

# CAREU U1 Vehicle Tracker User Guide

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SYSTEMS & TECHNOLOGY CORP.

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## Chapter 1. Introduction



Thank you for your purchasing **CAREU U1 GPS 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 GPS 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, **U1** 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

- Multiple serial ports and easy installation.
- Voices, SMS, GPRS TCP/UDP Communications
- Geo-fencing reports (circular/polygon/rectangle zones)
- Remote configuration
- Real-time tracking (time, distance interval or intelligent mode, and heading)
- Intelligent power management
- 1-wire® interfaces supported (optional)
- Power low/lost alarm
- Built-in voice communication
- Built-in interactive voice response
- Journey report wireless download
- GSM/GPRS simultaneously
- User-defined reports
- Firmware upgrade over the air (via GPRS)
- A-GPS functionality
- GPS antenna disconnect/cut alarm
- Up to 150,000 data log capacity
- Can-Bus support (optional)

## 1.2. Scope

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

## 1.3. About CAREU U1

**CAREU U1** GPS 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 AVL U1 Vehicle Tracker, in particular, they transmit data in ASCII mode (Intellitrac X Series compatible 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.

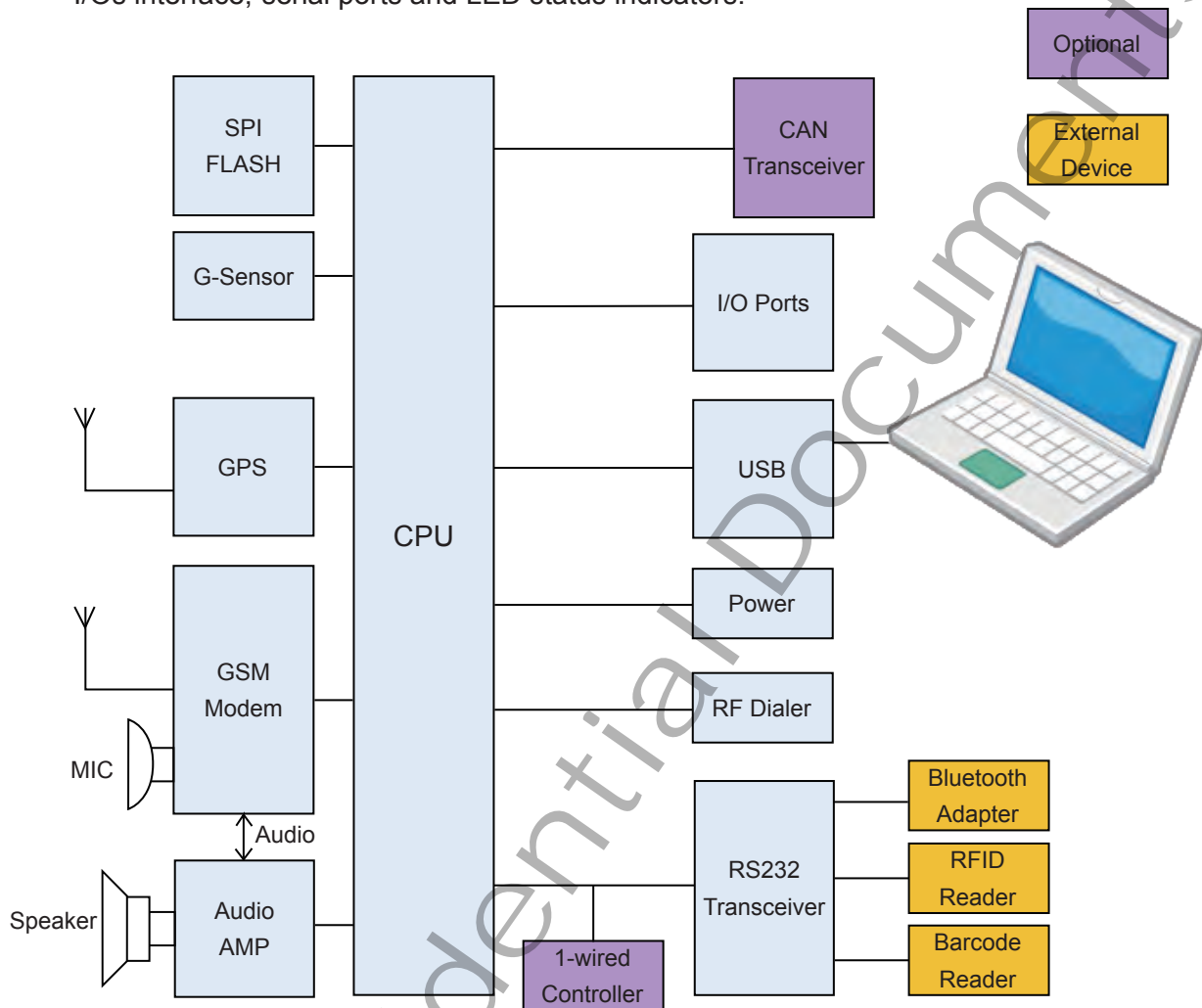
Backup battery and tamper sensing GPS Antennas primarily indicate the loss of Main Power and the interruption of GPS antenna connectivity.

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, **U1** has so many excellences to be competitive enough to stand out in the market. With regard to the technicality, **U1** saves and records more data even under inactive communication status, and it also provides better power management, coexistence of GPRS and SMS modes, 1-wired interface, direct connection to Temperature Sensor, and up to three serial ports. When it comes to the marketability, **U1** 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, **CAREU U1** is comprised of a micro-controller, regulator, GPS receiver, GSM/GPRS modem, G-Force sensor, flash memory data storage, audio interface, I/Os interface, serial ports 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.
- With the built-in RF receiving circuit, an emergency push button is designable, and anti-theft setting can be activated/deactivated.
- 1-wired interface, a reserved interface that is optional.
- The 1-wire interface facilitates the connection to temperature sensor, A/D devices, and iButton devices.

## 1.5. Related Document

[1] CAREU U1 Protocol Document

S&T Confidential Documents

## Chapter 2. Taking A Tour of CAREU U1

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

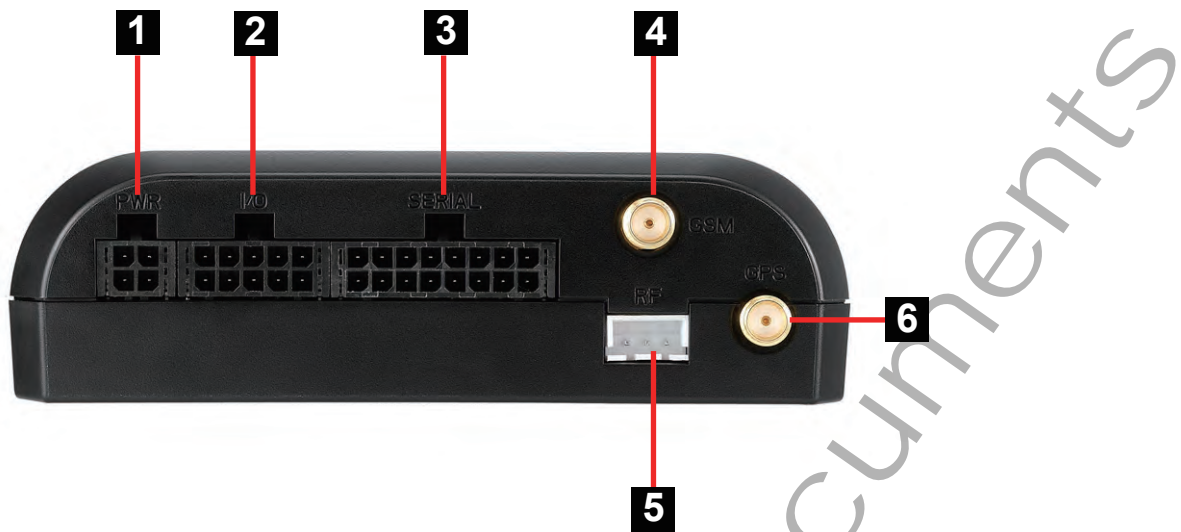
### 2.1. Dimensions



Dimensions: 108mm x 72mm x 31mm

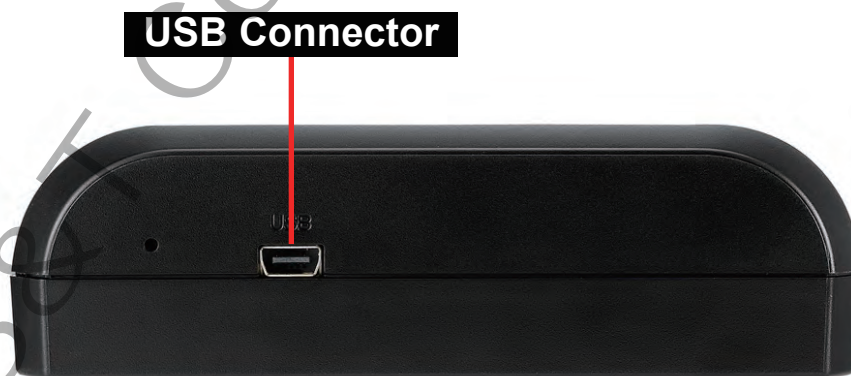


## 2.2. Front View



No.	Name	Description
<b>1</b>	PWR	Power Connector for Car Battery
<b>2</b>	I/O	Input/Output Connector including basic I/O, RS232
<b>3</b>	SERIAL	Serial Connector
<b>4</b>	GSM	SMA Connector for GSM External Receiver
<b>5</b>	RF	RF Connector for RF Receiver
<b>6</b>	GPS	SMA Connector for GPS External Antenna

