



# FCC RF Test Report

**APPLICANT** : Motorola Mobility LLC  
**EQUIPMENT** : Mobile Cellular Phone  
**BRAND NAME** : Motorola  
**MODEL NAME** : XT2005-3  
**FCC ID** : IHDT56YA3  
**STANDARD** : FCC Part 15 Subpart C §15.247  
**CLASSIFICATION** : (DTS) Digital Transmission System

The product was received on Feb. 21, 2019 and testing was completed on Apr. 10, 2019. 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. 1098, Pengxi North Road, Kunshan Economic Development Zone,**  
**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	-
3.2	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 3.11 dB at 2483.980 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 14.39 dB at 0.150 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-



# 1 General Description

## 1.1 Applicant

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

## 1.2 Manufacturer

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

## 1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	XT2005-3
FCC ID	IHDT56YA3
EUT supports Radios application	CDMA/EV-DO/GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/HSPA+(16QAM uplink is not supported)/LTE WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 Bluetooth BR/EDR/LE FM Receiver/GNSS
IMEI Code	Conducted: 352179100021738 Conduction: 352179100023486 Radiation: 352179100023098
HW Version	88941-1-12
SW Version	fastboot_surfna_t_oem_t_userdebug_9_PCB29.7_0446_i ntcfg-test-keys_t
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 : 24.23 dBm (0.2649 W) 802.11g : 26.18 dBm (0.4150 W) 802.11n HT20 : 26.07 dBm (0.4046 W) 802.11n HT40 : 24.23 dBm (0.2649 W)
<b>Antenna Type / Gain</b>	IFA Antenna with gain -2.47 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 Specification of Accessory

Specification of Accessory				
<b>AC Adapter 1</b>	<b>Brand Name</b>	Motorola(Acbel)	<b>Model Name</b>	SC-61
	<b>Power Rating</b>	I/P: 100-240 Vac, 130mA ; O/P: 5Vdc,1000mA		
<b>AC Adapter 2</b>	<b>Brand Name</b>	Motorola (Chenyang)	<b>Model Name</b>	SC-61
	<b>Power Rating</b>	I/P: 100-240 Vac, 130mA ; O/P: 5Vdc,1000mA		
<b>Battery 1</b>	<b>Brand Name</b>	Motorola(ATL)	<b>Model Name</b>	KE40
	<b>Power Rating</b>	3.8Vdc, 2820/3000mAh (Rated/typ)	<b>Type</b>	Li-ion
<b>Battery 2</b>	<b>Brand Name</b>	Motorola(Sunwoda)	<b>Model Name</b>	KE40
	<b>Power Rating</b>	3.8Vdc, 2820/3000mAh (Rated/typ)	<b>Type</b>	Li-ion
<b>USB Cable</b>	<b>Brand Name</b>	Motorola (SaiBao)	<b>Model Name</b>	711310002241
	<b>Signal Line Type</b>	1.0 meter, shielded cable, without ferrite core		



### 1.7 Testing Location

Sporton International (Kunshan) Inc is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0).

<b>Test Site</b>	Sporton International (Kunshan) Inc.		
<b>Test Site Location</b>	No. 1098, Pengxi North Road, Kunshan Economic Development Zone, Jiangsu Province 215335, China TEL : 86-512-57900158 FAX : 86-512-57900958		
<b>Test Site No.</b>	<b>Sporton Site No.</b>	<b>FCC designation No.</b>	<b>FCC Test Firm Registration No.</b>
	TH01-KS CO01-KS 03CH05-KS	CN5013	630927

### 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 v05r01
- ♦ 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 (X plane) were recorded in this report.
  
- b. AC power line Conducted Emission was tested under maximum output power.

### 2.1 Carrier Frequency and Channel

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





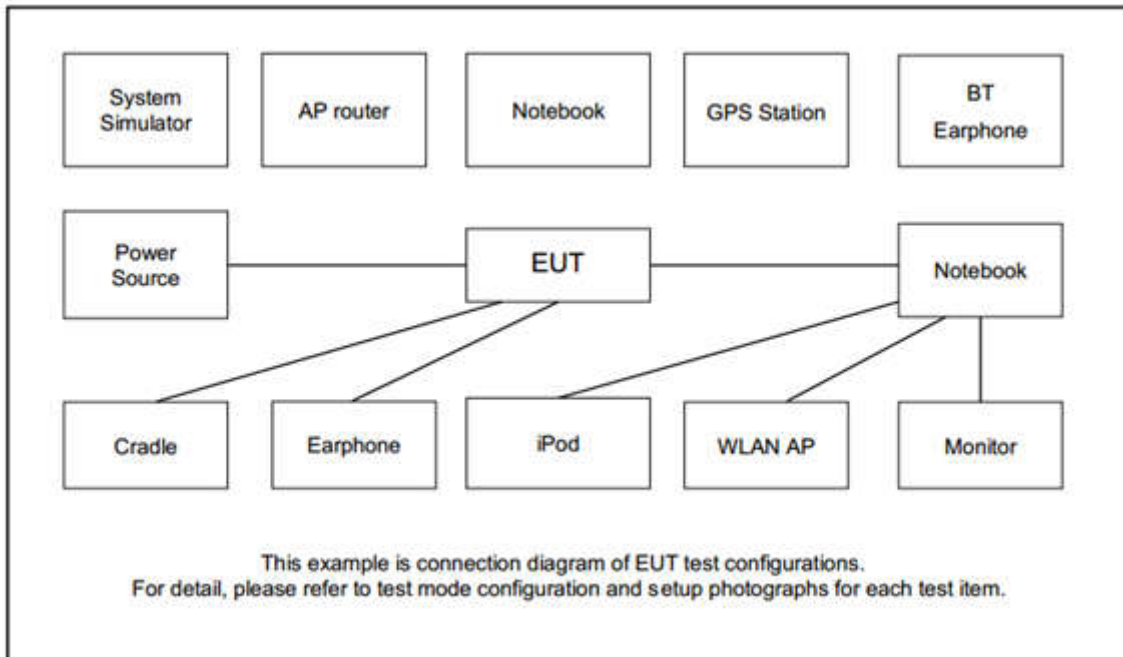
## 2.2 Test Mode

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

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

Test Cases	
AC Conducted Emission	Mode 1 :GSM 850 Idle + Bluetooth Link + WLAN Link (2.4G) + USB Cable (Charging from Adapter 2) + Earphone + Battery 2

### 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	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8m
2.	WLAN AP	D-Link	DIR-855	KA2DIR855A2	N/A	Unshielded, 1.8m
3.	Bluetooth Earphone	Lenovo	LBH308	N/A	N/A	N/A
4.	Notebook	Lenovo	G480	N/A	N/A	AC I/P: Unshielded, 1.8m DC O/P: Shielded, 1.8 m
5.	Earphone	Lenovo	SH100	N/A	Unshielded, 1.2 m	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 and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss

$$\text{Offset} = \text{RF cable loss}$$

Following shows an offset computation example with cable loss 5.5 dB

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)}. \\ &= 5.5 \text{ (dB)} \end{aligned}$$

### 3 Test Result

#### 3.1 6dB Bandwidth Measurement

##### 3.1.1 Limit of 6dB Bandwidth

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

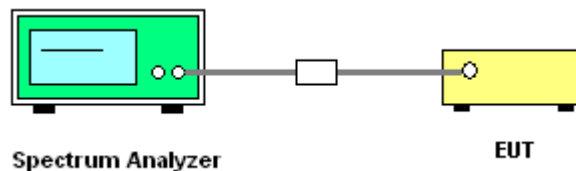
##### 3.1.2 Measuring Instruments

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

##### 3.1.3 Test Procedures

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

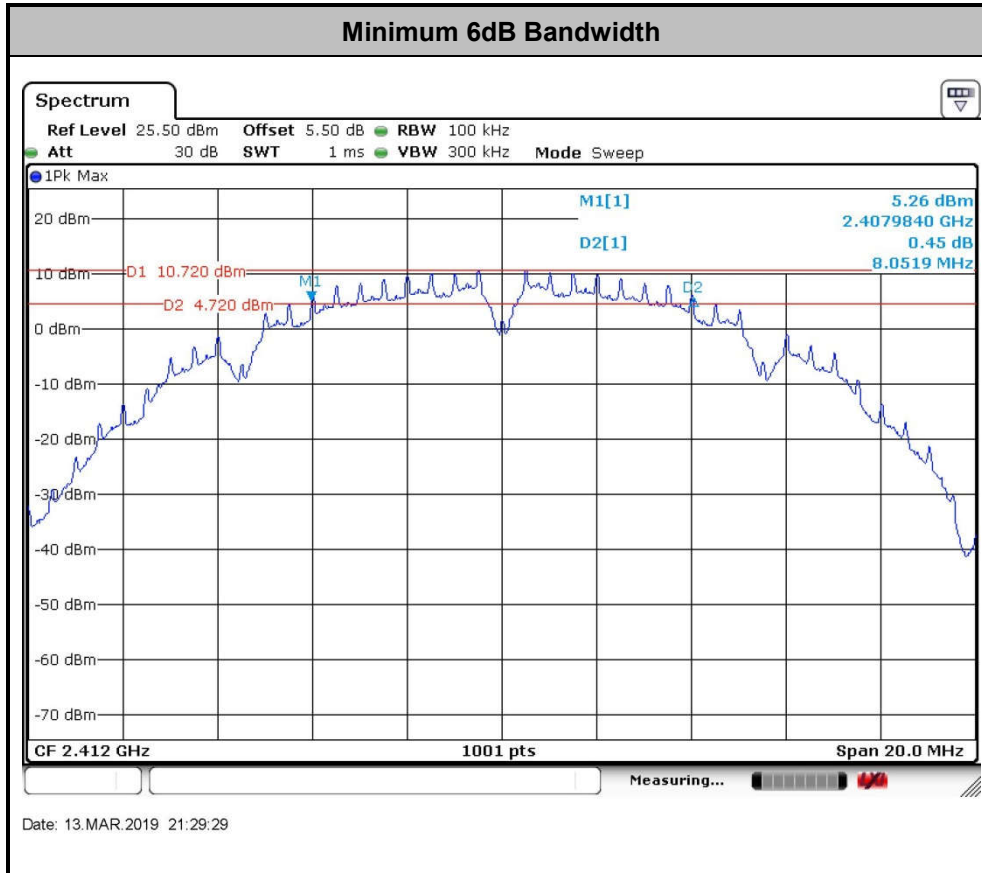
##### 3.1.4 Test Setup





### 3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.



## 3.2 Output Power Measurement

### 3.2.1 Limit of Output Power

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

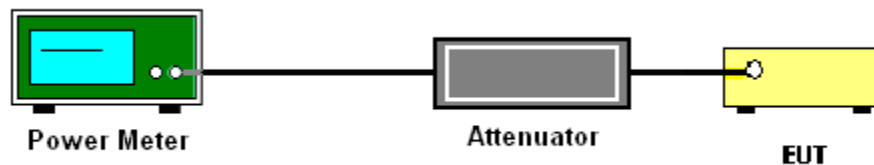
### 3.2.2 Measuring Instruments

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

### 3.2.3 Test Procedures

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

### 3.2.4 Test Setup



### 3.2.5 Test Result of Peak Output Power

Please refer to Appendix A.

### 3.2.6 Test Result of Average output Power (Reporting Only)

Please refer to Appendix A.



### 3.3 Power Spectral Density Measurement

#### 3.3.1 Limit of Power Spectral Density

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

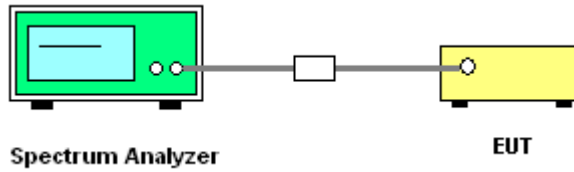
#### 3.3.2 Measuring Instruments

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

#### 3.3.3 Test Procedures

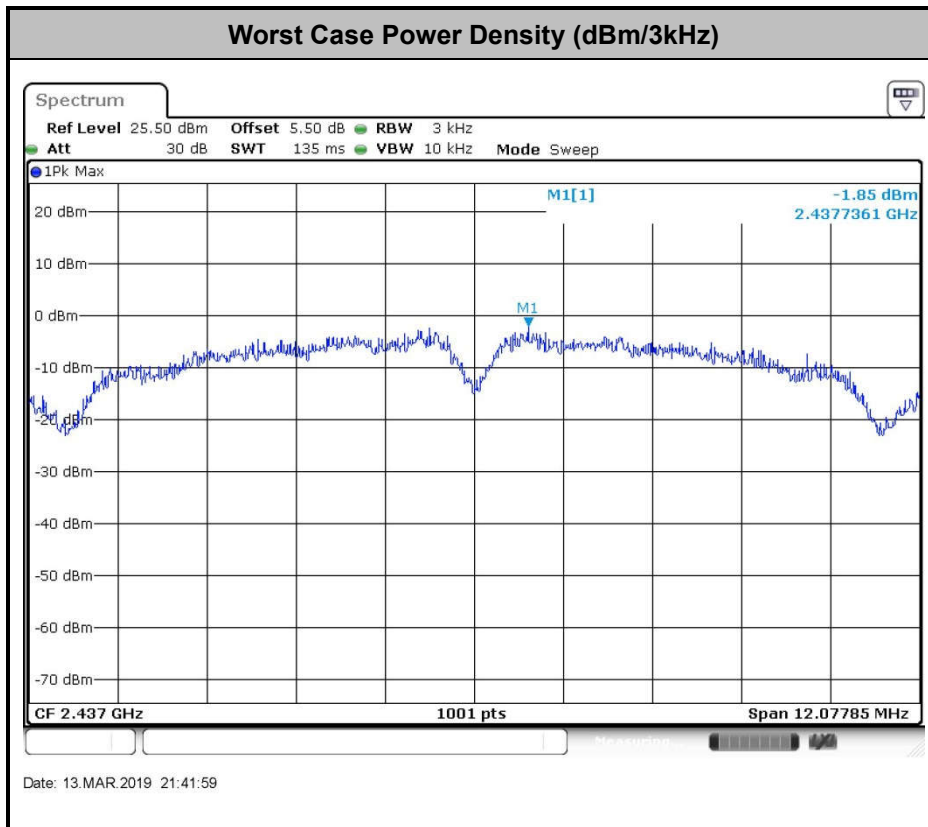
1. The testing follows Measurement Procedure of ANSI C63.10-2013 clause 11.10.2 Method PKPSD.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the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

### 3.3.4 Test Setup



### 3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.





## 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.

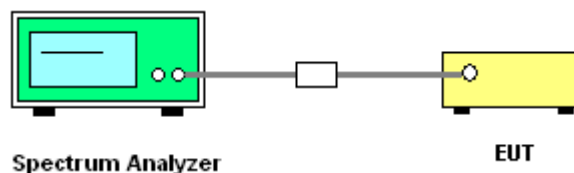
### 3.4.2 Measuring Instruments

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

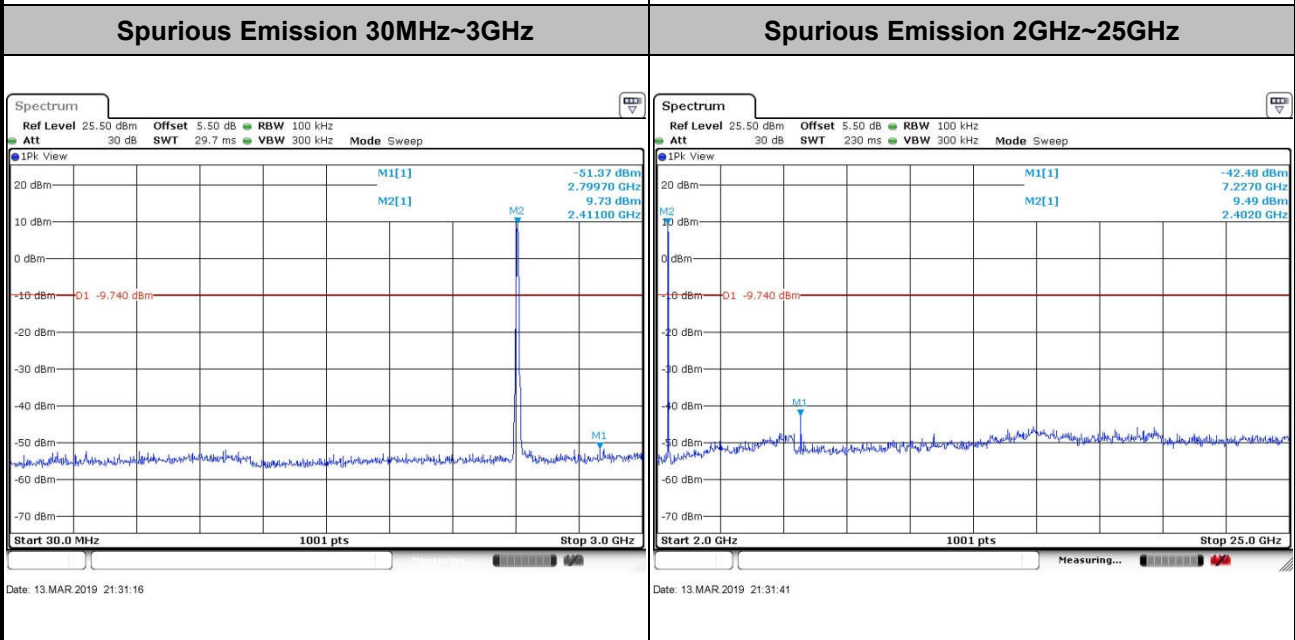
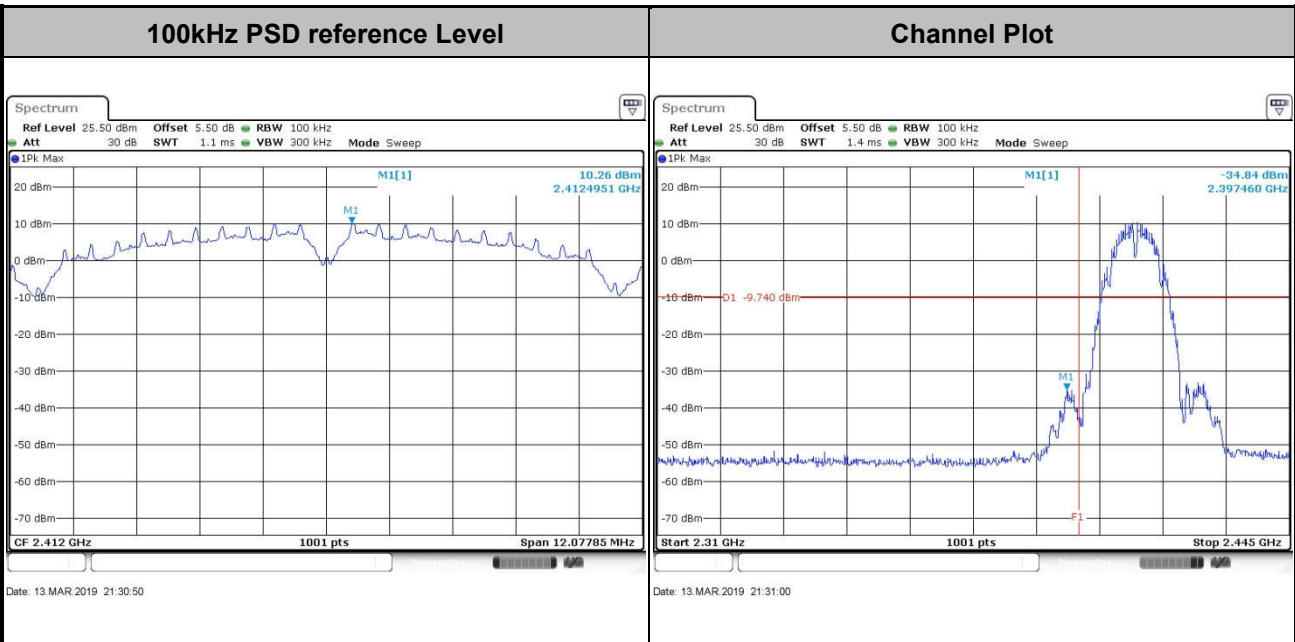




