

# RF Exposure Evaluation Report

APPLICANT : Sierra Wireless, Inc.  
EQUIPMENT : Wireless Module  
BRAND NAME : AirPrime  
MODEL NAME : EM9190  
FCC ID : N7NEM91  
STANDARD : 47 CFR Part 2.1091  
FCC KDB 447498 D01 v06

We, Sporton International Inc. (Shenzhen), would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091 and FCC KDB 447498 D01 v06, and pass the limit. Without written approval of Sporton International Inc. (Shenzhen), the test report shall not be reproduced except in full.

Hank Huang

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Reviewed by: Hank Huang / Supervisor

Johnny Chen

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Approved by: Johnny Chen / Manager



**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   |
|------------|---------|----------------------------------------------|---------------|
| FA1N1001   | Rev. 01 | Initial issue of report.                     | Feb. 18, 2022 |
| FA1N1001   | Rev. 02 | Revised LTE Band 42 Frequency typo on page 5 | Feb. 24, 2022 |
| FA1N1001   | Rev. 02 | Updated 5GNR n66 antenna gain value.         | Mar. 02, 2022 |
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## **1. Administration Data**

### **1.1. Testing Laboratory**

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

| Testing Laboratory |                                                                                                                                                                            |                     |                                |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------------------|
| Test Firm          | Sporton International Inc. (Shenzhen)                                                                                                                                      |                     |                                |
| Test Site Location | 1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055<br>People's Republic of China<br>TEL: +86-755-86379589<br>FAX: +86-755-86379595 |                     |                                |
| Test Site No.      | Sporton Site No.                                                                                                                                                           | FCC Designation No. | FCC Test Firm Registration No. |
|                    | SAR01-SZ                                                                                                                                                                   | CN1256              | 421272                         |

| Applicant    |                                                  |
|--------------|--------------------------------------------------|
| Company Name | Sierra Wireless, Inc.                            |
| Address      | 13811 Wireless Way, Richmond, BC, Canada V6A 3A4 |

| Manufacturer |                                                  |
|--------------|--------------------------------------------------|
| Company Name | Sierra Wireless, Inc.                            |
| Address      | 13811 Wireless Way, Richmond, BC, Canada V6A 3A4 |

## 2. Description of Equipment Under Test (EUT)

| Product Feature & Specification         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EUT Type                                | Wireless Module                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Brand Name                              | AirPrime                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Model Name                              | EM9190                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| IMEI                                    | 351735110001030                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| FCC ID                                  | N7NEM91                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Wireless Technology and Frequency Range | WCDMA Band II: 1850 MHz ~ 1910 MHz<br>WCDMA Band IV: 1710 MHz ~ 1755 MHz<br>WCDMA Band V: 824 MHz ~ 849 MHz<br>LTE Band 2: 1850 MHz ~ 1910 MHz<br>LTE Band 4: 1710 MHz ~ 1755 MHz<br>LTE Band 5: 824 MHz ~ 849 MHz<br>LTE Band 7: 2500 MHz ~ 2570 MHz<br>LTE Band 12: 699 MHz ~ 716 MHz<br>LTE Band 13: 777 MHz ~ 787 MHz<br>LTE Band 14: 788 MHz ~ 798 MHz<br>LTE Band 17: 704 MHz ~ 716 MHz<br>LTE Band 25: 1850 MHz ~ 1915 MHz<br>LTE Band 26: 824 MHz ~ 849 MHz<br>LTE Band 30: 2305 MHz ~ 2315 MHz<br>LTE Band 41: 2500 MHz ~ 2690 MHz<br>LTE Band 42: 3450 MHz ~ 3550 MHz<br>LTE Band 48: 3550 MHz ~ 3700 MHz<br>LTE Band 66: 1710 MHz ~ 1780 MHz<br>LTE Band 71: 663 MHz ~ 698 MHz<br>5G NR n2 : 1850 MHz ~ 1910 MHz<br>5G NR n5 : 824 MHz ~ 849 MHz<br>5G NR n7 : 2500 MHz ~ 2570 MHz<br>5G NR n12 : 699 MHz ~ 716 MHz<br>5G NR n25 : 1850 MHz ~ 1915 MHz<br>5G NR n41 : 2496 MHz ~ 2690 MHz<br>5G NR n66 : 1710 MHz ~ 1780 MHz<br>5G NR n71 : 663 MHz ~ 698 MHz<br>5G NR n77: 3450 MHz ~ 3550 MHz, 3700 MHz ~ 3980 MHz<br>5G NR n78: 3450 MHz ~ 3550 MHz, 3700 MHz ~ 3800 MHz |
| Mode                                    | RMC 12.2Kbps<br>HSDPA<br>HSUPA<br>DC-HSDPA<br>HSPA+ (16QAM uplink is not supported)<br>LTE: QPSK, 16QAM, 64QAM, 256QAM<br>DFT-s-OFDM (PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM)<br>CP-OFDM (QPSK / 16QAM / 64QAM / 256QAM)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 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 device supports HPUE for LTE band 41 with class 2 power level, so HPUE has been performed standalone power density calculation.
3. For DFT-s-OFDM and CP-OFDM output power measurement reduction, according to maximum power reduction for the CP-OFDM mode will not higher than DFT-s-OFDM mode, therefore, CP-OFDM measurement