## 2.3. Rear View



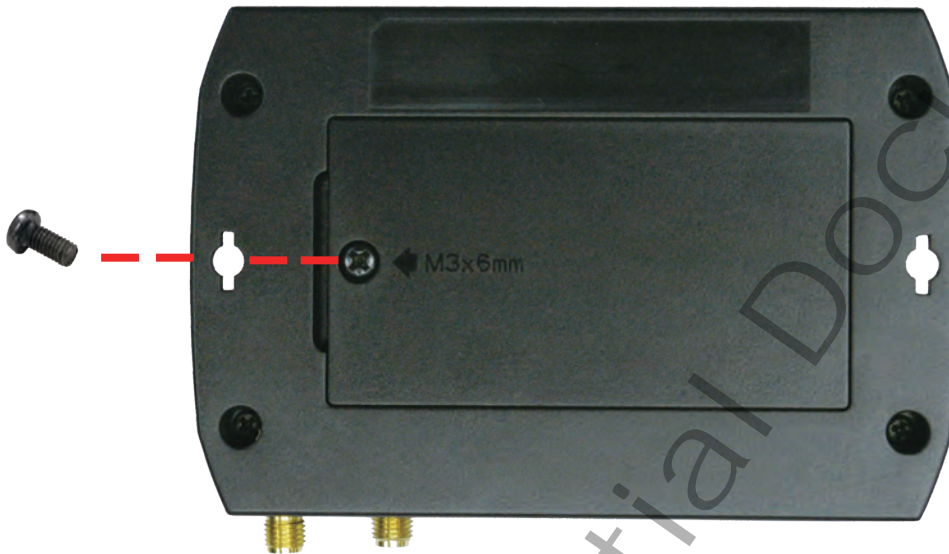
## Chapter 3. Getting Started with CAREU U1

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

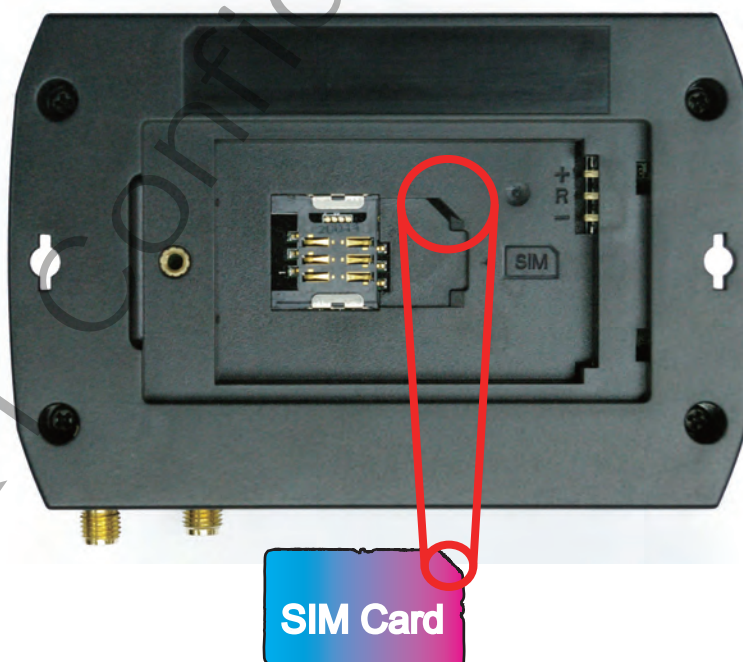
### 3.1. Hardware Installation

#### 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. GSM Antenna Connection

- Connect the GSM antenna to the SMA connector jack on the front side of the device (circled) as illustration below) by completely screwing the GSM 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.



4. Power, RS-232, and I/O Cable Connection

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



- Connect the 8-wire cable to **U1** device which enables **U1**'s connection to your system and also to related peripherals.



5. I/O Cable Connection



6. 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.

8. Microphone Installation (Optional)

Connect the microphone set to the 8-wire cables first. Plug the connector of the 8-wire cable completely into to the seial port on the front side of the device. See the illustration below.



9. Speaker Installation (Optional)

Connect the speaker set to the 8-wire cables first. Plug the connector of the 8-wire cable completely into to the seial port on the front side of the device. See the illustration below.



### 3.2. Connector Pin Assignment



Connector Pin Definition

#### 1. PWR Connector

Pin#	Signal Name	Description	I/O	Electrical Characteristic
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 ~ +0.7V (Active high)
4	Output1	Open-Collector Output1	O	I <sub>max</sub> = 300mA

#### 2. I/O Connector

Pin#	Signal Name	Description	I/O	Electrical Characteristic
1	Analog Input 2	Analog Input 2	I	DC VIN = +30V ~ 0V (default)
	Input 3 (Optional)	Positive Trigger input 3	I	DC VIN = +30V ~ +0.7V (High Active)
2	Input 4	Positive Trigger input 4	I	DC VIN = +30V ~ +0.7V (High Active)
3	Input 1	Negative Trigger input 1	I	DC VIN = +0.6V ~ 0V (Low Active)
4	Input 2	Negative Trigger input 2	I	DC VIN = +0.6V ~ 0V (Low Active)
5	Analog Input 1	Analog input 1	I	DC VIN = +30V ~ 0V
6	GND	Signal ground	----	
7	Output 2	Open-Collector Output 2	O	I <sub>max</sub> = 300mA

Pin#	Signal Name	Description	I/O	Electrical Characteristic
8	Output 3	Open-Collector Output 3	O	I <sub>max</sub> = 300mA
9	CAN H	CAN High	I	V <sub>I</sub> = 2.75V ~ 4.5V
10	CAN L	CAN Low	I	V <sub>I</sub> = 0.5V ~ 2.25V

### 3. Serial Connector

Pin#	Signal Name	Description	IO	Electrical Characteristic
1	Vout 1	Supply voltage output	O	V <sub>o</sub> = +5V (Vout 1~3 Total I <sub>max</sub> = 500mA)
2	GND	Signal ground	----	
3	TX1	RS232 Data output	O	
4	RX1	RS232 Data input	I	
5	Vout 2	Supply voltage output	O	
6	GND	Signal ground	----	
7	TX2	RS232 Data output	O	
8	RX2	RS232 Data input	I	
9	Vout 3 1-Wire	Supply voltage output 1-Wire Data input	O I	(Optional)
10	GND 1-Wire_GND	Signal ground 1-Wire ground	---- ----	
11	TX3	RS232 Data output	O	
12	RX3	RS232 Data input	I	
13	SPK+	Audio output	O	
14	SPK-	Audio output	O	
15	MIC+	Microphone Input	I	
16	MIC-	Microphone Input	I	



### 3.3. USB Device Driver Installation

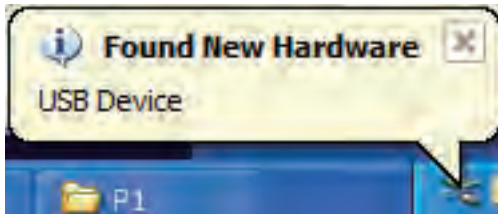
CAREU U1 communicates with your host computer by either RS-232 or USB interface.

In some newer editions of Windows XP, the U1 device can be installed as a "virtual COM port" device whereby U1 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 U1 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 U1,

Connect the U1 device to your system with an USB cable as mentioned in [USB Cable Connection](#) on page 10.

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



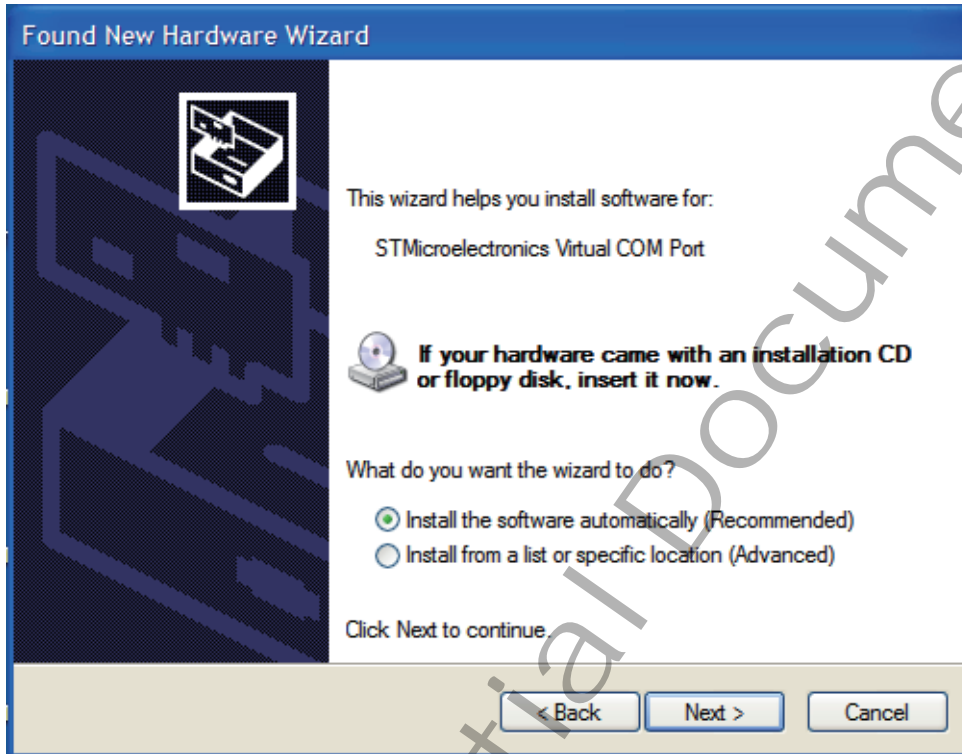
Click on this balloon to start [Found New Hardware] wizard.

