AS3/AS3E
User Manual

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1. Notification

1.1. Disclaimer

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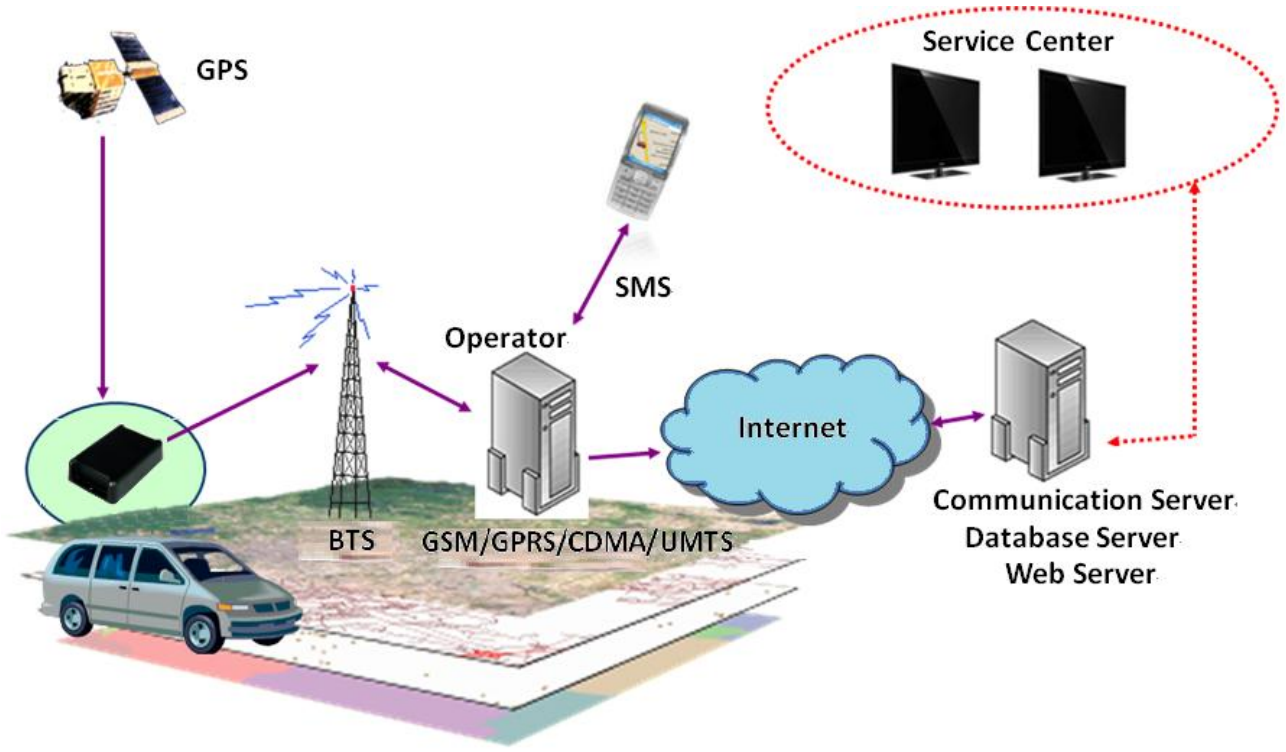
1.2. Copyright

1.3. Warning

Connecting the wire inputs can be hazardous to both the installer and your vehicle’s electrical system if not done by an experienced installer. This document assumes you are aware of the inherent dangers of working in and around a vehicle and have a working understanding of electricity.

2. Overview

From the following diagram, the AS3/AS3E GPS receiver receives incoming signals from each orbiting satellite. These signals consist of information such as satellite's position and the time that the signal was transmitted by each satellite. The receiver analyzes these data in order to determine how far away each satellite is and it uses the triangulation method to calculate the vehicle's exact position. Once the positioning data along with other event data are gathered, they will be transmitted to the service center across a Mobile network or via SMS. The communication is bidirectional, which means you can control the AS3/AS3E remotely across a Mobile network or via SMS.



System Architecture

3. Installation

3.1. Package Content

When you open the package, please verify that you received the following device and accessories:

- AS3/AS3E Device * 1

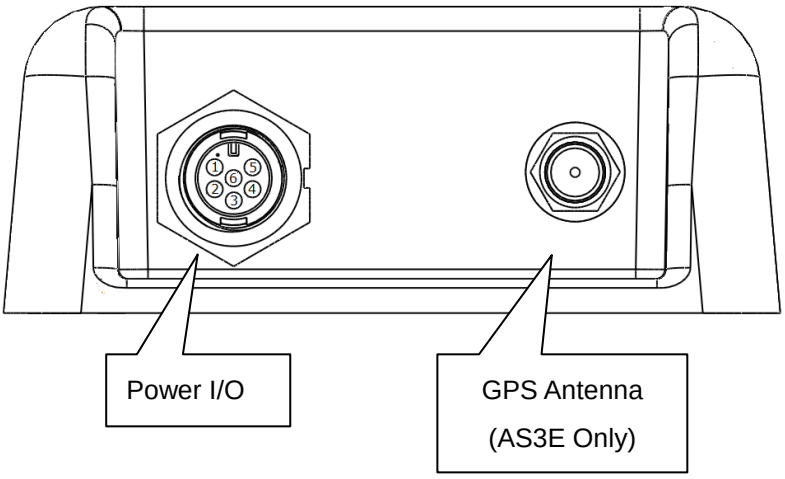
- Power/IO Cable * 1

- GPS Antenna * 1

- Magnet Mount Kits (Optional)

3.2. Power I/O Connector

The following figure shows power I/O connector and its pin number.



The following table describes the function of each pin.

Power I/O Connector				
Pin#	**Function**	**Color**	**Designation**	**Note**
1	Main power input	Red	PWR	DC 9V~40V input
2	ACC Input	Yellow	ACC	Ignition status positive trigger input
3**	General Input2 (Default) Analog Input1 1-Wire Protocol Input * RS232 Transmit data	Green	IO1	Positive trigger input Analog input (DC0V~40V) 1-Wire Data input See Chapter 5.1
4**	General Input1 General Output1 (Default)	Blue	IO2	Negative trigger input Open collector output (Max.300mA)
5**	General Input3 General Output2 (Default) RS232 Receive data	White	IO3	Negative trigger input Open collector output (Max.300mA) See Chapter 5.1
6	Power ground	Black	GND	

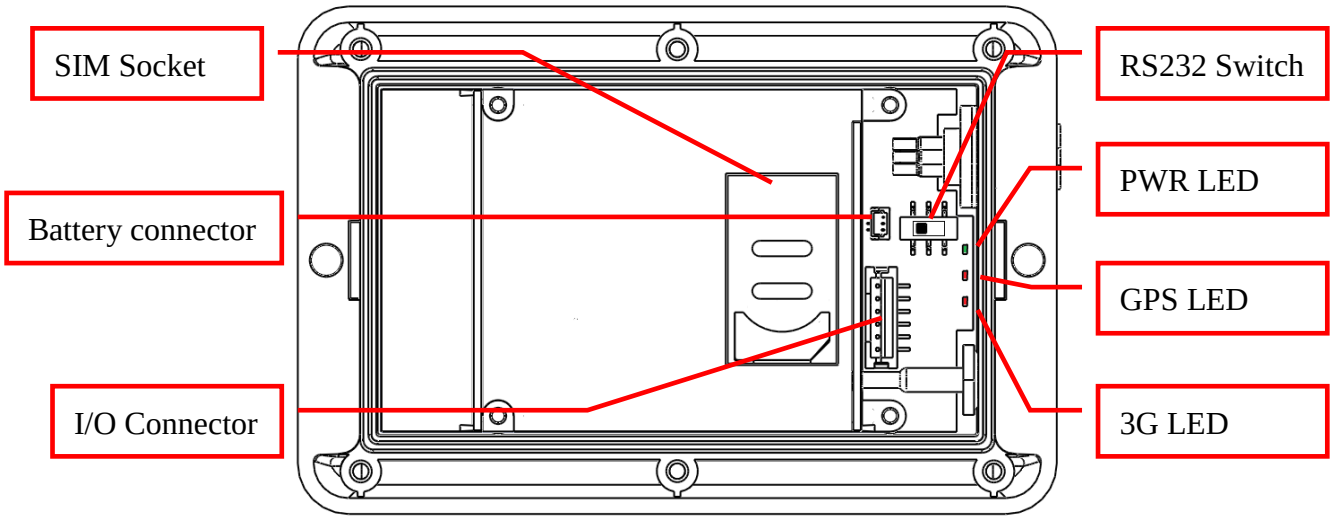
* The 1-Wire® Protocol supports up to three 1-Wire™ devices simultaneously, which means you can have one (iButton®, DS1990A) and two 1-Wire™ temperature sensor probes (DS18B20).

** You may configure the AT$IOCG command to change these specific I/O pins to any of those functions mentioned as above.

Please do not connect a positive voltage to any output pin!

3.3. Internal Connectors and LED indicators

The following figure shows the internal connectors and its functionality.

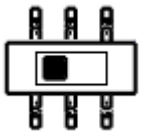


- **SIM Socket:**

  The AS3/AS3E supports a SIM card with either of these two operating voltages: 1.8V (ISO/IEC 7816-3 class C) or 3V (ISO/IEC 7816-3 class B).

