SIO04

High accuracy GNSS/RTK (Real-Time-Kinematik) localization module with Ethernet interface for applications in rail

Features

- GNSS RTK receiver, up to centimeter level accuracy
- GNSS Dead Reckoning optimized for Railway Vehicles
- Correction data via NTRIP service
- Inertial Measurement Unit (IMU) using specific movement model for rail vehicles.
- Odometer Input: Incremental / quadrature (single / differential)
- RS232 Interface for direct connection of speed sensor
- 100 MBit/s Ethernet Interface
- Integrated real time clock battery buffered
- Wide Range PSU 24...110 DC (nom); Ignition
- Remote update capability of firmware
- EN 50155 compliant

Introduction

The GNSS RTK precise positioning module *SIO04* is a member of the LYVE (Localize Your Vehicle) family by Ci4Rail and works as a standalone precise time and position server.

SIO04 has been designed to provide a track precise rail vehicle position for daily operations, shunting movements, vehicle depots, stations, etc. To provide precise positioning, *SIO04* uses sensor fusion to combine GNSS/RTK (Real-Time-Kinematik), NTRIP based correction services, inertial measurement unit (IMU) information various additional speed pulse input signal.

With permanent internet access, the position accuracy is enhanced with correction data from NTRIP correction data services like Sapos or PointPerfect (Ublox). However *SIO04* can also obtain correction data from a local reference station.

The positioning information is transferred to in-vehicle subsystems via an 100 MBit/s Ethernet interface.

SIO04 offers a rail compliant wide range PSU for use in every rail vehicle.

Applications

Applications in rail sector requiring high accuracy positioning and time information, e.g.

- Vehicle asset management
- Depot fleet management
- Track accurate parking position
- ... and further applications where correlation of user data with high precision positioning information increases the data value.

Software

Integrated microcontroller firmware:

- High precision position incl. quality metric information at least 1/sec.
- Integration of specific movement models based on IMU
- Firmware update via USB and Eth
- Remote access to firmware logs

SIO04 is designed to be used in closed networks. Data transfer is not encrypted.

Specifications

Interfaces / Features	S103-SIO04-
Communication Interface	100MBit/s Ethernet via M12 D-Coded (socket); no Auto-MDX/MDIX
Connector for External Antenna	1x SMA connector Active antenna required ((3,3 V +/-5% ; 100 mA) or (5,0 V +/-5% ; 100 mA))
Connector for optional LTE Antenna	1x SMA connector
Positioning Outdoor	Multi-band GNSS/RTK GPS/QZSS (L1C/A L2C); GLONASS (L1OF L2OF); Galileo (E1B/C E5b) ; BeiDou (B1I B2I)
Positioning accuracy	localization values have an accuracy of < 1m for 95% of the reported values
Speed Pulse Signal	Incremental encoder acc. to IEC 16844-2 Quadrature encoder (single ended / differential) Volt. level programmable –10/+10V via M12 5p A-coded (socket)**
RS232	1x RS232 (TX/RX) for direct connector of speed sensor (up to 115,2 kBaud) via M12 5p A-coded (socket)**
	ANT LED— red: Antenna short; yellow: Antenna open; green: Antenna ok FIX LED— red: no fix; yellow: weak fix; green: RTK fix BAT LED– red: low battery; green: battery ok
RTC— Real-Time-Clock	Integrated Realtime-Clock (with less than 10s deviation per week)
Battery Buffer (optional)	Easy removable CR1632 battery cell Buffer of RTC (15 years, on/off 20h/4h)
Software Features	
Firmware update	Via USB, Ethernet
Management	Via HTTPS REST API
Electrical	
Power Supply*	24...110V DC (nom) via M12 4pA-coded (plug)
Ignition*	On State: > 12 V Stby State: < 6 V or open
Power Consumption	Operation typ. < 2 W; (w/o LTE option) Standby State < 0,2 W
Mechanics	
Dimensions (w/o mouting accessories)	Width: 70.6 mm Depth: 80.0 mm Height: 111.5 mm
Weight	0,61 kg
Mounting	DIN Rail, wall mounting or 19” rack mounting (see accessories)
Ingress Protection	IP30

* Power, ignition, share on one M12 connector

** Speed Pulse Inputs, RS232 share on M12 connector

Specifications (2)

Environmental	
Operating Temperature	–40...+70°C (EN 50155:2021 – OT4)
Storage Temperature	–40...+85°C
Humidity	95% (EN 50155:2021)
Altitude	3000 m max. above sea level (EN 50125–1:2014, class AX)
Shock / Vibration	EN 61373:2010; Cat. 1; Class B
EMC	EN 50121–3–2:2016; EMV 06 Class S1
El. Safety	EN 50155:2017; EN 50153:2014+A1:2017; EN 50124–1:2017; EN ISO 13732–1:2008
Useful Life	20 years (EN 50155:2021, class L4)
Certifications	CE / EN 50155

Order Information and Related Article

Article number	Short	Software configuration	Power Supply	Host Inteface	LTE	FW Update
S103-SIO04-	RTK-Positioning Module	ETH	24..110 V DC (nom)	100 Mbit/s Ethernet	n/a	✓ Via ETH

Please contact us for any specific requests.