

RF Exposure Evaluation Declaration

Product Name : Embedded module

Brand Name : AirPrime

Model No. : HL7810

FCC ID : N7NHL78A

IC : 2417C-HL78A

Applicant : Sierra Wireless, Inc.

Address : 13811 Wireless Way, Richmond, BC V6V 3A4, Canada

Date of Receipt : Feb. 14, 2022

Issued Date : Oct. 19, 2022

Report No. : 2220254R-RFUSOTHV13-A

Report Version : V2.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF or any agency of the government.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

The test report shall not be reproduced except in full without the written approval of DEKRA Testing and Certification Co., Ltd.



Product Name : Embedded module
Applicant : Sierra Wireless, Inc.
Address : 13811 Wireless Way, Richmond, BC V6V 3A4, Canada
Manufacturer : Sierra Wireless, Inc.
Address : 13811 Wireless Way, Richmond, BC V6V 3A4, Canada
Brand Name : AirPrime
Model No. : HL7810
FCC ID : N7NHL78A
IC : 2417C-HL78A
EUT Voltage : DC 3.2 ~ 4.35V (host equipment)
Testing Voltage : DC 3.7V
Applicable Standard : FCC 47 CFR Part 2.1091 Radiofrequency radiation exposure
evaluation: mobile devices.
ISED RSS-102 Issue 5 (Feb. 2021) – Radio Frequency
Exposure Compliance of Radiocommunication Apparatus (All
Frequency Bands)
Laboratory Name : DEKRA Testing and Certification Co., Ltd.
Hsin Chu Laboratory
Address : No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu
County 310, Taiwan, R.O.C.
Test Result : Complied

Documented By :

Handwritten signature of Amelia Wu in blue ink.

(Amelia Wu / Project Specialist)

Approved By :

Handwritten signature of Rueyyan Lin in blue ink.

(Rueyyan Lin / Supervisor)

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Revision History

Version	Description	Issued Date
V1.0	Initial issue of report	Aug. 19, 2022
V2.0	Adding the verify results of LTE Band 2, LTE Band 4, LTE Band 5, LTE Band 12, LTE Band 13, LTE Band 25, LTE Band 26, LTE Band 66.	Oct. 19, 2022

1. General Information

1.1. EUT General Information

RF General Information				
Evaluation Mode	Band	Uplink Frequency (MHz)	Downlink Frequency (MHz)	Modulation Type
WWAN 4G	LTE Band 2	880 ~ 915	1930~1990	Cat-M1: QPSK / 16QAM NB-IoT: BPSK / QPSK
	LTE Band 4	1710~1755	2110~2115	
	LTE Band 5	824~849	869~894	
	LTE Band 8 (FCC only)	897.5 ~ 900.5	925 ~ 960	
	LTE Band 12	699~716	729~746	
	LTE Band 13	777~787	746~756	
	LTE Band 25	1850~1915	1930~1995	
	LTE Band 26	814~849 (ISED Not support 814 ~ 824MHz)	859~894	
	LTE Band 66	1710~1780	2110~2200	
	LTE Band 85	698 ~ 716	728 ~ 746	

Note: The above EUT information is declared by the manufacturer.

1.2. Test Facility

Laboratory Information

USA : **FCC Registration Number: TW3024**
Canada **CAB identifier : TW3024**

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: <http://www.dekra.com.tw>

If you have any comments, please don't hesitate to contact us. Our test sites as below:

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
Address	1. No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C. 2. No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
Phone number	1. +886-3-582-8001 2. +886-3-582-8001
Fax number	1. +886-3-582-8958 2. +886-3-582-8958
E mail address	info.tw@dekra.com
Website	http://www.dekra.com.tw
Note: Test site number for address 1 includes HC-SR02. Test site number for address 2 includes HC-CB02, HC-CB03, HC-CB04, HC-SR10 and HC-SR12.	

2. RF Exposure Evaluation

2.1. Test Limit

<For FCC>

(A) Test Limit for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
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) Test Limit for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
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

Note: f = frequency in MHz; *Plane-wave equivalent power density

Power Density (S) is calculated by the following formula:

$$S = (P \cdot G) / 4\pi R^2$$

where:

S = power density (in appropriate units, e.g. mW/ cm²)

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

π = 3.1416

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

<For ISED>

(A) Test Limit for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/ m ²)	Reference Period (minutes)
0.003-10 ²³	170	180	-	Instantaneous*
0.1-10	-	1.6/ f	-	6**
1.29-10	193/ $f^{0.5}$	-	-	6**
10-20	61.4	0.163	10	6
20-48	129.8/ $f^{0.25}$	0.3444/ $f^{0.25}$	44.72/ $f^{0.5}$	6
48-100	49.33	0.1309	6.455	6
100-6000	15.60 $f^{0.25}$	0.04138 $f^{0.25}$	0.6455 $f^{0.5}$	6
6000-15000	137	0.364	50	6
15000-150000	137	0.364	50	616000/ $f^{1.2}$
150000-300000	0.354 $f^{0.5}$	9.40 x 10 ⁻⁴ $f^{0.5}$	3.33 x 10 ⁻⁴ f	616000/ $f^{1.2}$

Note: f is frequency in MHz.

