	1.80	24.39	36.00	Pass
11g	6Mbps	1	11	2462	22.35	30.00	1.80	24.15	36.00	Pass
HT20	MCS0	1	1	2412	21.18	30.00	1.80	22.98	36.00	Pass
HT20	MCS0	1	6	2437	21.26	30.00	1.80	23.06	36.00	Pass
HT20	MCS0	1	11	2462	20.98	30.00	1.80	22.78	36.00	Pass
HT40	MCS0	1	3	2422	21.34	30.00	1.80	23.14	36.00	Pass
HT40	MCS0	1	6	2437	21.53	30.00	1.80	23.33	36.00	Pass
HT40	MCS0	1	9	2452	21.16	30.00	1.80	22.96	36.00	Pass

**TEST RESULTS DATA**  
**Average Power Table**  
**(Reporting Only)**

2.4GHz Band						
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
11b	1Mbps	1	1	2412	0.11	15.59
11b	1Mbps	1	6	2437	0.11	15.99
11b	1Mbps	1	11	2462	0.11	15.39
11g	6Mbps	1	1	2412	0.58	13.76
11g	6Mbps	1	6	2437	0.58	14.05
11g	6Mbps	1	11	2462	0.58	13.65
HT20	MCS0	1	1	2412	0.62	11.90
HT20	MCS0	1	6	2437	0.62	12.05
HT20	MCS0	1	11	2462	0.62	11.68
HT40	MCS0	1	3	2422	0.66	11.74
HT40	MCS0	1	6	2437	0.66	11.77
HT40	MCS0	1	9	2452	0.66	11.54

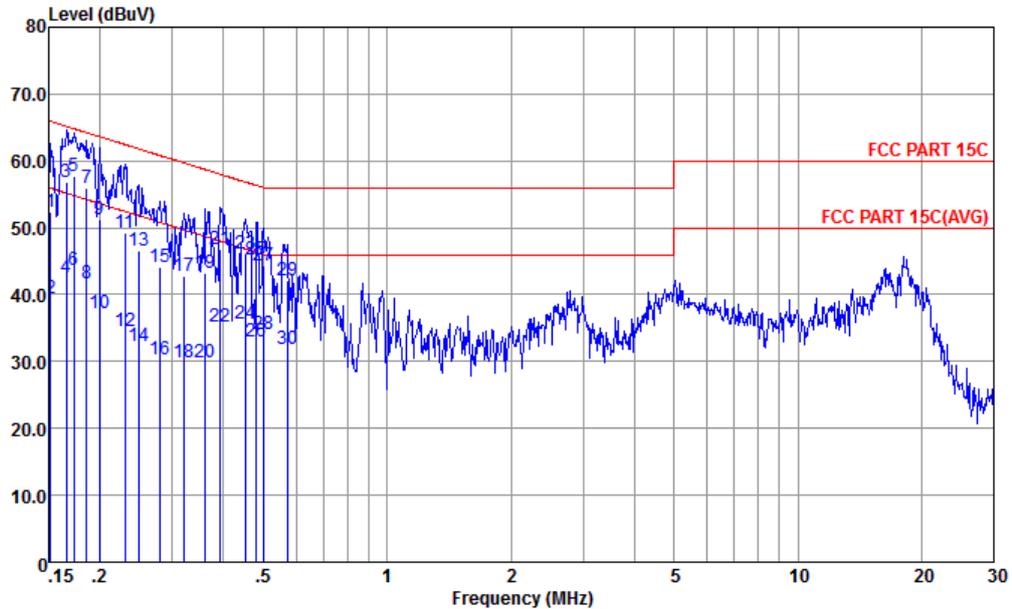
**TEST RESULTS DATA**  
**Peak Power Density**

2.4GHz Band								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
11b	1Mbps	1	1	2412	-6.76	1.80	8.00	Pass
11b	1Mbps	1	6	2437	-6.52	1.80	8.00	Pass
11b	1Mbps	1	11	2462	-7.40	1.80	8.00	Pass
11g	6Mbps	1	1	2412	-12.39	1.80	8.00	Pass
11g	6Mbps	1	6	2437	-10.83	1.80	8.00	Pass
11g	6Mbps	1	11	2462	-11.55	1.80	8.00	Pass
HT20	MCS0	1	1	2412	-14.28	1.80	8.00	Pass
HT20	MCS0	1	6	2437	-13.85	1.80	8.00	Pass
HT20	MCS0	1	11	2462	-13.82	1.80	8.00	Pass
HT40	MCS0	1	3	2422	-16.20	1.80	8.00	Pass
HT40	MCS0	1	6	2437	-15.95	1.80	8.00	Pass
HT40	MCS0	1	9	2452	-16.14	1.80	8.00	Pass



## Appendix B. AC Conducted Emission Test Results

Test Engineer :	Amos Zhang	Temperature :	22.1~23.2°C
		Relative Humidity :	41~44%
Test Voltage :	120Vac / 60Hz	Phase :	Line



