



# **RF Exposure Evaluation Report**

**APPLICANT** : Quectel Wireless Solutions Co., Ltd.  
**EQUIPMENT** : LTE Module  
**BRAND NAME** : Quectel  
**MODEL NAME** : SC20-A  
**FCC ID** : XMR201706SC20A  
**STANDARD** : 47 CFR Part 2.1091

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

A handwritten signature in black ink, reading "Mark Qu".

Reviewed by: Mark Qu / Manager

A handwritten signature in blue ink, reading "Jones Tsai".

Approved by: Jones Tsai / Manager

***Sporton International (KunShan) INC.***  
***No.3-2, Pingxiang Road, Kunshan Development Zone, Jiangsu, China***



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**Revision History**

| REPORT NO. | VERSION | DESCRIPTION             | ISSUED DATE   |
|------------|---------|-------------------------|---------------|
| FA741007   | Rev. 01 | Initial issue of report | Aug. 11, 2017 |
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**1. Administration Data****1.1. Testing Laboratory**

| Testing Laboratory |                                                                                                                        |
|--------------------|------------------------------------------------------------------------------------------------------------------------|
| Test Site          | Sporton International (KunShan) INC.                                                                                   |
| Test Site Location | No.3-2, Pingxiang Road, Kunshan Development Zone, Jiangsu, China<br>TEL: +86-0512-5790-0158<br>FAX: +86-0512-5790-0958 |

| Applicant    |                                                                                             |
|--------------|---------------------------------------------------------------------------------------------|
| Company Name | Quectel Wireless Solutions Co., Ltd.                                                        |
| Address      | 7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai<br>200233, China |

| Manufacturer |                                                                                             |
|--------------|---------------------------------------------------------------------------------------------|
| Company Name | Quectel Wireless Solutions Co., Ltd.                                                        |
| Address      | 7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai<br>200233, China |

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

| Product Feature & Specification                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EUT Type                                                                                                                                                                                                         | LTE Module                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Brand Name                                                                                                                                                                                                       | Quectel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Model Name                                                                                                                                                                                                       | SC20-A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| FCC ID                                                                                                                                                                                                           | XMR201706SC20A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| IMEI Code                                                                                                                                                                                                        | 861097036472516<br>861097036472524                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Wireless Technology and Frequency Range                                                                                                                                                                          | GSM850: 824.2 MHz ~ 848.8 MHz<br>GSM1900: 1850.2 MHz ~ 1909.8 MHz<br>WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz<br>WCDMA Band IV: 1712.4 MHz ~ 1752.6 MHz<br>WCDMA Band V: 826.4 MHz ~ 846.6 MHz<br>LTE Band 2: 1850.7 MHz ~ 1909.3 MHz<br>LTE Band 4: 1710.7 MHz ~ 1754.3 MHz<br>LTE Band 5: 824.7 MHz ~ 848.3 MHz<br>LTE Band 7: 2502.5 MHz ~ 2567.5 MHz<br>LTE Band 12: 699.7 MHz ~ 715.3 MHz<br>LTE Band 13: 779.5 MHz ~ 784.5 MHz<br>LTE Band 25: 1850.7 MHz ~ 1914.3 MHz<br>LTE Band 26: 814.7 MHz ~ 848.3 MHz<br>WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz<br>WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz<br>WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz<br>WLAN 5.5GHz Band: 5500 MHz ~ 5700 MHz<br>WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz<br>Bluetooth: 2402 MHz ~ 2480 MHz |
| Mode                                                                                                                                                                                                             | GSM/GPRS/EGPRS<br>RMC/AMR 12.2Kbps<br>HSDPA<br>HSUPA<br>DC-HSDPA<br>HSPA+ (16QAM uplink is not supported)<br>LTE: QPSK, 16QAM<br>802.11b/g/n HT20/HT40<br>802.11a/n HT20/HT40<br>Bluetooth v3.0 + EDR, Bluetooth v4.0 LE, Bluetooth v4.1 LE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Antenna Type                                                                                                                                                                                                     | WWAN: Dipole Antenna<br>WLAN: Dipole Antenna<br>Bluetooth: Dipole Antenna                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| HW Version                                                                                                                                                                                                       | R1.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| SW Version                                                                                                                                                                                                       | SC20ASAR04A03H8G                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| EUT Stage                                                                                                                                                                                                        | Identical Prototype                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Remark:</b><br>1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.<br>2. The device supports GPRS/EGPRS Class 33. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

**3. Maximum RF average output power among production units****<GSM>**

| Mode            | Burst Average Power (dBm) |          |
|-----------------|---------------------------|----------|
|                 | GSM 850                   | GSM 1900 |
| GSM 1 Tx slot   | 33.00                     | 30.50    |
| GPRS 1 Tx slot  | 33.00                     | 30.50    |
| GPRS 2 Tx slots | 33.00                     | 30.50    |
| GPRS 3 Tx slots | 31.50                     | 30.50    |
| GPRS 4 Tx slots | 30.00                     | 30.50    |
| EDGE 1 Tx slot  | 27.00                     | 26.50    |
| EDGE 2 Tx slots | 27.00                     | 26.50    |
| EDGE 3 Tx slots | 27.00                     | 26.50    |
| EDGE 4 Tx slots | 27.00                     | 26.50    |

