KCS TraceME TM-901 / N1C2
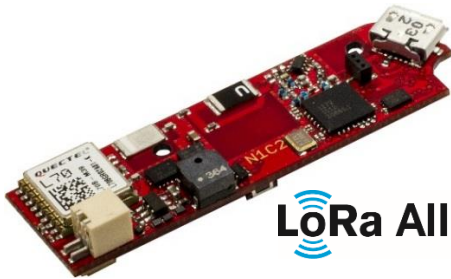## GPS/RF-module

The TM-901 / N1C2 is a budget product line member of KCS' advanced TraceME track and trace modules. The TM-901 is targeted for remotely tracking and tracing a variety of objects, even livestock, and for personal use.

The TM-901 offers excellent long range RF coverage and is optionally equipped with a low-power GPS receiver. The module is equipped with multiple on-board sensors, low-level I/O-connectivity and a non-rechargeable integrated battery. 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 (*)
- Very small, only 53 x 15mm
- Lightweight: 3 grams for a fully equipped PCB
- Standby battery lifespan of more than 15 years.
- IP67 housing (*)
- Excellent GPS accuracy, internal antenna.
- Integrated 2.45GHz. radio for special functions and peripherals. (*)
  - Long range, over 1 km range, line of sight
- LoRa™ technology
  - 868MHz. / 915MHz. (*)
  - Up to 60km line of sight at 25mW and with integrated antenna.
- Excellent indoor and outdoor performance with accuracy up to 1.5m
- Up to 3 LEDs for user interaction.
- 1 pushbutton for user interaction.

- Onboard sensors:
  - Temperature sensor (±0.5°C)
  - 3D accelerometer (up to 16g)
- Optional sensors
  - Humidity sensor (±2%RH)
  - Baro-/Altitude meter (±10cm)
  - Compass/3D Magnetometer
  - Distance sensor (up to 2m)
- Wide operating range: -30˚C … +85˚C
- Multiple watchdog levels for maximum stability.
- Solar cell charger (*)
- Versatile interfacing:
  - Digital I/O
  - Analog input
  - Serial, 3V
  - iButton™ / 1-Wire™
- Buzzer (*)
- Event based free configurable module to fit any job.
- Remote maintenance. 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
- Animal tracking, asset monitoring
- Security and surveillance
- Remote control and diagnostics
- Anti-theft
- Smart cities
- Agriculture and environmental

Product Summary

Equipped with a state-of-the-art GPS receiver, the KCS TraceME TM-901 / N1C2 module provides reliable and accurate navigational data.

The full version module (TM-901F) is equipped with different technologies for traceability (e.g. GPS/Glonass(*)/Galileo(*), LoRa™, Bluetooth LE, and proprietary RF), which can all be combined dependent of the application. The low-budget basic version module (TM-901B) is equipped without GPS while still offering the highly intelligent traceability functionality.

The combined LoRa™ and 2.4GHz. RF technologies offers tracing of the module over a wide area up to 60km. The rough tracing from 60km down to 300 meters is done by LoRa™, while the short-range tracing is done by the proprietary RF-technique. This technique offers excellent indoor and outdoor tracing with an accuracy up to 1.5 meters. Traditional national telecom costs are avoided because of the absence of GPRS/SMS.

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.

Multiple on-board sensors (temperature, acceleration and optional: humidity, baro-/altimeter, compass/3D magnetometer and distance sensor) as well as buzzer, LEDs, I/O-functionality and pushbutton enable the integration of TraceME into a variety of custom specific (M2M) applications. With a minimal size of 53 x 15 mm, weight of only 3 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.

Product Certification

LoRaWAN™

- LoRaWAN™ EU 868MHz
- LoRaWAN™ US 915MHz

C E

• Safety & Low Voltage	2014/35/EU
• EMC	2014/30/EU
• RED	2014/53/EU

Ordering information

Ordering info	RF		GNSS			LoRa		Buzzer	I/O	Sensors						Solar charger	Rechargeable
	Proprietary	BLE	GPS	Glonass	Galileo	868	915			Accel	Temp	Pressure	Humidity	Compass	Distance		
TM-901F	√	√	√			√		√	√	√	√	√					X
TM-901F-solar	√	√	√			√		√	√	√	√	√				√	√
TM-901B	√	√				√			√	√	√						X

(√) default functionality
(x) not possible in this configuration
( ) optional functionality, please contact sales for more details

Note: The module can be equipped with solar charger. The solar cell is sold separately.

Specifications KCS TraceME TM-901

Data communication

LoRa™	Semtech SX1272 transceiver
Frequency	868/915 MHz. (*)
Protocol	LoRaWAN™ 1.0.1 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 (*)