is unnecessary. We always chose higher power (DFT-s-OFDM mode) to perform MPE analysis.

4. 5GNR n2 / n5 / n7 / n12 / n25 / n41 / n66 / n71 / n77 / n78 supports NSA and SA mode.
5. The EN-DC mode combination could be referred to the product spec.

### 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.

**3. Maximum RF average output tune up power among production units****<WCDMA>**

| Mode  |         | Maximum Average power(dBm) |
|-------|---------|----------------------------|
| WCDMA | Band II | 24.50                      |
|       | Band IV | 24.50                      |
|       | Band V  | 24.50                      |

**<LTE>**

| Mode |              | Maximum Average power(dBm) |
|------|--------------|----------------------------|
| 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      | 24.00                      |
|      | Band 41      | 24.80                      |
|      | Band 41-HPUE | 26.00                      |
|      | Band 42      | 24.80                      |
|      | Band 48      | 24.80                      |
|      | Band 66      | 24.00                      |
|      | Band 71      | 24.00                      |



<5G NR>

| Mode  |     | Maximum Average power(dBm) |
|-------|-----|----------------------------|
| 5G NR | n2  | 24.50                      |
|       | n5  | 24.50                      |
|       | n7  | 24.50                      |
|       | n12 | 24.50                      |
|       | n25 | 24.50                      |
|       | n41 | 24.50                      |
|       | n66 | 24.50                      |
|       | n71 | 24.50                      |
|       | n77 | 24.50                      |
|       | n78 | 24.50                      |





