

TC3G

TCG data modules

KEY FEATURES

- Embedded Linux for fast and easy development of applications
- WiFi, Bluetooth, cellular communication and GNSS functionality
- Compatible with STWs cloud solutions and all other common cloud platforms
- CAN and Ethernet interface for monitoring machine data
- Compliance with standards for the automotive, agricultural and construction machinery industries

TECHNICAL DATA

- MPC5200B @400 MHz 1GB Flash / 128 MB RAM
- 3G/2G communication
- GPS / GLONASS
- WiFi 2.4/5 GHz / Bluetooth 2.1
- 2 CAN interfaces
- Ethernet 10/100-Base-T

ACCESSORIES

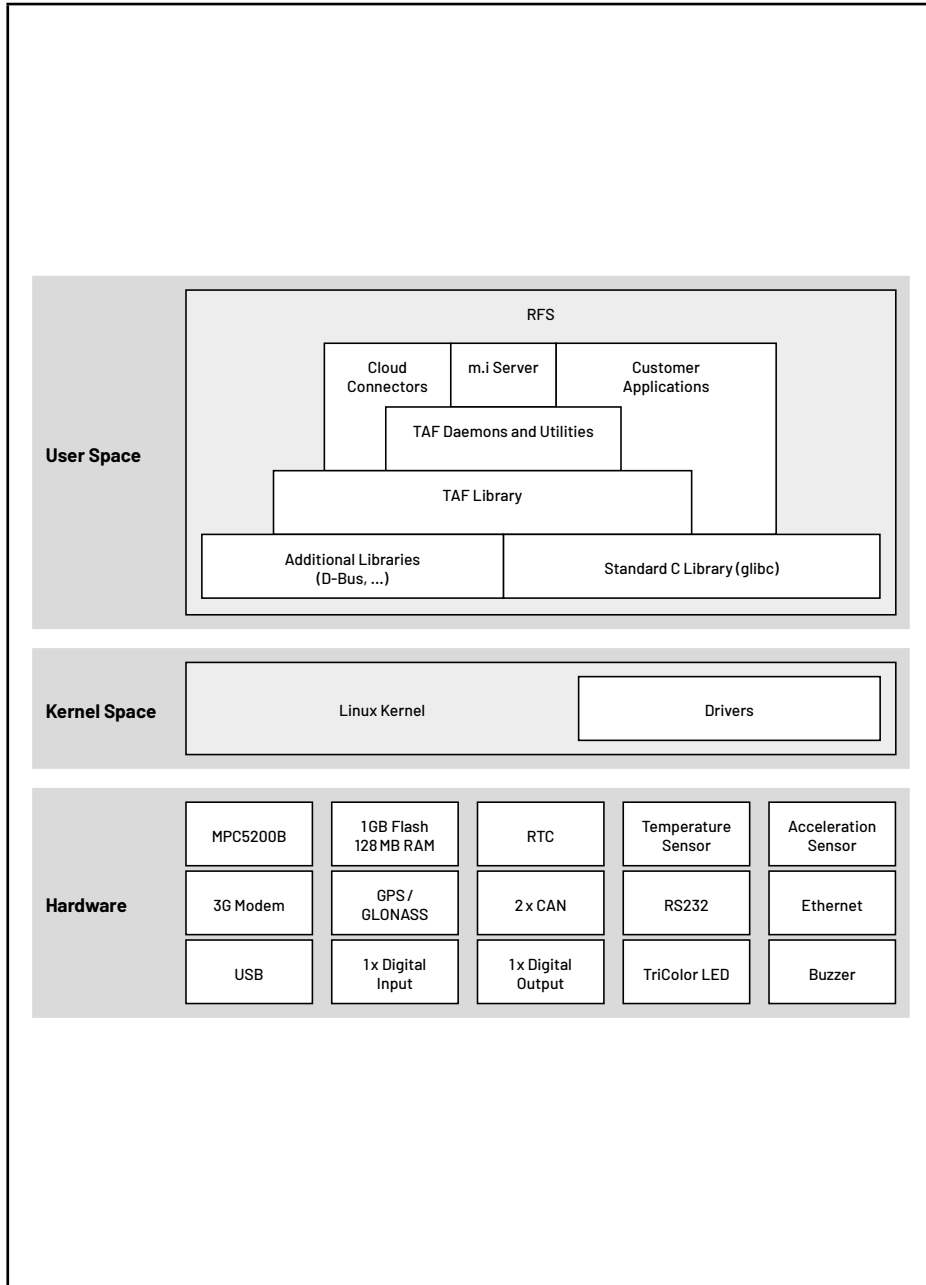
- Mating connector set
- Development box with power supply
- Breakout cable for development purposes
- Antennas for wireless communication interfaces
- Software toolchain under stw-digitalization.com pw: connectivity