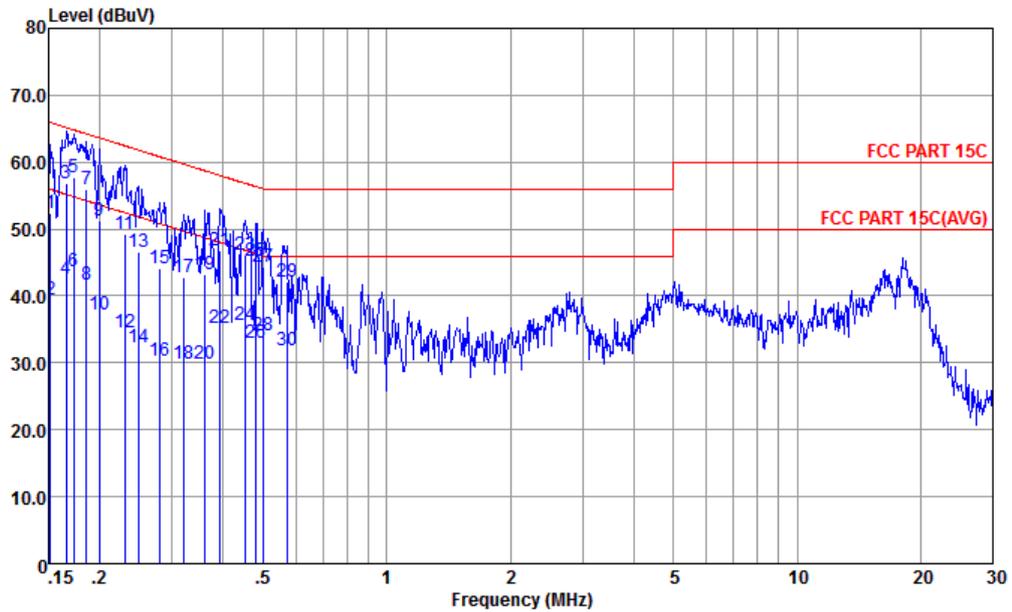
Site : CO01-KS  
 Condition : FCC PART 15C LISN-L-171013-060103 LINE

mode : Mode 1  
 : 356291090051561/356291090051579 #31

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.152	52.37	-13.54	65.91	41.60	0.16	10.61	QP
2	0.152	39.37	-16.54	55.91	28.60	0.16	10.61	Average
3	0.166	56.93	-8.23	65.16	46.20	0.17	10.56	QP
4	0.166	42.63	-12.53	55.16	31.90	0.17	10.56	Average
5 *	0.173	57.62	-7.19	64.81	46.90	0.18	10.54	QP
6	0.173	43.68	-11.13	54.81	32.96	0.18	10.54	Average
7	0.185	55.89	-8.35	64.24	45.20	0.19	10.50	QP
8	0.185	41.59	-12.65	54.24	30.90	0.19	10.50	Average
9	0.200	51.16	-12.46	63.62	40.50	0.20	10.46	QP
10	0.200	37.26	-16.36	53.62	26.60	0.20	10.46	Average
11	0.230	49.16	-13.28	62.44	38.50	0.21	10.45	QP
12	0.230	34.56	-17.88	52.44	23.90	0.21	10.45	Average
13	0.248	46.55	-15.27	61.82	35.90	0.21	10.44	QP
14	0.248	32.25	-19.57	51.82	21.60	0.21	10.44	Average
15	0.280	44.15	-16.66	60.81	33.50	0.22	10.43	QP
16	0.280	30.25	-20.56	50.81	19.60	0.22	10.43	Average
17	0.320	42.85	-16.86	59.71	32.20	0.23	10.42	QP



Test Engineer :	Amos Zhang	Temperature :	22.1~23.2°C
		Relative Humidity :	41~44%
Test Voltage :	120Vac / 60Hz	Phase :	Line