**<WCDMA>**

| Mode               | Average Power (dBm) |               |              |
|--------------------|---------------------|---------------|--------------|
|                    | WCDMA Band II       | WCDMA Band IV | WCDMA Band V |
| AMR 12.2Kbps       | 24.00               | 24.00         | 24.00        |
| RMC 12.2Kbps       | 24.00               | 24.00         | 24.00        |
| HSDPA Subtest-1    | 23.00               | 23.00         | 23.00        |
| HSDPA Subtest-2    | 23.00               | 23.00         | 23.00        |
| HSDPA Subtest-3    | 22.50               | 22.50         | 22.50        |
| HSDPA Subtest-4    | 22.50               | 22.50         | 22.50        |
| DC-HSDPA Subtest-1 | 22.00               | 22.00         | 22.00        |
| DC-HSDPA Subtest-2 | 22.00               | 22.00         | 22.00        |
| DC-HSDPA Subtest-3 | 22.00               | 22.00         | 22.00        |
| DC-HSDPA Subtest-4 | 22.00               | 22.00         | 22.00        |
| HSUPA Subtest-1    | 22.50               | 23.00         | 22.50        |
| HSUPA Subtest-2    | 21.50               | 21.50         | 21.50        |
| HSUPA Subtest-3    | 21.50               | 21.50         | 21.50        |
| HSUPA Subtest-4    | 22.00               | 22.00         | 22.00        |
| HSUPA Subtest-5    | 23.00               | 23.00         | 23.00        |

**<LTE>**

| Average Power (dBm) |          |         |            |            |            |            |            |             |             |             |             |
|---------------------|----------|---------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|
| Modulation          | BW (MHz) | RB Size | Target MPR | LTE Band 2 | LTE Band 4 | LTE Band 5 | LTE Band 7 | LTE Band 12 | LTE Band 13 | LTE Band 25 | LTE Band 26 |
| QPSK                | 20       | ≤ 18    | 0          | 24.00      | 24.50      | -          | 24.50      | -           | -           | 24.00       | -           |
| QPSK                | 20       | > 18    | 0-1        | 23.00      | 23.50      | -          | 23.50      | -           | -           | 23.00       | -           |
| 16QAM               | 20       | ≤ 18    | 0-1        | 23.00      | 23.50      | -          | 23.50      | -           | -           | 23.00       | -           |
| 16QAM               | 20       | > 18    | 0-2        | 22.00      | 22.50      | -          | 22.50      | -           | -           | 22.00       | -           |
| QPSK                | 15       | ≤ 16    | 0          | 24.00      | 24.50      | -          | 24.50      | -           | -           | 24.00       | 24.00       |
| QPSK                | 15       | > 16    | 0-1        | 23.00      | 23.50      | -          | 23.50      | -           | -           | 23.00       | 23.00       |
| 16QAM               | 15       | ≤ 16    | 0-1        | 23.00      | 23.50      | -          | 23.50      | -           | -           | 23.00       | 23.00       |
| 16QAM               | 15       | > 16    | 0-2        | 22.00      | 22.50      | -          | 22.50      | -           | -           | 22.00       | 22.00       |
| QPSK                | 10       | ≤ 12    | 0          | 24.00      | 24.50      | 24.50      | 24.50      | 24.00       | 24.00       | 24.00       | 24.00       |
| QPSK                | 10       | > 12    | 0-1        | 23.00      | 23.50      | 23.50      | 23.50      | 23.00       | 23.00       | 23.00       | 23.00       |
| 16QAM               | 10       | ≤ 12    | 0-1        | 23.00      | 23.50      | 23.50      | 23.50      | 23.00       | 23.00       | 23.00       | 23.00       |
| 16QAM               | 10       | > 12    | 0-2        | 22.00      | 22.50      | 22.50      | 22.50      | 22.00       | 22.00       | 22.00       | 22.00       |
| QPSK                | 5        | ≤ 8     | 0          | 24.00      | 24.50      | 24.50      | 24.50      | 24.00       | 24.00       | 24.00       | 24.00       |
| QPSK                | 5        | > 8     | 0-1        | 23.00      | 23.50      | 23.50      | 23.50      | 23.00       | 23.00       | 23.00       | 23.00       |
| 16QAM               | 5        | ≤ 8     | 0-1        | 23.00      | 23.50      | 23.50      | 23.50      | 23.00       | 23.00       | 23.00       | 23.00       |
| 16QAM               | 5        | > 8     | 0-2        | 22.00      | 22.50      | 22.50      | 22.50      | 22.00       | 22.00       | 22.00       | 22.00       |
| QPSK                | 3        | ≤ 4     | 0          | 24.00      | 24.50      | 24.50      | -          | 24.00       | -           | 24.00       | 24.00       |
| QPSK                | 3        | > 4     | 0-1        | 23.00      | 23.50      | 23.50      | -          | 23.00       | -           | 23.00       | 23.00       |
| 16QAM               | 3        | ≤ 4     | 0-1        | 23.00      | 23.50      | 23.50      | -          | 23.00       | -           | 23.00       | 23.00       |
| 16QAM               | 3        | > 4     | 0-2        | 22.00      | 22.50      | 22.50      | -          | 22.00       | -           | 22.00       | 22.00       |
| QPSK                | 1.4      | ≤ 5     | 0          | 24.00      | 24.50      | 24.50      | -          | 24.00       | -           | 24.00       | 24.00       |
| QPSK                | 1.4      | > 5     | 0-1        | 23.00      | 23.50      | 23.50      | -          | 23.00       | -           | 23.00       | 23.00       |
| 16QAM               | 1.4      | ≤ 5     | 0-1        | 23.00      | 23.50      | 23.50      | -          | 23.00       | -           | 23.00       | 23.00       |
| 16QAM               | 1.4      | > 5     | 0-2        | 22.00      | 22.50      | 22.50      | -          | 22.00       | -           | 22.00       | 22.00       |

