BROWAN

Industrial Tracker

Reference Manual

TNIT100-915
TNIT100-868

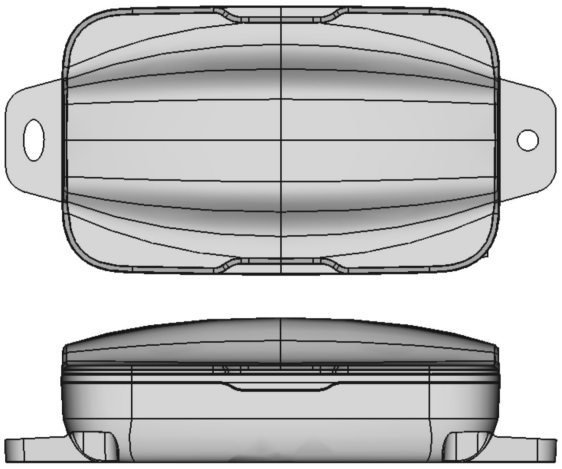
Table of Contents

1. Description

The Industrial Tracker is a general purpose tracker, designed for GPS tracking on various applications: bicycles, cars or pets. It is equipped with GPS and 3-axis accelerometer, that provides a much more cost-effective way for service providers to deploy this for tracking applications than to use GPRS network.

2. Specifications

2.1 Mechanical



2.1.1 Sensor

Length x Width x Height	107mm x 52mm x 27mm
Weight	35g without battery 45g with batteries
Sensor	• GNSS module • 3D MEMs • Accelerometer • Hall-effect

2.2 Environmental

Temperature	-20°C to +70°C
IP Rating	IP 66 equivalent

2.3 Radio

Frequency	• 863–870MHz for EU • 902–928MHz for North America
Tx Power	+19dBm conducted
Rx Sensitivity	-138dBm conducted
Antenna Gain	0dBi Peak, -3dBi Avg

2.4 Certifications and Conformity

FCC ID: 2AMUGTNIT100
IC: 22980-TNIT100
CE
ROHS REACH

2.5 Power

Source	3.6V ½ AA Li-SOCl2 1200mAh battery (*2)
Maximum Voltage	3.6V
Minimum Voltage	3.1V
Current	TBD

2.6 User Interface

LEDs	One green LED

2.7 Additional Features

PCB Temperature	NTC 100k ohm
Battery Monitoring	Resistor divider

3. Operation

3.1 Shipping Mode

When industrial trackers leave the factory, they are put into shipping mode, where the sensor is hibernating without functionality to prevent radioactivity and minimize battery usage. Devices are delivered in this mode.

3.2 User Mode

This mode is active when the device is in normal operating mode. To enter user mode from shipping mode, the user shall place a magnet near the hall sensor for at least 10 seconds. LED will light continuous for 3 seconds indicating it is awake.
There are two behaviors in user mode: stationary and moving.

3.2.1 Stationary Mode

1. Wake up every 15 minutes, and turn on GPS.
2. Analyze satellite status 5 seconds:
    a. If the number of satellites is less than 3, and the signal strength is lower than 20, it will turn off GPS and do LoRa uplink immediately.
    b. Or continuous positioning for 60 seconds, and then turn off the GPS and do LoRa uplink.
3. Set timer for the next round.
4. Enter moving mode when g-sensor is triggered.
    a. Trigger condition: continuous triggering over 3 seconds.

3.2.2 Moving Mode

1. LoRa uplinks every minute.
2. Turn on GPS every 5 minutes, and analyze satellites status 10 seconds:
    a. If the number of satellites is less than 3, and the signal strength is lower than 20, it will turn off GPS immediately.
    b. Or continuous positioning for 60 seconds, and then stop the GPS.
    c. If the GPS position is fixed, the device will never close GPS until entering the stationary mode.
3. Enter stationary mode when the device is not moving over 30 seconds (g-sensor is not triggered).

4. Messages

4.1 Uplink Payload

Port	136
Payload Length	11 bytes

Byte	1	2	3	4	5	6	7	8	9	10	11
Field	Status	Battery	Temp.	Lat				Long			

Status	**Sensors status** Bit [2] 1 - indoor mode, 0 - outdoor mode Bit [3] 1 - no GNSS fix, 0 - GNSS fixed Bit [4] 1 - GNSS error, 0 - GNSS OK
Battery	**Battery level** Bits [3:0] unsigned value v, range 1 – 14; battery voltage in V = (25 + v) ÷ 10. Bits [7:4] unsigned value κ, range 0 – 15; remaining battery capacity in % = 100 × (κ ÷ 15).
Temp	**Temperature as measured by on-board NTC** Bits [6:0] unsigned value τ, range 0 – 127; temperature in °C = τ - 32. Bit [7] RFU
Lat	**Latitude as last reported by GNSS receiver** Bits [27:0] signed value φ, range -90,000,000 – 90,000,000; WGS84 latitude in ° = φ ÷ 1,000,000. Bits [31:28] RFU
Long	**Longitude and position accuracy estimate as last reported by GNSS receiver** Bits [28:0] signed value λ, range -179,999,999 – 180,000,000; WGS84 longitude in ° = λ ÷ 1,000,000. Bits [31:29] unsigned value α, range 0-7; position accuracy estimate in m = $2^{\alpha+2}$ (max). The value 7 represents an accuracy estimate of worse than 256m. Note: If there is no GNSS fix (see sensor status), the Lat and Lon fields contain the last values reported by the GNSS receiver. If there has never been a GNSS fix acquired, the values may both be 0.

4.2 Configuration Downlink Command

Port	204
Payload Length	33 bytes

Byte	1	2 to 33
Field	Cmd	Config

Cmd	**Command** Bits [7:0] 0x00 - Set configuration
Config	**Industrial Tracker Configuration** Bytes [3:0] stationary threshold (second) Bytes [7:4] RFU **Stationary Mode Configuration** Bytes [11:8] reporting interval (second, 0=off, -1=transition only) Bytes [13:12] acquisition timeout (second) Bytes [15:14] back-off time (second) Bytes [16] tracking type: ● 0x00 - no GPS ● **0x01 - periodic GPS** ● 0x02 - full tracking ● 0x03 - PSM tracking Bytes [17] indoor: number of SVs required above threshold Bytes [18] indoor: detection threshold (dbHz) Bytes [19] indoor: detection timeout (second) **Moving Mode Configuration** Bytes [23:20] reporting interval (second, 0=off, -1=transition only) Bytes [25:24] acquisition timeout (second) Bytes [27:26] back-off time (second) Bytes [28] tracking type: ● 0x00 - no GPS ● 0x01 - periodic GPS ● **0x02 - full tracking** ● 0x03 - PSM tracking Bytes [29] indoor: number of SVs required above threshold Bytes [30] indoor: detection threshold (dbHz) Bytes [31] indoor: detection timeout (second)

5. Battery Replacement

Use ER14250 or equivalent.
Remove the screw and replace both batteries.
Do not mix old and new batteries.