



# FCC RF Test Report

**APPLICANT** : Sonim Technologies, Inc.  
**EQUIPMENT** : LTE Phone  
**BRAND NAME** : Sonim  
**MODEL NAME** : XP5800(PC2111)  
**FCC ID** : WYPPC2100  
**STANDARD** : FCC Part 15 Subpart E §15.407  
**CLASSIFICATION** : (NII) Unlicensed National Information Infrastructure

The product was received on Dec. 07, 2017 and testing was completed on Dec. 12, 2017. 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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## REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR792101-06A	Rev. 01	Initial issue of report	Dec. 14, 2017



## SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
-	2.1049 15.403(i)	26dB & 99% Bandwidth	-	Not Required	-
3.1	15.407(a)	Maximum Conducted Output Power	FCC $\leq 24$ dBm (depend on band)	Pass	-
-	15.407(a)	Power Spectral Density	FCC $\leq 11$ dBm (depend on band)	Not Required	-
3.2	15.407(b)	Unwanted Emissions	15.407(b) 15.209(a)	Pass	Under limit 1.39 dB at 5725.080 MHz
-	15.207	AC Conducted Emission	15.207(a)	Not Required	-
-	15.407(g)	Frequency Stability	Within Operation Band	Not Required	-
-	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Not Required	-
-	15.203 & 15.407(a)	Antenna Requirement	N/A	Not Required	-



# 1 General Description

## 1.1 Applicant

**Sonim Technologies, Inc.**

1825 S. Grant St., Suite 200., San Mateo, CA, 94402

## 1.2 Manufacturer

**Sonim Technologies (Shenzhen) Limited**

2nd Floor, No. 2 Building Phase B, Daqian Industrial park, Longchang Road, 67 District, Baoan, Shenzhen, P. R. China

## 1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	LTE Phone
Brand Name	Sonim
Model Name	XP5800(PC2111)
FCC ID	WYPPC2100
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 WLAN 5GHz 802.11ac VHT20/VHT40 Bluetooth v3.0 + EDR/ v 4.0 LE/ v 4.2 LE
IMEI Code	Conducted: N/A Radiation: 001080001912568/001080001912576
HW Version	A
SW Version	5SA.0.0-00-7.1.2-00.27.00
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. This is a variant report for XP5800(PC2111). The difference between the previous and current please refer to Appendix E. Based on the similarity between two models, only the conducted power and the worst case of RSE from original report (Sporton Report Number FR792101D) were verified for difference.

## 1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
<b>Tx/Rx Frequency Range</b>	5180 MHz ~ 5240 MHz 5260 MHz ~ 5320 MHz 5500 MHz ~ 5720 MHz
<b>Maximum Output Power to Antenna</b>	<b>&lt;5180 MHz ~ 5240 MHz&gt;</b> 802.11a : 17.04 dBm / 0.0506 W 802.11n HT20 : 16.39 dBm / 0.0436 W 802.11n HT40 : 14.91 dBm / 0.0310 W 802.11ac VHT20 : 15.22 dBm / 0.0333 W 802.11ac VHT40 : 13.05 dBm / 0.0202 W <b>&lt;5260 MHz ~ 5320 MHz&gt;</b> 802.11a : 16.83 dBm / 0.0482 W 802.11n HT20 : 16.10 dBm / 0.0407 W 802.11n HT40 : 14.95 dBm / 0.0313 W 802.11ac VHT20 : 15.23 dBm / 0.0333 W 802.11ac VHT40 : 13.14 dBm / 0.0206 W <b>&lt;5500 MHz ~ 5720 MHz&gt;</b> 802.11a : 16.59 dBm / 0.0456 W 802.11n HT20 : 15.53 dBm / 0.0357 W 802.11n HT40 : 14.46 dBm / 0.0279 W 802.11ac VHT20 : 14.72 dBm / 0.0296 W 802.11ac VHT40 : 13.03 dBm / 0.0201 W
<b>Antenna Gain / Gain</b>	<b>&lt;5180 MHz ~ 5240 MHz&gt;</b> PIFA Antenna with gain 2.00 dBi <b>&lt;5260 MHz ~ 5320 MHz &gt;</b> PIFA Antenna with gain 2.00 dBi <b>&lt;5500 MHz ~ 5720 MHz&gt;</b> PIFA Antenna with gain 2.00 dBi
<b>Type of Modulation</b>	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)



## 1.5 Modification of EUT

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

## 1.6 Testing Location

Sporton Lab 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	03CH03-KS	630927

**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 E
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v02
- ♦ ANSI C63.10-2013

**Remark:** All test items were verified and recorded according to the standards and without any deviation during the test.