**Remark:** The mark “-” in gray means that this bandwidth is not supported.

**<2.4GHz WLAN>**

| Frequency   | Mode         | Maximum Average Power (dBm) |
|-------------|--------------|-----------------------------|
| WLAN 2.4GHz | 802.11b      | 16.50                       |
|             | 802.11g      | 14.50                       |
|             | 802.11n-HT20 | 14.00                       |
|             | 802.11n-HT40 | 14.00                       |

**<5GHz WLAN>**

| Frequency   | Mode         | Maximum Average Power (dBm) |
|-------------|--------------|-----------------------------|
| WLAN 5.2GHz | 802.11a      | 13.00                       |
|             | 802.11n-HT20 | 14.00                       |
|             | 802.11n-HT40 | 13.50                       |
| WLAN 5.3GHz | 802.11a      | 13.50                       |
|             | 802.11n-HT20 | 14.00                       |
|             | 802.11n-HT40 | 13.50                       |
| WLAN 5.5GHz | 802.11a      | 13.00                       |
|             | 802.11n-HT20 | 13.50                       |
|             | 802.11n-HT40 | 12.50                       |
| WLAN 5.8GHz | 802.11a      | 12.50                       |
|             | 802.11n-HT20 | 12.00                       |
|             | 802.11n-HT40 | 11.00                       |

**<Bluetooth>**

| Frequency | Mode        | Maximum Average Power (dBm) |
|-----------|-------------|-----------------------------|
| Bluetooth | v3.0+EDR    | 8.00                        |
|           | v4.0/4.1 LE | 3.00                        |



