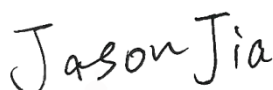


# FCC RF Test Report


**APPLICANT** : Xiaomi Communications Co., Ltd.  
**EQUIPMENT** : Mobile Phone  
**BRAND NAME** : MI  
**MODEL NAME** : M1903F10G  
**FCC ID** : 2AFZZ-XMSF10G  
**STANDARD** : FCC Part 15 Subpart E § 15.407  
**CLASSIFICATION** : (NII) Unlicensed National Information Infrastructure

The product was received on Jun. 11, 2019 and testing was completed on Jun. 19, 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.



Reviewed by: Jason Jia / Supervisor



Approved by: James Huang / Manager



**Sporton International (Kunshan) Inc.**

**No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300  
People's Republic of China**



## TABLE OF CONTENTS

<b>REVISION HISTORY.....</b>	<b>3</b>
<b>SUMMARY OF TEST RESULT .....</b>	<b>4</b>
<b>1 GENERAL DESCRIPTION .....</b>	<b>5</b>
1.1 Applicant .....	5
1.2 Product Feature of Equipment Under Test.....	5
1.3 Product Specification of Equipment Under Test.....	6
1.4 Modification of EUT .....	6
1.5 Testing Location .....	7
1.6 Applicable Standards.....	7
<b>2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST .....</b>	<b>8</b>
2.1 Carrier Frequency and Channel .....	8
2.2 Test Mode.....	9
2.3 Connection Diagram of Test System.....	10
2.4 Support Unit used in test configuration and system .....	10
2.5 EUT Operation Test Setup .....	10
<b>3 TEST RESULT.....</b>	<b>11</b>
3.1 Unwanted Emissions Measurement.....	11
3.2 Automatically Discontinue Transmission .....	16
3.3 Antenna Requirements .....	17
<b>4 LIST OF MEASURING EQUIPMENT .....</b>	<b>18</b>
<b>5 UNCERTAINTY OF EVALUATION .....</b>	<b>19</b>
<b>APPENDIX A. RADIATED SPURIOUS EMISSION</b>	
<b>APPENDIX B. DUTY CYCLE PLOTS</b>	
<b>APPENDIX C. SETUP PHOTOGRAPHS</b>	



## REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR931204-03F	Rev. 01	Initial issue of report	Jun. 24, 2019



## SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.407(b)	Unwanted Emissions	15.407(b)(4)(i) & 15.209(a)	Pass	Under limit 10.51 dB at 30.000 MHz
3.2	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.3	15.203 & 15.407(a)	Antenna Requirement	N/A	Pass	-

# 1 General Description

## 1.1 Applicant

Xiaomi Communications Co., Ltd.

The Rainbow City of China Resources, NO.68, Qinghe Middle Street, Haidian District, Beijing, China

## 1.2 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Phone
Brand Name	MI
Model Name	M1903F10G
FCC ID	2AFZZ-XMSF10G
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/ DC-HSDPA/HSPA+(16QAM uplink is not supported)/LTE/NFC WLAN 2.4GHz 802.11b/g/n HT20 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth BR /EDR/ LE FM Receiver / GNSS
IMEI Code	Radiation: 866962040422515/866962040422523
HW Version	P2
SW Version	MIUI 10
EUT Stage	Identical Prototype

### Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. There are two types of EUT sample 1 and sample 2, the differences between two samples is for memory, sample 1 is 6+64GB capacity and sample 2 is 6+128GB capacity.
3. This is a variant report for M1903F10G, the change note could be referred to the product equality declaration which is exhibit separately. According to the change, only the worst case of RSE are verified from original report FR931204F.



### 1.3 Product Specification of Equipment Under Test

Standards-related Product Specification	
<b>Tx/Rx Channel Frequency Range</b>	5745 MHz ~ 5805 MHz
<b>Type of Modulation</b>	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
<b>Antenna Type / Gain</b>	Fixed Internal Antenna with gain -1.00 dBi

### 1.4 Modification of EUT

No modifications are made to the EUT during all test items.



