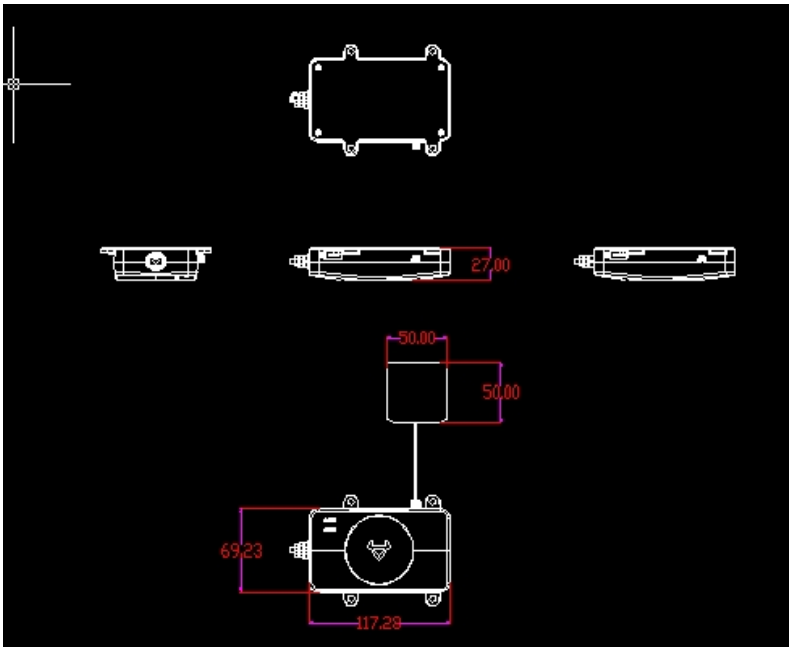
U3LTE ECU Manual

I. Overview

This ECU is designed mainly for overseas development, and is compatible with the N1SP and N1SP_RAL models.

II. Shape and Dimensions



III. Features

a) How the features work

The 485 host on the vehicle acts as the ECU, which includes the 485 communication module, GPRS communication module, GPS positioning module, ACC detection module, small battery charge and discharge module, power supply module, and gyroscope module. Together, these modules enable GPS positioning, GPRS
2G communication with the server, charge and discharge management of the small battery inside the ECU, and detection of vehicle attitude and acceleration.

i. Overview of features

1. Control with motor controller (including model verification and data reading):
   The ECU can communicate with the motor controller via the 485 protocol. At the time of push-button start, the ECU exchanges the verification code with the motor controller. If the code is obsolete, the motor controller runs at full speed. While the vehicle is running, the ECU queries motor controller data and performs calculations in real time. At the time of push-button start, the ECU uploads the serial number of the motor controller to the server to check if it has been reported stolen in the product library.
2. BMS control (including model verification and data reading): While the vehicle is running or being parked, the ECU queries BMS data at different intervals depending on the status of the vehicle. At the time of push-button start, the ECU uploads the BMS serial number to the server to check if it has been reported stolen in the product library.
3. Dashboard data display (including speed, battery level, status, alarm message): The ECU calculates speed and riding range using the rotation rate, obtains time using the GPS and RTC, reads the SOC and analyzes the status of the BMS and motor controller using the BMS, and controls how time, speed, riding range, SOC, riding status, and fault codes are displayed on the dashboard.
4. Charging time display:
   The ECU determines if the battery is being charged based on the current, time and the BMS status, and displays the charging time remaining on the dashboard.
5. Low battery speed limit:
   When the battery level is lower than 10%,
   the ECU controls the motor controller to limit
   the speed to gear 1.
6. Remote unlocking/locking: The server can use remote commands to control the ECU to lock and unlock the vehicle remotely. With remote locking, the ECU controls the motor controller to lock the vehicle without performing the start check with the motor controller.
7. Alarm signal: The ECU acquires the alarm's current status via the

alarm pin, and uploads the alarm in time when it is triggered.

8. GPS positioning:
   The ECU can use the GPS module for positioning, as well as acquiring and uploading the longitude and latitude, time, heading, positioning error, and satellite data.
9. Vehicle data backhaul:
   The ECU controls the GSM module to transmit vehicle data to the remote server via the 2G network.
10. Abnormal movement alarm: The ECU monitors the conditions of the vehicle in the parked status in real time, and uploads data immediately when detecting a tilt or movement in the vehicle.
11. Check for stolen reports:
    When the power switch is turned on, the ECU uploads the serial numbers of the BMS, motor controller, ECU, and SIM card. The server matches the uploaded serial numbers with serial numbers with stolen reports, and issues a lock command when it identifies one with a stolen report.
12. Battery removal report: When the main battery is removed, the ECU uploads the battery removal information.
13. Main battery power-down sleep:
    When the main battery powers down, the ECU enters a low power mode and sets the GPS, GSM, and microcomputer to the sleep mode to ensure maximum standby time.
14. Power switch control reset:
    Triggered if the power switch is quickly turned on and off 10 times within 20 seconds when no network is available.
15. A-GPS:
    Automatically downloads ephemeris data to offer positioning in seconds.
16. FOTA Upgrading via the differential package: Faster upgrading speed.
17. Setting upload templates remotely:
    a) The server can define any rules on how the ECU uploads data.
18. Updating any data remotely:
    a) The server can update any data in the ECU data sheet remotely.

IV. Status and Task Descriptions

Vehicle status			Description	GSM	GPS	485
Powering up			Verifies the motor controller's serial number with the	Uploads the vehicle's serial number information. (MEI, phone number, motor controller serial	On	Communicates with the motor controller, queries the motor controller serial number once every 100ms, checks with the CRC algorithm when a query is successful
Driving			Queries data in real time and displays	Uploads position information once every 5s and vehicle information	On	Communicates with one device once every 100ms. (It takes 300ms to complete one cycle from the dashboard
Shutting do			Saves riding range and reports stat	Uploads vehicle status information	Turns it on 90s before data	Saves riding range, and clears the status of the BMS and motor controller. (See the
Parking	With battery	Parking	Offers real-time monitoring, and reports vehicle status and	The GSM module enters a low power mode when no data is transferred, and exits this mode whenever data is transferred.	On	Communicates with the BMS once every 5min for the first 2h, and then once every 15min.
		Alarm	Uploads data quickly upon	Uploads position information once every 6s.	On	
		Abnorm	Anti-theft/ alert (The ECU is moved or	Uploads data 5 times every 15min when detecting a tilt and uploads data once when	On	
		Writing	Communicates with the host computer	Status does not change. When data writing is	On	Changes to slave state. Able to communicate with quality inspection software,
	Battery rem	Sleep	Runs with the minimum power consumption to	Uploads position information once every 15min, then turns it off. Off	Turns on for 60s upon ECU wake-up,	Module turns off

V. Anomalies

i. When any anomaly occurs with any other electronic device in the vehicle, the ECU controls the dashboard to display a fault code.

ii. Card not inserted: The ECU sets the dashboard to display 60, which is always displayed.

iii. SIM card fee in arrears: The ECU sets the dashboard to display 67 and clears the screen after it displays for 1s.

iv. The ECU cannot get the correct time when the vehicle is in a location without GPS signals for a long time, and after the ECU is completely powered off.

v. Input overvoltage or undervoltage may cause the ECU to burn out or be unable to supply power properly.

FCC Statements

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This

equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a

Particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user‘s authority to operate the equipment.

NOTE: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications or changes to this equipment. Such modifications or changes could void the user’s authority to operate the equipment.

The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

When using the product, maintain a distance of 20cm from the body to ensure compliance with RF exposure requirements.