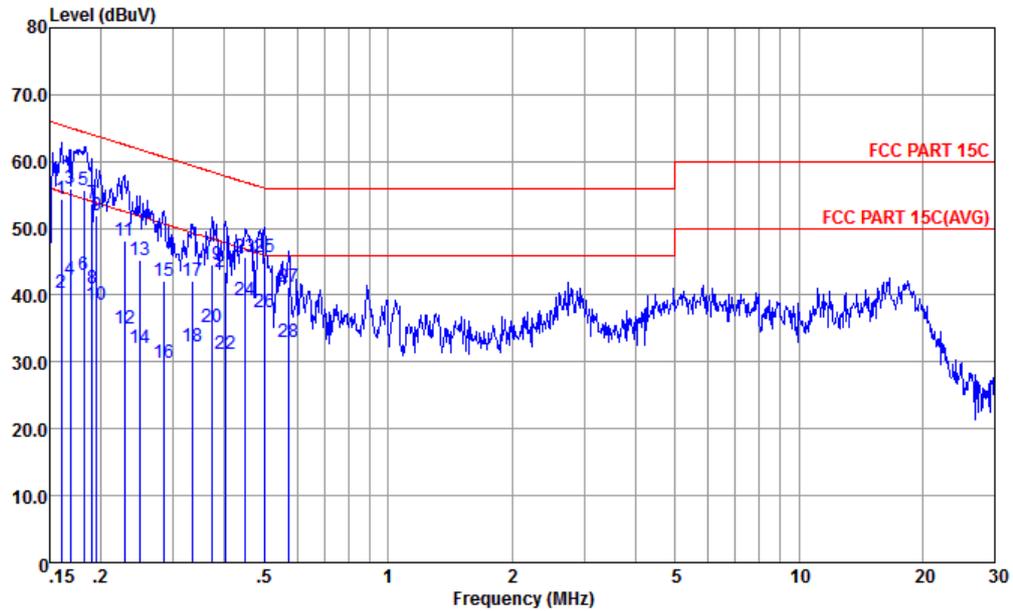


Site : CO01-KS  
 Condition : FCC PART 15C LISN-L-171013-060103 LINE  
 mode : Mode 1  
 : 356291090051561/356291090051579 #31

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
18	0.320	29.85	-19.86	49.71	19.20	0.23	10.42	Average
19	0.361	43.25	-15.44	58.69	32.60	0.24	10.41	QP
20	0.361	29.85	-18.84	48.69	19.20	0.24	10.41	Average
21	0.393	46.85	-11.14	57.99	36.20	0.24	10.41	QP
22	0.393	35.25	-12.74	47.99	24.60	0.24	10.41	Average
23	0.454	46.10	-10.70	56.80	35.50	0.25	10.35	QP
24	0.454	35.70	-11.10	46.80	25.10	0.25	10.35	Average
25	0.481	45.18	-11.14	56.32	34.60	0.26	10.32	QP
26	0.481	32.88	-13.44	46.32	22.30	0.26	10.32	Average
27	0.499	44.37	-11.64	56.01	33.80	0.26	10.31	QP
28	0.499	34.17	-11.84	46.01	23.60	0.26	10.31	Average
29	0.570	42.01	-13.99	56.00	31.50	0.26	10.25	QP
30	0.570	31.81	-14.19	46.00	21.30	0.26	10.25	Average



Test Engineer :	Amos Zhang	Temperature :	22.1~23.2°C
		Relative Humidity :	41~44%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral



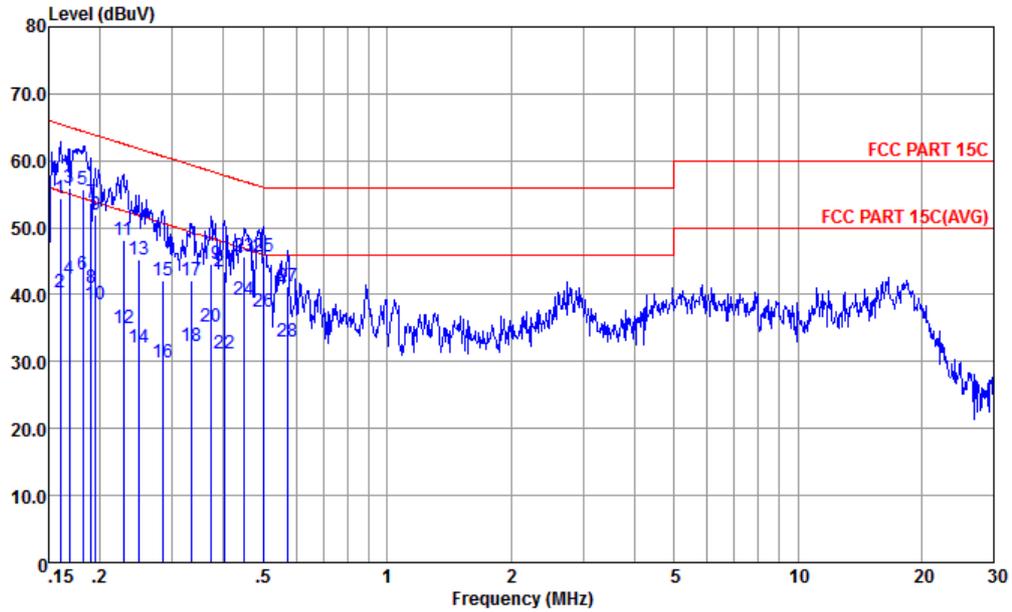
Site : CO01-KS  
 Condition : FCC PART 15C LISN-N-171013-060103 NEUTRAL