## 1.5 Testing Location

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

<b>Test Firm</b>	Sporton International (Kunshan) Inc.		
<b>Test Site Location</b>	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
<b>Test Site No.</b>	<b>Sporton Site No.</b>	<b>FCC Designation No.</b>	<b>FCC Test Firm Registration No.</b>
	03CH04-KS	CN1257	314309

## 1.6 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 E
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- ♦ 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: 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.

### 2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5745-5805 MHz Band 4 (U-NII-3)	149	5745	157	5785
	151*	5755	159*	5795
	153	5765	161	5805
	155 <sup>#</sup>	5775		

**Note:**

1. The above Frequency and Channel in "\*" were 802.11n HT40 and 802.11ac VHT40.
2. The above Frequency and Channel in "<sup>#</sup>" were 802.11ac VHT80.





## 2.2 Test Mode

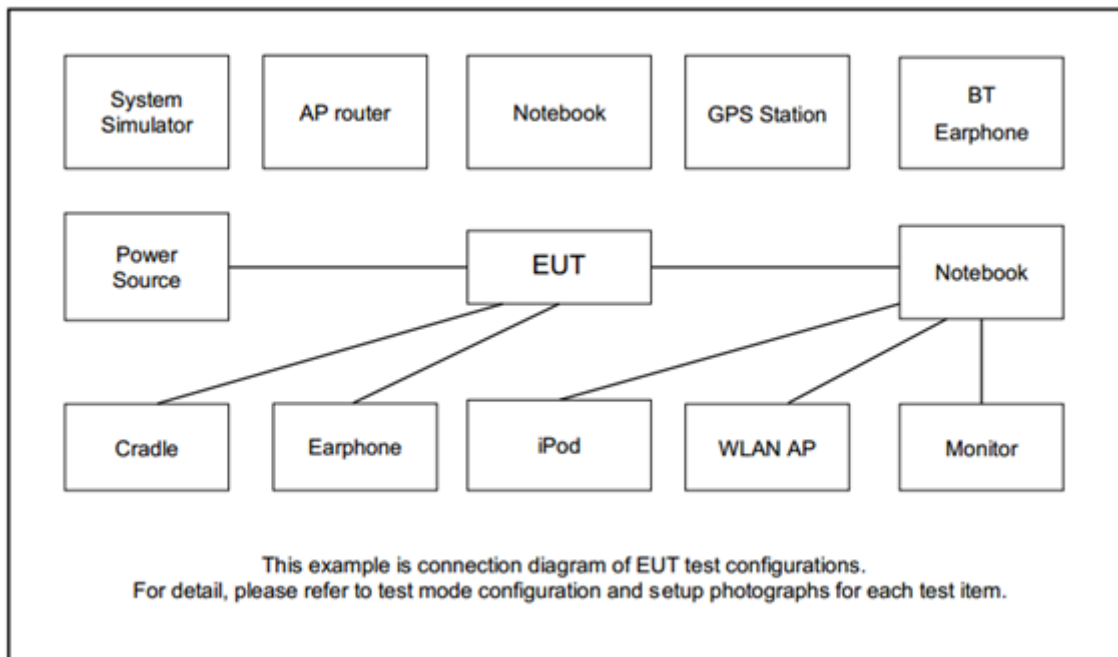
Final test modes are considering the modulation and worse data rates as below table.

### MIMO Mode

Modulation	Data Rate
802.11ac VHT20	MCS0

Ch. #		Band IV : 5745-5805 MHz
		802.11ac VHT20
L	Low	-
M	Middle	-
H	High	161

## 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.	LTE Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8m

## 2.5 EUT Operation Test Setup

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

### 3 Test Result

#### 3.1 Unwanted Emissions Measurement

This section is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement.