## 2 Test Configuration of Equipment Under Test

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: radiated 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 were recorded in this report.

### 2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5180-5240 MHz Band 1 (U-NII-1)	36	5180	44	5220
	38*	5190	46*	5230
	40	5200	48	5240
	42 <sup>#</sup>	5210		

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5260-5320 MHz Band 2 (U-NII-2A)	52	5260	60	5300
	54*	5270	62*	5310
	56	5280	64	5320
	58 <sup>#</sup>	5290		

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5500-5720 MHz Band 3 (U-NII-2C)	100	5500	112	5560
	102*	5510	116	5580
	104	5520	132	5660
	106 <sup>#</sup>	5530	134*	5670
	108	5540	136	5680
	110*	5550	140	5700

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
Straddle Channel	138 <sup>#</sup>	5690	144	5720
	142*	5710		

**Note:** The above Frequency and Channel in "\*" were 802.11n HT40 and 802.11ac VHT40.





## 2.2 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates as below table.

Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT20	MCS0
802.11ac VHT40	MCS0



Ch. #		Band I : 5180-5240 MHz	Band II : 5260-5320 MHz	Band III : 5500-5720MHz
		802.11a	802.11a	802.11a
L	Low	36	52	100
M	Middle	44	60	116
H	High	48	64	140
Straddle		-	-	144

Ch. #		Band I : 5180-5240 MHz	Band II : 5260-5320 MHz	Band III : 5500-5720MHz
		802.11n HT20	802.11n HT20	802.11n HT20
L	Low	36	52	100
M	Middle	44	60	116
H	High	48	64	140
Straddle		-	-	144

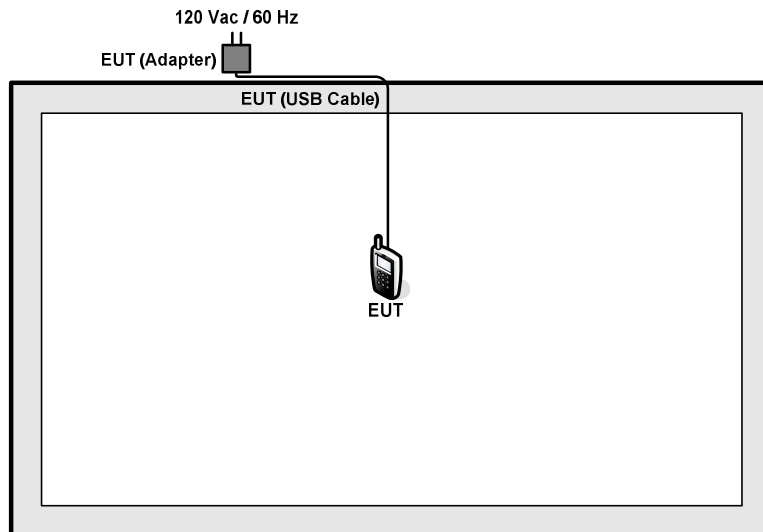
Ch. #		Band I : 5180-5240 MHz	Band II : 5260-5320 MHz	Band III : 5500-5720MHz
		802.11n HT40	802.11n HT40	802.11n HT40
L	Low	38	54	102
M	Middle	-	-	110
H	High	46	62	134
Straddle		-	-	142

Ch. #		Band I : 5180-5240 MHz	Band II : 5260-5320 MHz	Band III : 5500-5720MHz
		802.11ac VHT20	802.11ac VHT20	802.11ac VHT20
L	Low	36	52	100
M	Middle	44	60	116
H	High	48	64	140
Straddle		-	-	144

Ch. #		Band I : 5180-5240 MHz	Band II : 5260-5320 MHz	Band III : 5500-5720MHz
		802.11ac VHT40	802.11ac VHT40	802.11ac VHT40
L	Low	38	54	102
M	Middle	-	-	110
H	High	46	62	134
Straddle		-	-	142

## 2.3 Connection Diagram of Test System

< Radiated Emission Mode>



## 2.4 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 Maximum Conducted Output Power Measurement

##### 3.1.1 Limit of Maximum Conducted Output Power

**<FCC 14-30 CFR 15.407>**

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW.

