BE905A2 User Manual

Rev. V0.6

Revision History

Version	Note	Date
Preliminary	Initial Version	2013/07/31
V0.1	EVT, android image Version 0.93	2013/08/14
V0.2	DVT, android image Version 1.01	2013/12/18
V0.3	DVT, android image Version 1.06	2014/04/21
V0.4	DVT, android image Version 1.07	2014/07/11
V0.5	DVT, android image Version 1.10	2014/12/29
V0.6	Remove G Sensor Function	2015/10/16

Copyright

Safety Warning

> **WARNING:** To avoid injury, please read all the following operating instructions and safety information in detail before using BE905A2 unit.

GENERAL

- When installing the BE905A2 in the vehicle, place the device securely so that it doesn't obstruct the driver's view of the road or interfere with vehicle operating controls, such as the steering wheel, car pedals or gear shift.
- The air bag in the vehicle will inflate with great force. Do not place this MDT and its accessories around the area over the air bag or in the air bag deployment area.
- Before using the suction cup mount on your windshield, check State and local laws and ordinances where you drive. Some State laws prohibit drivers from using suction mounts on their windshields while operating motor vehicles. Other State laws allow the suction mount to be located only in specific locations on the windshield. Many other States have enacted restrictions against placing "non-transparent material" on the windshield or placing objects on the windshield in locations that obstruct the driver's vision.
- Check and follow local laws regarding MDT device usage.

DRIVING

- Do not be distracted by this device when driving, and please be aware of all driving conditions always.
- For your safety, we recommend you NOT operating BE905A2 while driving. To avoid accident, please operate this device after the vehicle is stopped.

BATTERY

- Do not use a sharp object to remove the battery pack.
- Do not disassemble, puncture or damage the battery pack.
- If using an AC charger or external battery charger, suggest only use the accessory approved for this product.
- Only replace the battery pack with the same or equivalent replaceable battery. To purchase a replacement battery, please contact your distributor.

HEAT

- Avoid touching the surface of heat sink located at the back side of MDT with burns and scalds in your hand. Its function is cooling the device by dissipating heat into surrounding air so that it would be normal to get warm when using MDT.

WATER PROTECTION

Rubber Covers – For connector

BE905A2 has rubber covers that protects the SD card slot, headset Jack, USB host/device connectors, reset button, power-In jack, Multi I/O connector, battery pack from water and dust (for example, when the device is used in the portable mode out of a vehicle). You must close all covers in any of these conditions.

Limited Warranty Statement

This limited warranty shall apply to the **BE905A2** product. We warrant that the product is at the time of its original purchase free of defects in materials and workmanship ("**Limited Warranty**").

This Limited Warranty is subject to the following terms and conditions:

1. This Limited Warranty is given only to the original purchaser of the **BE905A2** ("**Customer**"). It shall neither exclude nor limit.
   a) Any statutory rights of the **Customer** or
   b) Any of the Customer's rights against the seller/dealer of the **BE905A2**.

2. This Limited Warranty shall last for twelve (12) months from the date of original purchase for **BE905A2**product and twelve (12) months for its accessories ("**Warranty Period**")
   Customer shall present the PROOF OF PURCHASE upon claiming this Limited Warranty. This Limited Warranty may not be given to any subsequent purchaser.

3. Throughout the **Warranty Period** or its authorized agent will, at their discretion, without charge and subject to Clause 7 repair or replace a defective **BE905A2**. Repair or replacement may involve the use of functionally equivalent reconditioned unit. We will return the repaired **BE905A2** to the **Customer** in good working condition. All replaced faulty parts or components will become our property.

4. This Limited Warranty applies only to the hardware components of the **BE905A2** as originally supplied and does not apply to any software or other equipment.

5. If we repair or replace the **BE905A2**, the repaired or replaced **BE905A2** shall continue to be warranted for the remaining time of the original **Warranty Period** or for ninety (90) days from the date of repair or replacement, whichever is longer.

6. Before returning any unit for service, be sure to back up data and 3 remove any confidential, proprietary, or personal information from the **BE905A2**. We are not responsible for the damage to or loss of any programs, data, or removable storage media.

7. THIS LIMITED WARRANTY SHALL NOT APPLY IF THE DEFECT WAS CAUSED THROUGH ANY OF THE FOLLOWING:
   a) The **BE905A2** serial number, the accessory date code the IMEI number or the warranty seal has been removed, erased, defaced, altered or is illegible; or
   b) Deterioration of the **BE905A2** due to normal wear and tear; or

c) use other than in accordance with the user manual, rough handling, exposure to moisture, dampness or extreme thermal or environmental conditions or a rapid change in such conditions, corrosion, oxidation, unauthorized modifications or connections, unauthorized opening or repair, repair by use of unauthorized spare parts, accidents, forces of nature, or other actions beyond the reasonable control (including but not limited to deficiencies in consumable parts) unless the defect was caused directly by defects in materials or workmanship. This Limited Warranty does not cover physical damage to the surface of the BE905A2 including but not limited to cracks or scratches on the LCD screen; or

d) The defects caused by the fact that the battery has been short-circuited or by the fact that the seals of the battery enclosure or the cells are broken or show evidence of tampering or by the fact that the battery has been used in equipment other than those for which it has been specified; or

e) The defect was caused by a defective function of the cellular network or other system; or

f) The **BE905A2's** software needs to be upgraded due to changes in cellular network parameters; or

g) The defect was caused by the fact that the **BE905A2** was used with or connected to an accessory not approved or provided by us or used in other than its intended use and where it can be shown by us that such defect is not the fault of the **BE905A2** itself.

8. In the event of **BE905A2** failure, the Customer should take the following actions:

a) Refer to the user manual in order to identify and possibly correct the problem.

b) If the problem cannot be resolved by reference to the user manual the Customer should then contact the dealer where such **BE905A2** was purchased or visit our website, or our sales for further information.

c) Before the **Customer** contacts our service agent, please ensure the following information is at hand, the model and serial number, IMEI/ESN number of the **BE905A2**. The Customer's full address and contact information. A copy of the **Customers** original invoice, receipt or bill of sale of the purchase of the **BE905A2**. We will provide the **Customer** with instructions regarding how and when the defective **BE905A2** should be returned. We will pay costs in connection with both the return of the defective **BE905A2** to us and the repaired **BE905A2** back to the **Customer** if the Defective **BE905A2** is within the Warranty Period.

9. THIS LIMITED WARRANTY STATES THE ENTIRE WARRANTY GIVEN BY US TO THE CUSTOMER. ALL IMPLIED WARRANTIES OF SATISFACTORY QUALITY OR FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED TO THE RELEVANT WARRANTY PERIOD. IN NO EVENT SHALL WE BE LIABLE FOR INCIDENTAL OR CONSEQUENTAL LOSSESOR DAMAGES OF ANY NATURE WHATSOEVER, INCLUDING BUT NOT LIMITED TO LOST PROFITS OR COMMERCIAL LOSS, TO THE FULLEST EXTENT THAT THOSE LOSSES OR DAMAGES CAN BE DISCLAIMED BY LAW. IN ANY CASE WE AND ITS SUPPLIERS ENTIRE LIABILITY UNDER ANY PROVISION OF THIS LIMITED

WARRANTY SHALL BE LIMITED TO THE AMOUNT ACTUALLY PAID BY THE CUSTOMER FOR THE HARDWARE. We do not exclude or limit liability for personal injury or death resulting from its own negligence. Some countries do not allow exclusions or limitation of incidental or consequential loss or damage, or limitation of the duration of implied warranties, in those circumstances the preceding limitations or exclusions may not apply to such **Customers**. This warranty gives the **Customer** specific legal rights; the **Customer** may also have other rights, which may vary from country to country. This limited warranty does not affect the **Customers** statutory rights in law specific to the country of purchase, such rights remain protected. This Limited Warranty will be updated by us from time to time. Please visit our website to obtain the latest version of the Limited Warranty for the **BE905A2**.

Certifications

CE-ITE

CE-LVD

Declaration of Conformity

Issued Date: Sep. 27.2013
Report No.: SN1308068

This is to certify that the following designated product

Product	: MDT
Trade name	: N/A
Model Number	: BE905A11,BE906A12,BE905A13,BE906A14,BE905A21,BE905A22, BE905A23, BE905A24
Company Name	: Bolymin, Inc.
Address	: 6F, No. 38, Kefa Rd., Dafa Dist., Central Taiwan Science Park, Taichung City, 42881, Taiwan.

This product, which has been issued the test report listed as above in QuieTek Laboratory, is based on a single evaluation of one sample and confirmed to comply with the requirements of the following CE/LVD (Low-Voltage Directive; 2006/95/EC) standard.

EN 60950-1:2006+A11:2009+A1:2010+A12:2011

TEST LABORATORY

Ben Hung

Mr. Ben Hung / Senior Engineer
Safety Department

QuieTek 2F, No. 345, Xinhu 2nd Rd., Neihu District, Taipei City 114, Taiwan, R.O.C.
TEL:+886-2-8792-6808 FAX:+886-2-8792-9626 Email:service@quietek.com http://www.quietek.com

CE-RF

QTK **QuieTek** Corporation

QTK No.: 137525R

CE

Statement of Conformity

The certifies that the following designated product
- Product : MDT
- Model Number : BE905A11,BE905A12, BE905A13,BE905A14,
  BE905A21,BE905A22, BE905A23, BE905A24
- Company Name : Bolymin, Inc.

This product is herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the laws of the Member States relating to Directive of 9 March 1999 of the European Parliament and of the Council on Radio Equipment and Telecommunications Terminal Equipment. For the evaluation regarding radio equipment, the following standards were applied:

RF
ETSI EN 300 440-1:V1.6.1 (2010-08)
ETSI EN 300 440-2:V1.4.1 (2010-08)
HP
ETSI EN 301 511: V9.0.2 (2003-03)
ETSI EN 301 908-1: V5.2.1 (2011-05)
EMC
ETSI EN 301 489-24: V1.5.1 (2010-10)
ETSI EN 301 489-7: V1.3.1 2005-11
ETSI EN 301 489-3: V1.4.1 2002-08
ETSI EN 301 489-1: V1.9.2 (2011-09)
EN 61000-3-2: 2006+A2: 2009 Class A
EN 61000-3-3: 2008

TEST LABORATORY

Roy Wang

Roy Wang / Manager

The verification is based on a single evaluation of one sample of above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab. Logo.

QuieTek Corporation / No.75-1, Wang-Yeh Valley, Yung-Hsing, Chiang-Lin, Hsin-Chu County, Taiwan, R.O.C.
Tel: 886-3-5928858, Fax: 886-3-5928859, E-mail: service@quietek.com

NOTE: Only the host machine and accessories from Bolymin can be guaranteed to pass this certification.

FCC

DECLARATION OF CONFORMITY
Per FCC Part 2 Section 2. 1077(a)

The following equipment:

Product Name   :   MDT

Model Number   :   BE905A11, BE905A12, BE905A13, BE905A14,
                    BE905A21, BE905A22, BE905A23, BE905A24

Company Name :   Bolymin, Inc.

It's herewith confirmed to comply with the requirements of FCC Part 15 Rules. (Class B)
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.

The result of electromagnetic emission has been evaluated by QuieTek EMC laboratory
(NVLAP Lab. Code: 200347-0) and showed in the test report.
(Report No.: QTK- 137525R-ITUSP02V02)

It is understood that each unit marketed is identical to the device as tested, and
Any changes to the device that could adversely affect the emission
Characteristics will require retest.
The following importer / manufacturer is responsible for this declaration:

Company Name   _____

Company Address   _____

Telephone   _____ Facsimile : _____

Person is responsible for marking this declaration:

_____   _____
      Name (Full name)   Position / Title

_____   _____
            Date   Legal Signature

NOTE: Only the host machine and accessories from Bolymin can be guaranteed to pass this certification.

E-Mark

NOTE: Only the host machine and accessories from Bolymin can be guaranteed to pass this certification.

IP-54

METAL INDUSTRIES RESEARCH & DEVELOPMENT CENTRE

REGIONAL R&D SREVICE DEPARTMENT (TAICHUNG)

NO. 25, 37TH ROAD INDUSTRIAL PARK, 407 TAICHUNG, TAIWAN, R.O.C.

TEL: +886-4-23502169   FAX: +886-4-23594790

DUST & WATER PROTECTION TEST REPORT

Page 2 of 2

1.Test according to :
IEC 60529:2003
Degrees of protection provided by enclosures (IP Code)

2.Test equipment :
(1) Dust Protection Test Equipment.
(2) Water Protection Test Equipment.

3.Test items & contents :
(1) IP5X Test: The enclosure was not connected to a vacuum pump, test time was 8 hours.
(2) IPX4 Test: Tests for protection against water- Diameter of holes 0.5, 121 holes, and duration of test is 5 minutes.