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SYSTEM ARCHITECTURE

VARIANTS



TC3Gi

Internal antennas .

TC3Ge

External SMA connectors for Wi-Fi, cellular and GNSS, optional CDMA

TECHNICAL DATA

Software Data

Type	Features
Operation System	Embedded Linux
Buildroot Version	2011.02
Linux Kernel Version	3.10
Programming Language	C/C++, Shell script, Other programming languages available on request
Teleservice Application Framework	A set of daemons and utilities providing connectivity and telematics functionality

Development Package

Type	Features
Documentation	Contains all necessary user documentation and help files for product usage.
Tools	Contains all of STW's tools.
Libraries	Contains STW's library frameworks, which provide beneficial functionality for faster development.
Toolchain	Contains the GCC Linaro Toolchain that allows users to build own application within Linux and Windows.
OPKG Packages	Contains all of STW provided OPK packages. Possibility of individual updates.
Board Support Package	Contains all components, which are necessary to boot up the system. Included components are the bootloader u-boot, the Linux kernel, the device tree for hardware abstraction and the root file system.
BSP Updater	Contains mechanism for updating the board support package (BSP) of the device under Linux and Windows.

System

Type	Features
Power supply	9 ... 32 V DC
Current consumption	350 mA at 12 V
Operating temperature range	Operating: -30 °C ... +60 °C (-22 °F ... +140 °F) housing temperature
Dimensions	Internal antennas: ca. 134 mm x 117 mm x 36 mm (5.28" x 4.61" x 1.42")
External antennas: ca. 183 mm x 117 mm x 36 mm (7.21" x 4.61" x 1.42")	A set of daemons and utilities providing connectivity and telematics functionality
Connectors	19 pin cable suited plugs (Tyco / AMP) SMA plugs for 1 x WiFi or 1 x 2G/3G and 1 x GNSS, optional CDMA

Processor and Memory

Type	Features
Processor	32 bit controller, MPC5200B 400 MHz
RAM	128 MByte
EEPROM	8 kByte
NAND-Flash	1GByte
NOR-Flash	64 MByte
RTC	Gold cap buffered with wakeup function

Miscellaneous

Type	Features
Temperature sensor	Built-in
Acceleration sensor	Wakeup function

TECHNICAL DATA

Communication Interfaces

Type	Quantity	Configuration
3G / 2G Modem	1	Five-Band 3G - HSPA+ , Quad-Band 2G - GPRS/ EDGE
GPS & GLONASS	1	GLONASS & GPS simultaneously, 1 ... 10 Hz update rate, 33 tracking channels, SBAS (WAAS, EGNOS, MSAS, GAGAN, QZSS) support of improved location accuracy
Wi-Fi / Bluetooth	1	IEEE802.11 a/b/g/n, 2.4 & 5 GHz, Access Point and infrastructural mode Bluetooth V2.1+EDR, BLE (Bluetooth Low Energy), Power Class 1.5
CAN	2	CAN 2.0B (11 bit and 29 bit Identifier), Low- / High-Speed up to 1Mbit/s
RS232	1	Serial interface with programmable baud rate
Ethernet	1	IEEE 802.3, 10 / 100 Mbit/s
USB	1	USB 1.0