##### 3.1.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5.725-5.85 GHz band:

15.407(b)(4)(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(2) Unwanted spurious emissions fallen in restricted bands shall comply with the general field strength limits as below table,

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



EIRP (dBm)	Field Strength at 3m (dBμV/m)
- 27	68.3

**Note:** The following formula is used to convert the EIRP to field strength.

$$\text{EIRP} = E_{\text{Meas}} + 20\log(d_{\text{Meas}}) - 104.7$$

where

EIRP is the equivalent isotropically radiated power, in dBm

$E_{\text{Meas}}$  is the field strength of the emission at the measurement distance, in dBμV/m

$d_{\text{Meas}}$  is the measurement distance, in m

### 3.1.2 Measuring Instruments

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

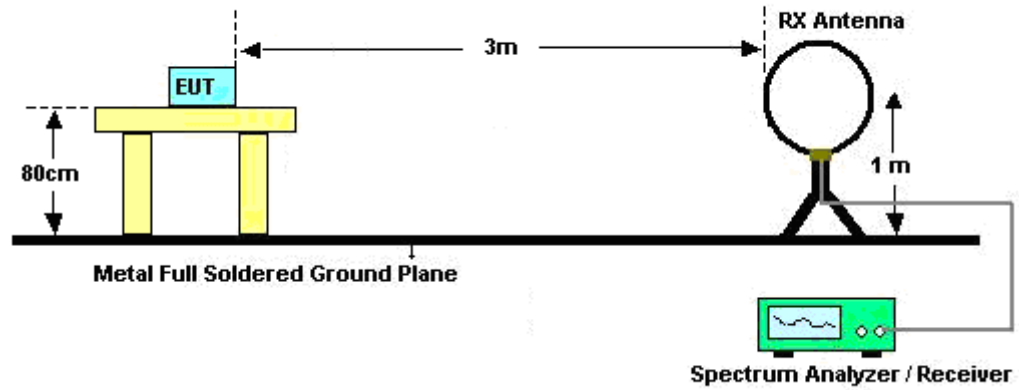


### 3.1.3 Test Procedures

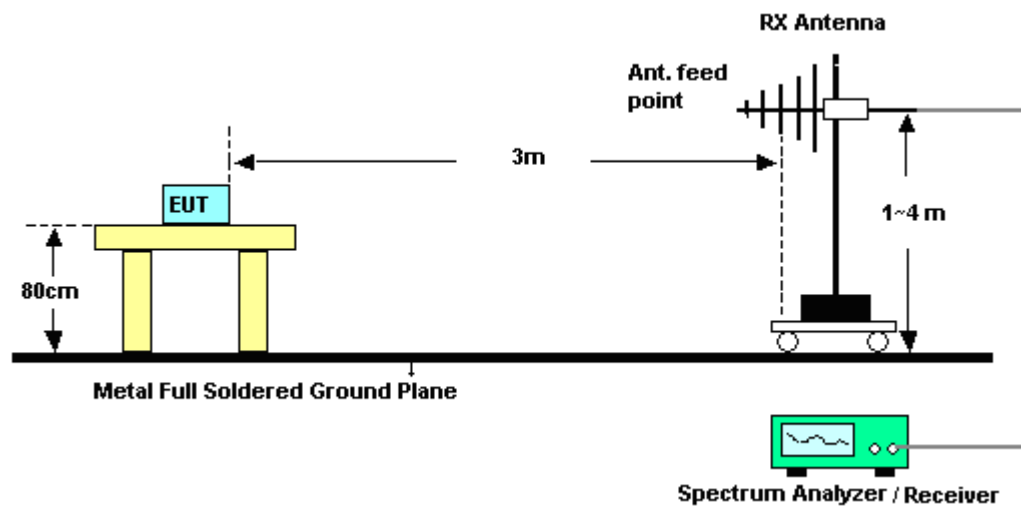
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section G) Unwanted emissions measurement.
  - (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
    - RBW = 120 kHz
    - VBW = 300 kHz
    - Detector = Peak
    - Trace mode = max hold
  - (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz
    - RBW = 1 MHz
    - VBW  $\geq$  3 MHz
    - Detector = Peak
    - Sweep time = auto
    - Trace mode = max hold
  - (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz
    - RBW = 1 MHz
    - 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.
2. 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.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
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.

