

Test report No:  
 NIE: 66136RAN.001A1

## Assessment report

### RF EXPOSURE REPORT ACCORDING TO FCC 47 CFR Part 2.1091 ISED RSS-102 Issue 5:2015

|                                             |                                                                                                                                                                                                                    |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (*) Identification of item under evaluation | LTE Wireless module                                                                                                                                                                                                |
| (*) Trademark                               | Telit                                                                                                                                                                                                              |
| (*) Model and /or type reference            | LE910C1-SAX                                                                                                                                                                                                        |
| (*) Other identification of the product     | Hardware version: 1.10<br>Software version: M0F.313002<br>FCC ID: RI7LE910CXSA<br>IC:5131A-LE910CXSA                                                                                                               |
| (*) Features                                | GNSS<br>Audio: VoLTE                                                                                                                                                                                               |
| Manufacturer                                | Telit Wireless Solutions Co., LTD<br>13th Fl.,Shinyoung Securities Bld, 6, Gukjegeumyung-ro<br>8-gil Yeongdeungpo-gu, Seoul, 07330, SOUTH KOREA                                                                    |
| Test method requested, standard             | FCC 47 CFR Part 2.1091 Radiofrequency radiation exposure evaluation: mobile devices.<br>ISED RSS-102 Issue 5 (2015-03) – Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) |
| Summary                                     | IN COMPLIANCE                                                                                                                                                                                                      |
| Approved by (name / position & signature)   | Miguel Lacave<br>Antennas Lab Manager                                                                                                                                                                              |
| Date of issue                               | 2020-10-27                                                                                                                                                                                                         |
| Report template No                          | FAN36_01<br>(*) "Data provided by the client"                                                                                                                                                                      |

# Index

|                                                                    |    |
|--------------------------------------------------------------------|----|
| Competences and guarantees .....                                   | 3  |
| General conditions .....                                           | 3  |
| Data provided by the client.....                                   | 3  |
| Identification of the client.....                                  | 3  |
| Document history .....                                             | 3  |
| General description of the device under evaluation.....            | 4  |
| Maximum Antenna Gain determination for RF Exposure compliance..... | 4  |
| Appendix A: FCC RF Exposure information .....                      | 6  |
| FCC RF Exposure evaluation .....                                   | 7  |
| FCC MPE Evaluation .....                                           | 8  |
| FCC EIRP Limits .....                                              | 8  |
| Appendix B: ISED RF Exposure information .....                     | 9  |
| ISED RF Exposure evaluation for mobile devices.....                | 10 |
| ISED MPE Evaluation .....                                          | 11 |
| ISED EIRP Limits .....                                             | 11 |

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## Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested", "General description of the device" and "Other identification of the product").
2. Maximum output power.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

## Identification of the client

Telit Wireless Solutions Co., LTD  
13th Fl., Shinyoung Securities Bld, 6, Gukjegeumyung-ro 8-gil  
Yeongdeungpo-gu, Seoul, 07330, SOUTH KOREA

## Document history

| Report number  | Date       | Description                                                                                         |
|----------------|------------|-----------------------------------------------------------------------------------------------------|
| 66136RAN.001   | 2020-10-20 | First release                                                                                       |
| 66136RAN.001A1 | 2020-10-27 | Second release. Modified SW version and detailed description of the product provided by the client. |

## General description of the device under evaluation

The device under evaluation consists of a LTE Wireless module.

As the equipment under evaluation is a module, a conservative evaluation distance of 20 cm has been used to perform the assessment.

The equipment specifications declared by the manufacturer for each LTE band are:

| Technology / Mode | Band | Frequency (MHz) | Maximum Output Power (Incl. Tune-Up) (dBm) | Maximum Output Power (Incl. Tune-Up) (mW) |
|-------------------|------|-----------------|--------------------------------------------|-------------------------------------------|
| LTE               | 2    | 1850 - 1910     | 25.00                                      | 316.23                                    |
| LTE               | 4    | 1710 - 1755     | 25.00                                      | 316.23                                    |
| LTE               | 12   | 699 - 716       | 25.00                                      | 316.23                                    |
| LTE               | 66   | 1710 - 1780     | 25.00                                      | 316.23                                    |