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

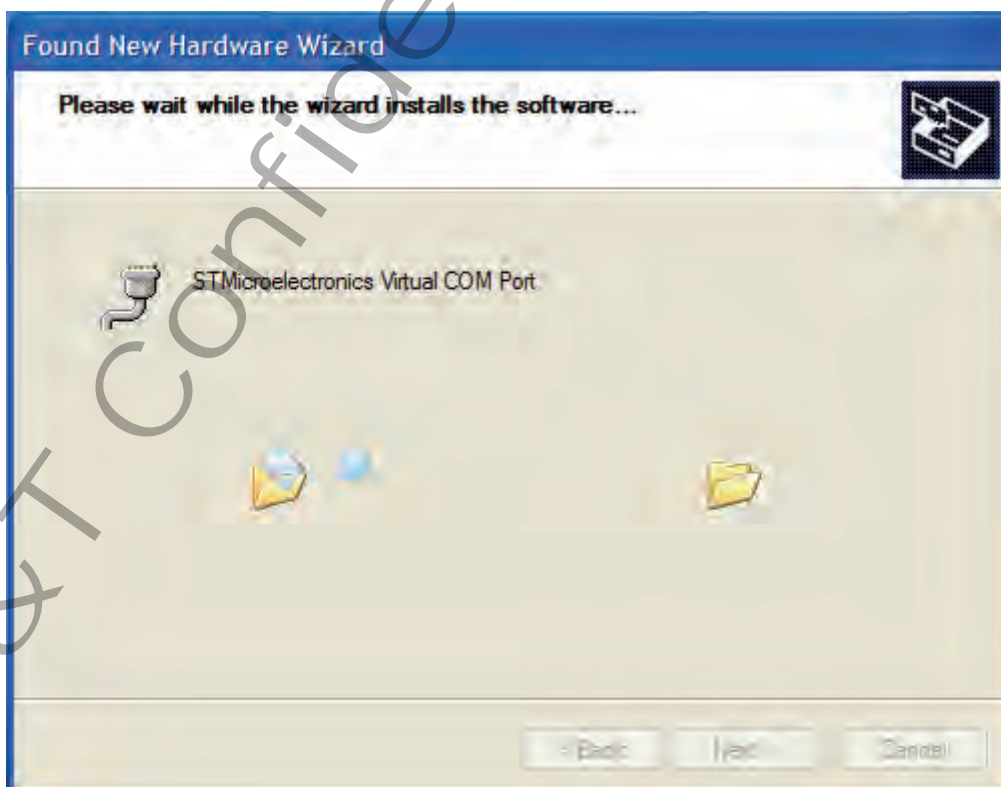


## 1. Automatic Installation

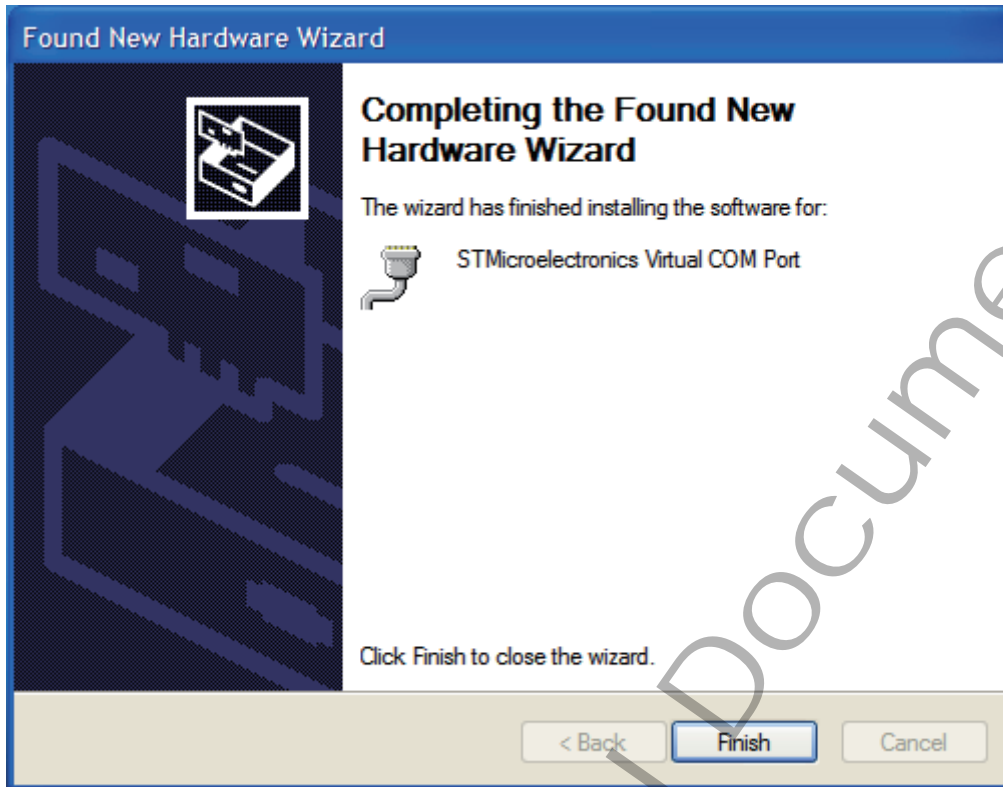
If the wizard prompts to help you install the software for "STMicroelectronics Virtual COM Port". Select **Install the software automatically (Recommended)**. Press **Next** button to proceed.



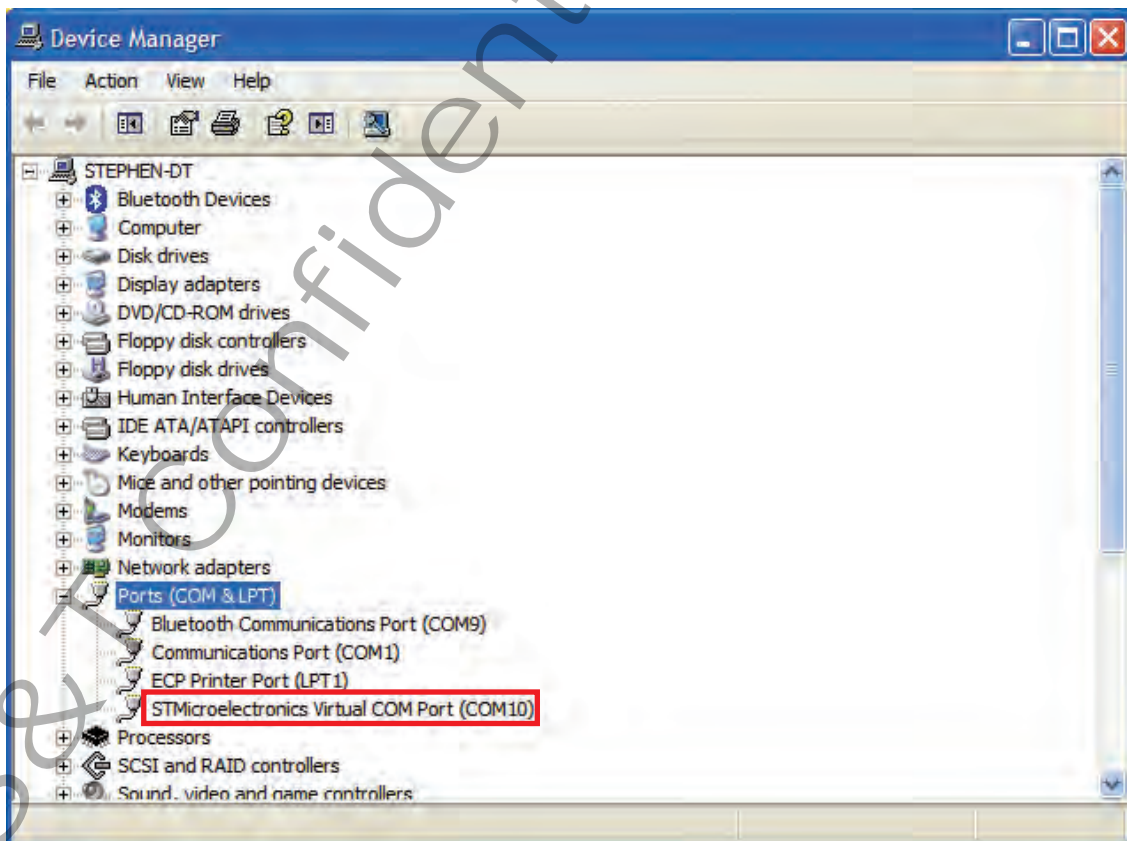
The wizard proceeds to install the driver.