### 3.1.4 Test Setup

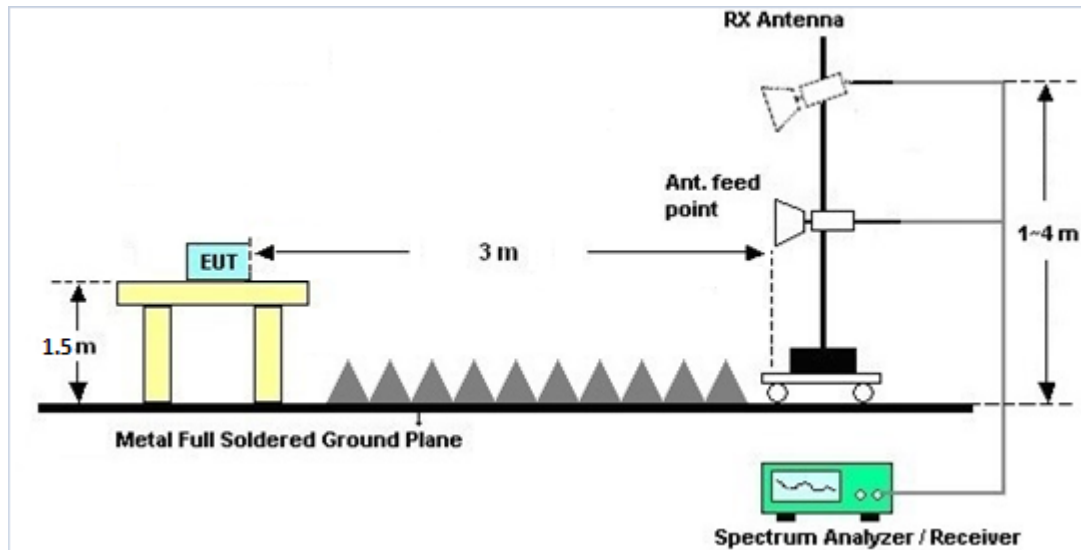
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



### 3.1.5 Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

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.

### 3.1.6 Test Result of Radiated Band Edges

Please refer to Appendix A.

### 3.1.7 Duty Cycle

Please refer to Appendix B.

### 3.1.8 Test Result of Unwanted Radiated Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix A.

## **3.2 Automatically Discontinue Transmission**

### **3.2.1 Limit of Automatically Discontinue Transmission**

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

### **3.2.2 Measuring Instruments**

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

### **3.2.3 Test Result of Automatically Discontinue Transmission**

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.





### **3.3 Antenna Requirements**

#### **3.3.1 Standard Applicable**

If transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### **3.3.2 Antenna Anti-Replacement Construction**

An embedded-in antenna design is used.

#### **3.3.3 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
EMI Test Receiver	Keysight	N9038A	MY564000 04	3Hz~8.5GHz;M ax 30dBm	Oct. 12, 2018	Jun. 19, 2019	Oct. 11, 2019	Radiation (03CH04-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY551502 44	10Hz~44G,MAX 30dB	Apr. 16, 2019	Jun. 19, 2019	Apr. 15, 2020	Radiation (03CH04-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 19, 2018	Jun. 19, 2019	Oct. 18, 2019	Radiation (03CH04-KS)
Bilog Antenna	TeseQ	CBL6111D	44483	30MHz~1GHz	Dec. 28, 2018	Jun. 19, 2019	Dec. 27, 2019	Radiation (03CH04-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	1648	1GHz~18GHz	Jan. 27, 2019	Jun. 19, 2019	Jan. 26, 2020	Radiation (03CH04-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2019	Jun. 19, 2019	Jan. 04, 2020	Radiation (03CH04-KS)
Amplifier	Burgeon	BPA-530	102219	0.01MHz ~3000MHz	Nov. 19, 2018	Jun. 19, 2019	Nov 18, 2019	Radiation (03CH04-KS)
Amplifier	MITEQ	TTA1840-35- HG	2014749	18~40GHz	Jan. 14, 2019	Jun. 19, 2019	Jan. 13, 2020	Radiation (03CH04-KS)
high gain Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	2025788	1Ghz-18Ghz	Aug.16, 2018	Jun. 19, 2019	Aug.15, 2019	Radiation (03CH04-KS)
Amplifier	Keysight	83017A	MY532703 19	500MHz~26.5G Hz	Oct. 12, 2018	Jun. 19, 2019	Oct. 11, 2019	Radiation (03CH04-KS)
AC Power Source	Chroma	61601	F1040900 04	N/A	NCR	Jun. 19, 2019	NCR	Radiation (03CH04-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jun. 19, 2019	NCR	Radiation (03CH04-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jun. 19, 2019	NCR	Radiation (03CH04-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 Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	5.0 dB
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### Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