- **RS232 Switch:**

  The pin#3(Green) and pin#5(White) of power I/O connector can be used for either general I/O or RS232. The RS232 switch is used for the configuration. See table below for detail description:

Mode	Switch setup	Description
RS232 Mode		Pin#3(Green) and Pin#5(White) are acting as RS232 Tx and Rx. This is manufactory default mode.
I/O Mode		Pin#3(Green) and Pin#5(White) are acting as general I/Os.

Power off the device and make sure the wire connection before adjust RS232 switch.

- **LED Indicators:**

LED	Indication	Description
PWR (Green)	Solid On	In full operation mode
	1 blink (0.1 sec.) in every 10 sec.	In sleep mode
	1 sec. On, 1 sec. Off	GPS module off, External power lost, running on backup battery
GPS (Red)	0.7 sec. On, 0.7 sec. Off	Searching for GPS signal
	Solid On	Position get fixed
3G (Red)	Off	3G module off
	0.7 sec. On, 0.7 sec. Off	Searching for 3G signal
	0.2 sec. On, 2 sec. Off	Registered on 3G network
	Continuous blinking	SIM PIN Error

Note: In the case of SIM PIN Error, the device will check the AT$SPIN every 10 minutes and try to access the SIM again. The PIN will be validated 3 times and if it fails the last attempt, including the first inserting time, the SIM card will be locked. Once the SIM is locked, you need to contact your 3G carrier for the PUK in order to unlock the SIM card using your cell phone.

3.4. DB9 Connector Wiring Diagram

For connecting the device to PC when configuration is needed, the following diagram shows how to solder/connect the DB9 connector.

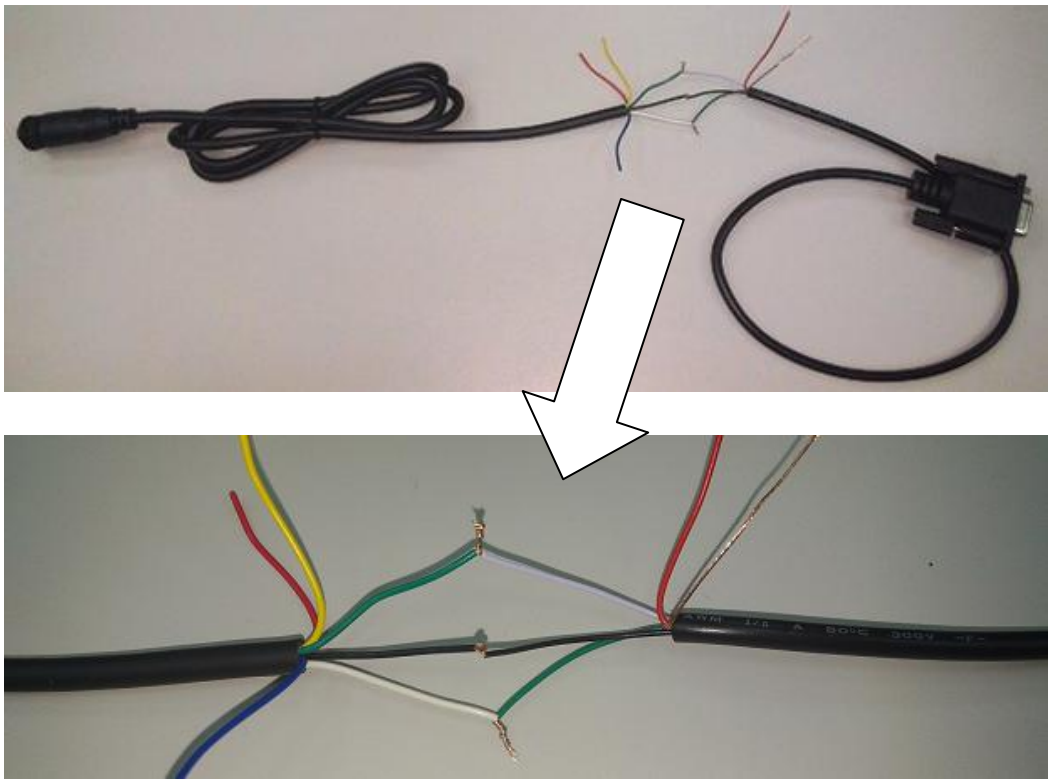
3.4.1. Using ATrack Serial Cable

Material needed: ATrack Serial Cable x 1, AS3 Power I/O cable x 1

1. Cut the ATrack Serial Cable and peel the Green, White, and Black wires as shown:

2. Peel the AS3 Power I/O Cable (Green, White, and Black wires) as shown:

3. Connect two cables together with **Green – White**, **Black – Black**, **White – Green** as shown:



Note: The Ground (Black) wire might need to be connected to the power supply ground as well so the voltage level is based on the same ground.

3.4.2. Connecting DB9 Female Connector

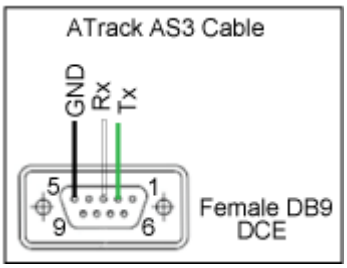
Material needed: AS3 Power I/O cable x 1, DB9 Female connector x 1

The ping connection is

Green – 2

White – 3

Black – 5



3.5. GPS Antenna Installation

The AS3/AS3E determines its position by communicating with Global Positioning Satellites through an external GPS antenna. The location where the AS3/AS3E GPS antenna is installed will have great effect in the overall performance of the GPS receiving. Please note that the following interior conditions may cause bad GPS reception when a GPS antenna is installed inside interior of vehicle:

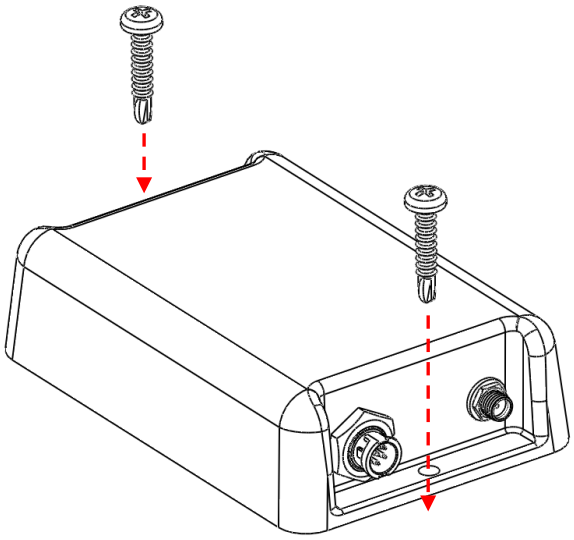
- Windows with metallic tint
- Windshield mounted radio antenna
- Windows with solar reflective covers
- The MP3 FM transmitter may interfere with GPS reception

3.6. Mounting Methods

The AS3/AS3E can be either surface or magnet mounted by using appropriate screws.

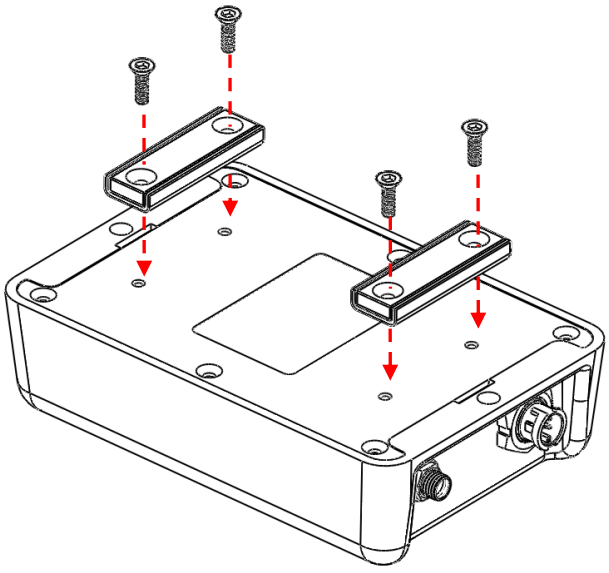
3.6.1. Surface Screw Mount

Use two #10 screws (diameter=4.8mm) to fix AS3/AS3E on a surface.



3.6.2. Magnet Mount

Use magnet mount kits to install magnets on AS3/AS3E device.