#### 4. 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



## 5. Radio Frequency Radiation Exposure Evaluation

### 5.1. Standalone Power Density Calculation

| Band             | Frequency (MHz) | Antenna Gain (dBi) | Maximum Power (dBm) | Maximum EIRP (dBm) | Average EIRP (mW) | Power Density at 20cm (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|------------------|-----------------|--------------------|---------------------|--------------------|-------------------|---------------------------------------------|-----------------------------|
| WCDMA Band 2     | 1852.4          | 8.5                | 24.50               | 33.000             | 1995.262          | 0.397                                       | 1.000                       |
| WCDMA Band 4     | 1712.4          | 5.5                | 24.50               | 30.000             | 1000.000          | 0.199                                       | 1.000                       |
| WCDMA Band 5     | 826.4           | 6.0                | 24.50               | 30.500             | 1122.018          | 0.223                                       | 0.551                       |
| LTE Band 2       | 1850.7          | 8.5                | 24.00               | 32.500             | 1778.279          | 0.354                                       | 1.000                       |
| LTE Band 4       | 1710.7          | 5.5                | 24.00               | 29.500             | 891.251           | 0.177                                       | 1.000                       |
| LTE Band 5       | 824.7           | 6.0                | 24.00               | 30.000             | 1000.000          | 0.199                                       | 0.550                       |
| LTE Band 7       | 2502.5          | 8.0                | 24.80               | 32.800             | 1905.461          | 0.379                                       | 1.000                       |
| LTE Band 12      | 699.7           | 6.0                | 24.00               | 30.000             | 1000.000          | 0.199                                       | 0.466                       |
| LTE Band 13      | 779.5           | 6.0                | 24.00               | 30.000             | 1000.000          | 0.199                                       | 0.520                       |
| LTE Band 14      | 790.5           | 6.0                | 24.00               | 30.000             | 1000.000          | 0.199                                       | 0.527                       |
| LTE Band 17      | 706.5           | 6.0                | 24.00               | 30.000             | 1000.000          | 0.199                                       | 0.471                       |
| LTE Band 25      | 1850.7          | 8.5                | 24.00               | 32.500             | 1778.279          | 0.354                                       | 1.000                       |
| LTE Band 26      | 814.7           | 6.0                | 24.00               | 30.000             | 1000.000          | 0.199                                       | 0.543                       |
| LTE Band 30      | 2307.5          | 0.0                | 24.00               | 24.000             | 251.189           | 0.050                                       | 1.000                       |
| LTE Band 41      | 2498.5          | 7.0                | 24.80               | 31.800             | 1513.561          | 0.301                                       | 1.000                       |
| LTE Band 41-HPUE | 2498.5          | 7.0                | 26.00               | 33.000             | 1995.262          | 0.397                                       | 1.000                       |
| LTE Band 42      | 3452.5          | 5.0                | 24.80               | 29.800             | 954.993           | 0.190                                       | 1.000                       |
| LTE Band 48      | 3552.5          | -1.8               | 24.80               | 23.000             | 199.526           | 0.040                                       | 1.000                       |
| LTE Band 66      | 1710.7          | 6.0                | 24.00               | 30.000             | 1000.000          | 0.199                                       | 1.000                       |
| LTE Band 71      | 665.5           | 6.0                | 24.00               | 30.000             | 1000.000          | 0.199                                       | 0.444                       |
| 5G NR n2         | 1850.0          | 8.5                | 24.50               | 33.000             | 1995.262          | 0.397                                       | 1.000                       |
| 5G NR n5         | 824.0           | 6.0                | 24.50               | 30.500             | 1122.018          | 0.223                                       | 0.549                       |
| 5G NR n7         | 2500.0          | 8.0                | 24.50               | 32.500             | 1778.279          | 0.354                                       | 1.000                       |
| 5G NR n12        | 699.0           | 6.0                | 24.50               | 30.500             | 1122.018          | 0.223                                       | 0.466                       |
| 5G NR n25        | 1850.0          | 8.5                | 24.50               | 33.000             | 1995.262          | 0.397                                       | 1.000                       |
| 5G NR n41        | 2496.0          | 7.0                | 24.50               | 31.500             | 1412.538          | 0.281                                       | 1.000                       |
| 5G NR n66        | 1710.0          | 5.5                | 24.50               | 30.000             | 1000.000          | 0.199                                       | 1.000                       |
| 5G NR n71        | 663.0           | 5.5                | 24.50               | 30.000             | 1000.000          | 0.199                                       | 0.442                       |
| 5G NR n77        | 3450.0          | 5.5                | 24.50               | 30.000             | 1000.000          | 0.199                                       | 1.000                       |
| 5G NR n78        | 3450.0          | 5.5                | 24.50               | 30.000             | 1000.000          | 0.199                                       | 1.000                       |

**Note:**

1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
2. This device supports HPUE for LTE band 41 with class 2 power level, so HPUE has been performed standalone power density calculation.