The table below summarized necessary items addressed in KDB 941225 D05 v02r05

| Summarized necessary items addressed in KDB 941225 D05 v02r05      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |         |       |        |        |        |          |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|--------|--------|--------|----------|------------------------------------------------------------------|--|--|--|--|--|--|--|------------|---------------------------------------------------------------|--|--|--|--|--|----------|---------|---------|-------|--------|--------|--------|------|-----|-----|-----|------|------|------|-----|--------|-----|-----|-----|------|------|------|-----|--------|-----|-----|-----|------|------|------|-----|--------------------------------------------------------------------|--|--|--|--|--|--|--|------------|---------------------------------------------------------------|--|--|--|--|--|----------|---------|---------|-------|--------|--------|--------|--------|-----|-----|-----|------|------|------|-----|--------|-----|-----|-----|------|------|------|-----|
| FCC ID                                                             | XMR201706SC20A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |       |        |        |        |          |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
| Equipment Name                                                     | LTE Module                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |         |       |        |        |        |          |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
| Operating Frequency Range of each LTE transmission band            | LTE Band 2: 1850.7 MHz ~ 1909.3 MHz<br>LTE Band 4: 1710.7 MHz ~ 1754.3 MHz<br>LTE Band 5: 824.7 MHz ~ 848.3 MHz<br>LTE Band 7: 2502.5 MHz ~ 2567.5 MHz<br>LTE Band 12: 699.7 MHz ~ 715.3 MHz<br>LTE Band 13: 779.5 MHz ~ 784.5 MHz<br>LTE Band 25: 1850.7 MHz ~ 1914.3 MHz<br>LTE Band 26: 814.7 MHz ~ 848.3 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |       |        |        |        |          |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
| Channel Bandwidth                                                  | LTE Band 2:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz<br>LTE Band 4:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz<br>LTE Band 5:1.4MHz, 3MHz, 5MHz, 10MHz<br>LTE Band 7: 5MHz, 10MHz, 15MHz, 20MHz<br>LTE Band 12:1.4MHz, 3MHz, 5MHz, 10MHz<br>LTE Band 13: 5MHz, 10MHz<br>LTE Band 25:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz<br>LTE Band 26:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |         |       |        |        |        |          |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
| Uplink modulations used                                            | QPSK and 16QAM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |       |        |        |        |          |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
| LTE Voice / Data requirements                                      | Data Only                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |         |       |        |        |        |          |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
| LTE MPR permanently built-in by design                             | <table><tr><th colspan="8">Table 6.2.3.3-1: Maximum Power Reduction (MPR) for Power Class 3</th></tr><tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth configuration [RB]</th><th rowspan="2">MPR (dB)</th></tr><tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr><tr><td>QPSK</td><td>&gt; 5</td><td>&gt; 4</td><td>&gt; 8</td><td>&gt; 12</td><td>&gt; 16</td><td>&gt; 18</td><td>≤ 1</td></tr><tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr><tr><td>16 QAM</td><td>&gt; 5</td><td>&gt; 4</td><td>&gt; 8</td><td>&gt; 12</td><td>&gt; 16</td><td>&gt; 18</td><td>≤ 2</td></tr></table><br><table><tr><th colspan="8">Table 6.2.3_3.3-1: Maximum Power Reduction (MPR) for Power Class 3</th></tr><tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth configuration [RB]</th><th rowspan="2">MPR (dB)</th></tr><tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr><tr><td>64 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 2</td></tr><tr><td>64 QAM</td><td>&gt; 5</td><td>&gt; 4</td><td>&gt; 8</td><td>&gt; 12</td><td>&gt; 16</td><td>&gt; 18</td><td>≤ 3</td></tr></table> |         |       |        |        |        |          | Table 6.2.3.3-1: Maximum Power Reduction (MPR) for Power Class 3 |  |  |  |  |  |  |  | Modulation | Channel bandwidth / Transmission bandwidth configuration [RB] |  |  |  |  |  | MPR (dB) | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz | QPSK | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 1 | 16 QAM | ≤ 5 | ≤ 4 | ≤ 8 | ≤ 12 | ≤ 16 | ≤ 18 | ≤ 1 | 16 QAM | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 2 | Table 6.2.3_3.3-1: Maximum Power Reduction (MPR) for Power Class 3 |  |  |  |  |  |  |  | Modulation | Channel bandwidth / Transmission bandwidth configuration [RB] |  |  |  |  |  | MPR (dB) | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 64 QAM | ≤ 5 | ≤ 4 | ≤ 8 | ≤ 12 | ≤ 16 | ≤ 18 | ≤ 2 | 64 QAM | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 3 |
| Table 6.2.3.3-1: Maximum Power Reduction (MPR) for Power Class 3   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |         |       |        |        |        |          |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
| Modulation                                                         | Channel bandwidth / Transmission bandwidth configuration [RB]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |         |       |        |        |        | MPR (dB) |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
|                                                                    | 1.4 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |          |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
| QPSK                                                               | > 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | > 4     | > 8   | > 12   | > 16   | > 18   | ≤ 1      |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
| 16 QAM                                                             | ≤ 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ≤ 4     | ≤ 8   | ≤ 12   | ≤ 16   | ≤ 18   | ≤ 1      |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
| 16 QAM                                                             | > 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | > 4     | > 8   | > 12   | > 16   | > 18   | ≤ 2      |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
| Table 6.2.3_3.3-1: Maximum Power Reduction (MPR) for Power Class 3 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |         |       |        |        |        |          |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
| Modulation                                                         | Channel bandwidth / Transmission bandwidth configuration [RB]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |         |       |        |        |        | MPR (dB) |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
|                                                                    | 1.4 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |          |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
| 64 QAM                                                             | ≤ 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ≤ 4     | ≤ 8   | ≤ 12   | ≤ 16   | ≤ 18   | ≤ 2      |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
| 64 QAM                                                             | > 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | > 4     | > 8   | > 12   | > 16   | > 18   | ≤ 3      |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
| LTE A-MPR                                                          | In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |         |       |        |        |        |          |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
| Spectrum plots for RB configuration                                | A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |       |        |        |        |          |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
| LTE Release Version                                                | R11, Cat 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |         |       |        |        |        |          |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |
| CA Support                                                         | Not Supported                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |         |       |        |        |        |          |                                                                  |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |      |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |                                                                    |  |  |  |  |  |  |  |            |                                                               |  |  |  |  |  |          |         |         |       |        |        |        |        |     |     |     |      |      |      |     |        |     |     |     |      |      |      |     |



