

## AT210 Vehicle Tracking Device

Version 5.x Hardware

### User Guide



Document Version:	3.0
Device Version:	5.0+
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# Abbreviations

ADC	Analogue to Digital Converter
ASCII	American Standard Code for Information Interchange (computer character set)
BLE	Bluetooth Low Energy
CAN	Controller Area Network
DC	Direct Current
FET	Field Effect Transistor
GIS	Geographic Information System
GNSS	Global Navigation Satellite System
GPRS	General Packet Radio Service (part of GSM)
GNSS	Global Positioning System
GSM	Global System for Mobile communication
IP	Internet Protocol (part of TCP/IP)
LED	Light Emitting Diode
MEMS	Micro Electro-Mechanical System
NMEA	National Marine Electronics Association (defined a GNSS output format)
OTA	Over the Air (remote configuration of devices)
PC	Personal Computer
PCB	Printed Circuit Board
PDU	Protocol Description Unit (describes a binary SMS format)
RFID	Radio Frequency Identification
SIM	Subscriber Identity Module
SMS	Short Message Service
SMSC	Short Message Service Centre
SV	Satellite Vehicle
TCP	Transmission Control Protocol (part of TCP/IP)
UDP	User Datagram Protocol
WGS84	World Geodetic System 1984 (global co-ordinate system used by GNSS)

# Product Overview

The AT210 is simple vehicle tracking device, housed in a sturdy plastic enclosure, sealed to IP67 specifications and designed for plant & machinery applications. Both GNSS and GSM antennas are internal, with the option to use an external GNSS antenna when the device cannot be mounted in a location with good sky visibility. The AT210 incorporates the very latest technology, including a Cortex M3 ARM processor, Quectel M66 Quad Band GSM/GPRS modem and ublox EVA-M8M GNSS with support for GPS, GLONASS, GALILEO and Beidou. The AT210 operates from an external DC voltage source and has a 510mAh internal back-up battery, which allows operation for approx. 5 hours in continuous mode. Interconnections are made with a single 9-way DSUB connector which provides IP67 sealing when mated.

## Features

The main features of the AT210 are highlighted below:

- Compact size (approximately cigarette box dimensions)
- IP67 sealing
- Cortex M3 ARM Processor
- ublox EVA-M8M GNSS
- Quectel M66 QUAD band GSM/GPRS/Bluetooth modem
- Internal GSM antenna, ceramic PIFA type
- Internal GNSS antenna, 25mm ceramic patch (optional external antenna)
- Low power consumption (near zero current drain when vehicle ignition is off)
- 3 axis accelerometer (2/8g)
- 2 digital inputs
- 2 digital outputs
- RS232 Port
- Internal back-up battery, lithium, 450mAh
- Configuration by RS232, SMS or TCP/UDP
- Fast and reliable over the air firmware update
- Modular communications protocol X
- TCP or UDP mode
- Non-volatile storage for 2000 reports
- Pass through data mode
- SDK available for rapid development of client customised applications
- Approved to: CE, 2004/104/EC

