

CAREU U1 Lite Vehicle Tracker User Guide

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SYSTEMS & TECHNOLOGY CORP.

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Chapter 1. Introduction



Thank you for your purchasing the CAREU U1 Lite Vehicle Tracker. We are very pleased to introduce you our excellent product, and you will enjoy great benefits by applying such a smart device. The CAREU U1 Lite Vehicle Tracker is an all-in-one device that integrates multiple applications of GPS (Global Position System), GSM (Global System for Mobile Communication) and GIS (Geographic Information Systems) with each other.

Designed with the latest GPS technology, the CAREU U1 Lite delivers positioning message by GSM wireless transmission to GIS platform, and then helps back-end users proceed with the analysis and the applications of vehicle transport, management, anti-theft, security and tracking.

1.1 Features

- Cost effective and easy installation
- SMS, GPRS TCP/UDP, USSD, FTP communications
- Geo-fencing reports
- Remote configuration
- Real-time tracking (time, distance interval or intelligent mode, and heading)
- Intelligent power management
- Power low/lost alarm
- Journey report wireless downloads
- GSM/GPRS simultaneously
- Mileage report
- User-defined reports
- Firmware upgrade over the air (via GPRS from FTP)
- Up to 20,000 data log capacity

1.2 Scope

This document will guide you to start the CAREU U1 Lite Vehicle Tracker. However, as this document contains basic device configuration only, please see the CAREU U1 Lite Protocol Document for the advanced information.

1.3 About CAREU U1 Lite

The CAREU U1 Lite Vehicle Tracker transmits the wireless signals such as location, peripheral, and vehicle control data to a control center. The onboard GPS receiver provides users with location data including speed, direction, mileage and altitude. It uses an onboard GSM/ GPRS module to accomplish wireless transmission.

A microcontroller can probe location and command data at regular intervals, derive actions from location, peripheral and control data, and execute such actions.

Among the best features of the CAREU U1 Lite Vehicle Tracker, in particular, they transmit data in ASCII mode or binary mode.

Peripheral data indicates the status of various peripherals connected to and/or controlled by the device. The peripherals include, but not limited to, door locks/un-locks, starter interrupt, ignition, battery, engine and panic button.

The firmware in the device applies intelligent filtering to overcome coverage limitations for both GPS and GSM/GPRS networks.

Motion sensor controls the status of the device, whether in sleep, idle or fully-powered mode, and thereby controls the amount of current consumed by the device.

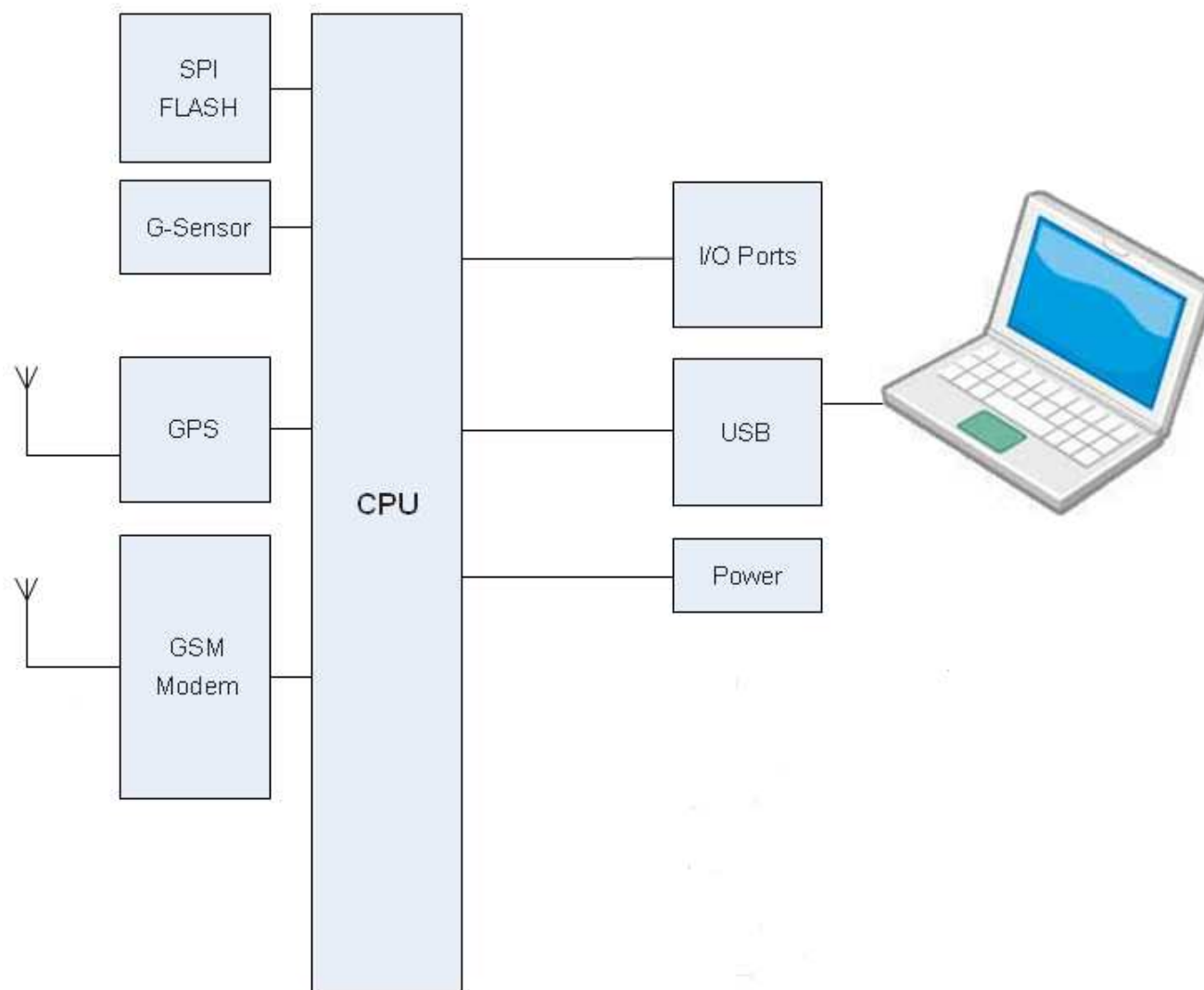
Backup battery and tamper sensing GPS Antennas primarily indicate the loss of Main Power and the interruption of GPS antenna connectivity.