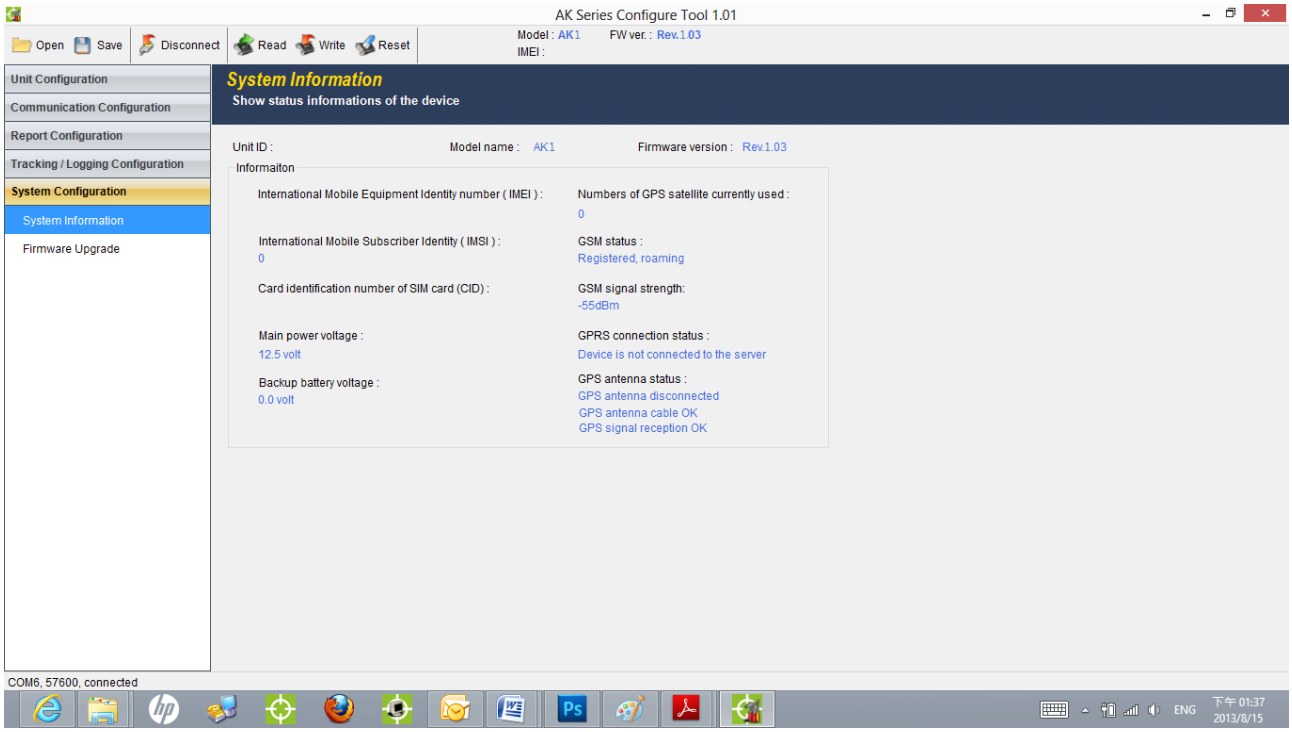
The magnets must be handled with care to prevent personal injury as they are extremely strong.

4. Configuration

You may explore great features on the AS3/AS3E either through AT commands or the AK Series Configure Tool. The commands can be sent to a device via RS232, SMS or Mobile network .

4.1. Set up a Device Using the AK Series Configure Tool

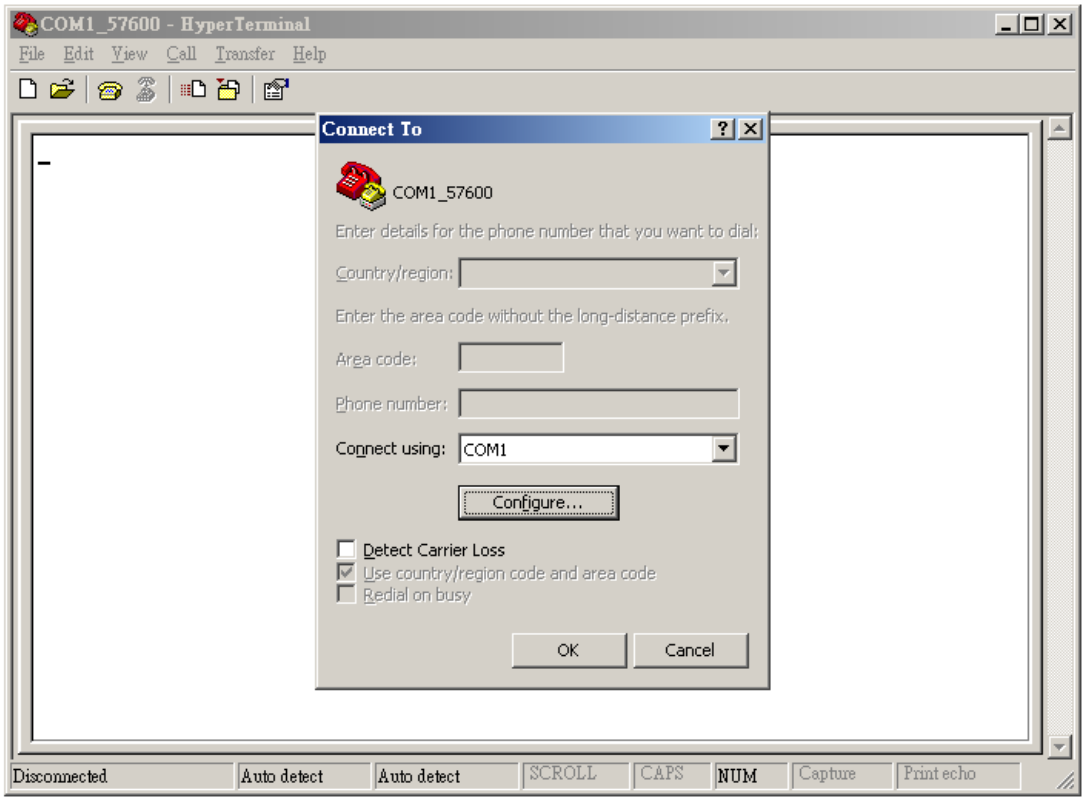
Before running the AK Series Configure Tool, make sure your device is connected to a PC/laptop via RS232. The AK Series Configure Tool provides a user-friendly intuitive interface that enables you to quickly and easily set up those basic parameters. Please refer to our AK Series configure Tool user manual for details.



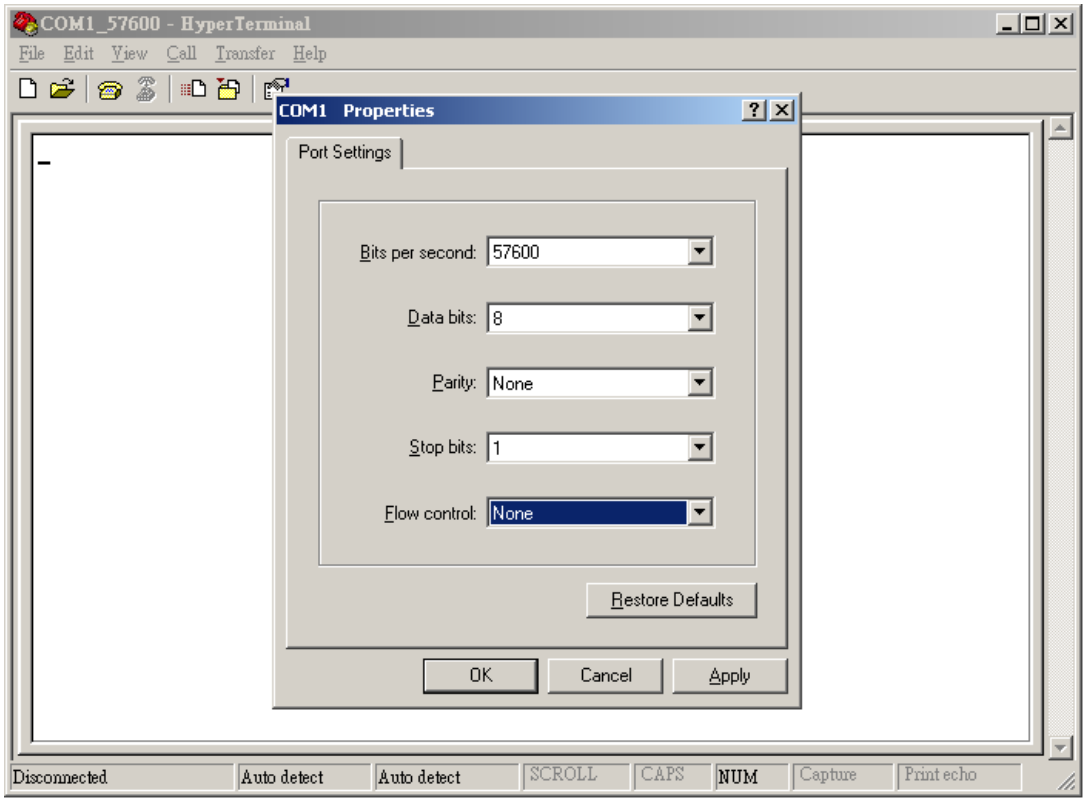
4.2. Connect a Device Using HyperTerminal

The following example shows how to connect the AS3/AS3E through HyperTerminal. You may use other popular terminal emulators such as Putty or Tera Term Pro to establish a console session with the AS3/AS3E.