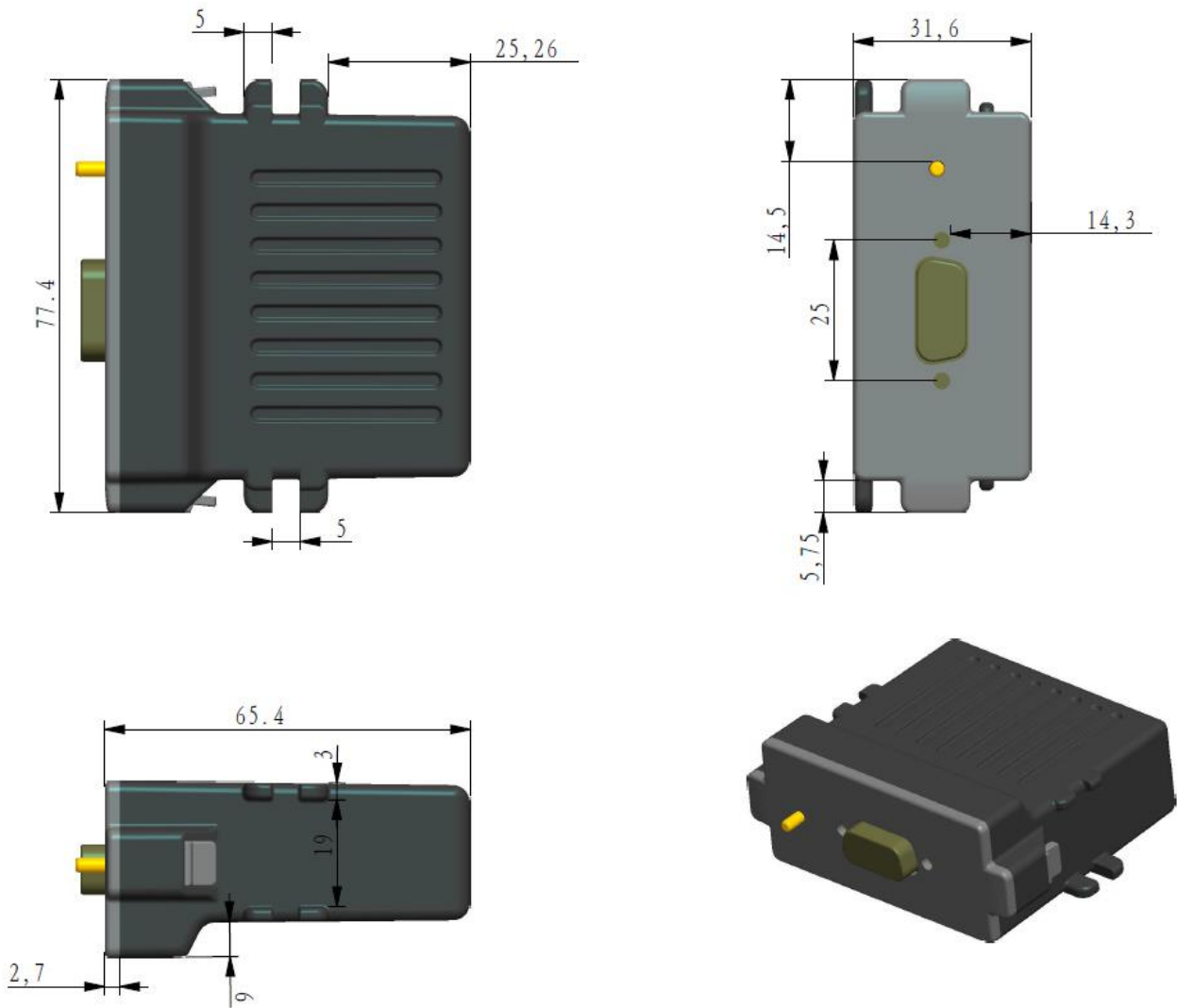
# Technical Specifications<sup>1</sup>

<b>E-GSM/GPRS Modem:</b>	2 Watts (E-GSM900 and GSM850 Class 4) 1 Watt (GSM1800 and GSM1900 Class 1) GPRS multi-slot class 10
<b>GSM up-link (TX): Frequencies</b>	824 – 849 MHz, 880 – 915 MHz, 1710 - 1785 MHz, 1850 – 1910 MHz
<b>GSM down-link (RX): Frequencies</b>	869 – 894 MHz, 925 - 960 MHz, 1805 - 1880 MHz, 1930 - 1990 MHz
<b>GNSS Receiver:</b>	ublox EVA-M8M GPS, GLONASS, GALILEO & BeiDou
L1 receiver:	72 channels
Position accuracy:	< 2.5m CEP
Receiver sensitivity:	-160dBm (tracking)
TTFF: Cold start	26 sec
Hot start	1 sec
<b>Input voltage:</b>	6 – 36 volts DC
<b>Input Protection:</b>	Reverse polarity, overvoltage
<b>Internal Battery:</b>	3.7V, 510mAh, lithium-polymer
<b>Battery Life:</b>	5 hours continuous operation 4 days operation in low-power mode
<b>Data transfer modes:</b>	GPRS (TCP/UDP)
<b>Inputs/outputs:</b>	2 digital inputs 2 digital outputs (low side MOSFET switch) RS232 serial port iButton input
<b>Driver ID:</b>	iButton
<b>Current consumption:</b>	25mA @ 13.8 VDC (typical) < 4mA (sleep mode - without battery) < 50uA (sleep mode - battery fitted)
<b>Dimensions:</b>	77 x 71 x 32 mm
<b>Weight:</b>	140g (with battery)
<b>Ingress Protection:</b>	IP67 according to DIN VDE 0470 Part 1 / EN 60 529 / IEC 529
<b>Temperature:</b>	
<b>Operating</b>	-20 to +60°C
<b>Storage</b>	-40 to +85°C
<b>Connector:</b>	DB9 (IP67)
<b>Mating Cable Assembly:</b>	LTW SDB-09AFFM-SL7A0.4
<b>Product Approvals:</b>	CE, 2004/104/EC

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<sup>1</sup>Specifications may change without notice.