### 3.4.5 Test Result of Conducted Band Edges and Spurious Emission

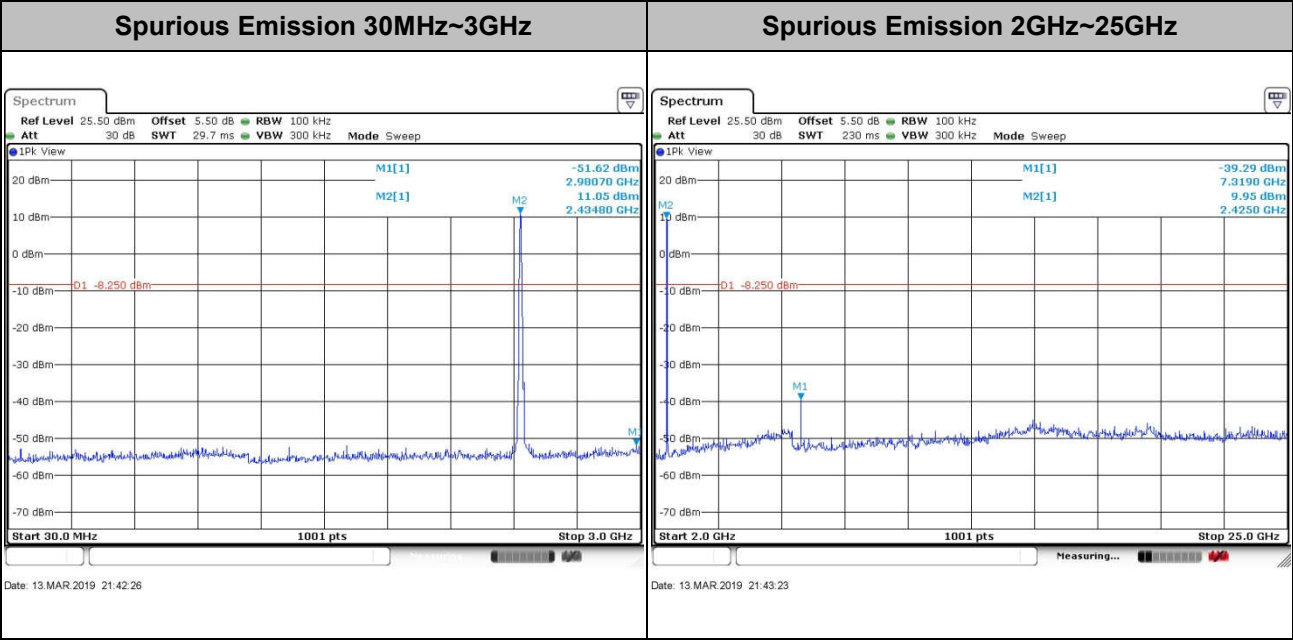
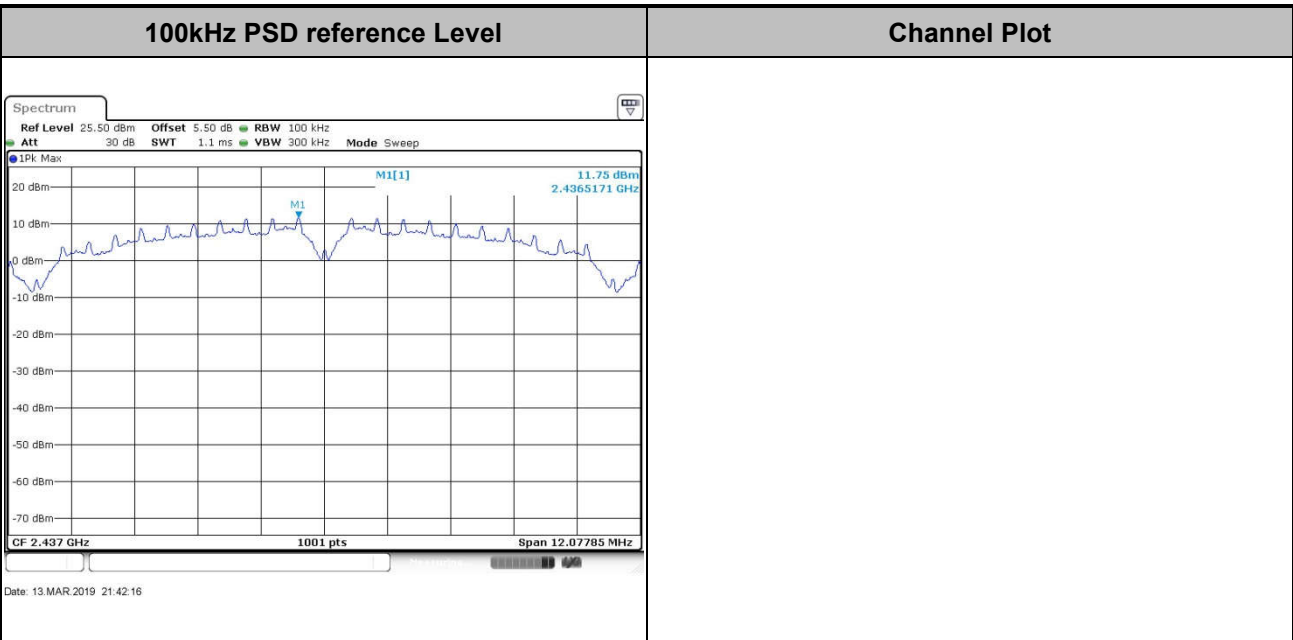
Test Engineer : Aaron Shen	Temperature : 21~25°C
	Relative Humidity : 51~54%

Test Mode : 802.11b	Test Channel : 01
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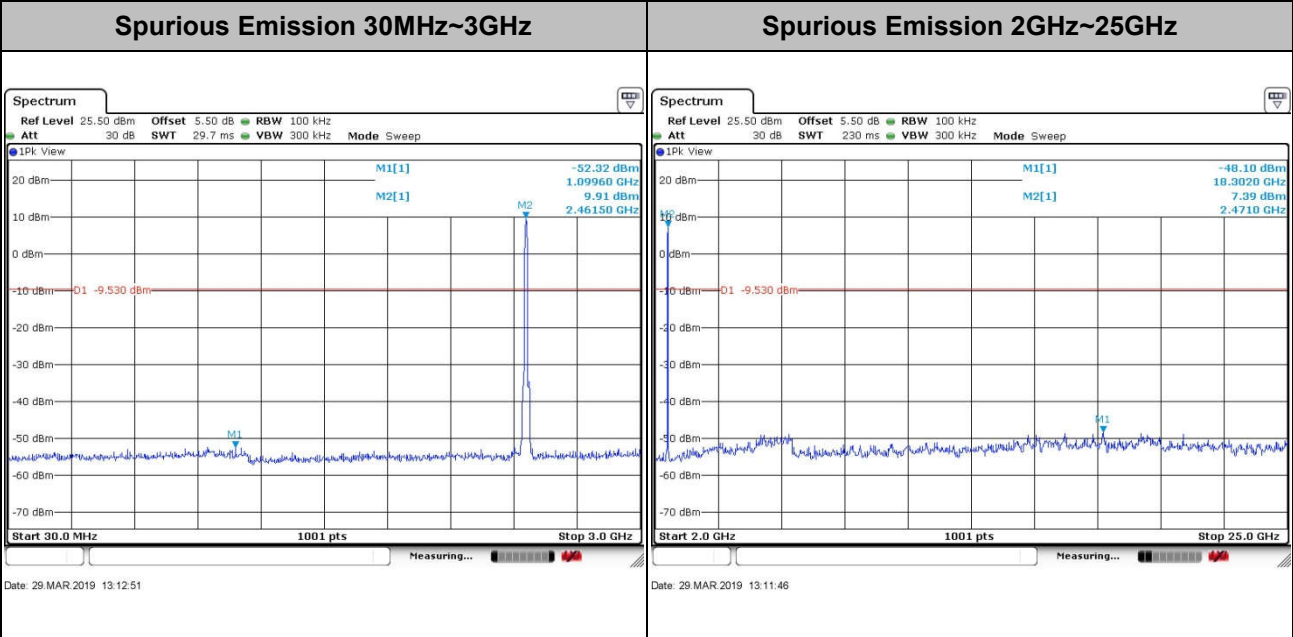
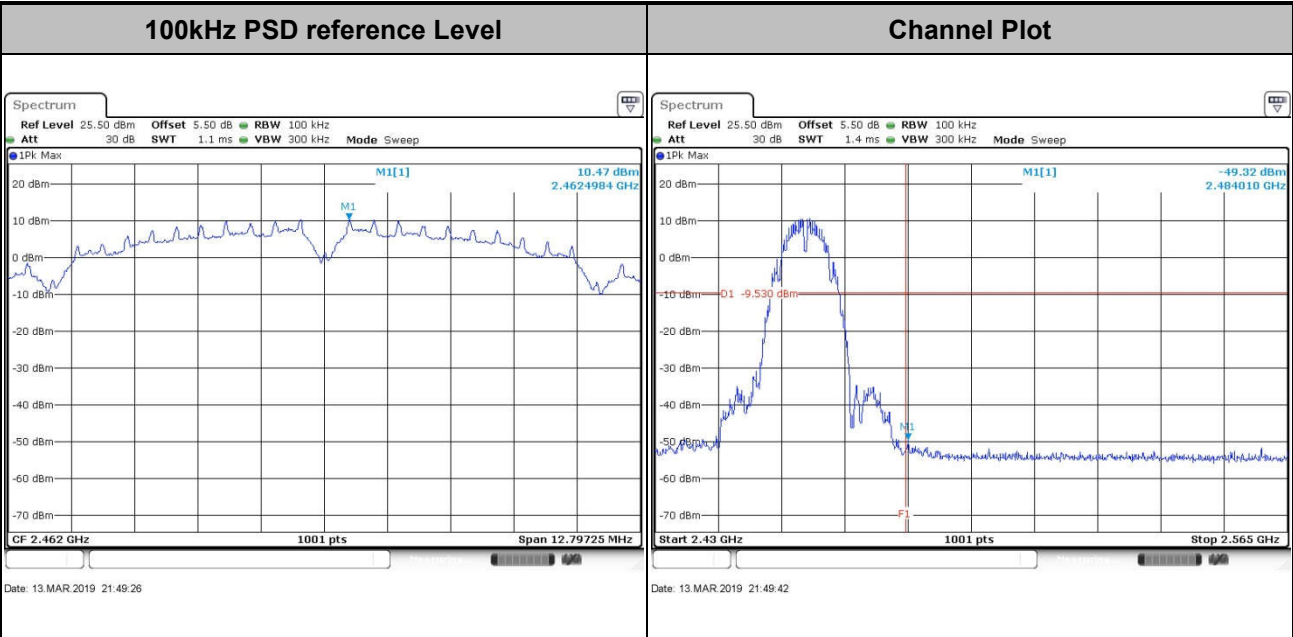


Test Mode :	802.11b	Test Channel :	06
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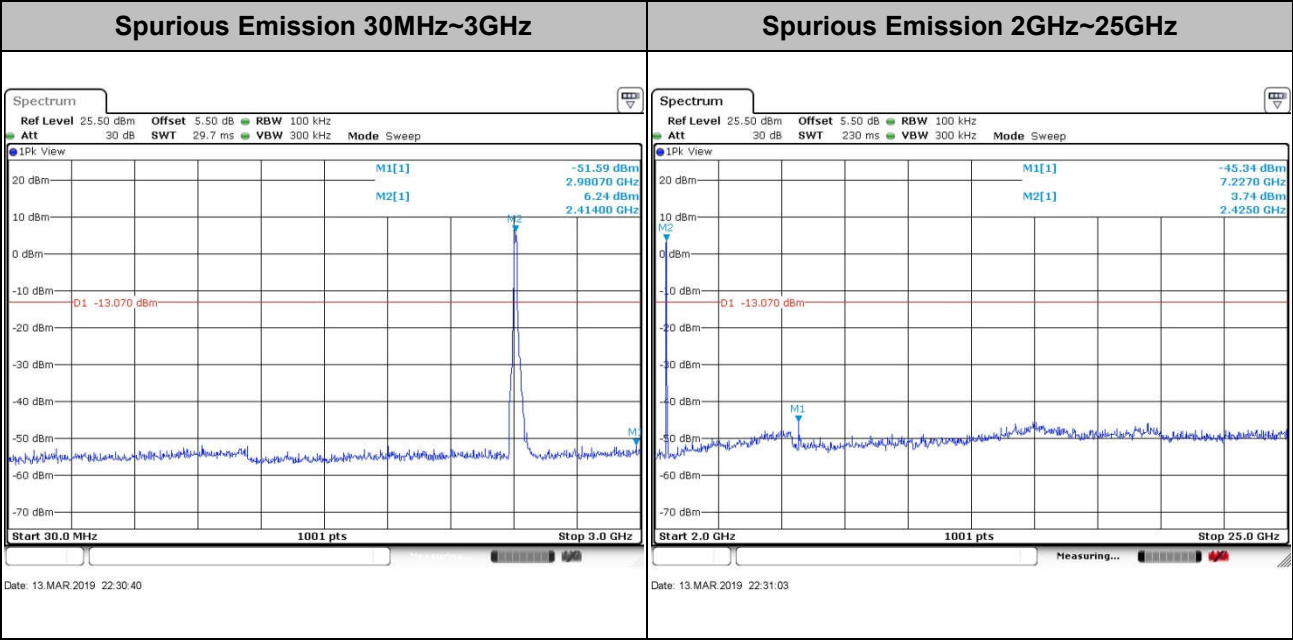
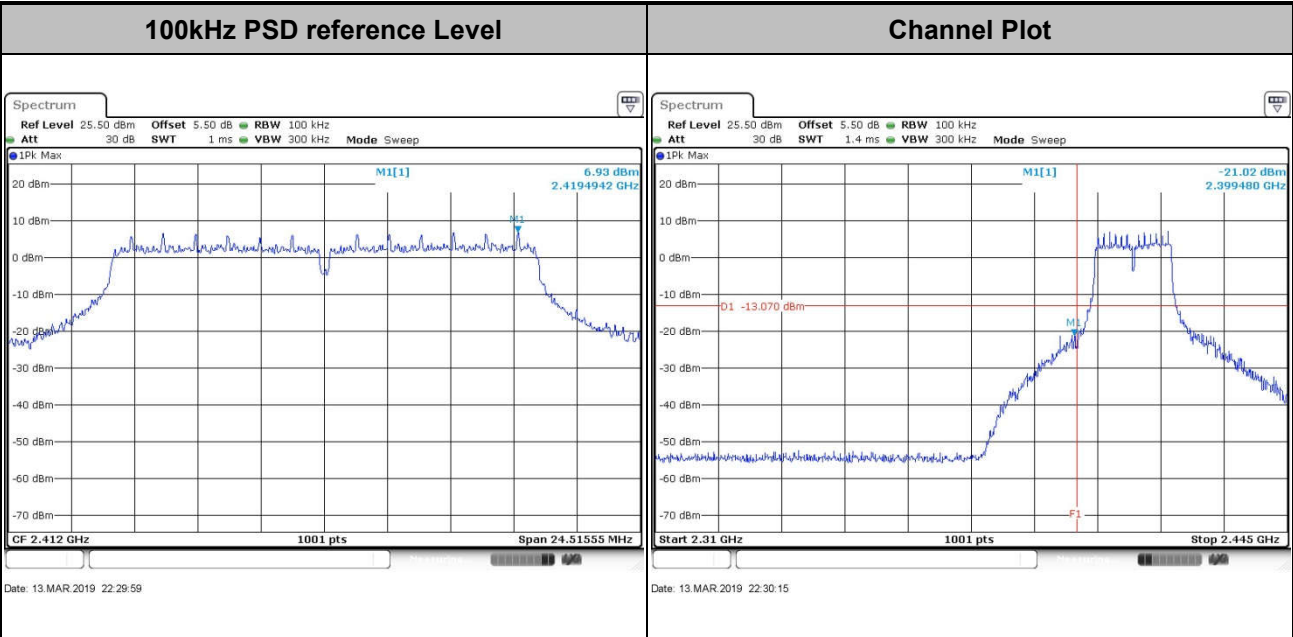


Test Mode :	802.11b	Test Channel :	11
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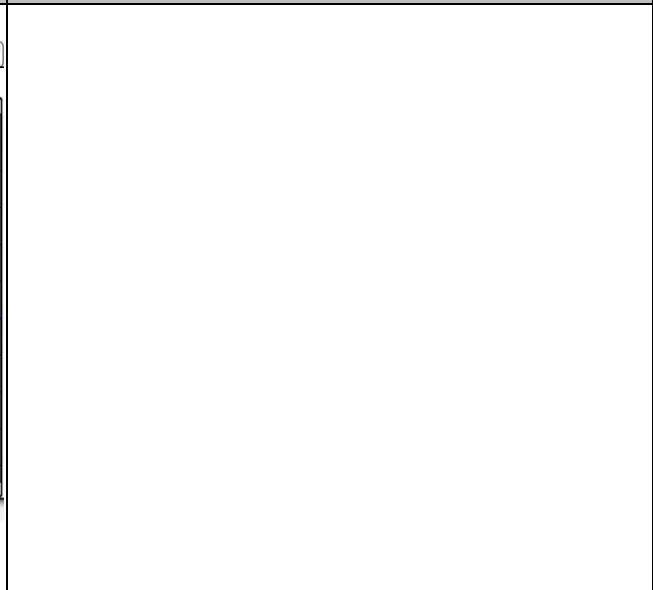
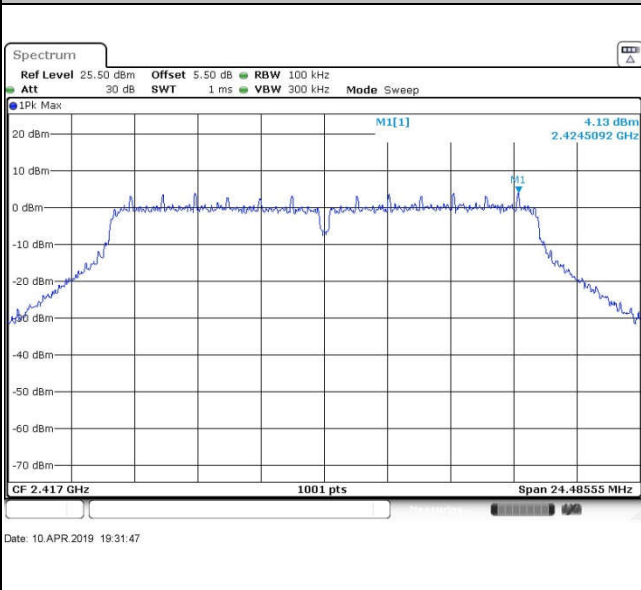
Test Mode : 802.11g Test Channel : 01



