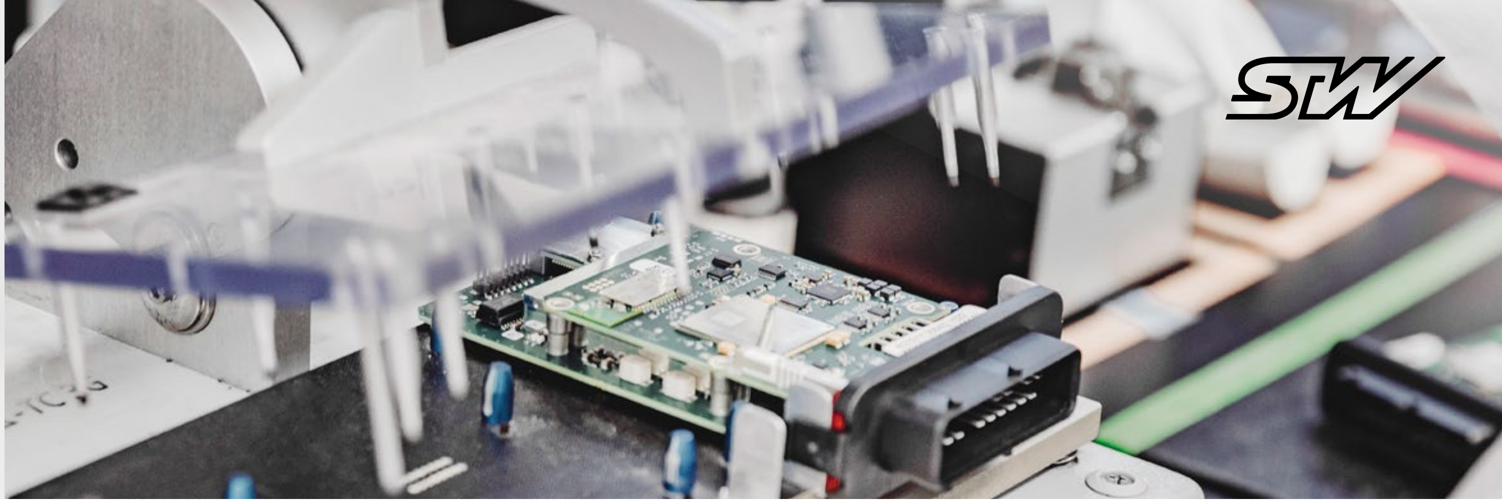


TCG.nano

TCG data management and connectivity modules

KEY FEATURES

- Future-proof cellular connectivity
- Embedded Linux for fast and easy development of applications
- Compatible with major cloud platforms
- Compliance with standards for the automotive, agricultural and construction machinery industries
- CRA ready and RED-DA compliant

TECHNICAL DATA

- i.MX single-/dual-core, 32 GB Flash, 2 GB RAM
- 4G/5G communication
- GPS, Galileo, BeiDou, GLONASS
- WiFi 6 / Bluetooth 5.2
- 2 CAN interfaces
- Single Pair Ethernet 100BASE-T1

ACCESSORIES

- Mating plug
- Breakout cable for development purposes
- Comprehensive tools, software, documentation, and examples

Sensor-Technik Wiedemann GmbH

Am Bärenwald 6
87600 Kaufbeuren
Germany

+49 8341 9505-0
info.stw@wiedemann-group.com
www.stw-mm.com

TECHNICAL DATA

Software data

Type	Features
Operation system	Yocto Linux
Linux kernel version	6.x
Programming language	C/C++, Shell script, other programming languages available on request

System

Type	Features
Power supply	9 … 32 V DC
Dimensions (L x W x H)	174 x 117 x 36 mm
Connector	Molex MX150
Antenna	Internal antenna (standard), external antenna available on request

Processor and memory

Type	Features
Processor	i.MX93 single-core i.MX93 dual-core (optional)
RAM	up to 2 GB
eMMC memory	up to 32 GB
RTC	Real time clock
Security	TPM 2.0

Miscellaneous

Type	Features
Watchdog	Configurable watchdog
Acceleration sensor	3-axis, measuring ranges ±2 g / ±4 g / ±8 g / ±16 g (configurable) System wake-up function (configurable)

Miscellaneous

Type	Features
Inertial Measurement Unit (IMU) (optional, instead of the acceleration sensor)	6-axis IMU (3-axis accelerometer + 3-axis gyroscope) Accelerometer ranges ±4 g / ±8 g / ±16 g / ±32 g (configurable) Gyro range ±125 / ±250 / ±500 / ±1000 / ±2000°/s System wake-up function (configurable)