For the 5.25–5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm  $10 \log B$ , where B is the 26 dB emission bandwidth in megahertz.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note that U-NII-2 band, devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

##### 3.1.2 Measuring Instruments

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

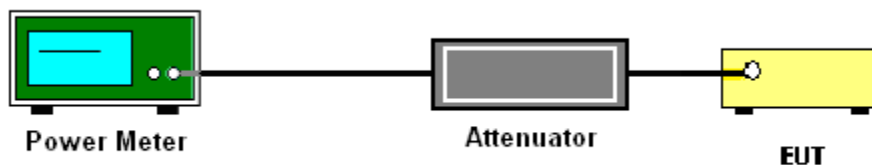
### 3.1.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02.

Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor,  $10 \log(1/x)$ , where  $x$  is the duty cycle.

### 3.1.4 Test Setup



### 3.1.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.

## 3.2 Unwanted Radiated Emission Measurement

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

### 3.2.1 Limit of Unwanted Emissions

- (1) For transmitters operating in the 5150-5250 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of -27dBm/MHz.

For transmitters operating in the 5250-5350 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5250-5350 MHz band that generate emissions in the 5150-5250 MHz band must meet all applicable technical requirements for operation in the 5150-5250 MHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5150-5250 MHz band.

For transmitters operating in the 5470-5725MHz band: all emissions outside of the 5470-5725MHz band shall not exceed an EIRP of -27 dBm/MHz.

- (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

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

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts)}$$



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

(3) KDB789033 D01 v02 G)2)c)

- (i) Section 15.407(b)(1) to (b)(3) specify the unwanted emission limits for the U-NII-1 and U-NII-2 bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz.<sup>3</sup>
- (ii) Section 15.407(b)(4) specifies the unwanted emission limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). The emission limits are in terms of a Peak detector. An alternative to the band emissions mask is specified in Section 15.407(b)(4)(ii). The alternative limits are based on the highest antenna gain specified in the filing. There are also marketing and importation restrictions for the devices using the alternative limit.<sup>4</sup>

**Note 3:** An out-of-band emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz peak emission limit.

**Note 4:** Only devices with antenna gains of 10 dBi or less may be approved using the emission limits specified in Section 15.247(d) till March 2, 2018; all other devices operating in this band must use the mask specified in Section 15.407(b)(4)(i).

### 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 FCC KDB 789033 D02 General UNII Test Procedures New Rules v02.

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.

