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AT300 GSM / LTE Cat 1 – GNSS Plant & Machinery Tracking Device

User Guide

Document Version:	1.0
Device Hardware Version:	1.2
Date:	January 2026

Abbreviations

ADC   Analogue to Digital Converter
ASCII   American Standard Code for Information Interchange (computer character set)
BLE   Bluetooth Low Energy
BT   Bluetooth
CAN   Controller Area Network
DC   Direct Current
FET   Field Effect Transistor
GNSS   Global Navigation Satellite System
GPRS   General Packet Radio Service (part of GSM)
GPS   Global Positioning System
GSM   Global System for Mobile communication
IP   Internet Protocol (part of TCP/IP)
LED   Light Emitting Diode
LPWAN   Low-Power Wide Area Network
LTE   Long-Term Evolution (wireless mobile communication standard)
MEMS   Micro Electro-Mechanical System
NMEA   National Marine Electronics Association (defined a GPS 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
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 GPS)

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Product Overview

The AT300 is a waterproof tracking device, designed and intended for plant & machinery applications, but with features to suit many others. The device is housed in a compact PC + GF enclosure, with IP68 ingress protection. Mobile network communications are LTE Cat 1 (full 4G) with 2G fallback, with frequency bands optimised for Europe and Asia regions. GNSS supports all the important constellations, including GPS, GLONASS, GALILEO and BeiBou. Antennas are internal, with the option to use an external GNSS antenna (via sealed FAKRA connector) in case the device location is not optimum for good GNSS signal visibility. The AT300 operates from an external DC voltage source up to 90V DC, and has a 900mAh internal back-up battery, allowing approx. 15 hours in continuous mode operation, or 50 days in low-power mode (daily update). Interconnections are made with a single 14-way connector.

Features

The main features of the AT300 are highlighted below:

- Compact size
- Cortex M4 ARM Processor
- ICOE CS101 GNSS
- Quectel EG915N-EA LTE Cat 1 / GSM communications
- Internal LTE antennas - PIFA ceramic, high-sensitivity
- Internal GNSS antenna, 15mm ceramic patch
- External GNSS via FAKRA connector
- Low power consumption (near zero current drain when vehicle ignition is off)
- 3 axis accelerometer (2/8g)
- Optional 6 axis IMU accelerometer / gyro
- CANBus
- 2 digital inputs
- 2 digital outputs
- RS232 Port
- Internal back-up battery, lithium-polymer, 900mAh
- 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
- SDK available for rapid development of client customised applications
- Approved to: EC Reg 10 & UKCA

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Technical Specifications

Communications Module:	Quectel EG915N–EA
LTE Cat 1 Frequency Bands:	B1/B3/B5/B7/B8/B20/B28/B38/B40/B41
GSM Frequency Bands:	B3/B8
LTE / GSM Antenna:	Internal PIFA ceramic
Data Transfer Modes:	TCP or UDP
SIM:	dual SIM, MFF2 chip SIM + plastic 4FF nanoSIM

GNSS Location

GNSS Antenna:	Internal 15 x 15 x 4mm ceramic patch
GNSS Receiver:	ICOE CS101
L1/B1 Receiver:	GPS L1 C/A: 1574.397–1576.443 MHz
	GLONASS L1: 1597.781–1605.656 MHz
	BeiDou B1 C/A: 1559.052–1563.144 MHz
Position Accuracy:	< 2.5m CEP @ –130dBm
Receiver Sensitivity:	–149dBm (GPS + GLONASS, acqusition)
	–165dBm (GPS + GLONASS, tracking & navigation)
TTFF: Cold start	26 sec (average) @ –130 dBm
Hot start	1 s (average) @ –130 dBm

BLE

Version:	4.2
Antenna:	Internal

Power

External Voltage Source:	5 – 90 VDC
Internal Battery:	3.7V, 900mAh
Battery Life:	15 hours continuous operation
	18 days operation in low–power mode @ 1 hour reporting
	50 days operation in low–power mode @ 1 day reporting
Current Consumption, max:	300mA @ 13.8 VDC (battery charging at max. rate)
Current consumption, average:	25mA @ 13.8 VDC (typical)
Current consumption, sleep:	< 100uA

Features

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Configuration:	Astra Generic Configuration commands over SMS / TCP / RS232
Firmware update:	Supports Firmware Update Over–The–Air (FOTA)
Memory:	Total 1024k on–board non–volatile flash memory
Report storage:	6000 reports
Communication Protocol:	Astra Telematics Modular Protocol X via TCP / UDP sockets

