

Revision Record

Check and Approval

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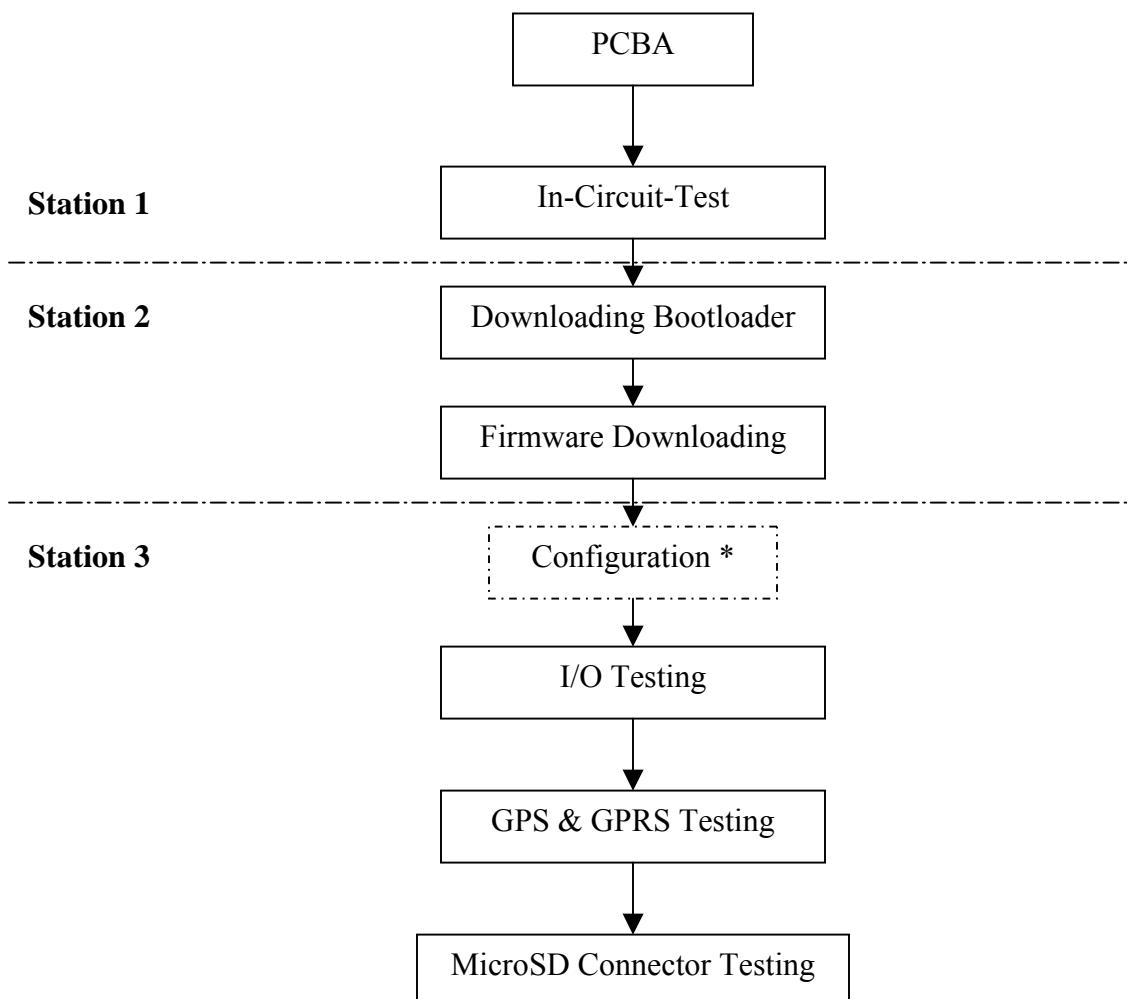
1. W618 Factor Test Overview

1.1 Test Objective

The objective of factory test is to make sure every unit is tested and functional before sending to customers. There will be three test stations including In-Circuit-Test station, downloading station and functional test station.

1.2 Flowchart

The flowchart of the testing procedure is shown below.



* Take Note: This configuration is only required at first setup. All the settings must be saved for subsequent testing.

2. Station Setup

2.1 Station One – ICT Station

This station is the ICT station. The fixture will do in-circuit-test for test points and certain components. Some of the points and components are not able to be tested by the fixture. The list of untested points is shown in the table below.

Item	Part Name	Remarks	Item	Part Name	Remarks
1	L201	No Access Point	20	C101	
2	R227	No Access Point	21	C102	
3	C3		22	C103	
4	C4		23	C104	
5	C5		24	C105	
6	C16		25	C106	
7	C50		26	C108	No Access Point
8	C51		27	C150	
9	C52		28	C200	
10	C53		29	C203	
11	C54		30	C205	
12	C55		31	C206	
13	C56		32	C208	
14	C57		33	C252	
15	C58		34	C267	
16	C60		35	C270	
17	C67		36	D203	No Access Point
18	C68		37	SW50	No Access Point
19	C100		38	BZ50	No Access Point

2.2 Station Two – Programming Station

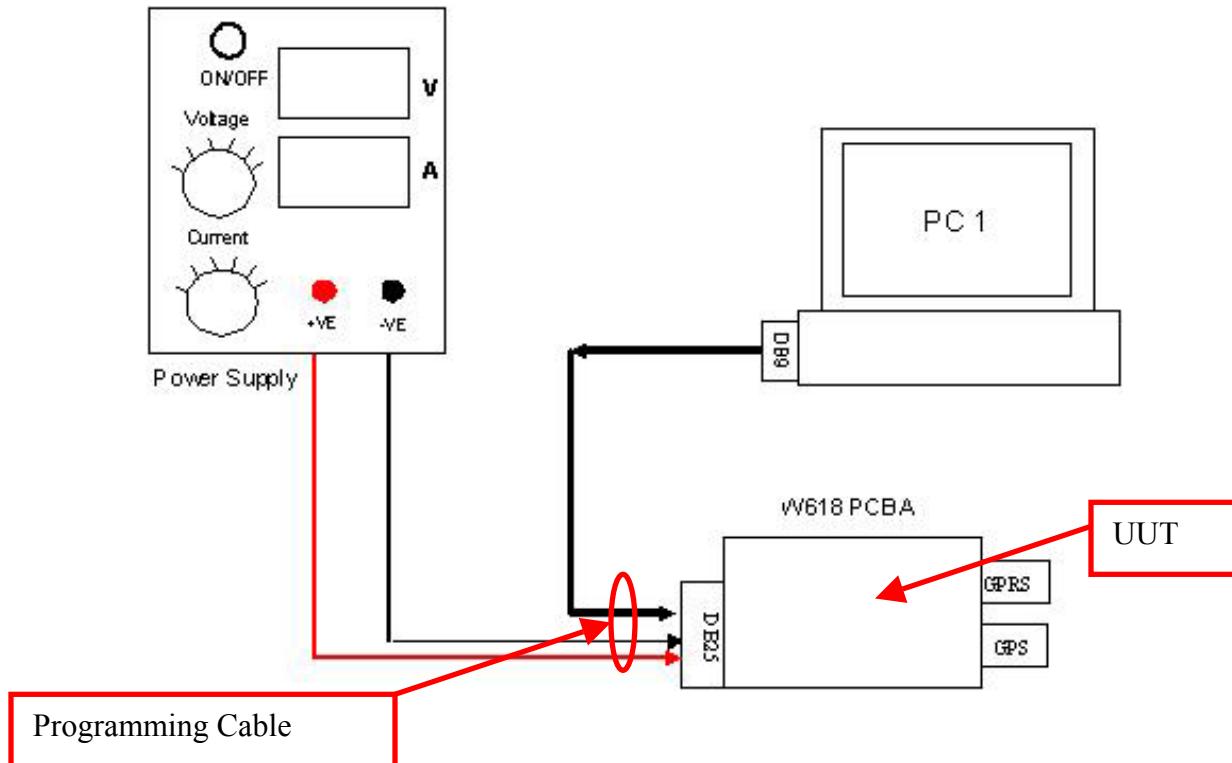
The bootloader and firmware is downloaded at this station. Required test equipment, station setup and test procedure is provided below.

2.2.1 Test Equipment

S/N	Equipment	Requirement
1	Personal Computer (PC1)	A personal computer with <ul style="list-style-type: none">* Windows Operating System* Microsoft.NET Framework 1.1* Microsoft.NET Framework 2.0 Service Pack 1* Microsoft.NET Framework 3.0 Service Pack 1* Microsoft.NET Framework 3.5* Samba Application - SAM-BA v2.8* Wave_PC_Monitor.exe” Application* RS-232 Serial Port (Male DB9)
2	Power Supply	Output Voltage: 12V±1% Current: < 200mA
3	Programming Cable	A cable with <ul style="list-style-type: none">* One end of Male DB25 connector* the other end of Female DB9 connector and wires connected to power supply

2.2.2 Setup Connection

As shown in the figure below, connect the UUT (Unit Under Test) to the programming cable. The Female DB9 connector is connected to the serial COM port of the PC. The power wires are connected to the power supply.