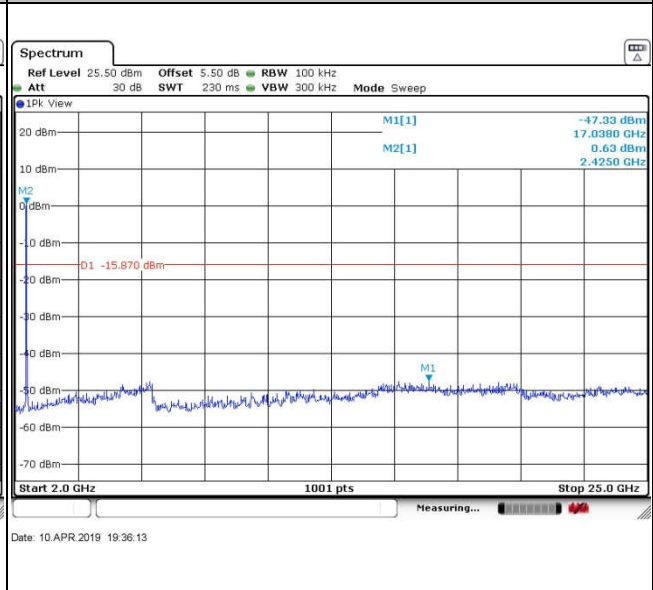
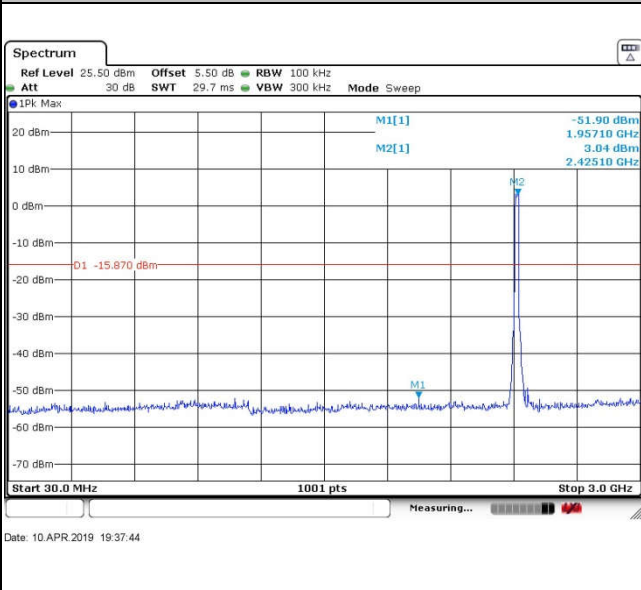


Test Mode :	802.11g	Test Channel :	02
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<b>100kHz PSD reference Level</b>	<b>Channel Plot</b>
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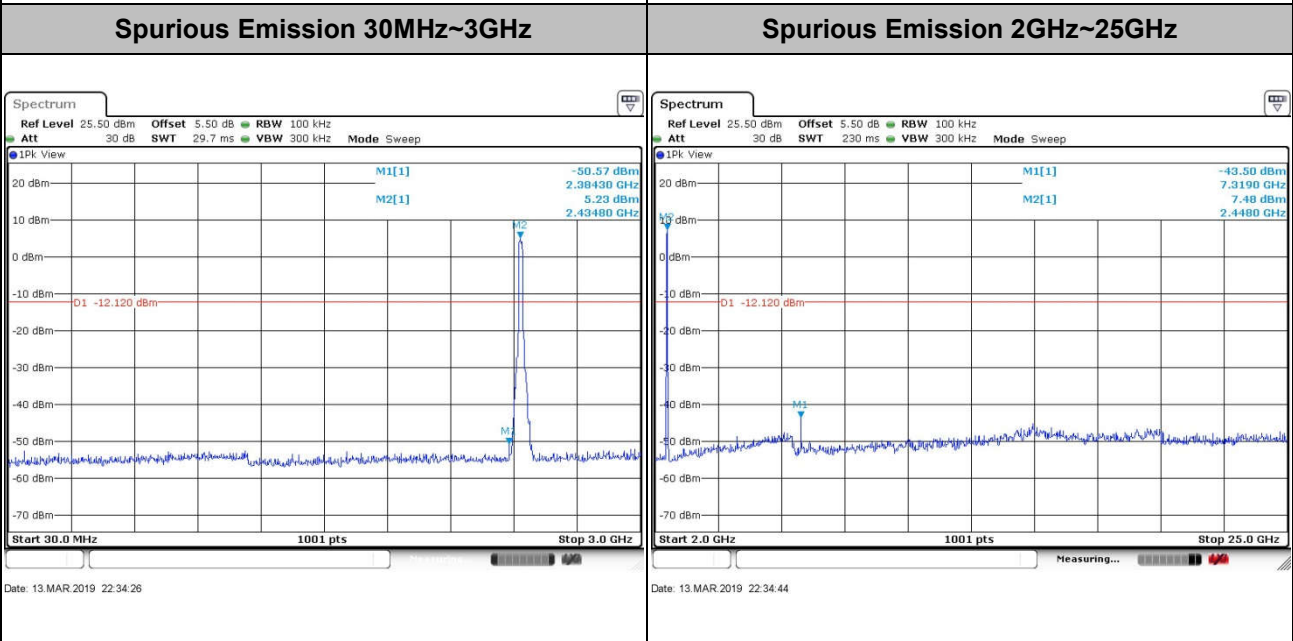
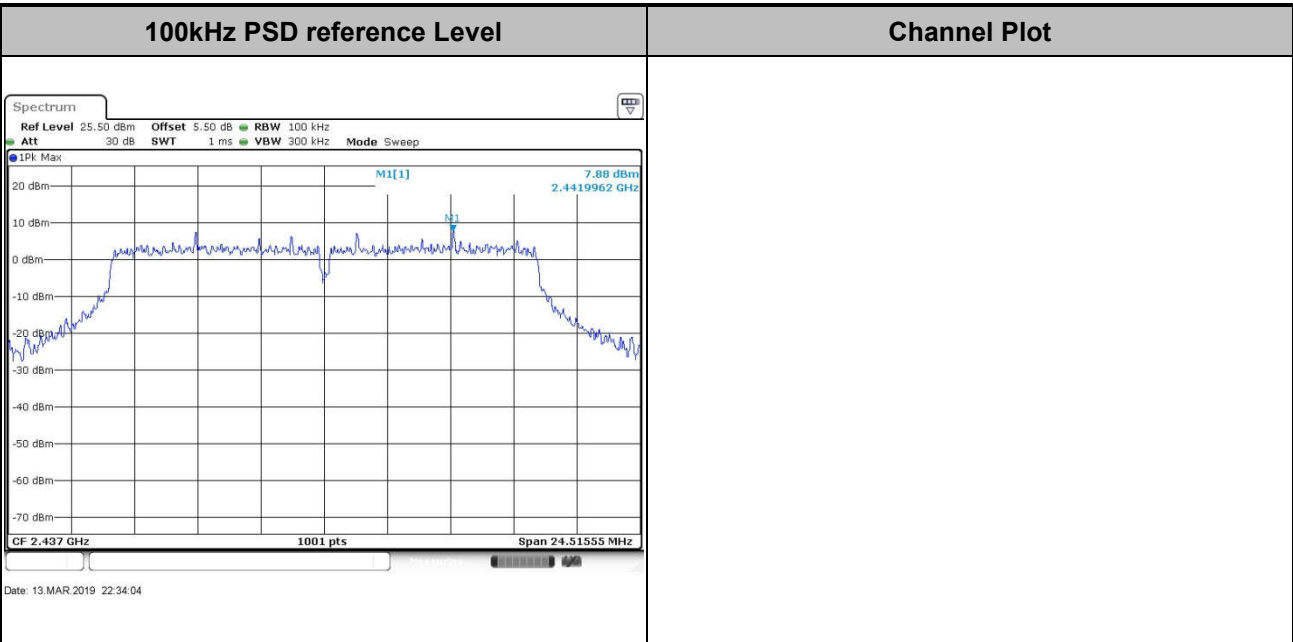


<b>Spurious Emission 30MHz~3GHz</b>	<b>Spurious Emission 2GHz~25GHz</b>
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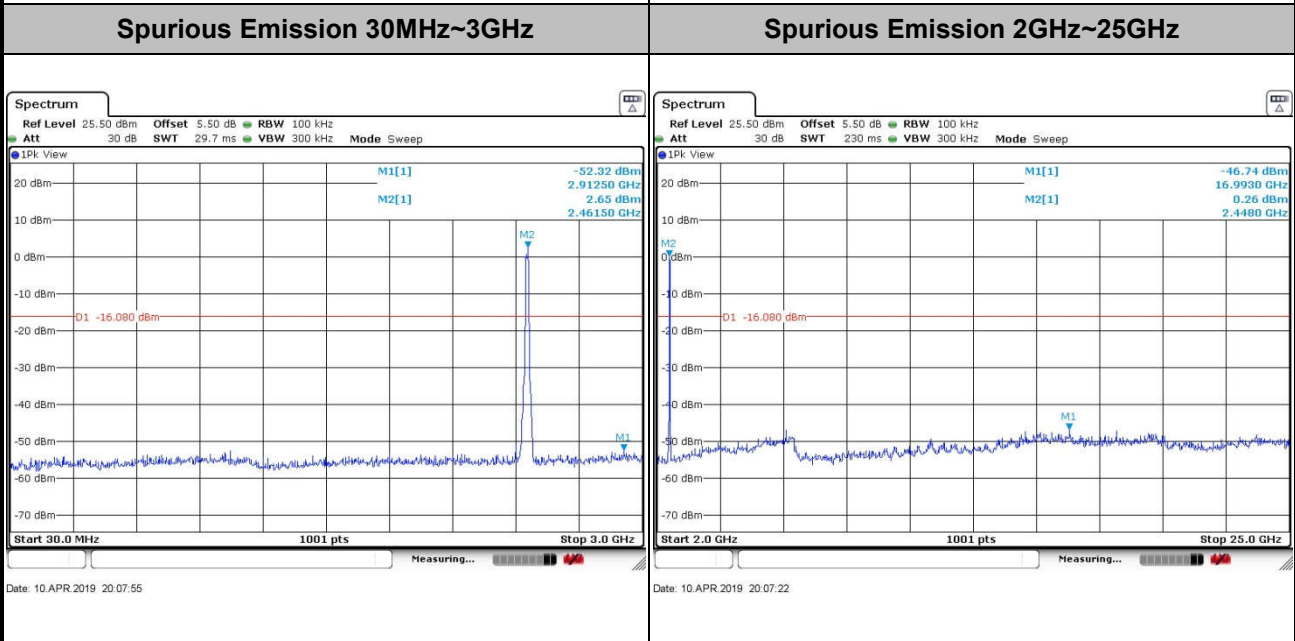
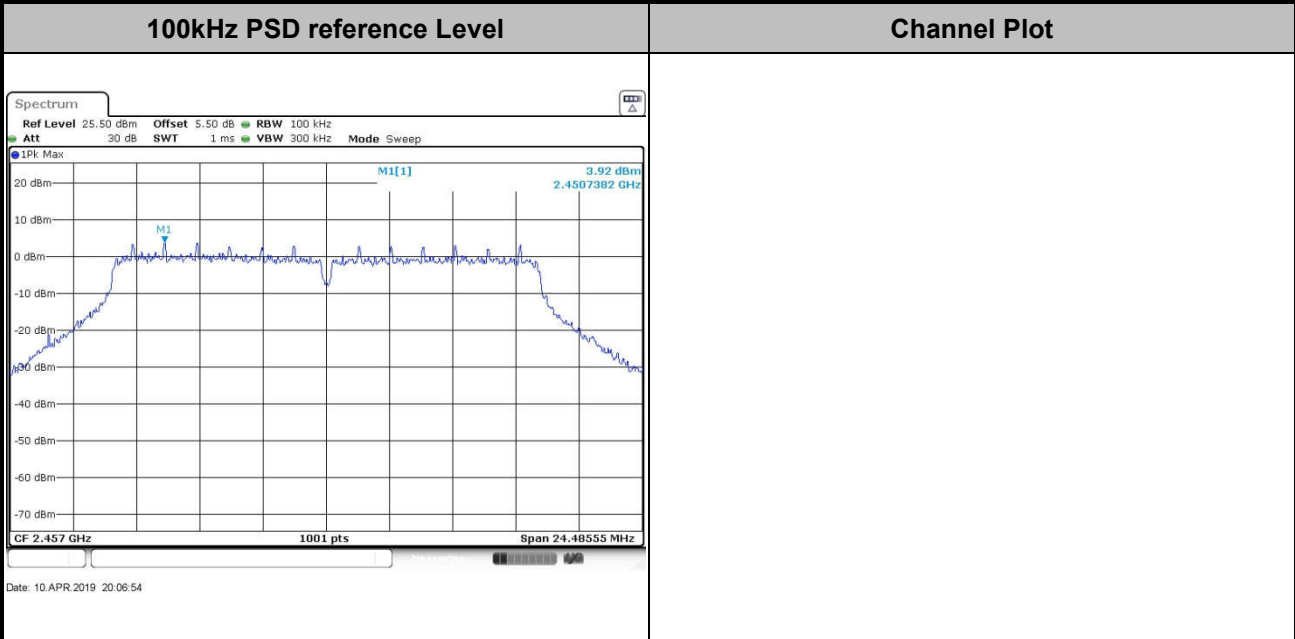


Test Mode :	802.11g	Test Channel :	06
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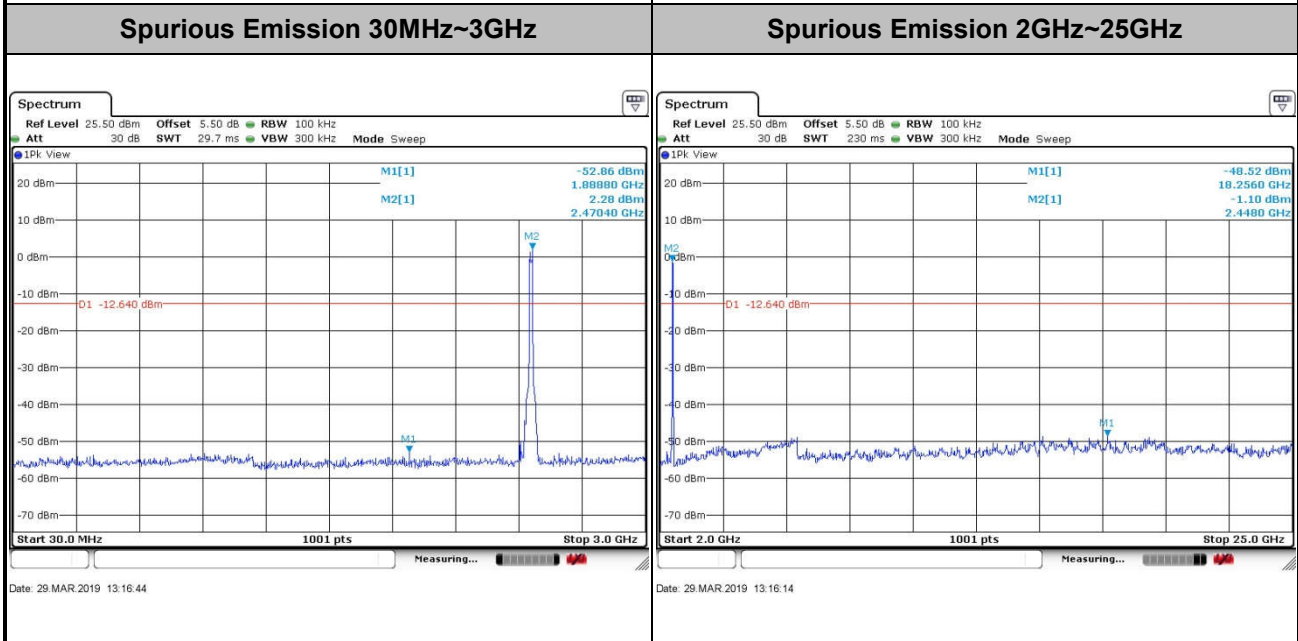
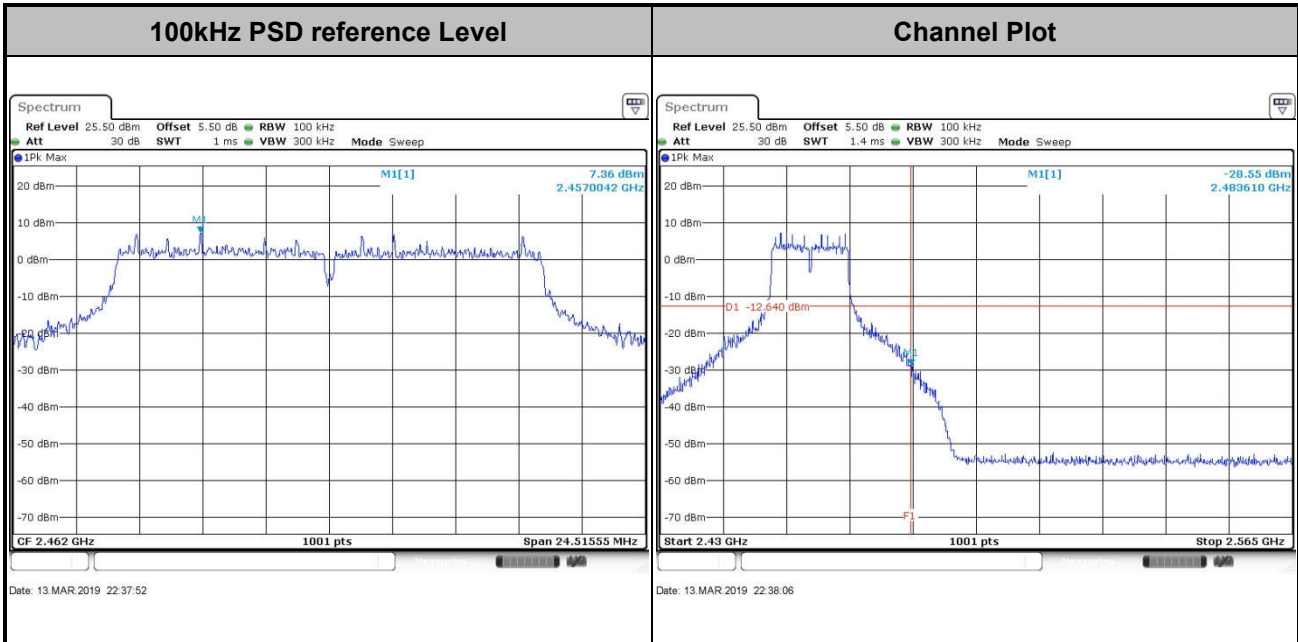
Test Mode :	802.11g	Test Channel :	10
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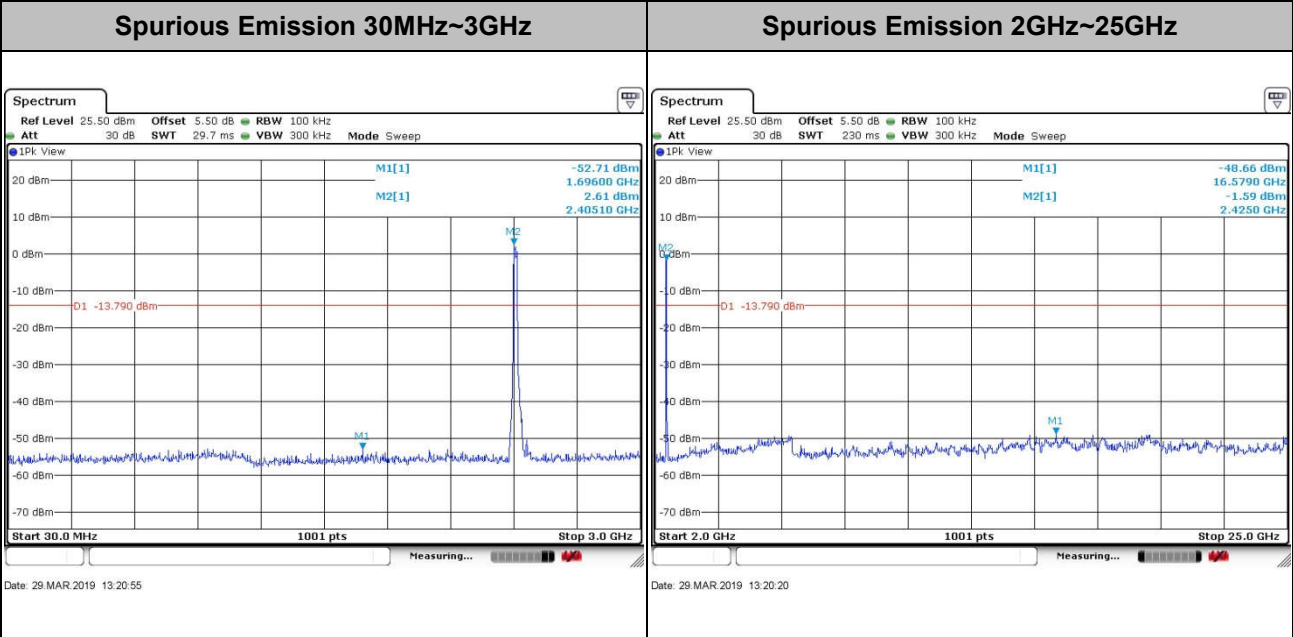
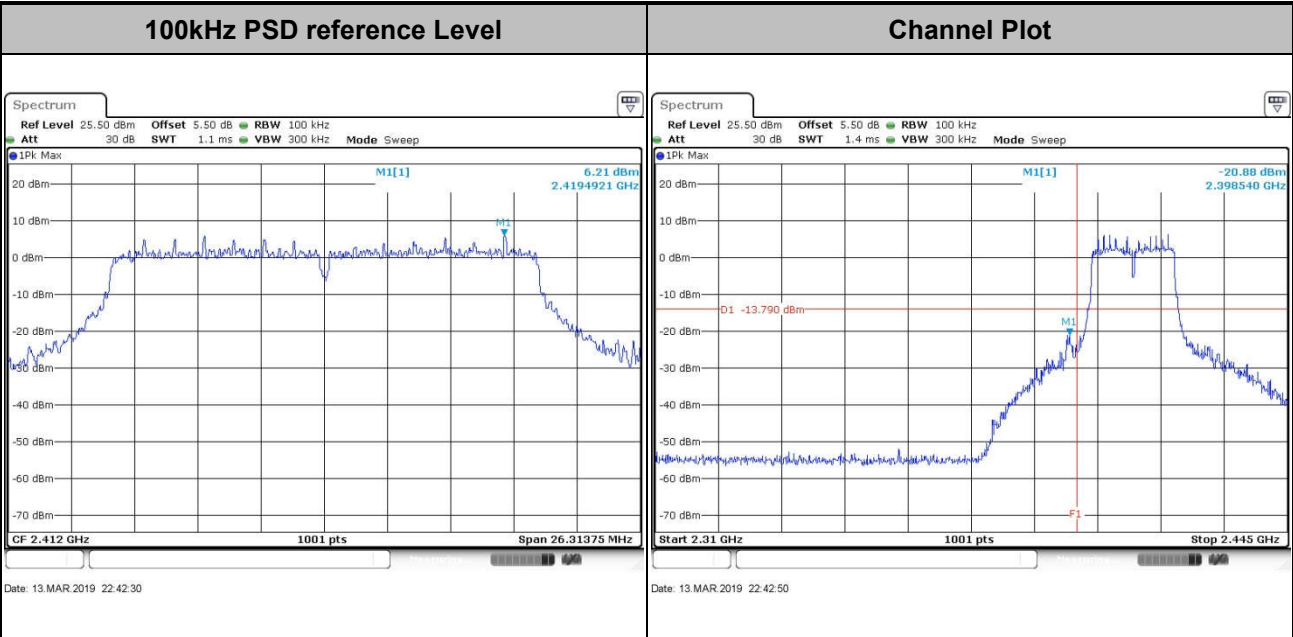