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Interconnections

	2 digital pull–up inputs
	2 digital outputs, 60V, 0.5A maximum, open drain (optional 3.3V drive)
	1–wire (dallas)
	CANBus / FMS 2.0 / OBD2
	1 RS232 serial port (TTL levels optional)
POWER & DATA:	Amphenol MicroSpaceXS 14–way

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Weight	115g
Dimensions	90 x 80 x 22 mm

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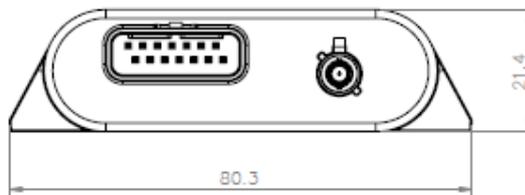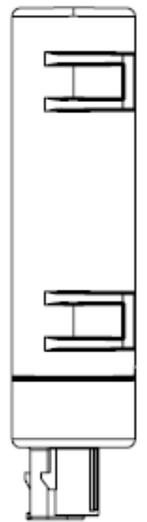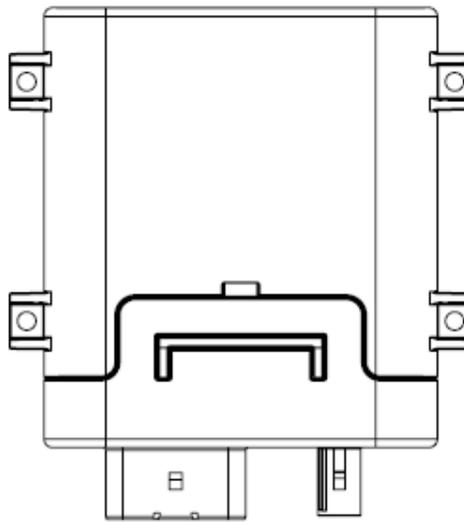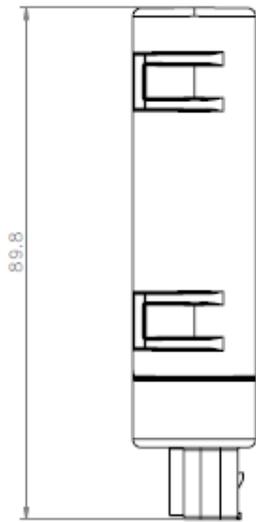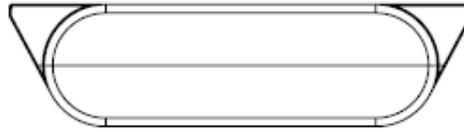
Hardware Description

Back-up battery
Each AT300 is supplied with a 900mAh internal lithium-polymer back-up battery.

Basic electrical connections
A permanent connection to +12V/+24V vehicle power should be provided to the AT300 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:

RED	+12 / +24V	1A FUSED
BLACK	GROUND	1A FUSED
WHITE	IGNITION	1A FUSED

All unused wires should be insulated to avoid undesired behaviour.

For a full table of AT300 connections please see page 7.

Power requirements
The AT300 operates from a DC Voltage between 6 and 90 Volts (95V absolute maximum). We recommend that a permanent 'live' power source is used to supply the AT300. If current drain is of concern, please refer to the power down options which can be specified with the IGNM command.

SIM installation
A 4FF plastic nanoSIM should be inserted as shown below. Note that the AT300 powers up when the SIM is inserted.
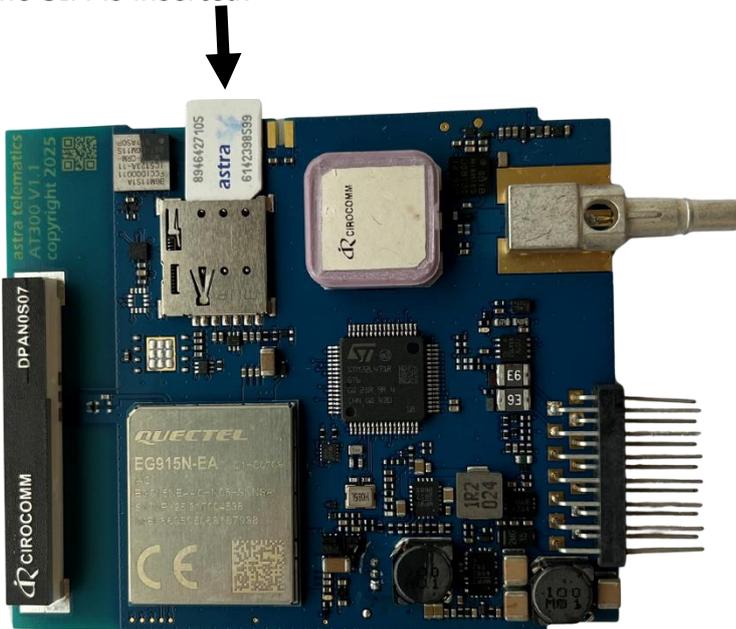
Status LEDs