| Transmission (H, M, L) channel numbers and frequencies in each LTE band |                   |             |                  |             |                  |             |                  |             |                  |             |                  |             |
|-------------------------------------------------------------------------|-------------------|-------------|------------------|-------------|------------------|-------------|------------------|-------------|------------------|-------------|------------------|-------------|
| LTE Band 2                                                              |                   |             |                  |             |                  |             |                  |             |                  |             |                  |             |
|                                                                         | Bandwidth 1.4 MHz |             | Bandwidth 3 MHz  |             | Bandwidth 5 MHz  |             | Bandwidth 10 MHz |             | Bandwidth 15 MHz |             | Bandwidth 20 MHz |             |
|                                                                         | Ch. #             | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) |
| L                                                                       | 18607             | 1850.7      | 18615            | 1851.5      | 18625            | 1852.5      | 18650            | 1855        | 18675            | 1857.5      | 18700            | 1860        |
| M                                                                       | 18900             | 1880        | 18900            | 1880        | 18900            | 1880        | 18900            | 1880        | 18900            | 1880        | 18900            | 1880        |
| H                                                                       | 19193             | 1909.3      | 19185            | 1908.5      | 19175            | 1907.5      | 19150            | 1905        | 19125            | 1902.5      | 19100            | 1900        |
| LTE Band 4                                                              |                   |             |                  |             |                  |             |                  |             |                  |             |                  |             |
|                                                                         | Bandwidth 1.4 MHz |             | Bandwidth 3 MHz  |             | Bandwidth 5 MHz  |             | Bandwidth 10 MHz |             | Bandwidth 15 MHz |             | Bandwidth 20 MHz |             |
|                                                                         | Ch. #             | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) |
| L                                                                       | 19957             | 1710.7      | 19965            | 1711.5      | 19975            | 1712.5      | 20000            | 1715        | 20025            | 1717.5      | 20050            | 1720        |
| M                                                                       | 20175             | 1732.5      | 20175            | 1732.5      | 20175            | 1732.5      | 20175            | 1732.5      | 20175            | 1732.5      | 20175            | 1732.5      |
| H                                                                       | 20393             | 1754.3      | 20385            | 1753.5      | 20375            | 1752.5      | 20350            | 1750        | 20325            | 1747.5      | 20300            | 1745        |
| LTE Band 5                                                              |                   |             |                  |             |                  |             |                  |             |                  |             |                  |             |
|                                                                         | Bandwidth 1.4 MHz |             | Bandwidth 3 MHz  |             | Bandwidth 5 MHz  |             | Bandwidth 10 MHz |             |                  |             |                  |             |
|                                                                         | Ch. #             | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) |
| L                                                                       | 20407             | 824.7       | 20415            | 825.5       | 20425            | 826.5       | 20450            | 829         |                  |             |                  |             |
| M                                                                       | 20525             | 836.5       | 20525            | 836.5       | 20525            | 836.5       | 20525            | 836.5       |                  |             |                  |             |
| H                                                                       | 20643             | 848.3       | 20635            | 847.5       | 20625            | 846.5       | 20600            | 844         |                  |             |                  |             |
| LTE Band 7                                                              |                   |             |                  |             |                  |             |                  |             |                  |             |                  |             |
|                                                                         | Bandwidth 5 MHz   |             | Bandwidth 10 MHz |             | Bandwidth 15 MHz |             | Bandwidth 20 MHz |             |                  |             |                  |             |
|                                                                         | Ch. #             | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) |
| L                                                                       | 20775             | 2502.5      | 20800            | 2505        | 20825            | 2507.5      | 20850            | 2510        |                  |             |                  |             |
| M                                                                       | 21100             | 2535        | 21100            | 2535        | 21100            | 2535        | 21100            | 2535        |                  |             |                  |             |
| H                                                                       | 21425             | 2567.5      | 21400            | 2565        | 21375            | 2562.5      | 21350            | 2560        |                  |             |                  |             |
| LTE Band 12                                                             |                   |             |                  |             |                  |             |                  |             |                  |             |                  |             |
|                                                                         | Bandwidth 1.4 MHz |             | Bandwidth 3 MHz  |             | Bandwidth 5 MHz  |             | Bandwidth 10 MHz |             |                  |             |                  |             |
|                                                                         | Ch. #             | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) |
| L                                                                       | 23017             | 699.7       | 23025            | 700.5       | 23035            | 701.5       | 23060            | 704         |                  |             |                  |             |
| M                                                                       | 23095             | 707.5       | 23095            | 707.5       | 23095            | 707.5       | 23095            | 707.5       |                  |             |                  |             |
| H                                                                       | 23173             | 715.3       | 23165            | 714.5       | 23155            | 713.5       | 23130            | 711         |                  |             |                  |             |