The device supports over-the-air firmware upgrade to deliver additional functionality without physically touching the device once installed.

In consideration of technicality and marketability, the CAREU U1 Lite has so many excellences to be competitive enough to stand out in the market. With regard to the technicality, the CAREU U1 Lite saves and records more data even under inactive communication status, and it also provides better power management, coexistence of GPRS and SMS modes. When it comes to the marketability, the CAREU U1 Lite users are provided with the convenience that its firmware can be upgraded through mini USB without disassembling the device.

1.4 Hardware Architecture

As hardware is concerned, the CAREU U1 Lite is comprised of a micro-controller, regulator, GPS receiver, GSM/GPRS modem, G-Force sensor, flash memory data storage, I/Os interface and LED status indicators.



- Users can connect PC's HyperTerminal to the Diagnostic/setting port for the AVL configuration.
- G-Sensor for car accident prevention, car tow-away warning and power management.
- The audio interface supports hand-free phone call.
- GPIO that connects to any customer monitoring points by door switch, anti-thief or actuators.
- The A/D input that connects the analog signal sensor to the AVL, such as the fuel or temperature sensor.

1.5 Related Document

[1] CAREU U1 Lite Protocol Document

Chapter 2. Taking a Tour of CAREU U1 Lite

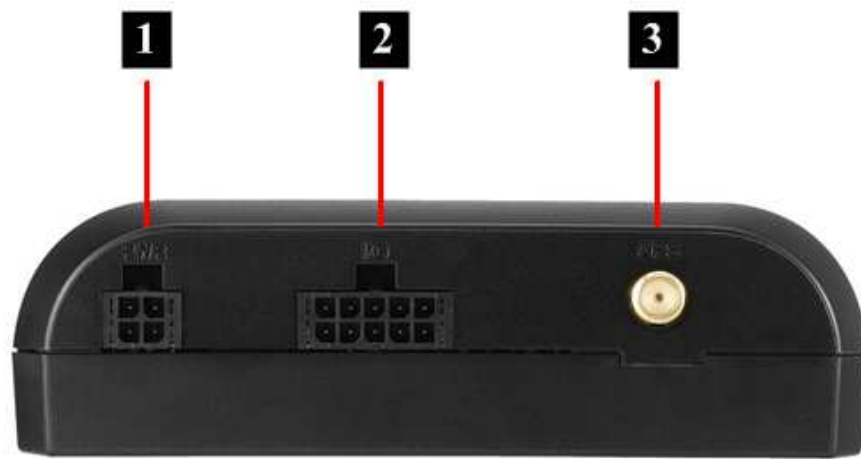
This chapter will guide you to the major connectors of the U1 Lite device.

2.1 Dimensions



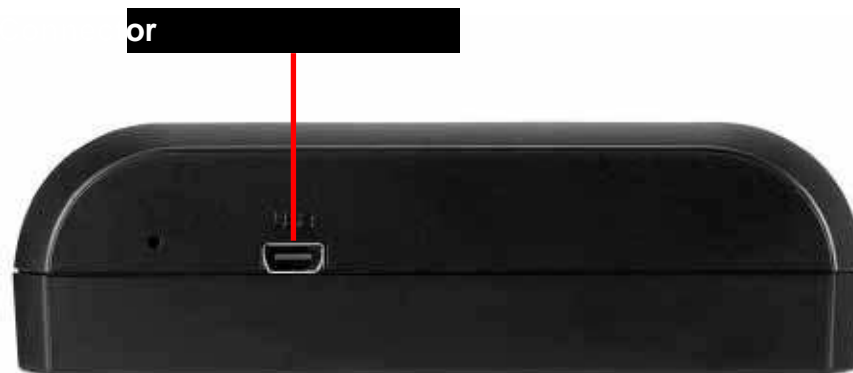
Dimensions: 108mm x 72mm x 31mm

2.2 Front View



No.	Name	Description
1	PWR	Power Connector for Car Battery
2	I/O	Input/Output Connector including basic I/O, RS-232
3	GPS	SMA Connector for GPS External Antenna

2.3 Rear View



Chapter 3. Getting Started with CAREU U1 Lite

To install the the CAREU U1 Lite device, follow the instructions below for basic operations.

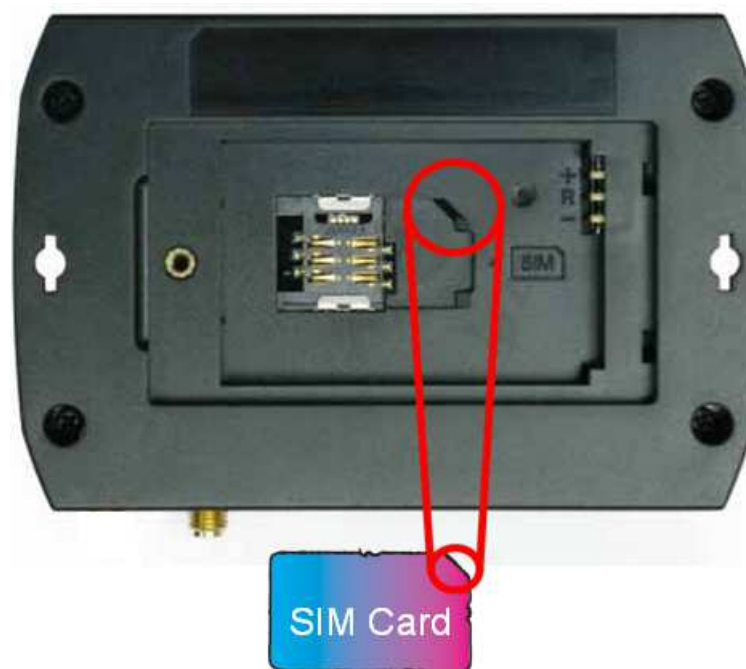
3.1 Hardware Installation

1. SIM Card Installation

- Remove the screw at the bottom of the device to open it. Then you will find the SIM card slot inside.



- Insert your SIM card into the device with SIM card's gold area down and the notched corner toward the notched edge of the SIM card socket. Make sure it is installed correctly in place. Reinstall the cover.



2. GPS Antenna Connection

- Connect the GPS antenna to the SMA connector jack on the front side of the device (circled as the illustration below) by completely screwing the GPS antenna's plug connector.
- It is recommended that a matching torque 7-10 inch pounds (80-110 N.cm) should be used for the SMA connector.