4.Results :
(1) IP5X Test: Pass.
(2) IPX4 Test: Pass.

Front view of BE905A1   Inside view of BE905A1

BE905A2

Note:(1) This report is responsible for designated samples only.
(2) Reproduction of all or parts of this report without a written approval is strictly prohibited

NOTE: Only the host machine and accessories from Bolymin can be guaranteed to pass this certification.

RoHS

SGS

Test Report

Report No.: CX/2013/C0101

BOLYMIN, INC.
5F., NO. 38, KEYA RD., DAYA DIST., CENTRAL TAIWAN SCIENCE PARK,
TAICHUNG CITY, 42881, TAIWAN

The following sample(s) was/were submitted and identified by/on behalf of the applicant as :

Sample Submitted By	:	BOLYMIN, INC.
Sample Description	:	MOBILE DATA TERMINAL
Style/Item No.	:	BE905A1 SERIES, BE905A2 SERIES
Sample Receiving Date	:	2013/12/05
Testing Period	:	2013/12/05 to 2013/12/19

Test Result(s) : Please refer to next page(s).

Conclusion : Based upon the performed tests by submitted samples, the test results comply with the limits of R
materials below according to the declaration from applicant (Directive 2002/95/EC being recast b
1. GOLDEN COLORED METALLIC TUBE (No.1.6) in Table 1: Lead (Pb)
("6(c), Copper alloy containing up to 4% lead by weight" in Directive 2011/65/EU)

Ellis Wei, Ph.D. / Supervisor
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory - Taipei

1/7

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SGS Taiwan Ltd. 台灣檢驗科技股份有限公司 | 33, Wu Chuan Rd., New Taipei Industrial Park, New Taipei City, Taiwan / 新北市新北產業園區五權路33號 t

NOTE: Only the host machine and accessories from Bolymin can be guaranteed to pass this certification.

REACH

SGS

For Question,
Please Contact with SGS
www.tw.sgs.com

Test Report   No. : CR/2013/C0034   Date : 2014/01/14   Page: 1 of 11

BOLYMIN, INC.
5F., NO. 38, KEYA RD., DAYA DIST., CENTRAL TAIWAN SCIENCE PARK, TAICHUNG CITY,
42881, TAIWAN

The following sample(s) was/were submitted and identified by/on behalf of the applicant as :

Sample Submitted By   : BOLYMIN, INC.
Sample Description   : MOBILE DATA TERMINAL
Style/Item No.   : BE905A1, BE905A2
Sample Receiving Date   : 2013/12/10
Testing Period   : 2013/12/10 TO 2013/12/17

Test Requested   : As requested by client, SVHC Screening of Candidate List (151 items) was performed.

Test Method   : SGS In-House method-RSTS-EE-SVHC-007. Analyzed by ICP-AES, UV-VIS, GC/MS,
                       LC/MS, GC/FPD, LC/MS/DAD.

Test Result(s)   : Please refer to next page(s).

Summary   : According to the specified scope and analytical technique, SVHC concentrations of 117
                       items in the submitted product(s) are all below 0.1%. ﹝See note N/A*﹞

Edison Chang / Sr. Supervisor
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory – Taipei

NOTE: Only the host machine and accessories from Bolymin can be guaranteed to pass this certification.

WEEE

NOTE: Only the host machine and accessories from Bolymin can be guaranteed to pass this certification.

Table of Content

1 Product Overview

Thank you for choosing BE905A2, the Mobile Data Terminal (MDT) designed by Bolymin Inc., In this new generation product, it carries more powerful CPU, larger memory capacity, more advanced and faster 3G telecom module and higher capacity battery. In addition to that, we add the water/dust proof grade of environment protection on mechanical design to endure harsh environment.

1.1 Package Content

Please check your package content upon receiving the product parcels. Besides the BE905A2 unit, make sure your accessories are included as well. Note that all accessory contents in the parcel are depended on your purchase order. If it doesn't match, please contact your dealer.

NOTE: The term as **"KIT-XX"** is the serial number of all accessories. All kits could be ordered separated (optional), please contact with your dealer for further information.

	S/N : KIT-01	S/N : KIT-02
BE905A2	**SanDisk 4GB SDHC Class 4**	**Bracket**

S/N : KIT-03	S/N : KIT-04	S/N : KIT-05
ActiveSync USB Cable (1.8m)	**Car Mount Holder (Glass Ver.)**	**Sun Shade**

S/N : KIT-06	S/N : KIT-07	S/N : KIT-08
Battery Pack	**Cigar Adapter (1.8m)**	**AC Adapter with Core**

S/N : KIT-09	S/N : KIT-10	S/N : KIT-11
Multi I/O Cable Type 1 (2.4m)	**Multi I/O Cable Type 2 (2m) - Power Cable**	**3.5mm Single side Headset**

NOTE: Among the two product parcels you received, you should find the **SD card**、**2G/3G antenna**、**VESA75 four washers** for mounting and two **battery pack cover screws** for spare, all packed together with **BE905A2 unit** in one parcel and find the SD card storing   booting OS image.

1.2 Product Profile

Product Outline

FRONT

Item	Usage
Microphone	To support GSM voice communication
LED indicator	Please refer to below table for definition
Light sensor	To auto-adjust the LCD backlight
Custom keypad	6 user keys, to be defined by programming
Power key	To turn BE905A2 on/off ; To wake up OS from suspend mode by key press

The definition of LED indicator

Power On Light	External Power Light	Battery Light
Green: power on **Off** : power off	**Orange** : plug-in external power **Off** : unplug external power	**Green** : battery charge completed **Orange** : battery charging **Off** : battery removed or damaged

BACK
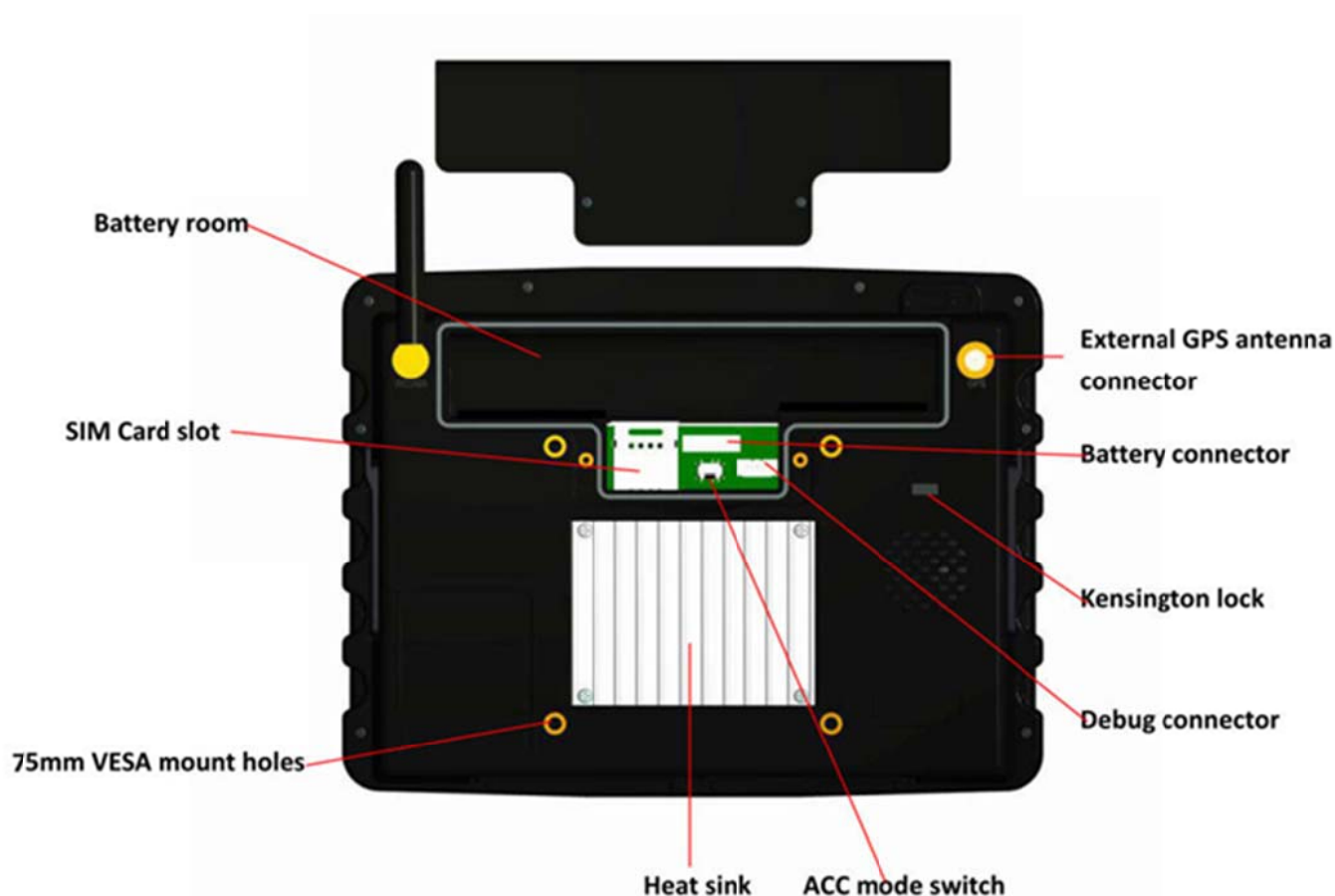
Item	Usage
Battery room	For Li-ion battery placement
Battery connector	To connect Li-ion battery and device
External GPS antenna connector	To connect external GPS antenna and device
SIM card slot	For SIM card placement
Debug connector	To connect RS232 debug kit and device
VESA mount holes	VESA75 (75mm x 75mm) holes, to screw product onto car mount or other external fixer
Heat sink	To cool the device by dissipating heat into surrounding air.
ACC mode switch	To switch ACC ignition mode to be on/off
Kensington security slot	Secured protection for anti-theft

RIGHT SIDE
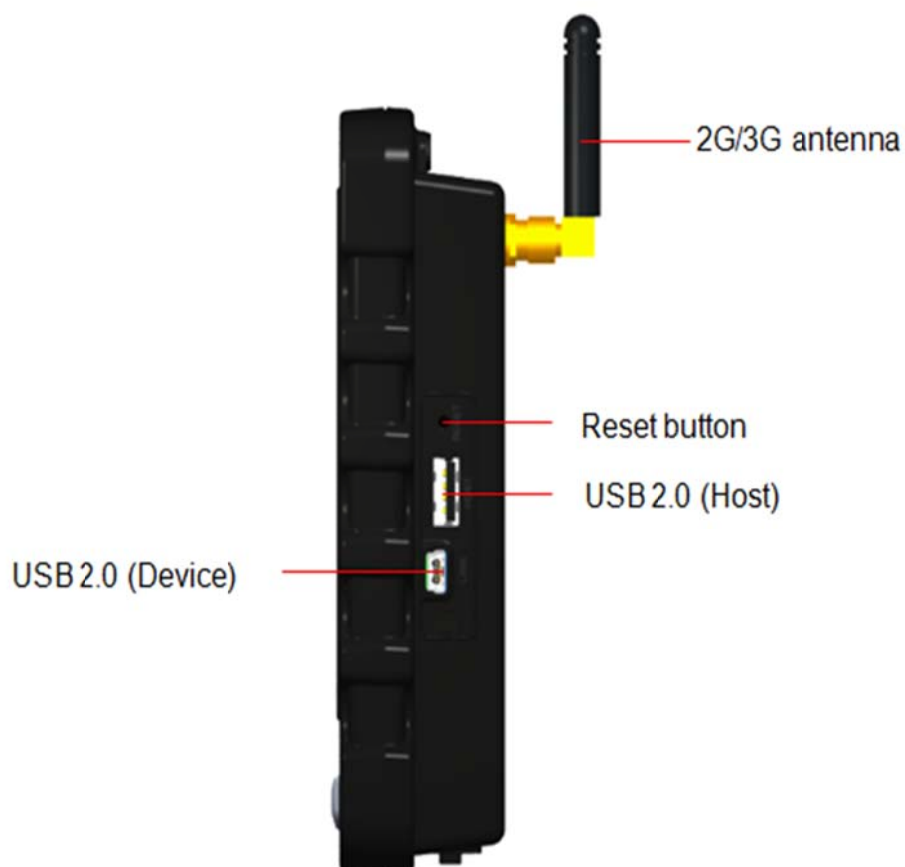
Item	Usage
2G/3G antenna	For enhancement of 2G/3G signal strength
Reset button	A hardware button to reset the device, when system hang-up or other unexpected situation occur or boot from bootable SD Card when you install a bootable SD card
USB 2.0 (Host)	To connect to peripherals such as mouse, keyboard, USB flash disk
USB 2.0 (Device)	To connect to PC for file transfer by synchronization software like Microsoft ActiveSync or Windows Mobile Device Center