mode : Mode 1  
 : 356291090051561/356291090051579 #31

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.160	54.36	-11.11	65.47	43.50	0.28	10.58	QP
2	0.160	40.36	-15.11	55.47	29.50	0.28	10.58	Average
3	0.169	55.93	-9.10	65.03	45.10	0.28	10.55	QP
4	0.169	42.23	-12.80	55.03	31.40	0.28	10.55	Average
5	0.182	55.69	-8.73	64.42	44.90	0.28	10.51	QP
6	0.182	42.99	-11.43	54.42	32.20	0.28	10.51	Average
7	0.190	53.66	-10.36	64.02	42.90	0.28	10.48	QP
8	0.190	40.96	-13.06	54.02	30.20	0.28	10.48	Average
9	0.195	51.85	-11.95	63.80	41.10	0.28	10.47	QP
10	0.195	38.65	-15.15	53.80	27.90	0.28	10.47	Average
11	0.228	48.23	-14.29	62.52	37.50	0.28	10.45	QP
12	0.228	34.93	-17.59	52.52	24.20	0.28	10.45	Average
13	0.249	45.32	-16.46	61.78	34.60	0.28	10.44	QP
14	0.249	32.02	-19.76	51.78	21.30	0.28	10.44	Average
15	0.285	42.21	-18.47	60.68	31.50	0.28	10.43	QP
16	0.285	29.91	-20.77	50.68	19.20	0.28	10.43	Average
17	0.334	42.21	-17.14	59.35	31.50	0.29	10.42	QP



Test Engineer :	Amos Zhang	Temperature :	22.1~23.2°C
		Relative Humidity :	41~44%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral



Site : CO01-KS  
 Condition : FCC PART 15C LISN-N-171013-060103 NEUTRAL  
 mode : Mode 1  
 : 356291090051561/356291090051579 #31

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
18	0.334	32.31	-17.04	49.35	21.60	0.29	10.42	Average
19	0.371	44.60	-13.87	58.47	33.90	0.29	10.41	QP
20	0.371	35.30	-13.17	48.47	24.60	0.29	10.41	Average
21	0.402	43.49	-14.32	57.81	32.80	0.29	10.40	QP
22	0.402	31.29	-16.52	47.81	20.60	0.29	10.40	Average
23	0.449	45.74	-11.15	56.89	35.09	0.29	10.36	QP
24 *	0.449	39.24	-7.65	46.89	28.59	0.29	10.36	Average
25	0.502	45.69	-10.31	56.00	35.10	0.29	10.30	QP
26	0.502	37.49	-8.51	46.00	26.90	0.29	10.30	Average
27	0.573	41.14	-14.86	56.00	30.60	0.29	10.25	QP
28	0.573	33.04	-12.96	46.00	22.50	0.29	10.25	Average



## Appendix C. Radiated Spurious Emission

Test Engineer :	Reid Huang	Temperature :	24~25°C
		Relative Humidity :	48~49%

### 2.4GHz 2400~2483.5MHz

#### WIFI 802.11b (Band Edge @ 3m)

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		2384.655	47.65	-26.35	74	45.27	27.04	6.65	31.31	104	321	P	H
		2389.38	37.02	-16.98	54	34.56	27.09	6.65	31.28	104	321	A	H
	*	2412	101.23	-	-	98.69	27.14	6.66	31.26	104	321	P	H
	*	2412	98.4	-	-	95.86	27.14	6.66	31.26	104	321	A	H
		2389.695	47.94	-26.06	74	45.48	27.09	6.65	31.28	100	239	P	V
		2389.905	38.36	-15.64	54	35.9	27.09	6.65	31.28	100	239	A	V
	*	2412	105.33	-	-	102.79	27.14	6.66	31.26	100	239	P	V
	*	2412	102.13	-	-	99.59	27.14	6.66	31.26	100	239	A	V
802.11b CH 06 2437MHz		2389.66	46.87	-27.13	74	44.41	27.09	6.65	31.28	100	324	P	H
		2389.8	36.65	-17.35	54	34.19	27.09	6.65	31.28	100	324	A	H
	*	2437	99.3	-	-	96.69	27.24	6.63	31.26	100	324	P	H
	*	2437	96.13	-	-	93.52	27.24	6.63	31.26	100	324	A	H
		2497.97	47.36	-26.64	74	44.58	27.4	6.58	31.2	100	324	P	H
		2490.69	37.15	-16.85	54	34.37	27.4	6.58	31.2	100	324	A	H
		2332.54	47.34	-26.66	74	45.26	26.88	6.55	31.35	100	240	P	V
		2389.8	37.38	-16.62	54	34.92	27.09	6.65	31.28	100	240	A	V
	*	2437	105.56	-	-	102.95	27.24	6.63	31.26	100	240	P	V
	*	2437	102.28	-	-	99.67	27.24	6.63	31.26	100	240	A	V
		2494.61	47.64	-26.36	74	44.86	27.4	6.58	31.2	100	240	P	V
		2493.7	37.76	-16.24	54	34.98	27.4	6.58	31.2	100	240	A	V