Test Mode :	802.11g	Test Channel :	11
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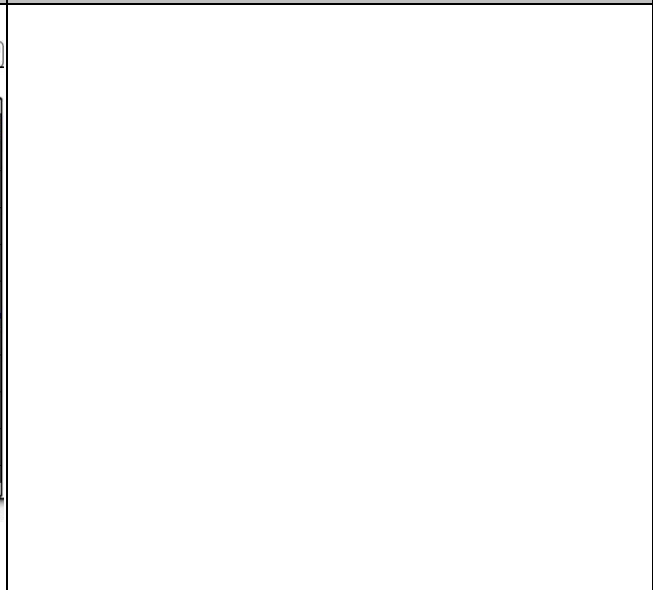
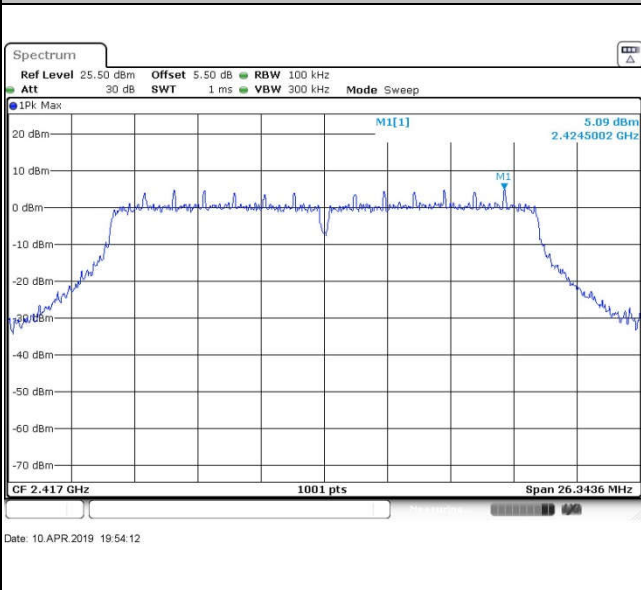
Test Mode : 802.11n HT20 Test Channel : 01



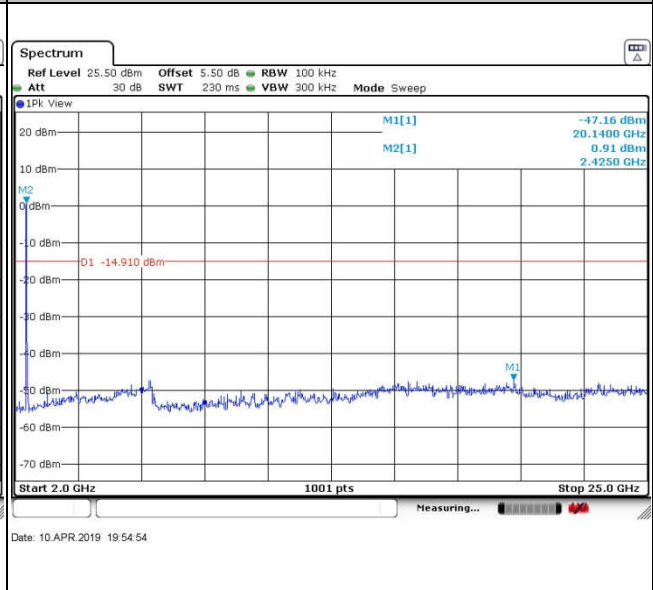
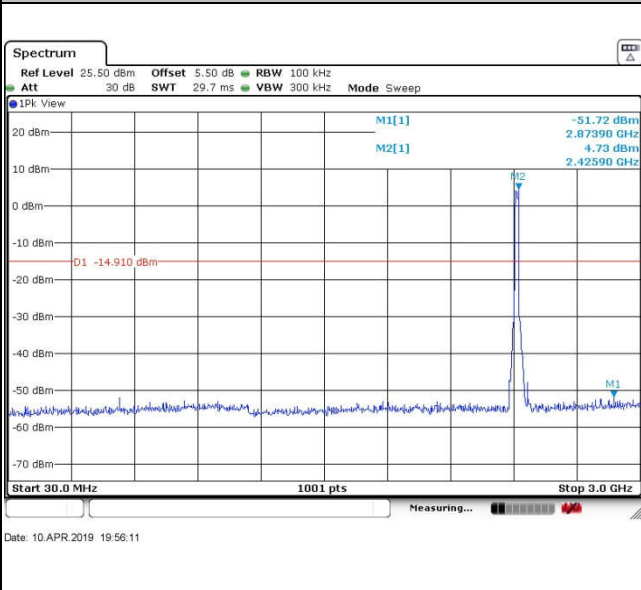


Test Mode :	802.11n HT20	Test Channel :	02
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<b>100kHz PSD reference Level</b>	<b>Channel Plot</b>
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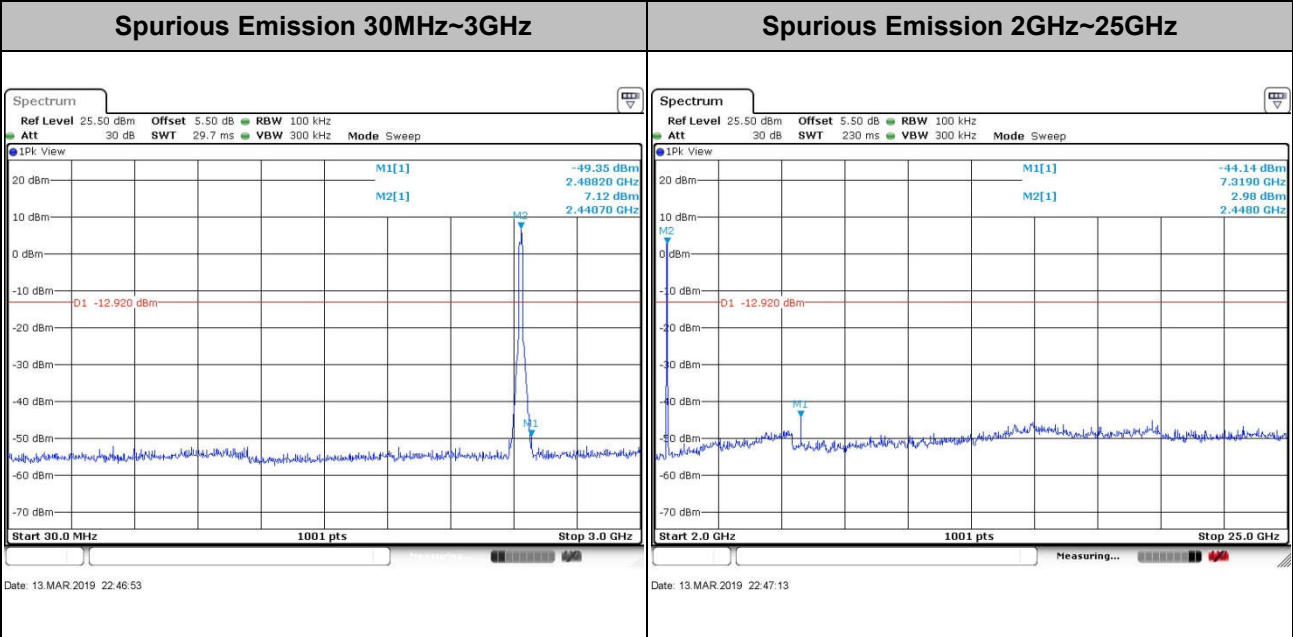
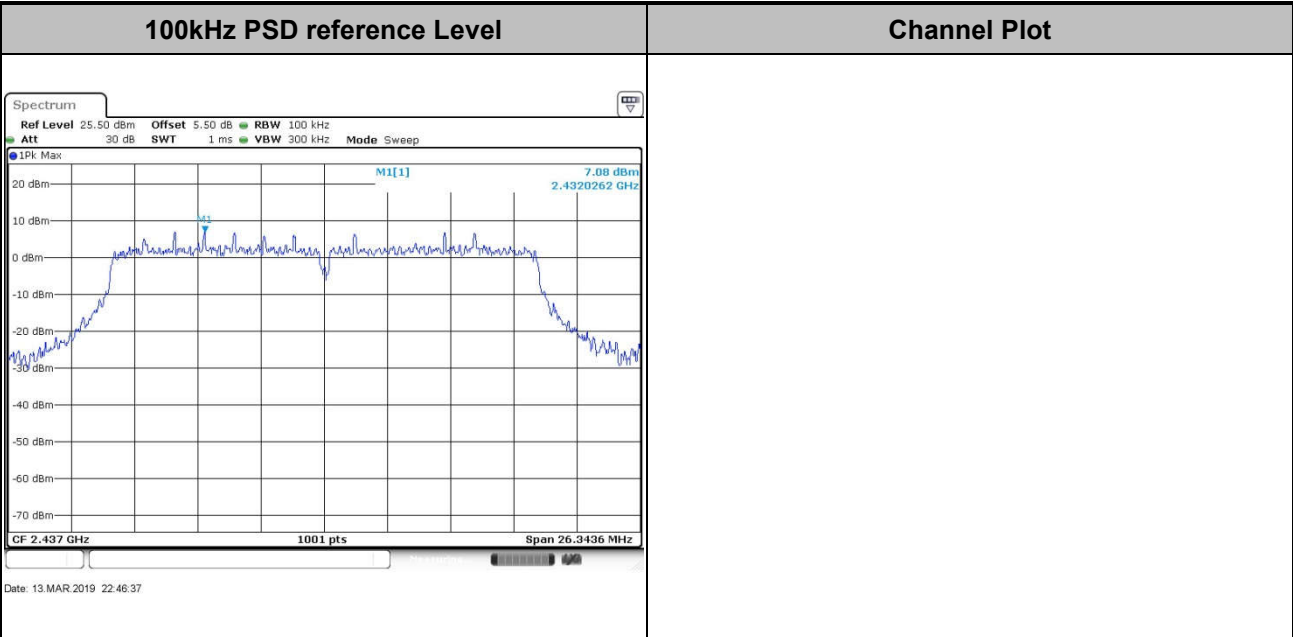


<b>Spurious Emission 30MHz~3GHz</b>	<b>Spurious Emission 2GHz~25GHz</b>
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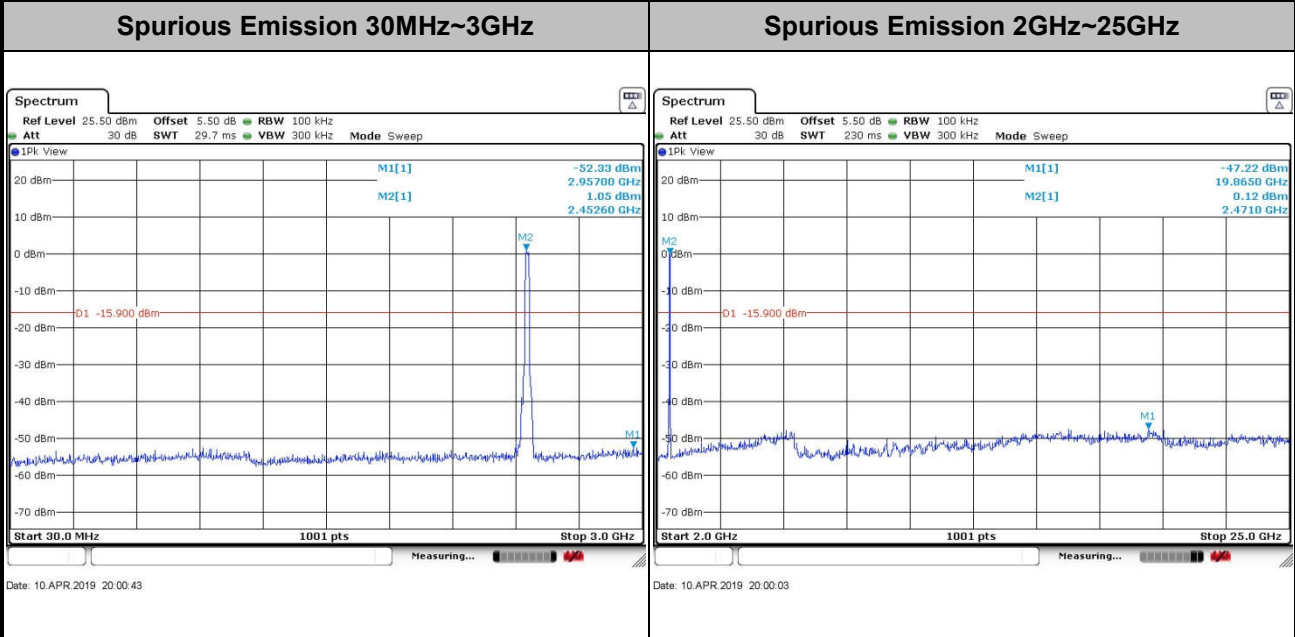
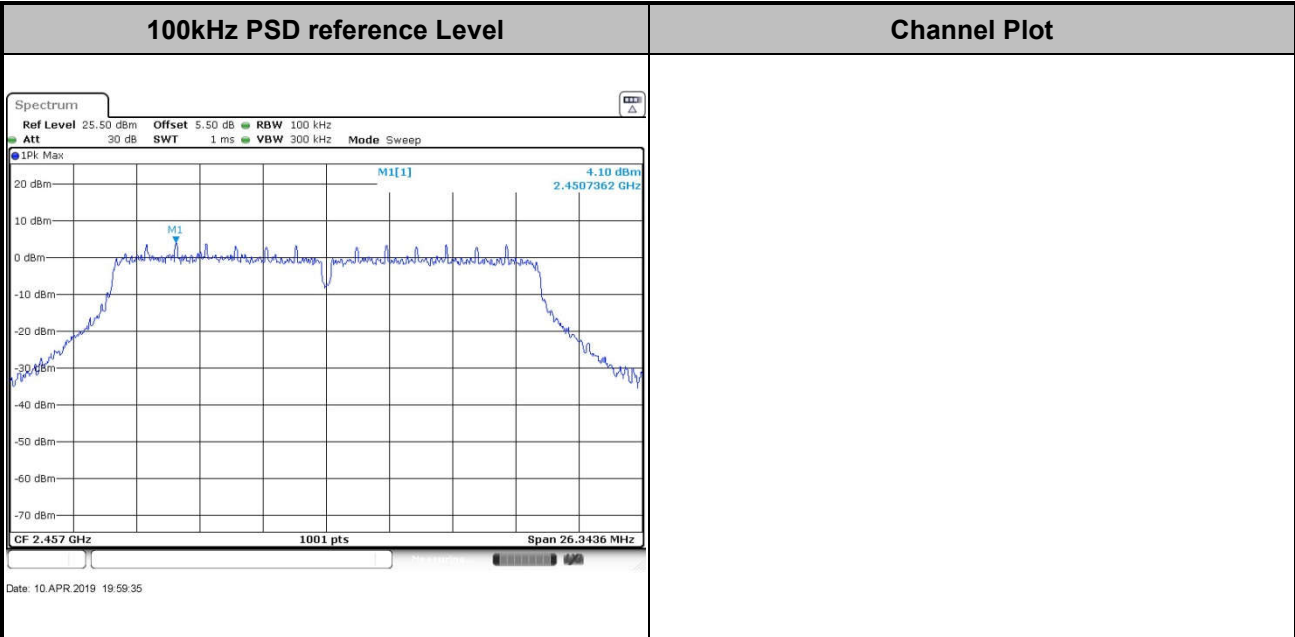