LEFT SIDE

3.5mm headset jack
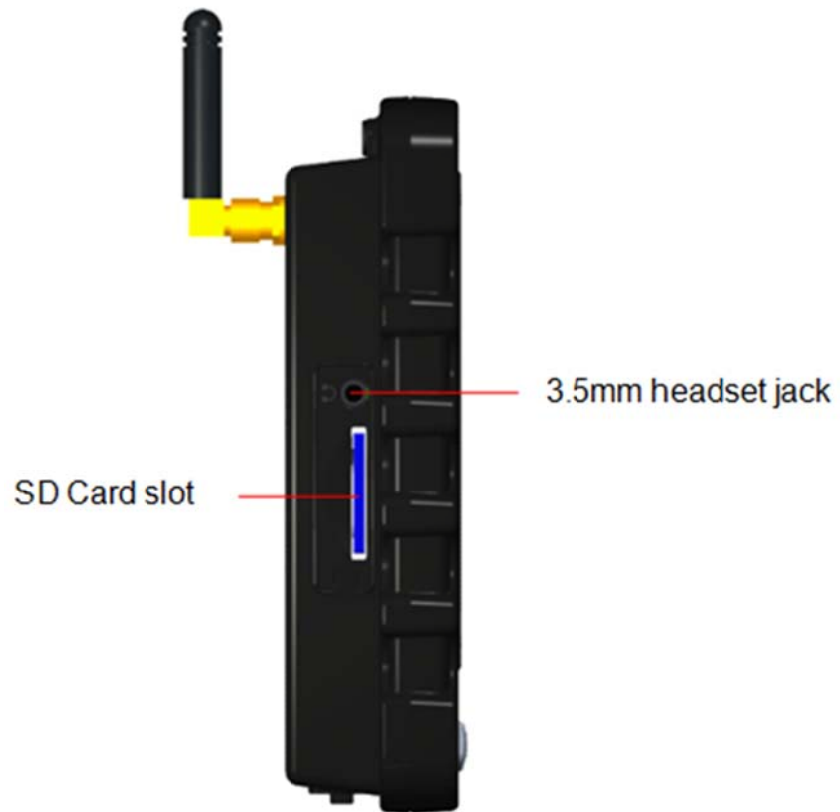
SD Card slot

Item	Usage
SD Card slot	To accept SD/MMC card
Headset jack	To accept 3.5mm headset terminal

BOTTOM

Power Jack
(Ø: 2.1 mm)
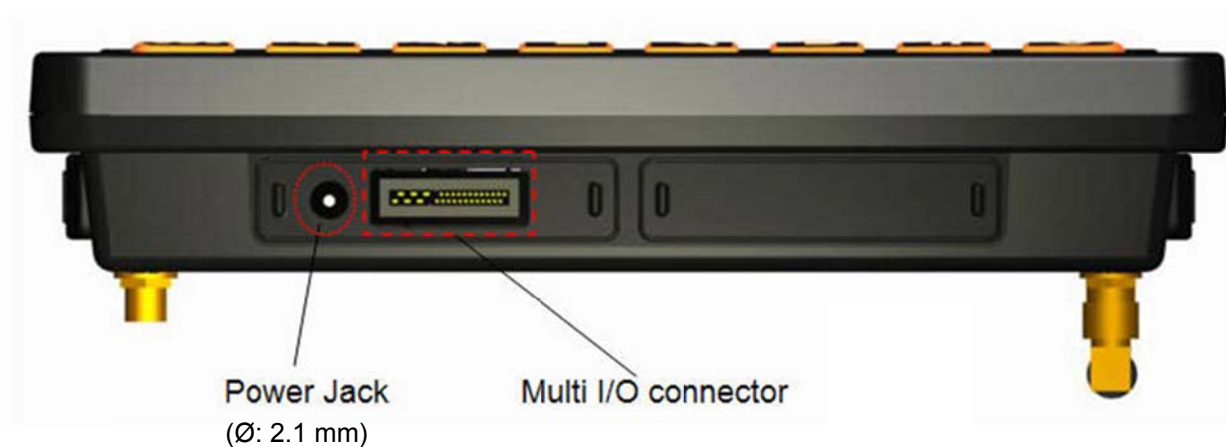
Multi I/O connector

| Item	Usage
Power jack	To plug in the AC adapter or Cigar adapter, to supply power to device and charge the optional battery pack
Multi I/O connector	To connect multi I/O cable and device, for offering specific I/O ports like RS232、ADC、GPIO、CAN BUS and Power/ACC

1.3 Product Specification

System Specification

| Category	Description
Processor	1GHz 32-bit ARM Cortex-A8 Single Core CPU
System Memory	LPDDR-400 200MHz 512MB (256MB x2)
Storage Memory	eMMC 4.41 I/F 8GB
External Storage	Support SD/SDHC Push-Pull Card Slot up to 32GB
Operating System	Android 2.3.4
Display	• 7" Color TFT LCD 800x480 WVGA • White LED Backlight Supported, 320 Nits Luminance • 4-wired Resistive Touch Panel
Telecom Module	• Hexa-Band UMTS (800/850/900/1700/1900/2100 MHz) • HSPA: HSUPA 5.76Mbps, HSDPA 7.2 Mbps • Quad-band GSM (850/900/1800/1900 MHz) • GPRS Class 33, CS1-CS4 107kbps • EDGE Class 33, MCS1-MCS9 296kbps
GPS Module	50-channel Receiver Engine, -162 dBm of Sensitivity
USB	1 x USB 2.0 Host Standard Type A / 1 x USB 2.0 Device Mini-B
Serial Port	1x RS232C of 5-Wire UART (TX,RX,CTS,RTS,GND)
GPIO	2 x GP Input / 2x GP Output
ADC	2 Channel ADC of 10-bits Resolution, Voltage Ranged From 0~30V
Keypads	6 x User Defined Programmable key, 1 x Home key, 1 x Power Key
CAN Bus	1x CAN 2.0b with ISO 11898-1 protocol
Audio	• Internal 2 Watt Speaker (Mono) / Internal MIC • External 3.5mm Stereo Headset Jack (Microphone/Earphone)
Power Supply	• DC 11~31V • Internal Li-ion Battery of 2500mAh(18.5Wh)
Operation Temperature	• -20°C~+70°C(without battery)/-20°C~+60°C(with battery discharge) • +2 °C~+33°C (with Internal Battery Charge Ambient)
Storage Temperature	-30 ℃ ~ +80 ℃
Humidity	90% ±5%RH, +40°C, Non-condensing
Chassis	Plastic Enclosure, Industrial Grade / VESA mount / Kensington Slot
Weight	795g (with battery) / 695g (without battery)
Dimension	190mm (W) x 144mm (H) x 35mm (D)

Mechanical Specification

BE905A2

Bracket

198

162

46

Sun Shade

195

112

58

38
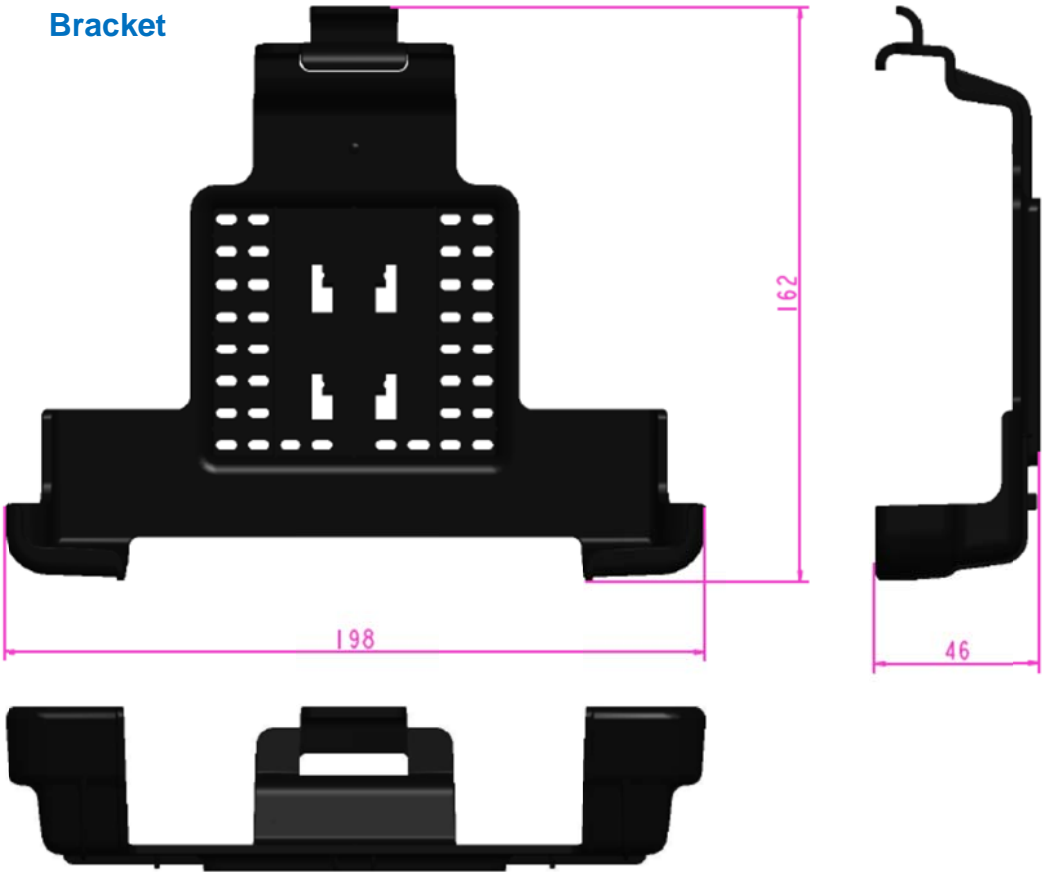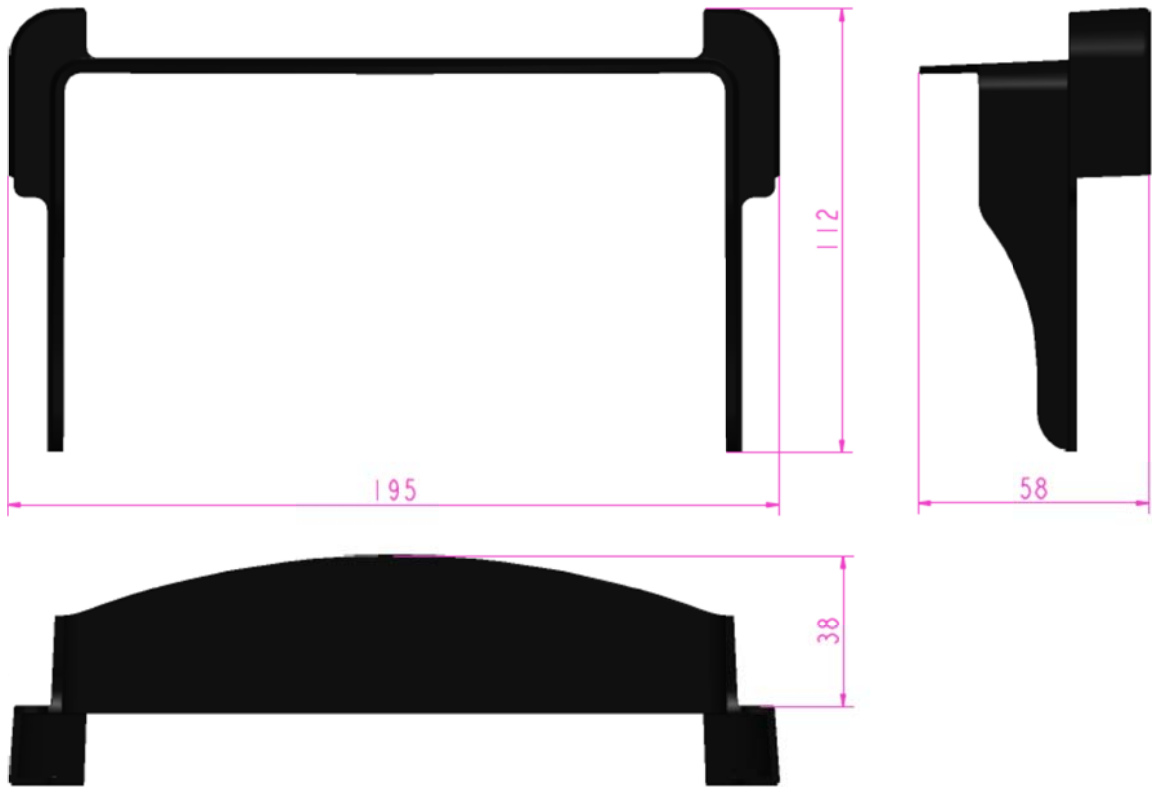
1.4 Order Information

There are 4 SKUs available for your options.