802.11b CH 11 2462MHz	*	2462	99.4	-	-	96.73	27.3	6.61	31.24	100	318	P	H
	*	2462	96.4	-	-	93.73	27.3	6.61	31.24	100	318	A	H
		2484.56	48.51	-25.49	74	45.8	27.35	6.58	31.22	100	318	P	H
		2483.8	37.99	-16.01	54	35.28	27.35	6.58	31.22	100	318	A	H
	*	2462	105.32	-	-	102.65	27.3	6.61	31.24	134	267	P	V
	*	2462	102.14	-	-	99.47	27.3	6.61	31.24	134	267	A	V
		2485.16	48.99	-25.01	74	46.28	27.35	6.58	31.22	134	267	P	V
		2483.68	39.31	-14.69	54	36.6	27.35	6.58	31.22	134	267	A	V
Remark	<ol style="list-style-type: none"> <li>No other spurious found.</li> <li>All results are PASS against Peak and Average limit line.</li> </ol>												



**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	38.39	-35.61	74	55.72	31.42	9.44	58.19	185	255	P	H
		4824	39.67	-34.33	74	57	31.42	9.44	58.19	185	255	P	V
802.11b CH 06 2437MHz		4874	38.92	-35.08	74	56.11	31.51	9.4	58.1	165	106	P	H
		7311	47.24	-26.76	74	56.8	36.36	12	57.92	174	100	P	H
		4874	38.66	-35.34	74	55.85	31.51	9.4	58.1	165	106	P	V
		7311	46.36	-27.64	74	55.92	36.36	12	57.92	174	100	P	V
802.11b CH 11 2462MHz		4924	39.2	-34.8	74	56.2	31.59	9.43	58.02	150	285	P	H
		7386	45.84	-28.16	74	54.83	36.65	12.01	57.65	155	274	P	H
		4924	39.41	-34.59	74	56.41	31.59	9.43	58.02	150	285	P	V
		7386	46.52	-27.48	74	55.51	36.65	12.01	57.65	155	274	P	V
<b>Remark</b>	<ol style="list-style-type: none"> <li>No other spurious found.</li> <li>All results are PASS against Peak and Average limit line.</li> </ol>												



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		2389.59	54.5	-19.5	74	52.04	27.09	6.65	31.28	100	317	P	H
		2389.695	42.15	-11.85	54	39.69	27.09	6.65	31.28	100	317	A	H
	*	2412	100	-	-	97.46	27.14	6.66	31.26	100	317	P	H
	*	2412	92.27	-	-	89.73	27.14	6.66	31.26	100	317	A	H
		2388.225	57.36	-16.64	74	54.9	27.09	6.65	31.28	100	238	P	V
		2389.905	45.16	-8.84	54	42.7	27.09	6.65	31.28	100	238	A	V
	*	2412	105.92	-	-	103.38	27.14	6.66	31.26	100	238	P	V
	*	2412	98.06	-	-	95.52	27.14	6.66	31.26	100	238	A	V
802.11g CH 06 2437MHz		2331.14	47.23	-26.77	74	45.15	26.88	6.55	31.35	100	316	P	H
		2384.9	38.04	-15.96	54	35.66	27.04	6.65	31.31	100	316	A	H
	*	2437	98.56	-	-	95.95	27.24	6.63	31.26	100	316	P	H
	*	2437	91.2	-	-	88.59	27.24	6.63	31.26	100	316	A	H
		2498.46	47.33	-26.67	74	44.55	27.4	6.58	31.2	100	316	P	H
		2489.57	38.73	-15.27	54	35.95	27.4	6.58	31.2	100	316	A	H
		2384.48	47.75	-26.25	74	45.37	27.04	6.65	31.31	100	240	P	V
		2384.62	39.32	-14.68	54	36.94	27.04	6.65	31.31	100	240	A	V
	*	2437	105.72	-	-	103.11	27.24	6.63	31.26	100	240	P	V
	*	2437	98.14	-	-	95.53	27.24	6.63	31.26	100	240	A	V
		2489.15	48.92	-25.08	74	46.14	27.4	6.58	31.2	100	240	P	V
		2489.15	40.26	-13.74	54	37.48	27.4	6.58	31.2	100	240	A	V



802.11g CH 11 2462MHz	*	2462	99.55	-	-	96.88	27.3	6.61	31.24	100	315	P	H
	*	2462	91.92	-	-	89.25	27.3	6.61	31.24	100	315	A	H
		2484.12	53.04	-20.96	74	50.33	27.35	6.58	31.22	100	315	P	H
		2483.52	40.82	-13.18	54	38.11	27.35	6.58	31.22	100	315	A	H
	*	2462	105.37	-	-	102.7	27.3	6.61	31.24	134	267	P	V
	*	2462	97.7	-	-	95.03	27.3	6.61	31.24	134	267	A	V
		2483.72	56.98	-17.02	74	54.27	27.35	6.58	31.22	134	267	P	V
		2483.56	44.32	-9.68	54	41.61	27.35	6.58	31.22	134	267	A	V
Remark	<ol style="list-style-type: none"> <li>No other spurious found.</li> <li>All results are PASS against Peak and Average limit line.</li> </ol>												