Antennas

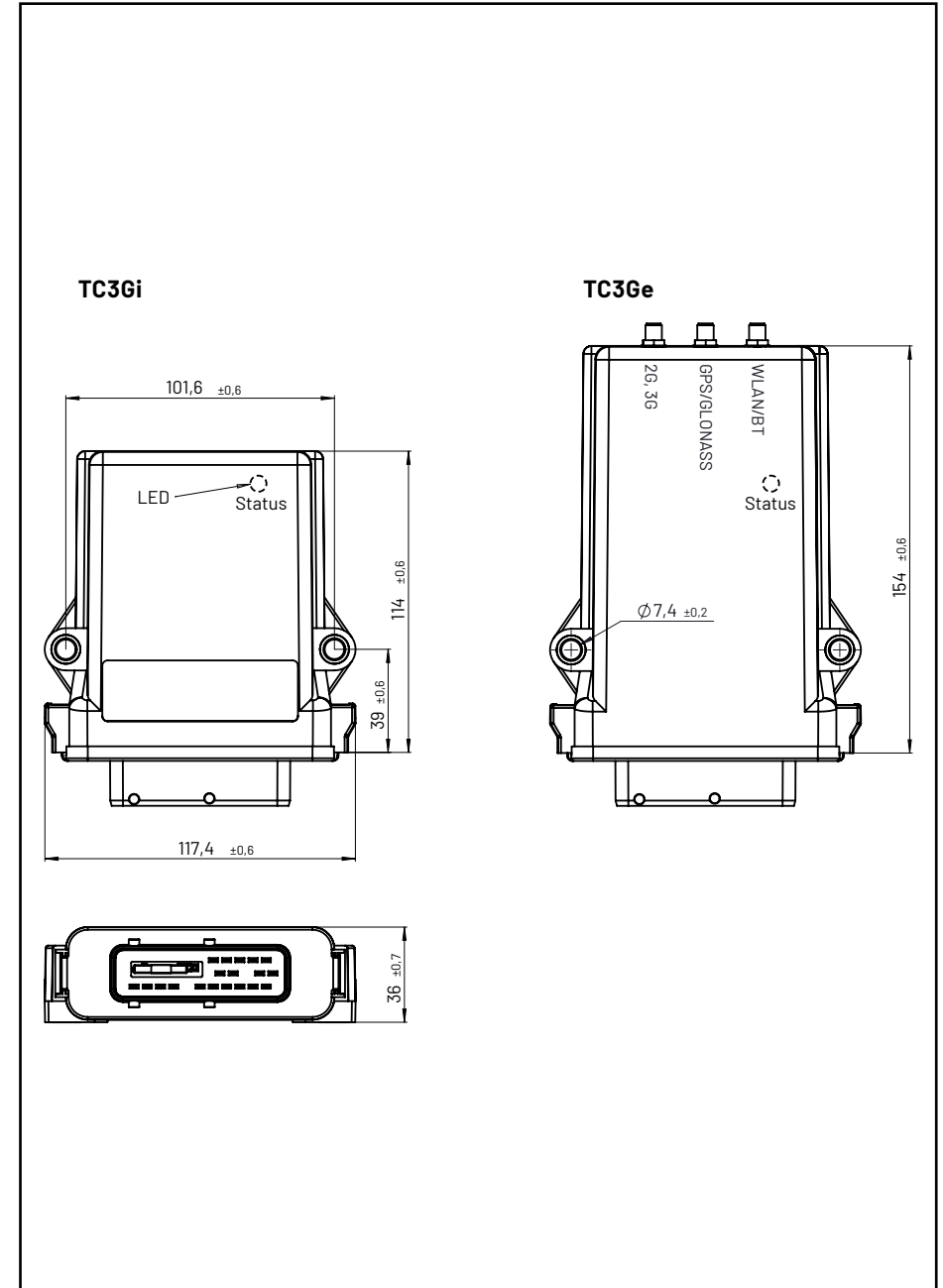
Type

Internal or external antenna (SMA connector, female)