| LTE Band 13 |                   |             |                 |             |                 |             |                  |             |                  |             |                  |             |
|-------------|-------------------|-------------|-----------------|-------------|-----------------|-------------|------------------|-------------|------------------|-------------|------------------|-------------|
|             | Bandwidth 5 MHz   |             |                 |             |                 |             | Bandwidth 10 MHz |             |                  |             |                  |             |
|             | Channel #         |             | Freq.(MHz)      |             |                 |             | Channel #        |             | Freq.(MHz)       |             |                  |             |
| L           | 23205             |             | 779.5           |             |                 |             | 23230            |             | 782              |             |                  |             |
| M           | 23230             |             | 782             |             |                 |             |                  |             |                  |             |                  |             |
| H           | 23255             |             | 784.5           |             |                 |             |                  |             |                  |             |                  |             |
| LTE Band 25 |                   |             |                 |             |                 |             |                  |             |                  |             |                  |             |
|             | Bandwidth 1.4 MHz |             | Bandwidth 3 MHz |             | Bandwidth 5 MHz |             | Bandwidth 10 MHz |             | Bandwidth 15 MHz |             | Bandwidth 20 MHz |             |
|             | Ch. #             | Freq. (MHz) | Ch. #           | Freq. (MHz) | Ch. #           | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) |
| L           | 26047             | 1850.7      | 26055           | 1851.5      | 26065           | 1852.5      | 26090            | 1855        | 26115            | 1857.5      | 26140            | 1860        |
| M           | 26340             | 1880        | 26340           | 1880        | 26340           | 1880        | 26340            | 1880        | 26340            | 1880        | 26340            | 1880        |
| H           | 26683             | 1914.3      | 26675           | 1913.5      | 26665           | 1912.5      | 26640            | 1910        | 26615            | 1907.5      | 26590            | 1905        |
| LTE Band 26 |                   |             |                 |             |                 |             |                  |             |                  |             |                  |             |
|             | Bandwidth 1.4 MHz |             | Bandwidth 3 MHz |             | Bandwidth 5 MHz |             | Bandwidth 10 MHz |             | Bandwidth 15 MHz |             |                  |             |
|             | Ch. #             | Freq. (MHz) | Ch. #           | Freq. (MHz) | Ch. #           | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) | Ch. #            | Freq. (MHz) |
| L           | 26697             | 814.7       | 26705           | 815.5       | 26715           | 816.5       | 26740            | 819         | 26765            | 821.5       |                  |             |
| M           | 26865             | 831.5       | 26865           | 831.5       | 26865           | 831.5       | 26865            | 831.5       | 26865            | 831.5       |                  |             |
| H           | 27033             | 848.3       | 27025           | 847.5       | 27015           | 846.5       | 26990            | 844         | 26965            | 841.5       |                  |             |