*Based on nerve stimulation (NS).

** Based on specific absorption rate (SAR).

(B) Test Limit for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/ m ²)	Reference Period (minutes)
0.003-10 ²¹	83	90	-	Instantaneous*
0.1-10	-	0.73/ f	-	6**
1.1-10	87/ $f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ $f^{0.25}$	0.1540/ $f^{0.25}$	8.944/ $f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 $f^{0.3417}$	0.008335 $f^{0.3417}$	0.02619 $f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ $f^{1.2}$
150000-300000	0.158 $f^{0.5}$	4.21 x 10 ⁻⁴ $f^{0.5}$	6.67 x 10 ⁻⁵ f	616000/ $f^{1.2}$

Note: f is frequency in MHz.

*Based on nerve stimulation (NS).

** Based on specific absorption rate (SAR).

Power Density (S_{FF}) is calculated by the following formula:

$$S_{FF} = (G_i \cdot P_{in}) / 4\pi d^2$$

where:

S_{FF} = far-field power density (W/m²)

G_i = far-field antenna gain (power ratio)

P_{in} = power input to the antenna (W)

π = 3.1416

d = distance to the antenna (m)

2.2. Test Result of RF Exposure Evaluation

Exposure Environment: General Population / Uncontrolled Exposure

<For FCC>

Evaluation Mode	E.I.R.P (dBm)	E.I.R.P (mW)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Test Result (PASS/FAIL)
Cat-M1 Band 2	26.500	446.684	0.089	1.000	PASS
Cat-M1 Band 4	26.500	446.684	0.089	1.000	PASS
Cat-M1 Band 5	26.500	446.684	0.089	0.549	PASS
Cat-M1 Band 8	26.500	446.684	0.089	0.587	PASS
Cat-M1 Band 12	26.500	446.684	0.089	0.466	PASS
Cat-M1 Band 13	26.500	446.684	0.089	0.518	PASS
Cat-M1 Band 25	26.500	446.684	0.089	1.000	PASS
Cat-M1 Band 26	26.500	446.684	0.089	0.543	PASS
Cat-M1 Band 66	26.500	446.684	0.089	1.000	PASS
Cat-M1 Band 85	26.500	446.684	0.089	0.465	PASS
NB-IoT Band 2	26.500	446.684	0.089	1.000	PASS
NB-IoT Band 4	26.500	446.684	0.089	1.000	PASS
NB-IoT Band 5	26.500	446.684	0.089	0.549	PASS
NB-IoT Band 8	26.500	446.684	0.089	0.587	PASS
NB-IoT Band 12	26.500	446.684	0.089	0.466	PASS
NB-IoT Band 13	26.500	446.684	0.089	0.518	PASS
NB-IoT Band 25	26.500	446.684	0.089	1.000	PASS
NB-IoT Band 26	26.500	446.684	0.089	0.543	PASS
NB-IoT Band 66	26.500	446.684	0.089	1.000	PASS
NB-IoT Band 85	26.500	446.684	0.089	0.465	PASS

Note:

1. The above EUT information is declared by the manufacturer.
2. Distance (m): 0.2 for Maximum Permissible Exposure.
3. The results are evaluated using the maximum power.

<For ISED>

Evaluation Mode	E.I.R.P (dBm)	E.I.R.P (W)	Power Density (W/m ²)	Limit (W/m ²)	Test Result (PASS/FAIL)
Cat-M1 Band 2	26.500	0.447	0.889	4.476	PASS
Cat-M1 Band 4	26.500	0.447	0.889	4.242	PASS
Cat-M1 Band 5	26.500	0.447	0.889	2.576	PASS
Cat-M1 Band 12	26.500	0.447	0.889	2.302	PASS
Cat-M1 Band 13	26.500	0.447	0.889	2.474	PASS
Cat-M1 Band 25	26.500	0.447	0.889	4.476	PASS
Cat-M1 Band 26	26.500	0.447	0.889	2.554	PASS
Cat-M1 Band 66	26.500	0.447	0.889	4.242	PASS
Cat-M1 Band 85	26.500	0.447	0.889	2.299	PASS
NB-IoT Band 2	26.500	0.447	0.889	4.476	PASS
NB-IoT Band 4	26.500	0.447	0.889	4.242	PASS
NB-IoT Band 5	26.500	0.447	0.889	2.576	PASS
NB-IoT Band 12	26.500	0.447	0.889	2.302	PASS
NB-IoT Band 13	26.500	0.447	0.889	2.474	PASS
NB-IoT Band 25	26.500	0.447	0.889	4.476	PASS
NB-IoT Band 26	26.500	0.447	0.889	2.554	PASS
NB-IoT Band 66	26.500	0.447	0.889	4.242	PASS
NB-IoT Band 85	26.500	0.447	0.889	2.299	PASS

Note:

1. The above EUT information is declared by the manufacturer.
2. Distance (m): 0.2 for Maximum Permissible Exposure.
3. The results are evaluated using the maximum power.