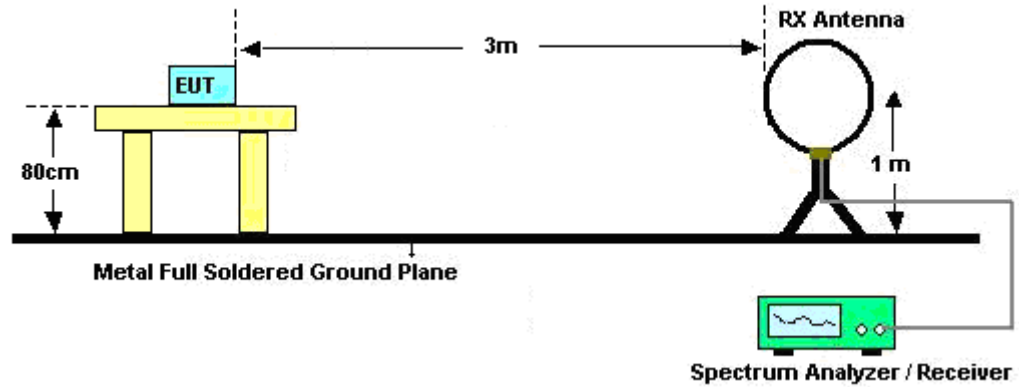




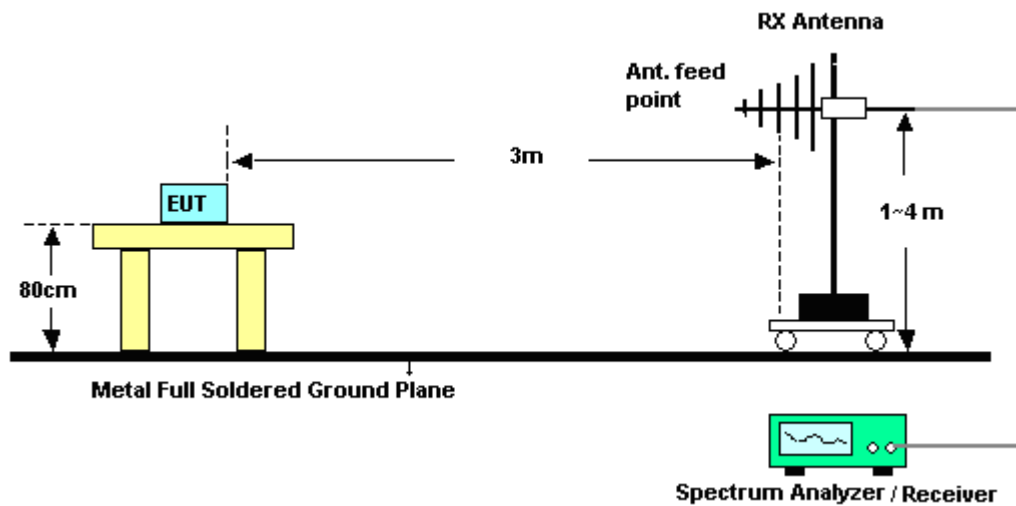
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband 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.

### 3.2.4 Test Setup

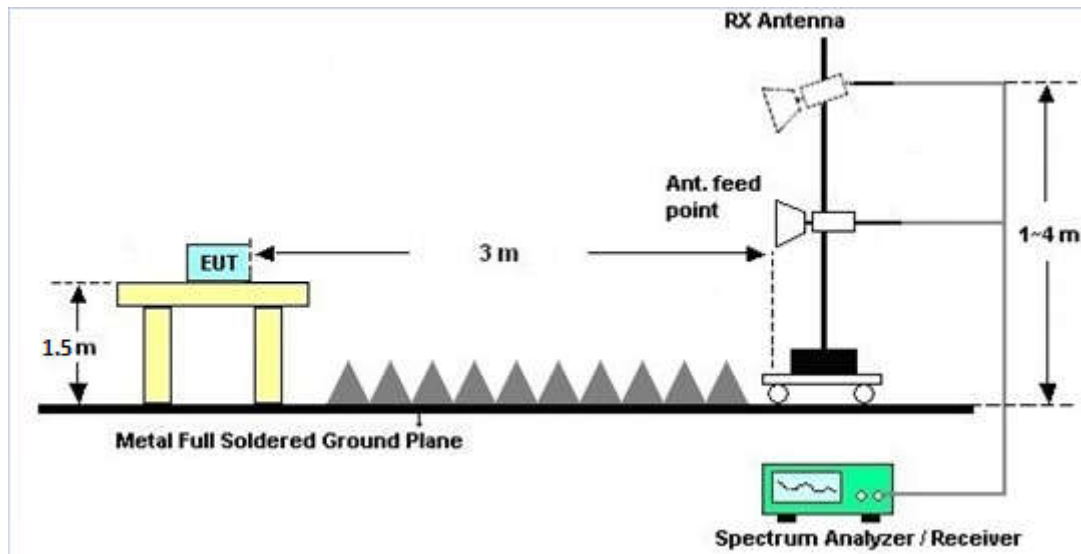
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



### 3.2.5 Test Results of Radiated Spurious 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.

### 3.2.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B.

### 3.2.7 Duty Cycle

Please refer to Appendix C.