The installation completes.

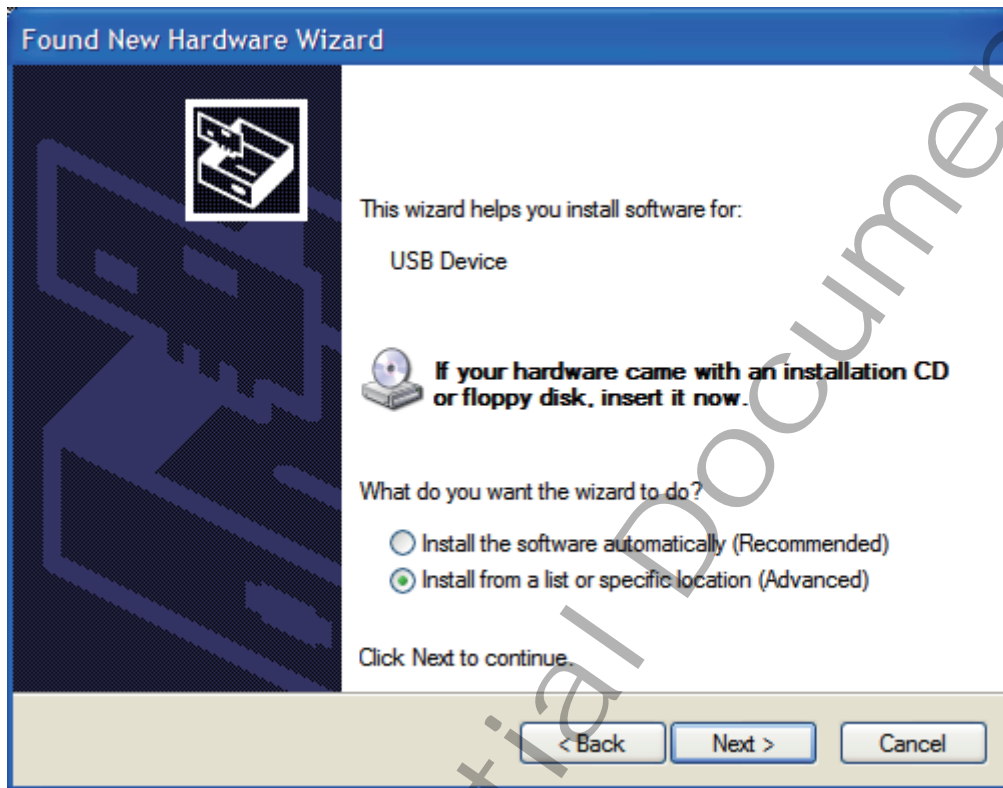


In [Device Manager], U1 device is included under Ports (COM & LPT) as "STMicroelectronics Virtual COM Port". COM port number is displayed as well.



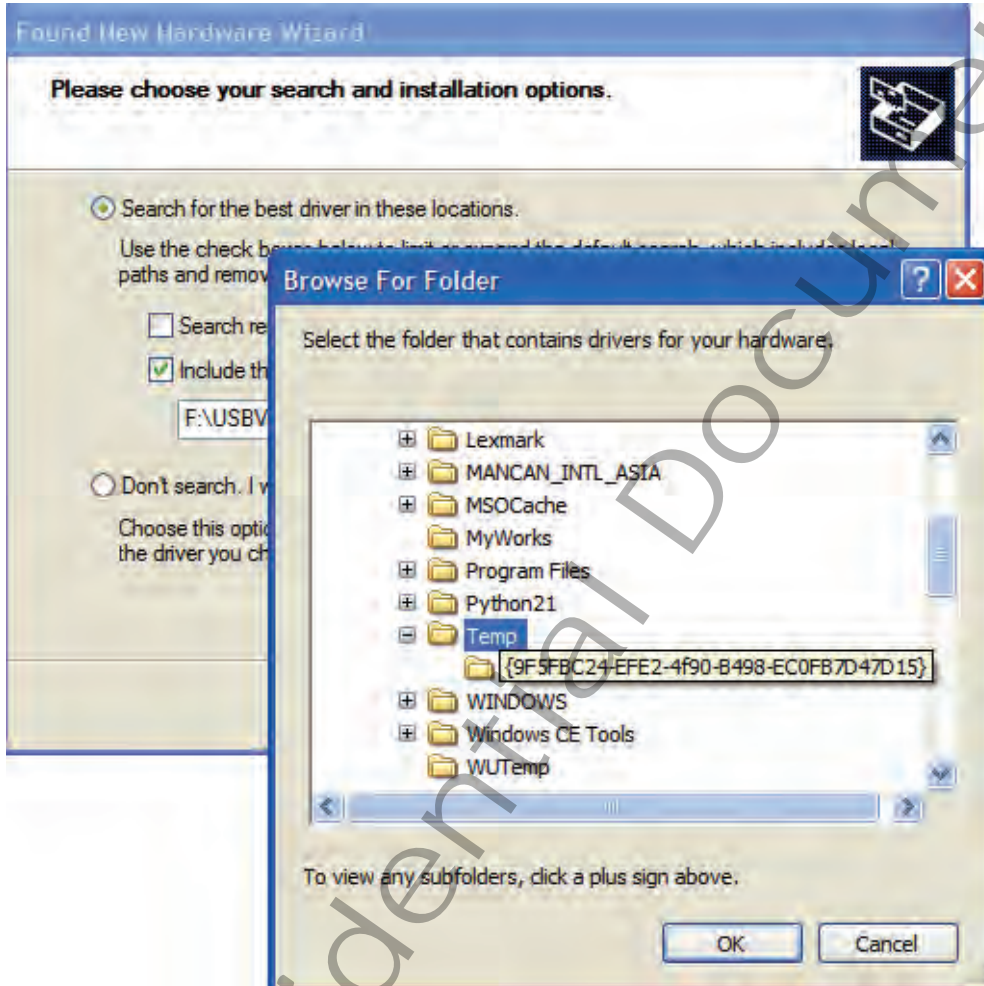
## 2. Manual Installation

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 **Next** button to proceed.

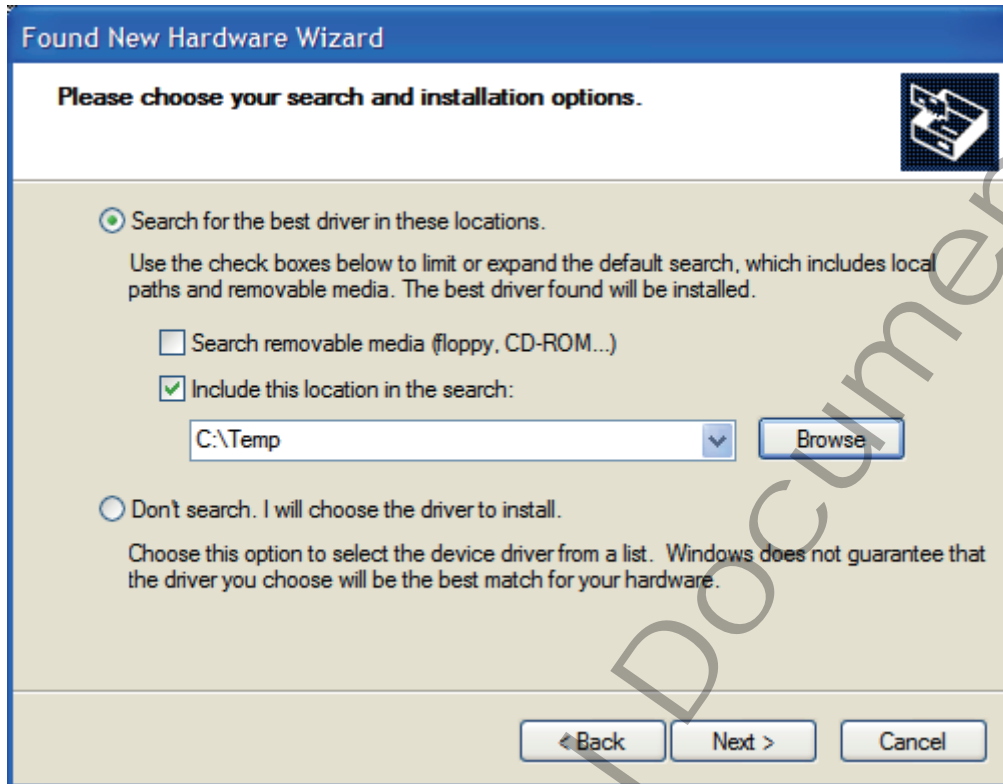


Select **Search for the best driver in these locations**. Check **Include this location in the search**. Press **Browse** button to assign where your **U1 device** driver locates on your local disk. (**U1's** USB device driver is free for download on S&T's website at: <http://www.systemtech.com.tw> )