In- / Outputs

Type	Quantity
Digital Input	1
Digital Output	1

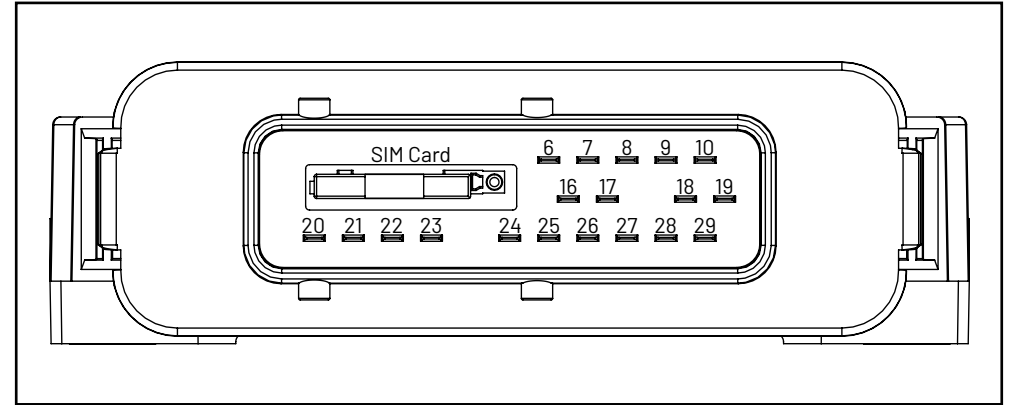
TECHNICAL DRAWING



PIN ASSIGNMENT TC3G

Pin assignment sorted by pin numbers

Pin	Description
6	USB Ground
7	Digital Output (int. 10 kOhm pull down, max. 400[mA] @ 12 V)
8	+UB Power supply (9-32 VDC)
9	GND (shield USB & WLAN)
10	KL15 / D+ (switched power / ignition switch)
16	USB 5V (power supply USB devices)
17	Digital Input (int. 10 kOhm pull down)
18	RS232 RxD (connect to PC - SUB-D Pin3)
19	RS232 TxD (connect to PC - SUB-D Pin2)
20	CAN1 low (termination required)
21	CAN1 high (termination required)
22	CAN2 low (termination required)
23	CAN2 high (termination required)
24	USB D-
25	USB D+
26	Ethernet Rx- (equals a PCs RJ45 - Pin 6)
27	Ethernet Rx+ (equals a PCs RJ45 - Pin 3)
28	Ethernet Tx- (equals a PCs RJ45 - Pin 2)
29	Ethernet Tx+ (equals a PCs RJ45 - Pin 1)
remaining pins	N/A



QUALIFICATION

Norm	Description
	Conformity
EMC corresponds 2004/104/EG; 2009/19/EG ff.	
DIN EN 62311	Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz) AT&T Approval PTCRB Certified

DETAILED QUALIFICATIONS

EMC industrial (CE)

Emission standard for residential, commercial and light -industrial environments	DIN EN 61000-6-3
Immunity for industrial environments -Electrostatic discharge immunity test	DIN EN 61000-6-2
Immunity for industrial environments -Radiated, radio-frequency, electromagnetic field immunity test	DIN EN 61000-6-2
Immunity for industrial environments -Immunity to conducted disturbances, induced by radio-frequency fields	DIN EN 61000-6-2

EMC automotive

Radiated emissions from components - ALSE method (emissions antenna) 150 kHz to 3 GHz, 1m, 120 kHz bandwidth	2006/28/EG (CISPR25, DIN EN 55025)
Radiated immunity Stripline: 10 kHz-400 MHz, 200 V/m, 80 % AM Antenna, ALSE: 200 MHz - 3 GHz, 200 V/m, PM	2006/28/EG (ISO 11452-5/-2)
Voltage transient emissions test	ISO 7637-2
Electrical transient conduction along supply lines only Pulse 1(12 V): 100 V, 5000 pulses, 10 Ω Pulse 1(24 V): - 600 V, 5000 pulses, 50 Ω Pulse 2a (12 V + 24 V): + 50 V, 5000 pulses, 2 Ω Pulse 2b (12 V): + 10 V, 10 pulses Pulse 2b (24 V): + 20 V, 10 pulses Pulse 3a (12V + 24 V): -200 V, 1 hour Pulse 3b (12 V + 24 V): + 200 V, 1 hour Pulse 4 (12 V): -7 V, 2 pulses Pulse 4 (24 V): - 16 V, 2 pulses Pulse 5b (24 V): US* 23 V, td 200 ms, 4 Ω	ISO 7637-2
Test pulse generator -Fast transient test pulses a and b 24 V, Level IV, 60 minutes pulse a: - 80 V pulse b: + 80 V	ISO 7637-3

DETAILED QUALIFICATIONS

EMC automotive

ESD-Component immunity test method (powered-up test)	ISO 10605
ESD-Packaging and handling (unpowered test)	ISO 10605