GNSS Status (green):	Constant ON	Searching for initial fix
	Double Flash @ 1Hz	GPS 3D navigation
	Slow Flash @ 0.2Hz	Lost GPS navigation
	Rapid Flashing (>2Hz)	TEST MODE (contact astra support)

COMM Status (blue):	200 ms ON / 1800 ms OFF	ON / SEARCHING
	1800 ms ON / 200 ms OFF	registered on network
	Constant OFF	Modem OFF

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Mounting

We recommend mounting the AT300 by either of the following methods:

- Double sided foam adhesive tape, using de-greaser / solvent on the vehicle surface
- 4 x M4 fasteners, using the mountings provider on the device

Orientation

For optimum GNSS performance, please mount the AT300 with the mounting feet facing down.

Interconnections

All connections to the AT300 are provided by a single 14-way connector.

AT300 Pin Applications and Colour Code

Pin	Function	Wire colour
1	VIN 6 – 90 VDC	RED
2	GND	BLACK
3	1-WIRE	GREY
4	DIGIN1	WHITE
5	DIGIN2	BROWN
6	DIGOUT1	YELLOW
7	DIGOUT2	PINK
8	RS232-TXD	GREEN
9	RS232-RXD	BLUE
10	3.3V AUX OUT	ORANGE
11	CANH	RED / WHITE
12	CANL	YELLOW / GREEN
13	SWDIO	VIOLET
14	SWCLK	VIOLET

Digital Inputs

Digital inputs 1 and 2 are suitable for use in 'power-take-off' applications and can be connected directly to 12/24V vehicle circuits.

Digital Output

The AT300 is capable of switching 2 external loads of up to 60V, 0.5A using MOSFET low side switches (open drain), which must be used to switch the GND side of the load. The digital output switches are protected by internal self-resetting fuses, rated at 0.5A.

CANBus

The AT300 has integrated CANBus. Please refer to CANBus and FMS Application Notes for details of supported protocols and features.

> **IMPORTANT NOTE:** The CANBus pins are ESD protected to 15kV, but can only withstand a continuous voltage of 12V maximum. These pins must not be used for any other application to avoid damage to the device.

Integrated Accelerometer

The AT300 has a built in 3 axis MEMS accelerometer that operates in the range ±2g and is used to measure driver behaviour (acceleration and braking) during normal driving conditions. A 6-axis IMU accelerometer / gyro is a factory fitted option with this device.

The accelerometer also allows the AT300 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 AT300 shares a common set of configuration commands with our other devices. Please refer to our Generic Device Configuration Reference for details.

1-wire / iButton (Dallas Key) Interface
This can be used with iButton devices for the purpose of driver ID, or with DS18B20 temperature probes. Please refer to the appropriate application notes for more details of how to use these features.

3.3V Auxilliary Power Output
This is reserved for use with external devices. The 3.3V regulated output can be used as a reference voltage for external temperature sensors and used with the ADC1 input. This output is fused at 100mA, maximum recommended current drain is 75mA.

Device Configuration / Settings
For device configuration options and related commands, please refer to the Astra Telematics Command Reference document, which describes our generic commands, which can be used with all our devices.

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Electrical Parameters

Operating Conditions

Parameter	Min	Max	Units
Power Supply Input Voltage	+6	+90	V
Digital Input High Voltage Threshold	+3.0	-	V
Digital Input Low Voltage Threshold	-	+2.0	V
Digital Output Maximum Voltage	-	+60.0	V
Digital Output Maximum Current	-	0.5	A

Absolute Maximum Ratings

Parameter	Min	Max	Units
Power Supply Input Voltage	-32	+95	V
Voltage on Digital 1-2	-32	+32	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	-	+60.0	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	N/A
Vibration, broadband random	Complies with IEC60068-2-64
Shock	Complies with IEC60068-2-64
Humidity	N/A