FCC RF Test Report

APPLICANT	: Sierra Wireless, Inc.
EQUIPMENT	: Wireless Module
BRAND NAME	: AirPrime
MODEL NAME	: EM9190
FCC ID	: N7NEM91
STANDARD	: 47 CFR Part 2, 27
CLASSIFICATION	: PCS Licensed Transmitter (PCB)
TEST DATE(S)	: Dec. 07, 2021

We, Sporton International Inc. (ShenZhen), would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown 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 Inc. (ShenZhen), the test report shall not be reproduced except in full.

Reviewed by: Derreck Chen / Supervisor

Approved by: Eric Shih / Manager

Cert #5145.01

Sporton International Inc. (ShenZhen)

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People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG1N1001C	Rev. 01	Initial issue of report	Feb. 17, 2022

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
-	§2.1046	Conducted Output Power	-	Report Only	1
-	§ 27.50 (k)(4)	Peak-to-Average Ratio	<13 dB	PASS	1
-	§2.1049	Occupied Bandwidth	-	Report Only	1
-	§2.1051 §27.53(m)(4) §27.53 (n)(2)	Conducted Band Edge Measurement (Band 41) (Band 42)	§27.53(m)(4)	PASS	1
	§2.1051 §27.53(m)(4) §27.53 (n)(2	Conducted Spurious Emission (Band 41) (Band 42)	< $55+10\log_{10}$(P[Watts])	PASS	1
-	§2.1055 §27.54	Frequency Stability Temperature & Voltage	Within Authorized Band	PASS	1
3.4	§2.1053 §27.53(m)(4) §27.53 (n)(2)	Radiated Spurious Emission (Band 41) (Band 42)	< $55+10\log_{10}$(P[Watts])	PASS	Under limit 23.10 dB at 14465.000 MHz

Remark 1 :
The test items of inter band CA were cover by LTE single carrier due to the CA power is reduced according to 3GPP MPR.

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Applicant

Sierra Wireless, Inc.
13811 Wireless Way, Richmond, BC, Canada V6A 3A4

1.2 Manufacturer

Sierra Wireless, Inc.
13811 Wireless Way, Richmond, BC, Canada V6A 3A4

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Wireless Module
Brand Name	AirPrime
Model Name	EM9190
FCC ID	N7NEM91
HW Version	1.0
SW Version	00.15.01.00
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 EM9190. The change note could be referred to the EM9190_Operational Description of Product Equality Declaration which is exhibit separately. Based on the similarity between current and previous project, only the related test cases from original test report (Sporton Report Number FG021501H) were verified for the differences.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	LTE Band 41 : 2496 MHz ~ 2690 MHz LTE Band 42: 3450 MHz ~ 3550 MHz
Rx Frequency	LTE Band 41 : 2496 MHz ~ 2690 MHz LTE Band 42: 3450 MHz ~ 3550 MHz
Uplink CA Bands	41A-42A
Type of Modulation	QPSK / 16QAM / 64QAM / 256QAM

1.5 Modification of EUT

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

1.6 Testing Location

<FCC>-SZ

Sporton International Inc. (Shenzhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International Inc. (Shenzhen)		
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City Guangdong Province China 518103 TEL: +86-755-33202398		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH02-SZ	CN1256	421272

1.7 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH02-SZ	AUDIX	E3	6.2009-8-24a

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 2, 27
- ANSI C63.26-2015
- FCC KDB 971168 D01 Power Meas License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01

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

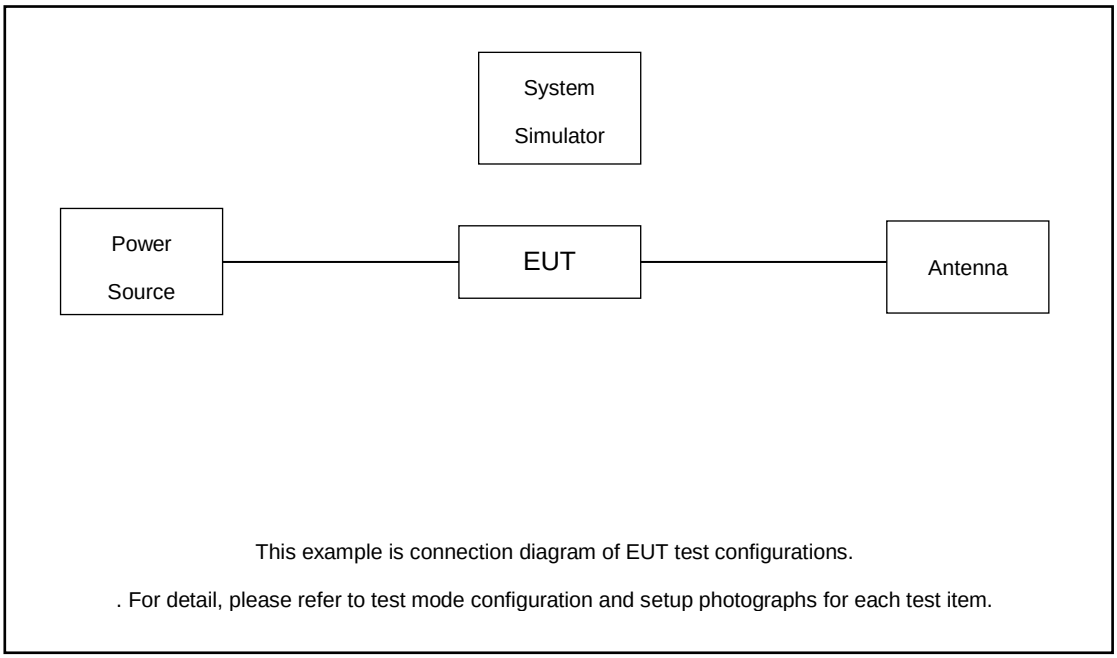
2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas License Digital Systems v03r01 with maximum output power.