### 3.2.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix B.



## 4 List of Measuring Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 19, 2017	Dec. 12, 2017	Jan. 18, 2018	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 19, 2017	Dec. 12, 2017	Jan. 18, 2018	Conducted (TH01-KS)
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Aug. 08, 2017	Dec. 12, 2017	Aug. 07, 2018	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY56400004	3Hz~8.5GHz; Max 30dBm	Oct. 19, 2017	Dec. 11, 2017	Oct. 18, 2018	Radiation (03CH03-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz~44GHz	Apr. 18, 2017	Dec. 11, 2017	Apr. 17, 2018	Radiation (03CH03-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 22, 2017	Dec. 11, 2017	Oct. 21, 2018	Radiation (03CH03-KS)
Bilog Antenna	TeseQ	CBL6112D	35406	25MHz~2GHz	Apr. 22, 2017	Dec. 11, 2017	Apr. 21, 2018	Radiation (03CH03-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1356	1GHz~18GHz	Apr. 22, 2017	Dec. 11, 2017	Apr. 21, 2018	Radiation (03CH03-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Feb. 15, 2017	Dec. 11, 2017	Feb. 14, 2018	Radiation (03CH03-KS)
Amplifier	com-power	PA-103A	161069	1MHz~1000MHz / 32 dB	Apr. 18, 2017	Dec. 11, 2017	Apr. 17, 2018	Radiation (03CH03-KS)
Amplifier	MITEQ	TTA1840-35-H G	1887435	18GHz~40GHz	Oct. 12, 2017	Dec. 11, 2017	Oct. 11, 2018	Radiation (03CH03-KS)
high gain Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	2025788	1GHz~18GHz	Apr. 18, 2017	Dec. 11, 2017	Apr. 17, 2018	Radiation (03CH03-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Oct. 12, 2017	Dec. 11, 2017	Oct. 11, 2018	Radiation (03CH03-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Dec. 11, 2017	NCR	Radiation (03CH03-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Dec. 11, 2017	NCR	Radiation (03CH03-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Dec. 11, 2017	NCR	Radiation (03CH03-KS)

NCR: No Calibration Required



## 5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.6 dB
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### Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.5 dB
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### Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.7 dB
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## **Appendix A. Conducted Test Results**

Report Number : FR792101-06A

Test Engineer:	Silent Hai	Temperature:	21~25	°C
Test Date:	2017/12/12	Relative Humidity:	51~55	%

**TEST RESULTS DATA**  
**Average Power Table**

FCC Band I										
Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)		Pass/Fail
11a	6Mbps	1	36	5180	0.58	16.89	24.00	2.00		Pass
11a	6Mbps	1	44	5220	0.58	17.04	24.00	2.00		Pass
11a	6Mbps	1	48	5240	0.58	16.80	24.00	2.00		Pass
HT20	MCS0	1	36	5180	0.62	16.08	24.00	2.00		Pass
HT20	MCS0	1	44	5220	0.62	16.39	24.00	2.00		Pass
HT20	MCS0	1	48	5240	0.62	16.14	24.00	2.00		Pass
HT40	MCS0	1	38	5190	0.64	14.76	24.00	2.00		Pass
HT40	MCS0	1	46	5230	0.64	14.91	24.00	2.00		Pass
VHT20	MCS0	1	36	5180	0.79	15.01	24.00	2.00		Pass
VHT20	MCS0	1	44	5220	0.79	15.22	24.00	2.00		Pass
VHT20	MCS0	1	48	5240	0.79	14.91	24.00	2.00		Pass
VHT40	MCS0	1	38	5190	1.49	12.74	24.00	2.00		Pass
VHT40	MCS0	1	46	5230	1.49	13.05	24.00	2.00		Pass