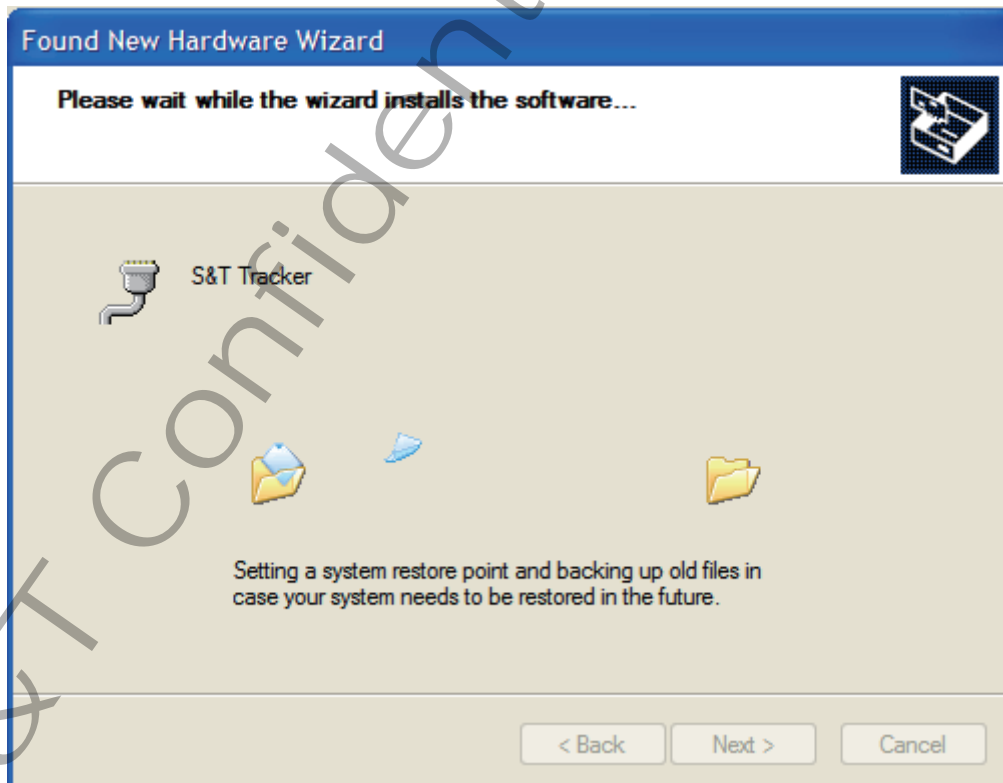
Press **OK** button.



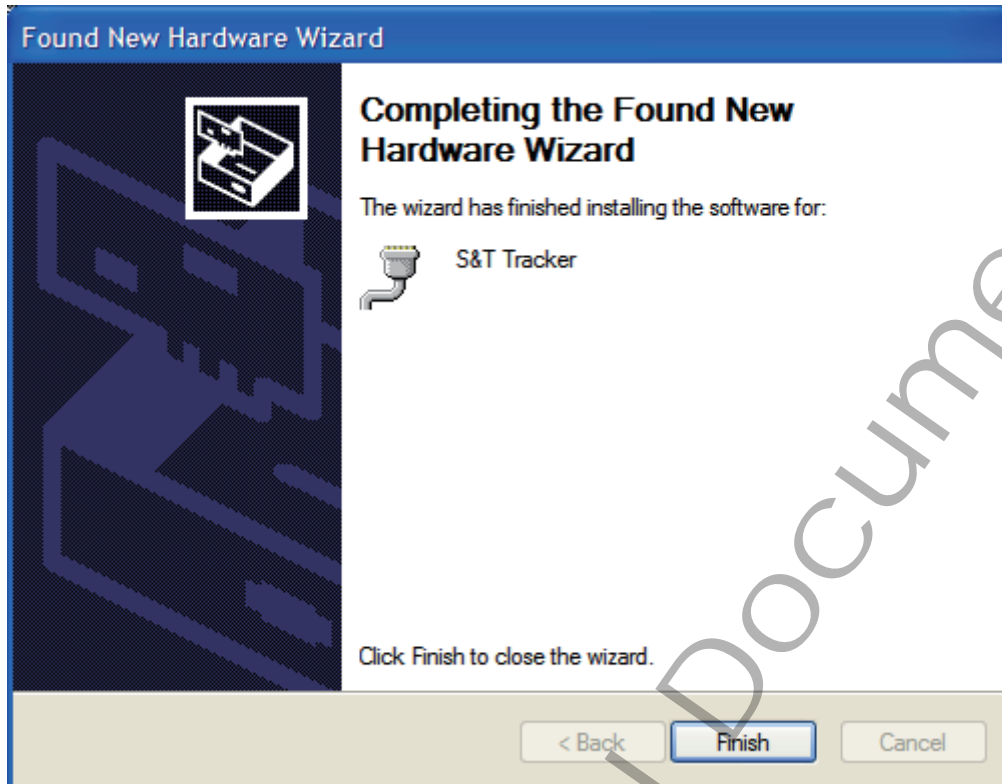
Press **Next** button to proceed.



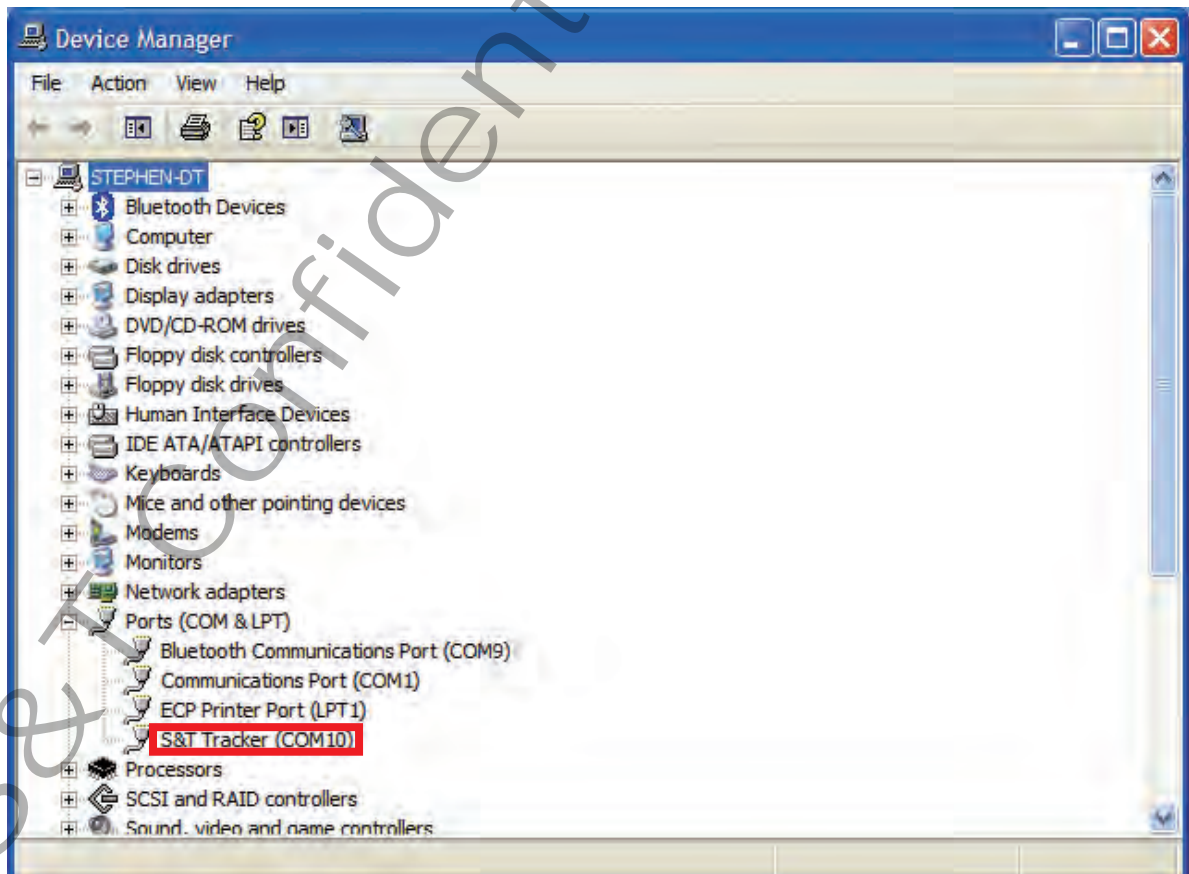
The wizard proceeds to install the driver.



The installation completes.