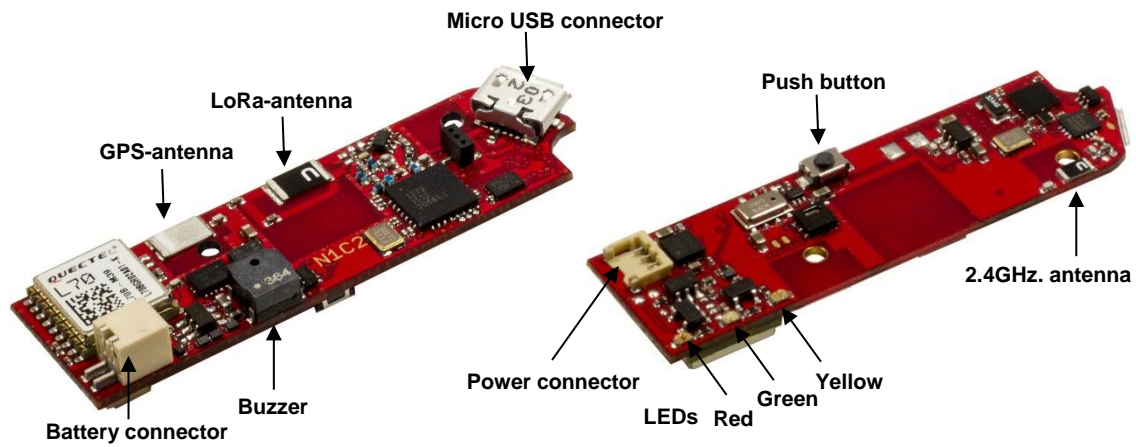| GPS Receiver	Quectel L70 GPS module, optional L76 GNSS (Glonass + GPS + Galileo) module	
Frequency	GPS L1 1575.42 MHz. C/A Code, 48 search channels Glonass L1 1598.0625 ~ 1605.375 C/A Code	
Sensitivity	Acquisition	-148 dBm (typical)
	Reacquisition	-160 dBm (typical)
	Tracking	-165 dBm (typical)
Horizontal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

Electrical

Power supply (**)	Default: Internal non-rechargeable Lithium battery AAA-size (+3.6V/700mAh), or: External +5VDC ±10% (micro USB-connector) Optional: Solar charger (5V cell) + rechargeable Lithium battery
Typical power consumption	2mA GPS low power tracking
	100mA BLE/LoRa™ transmission
	8uA standby, sensors, timer and I/O active, no transmissions

(**)   Battery charging functionality is only available on special hardware (TM-901F-solar).
- TM-901F / TM-901B: Non-rechargeable battery
  When using a non-rechargeable battery, it is not allowed to connect external 5V at the micro-USB connector.

- TM-901F-solar: Rechargeable battery + solar charger
  Battery charging can be done via micro-USB connector, OR by solar cell. When using a rechargeable battery, it is not allowed to connect external 5V at the micro-USB connector when the solar cell is connected.

Recommended environmental conditions

Operating Temperature	-30°C to +85°C (OEM) -20°C to +70°C (key fob housing)
Humidity	10% to 90%
Altitude	0.5 meters to 2000 meters

External Connections

Micro USB connector

LoRa-antenna

GPS-antenna

Push button

2.4GHz. antenna

Power connector

Yellow

Green

LEDs Red

Buzzer

Battery connector

Battery connector

Pin	Description
1	3.4 - 4.2V Non-rechargeable battery (+) connection
2	Ground

Power connector (*)
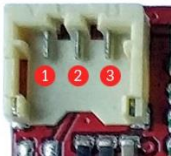
Pin	Description
1	3.4 - 4.2V Rechargeable battery (+) connection
2	Ground
3	Temperature sensor / Optional: Solar cell 5V

Micro-USB

Pin	Signal	Type	Description
1	USB VCC	VCC	+4.5 … +5.5 VDC Charge input, max 600mA
2	Serial IN	I	Serial input or digital input (2..31V for active high) ~ 50k pulldown
3	Serial OUT	O	Serial or digital output, open collector (max 31V/10mA/100mW)
4	Analog IN	-	Analog input (0..44V)
5	GND	GND	GND for charge and I/O

Onboard sensors

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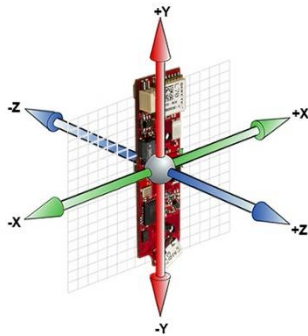
The module contains a 3D accelerometer (up to 16g), which can be used for a variety of custom specific (M2M) applications. Accelerometers are useful for measuring movement, speed, g-forces and vibration of the object. The accelerometer and advanced embedded firmware enables a very low-power battery solution.

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.

Humidity sensor (*)

The module contains an optional humidity sensor (±2%RH), which can be used to monitor and control any object in an environmental sensitive infrastructure, for example goods stored in a unmanned warehouse.

Baro-/Altitude meter (*)

The module contains an optional baro-/altitude meter (±10cm), which can be used for advanced 3D location based positioning applications.

Compass/3D Magnetometer (*)

The module contains an optional compass/3D magnetometer, which can be used for advanced position detection applications.

Distance sensor (*)

The module contains an optional advanced distance sensor, providing accurate distance measurement whatever of target reflectance, unlike conventional technologies. The maximum range is 2m, raging accuracy is up to 3% @ 120cm/white target/indoor). It can be used for advanced position detection applications.

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

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.

Support

Visit our support page at: www.trace.me

Sales

Contact us by email: Trade@trace.me

Final notes & certification

We certify that Kolff Computer Supplies BV, Dordrecht, The Netherlands does not make any hardware or IMEI modifications to the QUECTEL devices as used in the TraceME track & trace device. All software modifications are restricted to official firmware upgrades as provided by Quectel Wireless Solutions Co., Ltd..

KCS is ISO 9001:2008 and ISO 14001 certified since 1999.

WARNING:
- The device should be turned off in vicinity of petrol pumps, chemical, flammable or hazardous environments where ignition of flammable atmospheres is possible.
- The module and antennas shall be operated at a distance greater than 20 cm from the human body.
- The device is to be operated in accordance with the user instructions or manufactured recommendations.

Disclaimer

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