**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	38.92	-35.08	74	56.25	31.42	9.44	58.19	185	255	P	H
		4824	39.36	-34.64	74	56.69	31.42	9.44	58.19	185	255	P	V
802.11g CH 06 2437MHz		4874	39.43	-34.57	74	56.62	31.51	9.4	58.1	165	106	P	H
		7311	46.35	-27.65	74	55.91	36.36	12	57.92	174	100	P	H
		4874	39.93	-34.07	74	57.12	31.51	9.4	58.1	165	106	P	V
		7311	46.1	-27.9	74	55.66	36.36	12	57.92	174	100	P	V
802.11g CH 11 2462MHz		4924	39.9	-34.1	74	56.9	31.59	9.43	58.02	150	285	P	H
		7386	47.22	-26.78	74	56.21	36.65	12.01	57.65	155	274	P	H
		4924	39.35	-34.65	74	56.35	31.59	9.43	58.02	150	285	P	V
		7386	47.01	-26.99	74	56	36.65	12.01	57.65	155	274	P	V
<b>Remark</b>	<ol style="list-style-type: none"> <li>No other spurious found.</li> <li>All results are PASS against Peak and Average limit line.</li> </ol>												



2.4GHz 2400~2483.5MHz
WIFI 802.11n HT20 (Band Edge @ 3m)

Table with 14 columns: 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). Rows include data for 802.11n HT20 CH 01 (2412MHz) and 802.11n CH 06 (2437MHz).



802.11n HT20 CH 11 2462MHz	*	2462	98.19	-	-	95.52	27.3	6.61	31.24	120	320	P	H
	*	2462	90.08	-	-	87.41	27.3	6.61	31.24	120	320	A	H
		2483.6	49.55	-24.45	74	46.84	27.35	6.58	31.22	120	320	P	H
		2483.6	39.61	-14.39	54	36.9	27.35	6.58	31.22	120	320	A	H
	*	2462	102.91	-	-	100.24	27.3	6.61	31.24	134	265	P	V
	*	2462	95.03	-	-	92.36	27.3	6.61	31.24	134	265	A	V
		2483.76	56.9	-17.1	74	54.19	27.35	6.58	31.22	134	265	P	V
	2483.72	43.44	-10.56	54	40.73	27.35	6.58	31.22	134	265	A	V	
<b>Remark</b>	<ol style="list-style-type: none"> <li>No other spurious found.</li> <li>All results are PASS against Peak and Average limit line.</li> </ol>												



2.4GHz 2400~2483.5MHz
WIFI 802.11n HT20 (Harmonic @ 3m)

Table with 14 columns: 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). Rows include test data for 802.11n HT20 channels 01, 06, and 11, and a Remark section.



**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		2389.52	53.96	-20.04	74	51.5	27.09	6.65	31.28	272	207	P	H
		2389.8	42.8	-11.2	54	40.34	27.09	6.65	31.28	272	207	A	H
	*	2422	97.33	-	-	94.74	27.19	6.66	31.26	272	207	P	H
	*	2422	87.98	-	-	85.39	27.19	6.66	31.26	272	207	A	H
		2489.01	47.63	-26.37	74	44.85	27.4	6.58	31.2	272	207	P	H
		2485.58	37.6	-16.4	54	34.89	27.35	6.58	31.22	272	207	A	H
		2387.84	58.17	-15.83	74	55.71	27.09	6.65	31.28	134	267	P	V
		2389.52	46.42	-7.58	54	43.96	27.09	6.65	31.28	134	267	A	V
	*	2422	99.44	-	-	96.85	27.19	6.66	31.26	134	267	P	V
	*	2422	91.67	-	-	89.08	27.19	6.66	31.26	134	267	A	V
		2483.69	47.96	-26.04	74	45.25	27.35	6.58	31.22	134	267	P	V
		2483.83	38.78	-15.22	54	36.07	27.35	6.58	31.22	134	267	A	V
802.11n HT40 CH 06 2437MHz		2387.28	47.27	-26.73	74	44.81	27.09	6.65	31.28	272	207	P	H
		2389.38	38.16	-15.84	54	35.7	27.09	6.65	31.28	272	207	A	H
	*	2437	94.46	-	-	91.85	27.24	6.63	31.26	272	207	P	H
	*	2437	86.7	-	-	84.09	27.24	6.63	31.26	272	207	A	H
		2484.39	48.33	-25.67	74	45.62	27.35	6.58	31.22	272	207	P	H
		2483.76	38.29	-15.71	54	35.58	27.35	6.58	31.22	272	207	A	H
		2389.66	48.89	-25.11	74	46.43	27.09	6.65	31.28	134	267	P	V
		2389.8	39.06	-14.94	54	36.6	27.09	6.65	31.28	134	267	A	V
	*	2437	98.2	-	-	95.59	27.24	6.63	31.26	134	267	P	V
	*	2437	90.76	-	-	88.15	27.24	6.63	31.26	134	267	A	V
		2484.6	49.78	-24.22	74	47.07	27.35	6.58	31.22	134	267	P	V
		2483.62	39.94	-14.06	54	37.23	27.35	6.58	31.22	134	267	A	V