3. Power and I/O Cable Connection

- Connect 4-wire power cable to the power connector on the front side of the CAREU U1 Lite device (8~30V)



4. I/O Cable Connection



5. Mini USB Cable Connection



7. G-Sensor Installation Consideration

The device uses a 3-axis G-Force sensor to detect the vehicle motion and the impact on the vehicle. The X, Y and Z axis definition will be affected by the location of device installation.

3.2 Connector Pin Assignment



Connector Pin Definition

1. PWR Connector

Pin#	Signal Name	Description	I/O	Remark
1	DC IN	Power supply input	I	DC Vin = +8 ~ +30V Normal = 70mA @ 12V
2	GND	Signal ground	—	
3	Ignition	Ignition(ACC) Input	I	DC Vin = +30 ~ +7V (Active high)
4	Output1	Open-Collector Output1	O	I _{max} = 300mA

2. I/O Connector

Pin#	Signal Name	Description	I/O	Remark
1	Output 2	Open-Collector Output 2	O	I _{max} = 300mA
2	GND	Signal ground	—	
3	Input 2	Positive Trigger input 2	I	DC Vin = +30 ~ +7V (Active high)
4	Input 1	Negative Trigger input 1	I	DC VIN = +6V ~ 0V (Low Active)
5	NC	Not Connected		
6	Analog Input 1	Analog input 1	I	DC VIN = +30V ~ 0V
7	NC	Not Connected		
8	NC	Not Connected		
9	NC	Not Connected		
10	NC	Not Connected		

3.3 LED Indicator



1. GPS LED Indicator

Power Mode	GPS Status	GPS LED
Power Off	N/A	Off
Low Power	N/A	Off
Full Power	Acquiring	Flash Red (five times/second)
Full Power	Tracking	Solid Red

2. GSM LED Indicator

Power Mode	GSM/GPRS Status	GSM LED
Power Off	N/A	Off
Low Power	N/A	Off
Full Power	Acquiring	Flash Red (three times/second)
Full Power	Registered	Solid Red

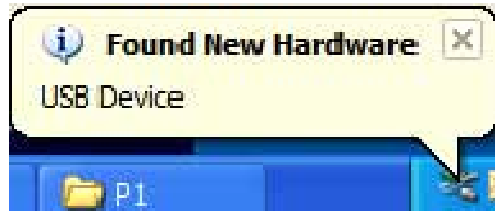
3.4 USB Device Driver Installation

The CAREU U1 Lite communicates with your host computer by either RS-232 or USB interface.

In some newer editions of Windows XP, the CAREU U1 Lite device can be installed as a "virtual COM port" device whereby the CAREU U1 Lite would automatically access Windows XP's inbox USB drivers. While in some other earlier editions of Windows XP, you would need to manually install the USB driver for the CAREU U1 Lite device. In the following content of this section, you will be guided to how the installation can be done in both cases.

To install the device driver for the CAREU U1 Lite, connect the CAREU U1 Lite device to your system with an USB cable as mentioned in [Mini USB Cable Connection](#) on section 3.1.

As soon as the connection is made between the CAREU U1 Lite and your computer, a balloon appears above the notification area saying an USB device is found.



Click on this balloon to start the **[Found New Hardware]** wizard.

Select **No, not this time**. Press the **Next** button to proceed.



1. Automatic Installation

If the wizard prompts to help you install the software for "STMicroelectronics Virtual COM Port". Select **Install the software automatically (Recommended)**. Press the **Next** button to proceed.



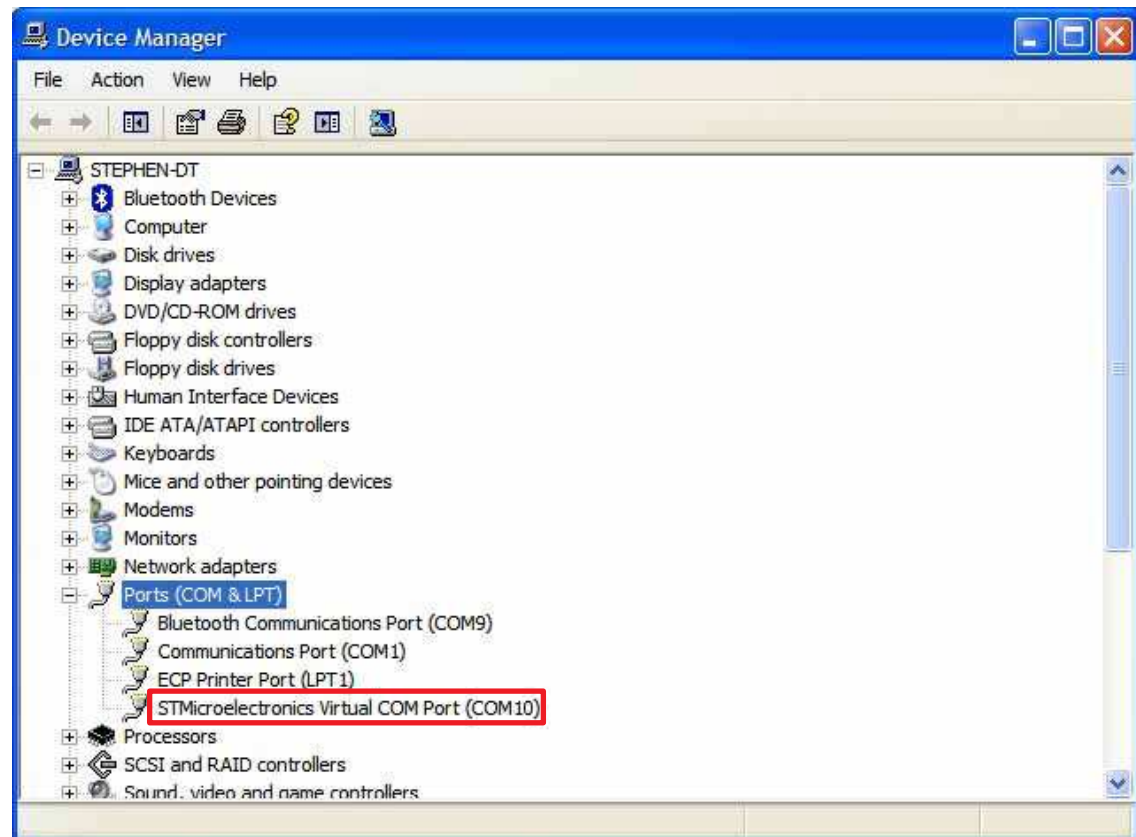
The wizard proceeds to install the driver.