**5.2. Collocated Power Density Calculation****General Note:**

1. This MPE analysis is applicable to any collocated transmitters with EIRP for WLAN is less than or equal to 28.0dBm and EIRP for Bluetooth is less than or equal to 22.0dBm.
2. A maximum antenna gain of 8dBi for WLAN and 5dBi for Bluetooth has been assumed for all collocated antennas.

| Band             | Frequency (MHz) | Antenna Gain (dBi) | Maximum Power (dBm) | Maximum EIRP (dBm) | Average EIRP (mW) | Power Density at 20cm (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Power Density / Limit |
|------------------|-----------------|--------------------|---------------------|--------------------|-------------------|---------------------------------------------|-----------------------------|-----------------------|
| WCDMA Band 2     | 1852.4          | 8.0                | 24.50               | 32.500             | 1778.279          | 0.354                                       | 1.000                       | 0.354                 |
| WCDMA Band 4     | 1712.4          | 5.5                | 24.50               | 30.000             | 1000.000          | 0.199                                       | 1.000                       | 0.199                 |
| WCDMA Band 5     | 826.4           | 5.5                | 24.50               | 30.000             | 1000.000          | 0.199                                       | 0.551                       | 0.361                 |
| LTE Band 2       | 1850.7          | 8.0                | 24.00               | 32.000             | 1584.893          | 0.315                                       | 1.000                       | 0.315                 |
| LTE Band 4       | 1710.7          | 5.5                | 24.00               | 29.500             | 891.251           | 0.177                                       | 1.000                       | 0.177                 |
| LTE Band 5       | 824.7           | 6.0                | 24.00               | 30.000             | 1000.000          | 0.199                                       | 0.550                       | 0.362                 |
| LTE Band 7       | 2502.5          | 8.0                | 24.80               | 32.800             | 1905.461          | 0.379                                       | 1.000                       | 0.379                 |
| LTE Band 12      | 699.7           | 5.5                | 24.00               | 29.500             | 891.251           | 0.177                                       | 0.466                       | 0.380                 |
| LTE Band 13      | 779.5           | 5.5                | 24.00               | 29.500             | 891.251           | 0.177                                       | 0.520                       | 0.341                 |
| LTE Band 14      | 790.5           | 6.0                | 24.00               | 30.000             | 1000.000          | 0.199                                       | 0.527                       | 0.378                 |
| LTE Band 17      | 706.5           | 5.5                | 24.00               | 29.500             | 891.251           | 0.177                                       | 0.471                       | 0.377                 |
| LTE Band 25      | 1850.7          | 8.0                | 24.00               | 32.000             | 1584.893          | 0.315                                       | 1.000                       | 0.315                 |
| LTE Band 26      | 814.7           | 6.0                | 24.00               | 30.000             | 1000.000          | 0.199                                       | 0.543                       | 0.366                 |
| LTE Band 30      | 2307.5          | 0.0                | 24.00               | 24.000             | 251.189           | 0.050                                       | 1.000                       | 0.050                 |
| LTE Band 41      | 2498.5          | 7.0                | 24.80               | 31.800             | 1513.561          | 0.301                                       | 1.000                       | 0.301                 |
| LTE Band 41-HPUE | 2498.5          | 7.0                | 26.00               | 33.000             | 1995.262          | 0.397                                       | 1.000                       | 0.397                 |
| LTE Band 42      | 3452.5          | 5.0                | 24.80               | 29.800             | 954.993           | 0.190                                       | 1.000                       | 0.190                 |
| LTE Band 48      | 3552.5          | -1.8               | 24.80               | 23.000             | 199.526           | 0.040                                       | 1.000                       | 0.040                 |
| LTE Band 66      | 1710.7          | 6.0                | 24.00               | 30.000             | 1000.000          | 0.199                                       | 1.000                       | 0.199                 |
| LTE Band 71      | 665.5           | 5.5                | 24.00               | 29.500             | 891.251           | 0.177                                       | 0.444                       | 0.400                 |
| LTE Band 71-ENDC | 665.5           | 5.5                | 21.00               | 26.500             | 446.684           | 0.089                                       | 0.444                       | 0.200                 |
| 5G NR n2         | 1850.0          | 8.0                | 24.50               | 32.500             | 1778.279          | 0.354                                       | 1.000                       | 0.354                 |
| 5G NR n5         | 824.0           | 5.5                | 24.50               | 30.000             | 1000.000          | 0.199                                       | 0.549                       | 0.362                 |
| 5G NR n7         | 2500.0          | 8.0                | 24.50               | 32.500             | 1778.279          | 0.354                                       | 1.000                       | 0.354                 |
| 5G NR n12        | 699.0           | 5.0                | 24.50               | 29.500             | 891.251           | 0.177                                       | 0.466                       | 0.381                 |
| 5G NR n25        | 1850.0          | 8.0                | 24.50               | 32.500             | 1778.279          | 0.354                                       | 1.000                       | 0.354                 |
| 5G NR n41        | 2496.0          | 7.0                | 24.50               | 31.500             | 1412.538          | 0.281                                       | 1.000                       | 0.281                 |
| 5G NR n66        | 1710.0          | 5.5                | 24.50               | 30.000             | 1000.000          | 0.199                                       | 1.000                       | 0.199                 |
| 5G NR n71        | 663.0           | 5.0                | 24.50               | 29.500             | 891.251           | 0.177                                       | 0.442                       | 0.401                 |
| 5G NR n71-ENDC   | 663.0           | 5.0                | 21.50               | 26.500             | 446.684           | 0.089                                       | 0.442                       | 0.201                 |
| 5G NR n77        | 3450.0          | 5.5                | 24.50               | 30.000             | 1000.000          | 0.199                                       | 1.000                       | 0.199                 |
| 5G NR n78        | 3450.0          | 5.5                | 24.50               | 30.000             | 1000.000          | 0.199                                       | 1.000                       | 0.199                 |
| WLAN2.4GHz Band  | 2412            | 5.0                | 20.00               | 25.000             | 316.228           | 0.063                                       | 1.000                       | 0.063                 |
| WLAN5GHz Band    | 5180            | 8.0                | 20.00               | 28.000             | 630.957           | 0.126                                       | 1.000                       | 0.126                 |
| Bluetooth        | 2402            | 5.0                | 17.00               | 22.000             | 158.489           | 0.032                                       | 1.000                       | 0.032                 |