Electrical tests

Safety of machinery - Electrical equipment of machines - Part 1: General requirements	DIN EN 60204-1
Supply voltage Operation at minimum and maximum supply voltage (9-32)V Duration: 60 minutes	STW Company Standard
overvoltage / Undervoltage Operation at 32.96V and 5.53V (maximum 3% above maximum supply voltage and below minimum supply voltage)	STW Company Standard
Cable breakage supply lines Disconnect each single supply line at minimum supply voltage and maximum supply voltage	STW Company Standard
Short circuit strength of signal and communication lines Short circuit test of each type of Input and Output against GND and UB at minimum supply voltage and maximum supply voltage. Short circuit test of PWM outputs and digital outputs to low resistance loads against GND.	STW Company Standard
Polarity protection Interchanged battery terminals	STW Company Standard
Current consumption Current consumption without D+ (9V UB): 1.42 mA Current consumption without D+ (16V UB): 1.77 mA Current consumption without D+ (32V UB): 2.56 mA Current consumption with D+ (9V UB): 361 mA Current consumption with D+ (16V UB): 209 mA Current consumption with D+ (32V UB): 126 mA	STW Company Standard

Electrical tests

Data retention Non-volatile memory keep data when supply voltage is disconnected NOR-Flash: 20 years NAND-Flash: 10 years	STW Company Standard
Load test Operate 48 hours at minimum temperature with minimum voltage and maximum current. (-40 °C / -40 °F, 9 V, 350 mA) Afterwards operate 48 hours at maximum temperature with maximum voltage and maximum current. (+70 °C / 158 °F, 32 V, 350 mA)	STW Company Standard
Direct current supply voltage	ISO 16750-2
Overvoltage -Systems with 12 V / 24 V nominal voltage	ISO 16750-2
Superimposed alternating voltage	ISO 16750-2
Slow decrease and increase of supply Voltage	ISO 16750-2
Discontinuities in supply voltage - Momentary drop in supply voltage	ISO 16750-2
Discontinuities in supply voltage - Reset behavior at voltage drop	ISO 16750-2
Discontinuities in supply voltage - Starting profile	ISO 16750-2
Discontinuities in supply voltage - Load Dump	ISO 16750-2
Reversed voltage	ISO 16750-2
Open circuit tests - Single line interruption	ISO 16750-2
Open circuit tests - Multiple line interruption	ISO 16750-2
Short circuit protection -signal circuits	ISO 16750-2
Short circuit protection -load circuits	ISO 16750-2
Withstand voltage	ISO 16750-2
Insulation resistance	ISO 16750-2

DETAILED QUALIFICATIONS

Climatic and mechanical tests

Free fall	ISO 16750-3
Vibration (sinusoidal)	DIN EN 60068-2-6
Shock, Bump	DIN EN 60068-2-27
Tests at constant temperature - low temperature - storage 24 hours at -40 °C / -40 °F	ISO 16750-4
Tests at constant temperature - low temperature - operation 24 hours at -40 °C / -40 °F	ISO 16750-4
Tests at constant temperature - high temperature - storage	ISO 16750-4
Tests at constant temperature -high temperature - storage 48 hours at 85 °C / 185 °F	ISO 16750-4
Tests at constant temperature -high temperature - operation 96 hours at 70 °C / 158 °F	ISO 16750-4
Temperature step test	ISO 16750-4
Temperature cycling test	ISO 16750-4 IEC 60068-2-14, Test Nb
Temperature cycling test - rapid change of temperature	ISO 16750-4 IEC 60068-2-14, Test Na
Salt spray tests -corrosion test	ISO 16750-4 IEC 60068-2-52, Test Kb
Humid heat, cyclic test - Test 2: Composite temperature / humidity cyclic test	ISO 16750- IEC 60068-2-38, Test Z/ AD
Damp heat, steady-state test	ISO 16750-4 IEC 60068-2-78
Corrosion test with flow of mixed gas	ISO 16750-4 IEC 60068-2-60, Test Ke, method 4
IP-Codes IP6x, IPx7, IPx9k	IEC 60529

Climatic and mechanical tests

Chemical loads	ISO 16750-5
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