# Hardware Description



## Overall Dimensions

77 x 71 x 32 mm

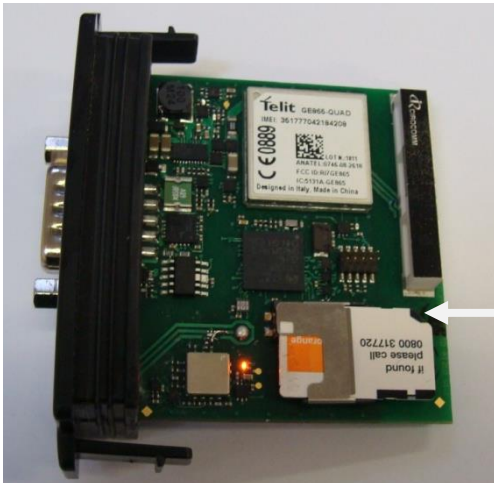
## Back-up battery

Each AT210 is supplied with a 510mAh back-up battery, which is fixed to the PCB and connected as shown below:



## SIM installation

Note that the AT210 powers up when the SIM is fitted



Notched corner here

## Basic electrical connections

A permanent connection to +12V/+24V vehicle power should be provided to the AT210 using the RED and BLACK wires, via a 1A fuse. If using a wired ignition-sense, connect this to digital input 1, again we recommend the use of a 1A fuse:

- i. RED            +12 / +24V 1A FUSED
- ii. BLACK        GROUND     1A FUSED
- iii. WHITE       IGNITION    1A FUSED

All unused wires should be insulated to avoid undesired behaviour.

For a full table of AT210 connections please see page 8.

## Power requirements

The AT210 operates from a DC Voltage between 6 and 36 Volts. We recommend that a permanent 'live' power source is used to supply the AT210. If current drain is of concern, please see the power-down option of the \$IGNM command, which can be used to minimise battery drain when vehicles may be stationary for long periods.

## External GNSS antenna (optional)

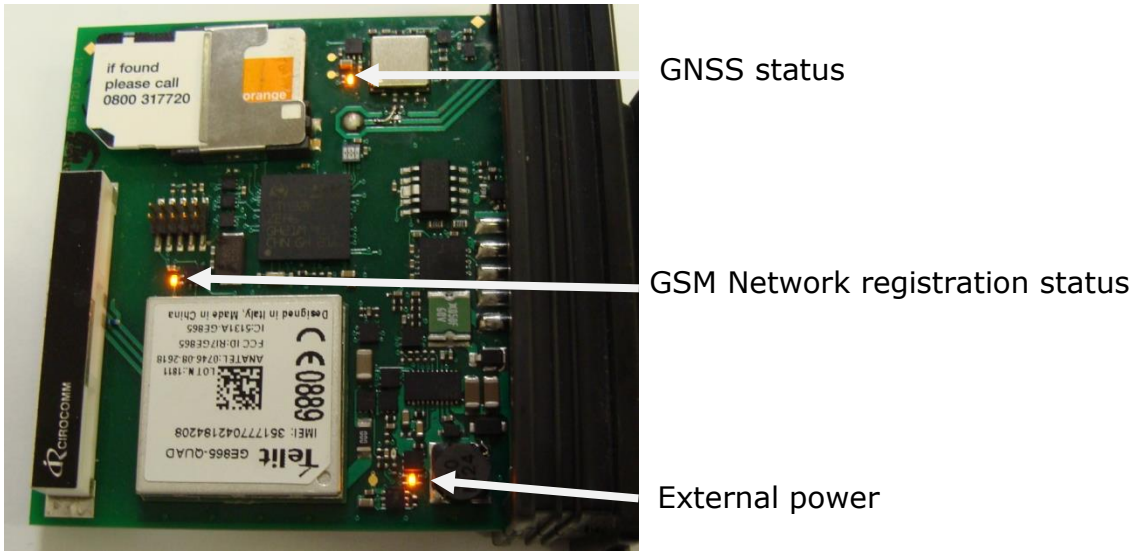
The AT210 has an internal GNSS antenna, so an external antenna is not required in most cases, but if the device is mounted in a location with poor sky visibility, an external antenna can be used. If this is required, remove the cover from the GNSS antenna connector (adjacent to the DB9) and plug in the AE004 GNSS active patch antenna.