Radiated measurements are performed by rotating the EUT in three different orthogonal(X,Y,Z plane) test planes to find the maximum emission(Y plane).

Test Items	Band	Bandwidth (MHz)				Modulation			RB #			Test Channel		
		5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
Radiated Spurious Emission	41A-42A	Worst Case											v	
Note	1. The mark "**v** " means that this configuration is chosen for testing 2. The mark "-" means that this bandwidth is not supported. 3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.													

2.2 Connection Diagram of Test System



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

The EUT has been configuration operated in a manner tended to maximize its emission characteristics in a typical application.

2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	Base Station	Anritsu	MT8821C	Fcc DoC	N/A	Shielded, 1.5m

2.4 Frequency List of Low/Middle/High Channels

LTE Band 41 Channel and Frequency List				
BW [MHz]	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
20	Channel	39750	40620	41490
	Frequency	2506	2593	2680
15	Channel	39725	40620	41515
	Frequency	2503.5	2593	2682.5
10	Channel	39700	40620	41540
	Frequency	2501	2593	2685
5	Channel	39675	40620	41565
	Frequency	2498.5	2593	2687.5

LTE Band 42 Channel and Frequency List				
BW [MHz]	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
20	Channel	42190	42590	42990
	Frequency	3460	3500	3540
15	Channel	42165	42590	43015
	Frequency	3457.5	3500	3542.5
10	Channel	42140	42590	43040
	Frequency	3455	3500	3545
5	Channel	42115	42590	43065
	Frequency	3452.5	3500	3547.5