SKU No.	3G module	GPS module	Remark
SKU 1	☆	☆	AGPS supported
SKU 2	☆		
SKU 3		☆	
SKU 4			

NOTE: Only SKU 1 model supports AGPS function and works well under the condition that the CN value of GPS signals must be greater than 38.

2 Getting Started

In this chapter, we'll introduce the way to power on BE905A2, attach the RF antenna to the device, install and use accessories that are available for this MDT device.

2.1 Power on BE905A2

The acceptable voltage range to power on BE905A2 is DC 11~31 Volts, so that this MDT could work almost in all kinds of vehicles. As shown in below table, there are multiple power modes available on BE905A2 from which the user can choose according to his requirement. Especially, this MDT has advanced power soft-start design so that there is no power drop when it is powered from ACC control.

| Power Mode	Usage	ACC Mode
AC adapter	Plug in AC adapter to DC jack on BE905A2. As illustrated in Section 2.2	Switch to OFF
Cigar adapter	Plug in cigar adapter to DC jack on BE905A2. As illustrated in Section 2.2	Switch to OFF
Li-ion battery	Install the battery into the battery room. See Section 2.3 for detailed description.	Switch to OFF
Car battery	By ACC ignition via Multi I/O cable. See Section 2.14 for detailed description.	ON: ignition by car key OFF: bypass car key

ACC Switch
ACC switch offers users an option to turn on/off BE905A2 by car key ignition or not.

ACC switch

1. **If you don't want to turn on/off the BE905A2 by car key ignition.**
   You should set the ACC switch, which is located in the battery room, to be in **OFF** position. Otherwise the device would NOT power on/off normally.
   In this option, you can supply power to BE905A2 by AC adapter, Cigar adapter or Li-ion battery.
   In this option, even if you connect car battery via Multi I/O cable, the car key ignition would bypass, that is, the device would be turned on/off only by power key.
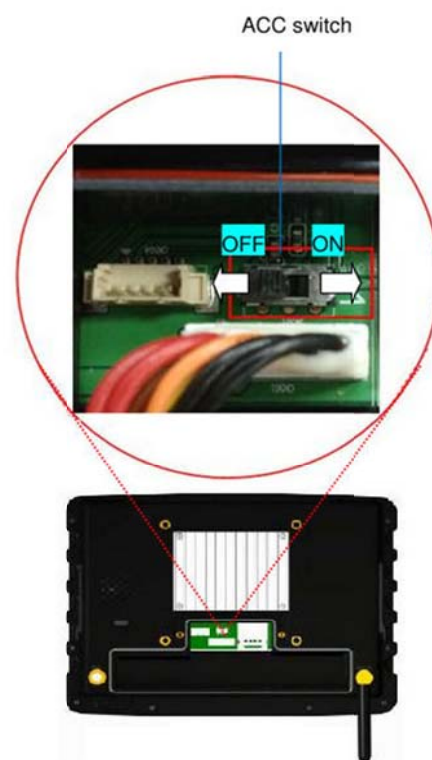
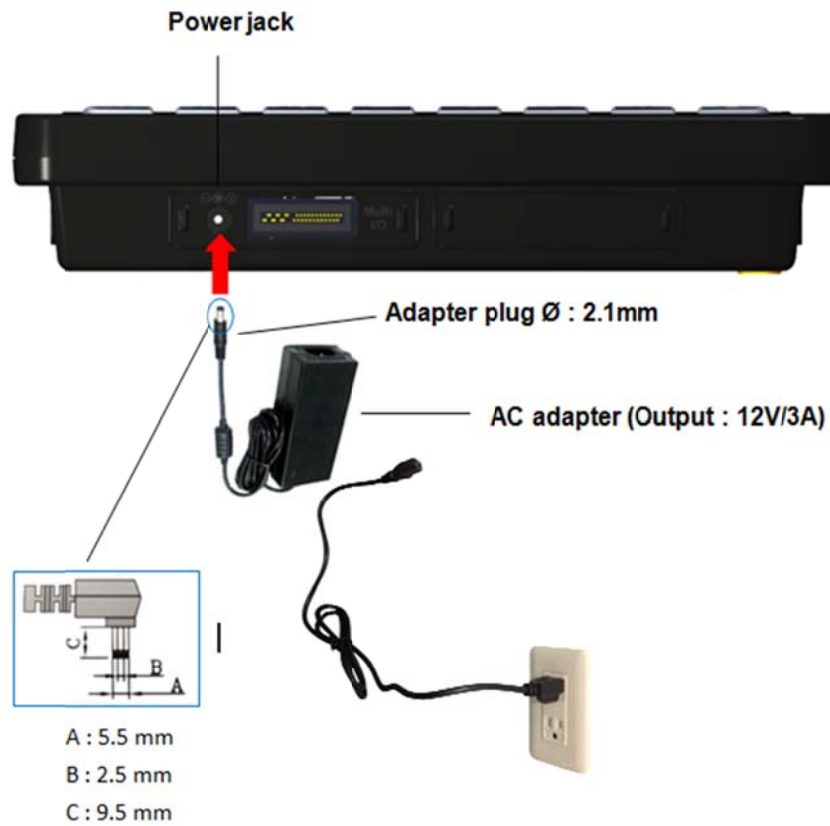## 2. If you want to turn on/off BE905A2 by car key ignition

You should set the ACC switch to be in **ON** position, and supply power from car battery via Multi I/O cable. The device could then be turned on/off by car key ignition.

Below table shows how users can launch BE905A2 under all combinations of power source selections and ACC switch mode:
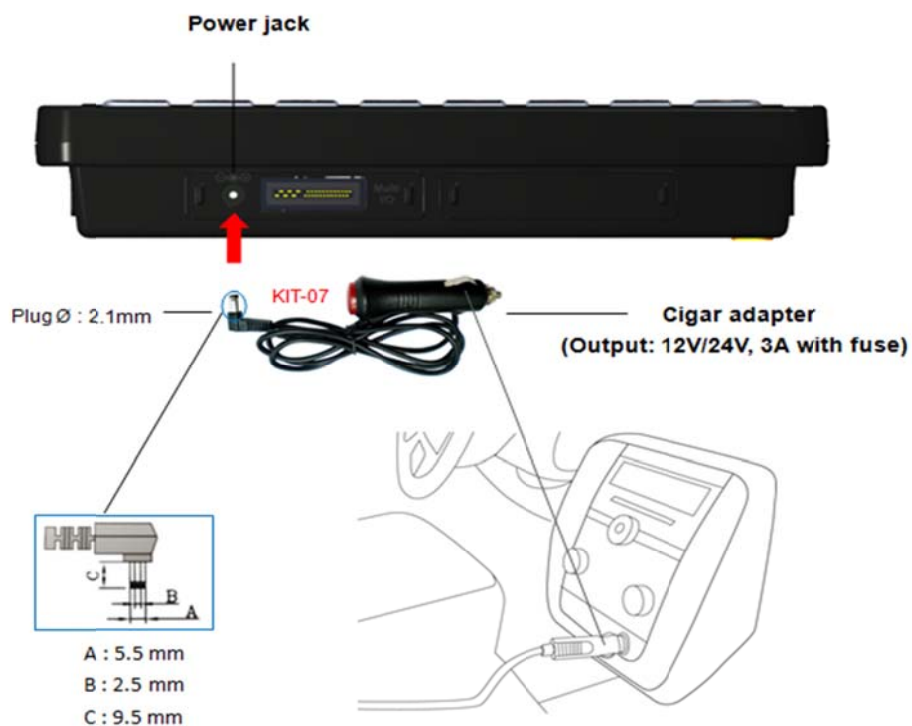
			Multi I/O Cable Used					
			YES			NO		
			Only Car BAT.	Only Li-ion BAT.	Car BAT. & Li-ion BAT.	Only DC JACK	Only Li-ion BAT.	DC JACK & Li-ion BAT.
ACC Switch ON mode	Car Key	ON	System on	System always on	1.System always on 2.Charging	System always off	System always on	System always on
		OFF	System off		1.System always on			
ACC Switch OFF mode	Power Button	ON	System on	System on	1.System on 2.Charging	System on	System on	1.System on 2.Charging
		OFF	System off	System off	1.System off 2.Charging	System off	System off	1.System off 2.Charging

2.2 Powered by AC and Cigar adapter

Powered by AC adapter

Power jack

Adapter plug Ø : 2.1mm

AC adapter (Output : 12V/3A)

A : 5.5 mm
B : 2.5 mm
C : 9.5 mm

Powered by Cigar adapter

Power jack

Plug Ø : 2.1mm

KIT-07

Cigar adapter
(Output: 12V/24V, 3A with fuse)

A : 5.5 mm
B : 2.5 mm
C : 9.5 mm

Power Key

When you supply power to BE905A2 from DC jack via AC adapter、Cigar adapter or by Li-ion battery, the MDT will power on automatically without any key pressing at first time.You should press the menu key enter android desktop.

After that, **as long as the power source remains on the device**, users can turn on/off the device by the **Power Key** as illustrated below, which is the rightmost button among the Keypads at the front panel so that users don't need to remove/reinstall the power source to power off or power on the device respectively.

System is OFF   System is ON   System is ON

Pressing key to turn on   Pressing Menu key to enter android desktop

Note: User should press the **menu** key enter android desktop.

System is ON   System is OFF

Pressing and hold about
4 sec will show the dialog
and click the Power off

Phone options
Silent mode
Sound is ON
Airplane mode
Airplane mode is OFF
Power off

2.3 Battery Pack

Install the battery pack

To install the battery pack, first turn BE905A2 off and detach the cover of battery room on the back of the device by unscrewing the 2 screws on it, then lever the cover up from the groove. Next, attach the battery connector into the socket as indicated and place the battery pack as shown below. Place the cover back and screw it up to complete the battery installation.

(Reminder: Please always put the barcode label face of battery pack toward the up direction and lay the battery in the battery room)

Put the barcode label side toward to the up direction
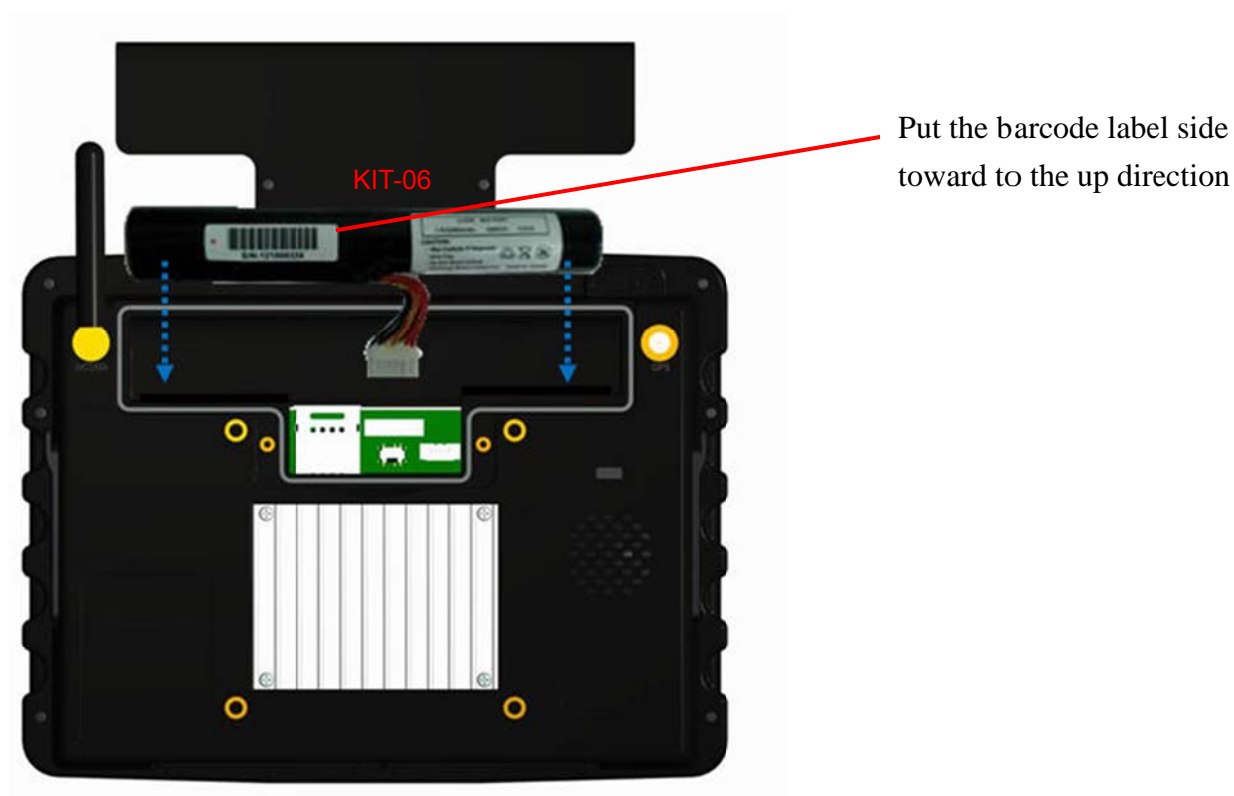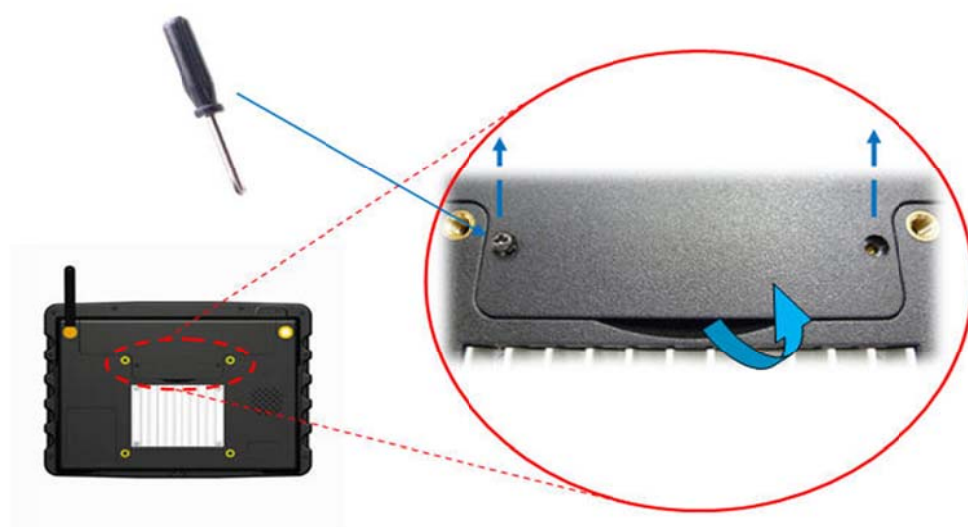
NOTE: After installing the battery pack, remember to check that you do **NOT** move the ACC switch to the **ON** position accidently during the installing process; otherwise the device would not be turned on/off normally.