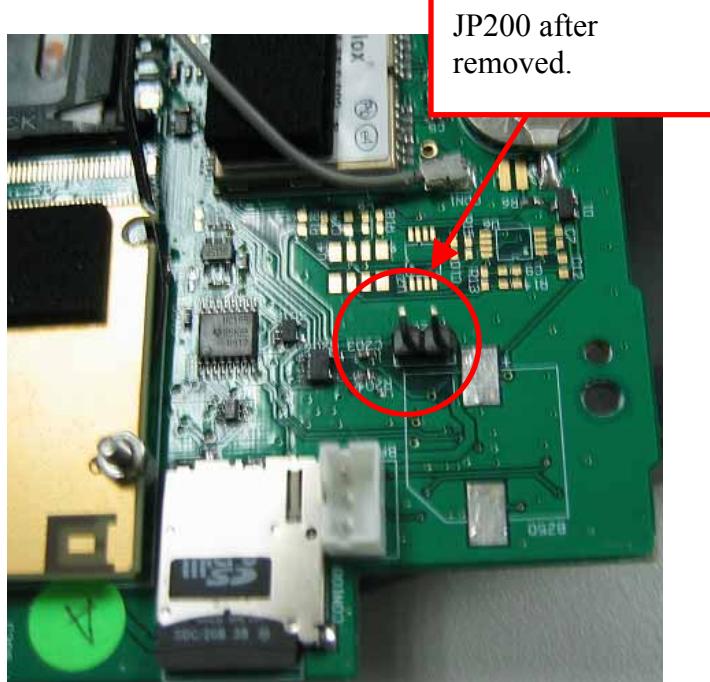
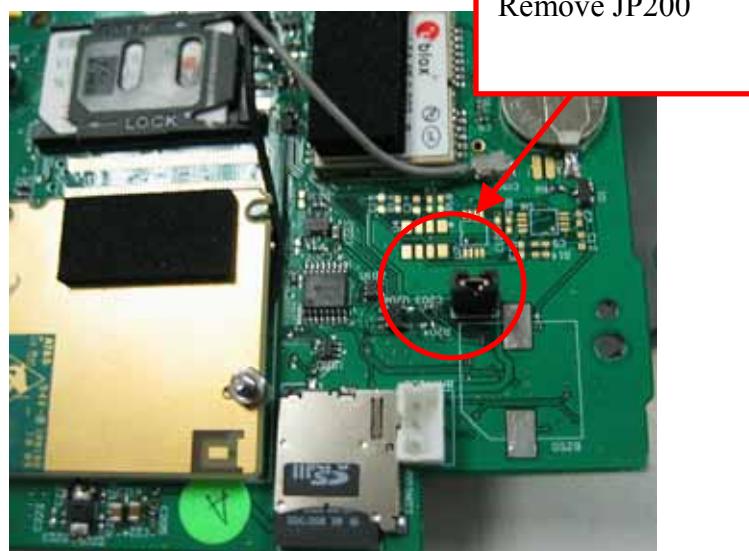
2.2.3 Test Steps

Before downloading the firmware, it is required to download the bootloader first.

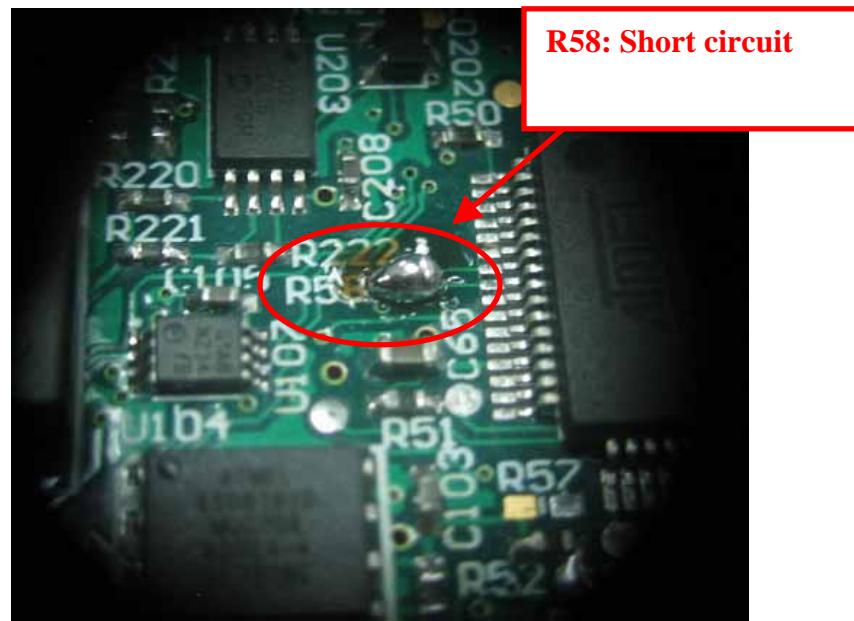
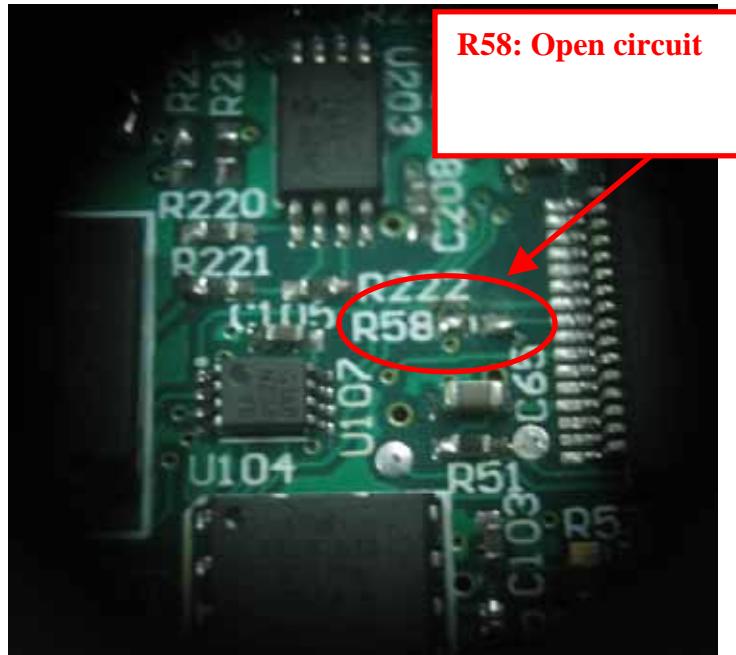
There will be three steps:

Step 1: Clear IC U50 Memory

- Remove Jumper JP200

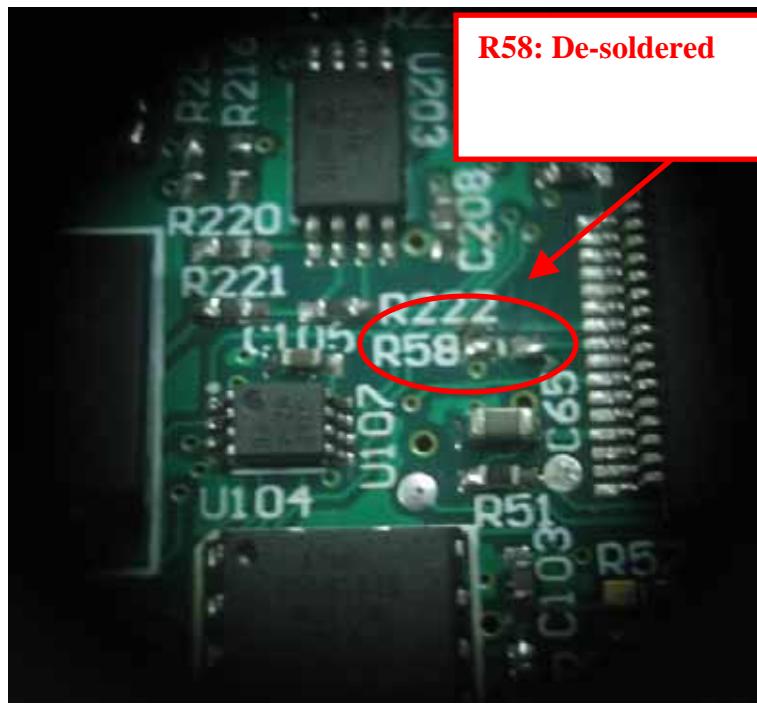


- Short the two pins of R58. It is unpopulated originally.



- Connect the power supply, UUT and PC as shown in setup connection. Set the voltage of the power supply to $12V \pm 1\%$ and power up for 10 seconds.
- After 10 seconds, shut down the power.

