

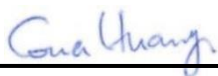
RF EXPOSURE EVALUATION REPORT

FCC ID : N7NXR80
Equipment : Router/Gateway
Brand Name : Sierra Wireless
Model Name : XR80
Applicant : Sierra Wireless Inc.
13811 Wireless Way, Richmond, BC Canada V6V 3A4
Manufacturer : Sierra Wireless Inc.
13811 Wireless Way, Richmond, BC Canada V6V 3A4
Standard : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC has been evaluated this product in accordance with 47 CFR Part 2.1091 and it complies with applicable limit.

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190) and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC evaluation.

The results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full



Approved by: Cona Huang / Deputy Manager



SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issued Date
FA150533	Rev. 01	Initial issue of report	Aug. 19, 2021



1. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Router/Gateway
Brand Name	Sierra Wireless
Model Name	XR80
FCC ID	N7NXR80
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2400 MHz ~ 2483.5 MHz WLAN 5.2GHz Band: 5150 MHz ~ 5250 MHz WLAN 5.3GHz Band: 5250 MHz ~ 5350 MHz WLAN 5.6GHz Band: 5470 MHz ~ 5725 MHz WLAN 5.8GHz Band: 5725 MHz ~ 5850 MHz
Mode	WLAN: 802.11a/b/g/ax HE20/HE40/HE80
HW Version	1.0
EUT Stage	Production Unit

1.2. Collocated Radios

General Note:

- Below WWAN radio may collocated with WLAN transmitter, additional WWAN power density calculation just for Sim-Tx analysis.

WWAN Module 1	
EUT Type	Wireless Module
Brand Name	AirPrime
Model Name	EM9190
Wireless Technology and Frequency Range	WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 17: 704 MHz ~ 716 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 30: 2305 MHz ~ 2315 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 42: 3550 MHz ~ 3600 MHz LTE Band 48: 3550 MHz ~ 3700 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz 5G NR n2 : 1850 MHz ~ 1910 MHz 5G NR n5 : 824 MHz ~ 849 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n66 : 1710 MHz ~ 1780 MHz 5G NR n71 : 663 MHz ~ 698 MHz
Mode	RMC/AMR 12.2Kbps HSDPA HSUPA DC-HSDPA LTE: QPSK, 16QAM, 64QAM, 256QAM 5G NR: DFT-s-OFDM/CP-OFDM, Pi/2 BPSK/QPSK/16QAM/64QAM/256QAM



WWAN Module 2	
EUT Type	Wireless Module
Brand Name	AirPrime
Model Name	HL7800
Wireless Technology and Frequency Range	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 17: 704 MHz ~ 716 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 66: 1710 MHz ~ 1780 MHz
Mode	LTE: QPSK, 16QAM, 64QAM

Reviewed by: Jason Wang

Report Producer: Daisy Peng

2. Maximum RF average output power among production units

<WLAN A>

Mode		Maximum Average Power (dBm)
5GHz WLAN	802.11a	24.50
	802.11ax-HE20	25.00
	802.11ax-HE40	26.00
	802.11ax-HE80	24.50

<WLAN B>

Mode		Maximum Average Power (dBm)
2.4GHz WLAN	802.11b	29.50
	802.11g	28.50
	802.11ax-HE20	29.00
	802.11ax-HE40	27.00
5GHz WLAN	802.11a	30.00
	802.11ax-HE20	30.00
	802.11ax-HE40	30.00
	802.11ax-HE80	30.00

<EM9190>

Mode		Maximum Average power(dBm)
WCDMA	Band II	24.50
	Band IV	24.50
	Band V	24.50
LTE	Band 2	24.00
	Band 4	24.00
	Band 5	24.00
	Band 7	24.80
	Band 12	24.00
	Band 13	24.00
	Band 14	24.00
	Band 17	24.00
	Band 25	24.00
	Band 26	24.00
	Band 30	23.00
	Band 38	24.80
	Band 41	24.80
	Band 41_HPUE	26.00
	Band 42	24.80
	Band 48	24.80
5G NR	Band 66	24.00
	Band 71	24.00
	n2	24.50
	n5	24.50
	n41	24.50
	n66	24.50
	n71	24.50

<HL7800>

Mode		Maximum Average power(dBm)
LTE	Band 2	24.50
	Band 4	24.50
	Band 5	24.50
	Band 12	24.50
	Band 13	24.50
	Band 17	24.50
	Band 25	24.50
	Band 26	24.50
	Band 66	24.50

3. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna



4. Radio Frequency Radiation Exposure Evaluation

4.1. Standalone Power Density Calculation

<WLAN A>

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
WLAN5GHz Band	0.50	26.00	26.5	0.45	446.68	0.089	1.000	0.089