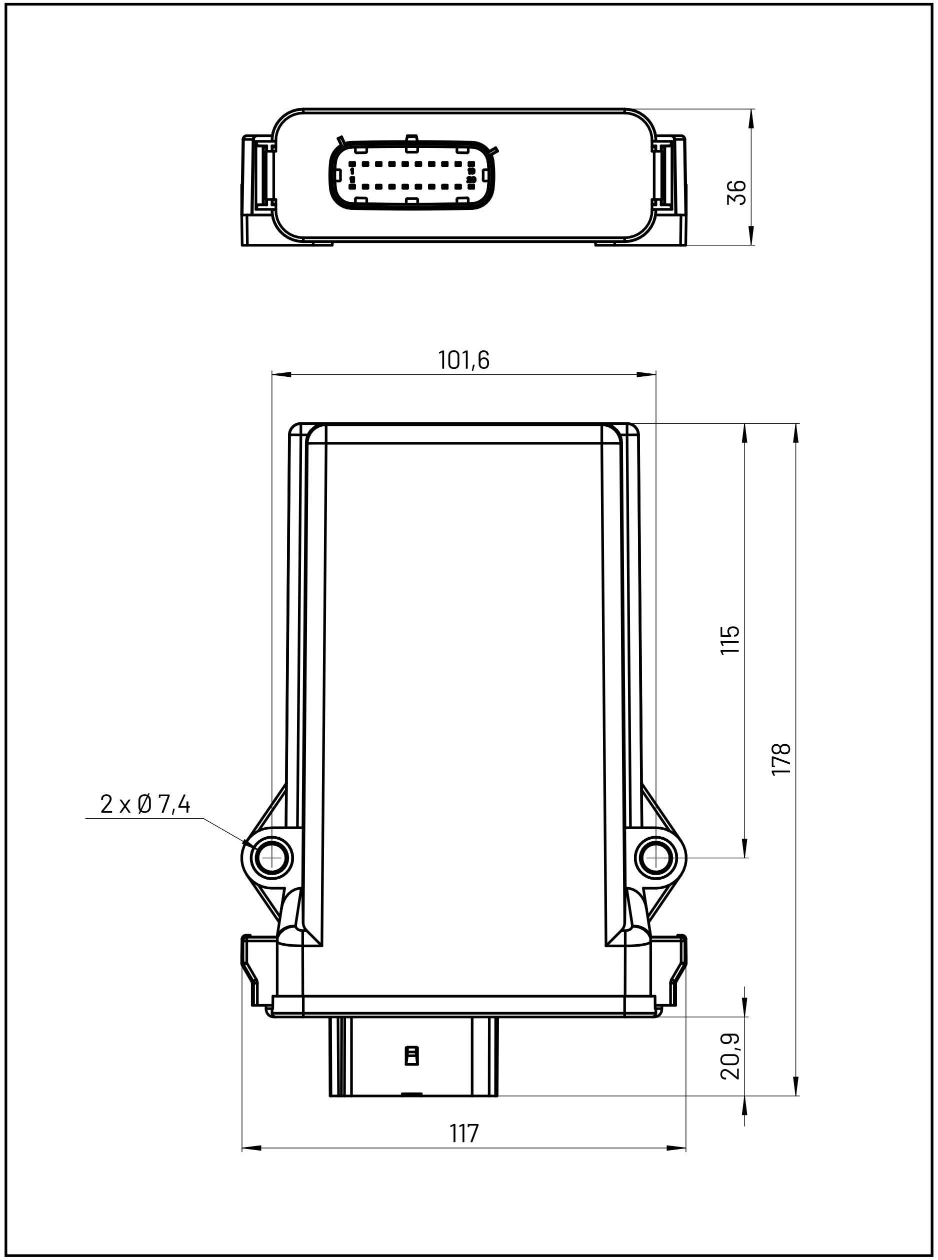
Communication interfaces

Type	Quantity	Configuration
5G/4G modem	1	4G LTE Cat 1bis global modem (optional 5G/4G global modem)
		SIM card MFF2 eSIM
GNSS	1	Standard: Dual-frequency GNSS (L1+L5)
WiFi/Bluetooth	1	WiFi 6
		Bluetooth 5.2
CAN	2	CAN-FD interface (up to 5 Mbit/s), ISOBUS compliant, CAN wake-up (optional)
		CAN-FD interface (up to 5 Mbit/s), ISOBUS compliant, galvanic isolation
Ethernet	1	Single Pair Ethernet 100 BASE-T1
USB	1	USB 2.0

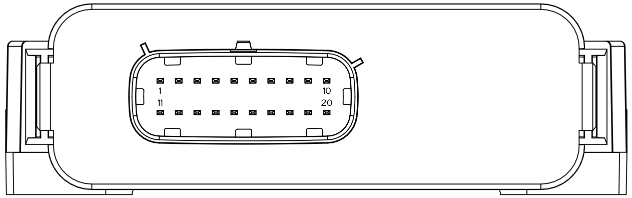
Inputs/outputs

Type	Quantity	Possible configuration
Multifunctional inputs (software-configurable)	2	Analog voltage input (0 … 36 V)
		Current input (0 … 24 mA)
		Digital input
Digital outputs	1	High-side switch, max. 300 mA