**TEST RESULTS DATA**  
**Average Power Table**

FCC Band II										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	EIRP Power Limit (dBm)	Pass/Fail
11a	6M bps	1	52	5260	0.58	16.83	23.98	2.00	26.99	Pass
11a	6M bps	1	60	5300	0.58	16.70	23.98	2.00	26.99	Pass
11a	6M bps	1	64	5320	0.58	16.45	23.98	2.00	26.99	Pass
HT20	MCS 0	1	52	5260	0.62	16.10	23.98	2.00	26.99	Pass
HT20	MCS 0	1	60	5300	0.62	16.05	23.98	2.00	26.99	Pass
HT20	MCS 0	1	64	5320	0.62	15.69	23.98	2.00	26.99	Pass
HT40	MCS 0	1	54	5270	0.64	14.95	23.98	2.00	26.99	Pass
HT40	MCS 0	1	62	5310	0.64	14.72	23.98	2.00	26.99	Pass
VHT20	MCS 0	1	52	5260	0.79	15.23	23.98	2.00	26.99	Pass
VHT20	MCS 0	1	60	5300	0.79	15.21	23.98	2.00	26.99	Pass
VHT20	MCS 0	1	64	5320	0.79	14.73	23.98	2.00	26.99	Pass
VHT40	MCS 0	1	54	5270	1.49	13.14	23.98	2.00	26.99	Pass
VHT40	MCS 0	1	62	5310	1.49	12.91	23.98	2.00	26.99	Pass

**TEST RESULTS DATA**  
**Average Power Table**

FCC Band III										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	EIRP Power Limit (dBm)	Pass/Fail
11a	6M bps	1	100	5500	0.58	16.59	23.98	2.00	26.99	Pass
11a	6M bps	1	116	5580	0.58	16.05	23.98	2.00	26.99	Pass
11a	6M bps	1	140	5700	0.58	16.45	23.98	2.00	26.99	Pass
11a	6Mbps	1	144	5720	0.58	15.99	23.98	2.00	26.99	Pass
HT20	MCS 0	1	100	5500	0.62	15.53	23.98	2.00	26.99	Pass
HT20	MCS 0	1	116	5580	0.62	15.16	23.98	2.00	26.99	Pass
HT20	MCS 0	1	140	5700	0.62	15.29	23.98	2.00	26.99	Pass
HT20	MCS0	1	144	5720	0.62	14.96	23.98	2.00	26.99	Pass
HT40	MCS 0	1	102	5510	0.64	13.95	23.98	2.00	26.99	Pass
HT40	MCS 0	1	110	5550	0.64	14.46	23.98	2.00	26.99	Pass
HT40	MCS 0	1	134	5670	0.64	13.97	23.98	2.00	26.99	Pass
HT40	MCS 0	1	142	5710	0.64	14.18	23.98	2.00	26.99	Pass
VHT20	MCS 0	1	100	5500	0.79	14.52	23.98	2.00	26.99	Pass
VHT20	MCS 0	1	116	5580	0.79	14.67	23.98	2.00	26.99	Pass
VHT20	MCS 0	1	140	5700	0.79	14.72	23.98	2.00	26.99	Pass
VHT20	MCS0	1	144	5720	0.79	13.91	23.98	2.00	26.99	Pass
VHT40	MCS 0	1	102	5510	1.49	12.81	23.98	2.00	26.99	Pass
VHT40	MCS 0	1	110	5550	1.49	13.03	23.98	2.00	26.99	Pass
VHT40	MCS 0	1	134	5670	1.49	12.67	23.98	2.00	26.99	Pass
VHT40	MCS0	1	142	5710	1.49	12.75	23.98	2.00	26.99	Pass



## Appendix B. Radiated Spurious Emission

### Band 3 - 5470~5725MHz

#### WIFI 802.11ac VHT20 (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
802.11ac VHT20 CH 140 5700MHz	*	5702	107.96	-	-	97.24	34.94	12.55	36.77	353	207	P	H
	*	5702	101.44	-	-	90.72	34.94	12.55	36.77	353	207	A	H
		5725.48	64.03	-9.97	74	53.35	34.92	12.57	36.81	353	207	P	H
	!	5725.08	52.61	-1.39	54	41.93	34.92	12.57	36.81	353	207	A	H
	*	5702	103.94	-	-	93.22	34.94	12.55	36.77	100	8	P	V
	*	5702	97.33	-	-	86.61	34.94	12.55	36.77	100	8	A	V
		5725	57.59	-16.41	74	46.91	34.92	12.57	36.81	100	8	P	V
		5725.01	49.59	-4.41	54	38.91	34.92	12.57	36.81	100	8	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