| WWAN<br>Power Density / Limit | WLAN<br>Power Density / Limit | Bluetooth<br>Power Density / Limit | Σ(Power Density / Limit)<br>of<br>WWAN + WLAN + Bluetooth |
|-------------------------------|-------------------------------|------------------------------------|-----------------------------------------------------------|
| 0.401                         | 0.126                         | 0.032                              | 0.559                                                     |

**ENDC:**

| LTE<br>Power Density / Limit | 5NR<br>Power Density / Limit | WLAN<br>Power Density / Limit | Bluetooth<br>Power Density / Limit | $\Sigma$ (Power Density / Limit)<br>of<br>LTE + 5NR<br>+ WLAN + Bluetooth |
|------------------------------|------------------------------|-------------------------------|------------------------------------|---------------------------------------------------------------------------|
| 0.200                        | 0.201                        | 0.126                         | 0.032                              | 0.559                                                                     |

**Note:**

1. For colocation analysis, 5GNR n71 is chosen for summation due to the highest (power density/limit) among all WWAN wireless modes.
2. For colocation analysis, LTE band 71 is chosen for summation due to the highest (power density/limit) among all LTE wireless modes.
3. For colocation analysis, 5GNR n71 is chosen for summation due to the highest (power density/limit) among all 5GNR wireless modes.
4. For colocation analysis, LTE band 71 and 5GNR n71 is chosen for summation due to the highest (power density/limit) among all LTE and 5GNR modes. For EN-DC mode, the total power (P total) is the same as LTE or NR transmission standalone power. When calculated EN-DC mode, LTE and 5GNR total power minus 3dB used to do EN-DC summed power density calculation.
5. Chose the worst power density among WLAN2.4/5GHz to do co-located.
6.  $\Sigma$ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WWAN + WLAN + Bluetooth, LTE + 5NR + WLAN + Bluetooth.
7. Considering the WWAN/5GNR 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 3/4 collocated transmitters is compliant.