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

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

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



## Appendix A. Radiated Spurious Emission

### 15E Band 4 - 5725~5850MHz

#### WIFI 802.11n VHT20 (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)
802.11n HT20 CH 161 5805MHz		5850	51.45	-70.85	122.3	42.11	31.96	9.06	31.68	100	63	P	H
		5861.6	51.45	-57.6	109.05	41.99	32.1	9.06	31.7	100	63	P	H
		5887.2	52.98	-43.26	96.24	43.49	32.15	9.05	31.71	100	63	P	H
		5983.2	50.04	-18.26	68.3	40.31	32.47	9.02	31.76	100	63	P	H
		5806	105.58	-	-	96.44	31.68	9.07	31.61	100	63	P	H
		5806	98.93	-	-	89.79	31.68	9.07	31.61	100	63	A	H
		5852.8	54.82	-61.09	115.91	45.48	31.96	9.06	31.68	100	114	P	V
		5861.2	53.56	-55.6	109.16	44.1	32.1	9.06	31.7	100	114	P	V
		5906	49.97	-32.35	82.32	40.38	32.26	9.04	31.71	100	114	P	V
		5960.8	51.45	-16.85	68.3	41.77	32.42	9.02	31.76	100	114	P	V
		5804	103.04	-	-	93.9	31.68	9.07	31.61	100	114	P	V
		5804	95.32	-	-	86.18	31.68	9.07	31.61	100	114	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



## 15E Band 4 5725~5850MHz

## WIFI 802.11n VHT20 (Harmonic @ 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)
802.11n		11610	43.69	-30.31	74	56.2	39.39	13.47	65.37	150	360	P	H
VHT20												P	V
CH 161		11610	44.53	-29.47	74	57.04	39.39	13.47	65.37	150	360		
5805MHz													
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



## 15E Band 4 5725~5850MHz

## 15E Emission below 1GHz

## 5GHz WIFI 802.11a VHT20 (LF @ 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)
5GHz 802.11ac VHT20 LF		30	29.49	-10.51	40	37.81	24.2	0.46	32.98	100	0	P	H
		97.9	20.25	-23.25	43.5	35.91	16.3	0.96	32.92	-	-	P	H
		198.78	25	-18.5	43.5	40.88	15.58	1.45	32.91	-	-	P	H
		246.31	25.17	-20.83	46	38.15	18.37	1.63	32.98	-	-	P	H
		402.48	22.66	-23.34	46	32.01	21.65	2.13	33.13	-	-	P	H
		981.57	26.33	-27.67	54	27.02	27.23	3.51	31.43	-	-	P	H
		30	21.49	-18.51	40	29.81	24.2	0.46	32.98	-	-	P	V
		97.9	24.25	-19.25	43.5	39.91	16.3	0.96	32.92	-	-	P	V
		198.78	25	-18.5	43.5	40.88	15.58	1.45	32.91	100	0	P	V
		246.31	25.17	-20.83	46	38.15	18.37	1.63	32.98	-	-	P	V
		402.48	22.66	-23.34	46	32.01	21.65	2.13	33.13	-	-	P	V
		840.92	24.28	-21.72	46	27.43	26.26	3.25	32.66	-	-	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 per 15.209(c).
!	Test result is <b>over limit</b> line.
P/A	<b>P</b> eak or <b>A</b> verage
H/V	<b>H</b> orizontal or <b>V</b> ertical



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

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
802.11b		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

1. Level(dBμV/m) =

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

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

**For Peak Limit @ 2390MHz:**

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

**For Average Limit @ 2390MHz:**

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

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



## Appendix B. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11ac VHT20	98.22	-	-	10Hz

## 802.11ac VHT20