## 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) | Maximum EIRP (W) | Maximum Output Power Limit (W) | Average EIRP (mW) | Power Density at 20cm (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Power Density / Limit |
|------------------------|-----------------|--------------------|---------------------|--------------------|------------------|--------------------------------|-------------------|---------------------------------------------|-----------------------------|-----------------------|
| GSM850 (1 Tx slot)     | 824.2           | 3.0                | 33.0                | 36.00              | 3.981            | 7.000                          | 501.187           | 0.100                                       | 0.549                       | 0.182                 |
| GPRS850 (1 Tx slot)    | 824.2           | 3.0                | 33.0                | 36.00              | 3.981            | 7.000                          | 501.187           | 0.100                                       | 0.549                       | 0.182                 |
| GPRS850 (2 Tx slots)   | 824.2           | 3.0                | 33.0                | 36.00              | 3.981            | 7.000                          | 1000.000          | 0.199                                       | 0.549                       | 0.362                 |
| GPRS850 (3 Tx slots)   | 824.2           | 3.0                | 31.5                | 34.50              | 2.818            | 7.000                          | 1056.818          | 0.210                                       | 0.549                       | 0.383                 |
| GPRS850 (4 Tx slots)   | 824.2           | 3.0                | 30.0                | 33.00              | 1.995            | 7.000                          | 1000.000          | 0.199                                       | 0.549                       | 0.362                 |
| EGPRS850 (1 Tx slot)   | 824.2           | 3.0                | 27.0                | 30.00              | 1.000            | 7.000                          | 125.893           | 0.025                                       | 0.549                       | 0.046                 |
| EGPRS850 (2 Tx slots)  | 824.2           | 3.0                | 27.0                | 30.00              | 1.000            | 7.000                          | 251.189           | 0.050                                       | 0.549                       | 0.091                 |
| EGPRS850 (3 Tx slots)  | 824.2           | 3.0                | 27.0                | 30.00              | 1.000            | 7.000                          | 374.973           | 0.075                                       | 0.549                       | 0.136                 |
| EGPRS850 (4 Tx slots)  | 824.2           | 3.0                | 27.0                | 30.00              | 1.000            | 7.000                          | 501.187           | 0.100                                       | 0.549                       | 0.182                 |
| GSM1900 (1 Tx slot)    | 1850.2          | 2.5                | 30.5                | 33.00              | 1.995            | 2.000                          | 251.189           | 0.050                                       | 1.000                       | 0.050                 |
| GPRS1900 (1 Tx slot)   | 1850.2          | 2.5                | 30.5                | 33.00              | 1.995            | 2.000                          | 251.189           | 0.050                                       | 1.000                       | 0.050                 |
| GPRS1900 (2 Tx slots)  | 1850.2          | 2.5                | 30.5                | 33.00              | 1.995            | 2.000                          | 501.187           | 0.100                                       | 1.000                       | 0.100                 |
| GPRS1900 (3 Tx slots)  | 1850.2          | 2.5                | 30.5                | 33.00              | 1.995            | 2.000                          | 748.170           | 0.149                                       | 1.000                       | 0.149                 |
| GPRS1900 (4 Tx slots)  | 1850.2          | 2.5                | 30.5                | 33.00              | 1.995            | 2.000                          | 1000.000          | 0.199                                       | 1.000                       | 0.199                 |
| EGPRS1900 (1 Tx slot)  | 1850.2          | 2.5                | 26.5                | 29.00              | 0.794            | 2.000                          | 100.000           | 0.020                                       | 1.000                       | 0.020                 |
| EGPRS1900 (2 Tx slots) | 1850.2          | 2.5                | 26.5                | 29.00              | 0.794            | 2.000                          | 199.526           | 0.040                                       | 1.000                       | 0.040                 |
| EGPRS1900 (3 Tx slots) | 1850.2          | 2.5                | 26.5                | 29.00              | 0.794            | 2.000                          | 297.852           | 0.059                                       | 1.000                       | 0.059                 |
| EGPRS1900 (4 Tx slots) | 1850.2          | 2.5                | 26.5                | 29.00              | 0.794            | 2.000                          | 398.107           | 0.079                                       | 1.000                       | 0.079                 |
| WCDMA Band II          | 1852.4          | 2.5                | 24.0                | 26.50              | 0.447            | 2.000                          | 446.684           | 0.089                                       | 1.000                       | 0.089                 |
| WCDMA Band IV          | 1712.4          | 5.0                | 24.0                | 29.00              | 0.794            | 1.000                          | 794.328           | 0.158                                       | 1.000                       | 0.158                 |
| WCDMA Band V           | 826.4           | 3.0                | 24.0                | 27.00              | 0.501            | 7.000                          | 501.187           | 0.100                                       | 0.551                       | 0.181                 |
| LTE Band 2             | 1850.7          | 2.5                | 24.0                | 26.50              | 0.447            | 2.000                          | 446.684           | 0.089                                       | 1.000                       | 0.089                 |
| LTE Band 4             | 1710.7          | 5.0                | 24.5                | 29.50              | 0.891            | 1.000                          | 891.251           | 0.177                                       | 1.000                       | 0.177                 |
| LTE Band 5             | 824.7           | 3.0                | 24.5                | 27.50              | 0.562            | 7.000                          | 562.341           | 0.112                                       | 0.550                       | 0.204                 |
| LTE Band 7             | 2502.5          | 8.5                | 24.5                | 33.00              | 1.995            | 2.000                          | 1995.262          | 0.397                                       | 1.000                       | 0.397                 |
| LTE Band 12            | 699.7           | 6.0                | 24.0                | 30.00              | 1.000            | 3.000                          | 1000.000          | 0.199                                       | 0.466                       | 0.427                 |
| LTE Band 13            | 779.5           | 6.0                | 24.0                | 30.00              | 1.000            | 3.000                          | 1000.000          | 0.199                                       | 0.520                       | 0.383                 |
| LTE Band 25            | 1850.7          | 2.5                | 24.0                | 26.50              | 0.447            | 2.000                          | 446.684           | 0.089                                       | 1.000                       | 0.089                 |
| LTE Band 26            | 814.7           | 3.0                | 24.0                | 27.00              | 0.501            | 7.000                          | 501.187           | 0.100                                       | 0.543                       | 0.184                 |