## Band 3 - 5470~5725MHz

## WIFI 802.11ac VHT20 (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)
802.11ac		11400	47.95	-26.05	74	58.03	39.23	16.1	65.41	300	0	P	H
VHT20		11400	53.69	-20.31	74	63.77	39.23	16.1	65.41	100	253	P	V
CH 140 5700MHz	!	11400	51.51	-2.49	54	61.59	39.23	16.1	65.41	100	253	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



**Band 3 - 5470~5725MHz**  
**WIFI 802.11ac VHT40 (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 )
802.11ac VHT40 CH 102 5510MHz		5467.76	59.34	-14.66	74	48.62	35.14	12.27	36.69	300	217	P	H
	!	5469.9	49.09	-4.91	54	38.37	35.14	12.27	36.69	300	217	A	H
	*	5524	100.59	-	-	89.84	35.09	12.34	36.68	300	217	P	H
	*	5524	93.46	-	-	82.71	35.09	12.34	36.68	300	217	A	H
		5746.28	52.71	-21.29	74	42.06	34.91	12.59	36.85	300	217	P	H
		5740.52	43.87	-10.13	54	33.22	34.91	12.59	36.85	300	217	A	H
		5468.56	60.53	-13.47	74	49.81	35.14	12.27	36.69	100	7	P	V
		5469.2	47.97	-6.03	54	37.25	35.14	12.27	36.69	100	7	A	V
	*	5520	99.58	-	-	88.83	35.09	12.34	36.68	100	7	P	V
	*	5520	92.5	-	-	81.75	35.09	12.34	36.68	100	7	A	V
		5755.72	52.04	-21.96	74	41.4	34.89	12.6	36.85	100	7	P	V
		5745.64	43.79	-10.21	54	33.14	34.91	12.59	36.85	100	7	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



**Band 3 - 5470~5725MHz**  
**WIFI 802.11ac VHT40 (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)
802.11ac		11020	49.11	-24.89	74	59.93	38.94	15.93	65.69	300	0	P	H
VHT40													
CH 102		11020	50.79	-23.21	74	61.61	38.94	15.93	65.69	100	0	P	V
5510MHz													
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



## Emission below 1GHz

## WIFI 802.11ac 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 )
802.11ac VHT20 LF		31.94	26.11	-13.89	40	31.31	26.36	0.73	32.29	100	60	P	H
		61.04	23.92	-16.08	40	41.23	13.78	1.13	32.22	-	-	P	H
		142.52	22.37	-21.13	43.5	35.16	17.73	1.76	32.28	-	-	P	H
		197.81	23.13	-20.37	43.5	36.3	17.02	2.07	32.26	-	-	P	H
		712.88	29.18	-16.82	46	29.18	27.64	4.05	31.69	-	-	P	H
		901.06	30.73	-15.27	46	28.61	29	4.57	31.45	-	-	P	H
	!	31.94	35.21	-4.79	40	40.41	26.36	0.73	32.29	156	20	P	V
		42.61	31.5	-8.5	40	41.91	20.8	0.99	32.2	-	-	P	V
		55.22	26.37	-13.63	40	41.89	15.6	1.08	32.2	-	-	P	V
		141.55	21.16	-22.34	43.5	33.93	17.76	1.75	32.28	-	-	P	V
		323.91	26.38	-19.62	46	34.97	20.61	2.88	32.08	-	-	P	V
		903.97	29.87	-16.13	46	27.73	29	4.58	31.44	-	-	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 not under limit 6dB.
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)