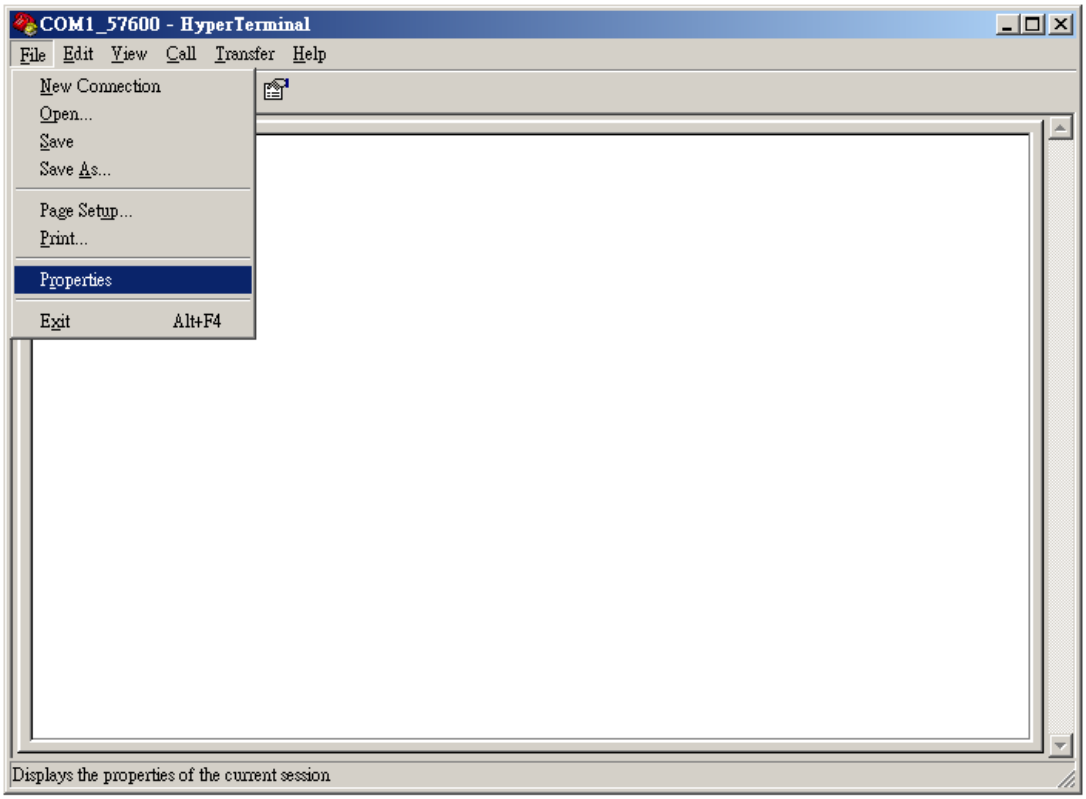
(1) Run HyperTerminal program and choose COM port and click [Configure…] button.



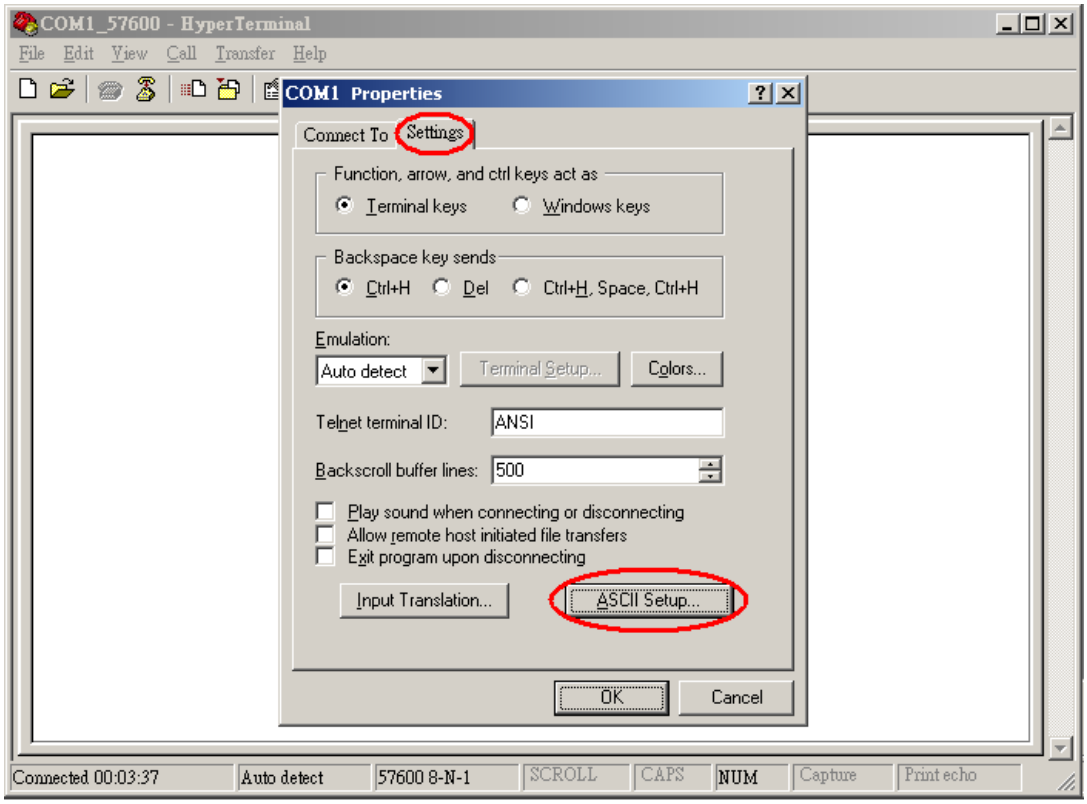
(2) Choose 57600,8,N,1 None flow control properties and click [OK] button.



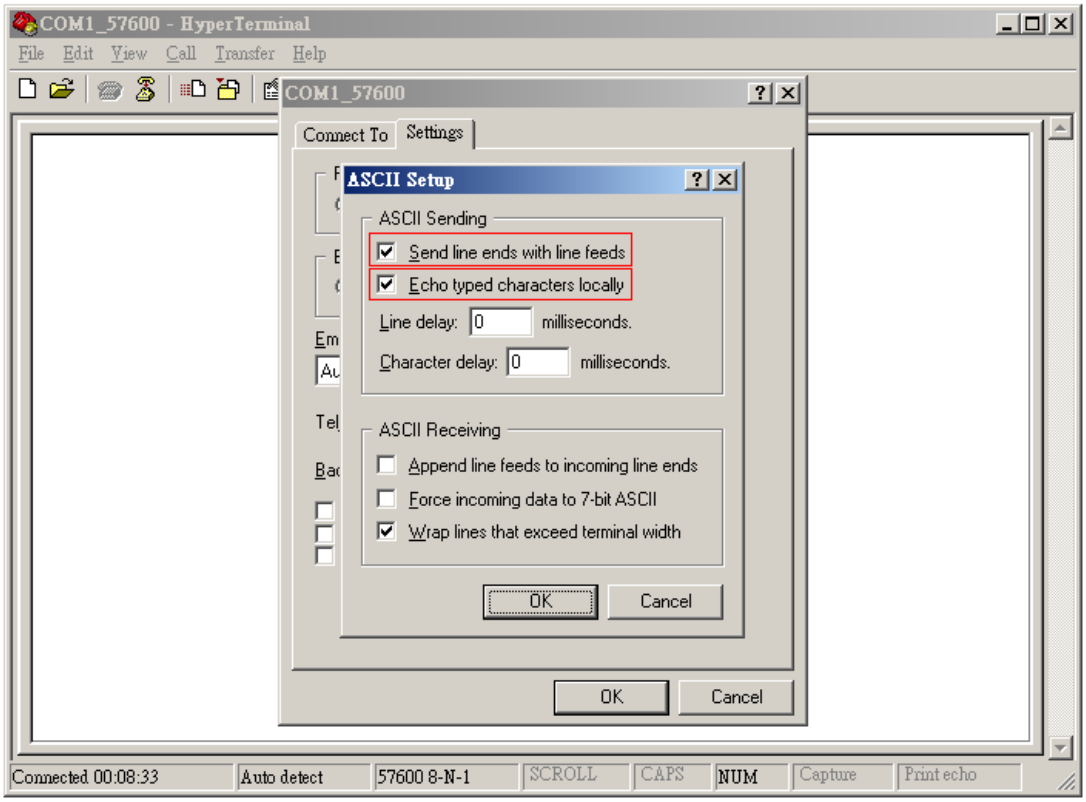
(3) Click [File]→[Properties]



