

Test report No:
 3163ERM.003

Assessment report RF EXPOSURE REPORT ACCORDING TO FCC 47 CFR Part 2.1093

| | |
|---|--|
| (*) Identification of item under evaluation | Tundra Tracker and Associated Wireless Dongle |
| (*) Trademark | Tundra Labs |
| (*) Model and /or type reference | Tundra Tracker |
| (*) Other identification of the product | FCC ID: 2ASXT-TT1 |
| (*) Features | 2.4GHz Proprietary protocol based on Nordic Advanced Shock burst |
| (*) Manufacturer | Tundra Labs LLC 2041 Holmgren Way Green Bay, WI 54304 USA. |
| Test method requested, standard | FCC 47 CFR Part 2.1093. Radiofrequency radiation exposure evaluation: portable devices |
| Summary | IN COMPLIANCE |
| Approved by (name / position & signature) | Domingo Galvez EMC&RF Lab Manager |
| Date of issue | 2021-12-10 |
| Report template No | FAN24_02 (*) "Data provided by the client" |

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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").
2. Maximum antenna gain and use distance information.

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

Identification of the client

Tundra Labs LLC
2041 Holmgren Way
Green Bay, WI 54304
USA.

Document history

| Report number | Date | Description |
|---------------|------------|---------------|
| 3163ERM.003 | 2021-12-10 | First release |

Appendix A: FCC RF Exposure assessment result

General description of the device under evaluation

The device under evaluation consists of a Sensor device for collection of 3D Motion. Device receives IR and Inertial data and transmits it via proprietary 2.4GHz wireless protocol.

According to the manufacturer, during its normal use, the separation distance between the radiating structures of the device and nearby users will be greater than distance (≥ 0 cm). In order to perform the assessment a conservative evaluation distance of 0.5 cm has been used.

As stated into DEKRA Certification Inc. test report num. 3163ERM.002, the maximum measured output power levels for Bluetooth low energy is:

| Technology / Mode | Band | Frequency (MHz) | Maximum Conducted Output Power (dBm) | Antenna peak gain (dBi) | Maximum E.I.R.P. (dBm) | Maximum E.I.R.P. (mW) |
|-------------------|---------|-----------------|--------------------------------------|-------------------------|------------------------|-----------------------|
| BTLE | 2.4 GHz | 2400 - 2483.5 | -6.40 | 2.50 | -3.90 | 0.41 |

Table 1: Equipment specifications

Assessment summary

The assessment summary according to the radiofrequency radiation exposure limits defined in FCC 47 CFR § 2.1093 is the following:

| Technology / Mode | Band | Frequency (MHz) | Verdict |
|-------------------|---------|-----------------|-------------|
| BTLE | 2.4 GHz | 2400 - 2483.5 | Pass |

Table 2: Assessment summary

Evaluation Results

The evaluation according to the minimum intended use distance of 5mm applied for the evaluation according to KDB 447498 D01 General RF Exposure Guidance, see Appendix B for additional information will be as follow:

| Technology / Mode | Band | Frequency (MHz) | Distance (cm) | Result | Limit 1-g SAR | SAR Test Exclusion |
|-------------------|---------|-----------------|---------------|--------|---------------|--------------------|
| BTLE | 2.4 GHz | 2400 - 2483.5 | 0.50 | 0.07 | 3.00 | Pass |

Table 3: FCC Evaluation Result

The computed value(s) are below the limit(s), so according to KDB 447498 D01 – General RF Exposure Guidance, these modes qualify for Standalone SAR test exclusion for 1-g SAR and 10-g Extremity SAR.

Appendix B: FCC RF Exposure information

FCC SAR test exclusion considerations for portable devices

For transmission frequencies below 6GHz, as stated by the FCC (47 CFR §2.1093), human exposure to RF emissions from portable devices, which are defined as transmitting devices to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user, must be evaluated with respect to the FCC-adopted limits for SAR.

According to FCC OET KDB 447498 D01 General RF Exposure Guidance:

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition is satisfied.

- For distances ≤ 50 mm

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$$\left[\frac{\text{max. power of channel, including tune-up tolerance, mW}}{[\sqrt{f(\text{GHz})}]^2} \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR} \right] \cdot \text{mm}$$

Where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Approximate SAR Test Exclusion Power Thresholds at Selected Frequencies and Test Separation Distances are illustrated in the following Table:

| MHz | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | mm |
|------|----|----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| 150 | 39 | 77 | 116 | 155 | 194 | 232 | 271 | 310 | 349 | 387 | SAR Test Exclusion Threshold (mW) |
| 300 | 27 | 55 | 82 | 110 | 137 | 164 | 192 | 219 | 246 | 274 | |
| 450 | 22 | 45 | 67 | 89 | 112 | 134 | 157 | 179 | 201 | 224 | |
| 835 | 16 | 33 | 49 | 66 | 82 | 98 | 115 | 131 | 148 | 164 | |
| 900 | 16 | 32 | 47 | 63 | 79 | 95 | 111 | 126 | 142 | 158 | |
| 1500 | 12 | 24 | 37 | 49 | 61 | 73 | 86 | 98 | 110 | 122 | |
| 1900 | 11 | 22 | 33 | 44 | 54 | 65 | 76 | 87 | 98 | 109 | |
| 2450 | 10 | 19 | 29 | 38 | 48 | 57 | 67 | 77 | 86 | 96 | |
| 3600 | 8 | 16 | 24 | 32 | 40 | 47 | 55 | 63 | 71 | 79 | |
| 5200 | 7 | 13 | 20 | 26 | 33 | 39 | 46 | 53 | 59 | 66 | |
| 5400 | 6 | 13 | 19 | 26 | 32 | 39 | 45 | 52 | 58 | 65 | |
| 5800 | 6 | 12 | 19 | 25 | 31 | 37 | 44 | 50 | 56 | 62 | |

SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm

- For distances > 50 mm

For 100 MHz to 6 GHz frequencies and for test separation distances > 50 mm, the SAR test exclusion threshold is determined according to the following:

- 1) [Power allowed at numeric threshold for 50 mm in table 1) + (test separation distance - 50 mm)·(f(MHz)/150)] mW, at 100 MHz to 1500 MHz
- 2) [Power allowed at numeric threshold for 50 mm in table 1) + (test separation distance - 50 mm)·10] mW, at > 1500 MHz and ≤ 6 GHz

Approximate SAR test exclusion power thresholds at selected frequencies and test separation distances are illustrated in the following table

| MHz | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 190 | mm |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|-----------------------------------|
| 100 | 474 | 481 | 487 | 494 | 501 | 507 | 514 | 521 | 527 | 534 | 541 | 547 | 554 | 561 | 567 | SAR Test Exclusion Threshold (mW) |
| 150 | 387 | 397 | 407 | 417 | 427 | 437 | 447 | 457 | 467 | 477 | 487 | 497 | 507 | 517 | 527 | |
| 300 | 274 | 294 | 314 | 334 | 354 | 374 | 394 | 414 | 434 | 454 | 474 | 494 | 514 | 534 | 554 | |
| 450 | 224 | 254 | 284 | 314 | 344 | 374 | 404 | 434 | 464 | 494 | 524 | 554 | 584 | 614 | 644 | |
| 835 | 164 | 220 | 275 | 331 | 387 | 442 | 498 | 554 | 609 | 665 | 721 | 776 | 832 | 888 | 943 | |
| 900 | 158 | 218 | 278 | 338 | 398 | 458 | 518 | 578 | 638 | 698 | 758 | 818 | 878 | 938 | 998 | |
| 1500 | 122 | 222 | 322 | 422 | 522 | 622 | 722 | 822 | 922 | 1022 | 1122 | 1222 | 1322 | 1422 | 1522 | |
| 1900 | 109 | 209 | 309 | 409 | 509 | 609 | 709 | 809 | 909 | 1009 | 1109 | 1209 | 1309 | 1409 | 1509 | |
| 2450 | 96 | 196 | 296 | 396 | 496 | 596 | 696 | 796 | 896 | 996 | 1096 | 1196 | 1296 | 1396 | 1496 | |
| 3600 | 79 | 179 | 279 | 379 | 479 | 579 | 679 | 779 | 879 | 979 | 1079 | 1179 | 1279 | 1379 | 1479 | |
| 5200 | 66 | 166 | 266 | 366 | 466 | 566 | 666 | 766 | 866 | 966 | 1066 | 1166 | 1266 | 1366 | 1466 | |
| 5400 | 65 | 165 | 265 | 365 | 465 | 565 | 665 | 765 | 865 | 965 | 1065 | 1165 | 1265 | 1365 | 1465 | |
| 5800 | 62 | 162 | 262 | 362 | 462 | 562 | 662 | 762 | 862 | 962 | 1062 | 1162 | 1262 | 1362 | 1462 | |

SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and > 50 mm

- For frequencies below 100 MHz

The following may be considered for SAR test exclusion:

- 1) For test separation distances > 50 mm and < 200 mm, the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by [1 + log(100/f(MHz))]
- 2) For test separation distances ≤ 50 mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by ½

Approximate SAR test exclusion power thresholds at selected frequencies and test separation distances are illustrated in the following table

| MHz | < 50 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 190 | mm |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----|
| 100 | 237 | 474 | 481 | 487 | 494 | 501 | 507 | 514 | 521 | 527 | 534 | 541 | 547 | 554 | 561 | 567 | mW |
| 50 | 308 | 617 | 625 | 634 | 643 | 651 | 660 | 669 | 677 | 686 | 695 | 703 | 712 | 721 | 729 | 738 | |
| 10 | 474 | 948 | 961 | 975 | 988 | 1001 | 1015 | 1028 | 1041 | 1055 | 1068 | 1081 | 1095 | 1108 | 1121 | 1135 | |
| 1 | 711 | 1422 | 1442 | 1462 | 1482 | 1502 | 1522 | 1542 | 1562 | 1582 | 1602 | 1622 | 1642 | 1662 | 1682 | 1702 | |
| 0.1 | 948 | 1896 | 1923 | 1949 | 1976 | 2003 | 2029 | 2056 | 2083 | 2109 | 2136 | 2163 | 2189 | 2216 | 2243 | 2269 | |
| 0.05 | 1019 | 2039 | 2067 | 2096 | 2125 | 2153 | 2182 | 2211 | 2239 | 2268 | 2297 | 2325 | 2354 | 2383 | 2411 | 2440 | |
| 0.01 | 1185 | 2370 | 2403 | 2437 | 2470 | 2503 | 2537 | 2570 | 2603 | 2637 | 2670 | 2703 | 2737 | 2770 | 2803 | 2837 | |

SAR Test Exclusion Thresholds for frequencies < 100 MHz