- De-solder the shorted pin of R58



Step 2: Download Bootloader

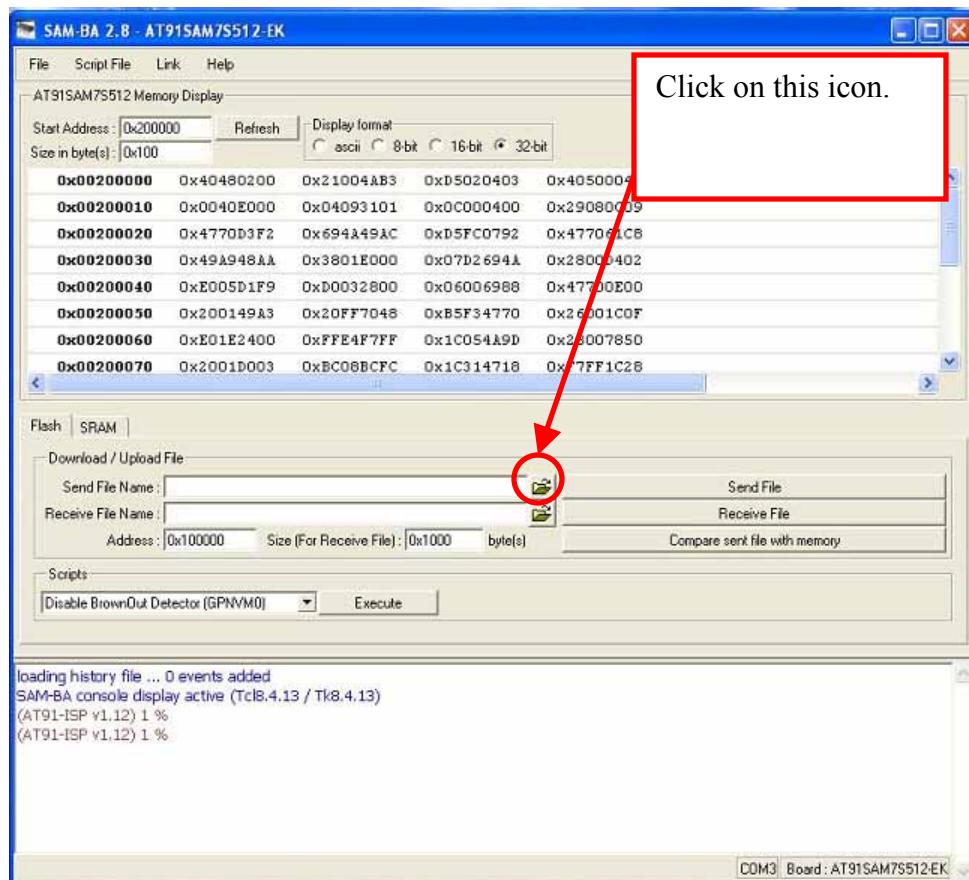
- Turn on the power supply
- Open Samba Application



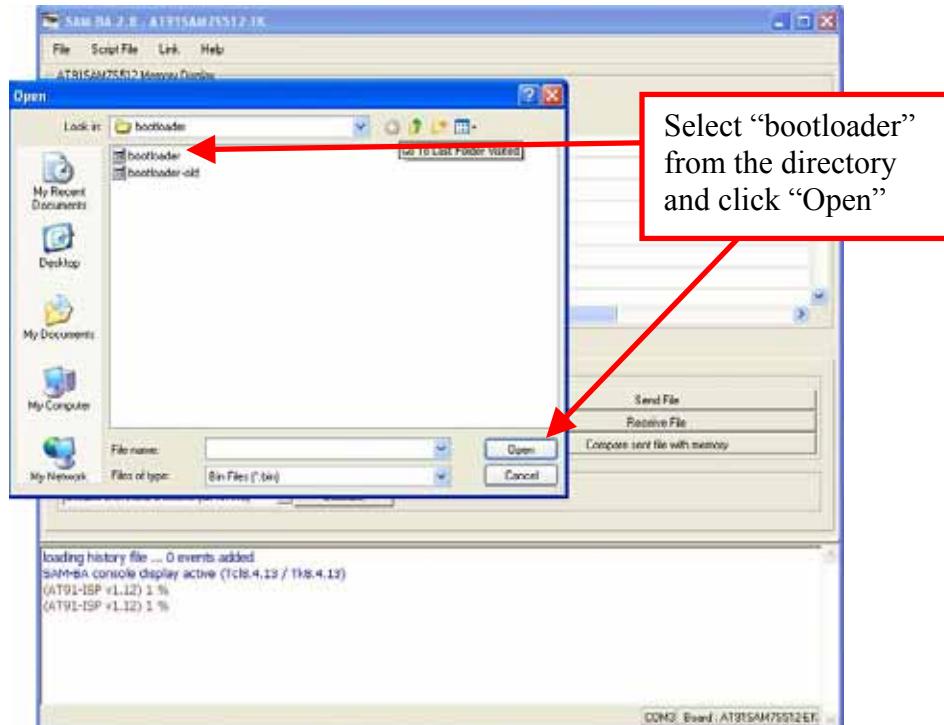
- Select the corresponding COM Port
- Under “Select your board”, select AT91SAM7S512-EK
- Click on “Connect”



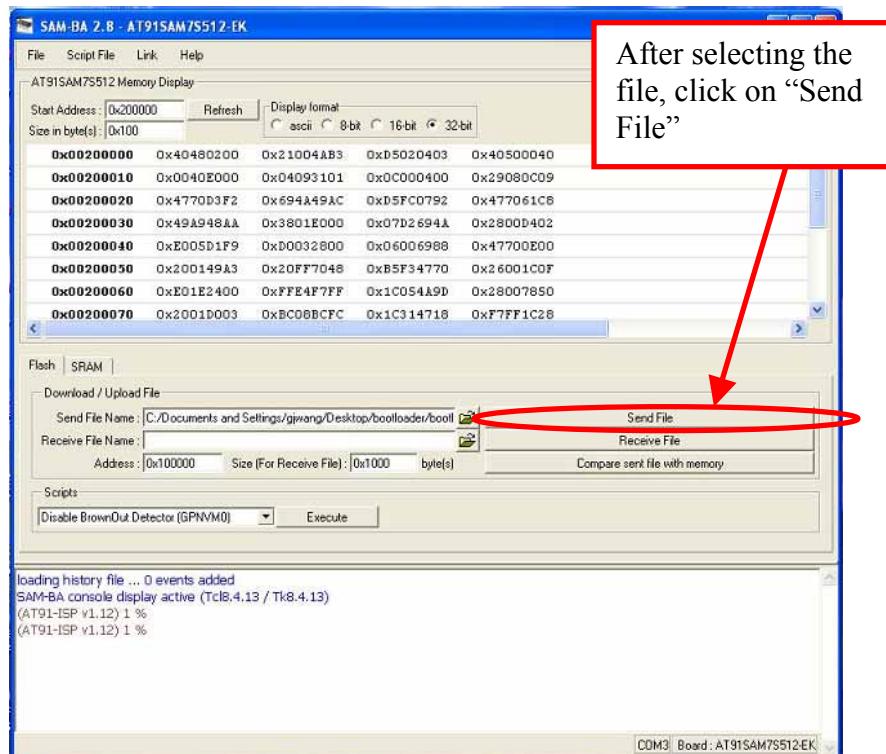
- After connecting, the following window will be opened:



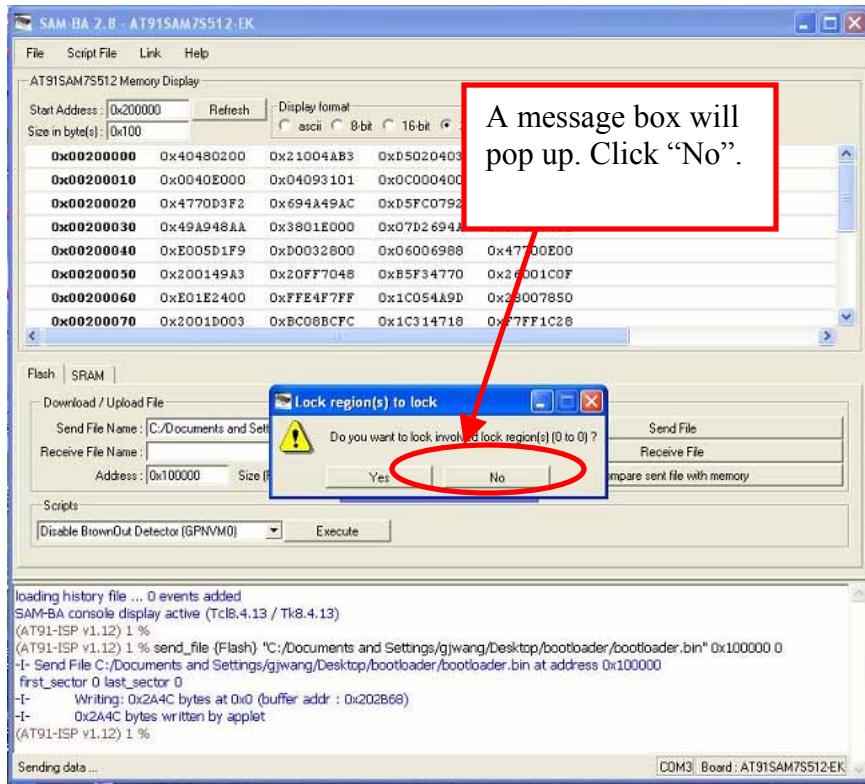
- Choose “bootloader” then click on “Open”