ACC OFF mode
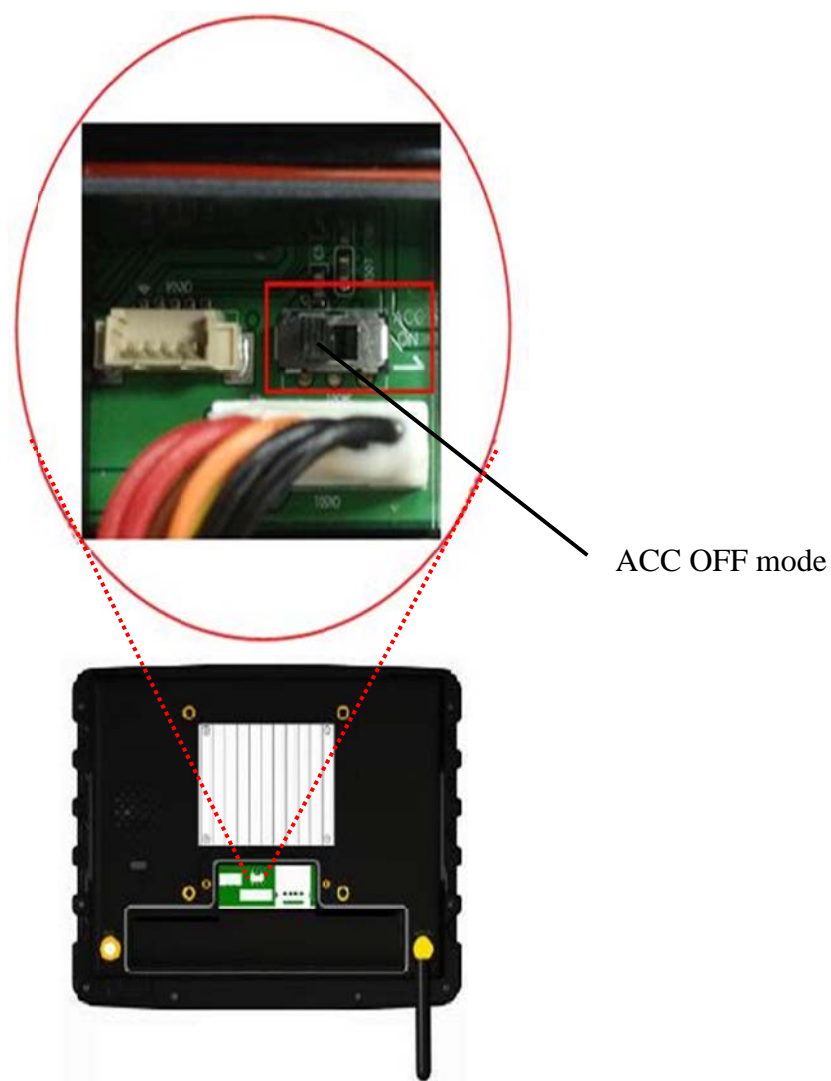
Charging the battery

To charge the BE905A2, you can plug in an AC adapter into the power jack of the device and the other end into a wall outlet, or use the cigar adapter in a vehicle. When the battery is charging, the battery light indicator is orange; when the battery is fully charged, the battery light indicator is green.

NOTE: The battery cannot be charged via the USB port on BE905A2.

Battery Characteristics

Type	Li-ion	
Output	7.4V/2.0A	
Capacity	2500mAh (18.5Wh)	
Charger Time	About 2.5hr (from 0% to full)	
Battery Life	Full-run	1 hr
	Idle (power on)	2 hr
	Suspend	10 hr
	Shut down (power off)	480 hr
Weight	100g	

NOTE: The battery of BE905A2 should only be seen as backup in case main power fails. It's not suggested to regard it as a laptop or a smart phone battery with longer battery life.

Low-Power Alert of Battery

When your BE905A2 is running via battery power purely, the below alert will pop up to indicate you to charge if system detects the device is very low (less than 15%) on battery power.
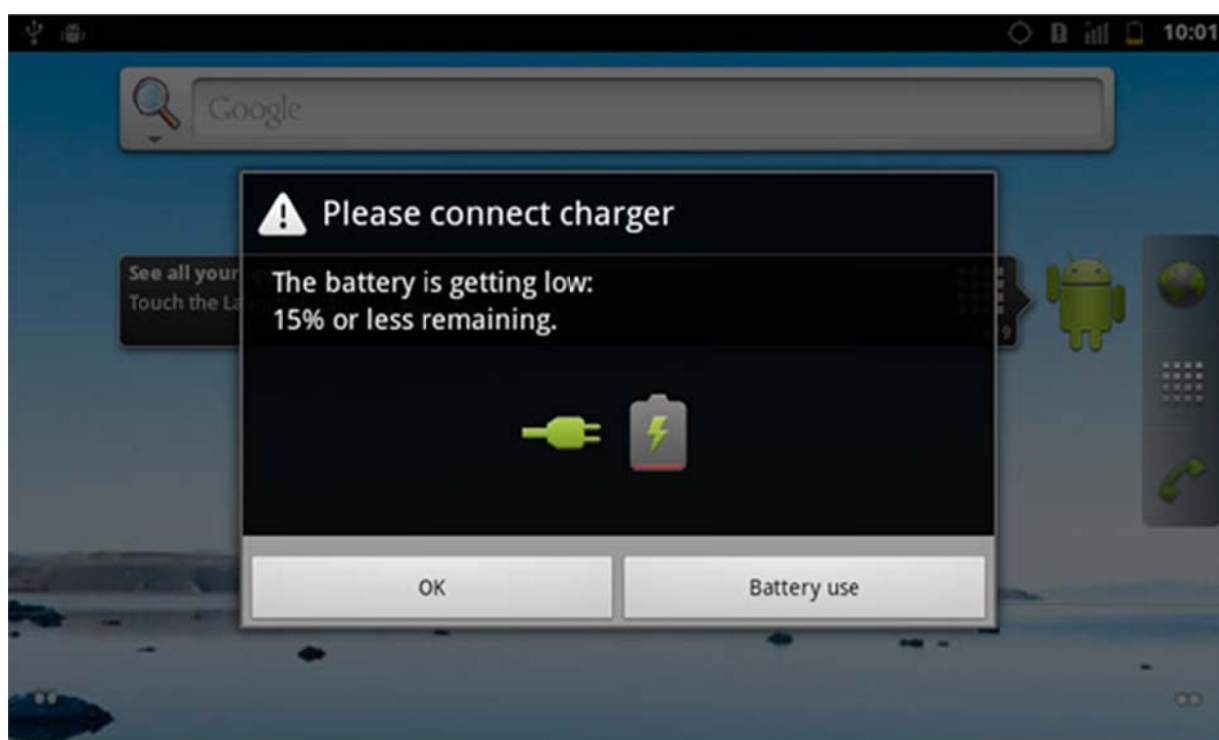
2.4 Bracket and Car Mount

For mounting the mobile data terminal in the vehicles, users can optionally purchase the bracket and car mount, assemble BE905A2 with suction mount to the windshield or assemble BE905A2 with screw mount in center console up to user's need.

Car mount with suction version
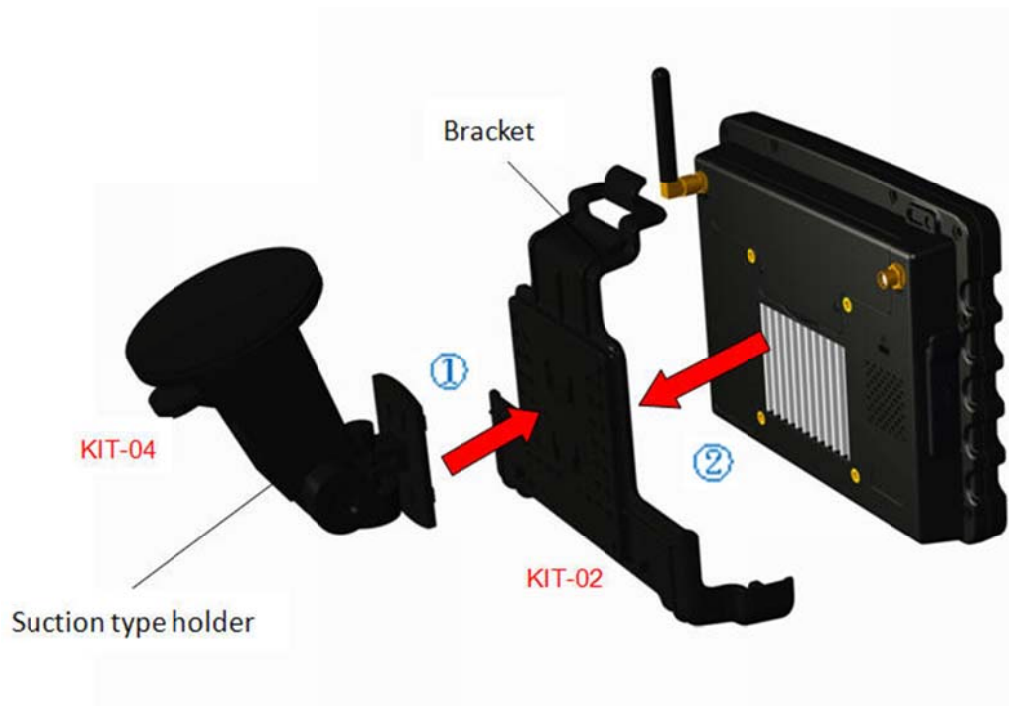
Standard VESA mount