Test Mode :	802.11n HT20	Test Channel :	06
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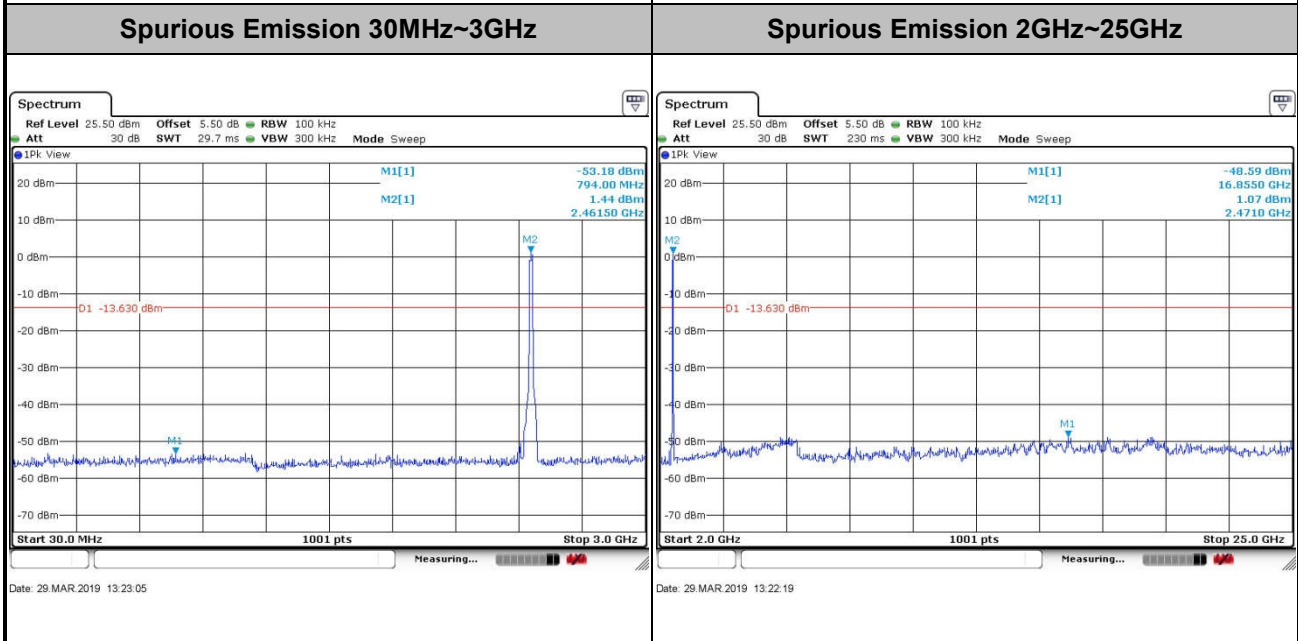
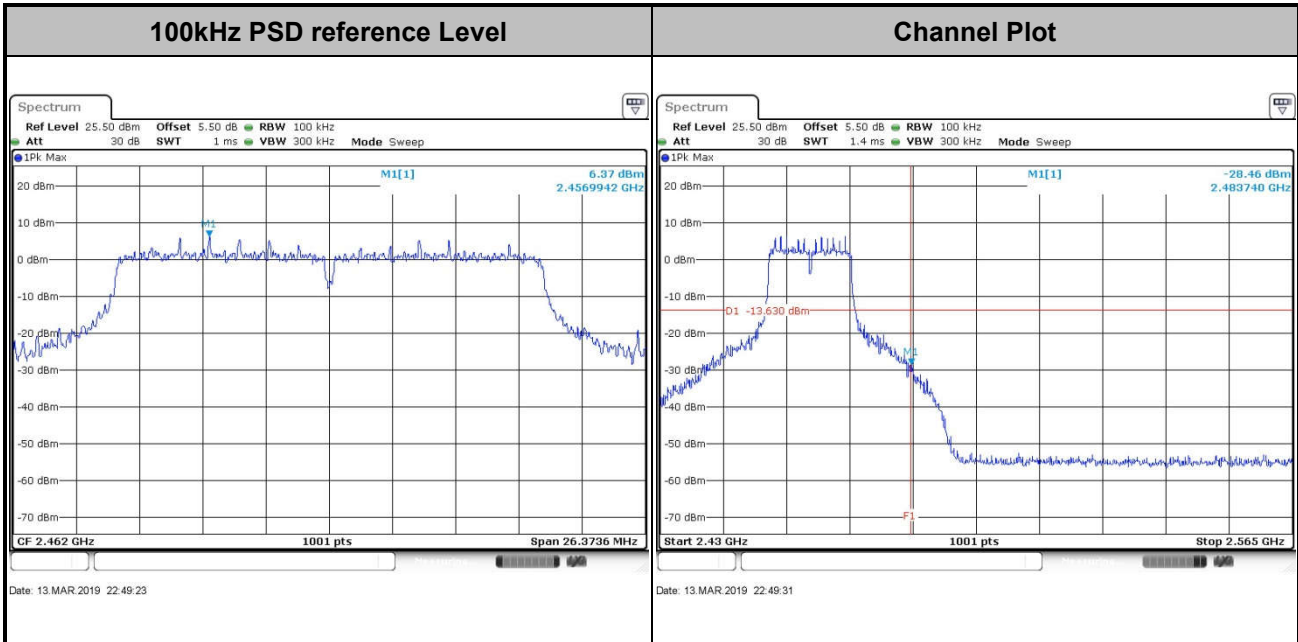


Test Mode :	802.11n HT20	Test Channel :	10
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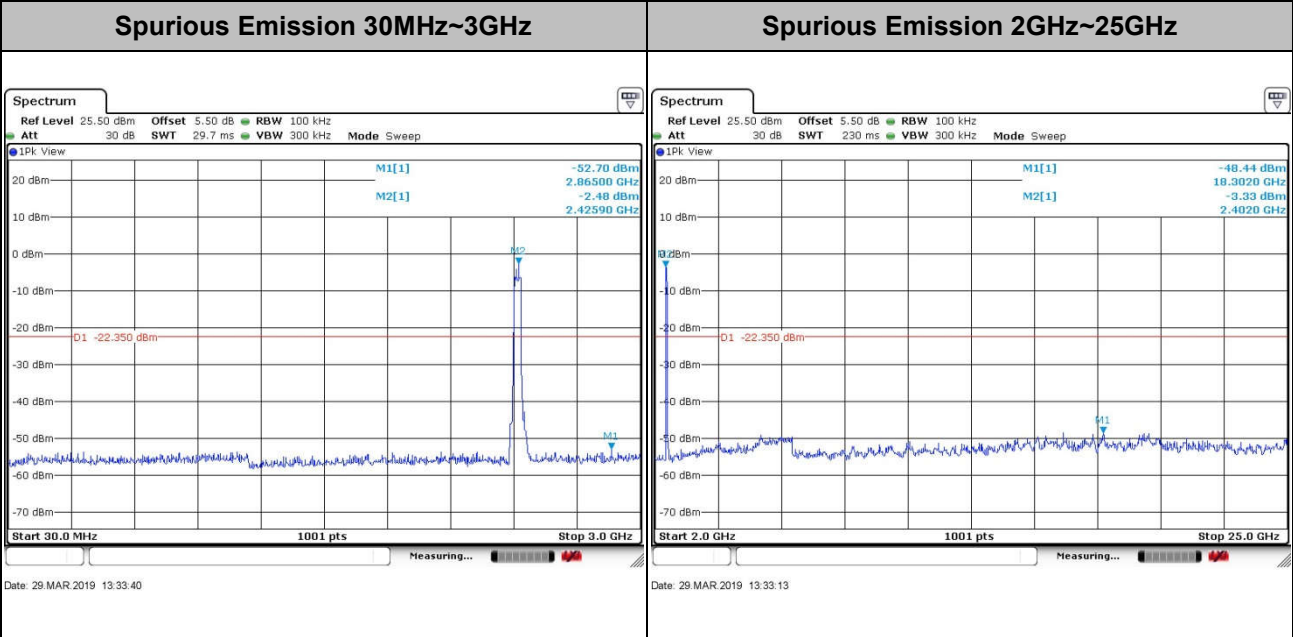
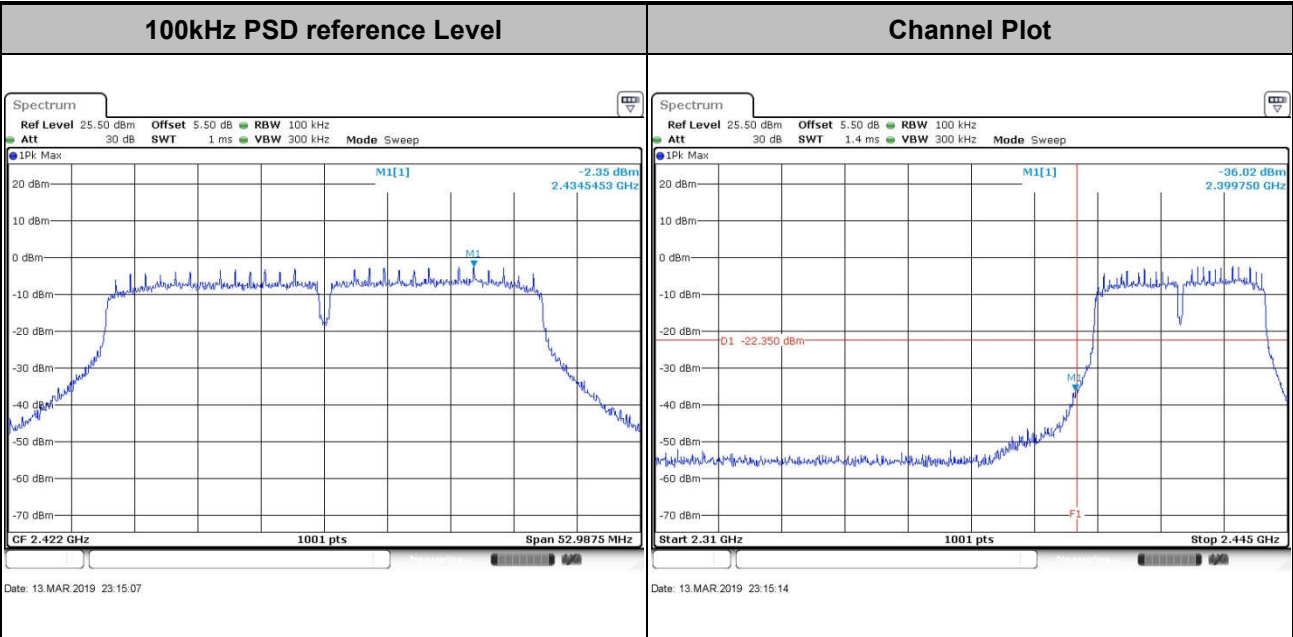


Test Mode :	802.11n HT20	Test Channel :	11
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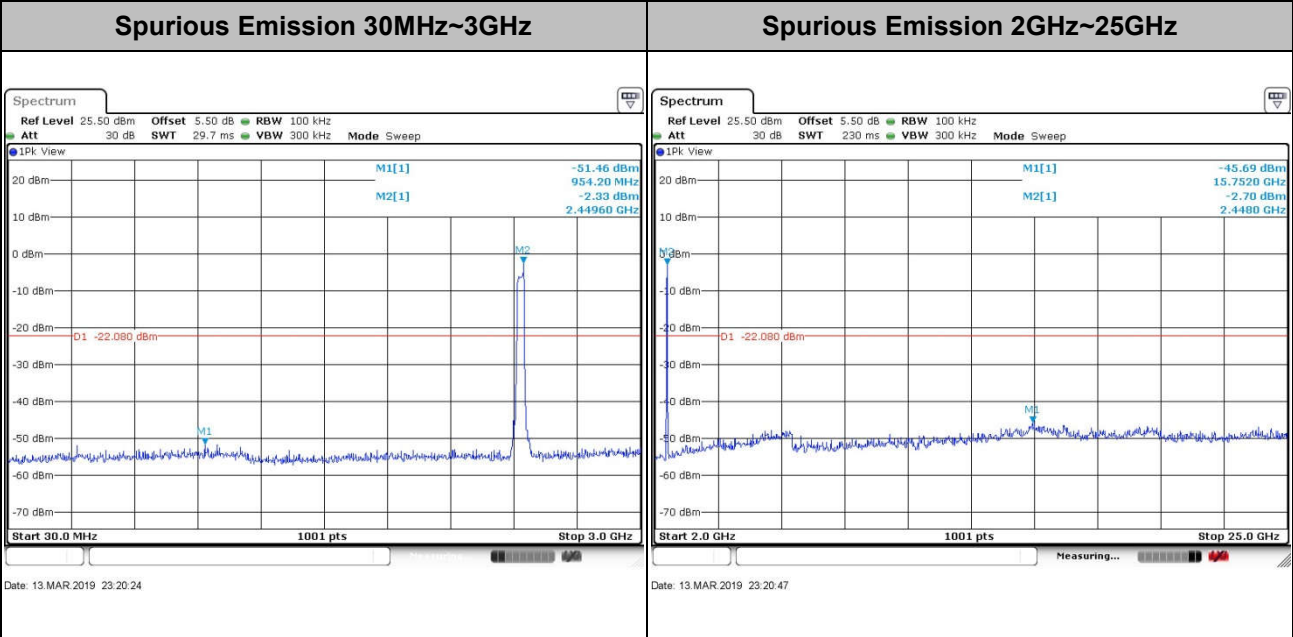
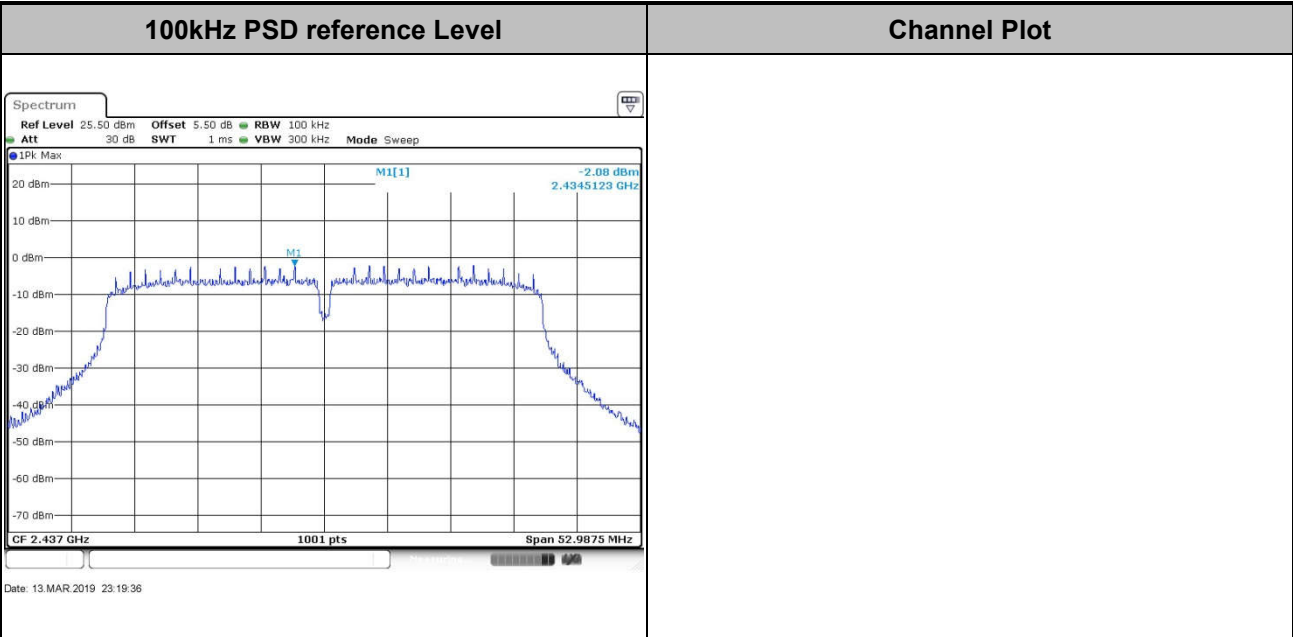