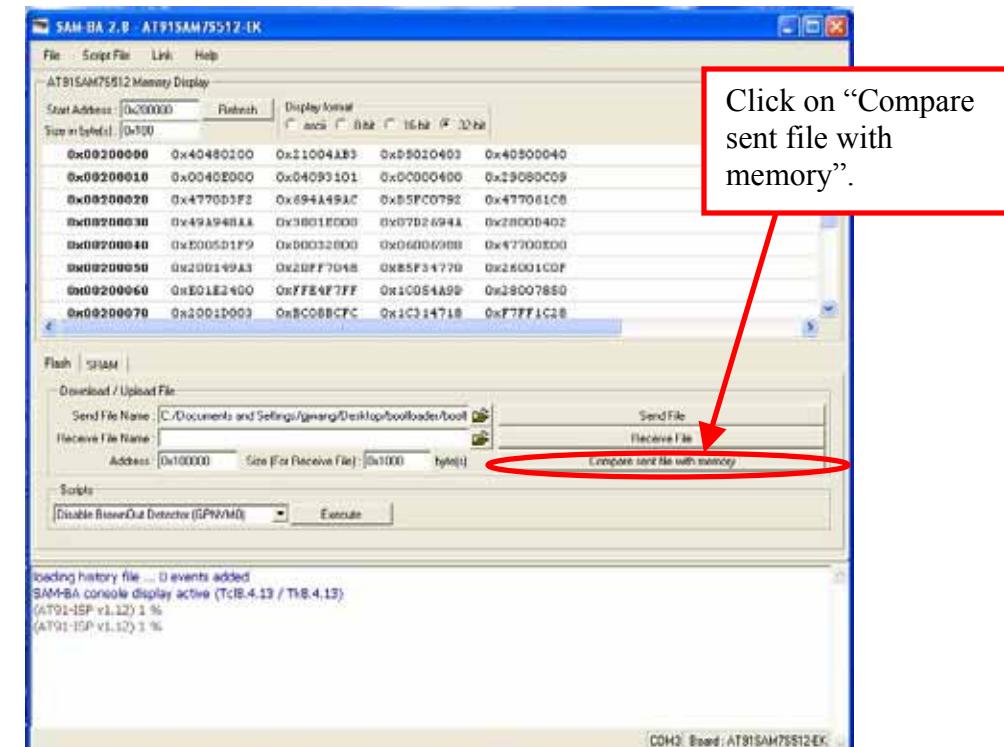
- After Opening the “bootloader”, click on “Send File”



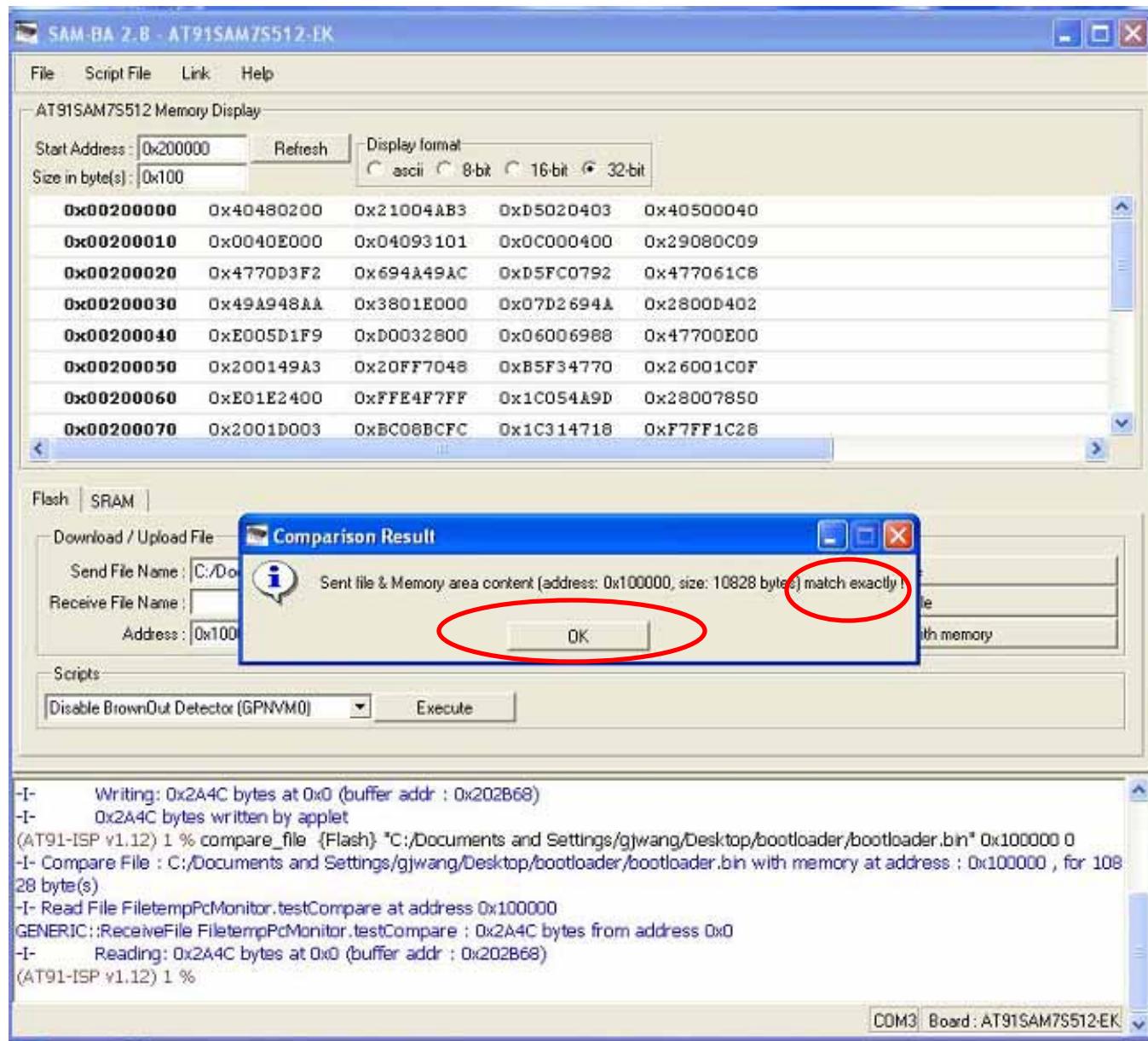
- Click on “No” when the message box pop up



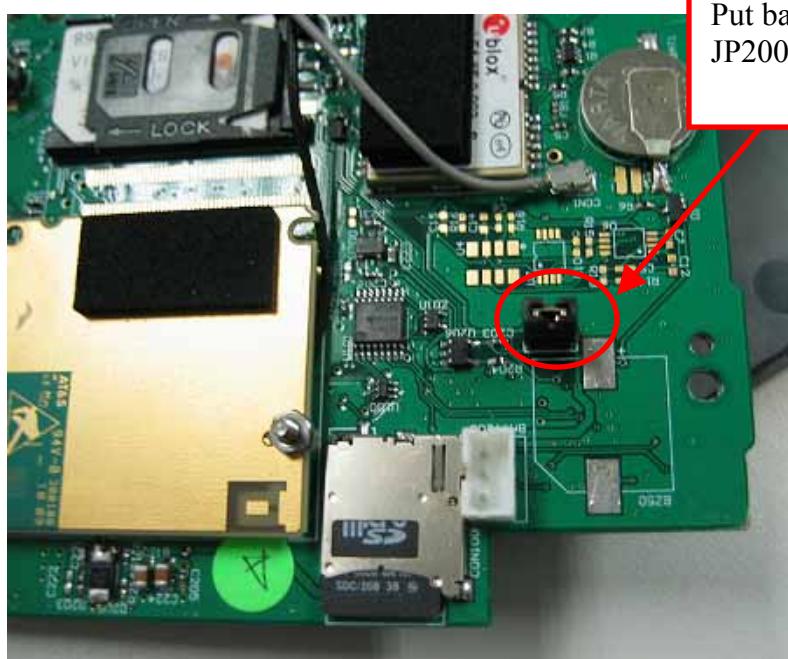
- Click on “Compare sent file with memory”



- A message stating the memory and sent file match exactly will pop up. Click on “OK”.



