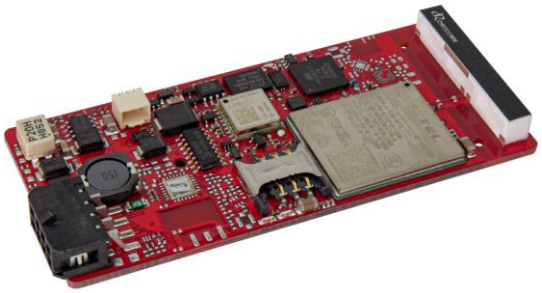
KCS TraceME TM-178 / R9H10

GPS / LTE-M / NB-IoT / RF module



The TM-178 / R9H10 is a mid-range product line member of KCS' advanced TraceME track and trace modules. The TM-178 is targeted for remotely tracing and controlling vehicles, vessels and other powered equipment and machinery.

The TM-178 is equipped with an intelligent location based positioning solution, which provides locating the vehicle or object quickly and accurate in scenarios where traditional GPS systems are insufficient. It offers multiple connectivity options and server connections. The module is designed to comply with all approvals for the North American market, and can be used in all countries of the world.

Key Features

- National telecom & worldwide satellite (GNSS) coverage
  - LTE Cat M1 / NB-2 / EGPRS
  - GPS (*)
  - Glonass/GPS/Galileo
- Micro SIM socket
- Very small, only 91 x 40 x 9 mm.
- Lightweight: 30 grams for the fully equipped PCB.
- BASIC I/O, Serial, analog and digital interfaces
  - RS232
  - CAN
- Ultra low power consumption, down to 12uA.
- 6 to 31VDC power supply
- Excellent GPS accuracy including full-size GPS antenna.
- Integrated 2.45 GHz 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.
- Portable type: Integrated antennas.
- External micro coax RF antenna (*)
- Li-ion charger/switcher system seamlessly feeds all parts from external power source or Li-ion battery.
- Onboard sensors:
  - 3D accelerometer (up to 16g)
  - Baro-/Altitude meter(±10cm) (*)
- Wide operating temperature range: -40°… +85°C (without LiPo battery)
- Robust IP67 housing (*)
- Multiple watchdog levels for maximum stability.
- Dual charge protection for voltages and temperature range.
- Event based free configurable module to fit any job; 300+ different events, up to 4,000 geozones.
- Remote maintenance. Both firmware and configuration files can be updated over the air.
- Runs local user scripts via .src files.
- User definable SMS commands.
- Supports integration into third party networks.

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

email: Trade@trace.me • URL: www.trace.me

Applications

- Vehicle and vessel tracking
- Object protection and tracking
- Logistics, M2M
- Security and surveillance
- Remote control and diagnostics
- Anti-theft
- Asset monitoring

Product Summary

Equipped with a state-of-the-art GPS receiver, the TM-178 / R9H10 module provides reliable and accurate navigational data. Advanced location-based positioning (LSB) by proprietary RF enables positioning inside buildings and offers special power saving features for a variety of applications.

The module's positioning coordinates are transmitted by a 2G or optional: 3G, LTE-M/NB-IoT modem, LoRa, Bluetooth Smart (BLE) and iBeacon offering easy integration with existing wireless networks and specific custom mobile App's on smartphones and tablets.

The module provides reliable, optimized connectivity and coverage for the next generation LTE-M and NB-IoT networks and offers seamless fall back to 2G networks. In areas without network coverage, position-data and events are stored in memory (up to 250,000 positions). As soon as communication is restored, all information can be transmitted.

The combined LoRa and 2.4GHz RF technologies offers tracing of the module over a wide area up to 10km. The rough tracing from 10km down to 300 meters is done by LoRa, while the short-range tracing is done by the proprietary RF-technique, which offers excellent indoor and outdoor tracing with an accuracy up to 1.5 meters.

The functionality of the module can be fully customized dependent on the application. For example, the full version module is equipped with different technologies for traceability (e.g. GPS/Glonass/Galileo, LTE-M/NB-IoT modem, LoRa, Bluetooth Smart (BLE) and proprietary RF), which can all be combined dependent of the application and local mobile network coverage. User specific low-budget basic versions are available on request.

Compared to the R9H7, the R9H10 is equipped with RS-232 and CAN-interface.

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.

Ordering information

The KCS TraceME TM-178 / R9H10 can be equipped with different optional technologies for traceability. It can be fully customized dependent of the application. Please contact sales for more details.

Enclosure (*)

The picture above is an example of an available enclosure.

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

Specifications KCS TraceME TM-178

Data communication

Modem	Quectel BG95-M3 LTE Cat M1 / NB-2, GSM Module, all global certifications and R&TTE directives.
Frequency bands	GSM/GPRS: 850/900/1800/1900 MHz LTE: B1-5, 8, 12, 13, 14 (Cat M1) 18, 19, 20, 25, 26, 27 (Cat M1), 28

LoRa	Semtech SX1272 transceiver
Frequency	868/915 MHz (*)
Protocol	LoRaWAN 1.0.2 and custom LoRa protocol
Transmitting power	up to +20 dBm
Sensitivity	-137 dBm

RF Communication

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 L76 GNSS (Glonass + GPS + Galileo) module, optional L70 GPS 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	

email: Trade@trace.me • URL: www.trace.me

Operating temperature conditions

With Primary Lithium Cell or without LiPo battery	-40°C … +85°C (discharging only)
With rechargeable LiPo Cell (**)	-20°C … +60°C (discharging) 0°C … +45°C (charging)