Test Mode : 802.11n HT40      Test Channel : 03





Test Mode :	802.11n HT40	Test Channel :	06
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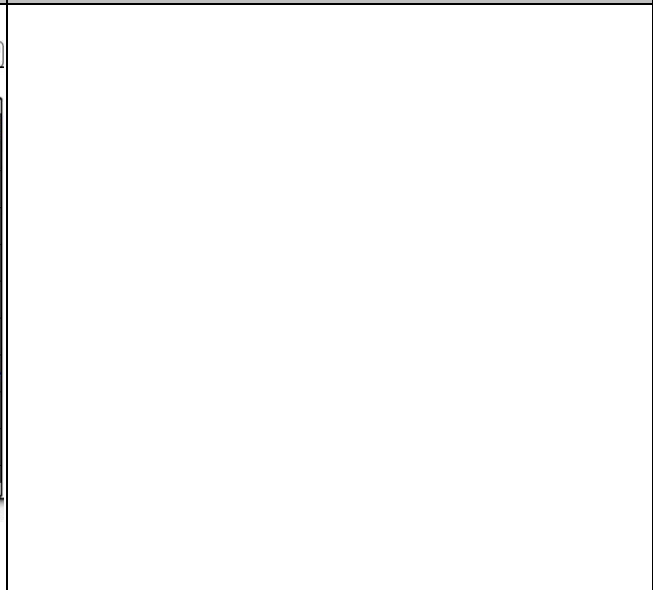
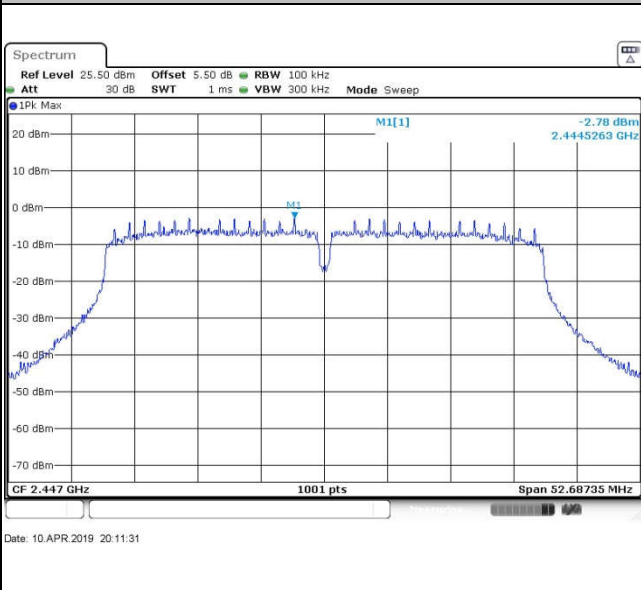




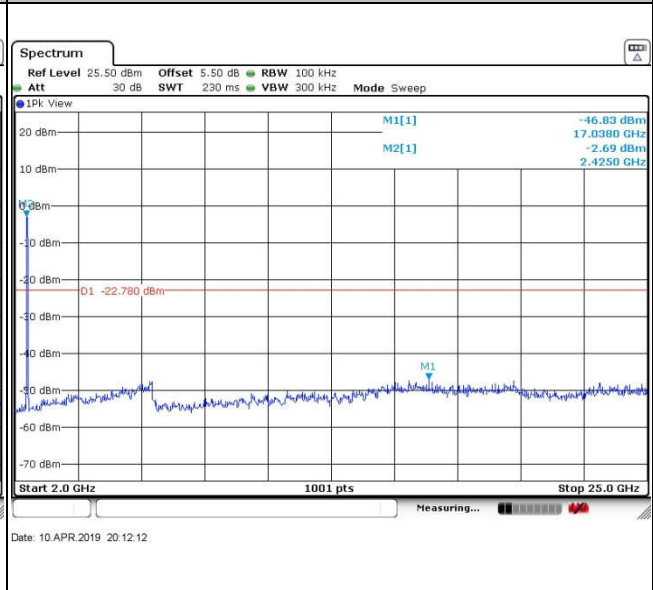
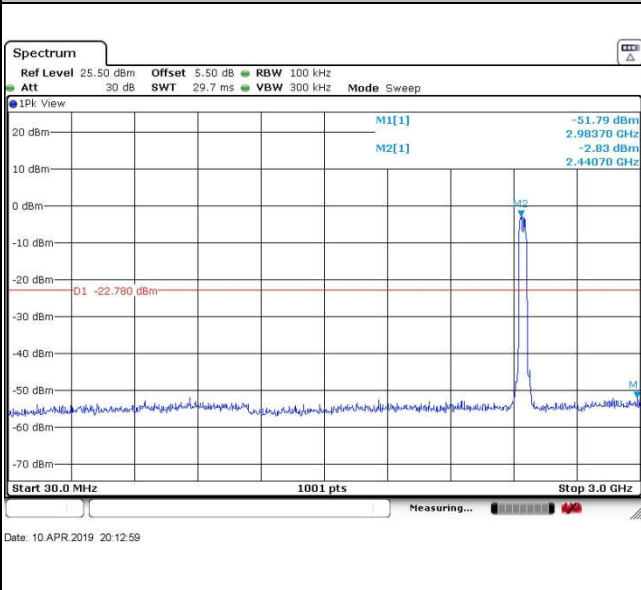


Test Mode :	802.11n HT40	Test Channel :	08
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<b>100kHz PSD reference Level</b>	<b>Channel Plot</b>
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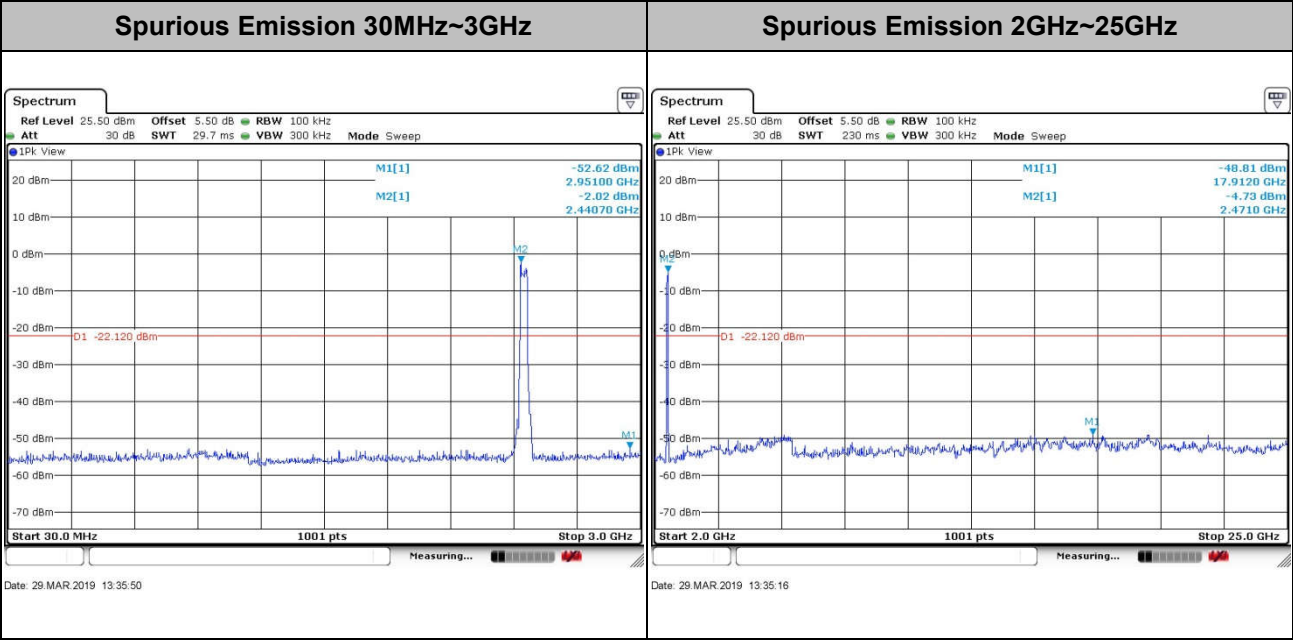
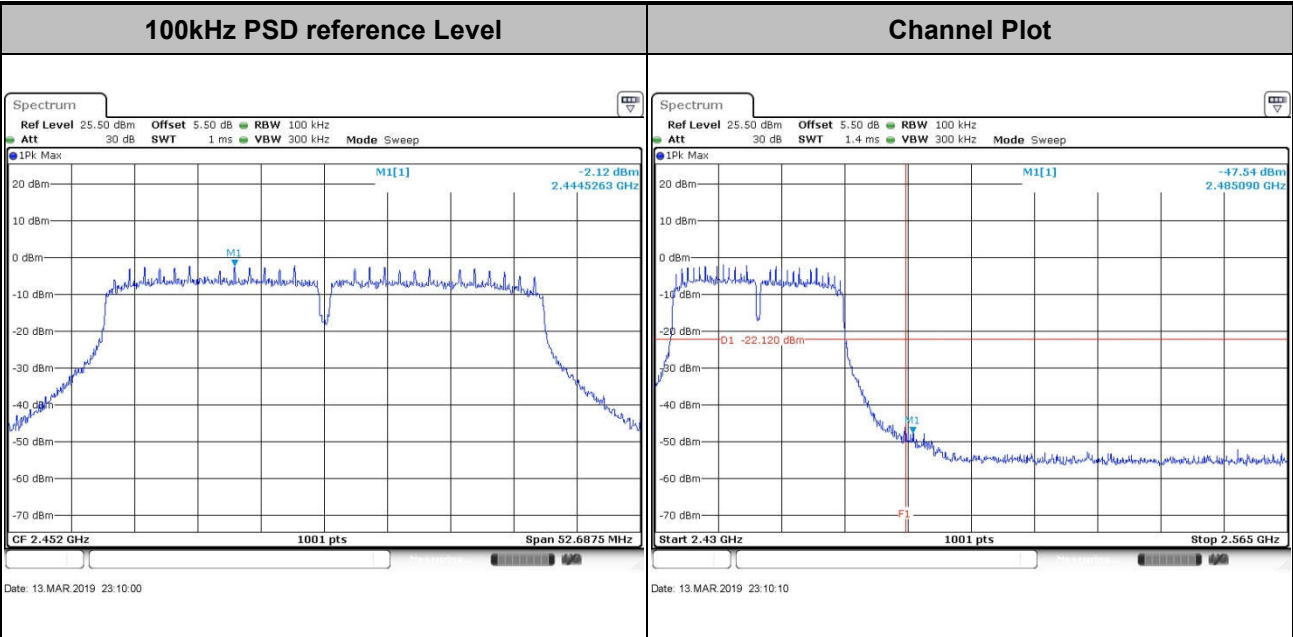


<b>Spurious Emission 30MHz~3GHz</b>	<b>Spurious Emission 2GHz~25GHz</b>
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Test Mode : 802.11n HT40      Test Channel : 09





### 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.

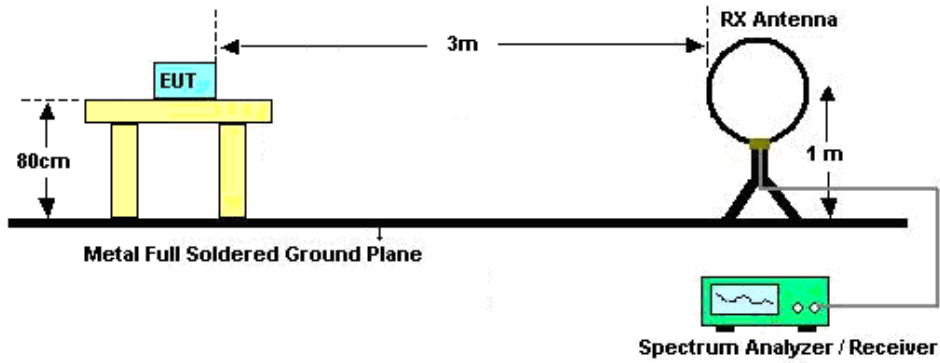


### 3.5.3 Test Procedures

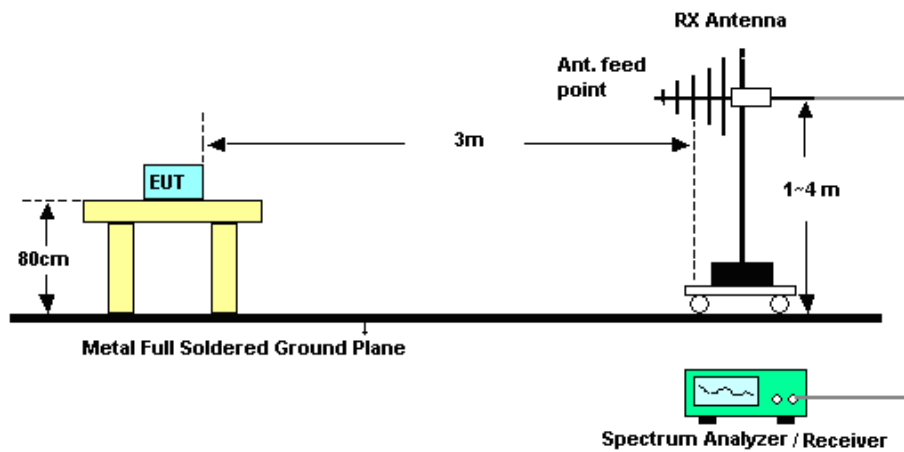
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better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

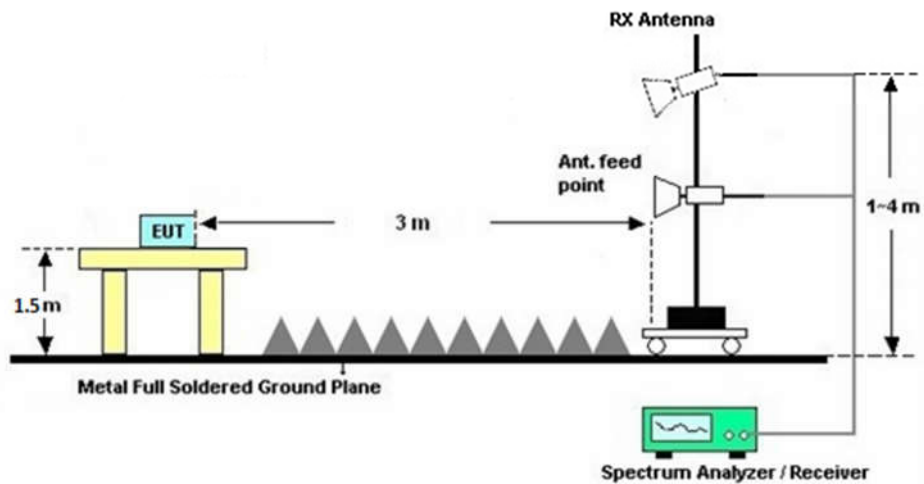
For radiated emissions below 30MHz



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 (dB $\mu$ V)	
	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.

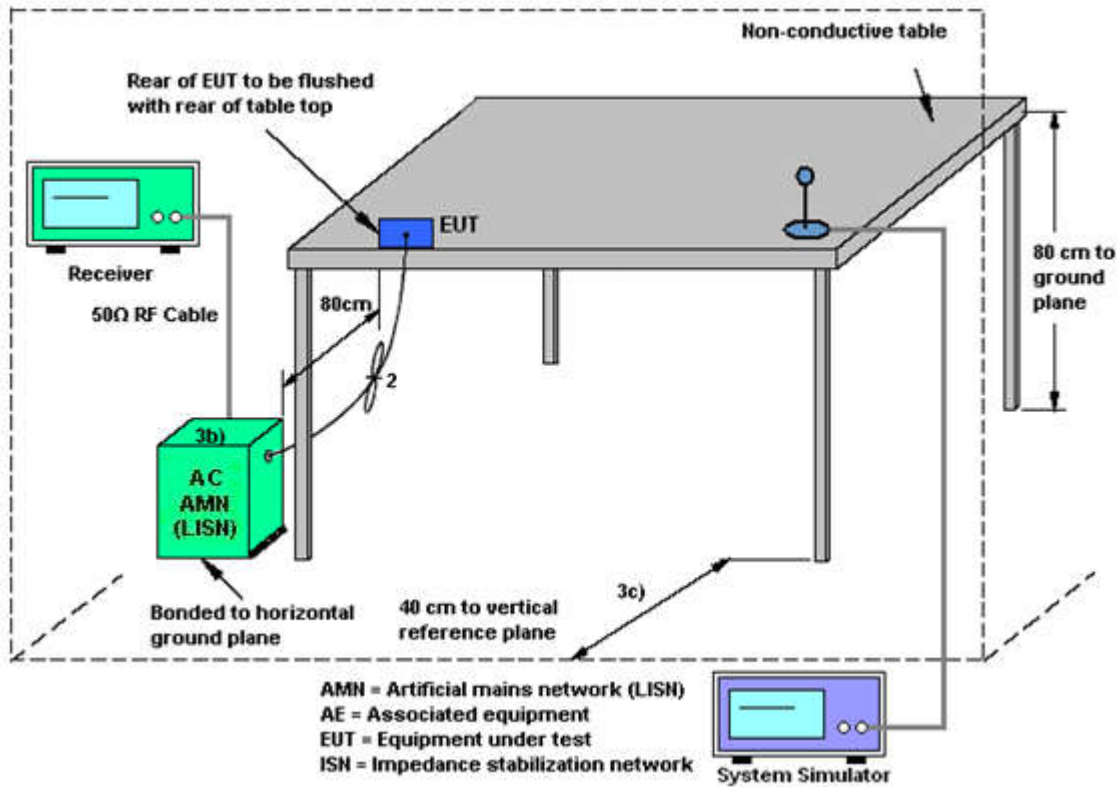
### 3.6.2 Measuring Instruments

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. 07, 2018	Mar. 13, 2019~ Apr. 10, 2019	Aug. 06, 2019	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 14, 2019	Mar. 13, 2019~ Apr. 10, 2019	Jan. 13, 2020	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 14, 2019	Mar. 13, 2019~ Apr. 10, 2019	Jan. 13, 2020	Conducted (TH01-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 19, 2018	Feb. 28, 2019	Apr. 18, 2019	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 12, 2018	Feb. 28, 2019	Oct. 11, 2019	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Nov. 17, 2018	Feb. 28, 2019	Nov. 16, 2019	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000811	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2018	Feb. 28, 2019	Oct. 11, 2019	Conduction (CO01-KS)
EMI Test Receiver	Keysight	N9038A	MY57290151	3Hz~8.5GHz; Max 30dBm	Jun. 25, 2018	Mar. 14, 2019	Jun. 24, 2019	Radiation (03CH05-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz~44GHz	Apr. 17, 2018	Mar. 14, 2019	Apr. 16, 2019	Radiation (03CH05-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 19, 2018	Mar. 14, 2019	Oct. 18, 2019	Radiation (03CH05-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz~1GHz	Jun. 12, 2018	Mar. 14, 2019	Jun. 11, 2019	Radiation (03CH05-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Jan. 27, 2019	Mar. 14, 2019	Jan. 26, 2020	Radiation (03CH05-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2019	Mar. 14, 2019	Jan. 04, 2020	Radiation (03CH05-KS)
Amplifier	com-power	PA-103A	161069	1MHz~1000MHz / 32dB	Apr. 17, 2018	Mar. 14, 2019	Apr. 16, 2019	Radiation (03CH05-KS)
Amplifier	MITEQ	TTA1840-35-HG	2014749	18~40GHz	Jan. 14, 2019	Mar. 14, 2019	Jan. 13, 2020	Radiation (03CH05-KS)
high gain Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	2025788	1Ghz-18Ghz	Apr. 17, 2018	Mar. 14, 2019	Apr. 16, 2019	Radiation (03CH05-KS)
Amplifier	Keysight	83017A	MY57280106	500MHz~26.5GHz	Apr. 18, 2018	Mar. 14, 2019	Apr. 17, 2019	Radiation (03CH05-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Mar. 14, 2019	NCR	Radiation (03CH05-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Mar. 14, 2019	NCR	Radiation (03CH05-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Mar. 14, 2019	NCR	Radiation (03CH05-KS)

NCR: No Calibration Required



## 5 Uncertainty of Evaluation

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.9 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))	5.0 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**

**A1 - DTS Part**

Test Engineer:	Aaron Shen	Temperature:	21~25	°C
Test Date:	2019/3/13~2019/3/29	Relative Humidity:	51~54	%