Besides the mounting solution as mentioned above, BE905A2 supports a standard VESA75 mount (MIS-D) 75mm x 75mm on the chassis of backplane so that users can combine their preferred VESA75 design bracket with MDT. Also, the depth of the screw hole is 5mm.
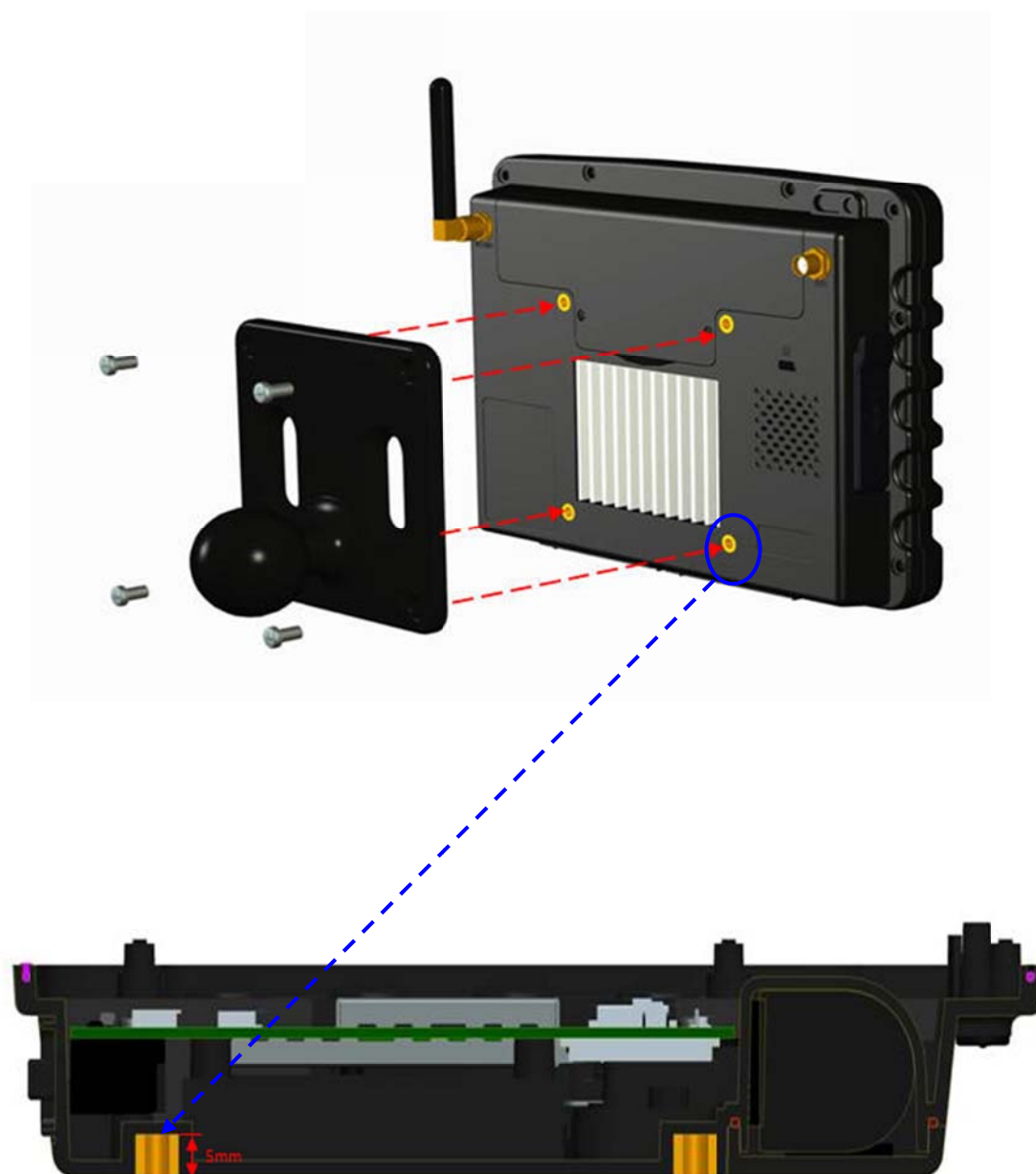
If the diameter of screw hole in your VESA mount holder is larger than the insert nut of BE905A2 VESA. You have to use these four washers attached in the parcel to prevent the insert nut to be pulled up to cause damage.

Place washer on the insert nut if needed

Here we provide the store information of mounts of VESA 75mm for your reference.

1. RAM MOUNTS: http://www.rammount.com

2. Related VESA 75mm mounts list:

http://www.rammount.com/SearchResults/tabid/38/searchBy/description/criteria/086069083065032055053/Default.aspx

2.5 Sun Shade

The purpose of the sun shade is to reduce the glare of sunlight that may cause the LCD screen difficult to be read in the car. To install the sun shade, be noted to remove the bracket first if it's been attached.

KIT-05

2.6 2G/3G Antenna

To attach the 2G/3G antenna to the BE905A2 device, plug the antenna jack into the SMA connector on the device, then screw the antenna by twisting the base of antenna in a clockwise motion gently until it is tight and cannot be turned any further. To detach the antenna, grip the antenna bulkhead connector and twist smoothly counterclockwise to unscrew it from the device.

SMA connector (female) of GSM

bulkhead
connector

twist in clockwise direction to screw
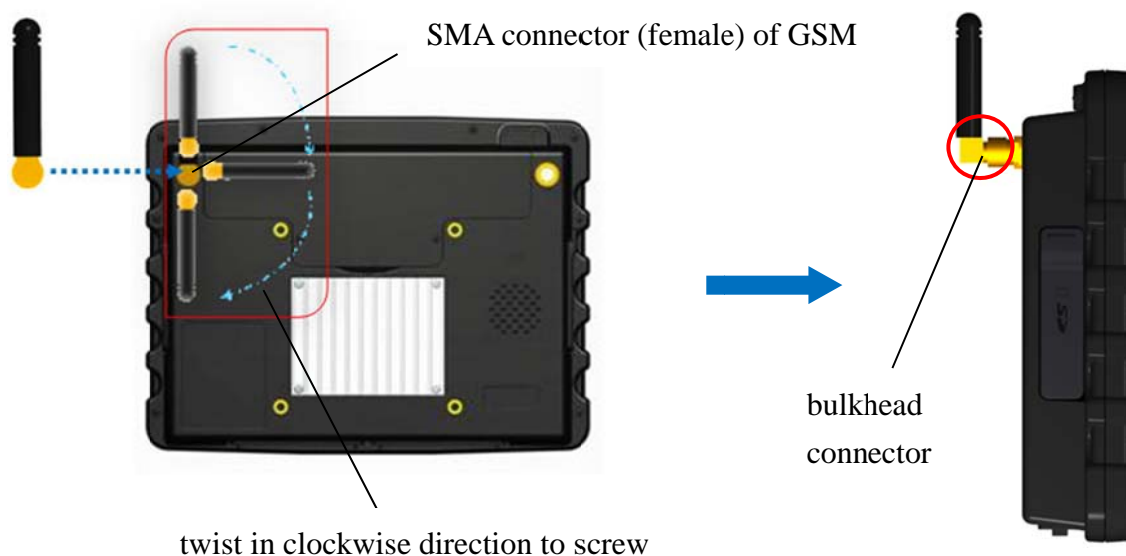
NOTE: The 3G signal quality may differ according to the cellular network of your mobile carrier.

NOTE: The antenna connector of GSM and GPS is the same as SMA type. Please note that the left side is for GSM module and the right side is for GPS module from the back view.

NOTE: When screwing the antenna into the device, please force gently to prevent breaking it.

2.7 External GPS Antenna

In case better GPS signal reception is required or the solar window film is used in vehicle, an external GPS antenna with SMA connector will be required. Please connect it to BE905A2 as indicated. Please do stretch the antenna outside the car or outdoors with clear line of sight.

To install the antenna, just plug the antenna jack with force into the SMA connector on the device.

SMA connector of GPS

2.8 SIM Card

IMPORTANT: To install a SIM card, please turn your BE905A2 off first and then remove battery pack in advance.

To install the SIM card, firstly detach the cover of battery room on the back of the device by unscrewing the 2 screws on it, and then lever the cover up from the groove. Secondly, gently push the SIM holder outwardly to loose it, slide the SIM card into the slot by aligning the notch of SIM card with that on the SIM slot to match corners. Thirdly, push the SIM holder inwardly to tighten it. Finally, place the cover back and screw it on to complete the SIM card installation.
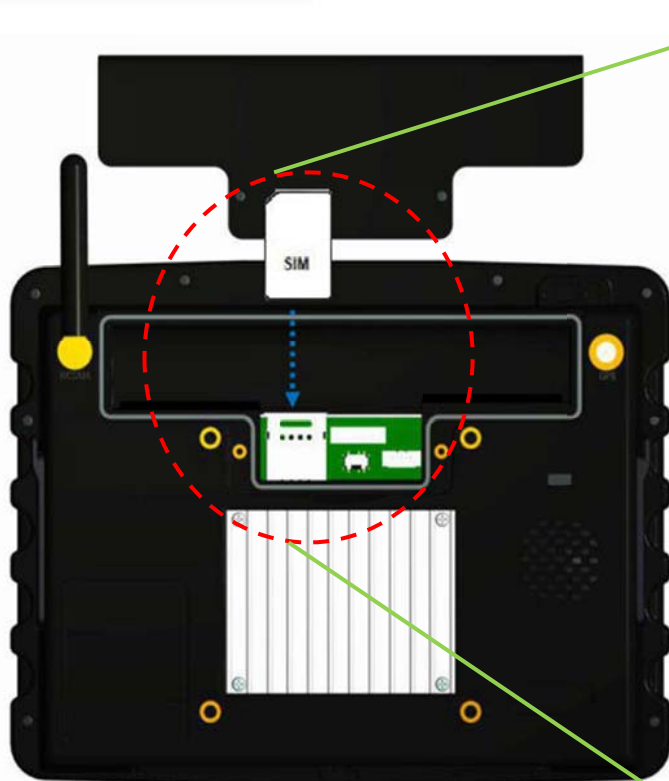
1. Push the cover inside to unlock

2. lever up the cover and then insert the SIM card

3. Push the cover outside to lock

2.9 SD Card

As illustrated below, plug the SD card into the slot after lifting the rubber cover. Users can see a card icon on the rubber cover showing the correct position to put the SD card to the slot. Also be noted, to remove the SD card, first make sure the SD card is not in the process of reading/writing, then press a firm push on the card to pull it out.


KIT-01

KIT-01
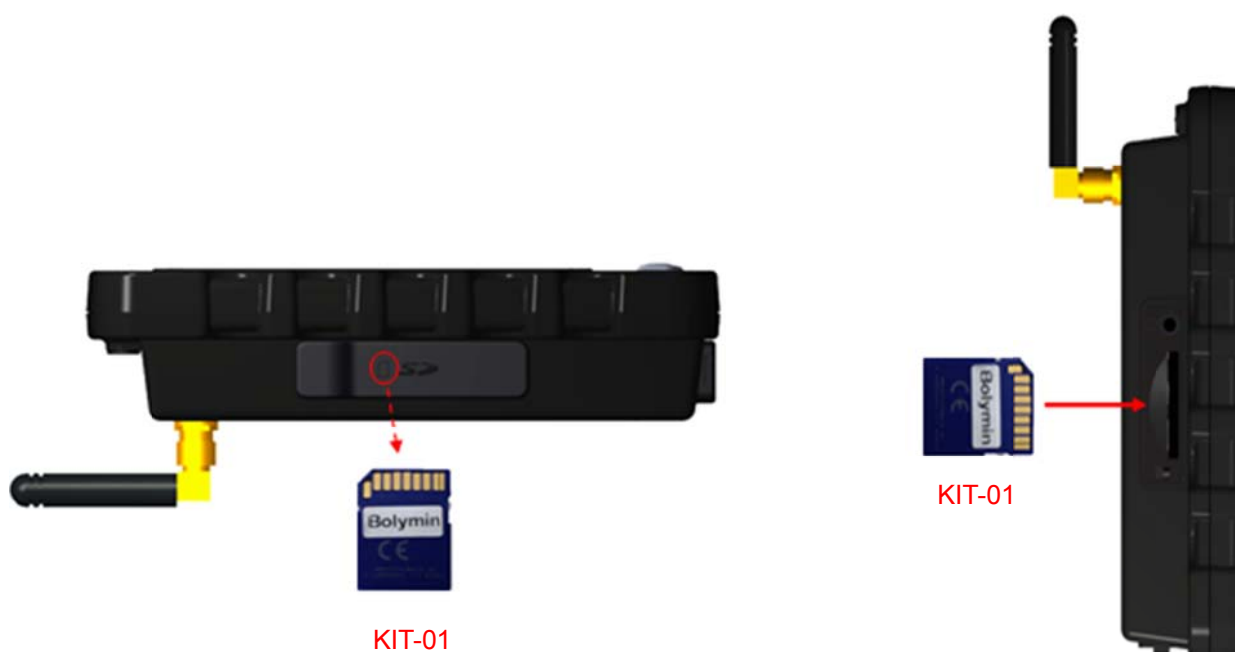
IMPORTANT: Below table lists the SD card that has been verified OK for BE905A2 prior to this user manual release.