- Turn off the power supply
- Put back jumper JP200

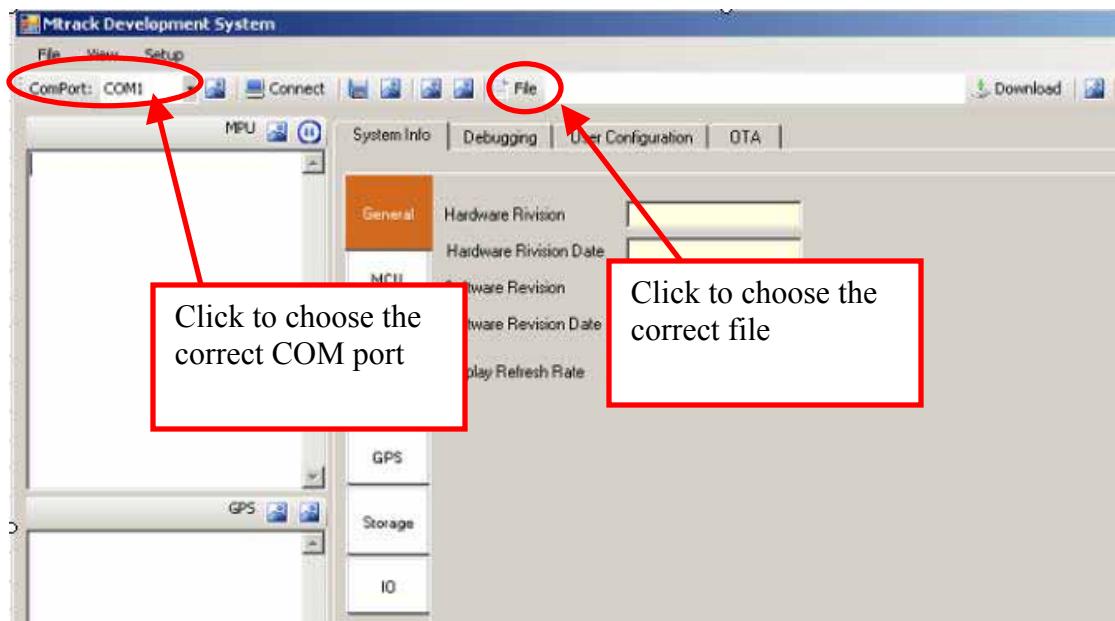


Step 3: Download Firmware

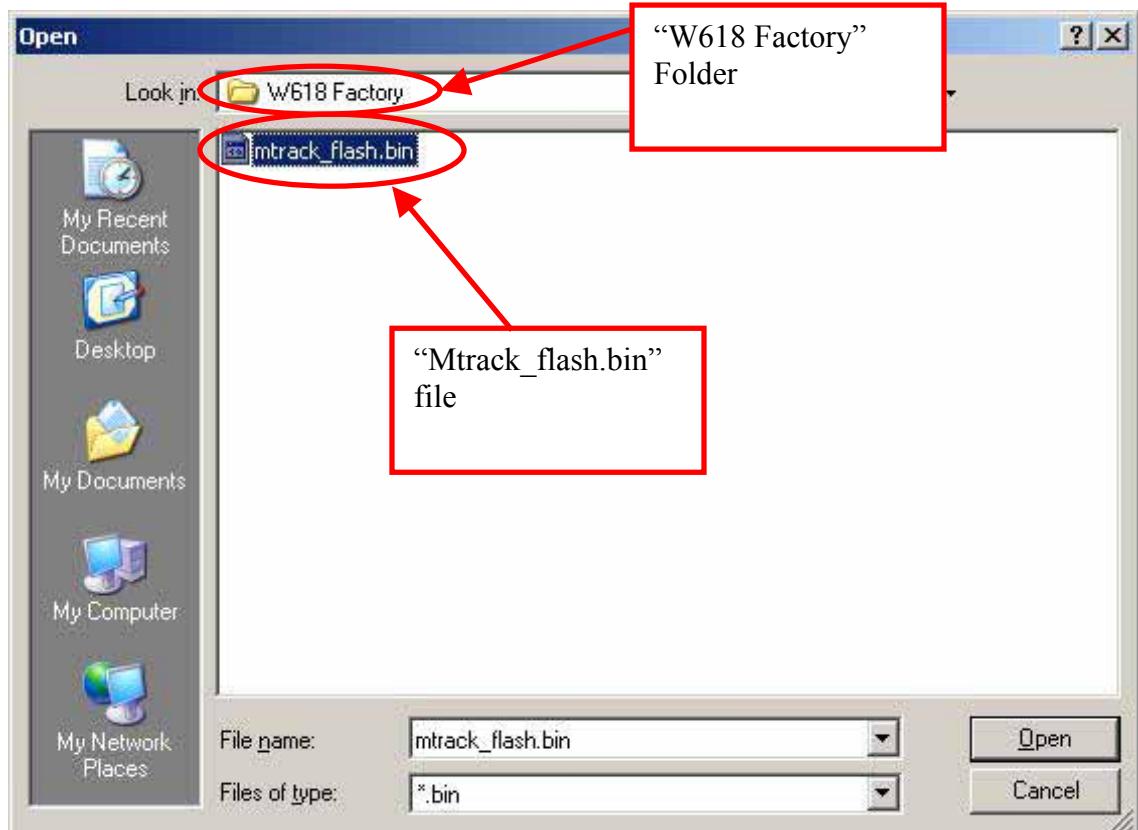
- Turn on the power supply
- Open the “Wave_PC_Monitor.exe” application



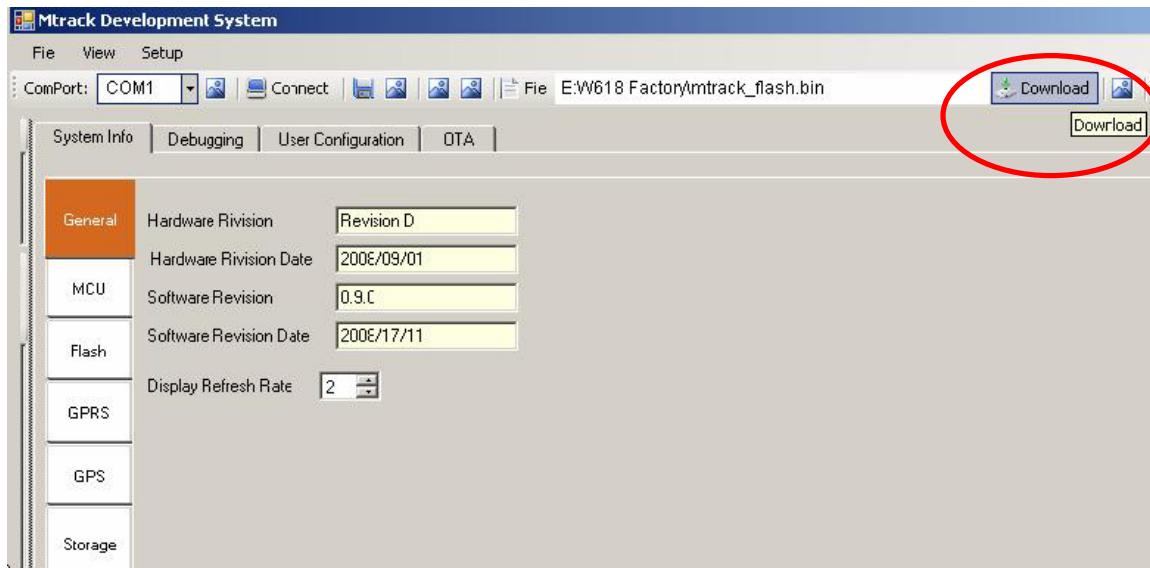
- Select the correct COM port and programming file



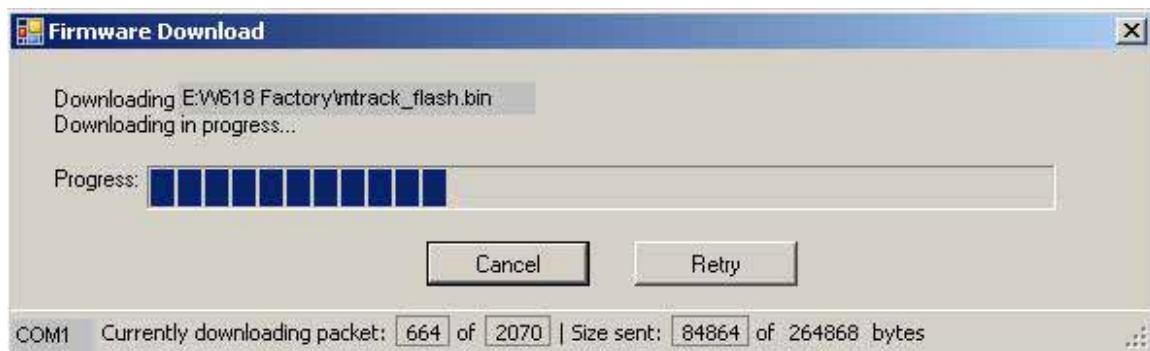
- Go to “W618 Factory” folder → Select “mtrack_flash.bin”



- Press Download to start the process



- The following process bar appears:



- Wait for approximately 2 minutes for the downloading process to complete

The UUT is ready for functional testing after downloading the firmware.

Disconnect the programming cable from the UUT and connect the next unit for downloading.

2.3 Station Three – Functional Station

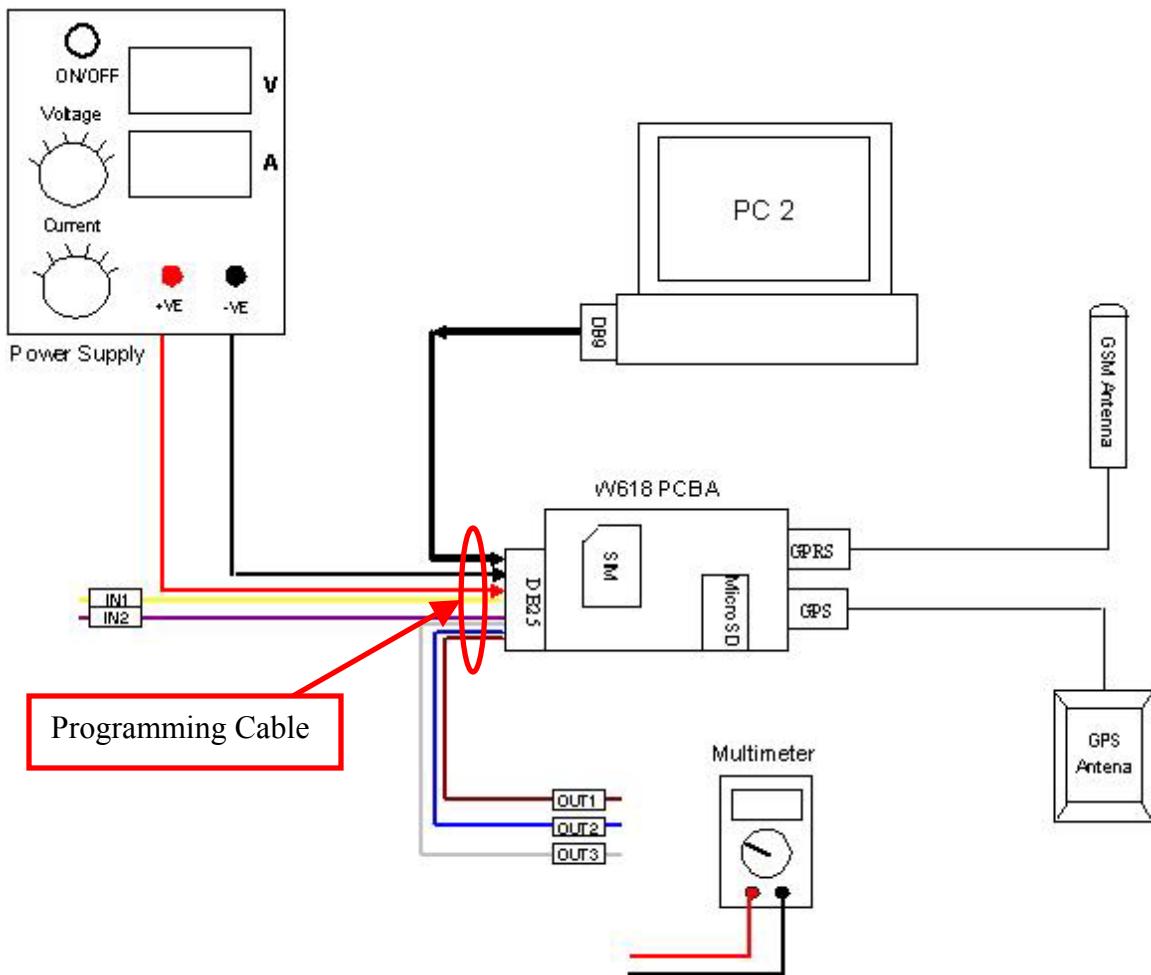
This station carries out the functional test, including I/O testing, GPS testing, GSM testing and MicroSD connector testing.