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

2.4GHz Band								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
11b	1Mbps	1	1	2412	13.19	8.05	0.50	Pass
11b	1Mbps	1	6	2437	13.09	8.05	0.50	Pass
11b	1Mbps	1	11	2462	13.24	8.53	0.50	Pass
11g	6Mbps	1	1	2412	19.13	16.34	0.50	Pass
11g	6Mbps	1	2	2417	18.78	16.32	0.50	Pass
11g	6Mbps	1	6	2437	18.78	16.34	0.50	Pass
11g	6Mbps	1	10	2457	18.73	16.32	0.50	Pass
11g	6Mbps	1	11	2462	19.63	16.34	0.50	Pass
HT20	MCS0	1	1	2412	19.38	17.54	0.50	Pass
HT20	MCS0	1	2	2417	19.28	17.56	0.50	Pass
HT20	MCS0	1	6	2437	19.28	17.56	0.50	Pass
HT20	MCS0	1	10	2457	19.63	17.56	0.50	Pass
HT20	MCS0	1	11	2462	19.83	17.58	0.50	Pass
HT40	MCS0	1	3	2422	36.46	35.33	0.50	Pass
HT40	MCS0	1	6	2437	36.46	35.33	0.50	Pass
HT40	MCS0	1	8	2447	36.46	35.12	0.50	Pass
HT40	MCS0	1	9	2452	36.66	35.13	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	23.77	30.00	-2.47	21.30	36.00	Pass
11b	1Mbps	1	6	2437	24.23	30.00	-2.47	21.76	36.00	Pass
11b	1Mbps	1	11	2462	23.00	30.00	-2.47	20.53	36.00	Pass
11g	6Mbps	1	1	2412	23.63	30.00	-2.47	21.16	36.00	Pass
11g	6Mbps	1	2	2417	25.24	30.00	-2.47	22.77	36.00	Pass
11g	6Mbps	1	6	2437	26.18	30.00	-2.47	23.71	36.00	Pass
11g	6Mbps	1	10	2457	24.36	30.00	-2.47	21.89	36.00	Pass
11g	6Mbps	1	11	2462	22.81	30.00	-2.47	20.34	36.00	Pass
HT20	MCS0	1	1	2412	24.05	30.00	-2.47	21.58	36.00	Pass
HT20	MCS0	1	2	2417	25.18	30.00	-2.47	22.71	36.00	Pass
HT20	MCS0	1	6	2437	26.07	30.00	-2.47	23.60	36.00	Pass
HT20	MCS0	1	10	2457	24.39	30.00	-2.47	21.92	36.00	Pass
HT20	MCS0	1	11	2462	22.26	30.00	-2.47	19.79	36.00	Pass
HT40	MCS0	1	3	2422	23.77	30.00	-2.47	21.30	36.00	Pass
HT40	MCS0	1	6	2437	24.23	30.00	-2.47	21.76	36.00	Pass
HT40	MCS0	1	8	2447	21.62	30.00	-2.47	19.15	36.00	Pass
HT40	MCS0	1	9	2452	20.83	30.00	-2.47	18.36	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	18.86
11b	1Mbps	1	6	2437	0.11	19.48
11b	1Mbps	1	11	2462	0.11	19.01
11g	6Mbps	1	1	2412	0.58	14.85
11g	6Mbps	1	2	2417	0.58	16.32
11g	6Mbps	1	6	2437	0.58	18.76
11g	6Mbps	1	10	2457	0.58	14.85
11g	6Mbps	1	11	2462	0.58	13.81
HT20	MCS0	1	1	2412	0.62	15.23
HT20	MCS0	1	2	2417	0.62	15.83
HT20	MCS0	1	6	2437	0.62	18.36
HT20	MCS0	1	10	2457	0.62	14.92
HT20	MCS0	1	11	2462	0.62	13.00
HT40	MCS0	1	3	2422	0.64	14.56
HT40	MCS0	1	6	2437	0.64	15.25
HT40	MCS0	1	8	2447	0.64	10.80
HT40	MCS0	1	9	2452	0.64	10.71



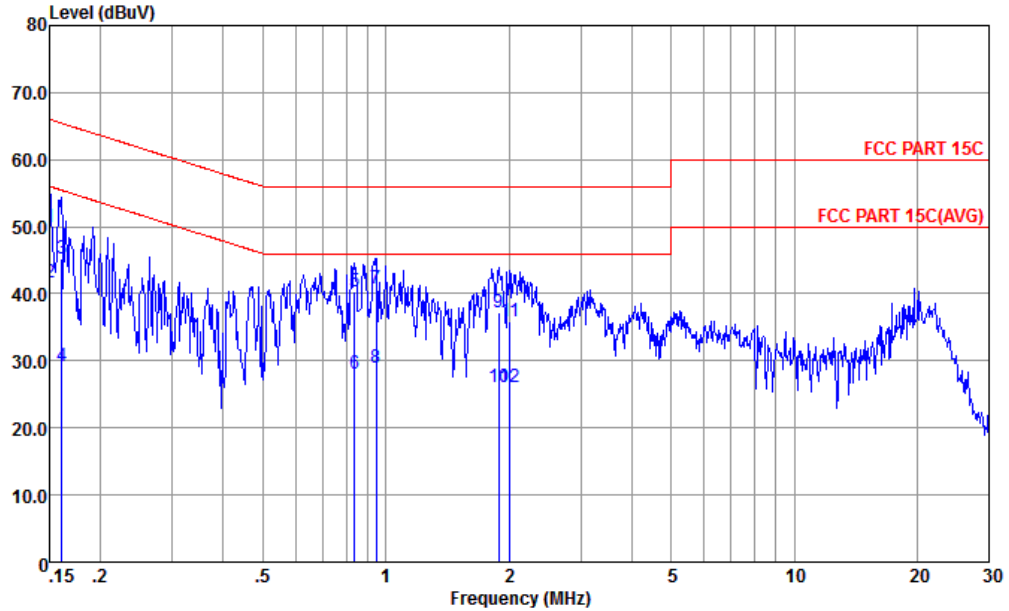
**TEST RESULTS DATA**  
**Peak Power Density**

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	-3.73	-2.47	8.00	Pass
11b	1Mbps	1	6	2437	-1.85	-2.47	8.00	Pass
11b	1Mbps	1	11	2462	-3.37	-2.47	8.00	Pass
11g	6Mbps	1	1	2412	-7.58	-2.47	8.00	Pass
11g	6Mbps	1	2	2417	-9.69	-2.47	8.00	Pass
11g	6Mbps	1	6	2437	-6.88	-2.47	8.00	Pass
11g	6Mbps	1	10	2457	-9.87	-2.47	8.00	Pass
11g	6Mbps	1	11	2462	-6.11	-2.47	8.00	Pass
HT20	MCS0	1	1	2412	-7.48	-2.47	8.00	Pass
HT20	MCS0	1	2	2417	-8.56	-2.47	8.00	Pass
HT20	MCS0	1	6	2437	-6.95	-2.47	8.00	Pass
HT20	MCS0	1	10	2457	-9.28	-2.47	8.00	Pass
HT20	MCS0	1	11	2462	-7.95	-2.47	8.00	Pass
HT40	MCS0	1	3	2422	-16.76	-2.47	8.00	Pass
HT40	MCS0	1	6	2437	-17.04	-2.47	8.00	Pass
HT40	MCS0	1	8	2447	-17.22	-2.47	8.00	Pass
HT40	MCS0	1	9	2452	-16.72	-2.47	8.00	Pass



## Appendix B. AC Conducted Emission Test Results

Test Engineer :	Amos Zhang	Temperature :	23.3~24.2°C
		Relative Humidity :	28~30%
Test Voltage :	120Vac / 60Hz	Phase :	Line

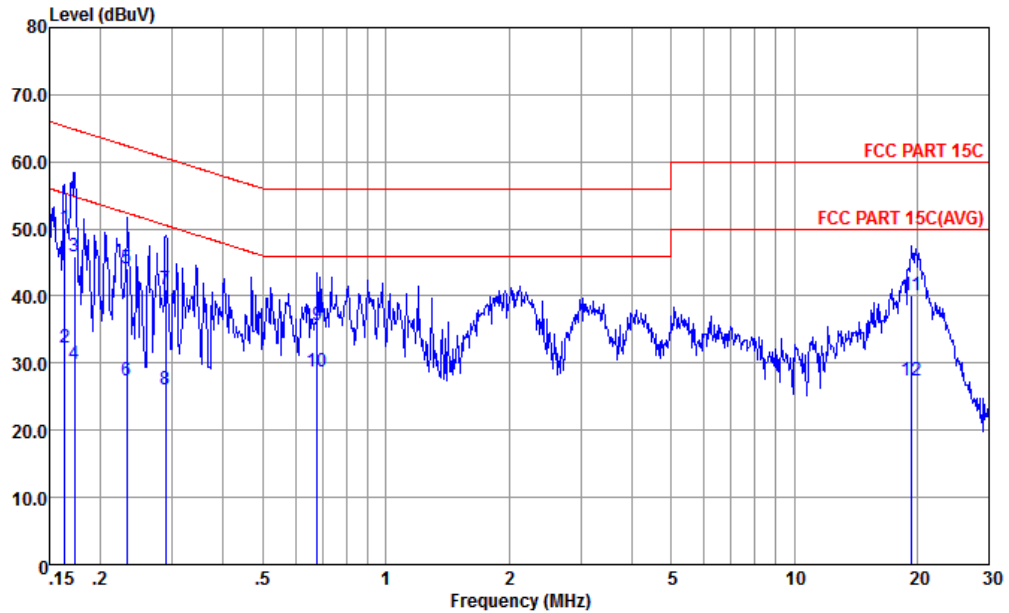


Site : CO01-KS  
 Condition : FCC PART 15C LISN-L-181013-060103 LINE

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.150	50.01	-15.99	66.00	39.30	0.23	10.48	QP
2 *	0.150	41.61	-14.39	56.00	30.90	0.23	10.48	Average
3	0.161	45.18	-20.25	65.43	34.50	0.23	10.45	QP
4	0.161	29.28	-26.15	55.43	18.60	0.23	10.45	Average
5	0.839	40.37	-15.63	56.00	29.90	0.23	10.24	QP
6	0.839	27.97	-18.03	46.00	17.50	0.23	10.24	Average
7	0.948	40.67	-15.33	56.00	30.19	0.24	10.24	QP
8	0.948	29.07	-16.93	46.00	18.59	0.24	10.24	Average
9	1.888	37.29	-18.71	56.00	26.80	0.26	10.23	QP
10	1.888	25.99	-20.01	46.00	15.50	0.26	10.23	Average
11	2.012	35.99	-20.01	56.00	25.50	0.26	10.23	QP
12	2.012	25.99	-20.01	46.00	15.50	0.26	10.23	Average



Test Engineer :	Amos Zhang	Temperature :	23.3~24.2°C
		Relative Humidity :	28~30%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral



Site : CO01-KS  
 Condition : FCC PART 15C LISN-N-181013-060103 NEUTRAL

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1 *	0.163	50.15	-15.15	65.30	39.49	0.21	10.45	QP
2	0.163	32.25	-23.05	55.30	21.59	0.21	10.45	Average
3	0.173	45.83	-18.98	64.81	35.20	0.21	10.42	QP
4	0.173	29.93	-24.88	54.81	19.30	0.21	10.42	Average
5	0.232	44.04	-18.35	62.39	33.50	0.20	10.34	QP
6	0.232	27.44	-24.95	52.39	16.90	0.20	10.34	Average
7	0.289	41.11	-19.43	60.54	30.60	0.20	10.31	QP
8	0.289	26.01	-24.53	50.54	15.50	0.20	10.31	Average
9	0.679	35.64	-20.36	56.00	25.20	0.20	10.24	QP
10	0.679	28.74	-17.26	46.00	18.30	0.20	10.24	Average
11	19.428	40.01	-19.99	60.00	29.21	0.32	10.48	QP
12	19.428	27.41	-22.59	50.00	16.61	0.32	10.48	Average



## Appendix C. Radiated Spurious Emission

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.
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
802.11b CH 01 2412MHz		2315.59	54.48	-19.52	74	51.86	31.83	5.38	34.59	338	89	P	H
		2389.95	43.45	-10.55	54	40.48	32	5.48	34.51	338	89	A	H
	*	2412	108.02	-	-	104.92	32.13	5.48	34.51	338	89	P	H
	*	2414	104.67	-	-	101.57	32.13	5.48	34.51	338	89	A	H
		2344.19	53.69	-20.31	74	50.78	32.1	5.38	34.57	384	51	P	V
		2389.82	42.83	-11.17	54	39.86	32	5.48	34.51	384	51	A	V
	*	2414	105.67	-	-	102.57	32.13	5.48	34.51	384	51	P	V
	*	2414	102.66	-	-	99.56	32.13	5.48	34.51	384	51	A	V
802.11b CH 11 2462MHz	*	2462	109.05	-	-	105.59	32.33	5.51	34.38	369	91	P	H
	*	2460	105.56	-	-	102.1	32.33	5.51	34.38	369	91	A	H
		2484.94	54.32	-19.68	74	50.82	32.27	5.55	34.32	369	91	P	H
		2483.92	43.97	-10.03	54	40.47	32.27	5.55	34.32	369	91	A	H
	*	2462	104.14	-	-	100.68	32.33	5.51	34.38	381	58	P	V
	*	2460	100.9	-	-	97.44	32.33	5.51	34.38	381	58	A	V
		2488.66	53.91	-20.09	74	50.48	32.2	5.55	34.32	381	58	P	V
		2484.22	43.29	-10.71	54	39.79	32.27	5.55	34.32	381	58	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 802.11b (Harmonic @ 3m)

Table with 14 columns: WIFI, 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 CH 01 (2412MHz) and CH 06 (2437MHz).

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	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		2389.82	65.7	-8.3	74	62.73	32	5.48	34.51	270	91	P	H
		2389.82	49.77	-4.23	54	46.8	32	5.48	34.51	270	91	A	H
	*	2416	106.83	-	-	103.67	32.13	5.48	34.45	270	91	P	H
	*	2420	98.55	-	-	95.25	32.27	5.48	34.45	270	91	A	H
		2388.26	59.04	-14.96	74	56.1	32	5.48	34.54	384	56	P	V
		2389.95	45.96	-8.04	54	42.99	32	5.48	34.51	384	56	A	V
	*	2416	103.94	-	-	100.78	32.13	5.48	34.45	384	56	P	V
	*	2416	96.04	-	-	92.88	32.13	5.48	34.45	384	56	A	V
802.11g CH 02 2417MHz		2389.04	64.66	-9.34	74	64.14	32	5.48	36.96	100	120	P	H
		2389.69	47.41	-6.59	54	46.89	32	5.48	36.96	100	120	A	H
	*	2420	109.82	-	-	109.03	32.27	5.48	36.96	100	120	P	H
	*	2424	101.73	-	-	100.91	32.27	5.51	36.96	100	120	A	H
		2389.56	65.12	-8.88	74	64.6	32	5.48	36.96	385	54	P	V
		2389.82	48.4	-5.6	54	47.88	32	5.48	36.96	385	54	A	V
	*	2416	108.3	-	-	107.65	32.13	5.48	36.96	385	54	P	V
	*	2422	100.35	-	-	99.56	32.27	5.48	36.96	385	54	A	V
802.11g CH 06 2437MHz		2315.59	54.48	-19.52	74	51.86	31.83	5.38	34.59	338	89	P	H
		2389.95	43.45	-10.55	54	40.48	32	5.48	34.51	338	89	A	H
	*	2412	108.02	-	-	104.92	32.13	5.48	34.51	338	89	P	H
	*	2414	104.67	-	-	101.57	32.13	5.48	34.51	338	89	A	H
		2344.19	53.69	-20.31	74	50.78	32.1	5.38	34.57	384	51	P	V
		2389.82	42.83	-11.17	54	39.86	32	5.48	34.51	384	51	A	V
	*	2414	105.67	-	-	102.57	32.13	5.48	34.51	384	51	P	V
	*	2414	102.66	-	-	99.56	32.13	5.48	34.51	384	51	A	V



<b>802.11g</b> <b>CH 10</b> <b>2457MHz</b>	*	2460	109.02	-	-	108.15	32.33	5.51	36.97	100	269	P	H
	*	2460	100.97	-	-	100.1	32.33	5.51	36.97	100	269	A	H
		2485.96	67.58	-6.42	74	66.73	32.27	5.55	36.97	100	269	P	H
		2483.68	49.13	-4.87	54	48.28	32.27	5.55	36.97	100	269	A	H
	*	2454	104.89	-	-	104.02	32.33	5.51	36.97	373	244	P	V
	*	2450	96.98	-	-	96.03	32.4	5.51	36.96	373	244	A	V
		2484.34	66.52	-7.48	74	65.67	32.27	5.55	36.97	373	244	P	V
		2483.68	45.75	-8.25	54	44.9	32.27	5.55	36.97	373	244	A	V
<b>802.11g</b> <b>CH 11</b> <b>2462MHz</b>	*	2458	107.29	-	-	103.83	32.33	5.51	34.38	369	93	P	H
	*	2456	99.01	-	-	95.55	32.33	5.51	34.38	369	93	A	H
		2483.68	68.56	-5.44	74	65.06	32.27	5.55	34.32	369	93	P	H
		2483.56	50.64	-3.36	54	47.14	32.27	5.55	34.32	369	93	A	H
	*	2468	103.77	-	-	100.21	32.33	5.55	34.32	372	45	P	V
	*	2470	95.83	-	-	92.27	32.33	5.55	34.32	372	45	A	V
		2483.68	67.98	-6.02	74	64.48	32.27	5.55	34.32	372	45	P	V
		2484.04	49.5	-4.5	54	46	32.27	5.55	34.32	372	45	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 802.11g (Harmonic @ 3m)

WIFI	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	41.28	-32.72	74	61.1	34.2	8.1	62.12	100	360	P	H
		4824	42.98	-31.02	74	62.8	34.2	8.1	62.12	100	0	P	V
802.11g CH 02 2417MHz		4836	39.68	-34.32	74	59.5	34.2	8.1	62.12	100	327	P	H
		7248	42.85	-31.15	74	59.43	36.5	9.69	62.77	100	327	P	H
		4836	39.47	-34.53	74	59.29	34.2	8.1	62.12	100	0	P	V
		7248	43.34	-30.66	74	59.92	36.5	9.69	62.77	100	0	P	V
802.11g CH 06 2437MHz		4872	38.93	-35.07	74	58.82	34.13	8.09	62.11	100	360	P	H
		7311	45.53	-28.47	74	61.95	36.6	9.75	62.77	100	360	P	H
		4874	39.89	-34.11	74	59.78	34.13	8.09	62.11	100	0	P	V
		7308	47.51	-26.49	74	63.93	36.6	9.75	62.77	100	0	P	V
802.11g CH 10 2457MHz		4914	37.9	-36.1	74	57.82	34.1	8.07	62.09	100	360	P	H
		7368	42.07	-31.93	74	58.52	36.55	9.78	62.78	100	360	P	H
		4914	39.51	-34.49	74	59.43	34.1	8.07	62.09	100	0	P	V
		7368	41.68	-32.32	74	58.13	36.55	9.78	62.78	100	0	P	V
802.11g CH 11 2462MHz		4926	40.79	-33.21	74	60.72	34.1	8.06	62.09	100	360	P	H
		7386	42.47	-31.53	74	58.94	36.5	9.81	62.78	100	360	P	H
		4924	40.41	-33.59	74	60.34	34.1	8.06	62.09	100	0	P	V
		7386	42.89	-31.11	74	59.36	36.5	9.81	62.78	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												