**Table 1:** Equipment specifications

## Maximum Antenna Gain determination for RF Exposure compliance

### Summary of maximum antenna gain values:

Maximum antenna gain for mobile operation to comply with MPE and EIRP limits (see Appendix A and B) shall not exceed the following values:

| Technology / Mode | Band | Frequency (MHz) | Maximum Gain to comply with: |                       |                            | Maximum Gain (dBi) |
|-------------------|------|-----------------|------------------------------|-----------------------|----------------------------|--------------------|
|                   |      |                 | FCC MPE Limits (dBi)         | ISED MPE Limits (dBi) | FCC/ISED EIRP Limits (dBi) |                    |
| LTE               | 2    | 1850 - 1910     | 12.0                         | 8.5                   | 8.0                        | <b>8.0</b>         |
| LTE               | 4    | 1710 - 1755     | 12.0                         | 8.2                   | 5.0                        | <b>5.0</b>         |
| LTE               | 12   | 699 - 716       | 8.6                          | 5.6                   | 11.9                       | <b>5.6</b>         |
| LTE               | 66   | 1710 - 1780     | 12.0                         | 8.2                   | 5.0                        | <b>5.0</b>         |

**Table 2:** Maximum Antenna Gain values

**Maximum Gain to meet FCC Radiofrequency radiation exposure limits:**

| Technology / Mode | Band | Frequency (MHz) | Distance (cm) | Power density (mW/cm <sup>2</sup> ) | FCC General Population Limit (mW/cm <sup>2</sup> ) | Verdict | Maximum Gain to meet FCC MPE Limits (dBi) |
|-------------------|------|-----------------|---------------|-------------------------------------|----------------------------------------------------|---------|-------------------------------------------|
| LTE               | 2    | 1850 - 1910     | 20.0          | 0.06                                | 1.0                                                | Pass    | 12.0                                      |
| LTE               | 4    | 1710 - 1755     | 20.0          | 0.06                                | 1.0                                                | Pass    | 12.0                                      |
| LTE               | 12   | 699 - 716       | 20.0          | 0.06                                | 0.5                                                | Pass    | 8.6                                       |
| LTE               | 66   | 1710 - 1780     | 20.0          | 0.06                                | 1.0                                                | Pass    | 12.0                                      |

**Table 3:** Maximum Antenna Gain values based on FCC MPE limits

**Maximum Gain to meet ISED Radiofrequency radiation exposure limits:**

| Technology / Mode | Band | Frequency (MHz) | Distance (cm) | Power density (W/m <sup>2</sup> ) | ISED General Public Limit (W/m <sup>2</sup> ) | Verdict | Maximum Gain to meet ISED MPE Limits (dBi) |
|-------------------|------|-----------------|---------------|-----------------------------------|-----------------------------------------------|---------|--------------------------------------------|
| LTE               | 2    | 1850 - 1910     | 20.0          | 0.63                              | 4.5                                           | Pass    | 8.5                                        |
| LTE               | 4    | 1710 - 1755     | 20.0          | 0.63                              | 4.2                                           | Pass    | 8.2                                        |
| LTE               | 12   | 699 - 716       | 20.0          | 0.63                              | 2.3                                           | Pass    | 5.6                                        |
| LTE               | 66   | 1710 - 1780     | 20.0          | 0.63                              | 4.2                                           | Pass    | 8.2                                        |

**Table 4:** Maximum Antenna Gain values based on ISED MPE limits

**Maximum Gain to meet FCC & ISED EIRP limits**

| Technology / Mode | Band | Frequency (MHz) | Maximum Conducted Output Power RMS Burst (Incl. Tune-Up) (dBm) | EIRP Limits (dBm) | Maximum Gain to meet EIRP Limits (dBi) |
|-------------------|------|-----------------|----------------------------------------------------------------|-------------------|----------------------------------------|
| LTE               | 2    | 1850 - 1910     | 25.0                                                           | 33.0              | 8.0                                    |
| LTE               | 4    | 1710 - 1755     | 25.0                                                           | 30.0              | 5.0                                    |
| LTE               | 12   | 699 - 716       | 25.0                                                           | 36.9              | 11.9                                   |
| LTE               | 66   | 1710 - 1780     | 25.0                                                           | 30.0              | 5.0                                    |

**Table 5:** Maximum Antenna Gain values based on EIRP limits

## Appendix A: FCC RF Exposure information

## FCC RF Exposure evaluation

Devices operating in standalone mobile device exposure conditions may contain a single transmitter or multiple transmitters that do not transmit simultaneously. A minimum test separation distance  $\geq 20$  cm is required between the antenna and radiating structures of the device and nearby persons to apply mobile device exposure limits. The distance must be at least 20 cm and fully supported by the operating and installation configurations of the transmitter and its antenna(s), according to the source-based time-averaged maximum power requirements of § 2.1091(d)(2). In cases where cable losses or other attenuations are applied to determine compliance, the most conservative operating configurations and exposure conditions must be evaluated. The minimum test separation distance required for a device to comply with mobile device exposure conditions must be clearly identified in the installation and operating instructions, for all installation and exposure conditions, to enable users and installers to comply with RF exposure requirements. For mobile devices that have the potential to operate in portable device exposure conditions, similar to the configurations described in § 2.1091(d)(4), a KDB inquiry is required to determine the SAR test requirements for demonstrating compliance.