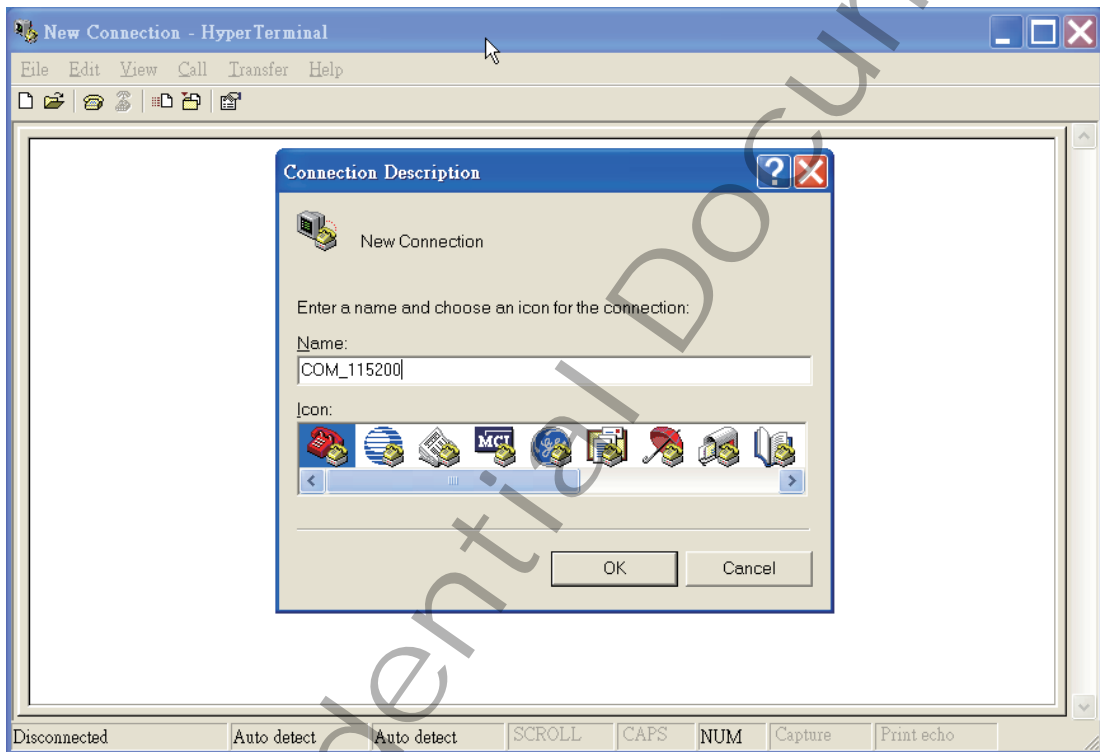


In [Device Manager], U1 device is included under Ports (COM & LPT) as "S&T Tracker". COM port number is displayed as well.



### 3.4. 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 **Icon** box, click an appropriate icon. Press **OK** button to proceed.

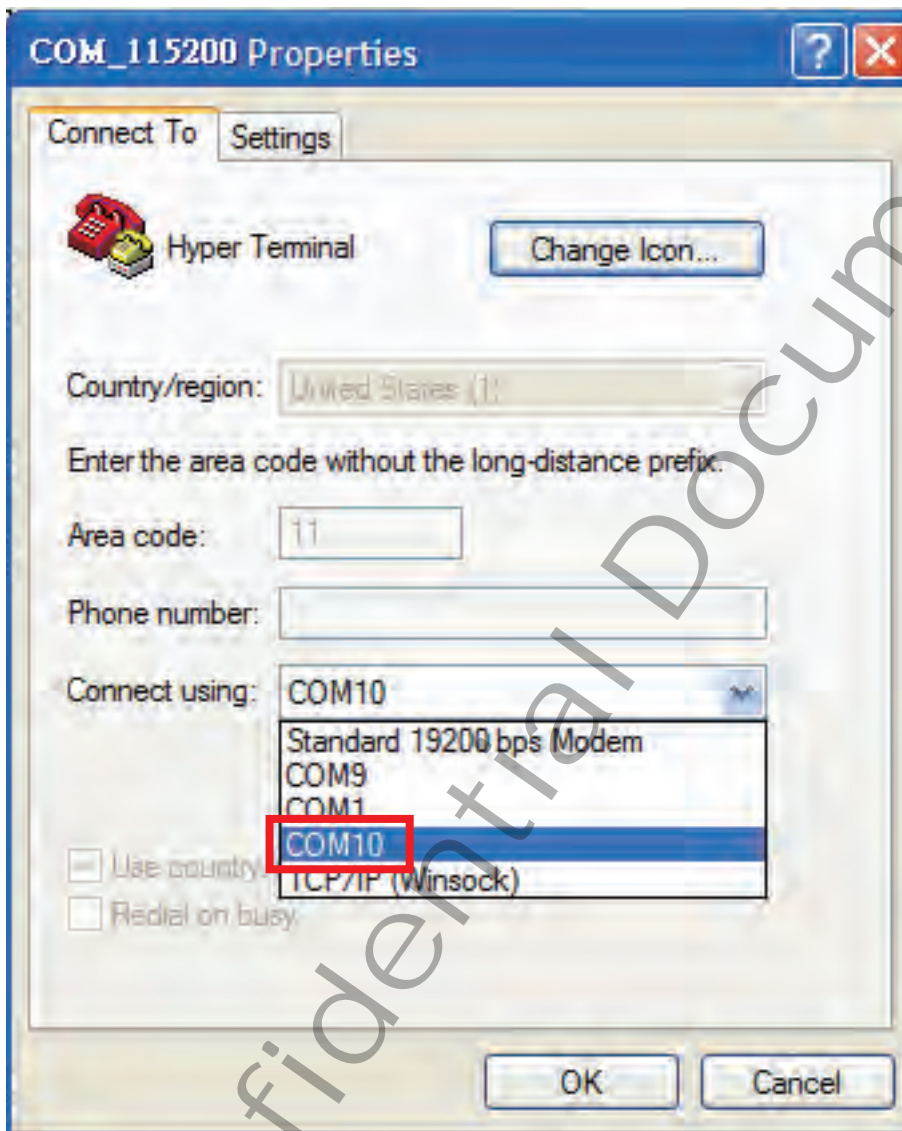


5. For Com port properties, configure as follows:

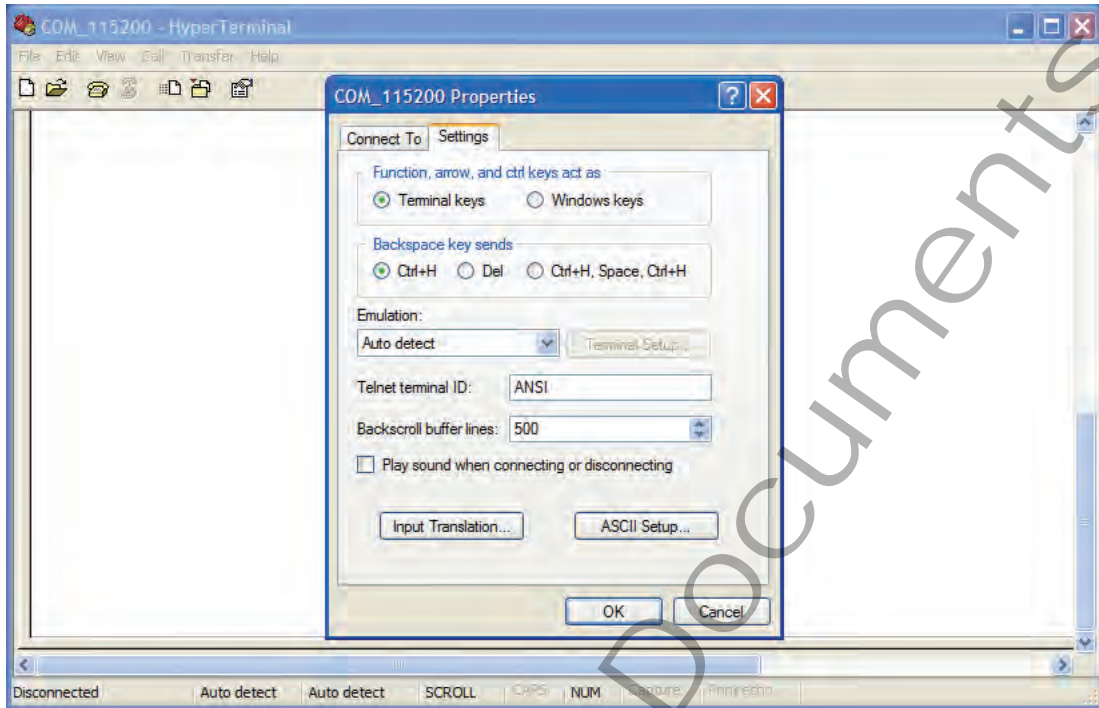
Baud Rate --> 115200 bps  
Data Bits --> 8  
Parity --> None  
Stop Bits --> 1  
Flow Control --> None