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

WIFI	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		2388.91	65.65	-8.35	74	62.71	32	5.48	34.54	382	93	P	H
		2389.95	50.39	-3.61	54	47.42	32	5.48	34.51	382	93	A	H
	*	2420	105.66	-	-	102.36	32.27	5.48	34.45	382	93	P	H
	*	2420	97.75	-	-	94.45	32.27	5.48	34.45	382	93	A	H
		2389.82	64.99	-9.01	74	62.02	32	5.48	34.51	384	65	P	V
		2389.69	48.01	-5.99	54	45.07	32	5.48	34.54	384	65	A	V
	*	2418	103.95	-	-	100.79	32.13	5.48	34.45	384	65	P	V
	*	2420	96.11	-	-	92.81	32.27	5.48	34.45	384	65	A	V
802.11n HT20 CH 02 2417MHz		2389.04	65.55	-8.45	74	65.03	32	5.48	36.96	240	286	P	H
		2389.95	48.61	-5.39	54	48.09	32	5.48	36.96	240	286	A	H
	*	2414	108.5	-	-	107.85	32.13	5.48	36.96	240	286	P	H
	*	2412	100.37	-	-	99.72	32.13	5.48	36.96	240	286	A	H
		2389.43	68.04	-5.96	74	67.52	32	5.48	36.96	389	230	P	V
		2389.69	49.85	-4.15	54	49.33	32	5.48	36.96	389	230	A	V
	*	2410	106.23	-	-	105.58	32.13	5.48	36.96	389	230	P	V
	*	2424	97.95	-	-	97.13	32.27	5.51	36.96	389	230	A	V
802.11n HT20 CH 06 2437MHz		2315.59	54.48	-19.52	74	51.86	31.83	5.38	34.59	338	89	P	H
		2389.95	43.45	-10.55	54	40.48	32	5.48	34.51	338	89	A	H
	*	2412	108.02	-	-	104.92	32.13	5.48	34.51	338	89	P	H
	*	2414	104.67	-	-	101.57	32.13	5.48	34.51	338	89	A	H
		2344.19	53.69	-20.31	74	50.78	32.1	5.38	34.57	384	51	P	V
		2389.82	42.83	-11.17	54	39.86	32	5.48	34.51	384	51	A	V
	*	2414	105.67	-	-	102.57	32.13	5.48	34.51	384	51	P	V
	*	2414	102.66	-	-	99.56	32.13	5.48	34.51	384	51	A	V



<b>802.11n</b> <b>HT20</b> <b>CH 10</b> <b>2457MHz</b>	*	2483.74	67.83	-6.17	74	66.98	32.27	5.55	36.97	368	83	P	H
	*	2483.5	49.95	-4.05	54	49.1	32.27	5.55	36.97	368	83	A	H
		2460	109.06	-	-	108.19	32.33	5.51	36.97	368	83	P	H
		2462	100.51	-	-	99.64	32.33	5.51	36.97	368	83	A	H
	*	2483.56	66.68	-7.32	74	65.83	32.27	5.55	36.97	375	238	P	V
	*	2483.8	46.37	-7.63	54	45.52	32.27	5.55	36.97	375	238	A	V
		2454	106.31	-	-	105.44	32.33	5.51	36.97	375	238	P	V
		2450	98.22	-	-	97.27	32.4	5.51	36.96	375	238	A	V
<b>802.11n</b> <b>HT20</b> <b>CH 11</b> <b>2462MHz</b>	*	2464	105.23	-	-	101.73	32.33	5.55	34.38	368	93	P	H
	*	2454	97.15	-	-	93.69	32.33	5.51	34.38	368	93	A	H
		2484.76	68.12	-5.88	74	64.62	32.27	5.55	34.32	368	93	P	H
		2484.34	50.78	-3.22	54	47.28	32.27	5.55	34.32	368	93	A	H
	*	2468	102.27	-	-	98.71	32.33	5.55	34.32	289	59	P	V
	*	2466	93.49	-	-	89.99	32.33	5.55	34.38	289	59	A	V
		2484.58	63.84	-10.16	74	60.34	32.27	5.55	34.32	289	59	P	V
		2483.8	46.3	-7.7	54	42.8	32.27	5.55	34.32	289	59	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 HT20 (Harmonic @ 3m)**

WIFI	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	41.86	-32.14	74	61.68	34.2	8.1	62.12	100	360	P	H
		4824	40.62	-33.38	74	60.44	34.2	8.1	62.12	100	0	P	V
802.11n HT20 CH 02 2417MHz		4836	39.31	-34.69	74	59.13	34.2	8.1	62.12	100	0	P	H
		7368	40.67	-33.33	74	57.12	36.55	9.78	62.78	100	0	P	H
		4836	39.33	-34.67	74	59.15	34.2	8.1	62.12	100	360	P	V
		7371	41.61	-32.39	74	58.06	36.55	9.78	62.78	100	360	P	V
802.11n HT20 CH 06 2437MHz		4872	39.66	-34.34	74	59.55	34.13	8.09	62.11	100	0	P	H
		7311	43.49	-30.51	74	59.91	36.6	9.75	62.77	100	0	P	H
		4874	39.76	-34.24	74	59.65	34.13	8.09	62.11	100	360	P	V
		7308	44.13	-29.87	74	60.55	36.6	9.75	62.77	100	360	P	V
802.11n HT20 CH 10 2457MHz		4914	38.56	-35.44	74	58.48	34.1	8.07	62.09	100	360	P	H
		7368	41.8	-32.2	74	58.25	36.55	9.78	62.78	100	360	P	H
		4914	38.09	-35.91	74	58.01	34.1	8.07	62.09	100	0	P	V
		7368	42.54	-31.46	74	58.99	36.55	9.78	62.78	100	0	P	V
802.11n HT20 CH 11 2462MHz		4926	39.96	-34.04	74	59.89	34.1	8.06	62.09	100	0	P	H
		7386	42.56	-31.44	74	59.03	36.5	9.81	62.78	100	0	P	H
		4926	40.24	-33.76	74	60.17	34.1	8.06	62.09	100	360	P	V
		7386	42.77	-31.23	74	59.24	36.5	9.81	62.78	100	360	P	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 (Band Edge @ 3m)**

WIFI	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		2388.91	61.8	-12.2	74	58.86	32	5.48	34.54	262	90	P	H
		2389.82	50.11	-3.89	54	47.14	32	5.48	34.51	262	90	A	H
	*	2434	102.91	-	-	99.58	32.27	5.51	34.45	262	90	P	H
	*	2434	95.12	-	-	91.79	32.27	5.51	34.45	262	90	A	H
		2483.62	59.09	-14.91	74	55.59	32.27	5.55	34.32	262	90	P	H
		2484.4	44.26	-9.74	54	40.76	32.27	5.55	34.32	262	90	A	H
		2388.78	59.86	-14.14	74	56.92	32	5.48	34.54	337	64	P	V
		2389.95	47.86	-6.14	54	44.89	32	5.48	34.51	337	64	A	V
	*	2432	100.78	-	-	97.45	32.27	5.51	34.45	337	64	P	V
	*	2434	92.91	-	-	89.58	32.27	5.51	34.45	337	64	A	V
		2484.04	56.46	-17.54	74	52.96	32.27	5.55	34.32	337	64	P	V
		2483.56	43.75	-10.25	54	40.25	32.27	5.55	34.32	337	64	A	V
802.11n HT40 CH 06 2437MHz		2315.59	54.48	-19.52	74	51.86	31.83	5.38	34.59	338	89	P	H
		2389.95	43.45	-10.55	54	40.48	32	5.48	34.51	338	89	A	H
	*	2412	108.02	-	-	104.92	32.13	5.48	34.51	338	89	P	H
	*	2414	104.67	-	-	101.57	32.13	5.48	34.51	338	89	A	H
		2344.19	53.69	-20.31	74	50.78	32.1	5.38	34.57	384	51	P	V
		2389.82	42.83	-11.17	54	39.86	32	5.48	34.51	384	51	A	V
	*	2414	105.67	-	-	102.57	32.13	5.48	34.51	384	51	P	V
*	2414	102.66	-	-	99.56	32.13	5.48	34.51	384	51	A	V	



802.11n HT40 CH 08 2447MHz		2387.48	55.21	-18.79	74	54.69	32	5.48	36.96	100	266	P	H
		2389.17	41.44	-12.56	54	40.92	32	5.48	36.96	100	266	A	H
	*	2462	103.78	-	-	102.91	32.33	5.51	36.97	100	266	P	H
	*	2460	96.15	-	-	95.28	32.33	5.51	36.97	100	266	A	H
		2485.78	66.54	-7.46	74	65.69	32.27	5.55	36.97	100	266	P	H
		2483.5	50.47	-3.53	54	49.62	32.27	5.55	36.97	100	266	A	H
		2374.35	52.35	-21.65	74	51.84	32.03	5.43	36.95	375	230	P	V
		2341.98	40.91	-13.09	54	40.37	32.1	5.38	36.94	375	230	A	V
	*	2452	100.53	-	-	99.58	32.4	5.51	36.96	375	230	P	V
	*	2450	92.61	-	-	91.66	32.4	5.51	36.96	375	230	A	V
		2487.7	61.28	-12.72	74	60.5	32.2	5.55	36.97	375	230	P	V
		2483.5	46.75	-7.25	54	45.9	32.27	5.55	36.97	375	230	A	V
	802.11n HT40 CH 09 2452MHz		2389.04	54.04	-19.96	74	51.1	32	5.48	34.54	100	271	P
		2388.52	43.01	-10.99	54	40.07	32	5.48	34.54	100	271	A	H
*		2466	101.51	-	-	98.01	32.33	5.55	34.38	100	271	P	H
*		2462	93.28	-	-	89.82	32.33	5.51	34.38	100	271	A	H
		2487.76	65	-9	74	61.57	32.2	5.55	34.32	100	271	P	H
		2483.98	50.89	-3.11	54	47.39	32.27	5.55	34.32	100	271	A	H
		2351.47	53.83	-20.17	74	50.87	32.1	5.43	34.57	372	233	P	V
		2343.54	43.02	-10.98	54	40.11	32.1	5.38	34.57	372	233	A	V
*		2442	98.32	-	-	94.79	32.4	5.51	34.38	372	233	P	V
*		2450	89.65	-	-	86.12	32.4	5.51	34.38	372	233	A	V
	2483.92	62.93	-11.07	74	59.43	32.27	5.55	34.32	372	233	P	V	
!	2483.5	48.71	-5.29	54	45.21	32.27	5.55	34.32	372	233	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	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		4842	41.69	-32.31	74	61.52	34.2	8.09	62.12	100	360	P	H
HT40		7266	42.21	-31.79	74	58.73	36.53	9.72	62.77	100	360	P	H
CH 03		4844	40.82	-33.18	74	60.65	34.2	8.09	62.12	150	360	P	V
2422MHz		7266	43.03	-30.97	74	59.55	36.53	9.72	62.77	150	360	P	V
802.11n		4872	40.68	-33.32	74	60.57	34.13	8.09	62.11	100	0	P	H
HT40		7311	43.24	-30.76	74	59.66	36.6	9.75	62.77	100	0	P	H
CH 06		4874	39.68	-34.32	74	59.57	34.13	8.09	62.11	100	0	P	V
2437MHz		7308	43.08	-30.92	74	59.5	36.6	9.75	62.77	100	0	P	V
802.11n		4896	38.64	-35.36	74	58.57	34.1	8.07	62.1	100	165	P	H
HT40		7344	40.87	-33.13	74	57.26	36.6	9.78	62.77	100	165	P	H
CH 08		4896	37.54	-36.46	74	57.47	34.1	8.07	62.1	100	360	P	V
2447MHz		7344	41.81	-32.19	74	58.2	36.6	9.78	62.77	100	360	P	V
802.11n		4902	39.89	-34.11	74	59.81	34.1	8.07	62.09	100	360	P	H
HT40		7356	42.82	-31.18	74	59.22	36.6	9.78	62.78	100	360	P	H
CH 09		4904	40.47	-33.53	74	60.39	34.1	8.07	62.09	100	360	P	V
2452MHz		7356	42.57	-31.43	74	58.97	36.6	9.78	62.78	100	360	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.
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
2.4GHz 802.11n HT40 LF		100.81	29.35	-14.15	43.5	43.33	16.79	1.16	31.93	100	0	P	H
		150.28	28.23	-15.27	43.5	42.37	16.4	1.4	31.94	-	-	P	H
		248.25	21.63	-24.37	46	33.64	18.09	1.86	31.96	-	-	P	H
		304.51	22.66	-23.34	46	33.37	19.31	1.99	32.01	-	-	P	H
		554.77	23.83	-22.17	46	28.58	24.96	2.64	32.35	-	-	P	H
		777.87	24.85	-21.15	46	27.86	25.96	3.21	32.18	-	-	P	H
		35.82	33.88	-6.12	40	44.78	20.34	0.72	31.96	100	0	P	V
		46.49	32.5	-7.5	40	48.82	14.83	0.79	31.94	-	-	P	V
		91.11	22.67	-20.83	43.5	38.48	15	1.11	31.92	-	-	P	V
		155.13	24.09	-19.41	43.5	38.29	16.29	1.45	31.94	-	-	P	V
		398.6	19.64	-26.36	46	27.83	21.67	2.25	32.11	-	-	P	V
	639.16	21.62	-24.38	46	26.13	24.99	2.87	32.37	-	-	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>not under limit 6dB</b> .
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+2		( 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:**

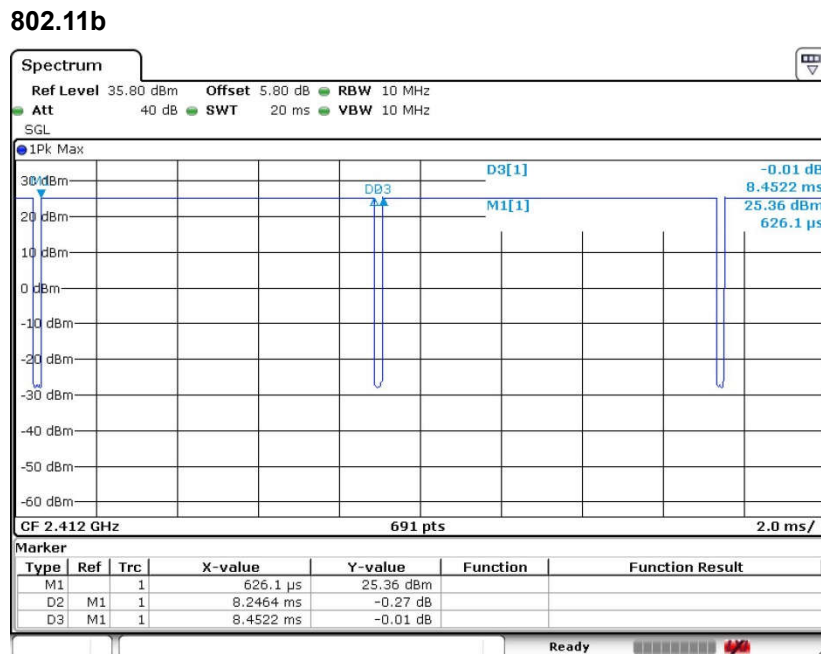
- Level(dBμV/m)  
= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)  
= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)  
= 43.54 (dBμV/m)
- Over Limit(dB)  
= Level(dBμV/m) – Limit Line(dBμV/m)  
= 43.54(dBμV/m) – 54(dBμV/m)  
= -10.46(dB)

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



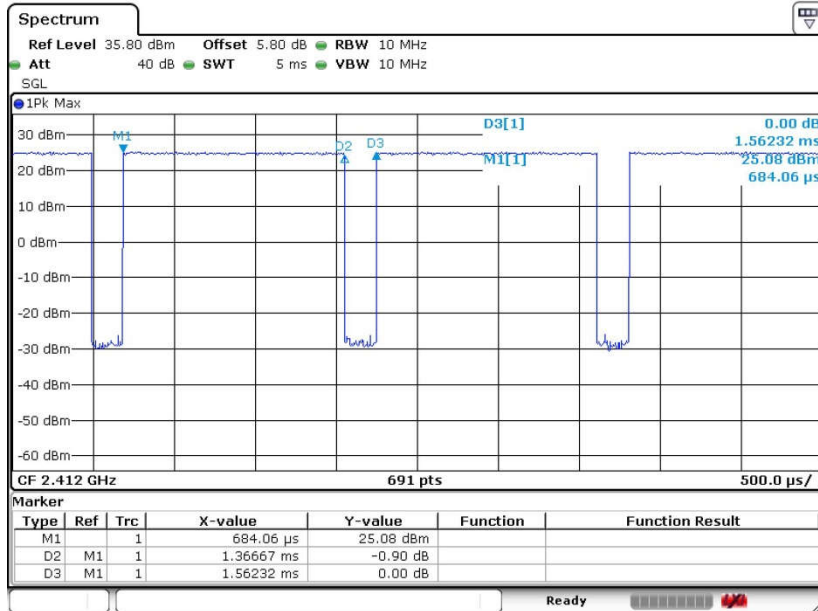
## Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	97.57	8.247	0.121	0.13KHz
802.11g	87.48	1.367	0.732	0.75KHz
802.11n HT20	86.67	1.272	0.786	0.82KHz
802.11n HT40	86.27	1.229	0.814	0.82KHz

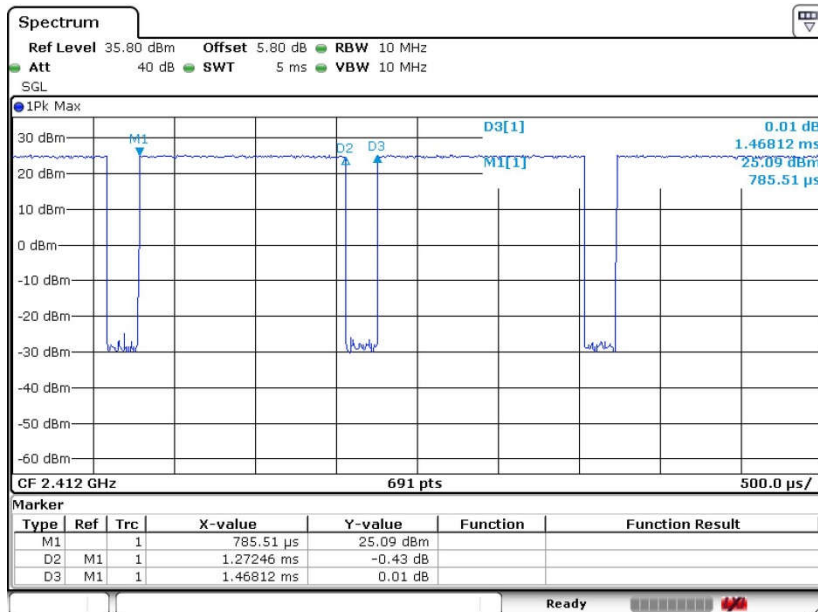




802.11g



802.11n HT20





802.11n HT40