<WLAN B>

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
WLAN2.4GHz Band	-0.25	29.50	29.3	0.84	841.40	0.167	1.000	0.167
WLAN5GHz Band	0.50	30.00	30.5	1.12	1122.02	0.223	1.000	0.223

<EM9190>

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
WCDMA Band 2	-0.50	24.5	24.0	0.25	251.19	0.050	1.000	0.050
WCDMA Band 4	-0.50	24.5	24.0	0.25	251.19	0.050	1.000	0.050
WCDMA Band 5	0.00	24.5	24.5	0.28	281.84	0.056	0.549	0.102
LTE Band 2	-0.50	24.0	23.5	0.22	223.87	0.045	1.000	0.045
LTE Band 4	-0.50	24.0	23.5	0.22	223.87	0.045	1.000	0.045
LTE Band 5	0.00	24.0	24.0	0.25	251.19	0.050	0.549	0.091
LTE Band 7	0.50	24.8	25.3	0.34	338.84	0.067	1.000	0.067
LTE Band 12	-0.50	24.0	23.5	0.22	223.87	0.045	0.466	0.096
LTE Band 13	-0.50	24.0	23.5	0.22	223.87	0.045	0.518	0.086
LTE Band 14	-0.50	24.0	23.5	0.22	223.87	0.045	0.525	0.085
LTE Band 17	-0.50	24.0	23.5	0.22	223.87	0.045	0.469	0.095
LTE Band 25	-0.50	24.0	23.5	0.22	223.87	0.045	1.000	0.045
LTE Band 26	0.00	24.0	24.0	0.25	251.19	0.050	0.543	0.092
LTE Band 30	0.50	23.0	23.5	0.22	223.87	0.045	1.000	0.045
LTE Band 38	0.50	24.8	25.3	0.34	338.84	0.067	1.000	0.067
LTE Band 41	0.50	24.8	25.3	0.34	338.84	0.067	1.000	0.067
LTE Band 41_HPUE	0.50	26.0	26.5	0.45	446.68	0.089	1.000	0.089
LTE Band 42	0.50	24.8	25.3	0.34	338.84	0.067	1.000	0.067
LTE Band 48	0.50	24.8	25.3	0.34	338.84	0.067	1.000	0.067
LTE Band 66	-0.50	24.0	23.5	0.22	223.87	0.045	1.000	0.045
LTE Band 71	-1.50	24.0	22.5	0.18	177.83	0.035	0.442	0.080
5G NR n2	-0.50	24.5	24.0	0.25	251.19	0.050	1.000	0.050
5G NR n5	0.00	24.5	24.5	0.28	281.84	0.056	0.549	0.102
5G NR n41	0.50	24.5	25.0	0.32	316.23	0.063	1.000	0.063
5G NR n66	-0.50	24.5	24.0	0.25	251.19	0.050	1.000	0.050
5G NR n71	-1.50	24.5	23.0	0.20	199.53	0.040	0.442	0.090

<HL7800>

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
LTE Band 2	-0.50	24.50	24.0	0.25	251.19	0.050	1.000	0.050
LTE Band 4	-0.50	24.50	24.0	0.25	251.19	0.050	1.000	0.050
LTE Band 5	0.00	24.50	24.5	0.28	281.84	0.056	0.549	0.102
LTE Band 12	-0.50	24.50	24.0	0.25	251.19	0.050	0.466	0.107
LTE Band 13	-0.50	24.50	24.0	0.25	251.19	0.050	0.518	0.097
LTE Band 17	-0.50	24.50	24.0	0.25	251.19	0.050	0.469	0.107
LTE Band 25	-0.50	24.50	24.0	0.25	251.19	0.050	1.000	0.050
LTE Band 26	0.00	24.50	24.5	0.28	281.84	0.056	0.543	0.103
LTE Band 66	-0.50	24.50	24.0	0.25	251.19	0.050	1.000	0.050

**4.2. Collocated Power Density Calculation**

Maximum WLAN 5GHz Power Density / Limit	EM9190 Maximum WWAN(3G,4G) Power Density / Limit	EM9190 Maximum WWAN(5G NR) Power Density / Limit	Σ (Power Density / Limit) of EM9190(LTE+NR) + 5GHz WLAN
0.089	0.102	0.102	0.293

Note:

1. Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for EM9190(worst case 3G/4G +5G NR) + 5GHz WLAN
2. Considering the WWAN module collocation with the WLAN transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 4 collocated transmitters is compliant.
3. For HL7800 and WLAN B has separation transmit antenna and will away 20cm from the other transmit antenna, Sim-Tx analysis unnecessary.

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.