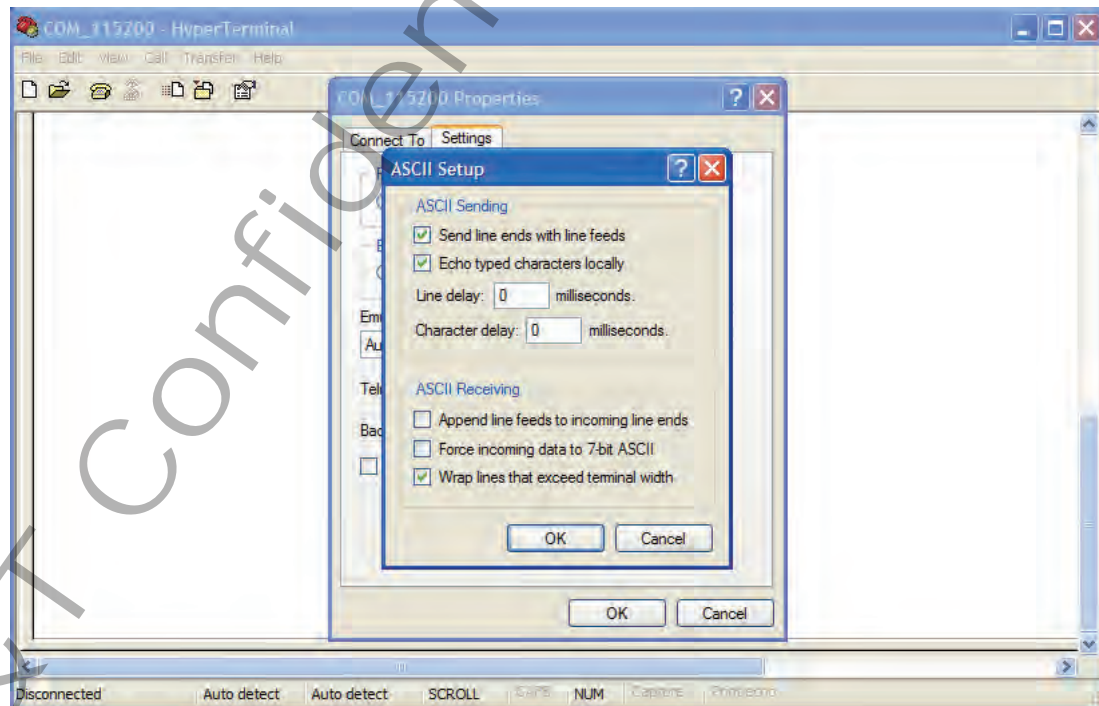
6. In the connection that you have just set up, click **File | Properties**. Select **[Connect To]** tab. From **[Connect using]** drop down list, select the correct com port by checking it up at Windows XP's **[DeviceManager]** as previously mentioned on page 16 and page 20. Go there by clicking **Start | Control Panel | System | Hardware | Device Manager**.



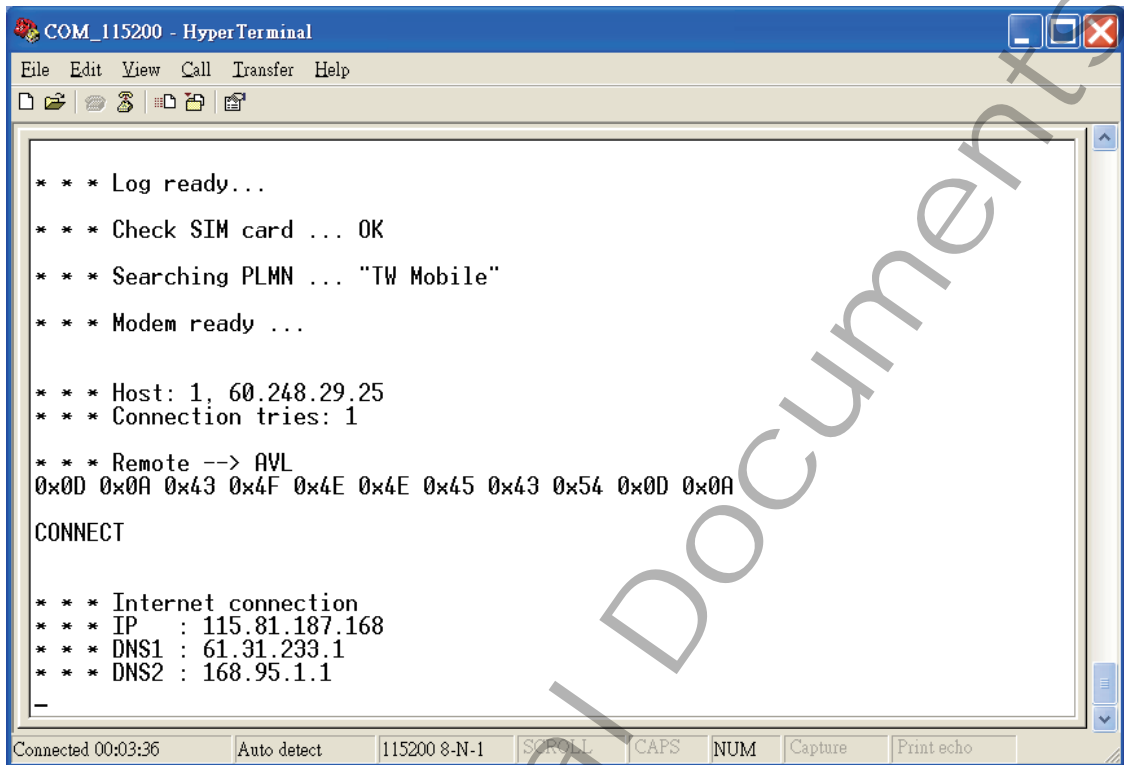
- In **File** menu, click **Properties**. Click **[Settings]** tab. Press **ASCII Setup** button.



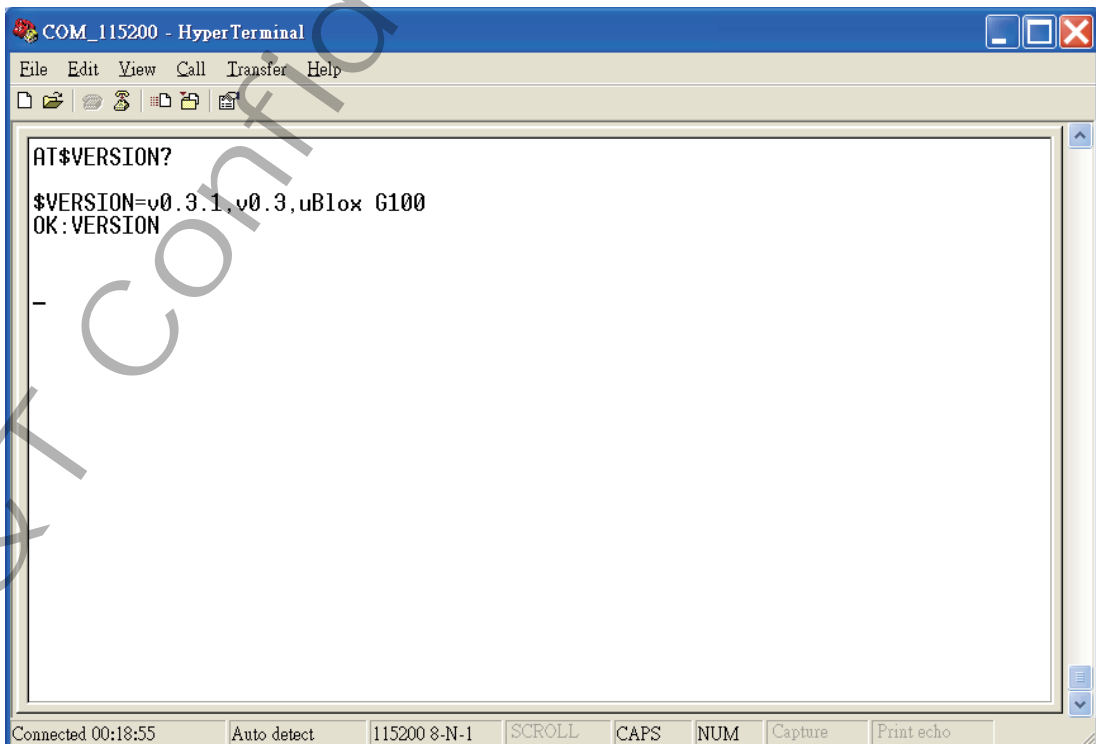
- In **[ASCII Sending]** group box. Select both **Send line ends with line feeds** and **Echo typed characters locally**. Press **OK** button.



9. Connect your **U1** device to power as mentioned in [Power, RS-232, and I/O Cable Connection](#) on page [9](#). The device startup message will be displayed.



10. In **[HyperTerminal]** window, type in the command "AT\$VERSION?" and press **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.