When a device qualifies for the categorical exclusion provision of § 2.1091(c), the minimum test separation distance may be estimated, when applicable, by simple calculations according to plane-wave equivalent conditions, to ensure the transmitter and its antenna(s) can operate in manners that meet or exceed the estimated distance. The source-based time-averaged maximum radiated power, according to the maximum antenna gain, must be applied to calculate the field strength and power density required to establish the minimum test separation distance. When the estimated test separation distance becomes overly conservative and does not support compliance, MPE measurement or computational modeling may be used to determine the required minimum separation distance.

According to §1.1310 Radiofrequency radiation exposure limits, paragraph (e), the limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields are:

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

| 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 Exposure</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                        |
| 300–1,500 .....                                                | .....                         | .....                         | f/300                               | 6                        |
| 1,500–100,000 .....                                            | .....                         | .....                         | 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                       |
| 300–1,500 .....                                                | .....                         | .....                         | f/1500                              | 30                       |
| 1,500–100,000 .....                                            | .....                         | .....                         | 1.0                                 | 30                       |

f = frequency in MHz \* = Plane-wave equivalent power density

## FCC MPE Evaluation

Each supported transmission technology will be evaluated to determine if it is in compliance with limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields.

In order to perform the assessment, the following equations have been used for the calculations; these equations are accurate in the far-field of an antenna and will over-predict power density in the near field, where they could be used for making a "worst-case" or conservative prediction:

$$\text{Power density: } S[mW / cm^2] = \frac{P_{\max} [mW]}{4\pi R[cm]^2}$$

$$\text{Maximum gain to meet the MPE limit: } G_{\max} [dBi] = (10 * \log[S[mW / cm^2] * 4\pi R[cm]^2) - P_{\max} [dBm]$$

$S$  = power density

$P_{\max}$  = power input to the antenna

$R$  = distance to the center of radiation of the antenna (evaluation distance)

$G_{\max}$  = power gain of the antenna in the direction of interest relative to an isotropic radiator

## FCC EIRP Limits

Maximum FCC EIRP limits are stated into FCC 47 CFR §24.232 and FCC 47 CFR §22.50 standards, these limits are frequency-dependent and are shown in the following table:

| Standard              | Frequency Band | Technology & Band | EIRP limit (W) | EIRP limit (dBm) |
|-----------------------|----------------|-------------------|----------------|------------------|
| FCC 47 CFR §27.50 (c) | 700            | LTE 12            | 4.92           | 36.92            |
| FCC 47 CFR §27.50 (d) | 1700           | LTE 4/66          | 1.0            | 30.0             |
| FCC 47 CFR §24.232    | 1900           | LTE 2             | 2.0            | 33.0             |



## Appendix B: ISED RF Exposure information

## ISED RF Exposure evaluation for mobile devices

According to RSS-102 Issue 5, Paragraph “4. Exposure Limits”, Industry of Canada has adopted the RF field strength limits established in Health Canada’s RF exposure guideline, Safety code 6:

**Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)**

| Frequency Range (MHz)                                                                                                   | Electric Field (V/m rms)         | Magnetic Field (A/m rms)                        | Power Density (W/m <sup>2</sup> )  | Reference Period (minutes)      |
|-------------------------------------------------------------------------------------------------------------------------|----------------------------------|-------------------------------------------------|------------------------------------|---------------------------------|
| 0.003-10 <sup>21</sup>                                                                                                  | 83                               | 90                                              | -                                  | Instantaneous*                  |
| 0.1-10                                                                                                                  | -                                | 0.73/ <i>f</i>                                  | -                                  | 6**                             |
| 1.1-10                                                                                                                  | 87/ <i>f</i> <sup>0.5</sup>      | -                                               | -                                  | 6**                             |
| 10-20                                                                                                                   | 27.46                            | 0.0728                                          | 2                                  | 6                               |
| 20-48                                                                                                                   | 58.07/ <i>f</i> <sup>0.25</sup>  | 0.1540/ <i>f</i> <sup>0.25</sup>                | 8.944/ <i>f</i> <sup>0.5</sup>     | 6                               |
| 48-300                                                                                                                  | 22.06                            | 0.05852                                         | 1.291                              | 6                               |
| 300-6000                                                                                                                | 3.142 <i>f</i> <sup>0.3417</sup> | 0.008335 <i>f</i> <sup>0.3417</sup>             | 0.02619 <i>f</i> <sup>0.6834</sup> | 6                               |
| 6000-15000                                                                                                              | 61.4                             | 0.163                                           | 10                                 | 6                               |
| 15000-150000                                                                                                            | 61.4                             | 0.163                                           | 10                                 | 616000/ <i>f</i> <sup>1.2</sup> |
| 150000-300000                                                                                                           | 0.158 <i>f</i> <sup>0.5</sup>    | 4.21 x 10 <sup>-4</sup> <i>f</i> <sup>0.5</sup> | 6.67 x 10 <sup>-3</sup> <i>f</i>   | 616000/ <i>f</i> <sup>1.2</sup> |
| Note: <i>f</i> is frequency in MHz.<br>*Based on nerve stimulation (NS).<br>** Based on specific absorption rate (SAR). |                                  |                                                 |                                    |                                 |