BE905A2 SD Card QVL	
Brand	**Specification**
KINGMAX	● 16GB class 6
KINGSTON	● 32GB class 10
PRETEC	● 8GB class 10
SANDISK	● 1GB ● 4GB class 4 ● 8GB SDHC class 4
TOSHIBA	● 16GB class 10
TRANSCEND	● 2GB ● 4GB class 2 ● 16GB class 4

2.10 Reset Button

The reset button is used to reset the BE905A2 in case the device is halted somehow or boot from bootable SD Card when you install a bootable SD card.

To enable this function, please find a pin-like object or straightened paper clip, push into the reset hole, then press gently and remove it.
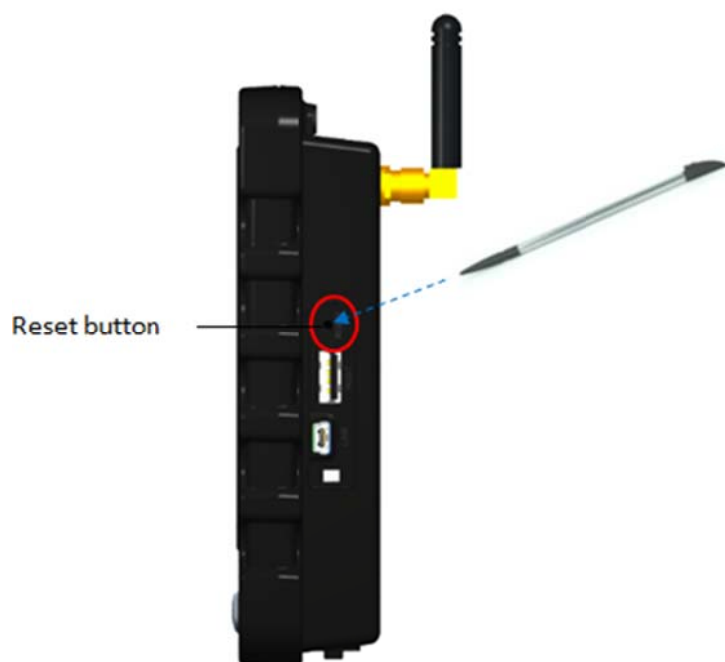
2.11 Audio

Internal speaker and microphone

The BE905A2 provides an integrated 2 Watt mono. speaker located on the back of the device. The speaker is connected to the platform audio CODEC that can output a maximum volume of 88dB. Also on the top of the front, there is a built-in mono. microphone which can be used to support hands-free voice communication.

speaker

Microphone

Headset jack

One 3.5mm headset jack is designed on the left side of the device for plugging a wired headset to use in privacy. Once a headset is plugged into the jack, the audio output path will automatically switch to the headset by default. For developers, they can programmably change the output path via API. (Please refer to the section "**Description of GPIO control functions**" in the BE905A2 programming guide).

KIT-11

3.5mm headset jack
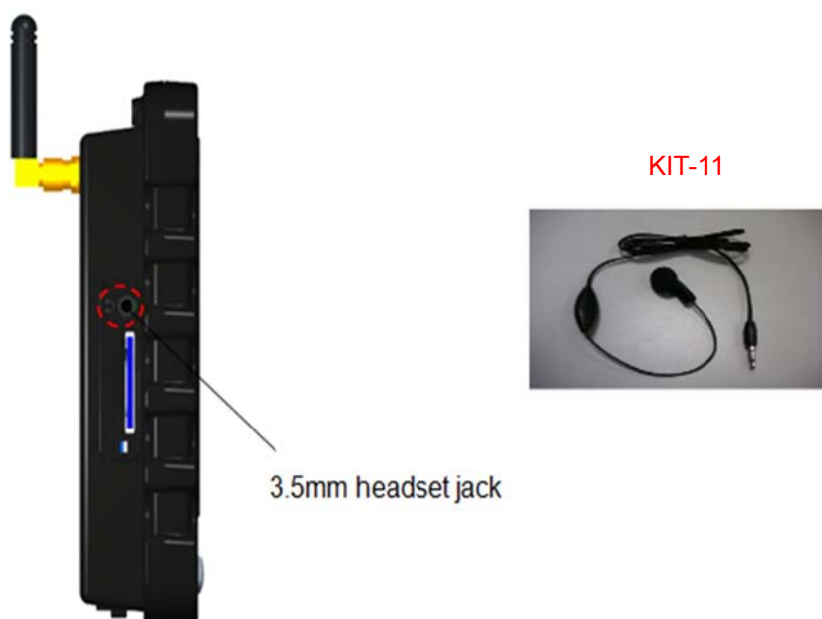
Headset splitter cable

If users use headsets (KIT 11) to connect to BE905A2, some of them may encounter the performance works inappropriately for hand-free voice communication. In this case, we suggest using the headset splitter cable and your favorite headset to solve the problem.

Standard 3.5mm microphone

Standard 3.5mm headphone/earphone/speaker

1:HP_L
2:HP_R
3.AGND/HP_SENSE
4.MIC_IN

Here list the recommended microphone specification when you try to find other one in BE905A2:

- Microphone Sensitivity: -58±3dB (0Db=1V/ubar)
- Speaker Normal Impedance: 32Ω±15% at 1K Hz
- Output S.P.L. :120dB±3dB
- Input Power: Rated - 2mW, Maximum -10mW
- Frequency Response: 20~20,000Hz

2.12 RS232 Debug Kit

About debug kit

What if you fail to start the BE905A2 system while power is on? It may be hardware problems or OS problems. We offer a debug port on the device for developers to connect it to your PC via a RS232 debug kit in order to dump the boot messages to your PC to diagnose the root cause. On PC side, you can directly connect this RS232 debug kit to PC COM port or connect to each other by a USB-to-R232 cable. Please refer to the below pin assignment table of debug board to ensure the opposite connector at PC side to make the connection work normally.

DB9 Female Pin Assignment of Debug Board

5 pin debug port

RS232 debug kit

PORT	No	Description
Debug Port Female	1	NC
	2	TX
	3	RX
	4	NC
	5	GND
	6	NC
	7	NC
	8	NC
	9	NC
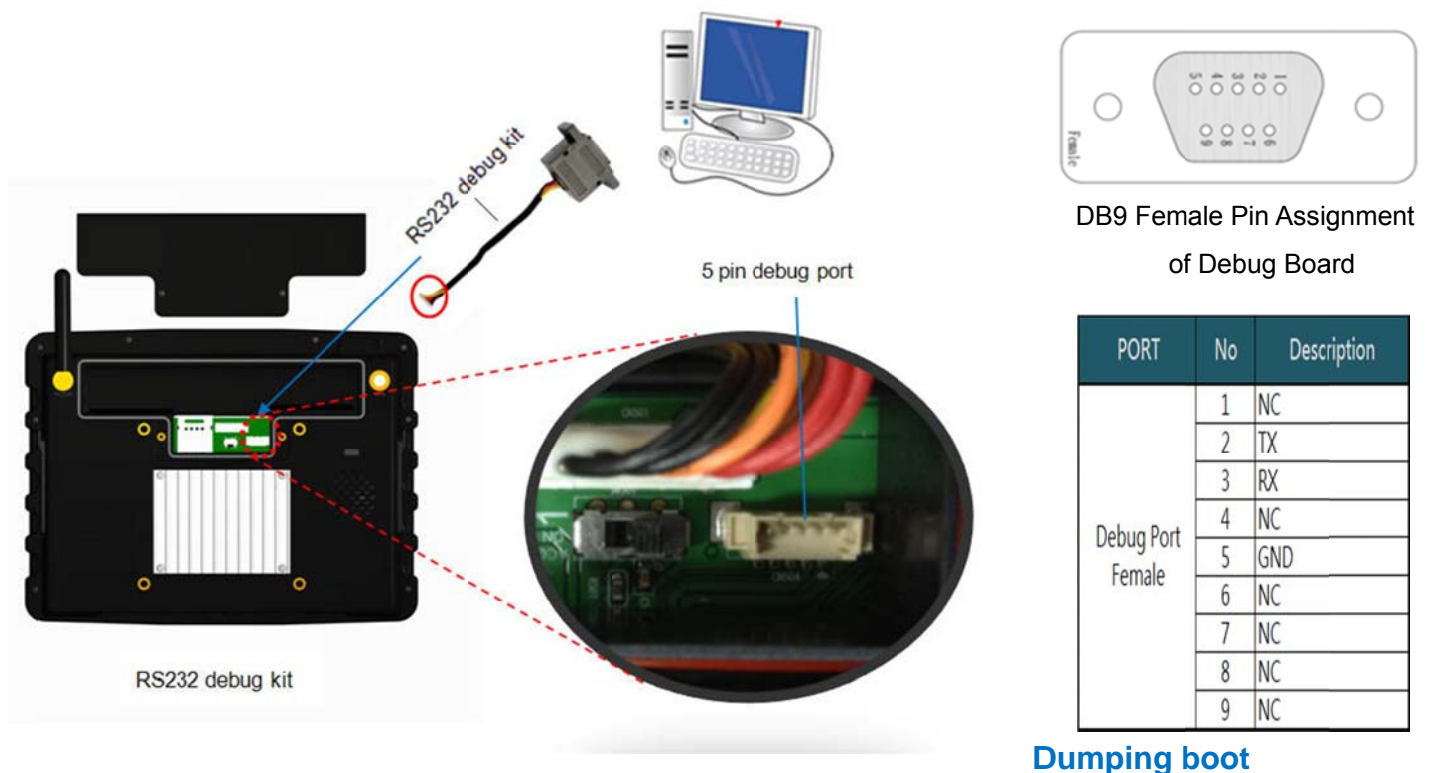
Dumping boot message of BE905A2

When connecting BE905A2 to PC via debug kit, you should run a terminal emulation program (e.g. Hyper Terminal or Putty) on PC side to show the boot message from BE905A2.
As to the related setting and usage, please refer to Appendix A - Dump Boot Message from BE905A2 for more details.

IMPORTANT: If your BE905A2 fails to start normally, you can capture the boot messages and forward boot messages to technical support for diagnosis.

2.13 USB Interface

BE905A2 offers two USB 2.0 interfaces - USB Host port and USB Device port, located on the right side of the device. The USB Host port by standard type A receptacle, compatible with USB 2.0/1.1 device, can be used to connect mouse, keyboard or USB flash disk. As to the USB Device port by type mini-B receptacle, it can be used to connect to PC with Windows OS to transfer files between each other. For communication with PC, please refer to Section 3.4 for more descriptions.
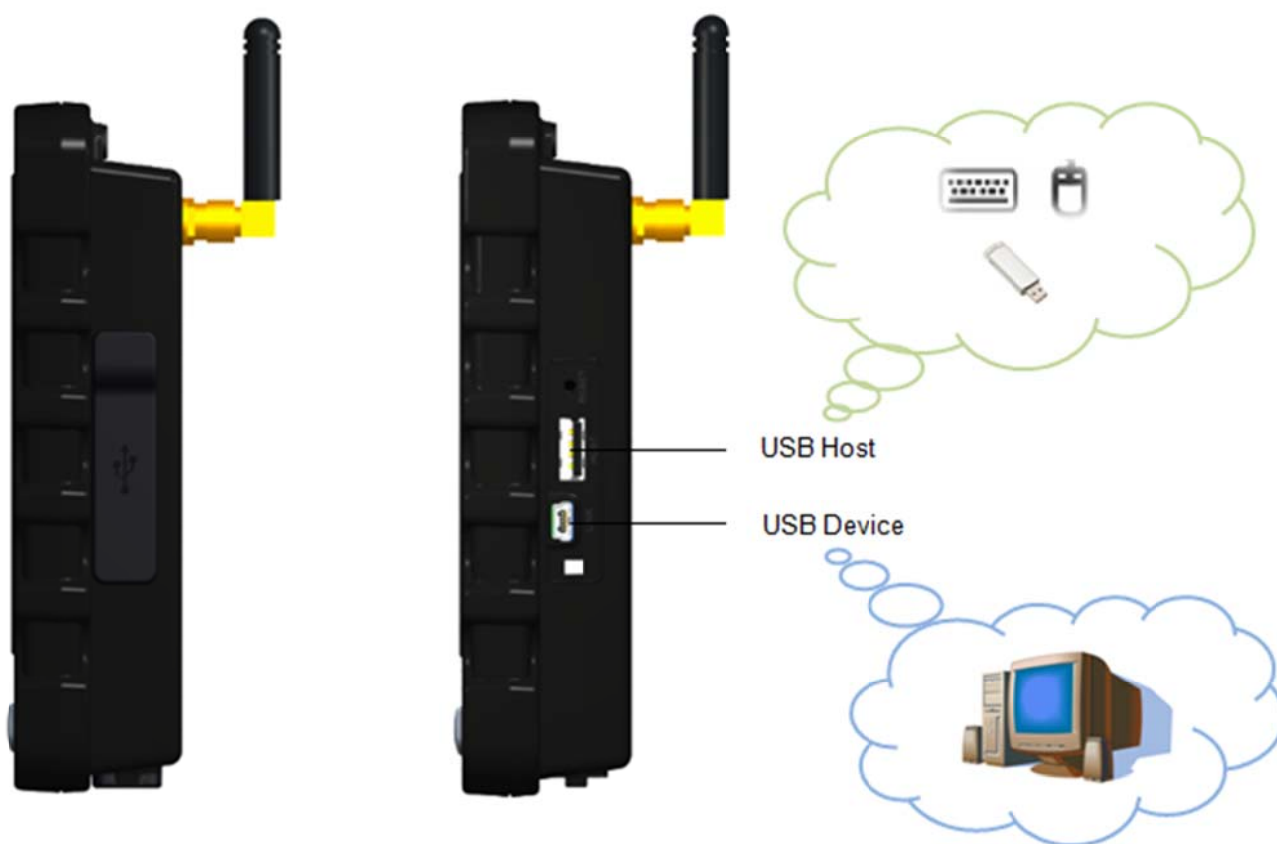
NOTE: If you want to connect external USB camera to BE905A2, please use USB Host. But it's required to install corresponding USB camera driver, released from the camera vendor, compatible for android 2.3.4.