The installation completes.



In [Device Manager], the CAREU U1 Lite device is included under **Ports (COM & LPT)** as "STMicroelectronics Virtual COM Port". COM port number is displayed as well.



2. Manual Installation

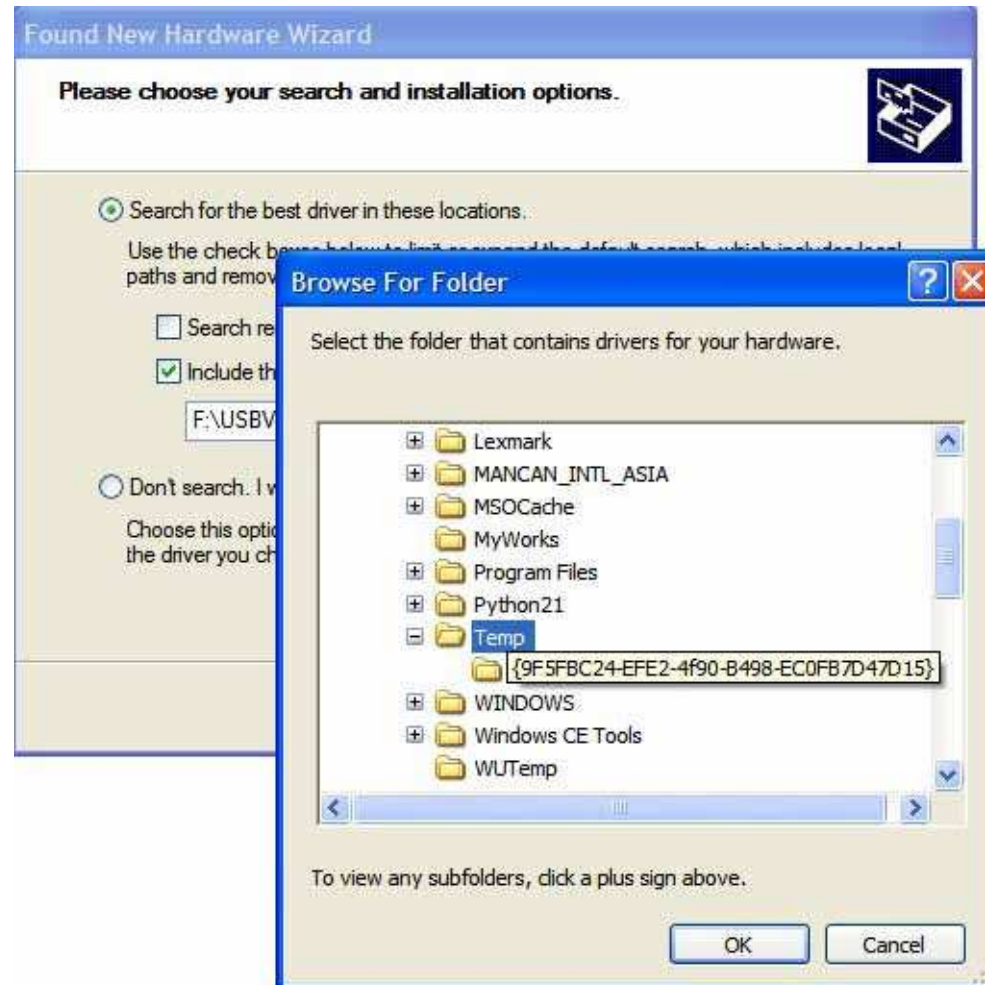
After you select **No, not this time**, if the wizard only prompts to help you install software for "USB device", you need to manually install the driver. Select **Install from a list or specific location (Advanced)**. Press the the **Next** button to proceed.



Select **Search for the best driver in these locations**. Check **Include this location in the search**. Press the **Browse** button to assign where your the CAREU U1 Lite device driver locates on your local disk.

Press the **OK** button.

You can download the USB device driver from <http://www.systech.com.tw/downloads.php>.



Press the **Next** button to proceed.



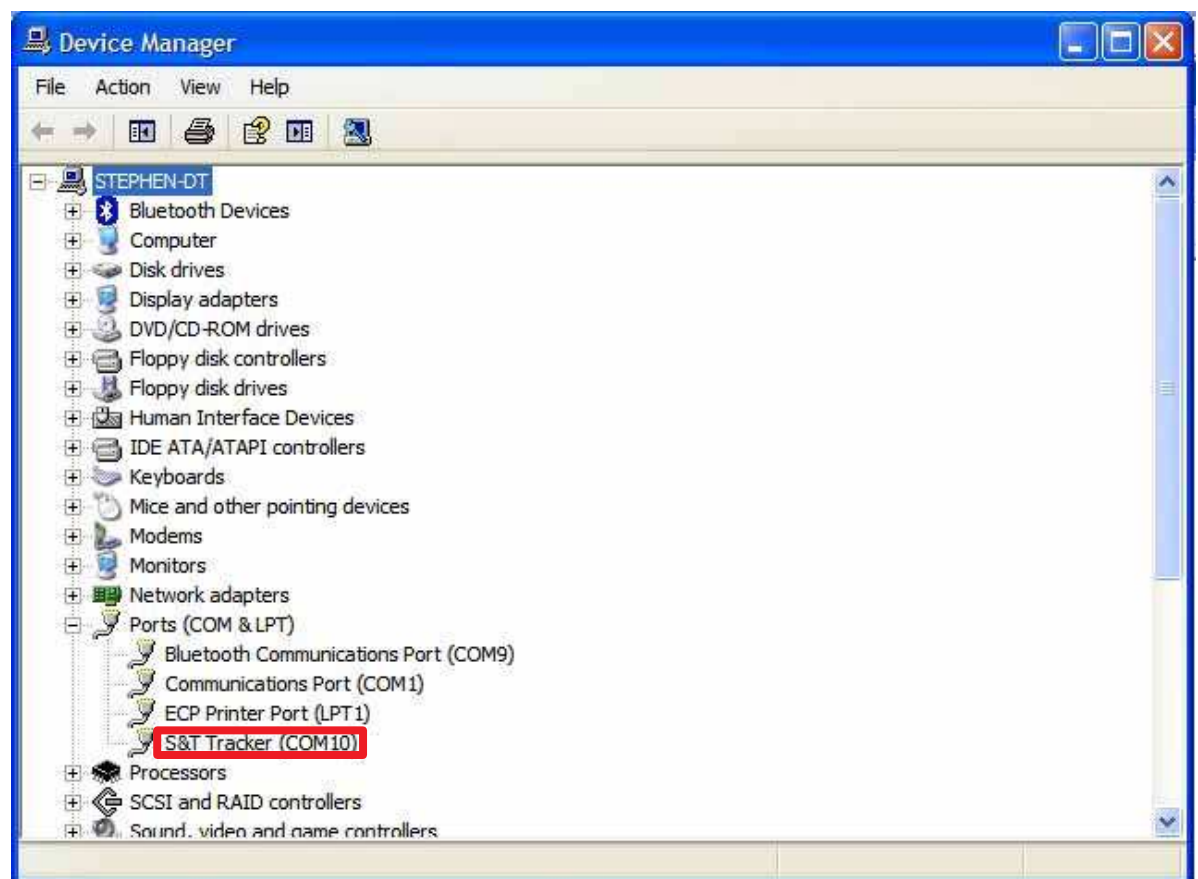
The wizard proceeds to install the driver.



