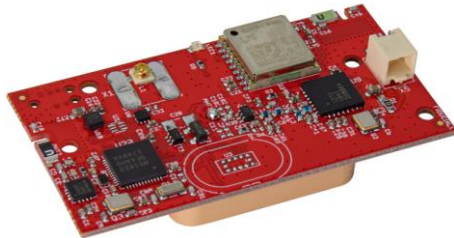# KCS TraceME TM-2001 / P1A5
LoRa/RF based proximity sensing module

The TM-2001 / P1A5 is a mid-range product line member of KCS' advanced TraceME track and trace modules.

The module contains an optional wide range distance sensor (Time-Of-Flight) offering proximity sensing for a wide range of IoT applications. It offers accurate location based position data to be connected to any existing worldwide server application.

Key Features

- Excellent satellite (GNSS) coverage
  - GPS
  - Glonass/GPS/Galileo   (*)
- LoRa® technology, EU-868MHz
  - Up to 60km line of sight at 25mW and with integrated antenna.
- Integrated 2.45GHz. radio for special functions and peripherals.
  - Long range, over 1 km range, line of sight
- Excellent indoor and outdoor performance with accuracy up to 1.5m
- Very small, only 50 x 26mm
- Lightweight: 18 grams for a fully equipped PCB
- Standby battery lifespan of more than 15 years.

- Onboard sensors:
  - 3D accelerometer (up to 16g)
- Optional sensors: (*)
  - Temperature sensor   (±0.5°C)
  - Distance sensor   (up to 4m)
- 1 LED for user interaction.   (*)
- Wide operating range: -30°C … +85°C
- Multiple watchdog levels for maximum stability.
- Event based free configurable module to fit any job.
- Remote configurable to fit any job (both firmware and configuration files can be updated over the air).
- Supports integration into third party networks.

(*) Optional, please contact sales for more details.

Applications

- Object protection, more than 15 years of standby on a single lithium AA-battery.
- Logistics, M2M
- Proximity sensing
- Smart waste management for smart cities
- Remote control and diagnostics
- Anti-theft

Product Summary

The KCS TraceME TM-2001 is a mid-range, LoRa-based track and trace module with basic functionality. The combined LoRa and 2.4GHz. RF technologies offers an intelligent traceability functionality. An intelligent 'Listen before talk' algorithm makes it practically impossible to locate the module which secures the valuable vehicle or asset. It enables stolen object recovery and thereby offers insurance premiums reduction possibilities.

With RF beacon support and RF triangulation, an indoor geolocation accuracy up to 1.5 meters can be reached. In LoRa based networks the outdoor geolocation accuracy of static devices is typically 50 meters and can be further improved up to 1.5 meters by on-site RF localization. Optionally the module can be equipped with GNSS functionality.

The module contains an optional advanced distance sensor (Time-Of-Flight), providing accurate distance measurements up to 4m and programmable receiver field-of-view. The module can be integrated into a wide range of M2M/IoT applications, such as smart waste management and proximity sensing.

With a minimal size of 50 x 26 mm, weight of only 18 grams and a battery lifespan of more than 15 years, the module offers endless OEM integration possibilities.

The functionality of the module can be remotely programmed to fit any job. From basic/general functionality to advanced/low-level application specific detailed functionality.

All of the necessary server-side scripts to process and store data from these units are available for registered distributors and resellers. If you do not want to host data and maps yourself, you can use the hosting services of one of our partner companies.

(*) Optional, please contact sales for more details.

Ordering information

- TM-2001   Basic version (LoRa and 2.45GHz. RF)
- (*)   Optional, please contact sales for more details.

Enclosure (*)

The picture above is an example of the 'proximity sensor enclosure'.

Battery

Depending on the application, different battery types and capacities might be required, which can be provided separately.

Specifications KCS TraceME TM-2001

Data communication

LoRa	Semtech SX1272 transceiver
Frequency	EU 868 MHz.
Protocol	LoRaWAN 1.0.2 and custom LoRa protocol
Transmitting power	up to +20 dBm
Sensitivity	-137 dBm

RF 2.4GHz.	Nordic nRF51822
Frequency	2.45 GHz.
Protocol	BLE 4.0 and custom 2.4 GHz. protocol
Transmitting power	up to +20 dBm (with on-board amplifier)
Sensitivity	-93 dBm (BLE)

Navigation (*)

GPS Receiver	Quectel L70 GPS module, optional L76 GNSS (Glonass + GPS + Galileo) module	
Frequency	GPS L1 1575.42 MHz. C/A Code, 48 search channels Glonass L1 1598.0625 ~ 1605.375 C/A Code	
Sensitivity	Acquisition	-148 dBm (typical)
	Reacquisition	-160 dBm (typical)
	Tracking	-165 dBm (typical)
Horizontal Position Accuracy	<2.5 m CEP	

Electrical

Power supply	Internal non-rechargeable Lithium battery
Typical power consumption	100mA BLE/LoRa transmission
	8uA standby, sensors, timer active, no transmissions

Recommended environmental conditions

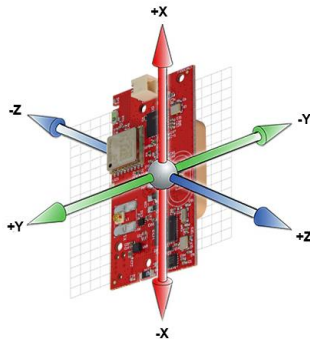| Operating Temperature	-30°C to +85°C (OEM) -20°C to +70°C (proximity sensing enclosure)
Humidity	10% to 90%

External Connections
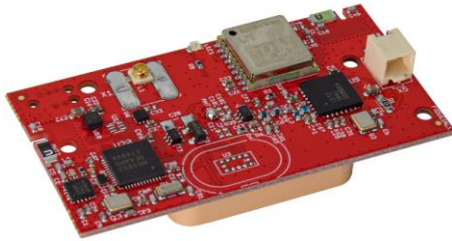
Battery connector

Pin	Description
1	2.8 - 3.6V Non-rechargeable battery (+) connection
2	Ground

Onboard sensors

3D accelerometer

The module contains a 3D accelerometer (up to 16g), which can be used for a variety of custom specific (M2M) applications. Accelerometers are useful for measuring movement, speed, g-forces and vibration of the object. The accelerometer and advanced embedded firmware enables a very low-power battery solution.

Temperature sensor (*)

The module contains a temperature sensor (±0.5°C), which can be used for example to monitor and control any temperature sensitive equipment.

Distance sensor (*)

The module contains an optional advanced distance sensor (VL53L1x) , providing accurate distance measurement. The maximum range is 4m and the receiver field-of-view is programmable from 15 to 27 degrees. It can be used for advanced position detection applications. An optional IR lens is available to withstand ambient light performance influences.

About KCS BV

KCS BV, founded in The Netherlands in 1984, develops and manufactures electronics in-house for industrial applications, medical purposes, broad- casting solutions, etc.

KCS is ISO 9001:2015 and ISO 14001:2015 certified.

LoRa Alliance Member™

KCS is a LoRa Alliance member since 2016.

Support

Visit our support page at: www.trace.me

Sales

Contact us by email: Trade@trace.me

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