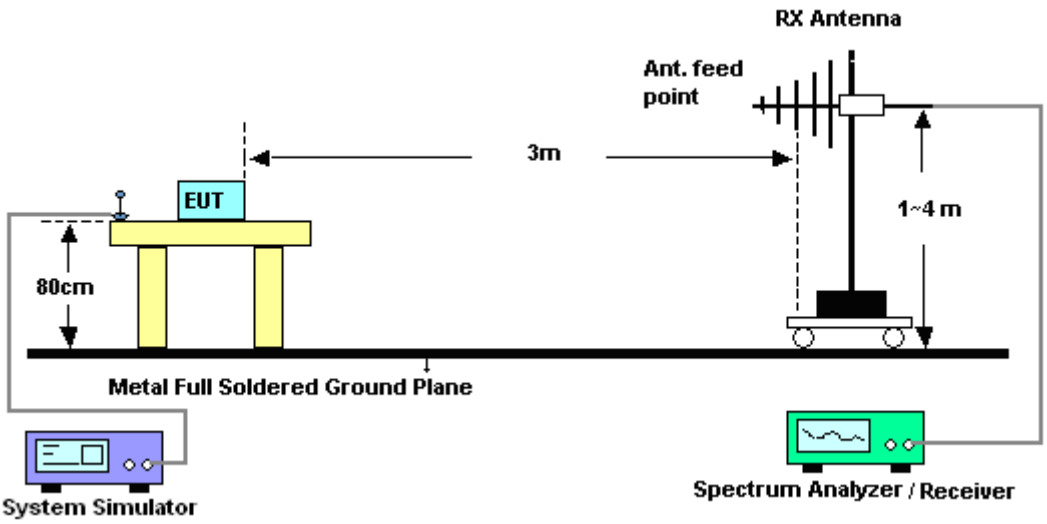
3 Radiated Test Items

3.1 Measuring Instruments

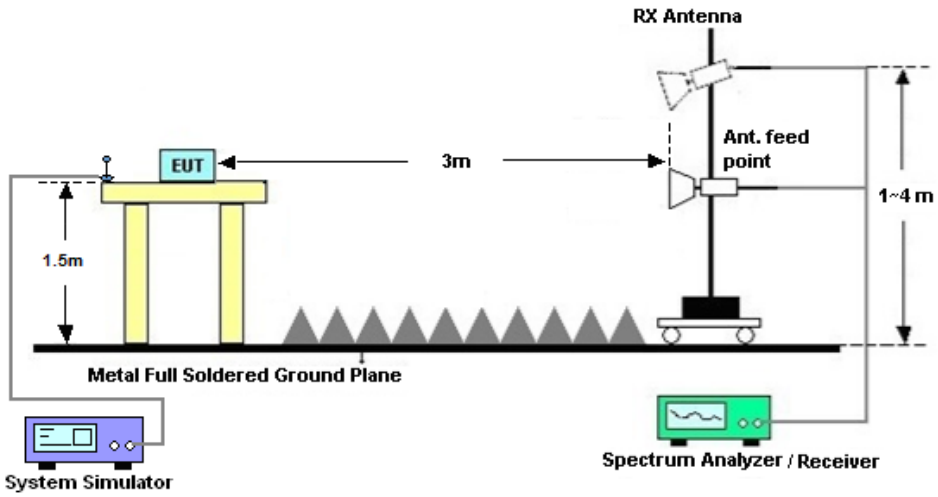
See list of measuring instruments of this test report.

3.2 Test Setup

3.2.1 For radiated test from 30MHz to 1GHz



3.2.2 For radiated test above 1GHz



3.3 Test Result of Radiated Test

Please refer to Appendix A.

3.4 Radiated Spurious Emission

3.4.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI C63.26. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

For Band 41

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 55 + 10 log (P) dB.

3.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
2. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
6. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
7. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
8. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
9. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
10. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
11. ERP (dBm) = EIRP - 2.15
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
    The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
    = P(W)- [43 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
    = -13dBm.
13. For Band 41:
    The limit line is derived from 55 + 10log(P)dB below the transmitter power P(Watts)

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Jul. 13, 2021	Dec. 07, 2021	Jul. 13, 2022	Radiation (03CH02-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jun. 22, 2020	Dec. 07, 2021	Jun. 21, 2022	Radiation (03CH02-SZ)
Bilog Antenna	TeseQ	CBL6112D		30MHz-2GHz	Oct. 22, 2021	Dec. 07, 2021	Oct. 21, 2022	Radiation (03CH02-SZ)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00119436	1GHz~18GHz	Jul. 25, 2021	Dec. 07, 2021	Jul. 24, 2022	Radiation (03CH02-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 13, 2021	Dec. 07, 2021	Jul. 13, 2022	Radiation (03CH02-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Apr. 11, 2021	Dec. 07, 2021	Apr. 10, 2022	Radiation (03CH02-SZ)
LF Amplifier	Bur35407geon	BPA-530	102211	0.01~3000Mhz	Jul. 13, 2021	Dec. 07, 2021	Jul. 13, 2022	Radiation (03CH02-SZ)
HF Amplifier	KEYSIGHT	83017A	MY53270105	0.5GHz~26.5Ghz	Oct. 22, 2021	Dec. 07, 2021	Oct. 21, 2022	Radiation (03CH02-SZ)
AC Power Source	Chroma	61601	616010002470	N/A	NCR	Dec. 07, 2021	NCR	Radiation (03CH02-SZ)
Turn Table	Chaintek	T-200	N/A	0~360 degree	NCR	Dec. 07, 2021	NCR	Radiation (03CH02-SZ)
Antenna Mast	Chaintek	MBS-400	N/A	1 m~4 m	NCR	Dec. 07, 2021	NCR	Radiation (03CH02-SZ)

NCR: No Calibration Required

5 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.26-2015. 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))	**2.47dB**

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.31dB**

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.72dB**

Appendix A. Test Results of Radiated Test

Radiated Spurious Emission

Test Engineer :	Levi Zhuo	Temperature :	22~23℃
		Relative Humidity :	41~42%

ULCA_41A-42A									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
LTE B41 BW 20MHz Middle 1RB0,QPSK	5168.00	-62.46	-25	-37.46	-57.15	-68.02	7.14	12.70	H
	7752.00	-56.85	-25	-31.85	-56.29	-60.15	8.30	11.60	H
	10336.00	-53.05	-25	-28.05	-57.15	-54.57	10.48	12.00	H
	5168.00	-58.84	-25	-33.84	-53.8	-64.40	7.14	12.70	V
	7752.00	-57.56	-25	-32.56	-56.85	-60.86	8.30	11.60	V
	10336.00	-54.22	-25	-29.22	-57.41	-55.74	10.48	12.00	V
LTE B42 BW 20MHz Middle 1RB0,QPSK	7132.50	-56.71	-25	-31.71	-55.98	-60.01	8.30	11.60	H
	10848.75	-53.19	-25	-28.19	-58.59	-54.71	10.48	12.00	H
	14465.00	-48.10	-25	-23.10	-59.00	-49.80	11.80	13.50	H
	7132.50	-51.99	-25	-26.99	-51.66	-55.29	8.30	11.60	V
	10848.75	-53.61	-25	-28.61	-58.64	-55.13	10.48	12.00	V
	14465.00	-48.79	-25	-23.79	-59.11	-50.49	11.80	13.50	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.