The installation completes.



In [Device Manager], the CAREU U1 Lite device is included under **Ports (COM & LPT)** as "S&T Tracker". COM port number is displayed as well.



3.5 Device Configuration

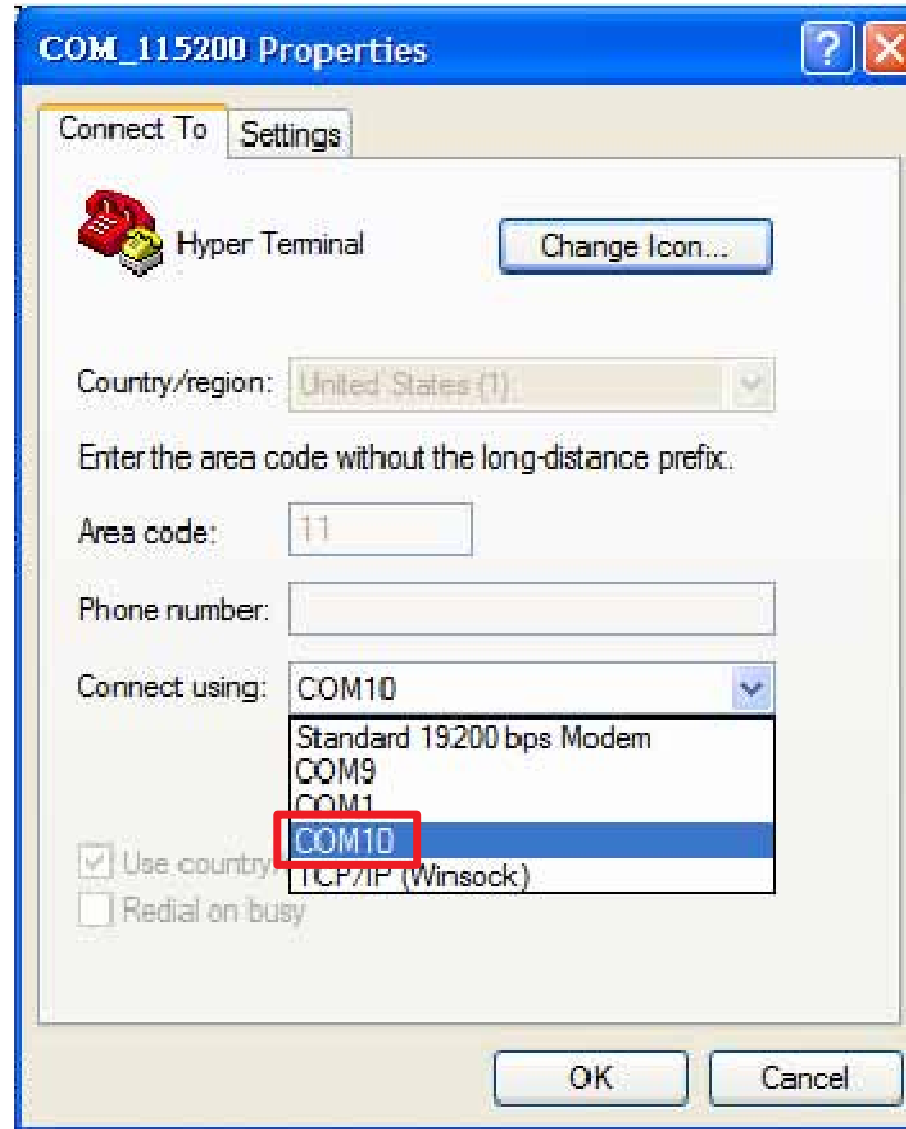
1. In Windows XP desktop, click **Start | All Programs | Accessories | Communications | HyperTerminal**.
2. If you are prompted to input the information of your location, complete them to proceed.
3. On the **File** menu of **HyperTerminal**, click **New Connection**.
4. In the **Name** box, type a name that describes the connection. In the **Icon** box, click an appropriate icon. Press the **OK** button to proceed.



5. For Com port properties, configure as follows:

Baud Rate --> 115200 bps
Data Bits --> 8
Parity --> None
Stop Bits --> 1
Flow Control --> None