2.3.1 Test Equipment

S/N	Equipment	Requirement
1	Personal Computer (PC1)	A personal computer with <ul style="list-style-type: none"> * Windows Operating System * Microsoft.NET Framework 1.1 * Microsoft.NET Framework 2.0 Service Pack 1 * Microsoft.NET Framework 3.0 Service Pack 1 * Microsoft.NET Framework 3.5 * Samba Application - SAM-BA v2.8 * “Wave_PC_Monitor.exe” Application * “WaveServer” Application * RS-232 Serial Port (Male DB9) * USB port
2	Power Supply	Output Voltage: 12V±1% Current: < 200mA
3	Programming Cable	A cable with <ul style="list-style-type: none"> * One end of Male DB25 connector * the other end of Female DB9 connector and wires connected to power supply
4	Digital Multimeter	Only DC voltage will be measured
5	GPS Antenna	Magnetic base GPS antenna with SMA connector
6	GSM Antenna	Adhesive base QUAD band GSM antenna with RP-SMA connector
7	SIM Card	Data SIM card
8	MicroSD Card	≥1GB storage
9	MicroSD Card Reader	All-in-One card reader with USB2.0

2.3.2 Setup Connection

The setup for functional test station is similar to the programming station, except for additional connections. The UUT is required to connect to 12V DC Power Supply and serial COM port of the PC. SIM Card must be inserted for GPRS testing. MicroSD card is also inserted and must be tested on PC upon completion of the functional testing. GSM antenna and GPS antenna are connected to amplify the signal strength for GPRS and GPS testing. Lastly, a digital multimeter is required to measure the output voltages. The basic station setup diagram is shown in the figure below.



2.3.3 Test Steps

The functional test includes 2 GPIO input signal and 3 output signal testing. GPRS and GPS are tested as well. MicroSD card connector is tested by copying data into the MicroSD card and deleting it on PC via all-in-one card reader.

Some configuration can be set and saved before testing. Once the settings are saved, the subsequent test will take less time.

2.3.3.1 User Configuration Settings

Step 1: Connect the power supply, UUT and PC 2 as shown in the setup connection. Insert SIM card and MicroSD card.

Step 2: Set the input voltage to be $12V \pm 1\%$ and turn on the power.

Step 3: Open the “Wave_PC_Monitor.exe” application.

Step 4: Select the correct COM port and press “Connect” as shown.

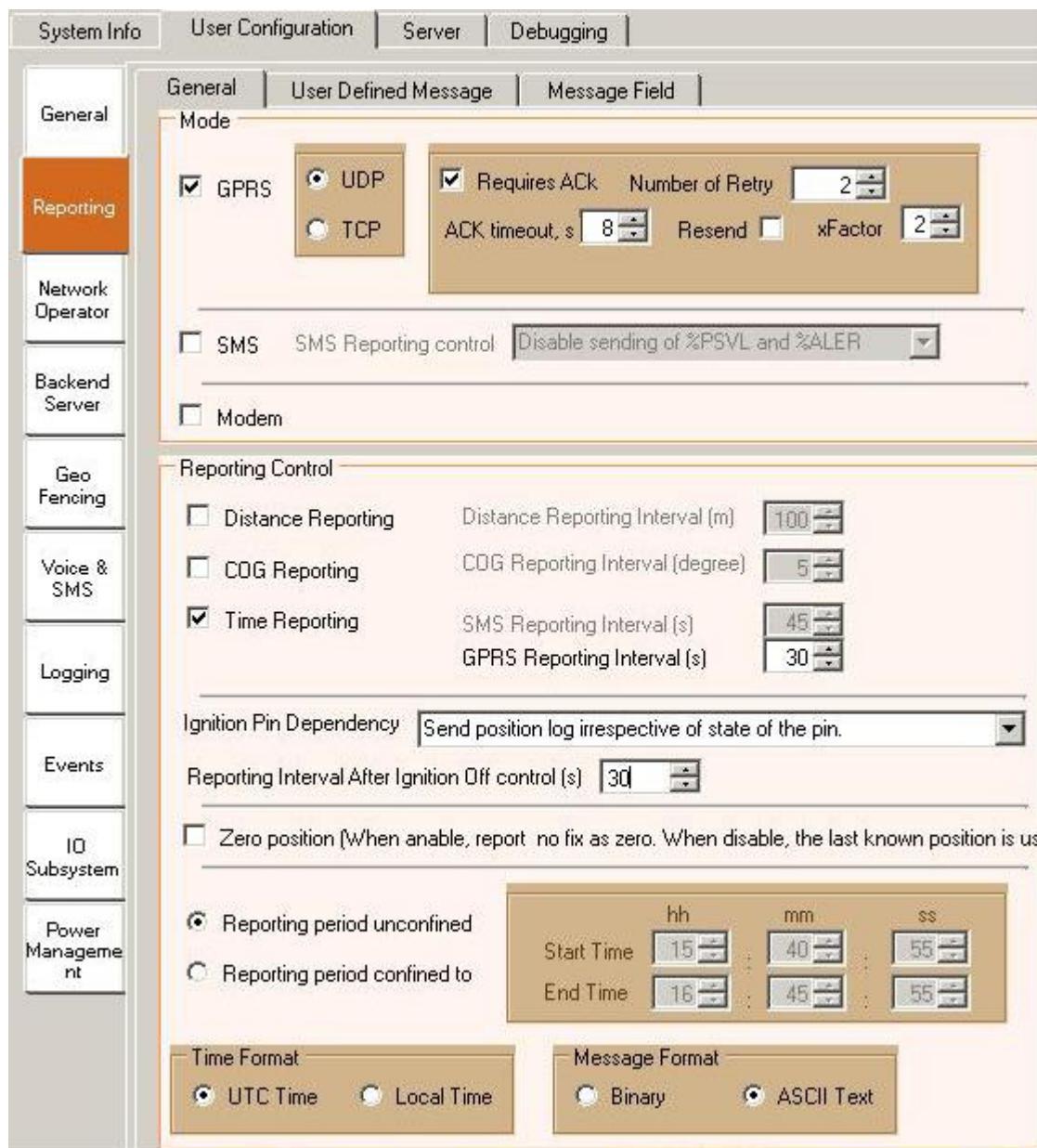


Step 5: Go to “User Configuration” Tab → Click on “Reporting”

Step 6: Go to “General” Tab and set the parameters as shown below

- Check “GPRS” and choose “UDP”
- Check “Requires ACK”, set “Number of Retry” to be 2 and “ACK Timeout” to be 8 seconds
- Under “Reporting Control”, check “Time Reporting” and set the “GPRS Reporting Interval” to be 30 seconds
- Set “Ignition Pin Dependency” to “Send position log irrespective of state of the pin”
- Reporting Interval After Ignition Off control to be set to 30 seconds

- Choose “Reporting Period Unconfined”
- Set Time Format to be “UTC Time” and Message Format to be “ASCII Text”

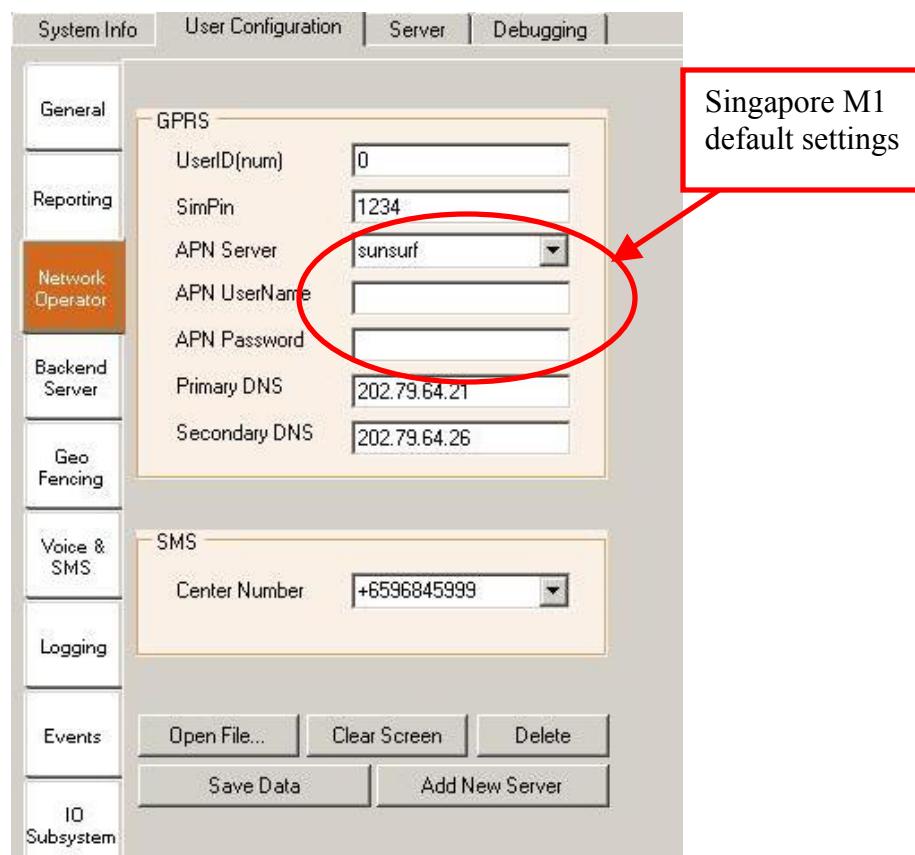


Press “Save” after setting.