### 3.5. Communication Settings

**CAREU U1 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 **U1** 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 **CAREU U1 Protocol Document** for more command details.*

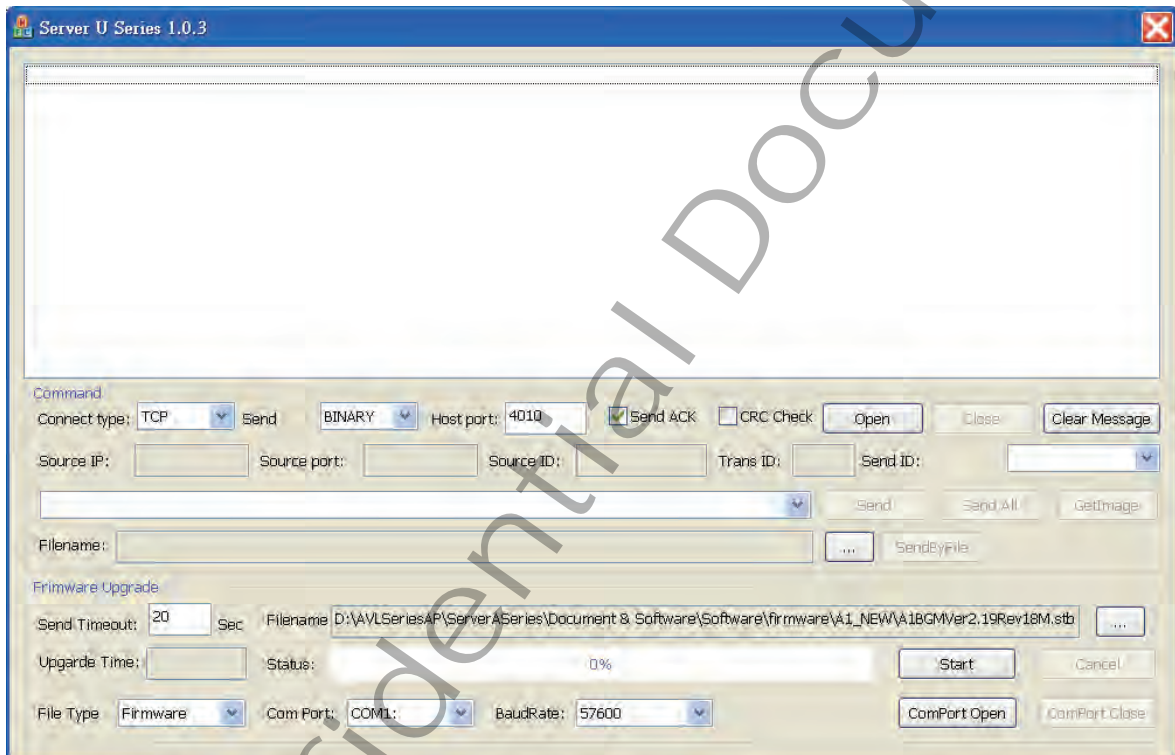
### 3.6. GPS Tracking Configurations

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,

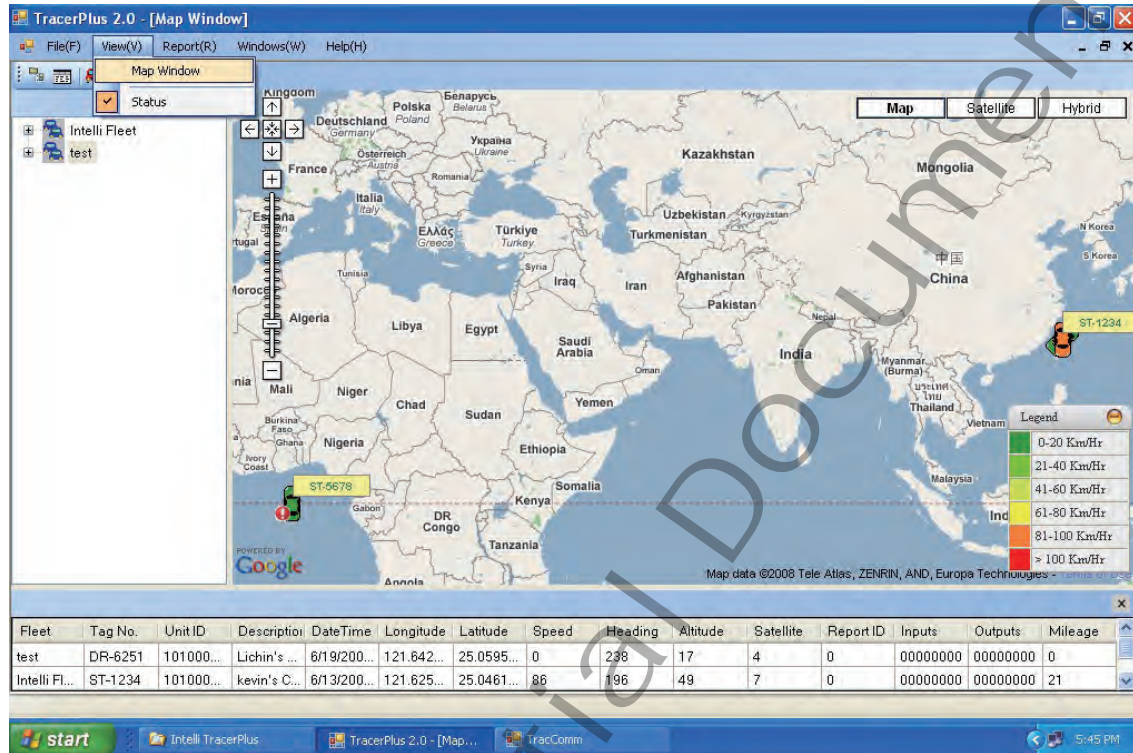
```
AT$PDSR=1,30,0,0,2,0,0,1,1 (Tracking through GPRS by time interval 30 seconds)
```

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 would need the software **IntelliTrac Tracer Plus**, which is now available for your download at [ftp://ftp.systech.com.tw/AVL/AVLS\\_TracerPlus/](ftp://ftp.systech.com.tw/AVL/AVLS_TracerPlus/). Please contact your account manager with S&T to request a set of user name and password to access the FTP.



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

The main page of **Intelli Fleetweb** appears as below:

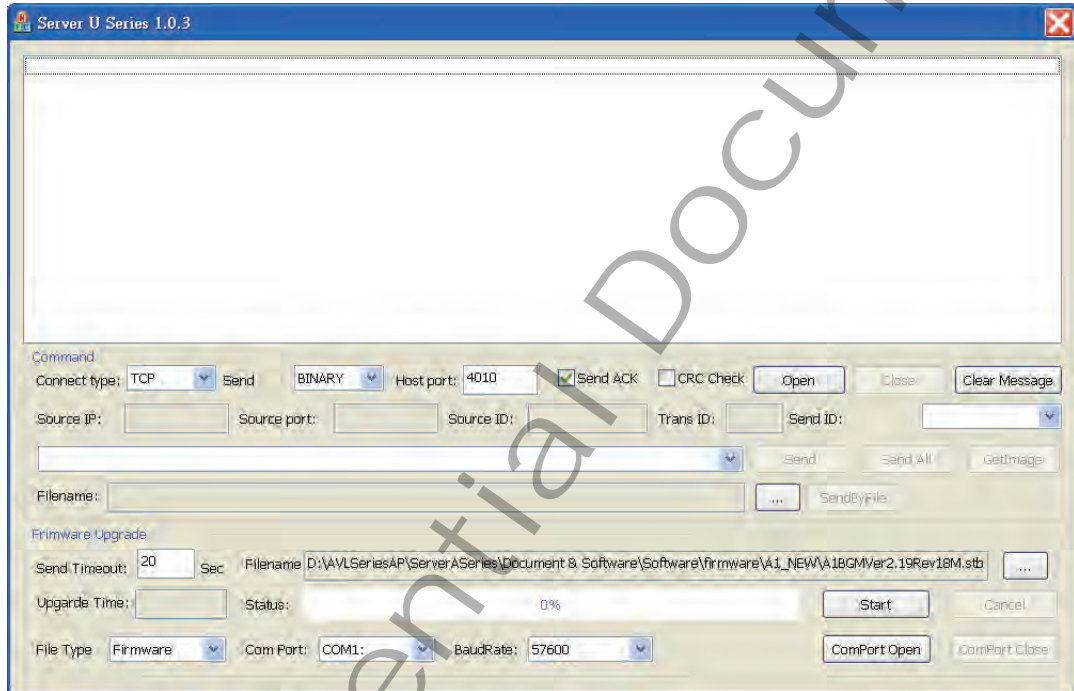





### 3.7. Firmware Upgrade

CAREU U1's firmware 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 button  to browse to the firmware provided by S&T.
- (6). Press **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 (With Connector)
Weight	165gm
Radio Performance	
Frequency (MHz)	Quad-Band 850/900/1800/1900MHz
GSM Functionality / GPRS	
GPRS Mode	MultiSlot Class 10
GPRS Coding Scheme	CS1,CS2,CS3 and CS4
GSM Antenna	External
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	8MB flash
Motion Sensor	3-Axes Acceleration Sensor
Led Indicator	2. Each orange (GPS status) and red (GSM status) one.

Interface I/O	
I/O Connector	1 Connector, 10pin
Serial Connectors	Serial 1 (configurable): 115200bps Serial 2 (configurable): 19200bps Serial 3 (configurable): 19200bps
Input Ports	Positive Triggers: 2 Negative Triggers: 2 Analog Inputs: 2 (0~30V, 12 Bits)
Output Ports	Negative Triggers: 3 (Total 500mA)
Electrical	
Power Source	DC 8V to 30V
Power Consumption	T.B.A.

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

## Chapter 5. About Systems & Technology Corp.

CAREU U1 Vehicle Tracker is produced by **Systems & Technology Corporation**. The company is a key developer and supplier of advanced systems in the Automatic Vehicle Location (AVL), Digital Map and Car Navigation Systems.

If you need information about other vehicle tracking solutions or products, please contact us by the phone and fax numbers listed below, or visit our websites.

Contact Information for **Systems & Technology Corp.**



S&T Web Site	<a href="http://www.systech.com.tw">http://www.systech.com.tw</a>
Technical Support Hotline	+886-2-2698-1599
Technical Support E-mail	<a href="mailto:avl@systech.com.tw">avl@systech.com.tw</a>
Main Phone	+886-2-2698-1599
Main Fax	+886-2-2698-1211

## Chapter 6. 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.