External GNSS antenna connection

## Status LEDs

The AT210 has internal status LEDs as below:



During normal operation the LEDs should appear as below:

GNSS	double flash once per second
GSM	single flash every 2 seconds
POWER	stays on constantly

## Enclosure Sealing



When fitting the enclosure cover, please ensure that both clips are snapped into place to guarantee IP67 sealing. Note that the GNSS antenna faces the top of the enclosure (with the slots). Ensure that the PCB is aligned with the guide slots inside the enclosure and carefully push in until the clips are fully engaged.

## Mounting



The AT210 can be secured to a flat surface with double sided foam adhesive tape, screwed in place using the two mounting lugs or secured with a single tie wrap (up to 5mm width).

## Interconnections

All connections to the AT210 are provided by a single DB9 cable assembly.

### AT210 Pin Applications and Colour Code

Pin	Function	Wire colour
1	VIN 7 - 36 VDC	red
2	RS232-TX1	green
3	RS232-RX1	blue
4	DIG-OUT1	yellow
5	GND	black
6	DIG-OUT2	pink
7	DIG-IN1	white
8	DIG-IN2	brown
9	IBUTTON	grey

### Digital Inputs

Digital inputs 1 and 2 are normally-low and can be connected directly to 12/24V vehicle circuits (i.e. power take off).

### Digital Outputs

The AT210 is capable of switching two external loads of up to 30V, 0.5A using MOSFET low side switches, which must be used to switch the GND side of the load. The use of a 1A in-line fuse with these switches is essential to prevent any damage through fault scenarios.

### Integrated Accelerometer

The AT210 has a built in 3 axis MEMS accelerometer that operates in the range  $\pm 2g$  and is used to measure driver behaviour (acceleration and braking) during normal driving conditions.

The accelerometer also allows the AT210 to wake from sleep on movement, with configurable thresholds. Please refer to the \$MEMS parameter for more details.

### iButton (Dallas Key) Interface

This can be used to read iButton devices for the purpose of Driver Identification. See the Driver ID Application Note for more details of how to use this feature.

### Configuration

The AT210 shares a common set of configuration commands with our other devices. Please refer to our Generic Device Configuration Reference for details.



# Electrical Parameters

## Operating Conditions

Parameter	Min	Max	Units
Power Supply Input Voltage	+6	+36	V
Digital Input High Voltage Threshold	+5.0	-	V
Digital Input Low Voltage Threshold	-	+2.0	V
Digital Maximum Voltage	-	+30.0	V
Digital Maximum Current	-	0.5	A

## Absolute Maximum Ratings

Parameter	Min	Max	Units
Power Supply Input Voltage	-32	+38	V
Voltage on RS232 RX	-25	+25	V
Voltage on RS232 TX	-13	+13	V
Voltage on iButton/Dallas Interface	-5	+5	V
Current sunk by MOSFET low side switches		500	mA
Voltage rating of MOSFET switches	-	+30.0	V
Storage Temperature	-40	+85	°C
Operating Temperature (without battery)	-20	+60	°C
Operating Temperature (with battery)	0	45	°C

## Typical Power Consumption

Operating Mode	Current @ 13.8V	Current @ 27.6V	Power Consumption
Fully Operational	25mA	14mA	< 400mW
Battery charging	500mA	275mA	< 7W
Sleep (no battery)	0.5mA	0.3mA	7mW
Sleep (with battery)	< 10uA	< 10uA	0.1mW

## Environmental Specifications

Parameter	Specification
Storage temperature	-40 to +85 °C
Operating temperature (no battery)	-20 to +60 °C
Operating temperature (with battery)	0 to +45 °C (note: no charging below 0°C)
Ingress Protection	IP67 (dustproof and waterproof to 1m*)
Vibration, broadband random	Complies with IEC60068-2-64
Shock	Complies with IEC60068-2-64
Humidity	Complies with IEC60068-2-64

\* Conditions as per DIN VDE 0470 PART 1 / EN 60 529 / IEC 529