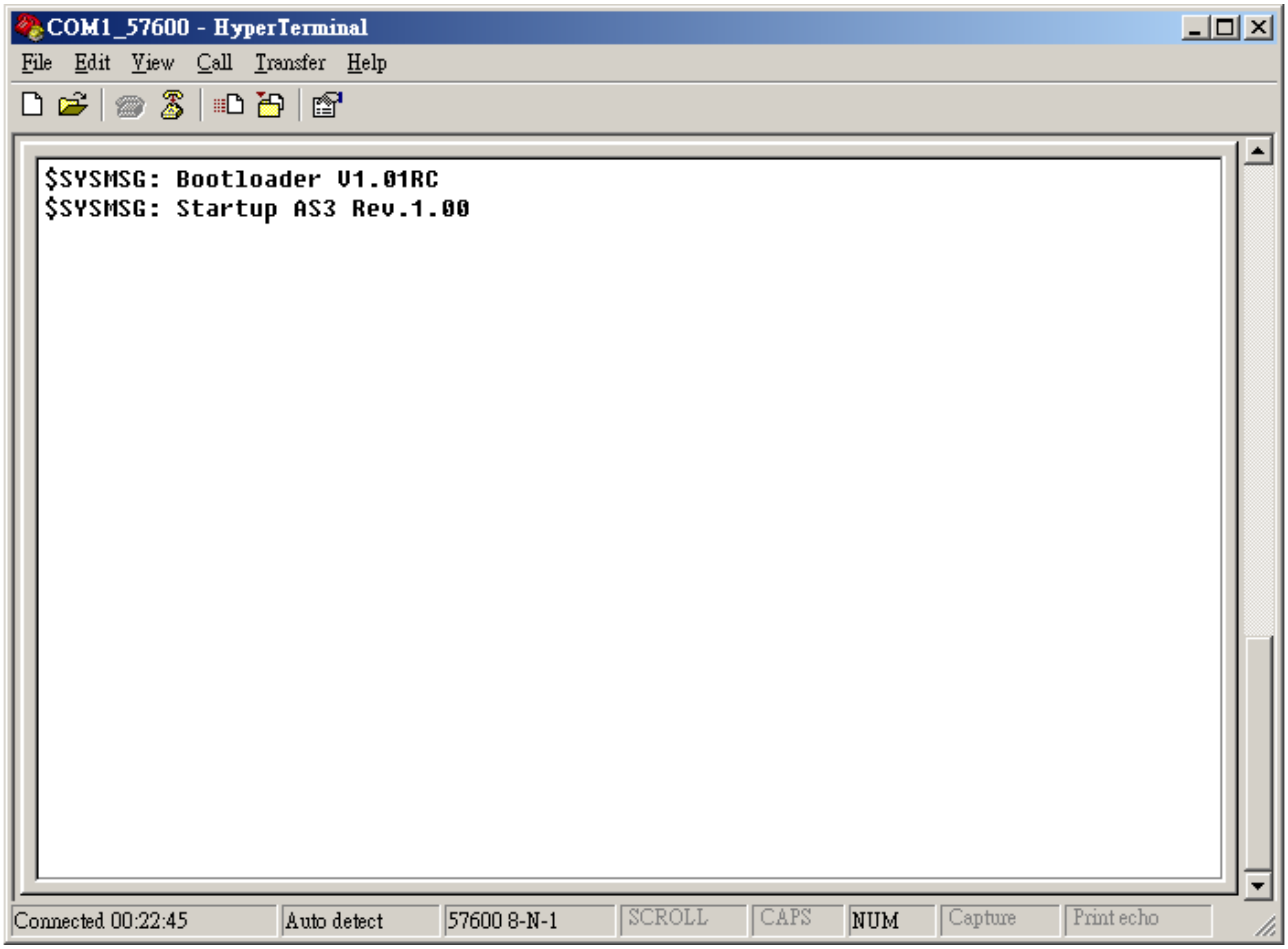
(4) Click [Settings] tab and [ASCII Setup…] button



(5) Checked the following options and click [OK] button

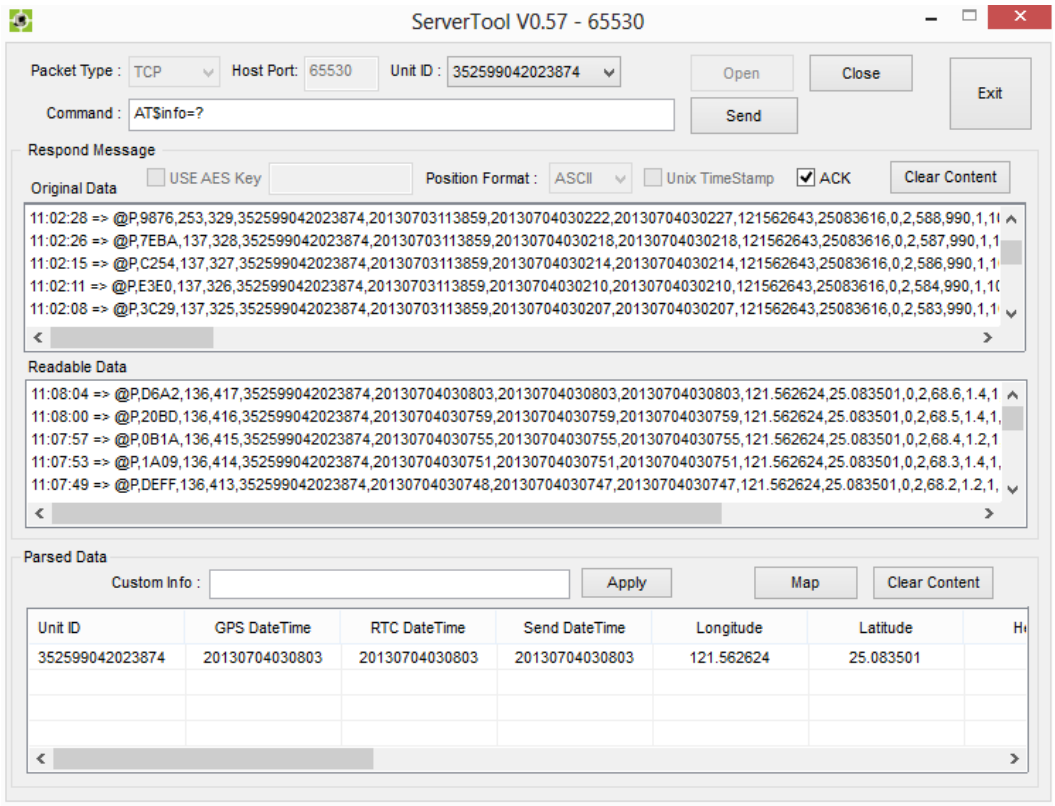


(6) Power ON the device. The startup message will show on the screen. The device AT command can be sent through the terminal after device startup.



4.3. Connect a Device to a Remote Server

The GPRS or UMTS connection can either be enabled by typing the AT$GPRS command or thorough the AK Series Configure Tool. Once enabled, the ATrack ServerTool is then installed on a Windows PC in order to communicate with the AS3/AS3E remotely via a GPRS or UMTS network. The ServerTool is a remote server application, which is mainly used for parsing data by translating binary formats into readable formats or other testing purposes. Port forwarding is required if the PC is located behind a Broadband router or any other firewall device or if it has third-party firewall software installed. The communication is bidirectional, which means you can issue any AT command to the AS3/AS3E by clicking the Send button. Please refer to the following snapshot and the Port forwarding website: http://portforward.com/ for details.



5. AT$IOCG Command Reference

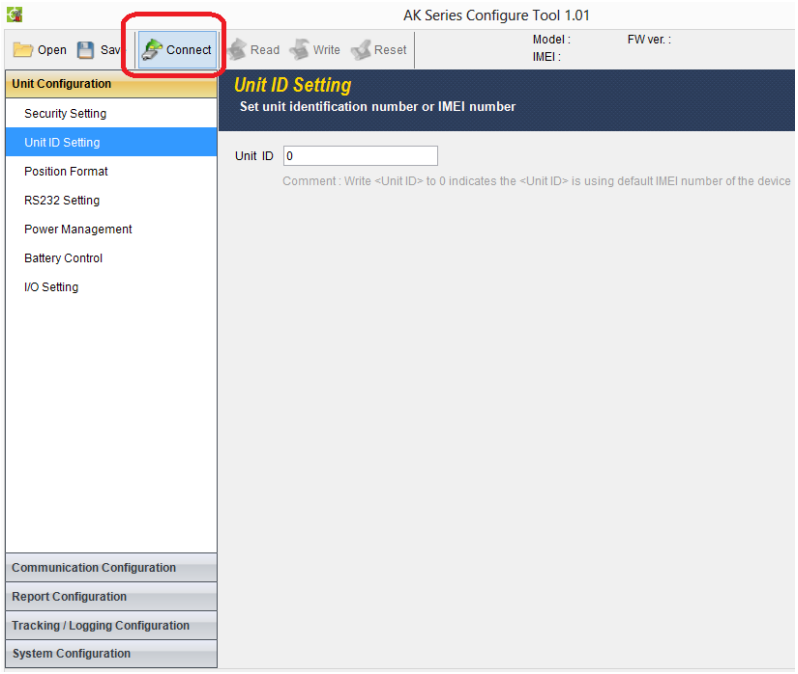
5.1. Configure or Query I/O Pin Characteristics

Command Description			
This command is used to set or query the I/O port characteristics of the AS3/AS3E. It is recommended to disconnect all I/O connections prior to changing the I/O characteristic in order to avoid damage to the I/O port.			
Syntax			
Write Command	AT$IOCG=<IO1>,<IO2>,<IO3>		
Response	$OK		
Read Command	AT$IOCG=?		
Response	$IOCG=<IO1>,<IO2>,<IO3>		
Parameter Description			
Parameters	**Description**	**Data Type**	**Default**
<IO1>	I/O configuration on Pin#3 (Green wire) 1: Input2 (VSS ,Pulse counter) 3: Analog Input 4: 1-Wire Data	U8	1
<IO2>	I/O configuration on Pin#4 (Blue wire) 1: Input 1 2: Output 1	U8	2
<IO3>	I/O configuration on Pin#5 (White wire) 1: Input 3 (RPM) 2: Output 2	U8	2
Example			
(1) Change all ports to inputs: AT$IOCG=1,1,1 (2) Change Pin#3 to 1-Wire Data input AT$IOCG=4,2,2 (3) Change Pin#4 and Pin#5 to digital inputs, and Pin#3 to analog input: AT$IOCG=3,1,1			
Remark			
☒**MEMO** ☒**SERIAL** ☒**SMS** ☒**GPRS**			