# RF Exposure Evaluation Report

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| Band                    | Frequency (MHz) | Antenna Gain (dBi) | Maximum Power (dBm) | Maximum EIRP (dBm) | Maximum EIRP (W) | Maximum Output Power Limit (W) | Average EIRP (mW) | Power Density at 20cm (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Power Density / Limit |
|-------------------------|-----------------|--------------------|---------------------|--------------------|------------------|--------------------------------|-------------------|---------------------------------------------|-----------------------------|-----------------------|
| WLAN2.4GHz 802.11b      | 2412            | 3.0                | 16.5                | 19.50              | 0.089            | 1.000                          | 89.125            | 0.018                                       | 1.000                       | 0.018                 |
| WLAN2.4GHz 802.11g      | 2412            | 3.0                | 14.5                | 17.50              | 0.056            | 1.000                          | 56.234            | 0.011                                       | 1.000                       | 0.011                 |
| WLAN2.4GHz 802.11n-HT20 | 2412            | 3.0                | 14.0                | 17.00              | 0.050            | 1.000                          | 50.119            | 0.010                                       | 1.000                       | 0.010                 |
| WLAN2.4GHz 802.11n-HT40 | 2422            | 3.0                | 14.0                | 17.00              | 0.050            | 1.000                          | 50.119            | 0.010                                       | 1.000                       | 0.010                 |
| WLAN5.2GHz 802.11a      | 5180            | 4.0                | 13.0                | 17.00              | 0.050            | 0.250                          | 50.119            | 0.010                                       | 1.000                       | 0.010                 |
| WLAN5.2GHz 802.11n-HT20 | 5180            | 4.0                | 14.0                | 18.00              | 0.063            | 0.250                          | 63.096            | 0.013                                       | 1.000                       | 0.013                 |
| WLAN5.2GHz 802.11n-HT40 | 5190            | 4.0                | 13.5                | 17.50              | 0.056            | 0.250                          | 56.234            | 0.011                                       | 1.000                       | 0.011                 |
| WLAN5.3GHz 802.11a      | 5260            | 4.0                | 13.5                | 17.50              | 0.056            | 0.250                          | 56.234            | 0.011                                       | 1.000                       | 0.011                 |
| WLAN5.3GHz 802.11n-HT20 | 5260            | 4.0                | 14.0                | 18.00              | 0.063            | 0.250                          | 63.096            | 0.013                                       | 1.000                       | 0.013                 |
| WLAN5.3GHz 802.11n-HT40 | 5270            | 4.0                | 13.5                | 17.50              | 0.056            | 0.250                          | 56.234            | 0.011                                       | 1.000                       | 0.011                 |
| WLAN5.5GHz 802.11a      | 5500            | 4.0                | 13.0                | 17.00              | 0.050            | 0.250                          | 50.119            | 0.010                                       | 1.000                       | 0.010                 |
| WLAN5.5GHz 802.11n-HT20 | 5500            | 4.0                | 13.5                | 17.50              | 0.056            | 0.250                          | 56.234            | 0.011                                       | 1.000                       | 0.011                 |
| WLAN5.5GHz 802.11n-HT40 | 5510            | 4.0                | 12.5                | 16.50              | 0.045            | 0.250                          | 44.668            | 0.009                                       | 1.000                       | 0.009                 |
| WLAN5.8GHz 802.11a      | 5745            | 4.0                | 12.5                | 16.50              | 0.045            | 1.000                          | 44.668            | 0.009                                       | 1.000                       | 0.009                 |
| WLAN5.8GHz 802.11n-HT20 | 5745            | 4.0                | 12.0                | 16.00              | 0.040            | 1.000                          | 39.811            | 0.008                                       | 1.000                       | 0.008                 |
| WLAN5.8GHz 802.11n-HT40 | 5755            | 4.0                | 11.0                | 15.00              | 0.032            | 1.000                          | 31.623            | 0.006                                       | 1.000                       | 0.006                 |
| Bluetooth v3.0+EDR      | 2402            | 3.0                | 8.0                 | 11.00              | 0.013            | 0.125                          | 12.589            | 0.003                                       | 1.000                       | 0.003                 |
| Bluetooth v4.0/4.1 LE   | 2402            | 3.0                | 3.0                 | 6.00               | 0.004            | 1.000                          | 3.981             | 0.001                                       | 1.000                       | 0.001                 |

**Note:** For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.

**5.2. Collocated Power Density Calculation**

| Power Density / Limit |             |           |           | $\Sigma$ (Power Density / Limit)<br>of<br>WWAN+2.4GHz WLAN+5GHz WLAN+Bluetooth |
|-----------------------|-------------|-----------|-----------|--------------------------------------------------------------------------------|
| 1                     | 2           | 3         | 4         | 1+2+3+4                                                                        |
| WWAN                  | 2.4GHz WLAN | 5GHz WLAN | Bluetooth |                                                                                |
| 0.427                 | 0.018       | 0.013     | 0.003     | 0.461                                                                          |

**Note:**

1. For colocation analysis, LTE Band 12 is chosen for summation due to the highest (power density/limit) among all WWAN wireless modes.
2.  $\Sigma$  (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)].

**Conclusion:**

Based on 47 CFR §2.1091, 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:

| Technology | Band             | Maximum<br>Conducted Power (dBm) | Maximum Antenna Gain (dBi) |
|------------|------------------|----------------------------------|----------------------------|
| GSM        | GSM850           | 33.0                             | 3.0                        |
|            | GSM1900          | 30.5                             | 2.5                        |
| WCDMA      | Band II          | 24.0                             | 2.5                        |
|            | Band IV          | 24.0                             | 5.0                        |
|            | Band V           | 24.0                             | 3.0                        |
| LTE        | Band 2           | 24.0                             | 2.5                        |
|            | Band 4           | 24.5                             | 5.0                        |
|            | Band 5           | 24.5                             | 3.0                        |
|            | Band 7           | 24.5                             | 8.5                        |
|            | Band 12          | 24.0                             | 6.0                        |
|            | Band 13          | 24.0                             | 6.0                        |
|            | Band 25          | 24.0                             | 2.5                        |
|            | Band 26          | 24.0                             | 3.0                        |
| WLAN       | 2.4GHz WLAN      | 16.5                             | 3.0                        |
|            | 5GHz WLAN        | 14.0                             | 4.0                        |
| Bluetooth  | 2.4GHz Bluetooth | 8.0                              | 3.0                        |