**Conclusion:**

Based on 47 CFR §2.1091 and FCC KDB 447498 D01 v06, 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                  | Band             | Frequency (MHz) | Maximum Conducted Power (dBm) | Standalone Maximum Antenna Gain (dBi) | Collocated Maximum Antenna Gain (dBi) |
|-------------------------|------------------|-----------------|-------------------------------|---------------------------------------|---------------------------------------|
| EM9190                  | WCDMA Band 2     | 1852.4          | 24.50                         | 8.5                                   | 8.0                                   |
|                         | WCDMA Band 4     | 1712.4          | 24.50                         | 5.5                                   | 5.5                                   |
|                         | WCDMA Band 5     | 826.4           | 24.50                         | 6.0                                   | 5.5                                   |
|                         | LTE Band 2       | 1850.7          | 24.00                         | 8.5                                   | 8.0                                   |
|                         | LTE Band 4       | 1710.7          | 24.00                         | 5.5                                   | 5.5                                   |
|                         | LTE Band 5       | 824.7           | 24.00                         | 6.0                                   | 6.0                                   |
|                         | LTE Band 7       | 2502.5          | 24.80                         | 8.0                                   | 8.0                                   |
|                         | LTE Band 12      | 699.7           | 24.00                         | 6.0                                   | 5.5                                   |
|                         | LTE Band 13      | 779.5           | 24.00                         | 6.0                                   | 5.5                                   |
|                         | LTE Band 14      | 790.5           | 24.00                         | 6.0                                   | 6.0                                   |
|                         | LTE Band 17      | 706.5           | 24.00                         | 6.0                                   | 5.5                                   |
|                         | LTE Band 25      | 1850.7          | 24.00                         | 8.5                                   | 8.0                                   |
|                         | LTE Band 26      | 814.7           | 24.00                         | 6.0                                   | 6.0                                   |
|                         | LTE Band 30      | 2307.5          | 24.00                         | 0.0                                   | 0.0                                   |
|                         | LTE Band 41      | 2498.5          | 24.80                         | 7.0                                   | 7.0                                   |
|                         | LTE Band 41-HPUE | 2498.5          | 26.00                         | 7.0                                   | 7.0                                   |
|                         | LTE Band 42      | 3452.5          | 24.80                         | 5.0                                   | 5.0                                   |
|                         | LTE Band 48      | 3552.5          | 24.80                         | -1.8                                  | -1.8                                  |
|                         | LTE Band 66      | 1710.7          | 24.00                         | 6.0                                   | 6.0                                   |
|                         | LTE Band 71      | 665.5           | 24.00                         | 6.0                                   | 5.5                                   |
|                         | 5G NR n2         | 1850.0          | 24.50                         | 8.5                                   | 8.0                                   |
|                         | 5G NR n5         | 824.0           | 24.50                         | 6.0                                   | 5.5                                   |
|                         | 5G NR n7         | 2500.0          | 24.50                         | 8.0                                   | 8.0                                   |
|                         | 5G NR n12        | 699.0           | 24.50                         | 6.0                                   | 5.0                                   |
|                         | 5G NR n25        | 1850.0          | 24.50                         | 8.5                                   | 8.0                                   |
|                         | 5G NR n41        | 2496.0          | 24.50                         | 7.0                                   | 7.0                                   |
|                         | 5G NR n66        | 1710.0          | 24.50                         | 5.5                                   | 5.5                                   |
|                         | 5G NR n71        | 663.0           | 24.50                         | 5.5                                   | 5.0                                   |
|                         | 5G NR n77        | 3450            | 24.50                         | 5.5                                   | 5.5                                   |
|                         | 5G NR n78        | 3450            | 24.50                         | 5.5                                   | 5.5                                   |
| Collocated Transmitters | WLAN2.4GHz       | 2412            | 20.00                         |                                       | 5.0                                   |
|                         | WLAN5GHz         | 5180            | 20.00                         |                                       | 8.0                                   |
|                         | Bluetooth        | 2402            | 17.00                         |                                       | 5.0                                   |

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