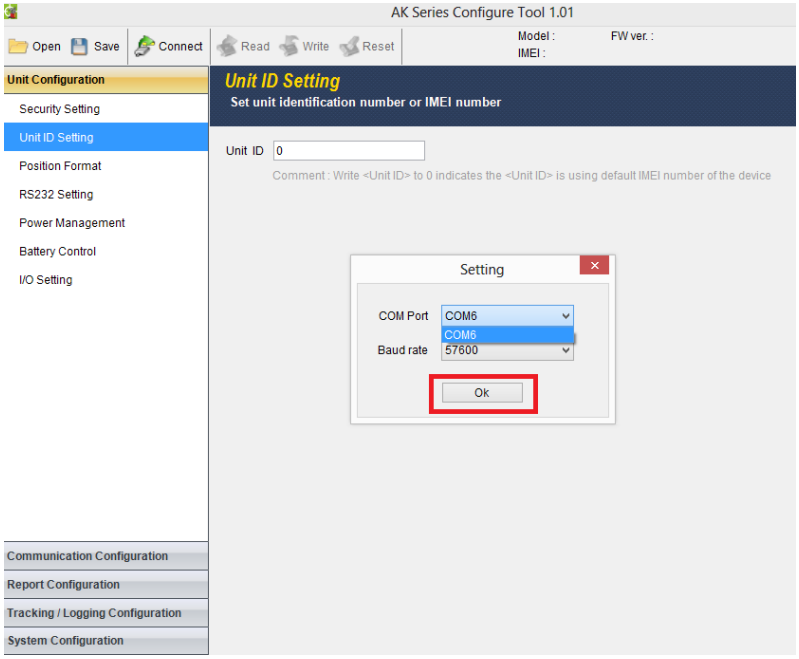
6. Firmware Upgrade

The device firmware can be upgraded via RS232 or through the FTP protocol. Following is an example of firmware upgrade via RS232.

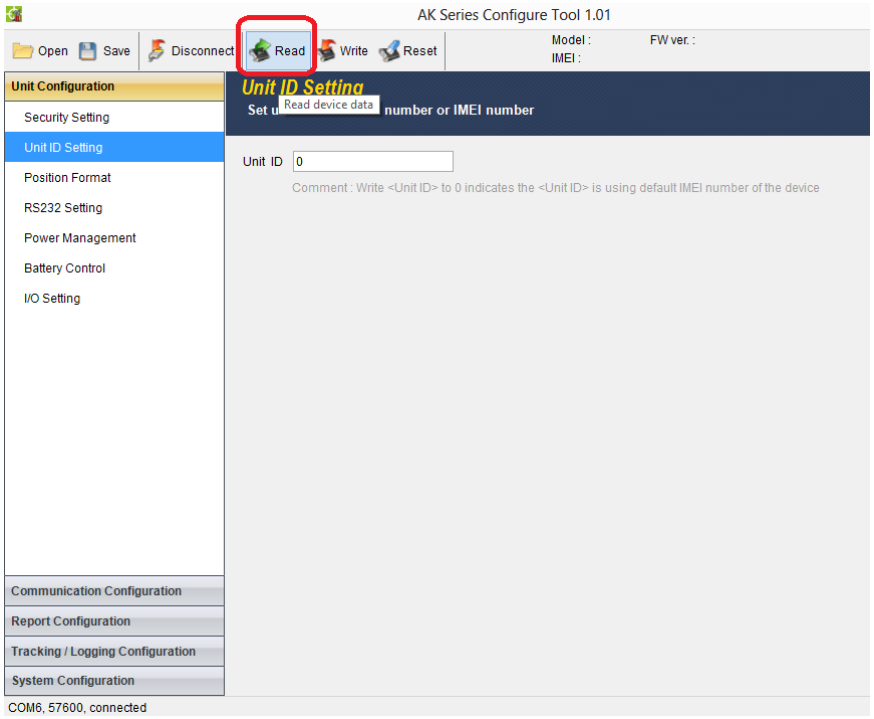
(1) Run the AK Series Configure Tool and click on the **[Connect]** button.



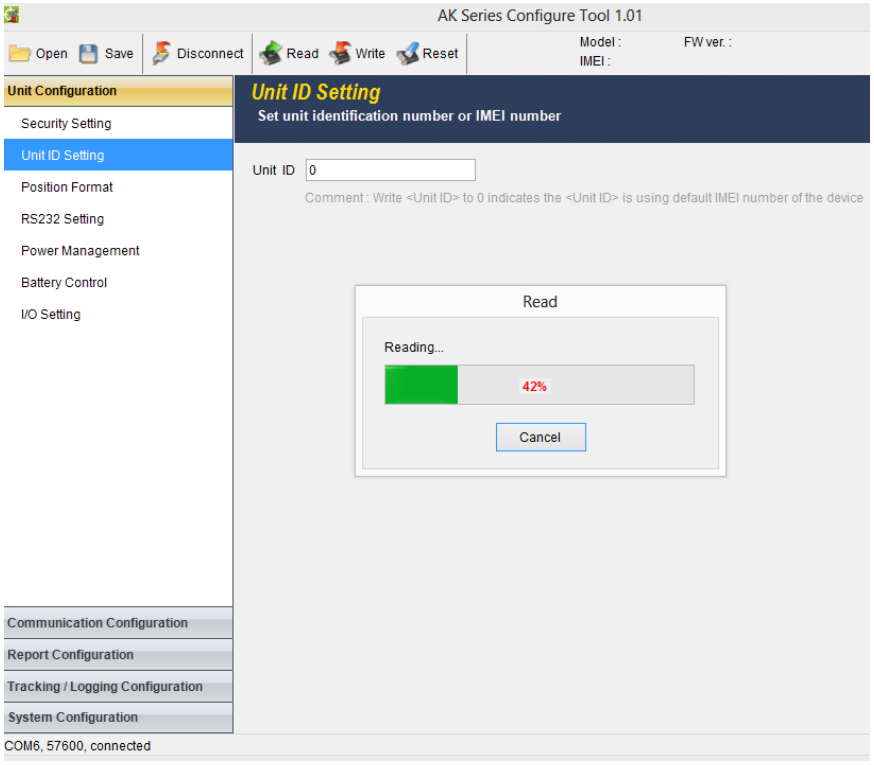
(2) Select the correct COM port and the Baud Rate (57600) from drop-down lists. Click on the **[Ok]** button to close Setting.



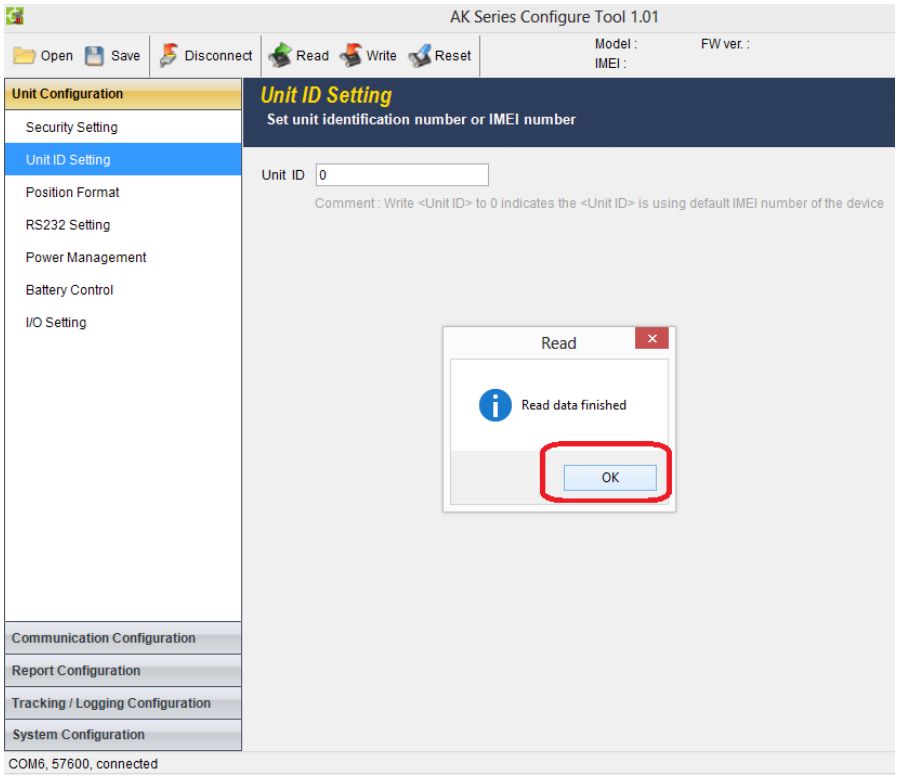
(3) Click on the **[Read]** button to read out data from the device.