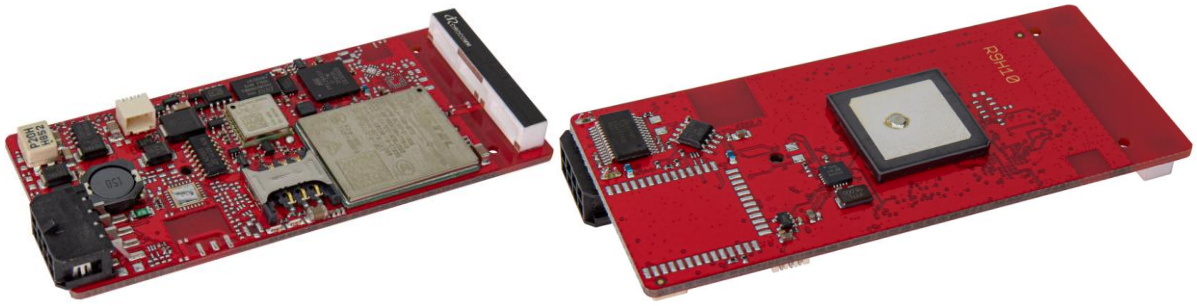
(**) Extended temperature range LiPo batteries available on request.

Electrical

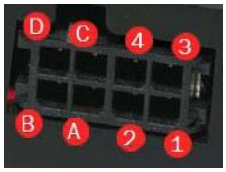
Power supply	Maximum range: +6…+31VDC
Charging Current	Max 450mA. Observing 0...+45˚C safety range for LiPolymer. Higher charging currents (for batteries with higher capacity) on request.
Power Consumption	60 µW standby (typical): GPS off, hot start possible. GSM off. Processor monitors timer + acceleration sensor + I/O, watchdog on, brownout detection on.
	Power per fix: < 1.3 mAh, including cold start of GPS, GSM power-up and transmission via GPRS or SMS.
	150 mW tracking: GPS always on, GPRS active, GPRS session open.
	Power consumption depends on amount of GPRS traffic and navigation parameters.

email: Trade@trace.me • URL: www.trace.me

External connections



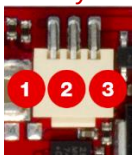
Power and I/O-connector



Pin	Signal	Type	Description
1	GND	GND	Ground for VCC and IO
2	VCC	VCC	+6 to +31VDC charge input and power supply
3	TxD4, RS-232 Tx	0	3V serial Tx4, RS-232 Tx
4	Analog In 3/In 5	I	Analog Input #3/#5 (0..35V)
A	RxD4, or analog input 0..1V, RS-232-Rx	I	3V serial Rx4, or analog input 0..1V (*), RS-232 Rx
B	CAN-H	I/O	CAN-H
C	CAN-L	I/O	CAN-L
D	Analog in 2	I	Analog input #2 0..35V

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

Battery connector

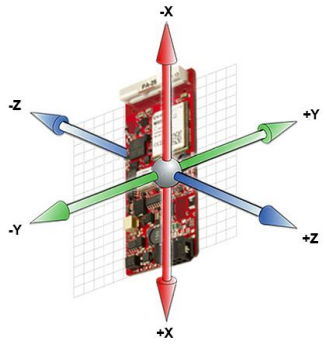


Pin	Description
1	Temperature sensor
2	Ground
3	3.4 - 4.5V Battery (+) connection

email: Trade@trace.me • URL: www.trace.me

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.

Baro-/Altitude meter (*)

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

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

Module revision history

		TM-178/R9H4	TM-178/R9H5	TM-178/R9H7	TM-178/R9H10
GSM		Quad band GSM	Quad band GSM Optional: 2-band UMTS Optional: 5-band UMTS	LTE-M/NB-IoT	LTE-M/NB-IoT
RF				LoRa, BLE	LoRa, BLE
Sensors		Acceleration	Acceleration	Acceleration, pressure	Acceleration, pressure
Battery (Primary or Li-Ion)		Required for transmissions	Optional	Optional	Optional
Electrical connections	Pin 3	GND	TxD4, 3V	TxD4, 3V	TxD4 3V, RS-232 Tx
	Pin 4	Analog In5	Analog In3/In5 + digital Out3 (*)	Analog In3/In5 + digital Out3 (*)	Analog In3/In5
	Pin A	RxD4/TxD4, 3V	RxD4 3V, or analog input 0..1V	RxD4 3V, or analog input 0..1V (*)	RxD4 3V, or analog input 0..1V (*)
	Pin B	Analog In1	Analog In1 + digital Out1	Analog In1 + digital Out1	CAN-H
	Pin C	Not connected	Power output 5V/500mA	Power output 5V/500mA	CAN-H
	Pin D	Digital In2, TxD2 open collector	Analog In2 + Out2, TxD2 open collector	Analog In2 + Out2, TxD2 open collector	Analog In2
Hardware Pulse counter		Combined with In2 (Pin D)	On special request	On special request	On special request
Power down mode		± 100uA	± 12uA	± 12uA	± 12uA

email: Trade@trace.me • URL: www.trace.me

About KCS BV

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

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

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

Disclaimer

KCS BV reserves the right to make changes without further notice to any products herein to improve reliability, function or design. KCS BV does not assume any liability arising out of the application or use of any product or circuit described herein; neither does it convey any license under its patent rights, nor the rights of others.

Kuipershaven 22
3311 AL Dordrecht
The Netherlands

email: Trade@trace.me
URL: www.trace.me