<b>802.11n</b>  <b>HT40</b>  <b>CH 09</b>  <b>2452MHz</b>		2387.14	46.83	-27.17	74	44.37	27.09	6.65	31.28	100	201	A	H
	*	2389.1	37.74	-16.26	54-	35.28	27.09	6.65	31.28	100	201	P	H
	*	2452	98.71	-	-	96.08	27.24	6.63	31.24	100	201	A	H
		2452	86.84	-	-	86.03	27.24	6.61	31.24	100	201	P	H
		2485.16	56.6	-17.4	74	53.89	27.35	6.58	31.22	100	201	A	H
		2483.97	43.84	-10.16	54	41.13	27.35	6.58	31.22	100	201	P	H
		2380.98	47.91	-26.09	74	45.53	27.04	6.65	31.31	134	267	P	V
		2389.1	38.04	-15.96	54	35.58	27.09	6.65	31.28	134	267	A	V
	*	2452	99.67	-	-	97.06	27.24	6.61	31.24	134	267	P	V
	*	2452	92.18	-	-	89.57	27.24	6.61	31.24	134	267	A	V
		2484.46	61.95	-12.05	74	59.24	27.35	6.58	31.22	134	267	P	V
		2483.97	45.87	-8.13	54	43.16	27.35	6.58	31.22	134	267	A	V
<b>Remark</b>	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	39.61	-34.39	74	56.89	31.45	9.43	58.16	150	350	P	H
HT40		7266	46.44	-27.56	74	56.27	36.24	11.96	58.03	200	360	P	H
CH 03		4844	39.23	-34.77	74	56.51	31.45	9.43	58.16	150	350	P	V
2422MHz		7266	45.89	-28.11	74	55.72	36.24	11.96	58.03	200	360	P	V
802.11n		4874	39.2	-34.8	74	56.39	31.51	9.4	58.1	165	230	P	H
HT40		7311	46.04	-27.96	74	55.6	36.36	12	57.92	186	323	P	H
CH 06		4874	39.2	-34.8	74	56.39	31.51	9.4	58.1	165	230	P	V
2437MHz		7311	45.55	-28.45	74	55.11	36.36	12	57.92	186	323	P	V
802.11n		4904	39.39	-34.61	74	56.49	31.56	9.38	58.04	150	360	P	H
HT40		7356	46.66	-27.34	74	55.88	36.53	12.01	57.76	165	335	P	H
CH 09		4904	39.2	-34.8	74	56.3	31.56	9.38	58.04	150	360	P	V
2452MHz		7356	45.6	-28.4	74	54.82	36.53	12.01	57.76	165	335	P	V
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz

2.4GHz WIFI 802.11n HT40 (LF)

WIFI	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 )
2.4GHz 802.11n HT40 LF		32.91	25.46	-14.54	40	30.56	26.22	0.28	31.6	-	-	P	H
		155.13	19.97	-23.53	43.5	31.57	18.44	1.34	31.38	-	-	P	H
		385.02	26.74	-19.26	46	32.27	23.23	2.34	31.1	-	-	P	H
		610.06	28.76	-17.24	46	31.72	25.2	3.04	31.2	-	-	P	H
		770.11	32.64	-13.36	46	31.8	28.62	3.52	31.3	-	-	P	H
		905.91	32.81	-13.19	46	31.63	28.65	3.83	31.3	100	49	P	H
		30.97	25.35	-14.65	40	30.16	26.54	0.25	31.6	-	-	P	V
		124.09	18.96	-24.54	43.5	30.78	18.55	1.08	31.45	-	-	P	V
		409.27	25.64	-20.36	46	29.91	24.41	2.42	31.1	-	-	P	V
		676.02	28.88	-17.12	46	30.44	26.43	3.21	31.2	-	-	P	V
		801.15	32.02	-13.98	46	30.62	29.09	3.61	31.3	100	49	P	V
	921.43	31.55	-14.45	46	29.92	29.06	3.87	31.3	-	-	P	V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Note symbol

*	<b>Fundamental Frequency</b> which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is <b>over limit</b> line.
P/A	<b>Peak</b> or <b>Average</b>
H/V	<b>Horizontal</b> or <b>Vertical</b>



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		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

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

**For Peak Limit @ 2390MHz:**

- 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)
- Over Limit(dB)  
= Level(dBμV/m) – Limit Line(dBμV/m)  
= 55.45(dBμV/m) – 74(dBμV/m)  
= -18.55(dB)

**For Average Limit @ 2390MHz:**

- 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)
- Over Limit(dB)  
= Level(dBμV/m) – Limit Line(dBμV/m)  
= 43.54(dBμV/m) – 54(dBμV/m)  
= -10.46(dB)