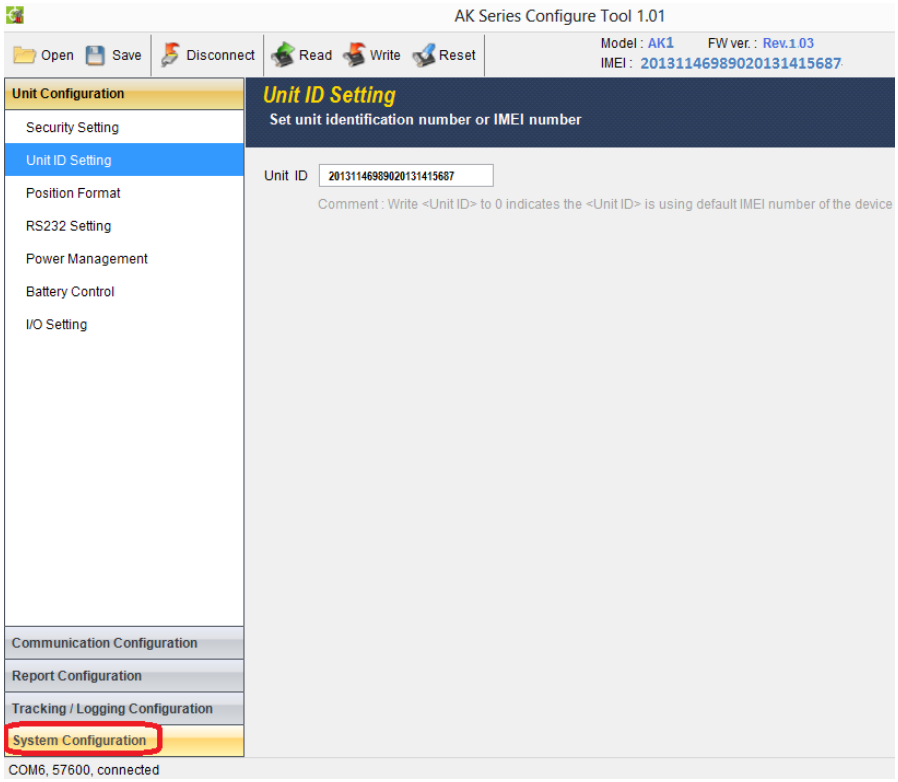
(4) From the following snapshot, the data is being read out.



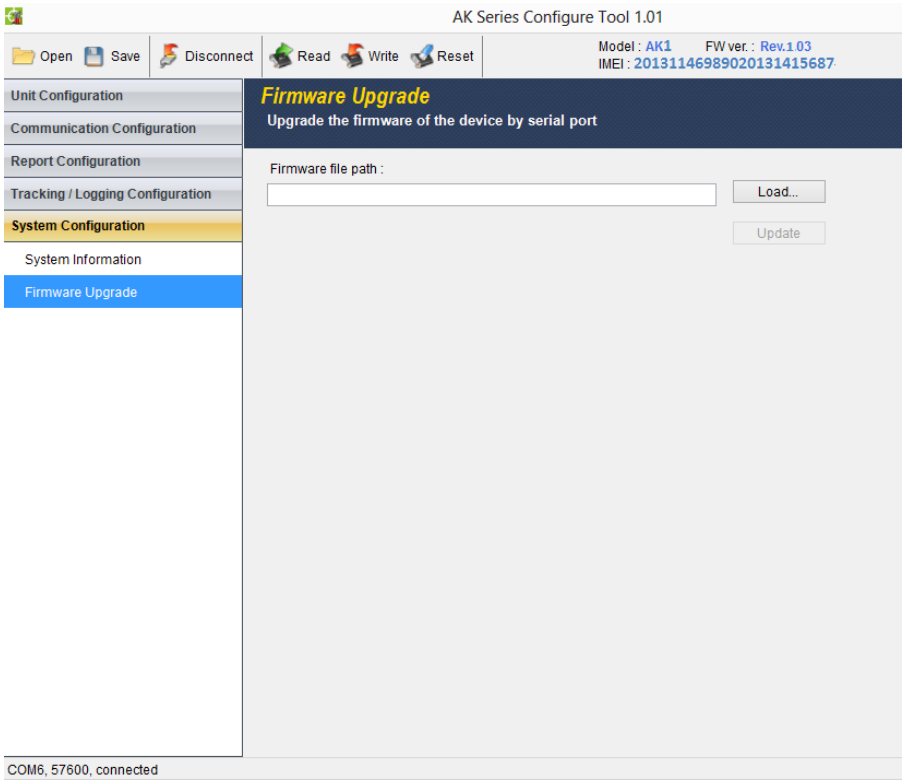
(5) Click on the **[OK]** button to close the message box.