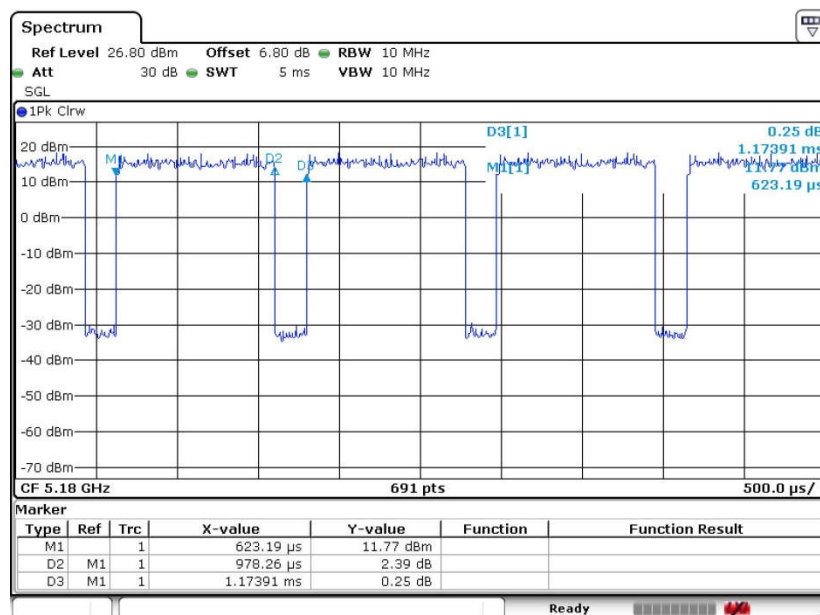
Both peak and average measured complies with the limit line, so test result is “PASS”.



## Appendix C. Duty Cycle Plots

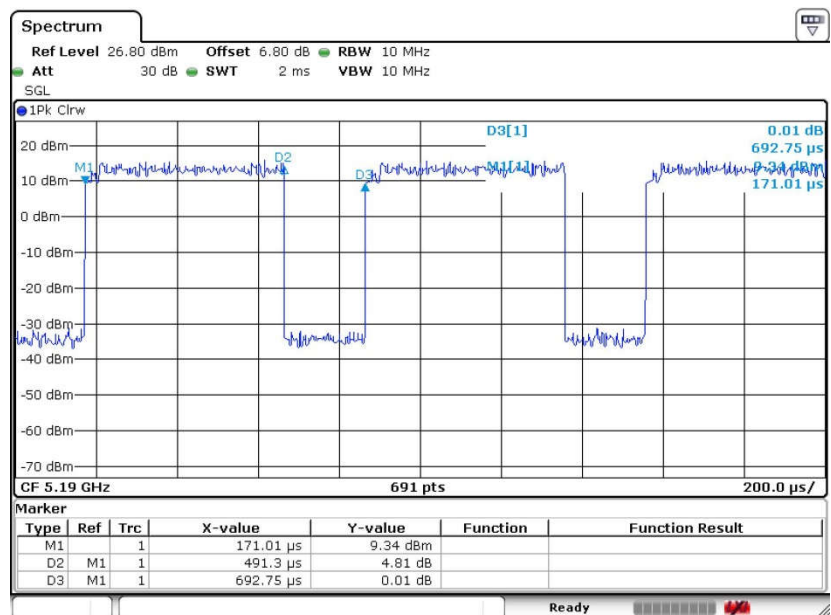
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11ac VHT20	83.33	0.978	1.022	3 kHz
802.11ac VHT40	70.92	0.491	2.035	3 kHz

### 802.11ac VHT20





802.11ac VHT40





## **Appendix E. Product Equality Declaration**

# Sonim Technologies, Inc. Company

Address: 1825 S. Grant St., Suite 200., San Mateo, CA, 94402

Date: December 13, 2017

## Product Equality Declaration

We, Sonim Technologies, Inc., declare on our sole responsibility for the product of XP5800 (PC2111) as below:

The difference of XP5800 (PC2111) 5SA.0.0-00-7.1.2-00.25.01 and XP5800 (PC2111) 5SA.0.0-00-7.1.2-00.27.00 as below:

- HW: Same Hardware
- SW:
  - 802.11ac is enabled

All the others are the same.

Should you have any questions or comments regarding this matter, please have my best attention.

Sincerely yours,



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**Contact Person:** Avena Xu

**Company:** Sonim Technologies, Inc.

**TEL:** 86-10-65033324

**FAX:** +1 650 3788190

**E-mail:** avena.xu@sonimtech.com