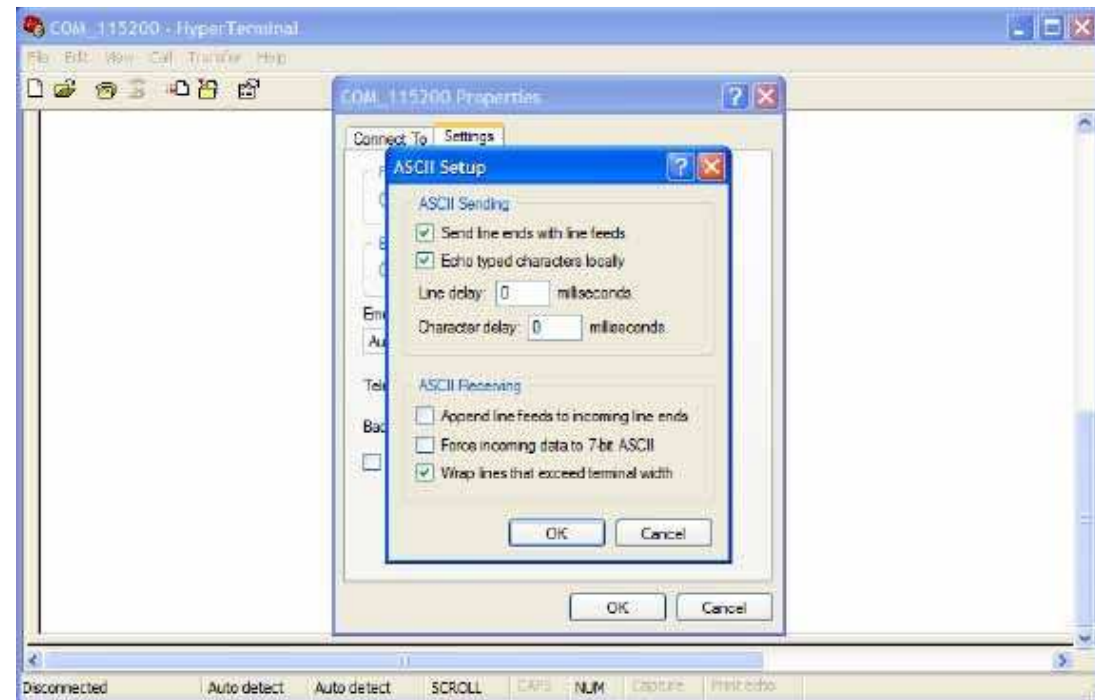
6. In the connection that you have just set up, click **File | Properties**. Select the **[Connect To]** tab. From the **[Connect using]** drop down list, select the correct com port by checking it up at Windows XP's **[DeviceManager]** as previously mentioned on page 21. Go there by clicking **Start | Control Panel | System | Hardware | Device Manager**.



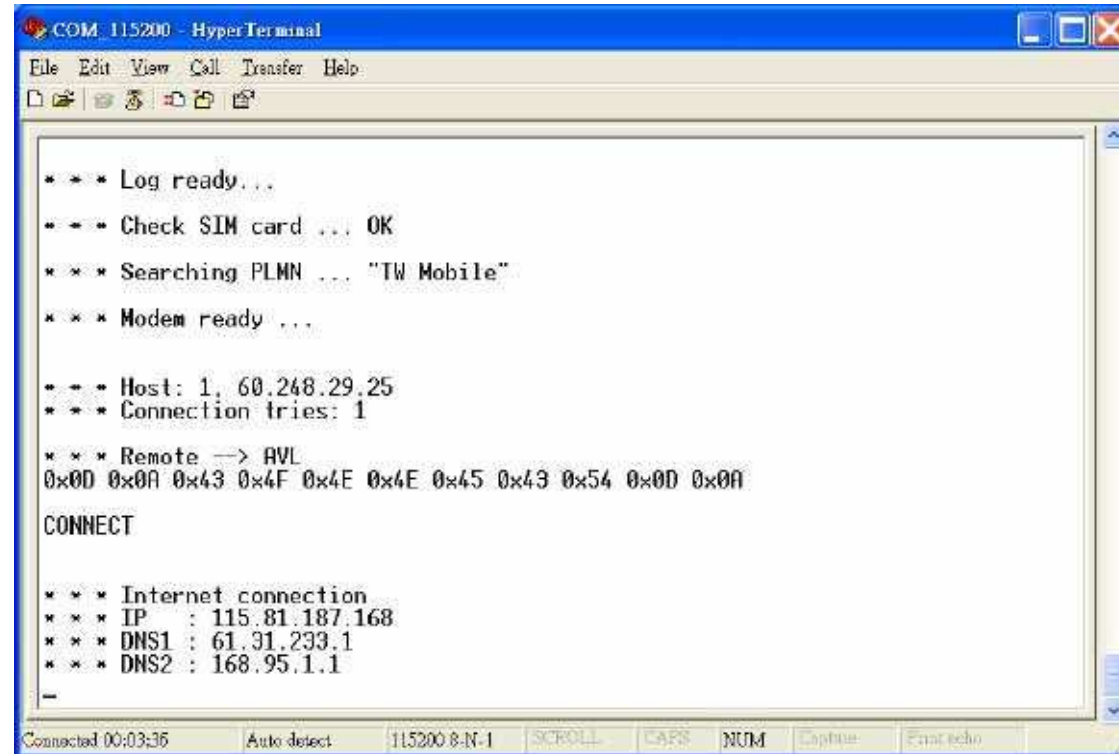
7. In the **File** menu, click **Properties**. Click the **[Settings]** tab. Press the **ASCII Setup** button.



8. In the **[ASCII Sending]** group box. Select both **Send line ends with line feeds** and **Echo typed characters locally**. Press the **OK** button.



9. Connect your the CAREU U1 Lite device to power as mentioned in [Power and I/O Cable Connection](#) on page [12](#). The device startup message will be displayed.



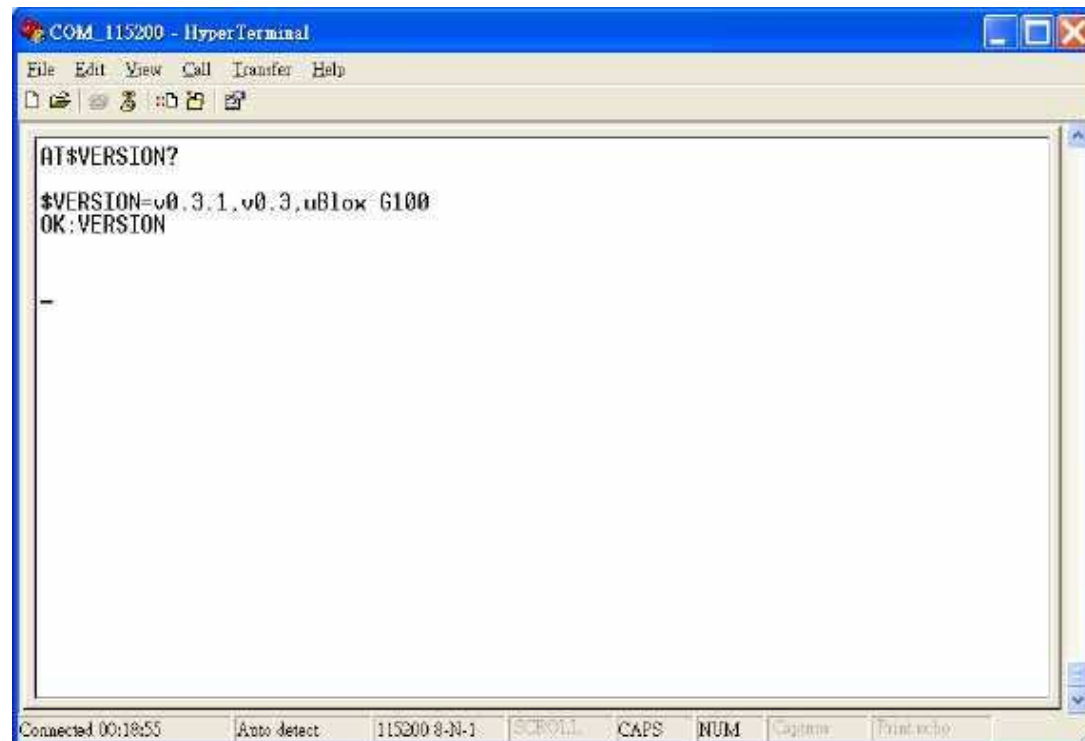
```
COM_115200 - HyperTerminal
File Edit View Call Transfer Help
*** Log ready...
*** Check SIM card ... OK
*** Searching PLMN ... "TW Mobile"
*** Modem ready ...

*** Host: 1, 60.248.29.25
*** Connection tries: 1

*** Remote -> AVL
0x00 0x0A 0x43 0x4F 0x4E 0x4E 0x45 0x43 0x54 0x0D 0x0A
CONNECT

*** Internet connection
*** IP : 115.81.187.168
*** DNS1 : 61.91.233.1
*** DNS2 : 168.95.1.1
-
Connected 00:03:35 Auto detect 115200 8-N-1 SCROLL CAPS NUM Capture Print echo
```

