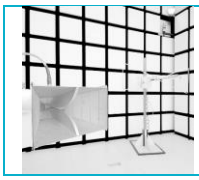
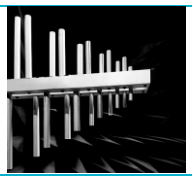
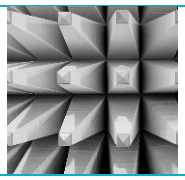

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BNetzA-CAB-02/21-102

# Maximum Permissible Exposure (MPE) & Exposure evaluation

## Report identification number: 1-3523/21-01-12 MPE (FCC_ISED)

| Certification numbers and labeling requirements | |
|---|---|
| FCC ID | ZMF-TU600B |
| ISED number | 9746A-TU600B |
| HVIN (Hardware Version Identification Number) | TU600-21, TU600-22, TU600-25 |
| PMN (Product Marketing Name) | Trackunit |
| FVIN (Firmware Version Identification Number) | -/- |
| HMN (Host Marketing Name) | -/- |

This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

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**EUT technologies:**

| Technologies: | Max. EIRP declared by customer |
|---|---|
| E GPRS<br>850 MHz | 24.0 dBm ± 2.0dB |
| PCS<br>1900 MHz | 21.0 dBm ± 2.0dB |
| LTE FDD 2<br>Cat M1/Cat NB1<br>1900 MHz | 21.0 dBm ± 2.0dB |
| LTE FDD 4<br>Cat M1/Cat NB1<br>1750 MHz | 21.0 dBm ± 2.0dB |
| LTE FDD 5<br>Cat M1/Cat NB1<br>850 MHz | 21.0 dBm ± 2.0dB |
| LTE FDD 12<br>Cat M1/Cat NB1<br>700 MHz | 21.0 dBm ± 2.0dB |
| LTE FDD 13<br>Cat M1/Cat NB1<br>700 MHz | 21.0 dBm ± 2.0dB |
| LTE FDD 25<br>Cat M1/Cat NB1<br>1900 MHz | 21.0 dBm ± 2.0dB |
| LTE FDD 26<br>Cat M1/Cat NB1<br>850 MHz | 21.0 dBm ± 2.0dB |
| LTE FDD 66<br>Cat M1/Cat NB1<br>900 MHz | 21.0 dBm ± 2.0dB |
| LTE FDD 71<br>Cat M1/Cat NB1<br>600 MHz | 21.0 dBm ± 2.0dB |
| LTE FDD 85<br>Cat M1/Cat NB1<br>700 MHz | 21.0 dBm ± 2.0dB |
| BT LE<br>2450 MHz | 2.8 dBm Peak Cond. |

**NOTE: The device is capable of using either LTE Cat M1 or LTE-NB IoT. As the Maximum Output power levels for both technologies are the same for the calculation below the technology is referred as LTE FDD x.**

**Collocation overview:**

| **Active scenario:** / **Technology** | **1** | **2** | **3** | **4** |
|---|---|---|---|---|
| E GPRS / LTE | x | | x | |
| BT LE | x | x | | |

**Prediction of MPE limit at given distance - FCC**

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S = PG / 4\pi R^2$

where: S = Power density
P = Power input to the antenna
G = Antenna gain
R = Distance to the center of radiation of the antenna
PG = Output Power including antenna gain

The table below is excerpted from Table 1B of 47 CFR 1.1310 titled “Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure”

| Frequency Range (MHz) | Power Density (mW/cm²) | Averaging Time (minutes) |
|---|---|---|
| 300 -1500 | f/1500 | 30 |
| 1500 - 100000 | 1.0 | 30 |

where f = Frequency (MHz)

Prediction: worst case

| | Technologies: | E GPRS | LTE | LTE | BT LE | |
|---|---|---|---|---|---|---|
| | Frequency (MHz) | 850 | 600 | 1900 | 2450 | |
| PG | Declared max power (EIRP) | 26 | 23 | 23 | 2.8 | dBm |
| R | Distance | 20 | 20 | 20 | 20 | cm |
| S | MPE limit for uncontrolled exposure | 0.567 | 0.400 | 1 | 1 | mW/cm² |
| | **Calculated Power density:** | 0.0792 | 0.0397 | 0.0397 | 0.0004 | mW/cm² |
| | **Calculated percentage of Limit:** | 13.98% | 9.93% | 3.97% | 0.04% | |
| | **Collocation:** | | | | | |
| | Scenario 1: BT LE + E GPRS / LTE Calculated percentage of Limit: | 14.02% | | | | |

**This prediction demonstrates the following:**

The power density levels for FCC at a distance of 20 cm are below the maximum levels allowed by regulations.

**Prediction of MPE limit at given distance - ISED**

RSS-102, Issue 5, 2.5.2

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$W (adjusted for tune-up tolerance), where $f$ is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2}\ f^{0.6834}$ W (adjusted for tune-up tolerance), where $f$ is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

Prediction: worst case

| | | E GPRS | LTE | LTE | BT LE | |
|---|---|---|---|---|---|---|
| | Frequency | 850 | 600 | 1900 | 2450 | MHz |
| R | Distance | 20 | 20 | 20 | 20 | cm |
| PG | Maximum EIRP | 26 | 23 | 23 | 2.8 | dBm |
| PG | **Maximum EIRP** | 398.1 | 199.5 | 199.5 | 1.9 | mW |
| | **Exclusion Limit from above:** | 1.32 | 1.04 | 2.28 | 2.71 | W |
| | **Calculated percentage of Limit:** | 30.25% | 19.24% | 8.75% | 0.07% | |
| | **Collocation:** | | | | | |
| | Scenario 1: BT LE + E GPRS / LTE<br>Calculated percentage of Limit: | 30.32% | | | | |

**Conclusion:** RF exposure evaluation is not required.