

# RF EXPOSURE EVALUATION REPORT

FCC ID : N7NHL78A  
Equipment : Radio Module  
Brand Name : AirPrime  
Model Name : HL7810  
Applicant : Sierra Wireless, ULC  
13811 Wireless Way, Richmond, BC V6V 3A4 Canada  
Manufacturer : Sierra Wireless, ULC  
13811 Wireless Way, Richmond, BC V6V 3A4 Canada  
Standard : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC has been evaluated this product in accordance with 47 CFR Part2.1091 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. Laboratory, the test report shall not be reproduced except in full.



Approved by: Cona Huang / Deputy Manager



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## History of this test report

| Report No. | Version | Description             | Issued Date   |
|------------|---------|-------------------------|---------------|
| FA461108   | Rev. 01 | Initial issue of report | Jan. 16, 2025 |
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**1. Description of Equipment Under Test (EUT)**

| Product Feature & Specification         |                                                                               |
|-----------------------------------------|-------------------------------------------------------------------------------|
| EUT Type                                | Radio Module                                                                  |
| Brand Name                              | AirPrime                                                                      |
| Model Name                              | HL7810                                                                        |
| FCC ID                                  | N7NHL78A                                                                      |
| Wireless Technology and Frequency Range | NTN Band 23: 2000.1 MHz ~ 2019.9 MHz<br>NTN Band 255: 1626.6 MHz ~ 1660.4 MHz |
| Mode                                    | LTE: BPSK, QPSK                                                               |
| EUT Stage                               | Production Unit                                                               |

| Accessories Information |         |            |                 |            |           |
|-------------------------|---------|------------|-----------------|------------|-----------|
| Accessories Information | Fixture | Brand Name | Sierra Wireless | Model Name | HL DevKit |

Reviewed by: Jason Wang

Report Producer: Carlie Tsai

**2. Maximum RF average output power among production units**

| Mode |          | Maximum Average power(dBm) |
|------|----------|----------------------------|
| NTN  | Band 23  | 24.5                       |
|      | Band 255 | 24.5                       |

### 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 <sup>2</sup> ) | Averaging time (minutes) |
|----------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational/Controlled Exposures</b>        |                               |                               |                                     |                          |
| 0.3-3.0                                                        | 614                           | 1.63                          | *(100)                              | 6                        |
| 3.0-30                                                         | 1842/f                        | 4.89/f                        | *(900/f <sup>2</sup> )              | 6                        |
| 30-300                                                         | 61.4                          | 0.163                         | 1.0                                 | 6                        |
| 300-1500                                                       |                               |                               | f/300                               | 6                        |
| 1500-100,000                                                   |                               |                               | 5                                   | 6                        |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 0.3-1.34                                                       | 614                           | 1.63                          | *(100)                              | 30                       |
| 1.34-30                                                        | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 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**

| Band         | Antenna Gain (dBi) | Maximum Power (dBm) | Maximum EIRP (dBm) | Maximum EIRP (W) | Maximum EIRP Limit (W) | Maximum PG (mW) | Power Density at 20cm (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|--------------|--------------------|---------------------|--------------------|------------------|------------------------|-----------------|---------------------------------------------|-----------------------------|
| NTN Band 23  | 8.50               | 24.50               | 33.000             | 1.995            | 2.000                  | 1995.262        | 0.397                                       | 1.000                       |
| NTN Band 255 | 8.50               | 24.50               | 33.000             | 1.995            | 2.000                  | 1995.262        | 0.397                                       | 1.000                       |

### **4.2. Collocated Power Density Calculation**

**Note:**

- This MPE analysis is applicable to any collocated transmitters, with the maximum EIRP for WLAN assumed to be 30 dBm and the maximum EIRP for BT assumed to be 20 dBm.

| Band            | Antenna Gain (dBi) | Maximum Power (dBm) | Maximum EIRP (dBm) | Maximum EIRP (W) | Maximum PG (mW) | Power Density at 20cm (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Power Density / Limit |
|-----------------|--------------------|---------------------|--------------------|------------------|-----------------|---------------------------------------------|-----------------------------|-----------------------|
| NTN Band 23     | 8.50               | 24.50               | 33.0               | 2.00             | 1995.26         | 0.397                                       | 1.000                       | 0.397                 |
| NTN Band 255    | 8.50               | 24.50               | 33.0               | 2.00             | 1995.26         | 0.397                                       | 1.000                       | 0.397                 |
| WLAN2.4GHz Band |                    |                     | 30.0               | 1.00             | 1000.00         | 0.199                                       | 1.000                       | 0.199                 |
| WLAN5GHz Band   |                    |                     | 30.0               | 1.00             | 1000.00         | 0.199                                       | 1.000                       | 0.199                 |
| Bluetooth       |                    |                     | 20.0               | 0.10             | 100.00          | 0.020                                       | 1.000                       | 0.020                 |

| NTN Power Density / Limit | WLAN Power Density / Limit | Bluetooth Power Density / Limit | $\Sigma$ (Power Density / Limit) of NTN+WLAN+Bluetooth |
|---------------------------|----------------------------|---------------------------------|--------------------------------------------------------|
| 0.397                     | 0.199                      | 0.020                           | 0.616                                                  |

**Note:**

- $\Sigma$  (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for NTN + WLAN + Bluetooth.
- Considering the NTN module collocation with the WLAN and Bluetooth transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 3 collocated transmitters is compliant.

## **Conclusion:**

Based on FCC 47 CFR §1.1307, the analysis concludes that this product when transmitting in standalone within a host device, is compliant with the FCC RF exposure requirements in mobile exposure condition, provided the conducted power and antenna gain do not exceed the limits for each given frequency band per wireless technology as follow table:

| Device | Technology | Band     | Frequency (MHz) | Maximum Conducted Power (dBm) | Stanalone Maximum Antenna Gain (dBi) | Collocated Maximum Antenna Gain (dBi) |
|--------|------------|----------|-----------------|-------------------------------|--------------------------------------|---------------------------------------|
| HL7810 | NTN        | Band 23  | 2000.1 ~ 2019.9 | 24.5                          | 8.5                                  | 8.5                                   |
|        |            | Band 255 | 1626.6 ~ 1660.4 | 24.5                          | 8.5                                  | 8.5                                   |