Step 7: Under “User Configuration” tab, go to “Network Operator”

- Set the “APN Server”, “APN UserName” and “APN Password” according to factory local mobile communication service provider.
- In the figure below, the “APN Server” was set to be “sunsurf”, and “APN UserName” and “APN Passwork” to be blank. This is because the SIM card used was from M1 Singapore. These are the default settings from M1.
- If in Batam factory the SIM card is from Telcomsel, the APN Server can be set to “Telcomsel” and the APN UserName to be “wap” with APN Password blank.

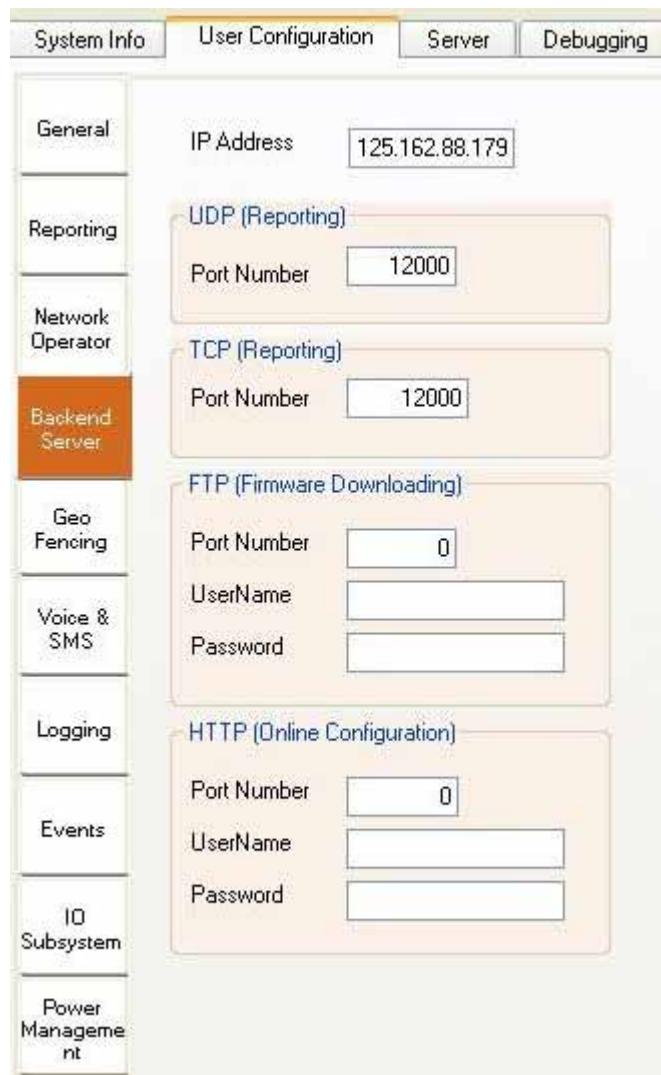


Press “Save” after setting.



Step 8: Go to “Backend Server”

- Key in the IP Address. Key in the static Internet Service Provider (ISP) IP address.
- Assign a port number to the work station PC. Key this number into UDP (Reporting) and TCP (Reporting) Port Number.

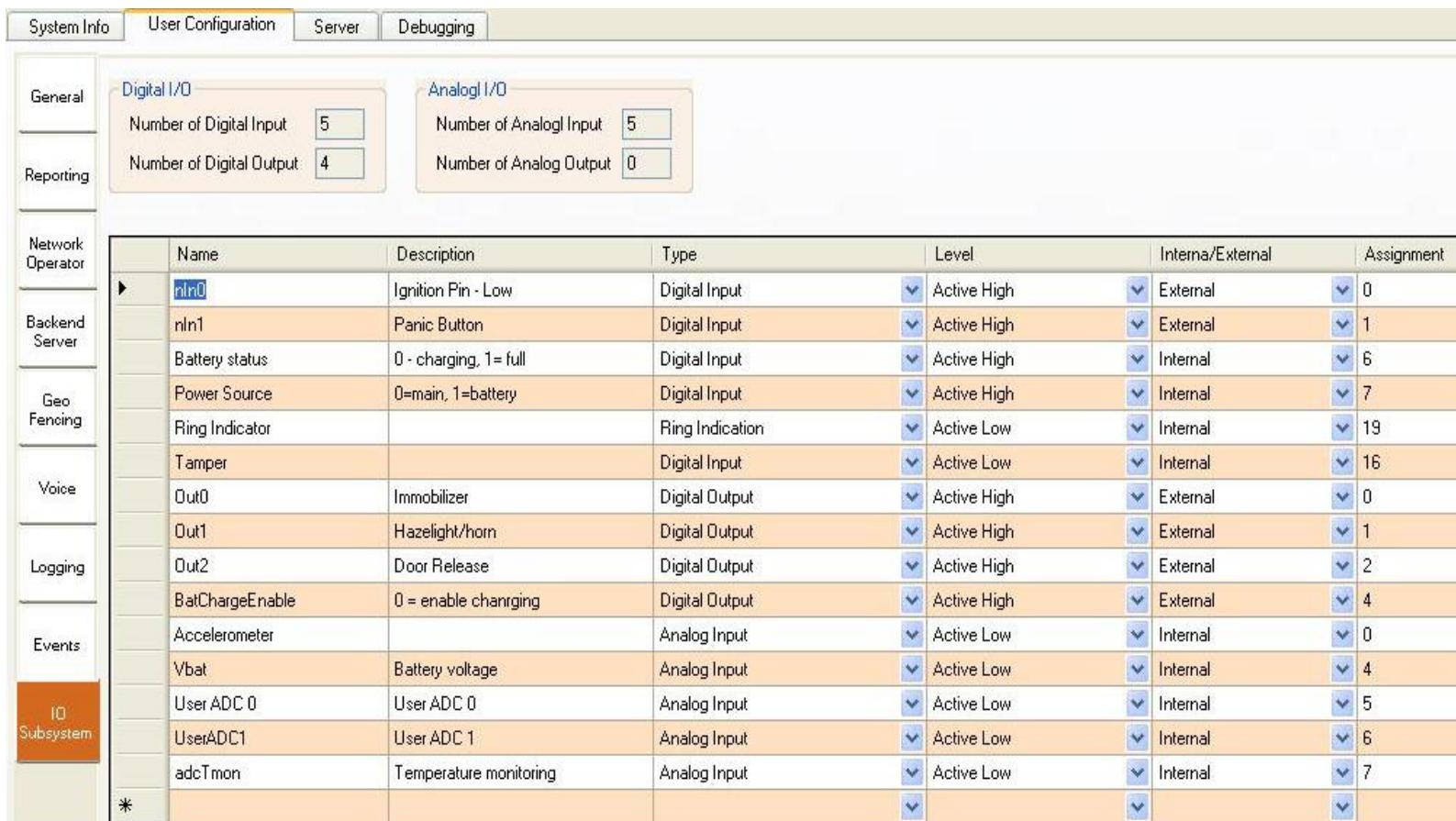


Press “Save” after setting.



Step 9: Go to “IO Subsystem”

For first time opening the application, this IO Subsystem page will be empty. It is required to key in the settings accordingly as shown in figure below by the user.



System Info User Configuration Server Debugging

General Reporting Network Operator Backend Server Geo Fencing Voice Logging Events **IO Subsystem**

	Name	Description	Type	Level	Internal/External	Assignment
nlh0	Ignition Pin - Low	Digital Input	Active High	External	0	
nlh1	Panic Button	Digital Input	Active High	External	1	
Battery status	0 - charging, 1 = full	Digital Input	Active High	Internal	6	
Power Source	0=main, 1=battery	Digital Input	Active High	Internal	7	
Ring Indicator		Ring Indication	Active Low	Internal	19	
Tamper		Digital Input	Active Low	Internal	16	
Out0	Immobilizer	Digital Output	Active High	External	0	
Out1	Hazelight/horn	Digital Output	Active High	External	1	
Out2	Door Release	Digital Output	Active High	External	2	
BatChargeEnable	0 = enable charging	Digital Output	Active High	External	4	
Accelerometer		Analog Input	Active Low	Internal	0	
Vbat	Battery voltage	Analog Input	Active Low	Internal	4	
User ADC 0	User ADC 0	Analog Input	Active Low	Internal	5	
UserADC1	User ADC 1	Analog Input	Active Low	Internal	6	
adcTmon	Temperature monitoring	Analog Input	Active Low	Internal	7	
*						

Press “Save” to save all the settings.