10. In **[HyperTerminal]** window, type in the command "AT\$VERSION?" and press the **Enter** key. The hardware and firmware version will show. As long as your **[HyperTerminal]** window appears as the screenshot below, a connection between the device and your system has already been built up and working. It is time to send all configuration commands.



```
COM_115200 - HyperTerminal
File Edit View Call Transfer Help
AT$VERSION?
$VERSION=v0.3.1,v0.3,uBlox G100
OK:VERSION
-
Connected 00:18:55 Auto detect 115200 8-N-1 SCROLL CAPS NUM Capture Print echo
```

3.6 Communication Settings

The CAREU U1 Lite Vehicle Tracker communicates with your control center by either SMS or GPRS (TCP/UDP). Before the device is installed into a vehicle, communication parameters should be set.

1. SMS Configuration

Use AT\$SMSDST command to set a SMS control center phone number or short code. For example, if the SMS control center phone number is +886123456789, the AT\$SMSDST command to be issued into **HyperTerminal** should be:

```
AT$SMSDST=+886123456789
```

OK

Then you can try to use cellular phone or SMS gateway to send a SMS message to the CAREU U1 Lite device. Send a SMS message --> "AT\$MODID?"

Device will response:

```
$MODID=101000001
```

OK

This proves a successful mobile phone SMS connection.

2. GPRS Configuration

Set GPRS servers by using the following commands:

```
AT$APN=internet,username,password (APN=internet, Username=username,  
Password=password) OK  
AT$HOSTS=1,0,60.148.19.10,6000
```

(Server IP address = 60.148.19.10 and Port number =6000)

OK

```
AT$RETRY=5,10 (Message retry settings)
```

OK

```
AT$IPTYPE=1 (Using TCP/IP mode)
```

OK

```
AT$GPRSEN=1 (GPRS enable)
```

OK

```
AT$HB=60,1 (Heartbeat setting)
```

OK

Please refer to the CAREU U1 Lite Protocol Document for more command details.

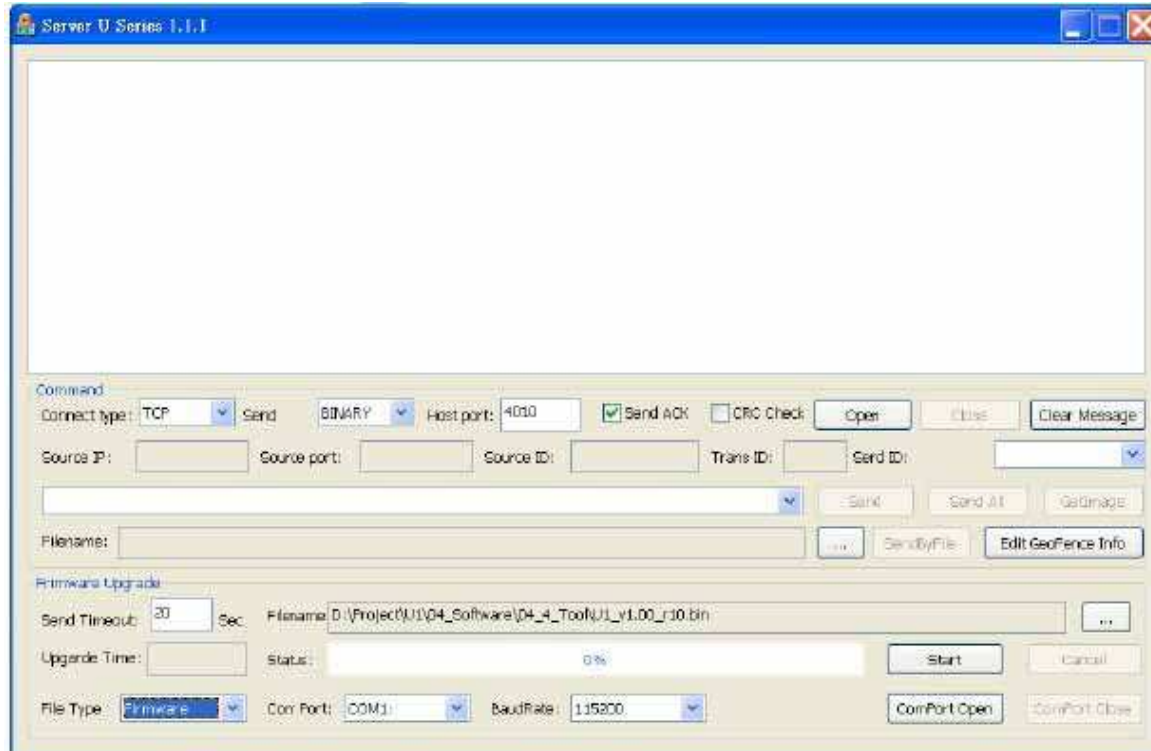
3.7 GPS Tracking Configurations

After the device communication settings are done, the remote GPS tracking is ready to function. The setting of GPS tracking can be done by using AT\$PDSR command. For example,

AT\$PDSR=1,30,0,0,2,0,0,1,1 (Tracking through GPRS by time interval 30 seconds)

OK

For simple testing GPRS, run the TCP Server U-Series software which is provided by S&T. It is simple server software that can wait for device connection and data.