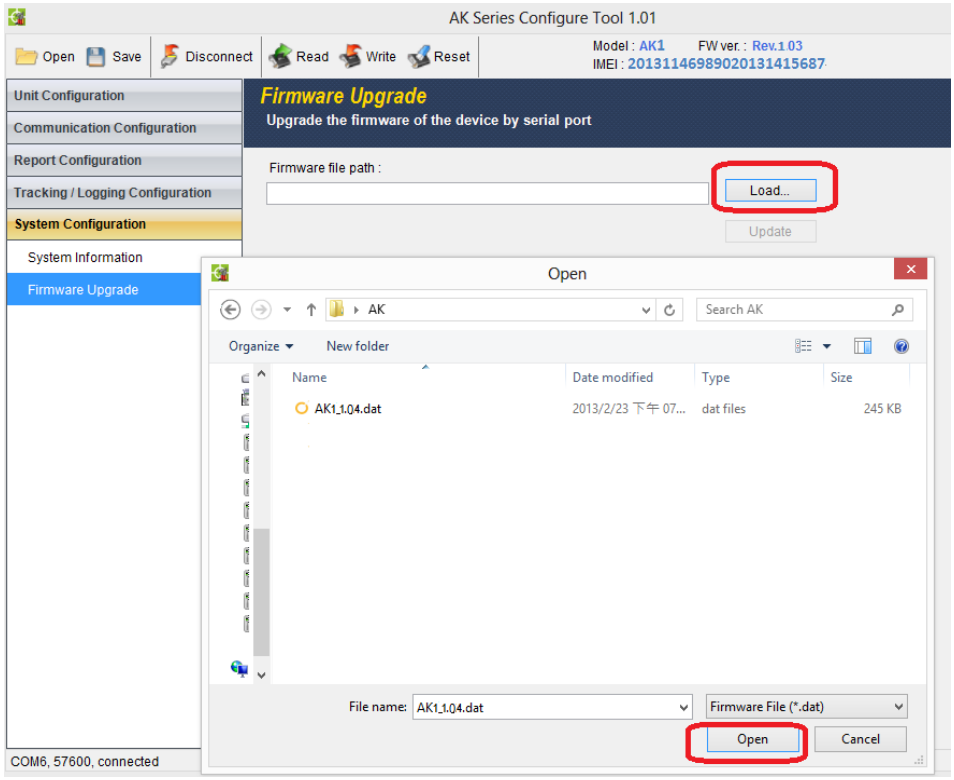
(6) Click on **[System Configuration]**



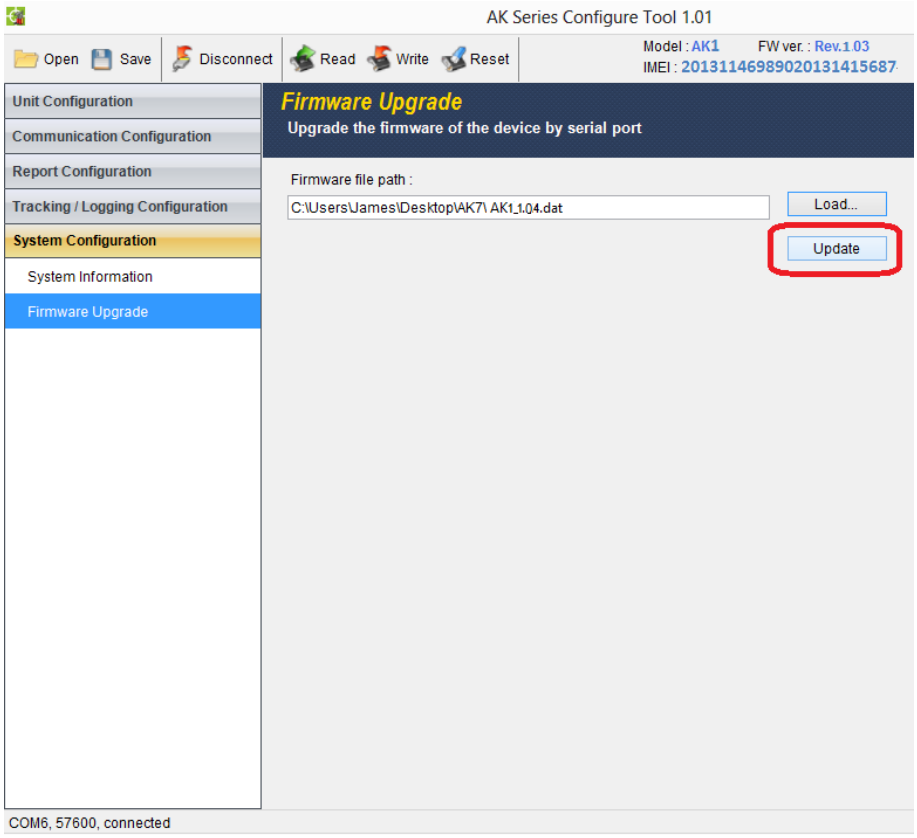
(7) Click on **[Firmware Upgrade]**



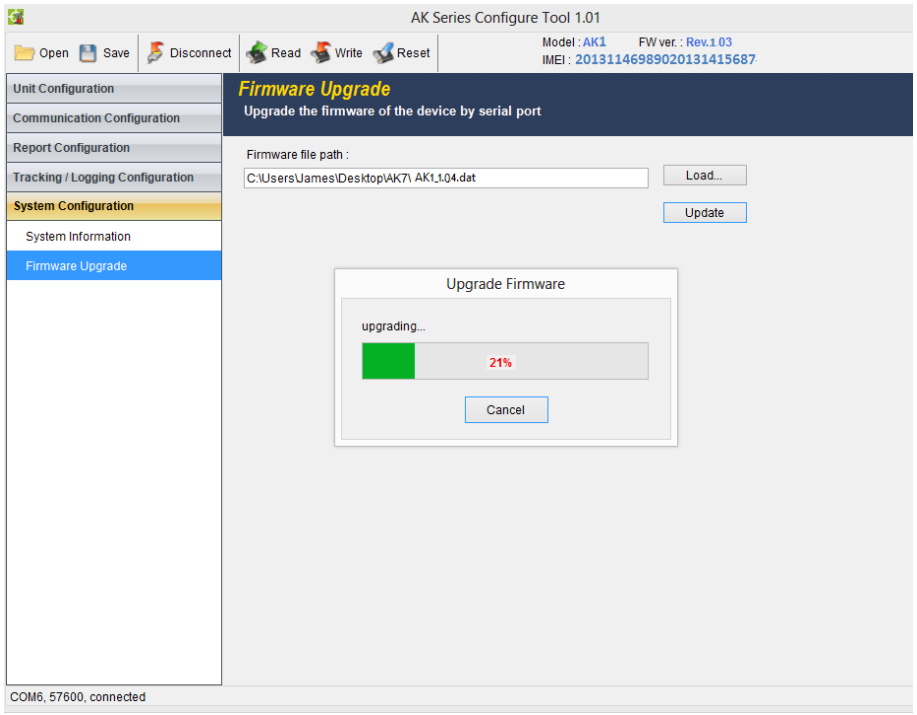
(8) Click on the **[Load…]** button to browse the firmware file where you saved. In the following example, **AS3/AS3E_1.04.dat** is selected and click on the **[Open]** button to close the window.



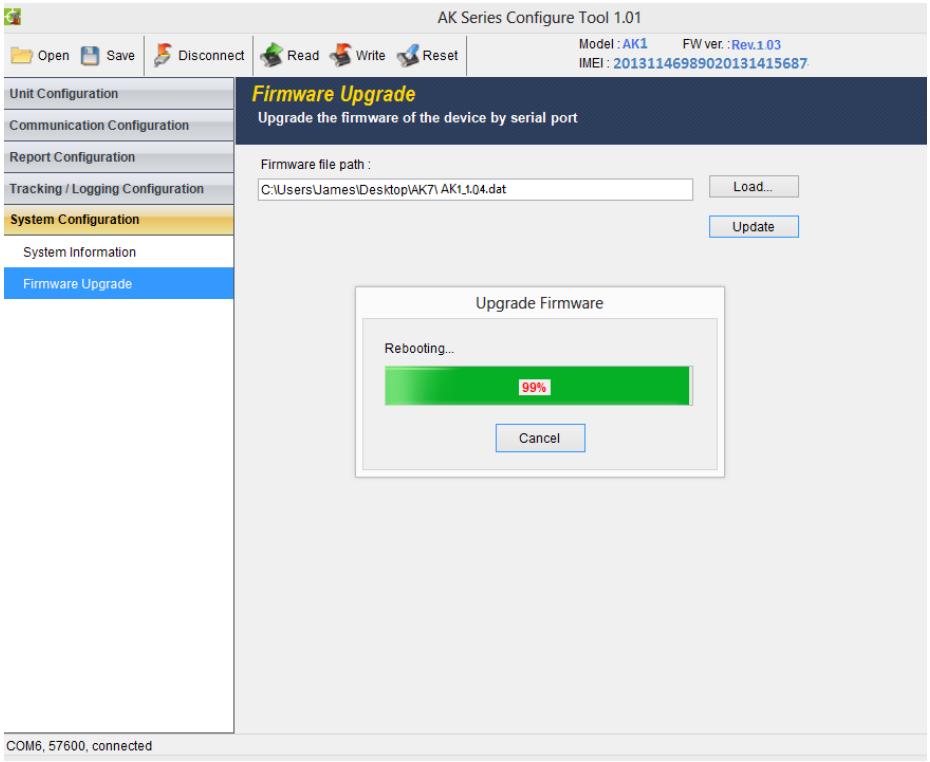
(9) Click on the **[Update]** button to upgrade the firmware.



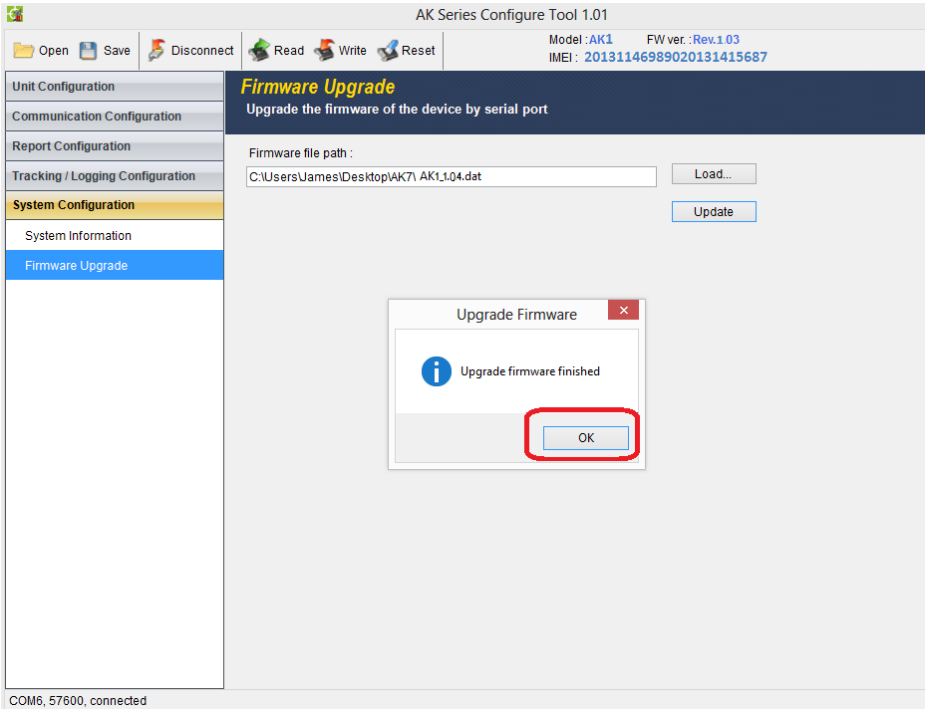
(10) From the following snapshot, the firmware is being uploaded.



(11) From the following snapshot, the device is being rebooted.



(12) Click on the **[OK]** button to close the message box.



7. Appendix

7.1. Hardware Specification

Model Number	AS3	AS3E
Dimensions (L x W x H)	120 x 80 x 32 mm	
Housing	Flame Retardant ABS+PC (UL 94 V-0), IP67 water proof	
Operating Temperature	-20℃ ~ +60℃	
Electrical Characteristics		
Power Supply	8V ~ 36V DC (±20%)	
Internal Battery	2050mAh Li-ion rechargeable battery	
Cellular Network Communication		
Frequency(MHz)	HSPA : Dual-band (850/1900 or 900/2100)	
Cellular Antenna	Internal Cellular antenna	
SIM Card	1.8V/3V Mini SIM(2FF)	
GPS/GLONASS		
Receiver	66 Acquisition Channels, L1 Band, C/A Code, -165dBm sensitivity	
Accuracy	3.0m CEP50 without SA	
Data Acquisition Rate	1Hz	
GPS Antenna	Internal GPS antenna	External GPS antenna
GPS Data Buffer	2 MB	
Accelerometer		
3-Axis	Z,X,Y	
Resolution	±2g, 10-bits resolution	
Interface/Input /Output	*The specification shown the max. ports of the I/O configuration.	
Input/Output	1 ACC Positive Triggered	
	*1 Digital Positive, 2 Negative Triggered	
	*2 Open-Collect Output (Max. sink current 300mA)	
	*1 Analog input (0~40VDC, 12bits resolution)	
	*1-Wire Protocol Supported	
	*1 RS232 interface	
Standard Accessories		
Power cable	6-wires (1.2m)	
GPS Antenna	N/A	GPS Antenna(5.0m)

7.2. FCC Regulations:

● 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.

● This device 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 generate, uses and can radiated 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.

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.

● 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 (8 inches) during normal operation.