TECHNICAL DRAWING



PIN ASSIGMENT



Pin Assigment		Function
Pin	**Signal**	
1	CAN2_H	CAN2 High
2	GND	GND
3	CAN1_H	CAN1 High
4	TRXP_1	100/1000Base-T1
5	TRXN_1	100/1000Base-T1
6	USB_DP	USB D+
7	USB_DN	USB D-
8	MIN1	Multifunction Input 1
9	DOUT1	Digital Output 1
10	BATT -	
11	CAN2_L	CAN2 Low
12	CAN1_L	CAN1 Low
13	USB_V	USB VBUS
14	GND	GND
15	RX1	RS232_1 RxD
16	TX1	RS232_1 TxD
17	BATT -	
18	MIN2	Multifunction Input 2
19	KL15	Ignition Input
20	BATT +	

CYBERSECURITY FEATURES

Security capabilities

Category	**Description**	**Relevant standards / conformity**
Secure Subsystem	Integrated Secure Enclave as hardware Root-of-Trust, isolated security subsystem for cryptography, key management, and attestation	IEC 62443-4-2, ISO/SAE 21434, CRA Art. 10
Secure Boot	Hardware-based chain-of-trust from ROM boot to OS, signed images, eFUSE configuration, anti-rollback mechanism	ETSI EN 303 645 §5.2 / RED-DA Art. 3(3)(d)
Hardware Cryptography	AES, SHA, RSA, ECC accelerators, secure random number generator	FIPS 140-3 (supported with SE050), IEC 62443-4-2
Secure Key Storage	On-chip key storage within EdgeLock Enclave	Common Criteria EAL6+ (SE050), CRA Art. 10(2)
Secure Debug / JTAG	Authenticated or locked debug access, eFUSE locking	ETSI EN 303 645 §5.5
Secure OTA / Update Mechanism	Firmware update signature verification, rollback protection, staged rollout recommended	CRA Art. 10(5), RED-DA Art. 3(3)(e)
Runtime Attestation / Integrity Check	Attestation API via EdgeLock, proof of system integrity during runtime	IEC 62443-4-2 §7.8
SBOM (Bill of Materials)	Available for the complete system	CRA Art. 10(2) & (5)
Vulnerability Disclosure / PSIRT	See homepage: https://www.stw-mobile-machines.com/en/psirt/	ETSI EN 303 645 §5.1 / CRA Art. 11

PLANNED QUALIFICATION

Regulatory body/standard	Description	Remarks
CE conformity	According document can be found in the User Manual	
KBA (Kraftfahrt-Bundesamt)	Compliant with the requirements of UN ECE Regulation No. 10	Suitable for all vehicles with 12 V or 24 V electrical systems (negative ground).
ISO 16750	Road Vehicles – Environmental conditions and electrical testing for electrical and electronic equipment	CODE ISO 16750-C/E-Z(4.2.2)-C-H-D-Z(IP6k6/IP6k7/IP6k9k)
DIN EN 13309	Construction machinery - Electromagnetic compatibility of machines with internal power supply	
ISO 13766	Earth-moving machinery - Electromagnetic compatibility	
DIN EN ISO 14982	Agricultural and forestry machines - Electromagnetic compatibility	Compliance with this standard is only achieved in combination with an external load-dump module. The max. clamping voltage must not exceed 55 V!

PLANNED QUALIFICATION

Environmental qualification

Standard	Test description	Parameter
ISO 20653	IP protection class	IP6Kx, IPx7 IPx6, IPx9K
DIN EN 60068-2-6	Vibration (sinusoidal)	10 Hz to 2 kHz, 1 oct./min., 5 g, 10 cycles, bidirectional
DIN EN 60068-2-27	Shock	50 g, 11 ms, half sinus, 3 shocks/axis
DIN EN 60068-2-27	Bump	30 g, 6 ms, half sinus, 1000 shocks/axis
ISO 16750-4	Tests at constant temperature - high temperature - storage	48 hours at 85 °C
ISO 16750-4	Tests at constant temperature - low temperature - storage	24 hours at -40 °C

Countries with planed certification

Albania	Croatia	Iceland	Malaysia	Slovenia
Andorra	Cyprus	India	Malta	South Africa
Argentina	Czech Republic	Indonesia	Mexico	South Korea
Australia	Denmark	Ireland	Netherlands	Spain
Austria	Estonia	Isle of Man	New Zealand	Sweden
Belgium	Faroe Islands	Israel	Norway	Switzerland
Bosnia and Herzegovina	Finland	Italy	Peru	Taiwan
Brazil	France	Japan	Philippines	Thailand
Bulgaria	French Guiana	Kosovo	Poland	Turkey
Canada	Germany	Latvia	Portugal	United Arab Emirates
Canary Islands	Gibraltar	Liechtenstein	Romania	United Kingdom
Chile	Greece	Lithuania	Saudi Arabia	USA
Colombia	Greenland	Luxembourg	Singapore	Vietnam
Costa Rica	Hungary	Madeira	Slovakia	