For advanced testing, you need the software Intelli TracerPlus. Please request this software through your sales contact.



You can also apply for a testing account from S&T's FleetWeb solution through your sales contact.

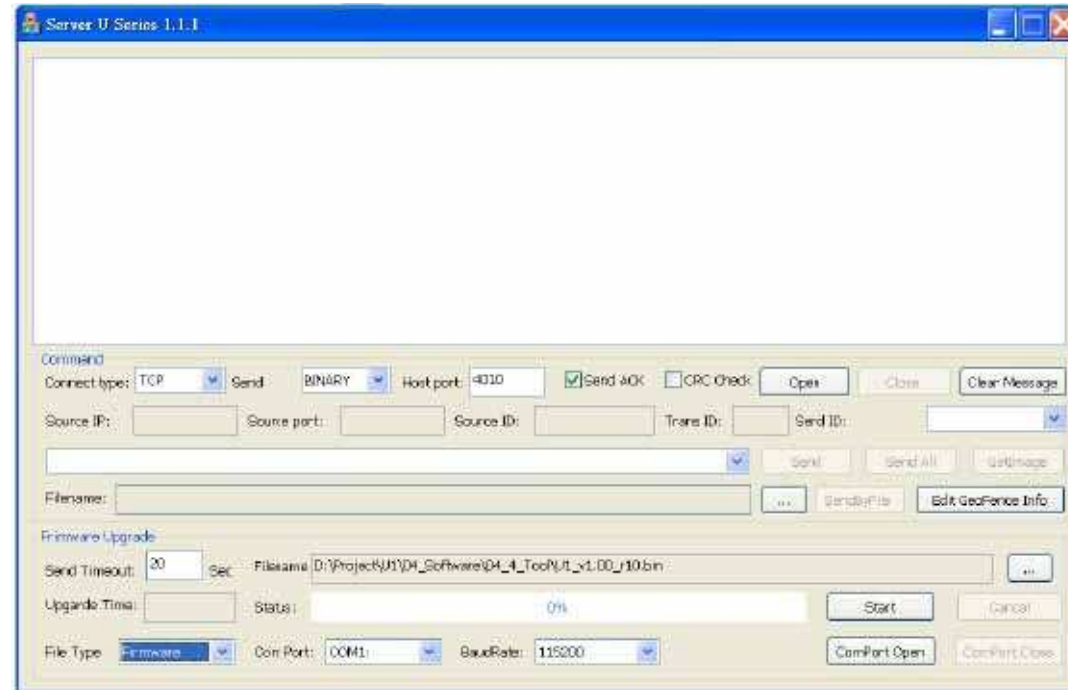
The main page of the Intelli FleetWeb appears as below:




3.8 Firmware Upgrade

The firmware of the CAREU U1 Lite can only be updated through USB interface. With the firmware loader tool provided by S&T, firmware update can be done for the device. Such firmware loader runs on Windows-based systems. To upgrade the firmware, follow the procedure below:

- 1). Connect the device to your PC with the USB cable.
- 2). Connect the device to power.
- 3). Power on the device.
- 4). Run ServerUSeries.exe. A window displays as follows:



- 5). Press browse the button  to browse to the firmware provided by S&T.
- 6). Press the **Start** button to run the firmware program.
- 7). After the writing progresses to 100%, it takes about 20 seconds for the update to completes.
- 8). Firmware update completes.

Chapter 4. Technical Specification

Characteristics	
Dimensions (L x W x H)	108 x 72 x 31mm
Weight	165g
Radio Performance	
Frequency	Quad-band 850/900/1800/1900MHz
GSM Functionality / GPRS	
GPRS Mode	Multi-slot class 10
GPRS Coding Scheme	CS1,CS2,CS3 and CS4
GSM Antenna	Internal
SIM Interface	SIM card 1.8V, 2.9V supported
GPS Functionality	
Receiver	50 channels
Sensitivity (Tracking)	-160dBm
Antenna Type	External GPS active antenna, 3.3V
Connector	SMA female
GPS Protocol	NMEA 0183 Ver3.0
Onboard Components	
MCU	32-bit microcontroller
Data Memory	8 MB Flash
Motion Sensor	3-axes acceleration sensor
Led Indicator	GPS and GSM Indicator

Interface I/O	
I/O Connector	1 connector, 10pin
Serial Connector	1 RS-232 ports (configurable) : Standard version No RS-232 port : US version
Input Ports	Positive triggers: 2 Negative triggers: 1 Analog Inputs: 1 (0~30V, 12 bits)
Output Ports	Negative triggers: 2 (300mA)
Electrical	
Power Source	DC 8V to 30V
Power Consumption	72 mA @ 12V (operating mode) 8 mA @ 12V (standby mode) 6 mA @ 12V (deep sleep mode)
Environment	
Operating Temperature	-20 °C to +60 °C (without backup battery) -20 °C to +60 °C (with backup battery)
Battery	
Rechargeable Backup Battery	1050mAH

Note: The specification herein is subject to change without prior notice.

Systems & Technology Corp. (S&T), founded in 1987, is a market leader in Automatic Vehicle Locating (AVL) solutions, Geographical Information Systems (GIS) and navigation. It has formed a professional development team to innovate the most advanced and comprehensive GPS tracking products for the customers and has built a global service network to provide non-stop services and support.

With the well-established marketing networks of over 100 distributors in the world, S&T is your trustworthy tracking solution provider. For more product information, please contact S&T by Email, phone or fax.

This marking or statement shall include the following or similar text:

**CAUTION
RISK OF EXPLOSION IF BATTERY IS REPLACED
BY AN INCORRECT TYPE.
DISPOSE OF USED BATTERIES ACCORDING
TO THE INSTRUCTIONS**



Web Site	http://www.systech.com.tw
Email	avl@systech.com.tw
Phone	+886-2-2698-1599
Fax	+886-2-2698-1211

Chapter 5. Regulation

FCC Regulations:

15.19(a)(3):

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.

15.105(b):

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.

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

This device complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20cm (8inches) during normal operation.

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

RF Exposure Information

This device meets the government's requirements for exposure to radio waves. This device is designed and manufactured not to exceed the emission limits for exposure to radio frequency (RF) energy set by the Federal Communications Commission of the U.S. Government.