**Table 6: RF Field Strength Limits for Controlled Use Devices (Controlled Environment)**

| Frequency Range (MHz)                                                                                                   | Electric Field (V/m rms)        | Magnetic Field (A/m rms)                        | Power Density (W/m <sup>2</sup> ) | Reference Period (minutes)      |
|-------------------------------------------------------------------------------------------------------------------------|---------------------------------|-------------------------------------------------|-----------------------------------|---------------------------------|
| 0.003-10 <sup>23</sup>                                                                                                  | 170                             | 180                                             | -                                 | Instantaneous*                  |
| 0.1-10                                                                                                                  | -                               | 1.6/ <i>f</i>                                   | -                                 | 6**                             |
| 1.29-10                                                                                                                 | 193/ <i>f</i> <sup>0.5</sup>    | -                                               | -                                 | 6**                             |
| 10-20                                                                                                                   | 61.4                            | 0.163                                           | 10                                | 6                               |
| 20-48                                                                                                                   | 129.8/ <i>f</i> <sup>0.25</sup> | 0.3444/ <i>f</i> <sup>0.25</sup>                | 44.72/ <i>f</i> <sup>0.5</sup>    | 6                               |
| 48-100                                                                                                                  | 49.33                           | 0.1309                                          | 6.455                             | 6                               |
| 100-6000                                                                                                                | 15.60 <i>f</i> <sup>0.25</sup>  | 0.04138 <i>f</i> <sup>0.25</sup>                | 0.6455 <i>f</i> <sup>0.5</sup>    | 6                               |
| 6000-15000                                                                                                              | 137                             | 0.364                                           | 50                                | 6                               |
| 15000-150000                                                                                                            | 137                             | 0.364                                           | 50                                | 616000/ <i>f</i> <sup>1.2</sup> |
| 150000-300000                                                                                                           | 0.354 <i>f</i> <sup>0.5</sup>   | 9.40 x 10 <sup>-4</sup> <i>f</i> <sup>0.5</sup> | 3.33 x 10 <sup>-4</sup> <i>f</i>  | 616000/ <i>f</i> <sup>1.2</sup> |
| Note: <i>f</i> is frequency in MHz.<br>*Based on nerve stimulation (NS).<br>** Based on specific absorption rate (SAR). |                                 |                                                 |                                   |                                 |

## ISED MPE Evaluation

Each supported transmission technology will be evaluated to determine if it is in compliance with RSS-102 Issue 5, RF Field Strength Limits.

In order to perform the assessment, the following equations have been used for the calculations; these equations are accurate in the far-field of an antenna and will over-predict power density in the near field, where they could be used for making a "worst-case" or conservative prediction:

$$\text{Power density: } S[W/m^2] = \frac{P_{\max}[W]}{4\pi R[m]^2}$$

$$\text{Maximum gain to meet Field Strength limits: } G_{\max}[dBi] = (10 * \log[S[W/m^2] * 4\pi R[m]^2]) + 30 - P_{\max}[dBm]$$

$S$  = power density

$P_{\max}$  = power input to the antenna

$R$  = distance to the center of radiation of the antenna (evaluation distance)

$G_{\max}$  = power gain of the antenna in the direction of interest relative to an isotropic radiator

## ISED EIRP Limits

Maximum ISED EIRP limits are stated into RSS-130 Issue 2, RSS-133 Issue 6, RSS-139 Issue 3. These limits are frequency-dependent and are shown in the following table:

| Standard         | Frequency Band | Technology & Band | EIRP limit (W) | EIRP limit (dBm) |
|------------------|----------------|-------------------|----------------|------------------|
| RSS-130 Issue 2  | 700            | LTE 12            | 4.92           | 36.92            |
| RSS-139. Issue 3 | 1700           | LTE 4/66          | 1.0            | 30.0             |
| RSS-133 Issue 6  | 1900           | LTE 2             | 2.0            | 33.0             |