Once all the settings are configured and saved, the system is ready for testing.

2.3.3.2 GPIO Test

Step 1: After the configuration being saved, switch to “System Info” tab.

Step 2: Go to “IO” page. The following data will be shown.

System Info			
User Configuration			
Server			
Debugging			
General			
Digital Input			
MCU	Name	Description	Level
	nln0	Ignition Pin - Low	Active High
Flash	nln1	Panic Button	Active High
	Battery status	0 - charging, 1= full	Active High
GPRS	Power Source	0=main, 1=battery	Active High
GPS	Tamper		Active Low
Digital Output			
Storage	Name	Description	Level
IO	Out0	Immobilizer	Active High
	Out1	Hazelight/horn	Active High
	Out2	Door Release	Active High
	BatChargeEnable	0 = enable charging	Active High
Analog Input			
	Name	Description	Value
	Accelerometer		1, z = 168, pitch = 0.52(29.63d), rho = 0.56(31.99d)xy plane =
	Vbat	Battery voltage	0
	User ADC 0	User ADC 0	0
	UserADC1	User ADC 1	172
	adcTmon	Temperature monitoring	0

Step 3: Connect IN1 (Yellow color wire from programming cable) to 12V supply.

Observe the value change of “nln0”. It should be highlighted into RED, with value changed from “Ignition pin is off” to “Ignition pin is on”.

System Info				
User Configuration				
Server				
Debugging				
General				
Digital Input				
MCU	Name	Description	Level	Value
	nln0	Ignition Pin - Low	Active High	Ignition pin is on
Flash	nln1	Panic Button	Active High	On
GPRS	Battery status	0 - charging, 1= full	Active High	Panic button on
GPS	Power Source	0=main, 1=battery	Active High	On
	Tamper		Active Low	0
Digital Output				
Storage	Name	Description	Level	Value
IO	Out0	Immobilizer	Active High	On
	Out1	Hazelight/horn	Active High	Off
	Out2	Door Release	Active High	On
	BatChargeEnable	0 = enable charging	Active High	Charging is enabled

Step 4: Disconnect IN1 and connect IN2 (Purple color wire from programming cable) to 12V supply. Observe value change of nln1. It should be highlighted into RED, with value change from “On” to “Off”.

System Info				
User Configuration				
Server				
Debugging				
General				
Digital Input				
MCU	Name	Description	Level	Value
	nln0	Ignition Pin - Low	Active High	Ignition pin is off
Flash	nln1	Panic Button	Active High	Off
GPRS	Battery status	0 - charging, 1= full	Active High	Panic button on
GPS	Power Source	0=main, 1=battery	Active High	On
	Tamper		Active Low	0
Digital Output				
Storage	Name	Description	Level	Value
IO	Out0	Immobilizer	Active High	On
	Out1	Hazelight/horn	Active High	Off
	Out2	Door Release	Active High	On
	BatChargeEnable	0 = enable charging	Active High	Charging is enabled

Step 5: Disconnect IN1 from Power Supply.

Step 6: Test OUT1, OUT2 and OUT3.

- Connect +VE of multimeter to OUT1 (Brown color wire of programming cable), while –VE to GND (Black color wire of programming cable).

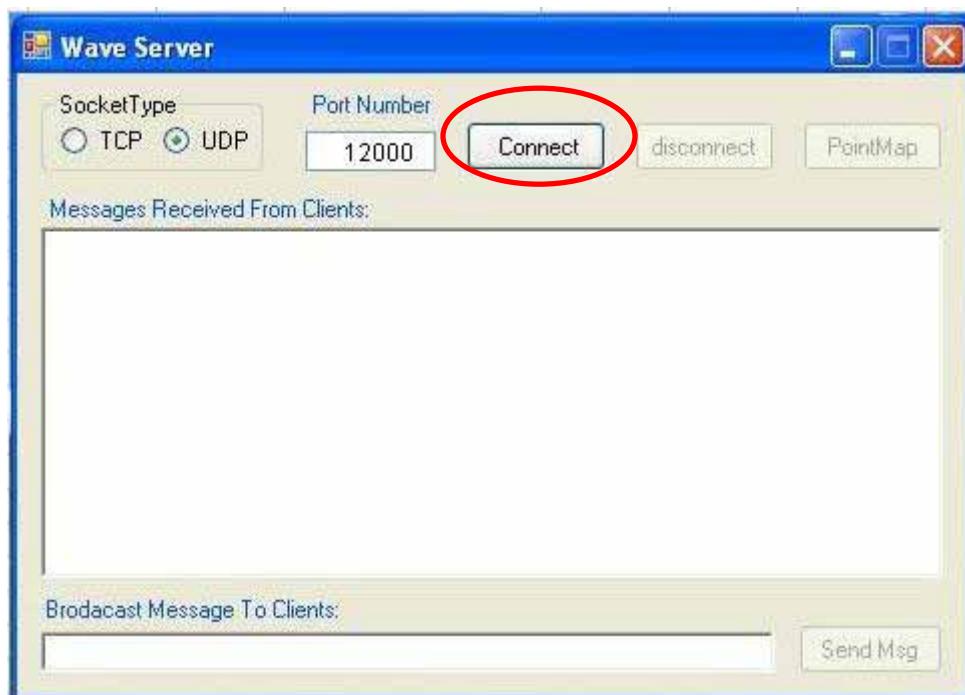
- Change the value of OUT1 to OFF, observe the reading of the multimeter. It should show value around 12V. Change OUT1 value to be ON, the multimeter reading should change to 0V accordingly.
- Connect +VE of multimeter to OUT2 (Blue color wire of programming cable), while -VE to GND (Black color wire of programming cable).
- Change the value of OUT2 to OFF, observe the reading of the multimeter. It should show value around 12V. Change OUT2 value to be ON, the multimeter reading should change to 0V accordingly.
- Connect +VE of multimeter to OUT3 (White color wire of programming cable), while -VE to GND (Black color wire of programming cable).
- Change the value of OUT3 to OFF, observe the reading of the multimeter. It should show value around 12V. Change OUT3 value to be ON, the multimeter reading should change to 0V accordingly.

2.3.3.3 GPRS and GPS Test

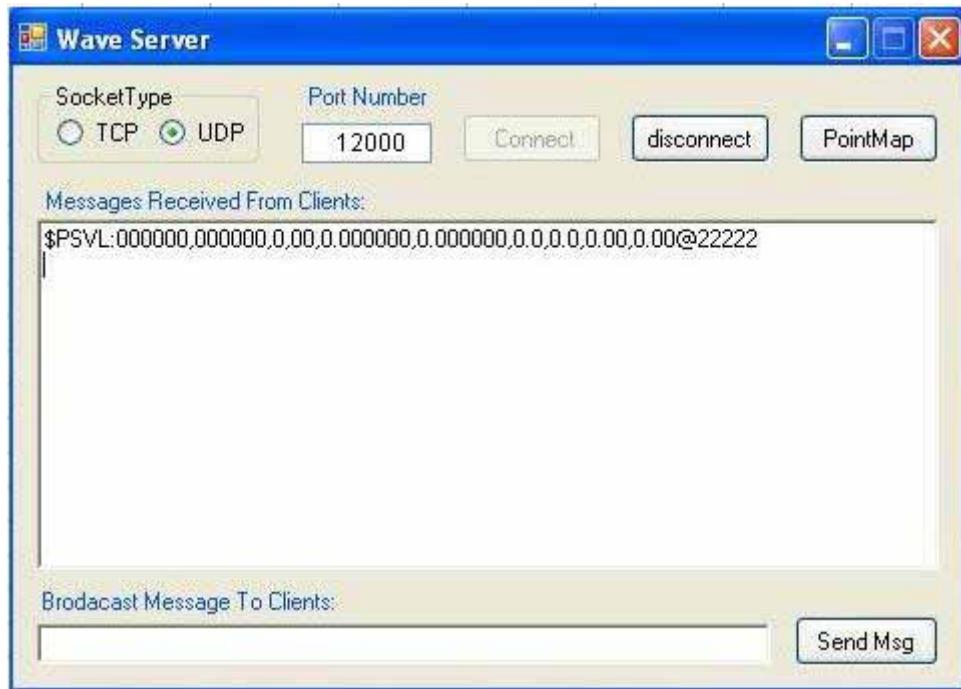
Step 1: Open “WaveServer” Application

Step 2: Choose SocketType to be UDP and set Port Number to be the same as the Port Number in Backend Server.

Step 3: Press Connect



Step 4: There will be a string of message shown in “Message Received From Clients” every 30 seconds.



Take note that in actual test, the message should be a string of value instead of all zeros. The values indicate the longitude and latitude of the device location, as well as time.

Receiving of the string message shows that the GPRS is working. Message showing values means the GPS is receiving information from satellite.

2.3.3.4 MicroSD Connector Test

To test whether the MicroSD connector is soldered properly, simply remove the MicroSD card from the UUT and connect it to PC after GPS & GPRS testing via All-In-One card reader. There will be a text file auto saved into MicroSD card after GPS & GPRS testing. Open the file to make sure there is data inside. Delete after reading for next test. A sample display of the file content is shown below.