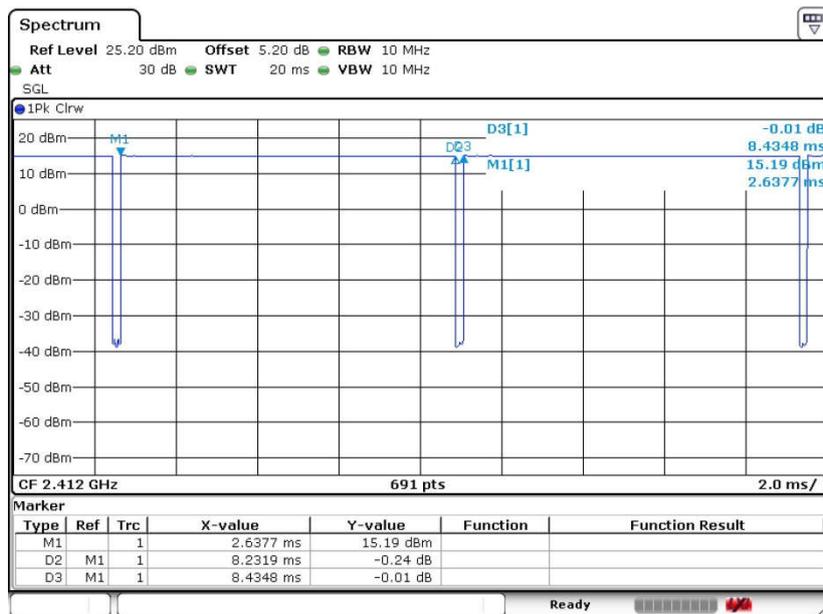
Both peak and average measured complies with the limit line, so test result is “PASS”.



### Appendix D. Duty Cycle Plots

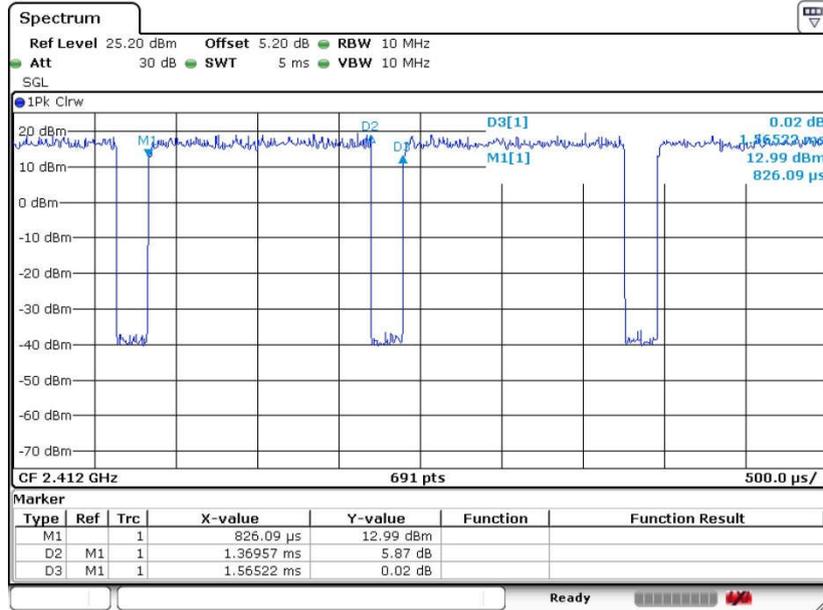
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
11b	97.59	8.232	0.121	300Hz
11g	87.50	1.370	0.730	1kHz
11n HT20	86.70	1.275	0.784	1kHz
11n HT40	85.95	1.232	0.817	1kHz

11b

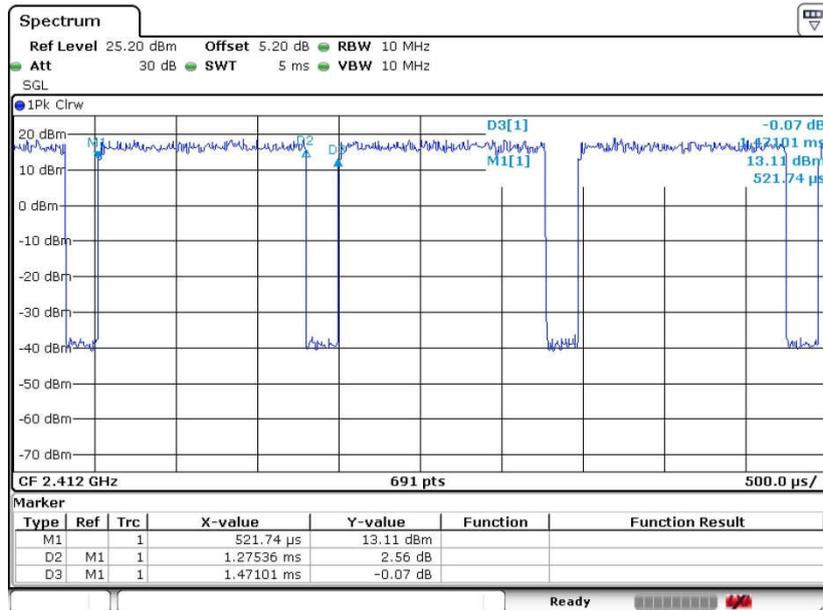




11g



11n HT20





11n HT40