2.14 Multi I/O Connector and Cable

In order to provide a variety of featured interfaces that can lead to specific applications on BE905A2, one 30-pin multi I/O connector is offered on the bottom side of the device. By attaching a multi I/O cable of around 2.4 meter length to the connector could extend the connectivity to other peripheral devices for this MDT.

From below pictures, users can see the multi I/O connector and cable that are combined with power cable, RS232 cable, ADC、GPIO interfaces and CAN BUS port.

Multi I/O Female Connector

Multi I/O connector

Pin Assignment of Multi I/O Female Connector

1	CTS3	2	RTS3
3	TXD3	4	RXD3
5	GND	6	GND
7	ADC_IN1	8	GND
9	ADC_IN2	10	GND
11	GND	12	GND
13	CANH	14	CANL
15	GND	16	GND
17	IN1	18	GND_GPIO
19	IN2	20	GND_GPIO
21	OUT1	22	GND_GPIO
23	OUT2	24	GND_GPIO
25	+30VAL_GPIO	26	ACC
27	+DCIN	28	+DCIN
29	GND_+DCIN	30	GND_+DCIN

UART	ADC	CAN	GPIO	Power

Multi I/O Cable Connector

KIT-09
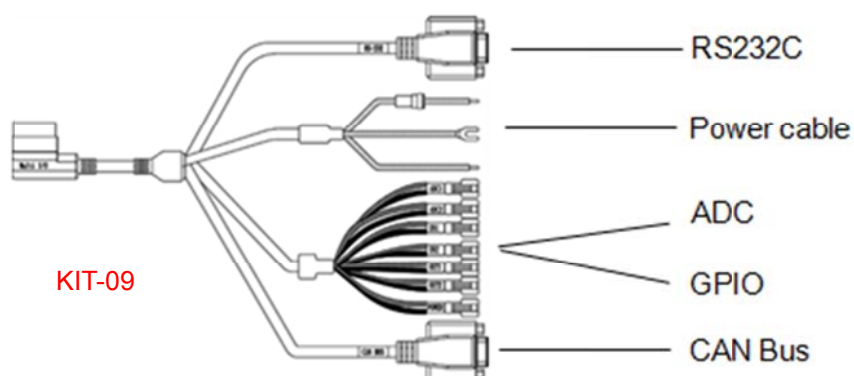
Pin Assignment of Multi I/O Cable Connector

MULTI-IO PIN TABLE			
PORT		**No**	**Description**
RS-232 Male		1	NC
		2	RX
		3	TX
		4	NC
		5	GND
		6	NC
		7	RTS
		8	CTS
		9	NC
CAN BUS Male		1	NC
		2	CANL
		3	GND
		4	NC
		5	NC
		6	NC
		7	CANH
		8	NC
		9	NC
ADC	ADC1	1	ADC IN (DC 0~30V)
		2	GND
	ADC2	1	ADC IN (DC 0~30V)
		2	GND
GPIO	GPIO IN1	1	IN1
		2	GND
	GPIO IN2	1	IN2
		2	GND
	GPIO OUT1	1	OUT1
		2	GND
	GPIO OUT2	1	OUT2
		2	GND
	GPIO POWER	1	GPIO POWER (DC 5~30V)
		2	GND
Car Power	ACC	Red	ACC
	POWER+	Yellow	POWER INPUT +12V/+24V
	POWER-	Black	POWER GND

Power Cable

As illustrated below, they are the power cables among the multi I/O cable where the yellow wire is "**Battery ＋**", the black wire is "**Battery －**" and the red one is "**ACC**".
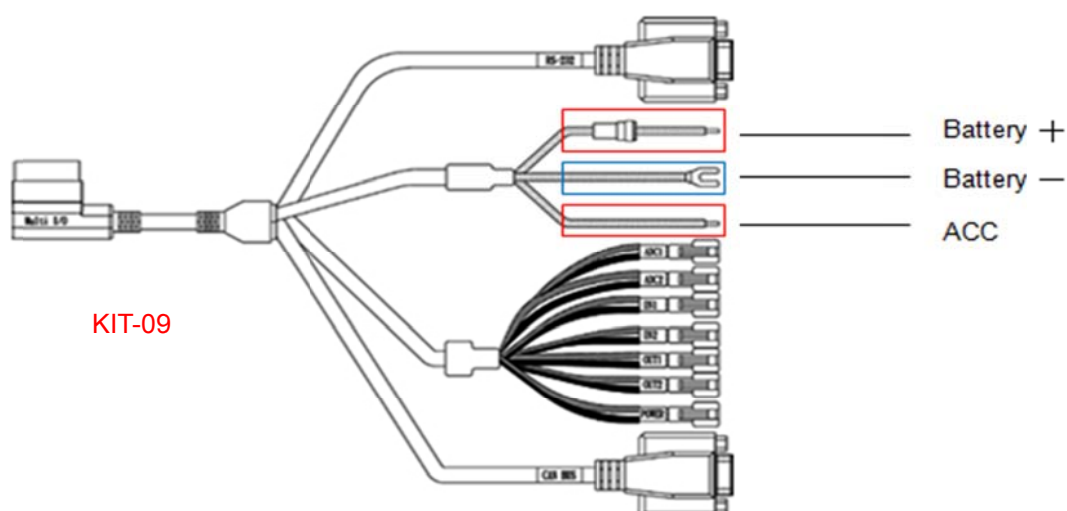
MULTI-IO PIN TABLE			
PORT		**No**	**Description**
Car Power	ACC	Red	ACC
	POWER+	Yellow	POWER INPUT +12V/+24V
	POWER-	Black	POWER GND

Connect Power Cable to Car Battery

Below diagram illustrates the principle to connect power cable to the car battery.
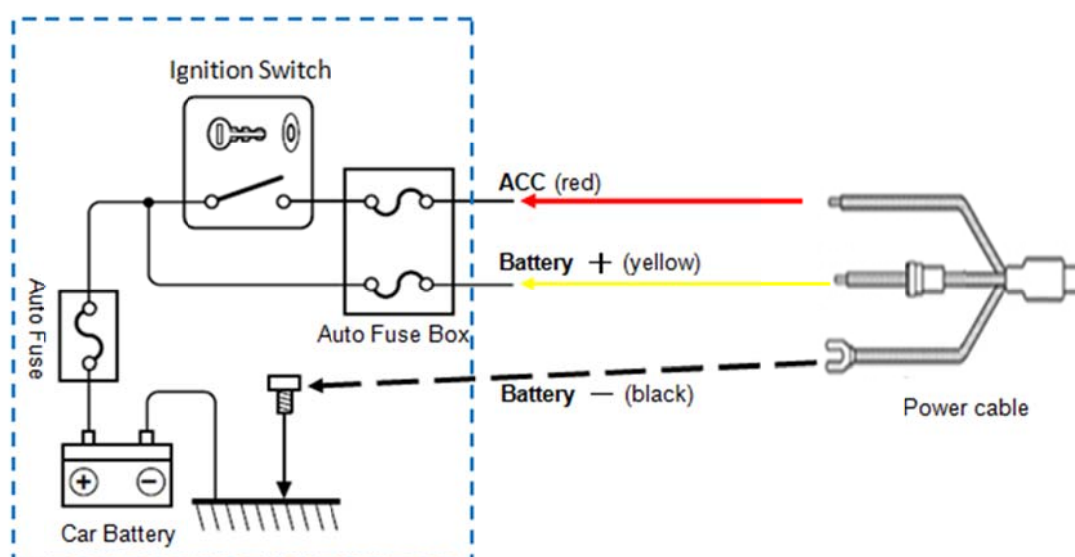
NOTE: If you want to connect power supply from the Auto Fuse Box of your vehicle via the power cable, please consult your automaker or car dealers about the correct usage on Auto Fuse Box.

RS232 Cable

A cable marked RS232 can be used to connect from BE905A2 to peripheral devices with serial port interface like barcode reader or sensor modules with UART from BE905A2. Below table lists the pin-out definitions of this RS232 interface. To verify the functionality of this interface, we provides a test utility for developers. Please refer to Section 4.1 for more details.


PORT	No	Description
	1	NC
	2	RX
	3	TX
	4	NC
RS-232 Male	5	GND
	6	NC
	7	RTS
	8	CTS
	9	NC

ADC Interface

BE905A2 offers 2 ADC channels as illustrated below. Below table lists the pin-out definitions of this interface. To verify the functionality of this interface, we provide a test utility for developers. Please refer to Section 4.6 for more details.
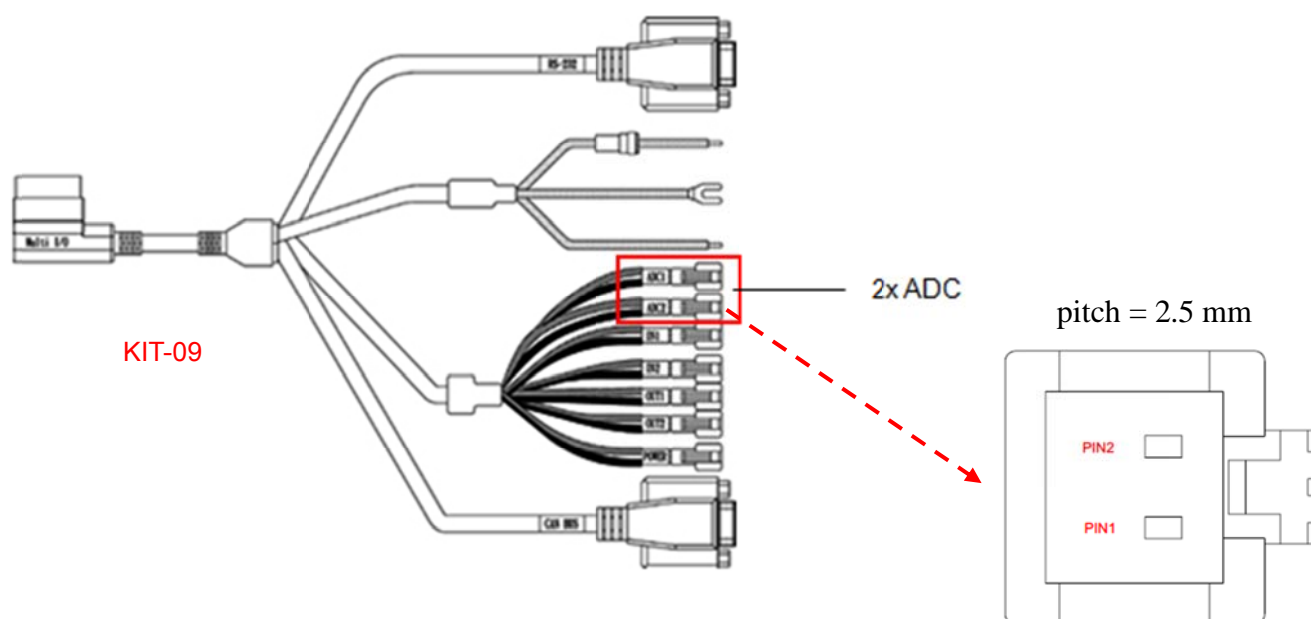
MULTI-IO PIN TABLE			
PORT		No	Description
ADC	ADC1	1	ADC IN (DC 0~30V)
		2	GND
	ADC2	1	ADC IN (DC 0~30V)
		2	GND

Please also be noted that, before the testing you need to make a hardware ADC board by yourself and connect it to the JST male connector (**JST SMR-02V-B**). Below is the circuit diagram for your reference.

ADC Test Schematic
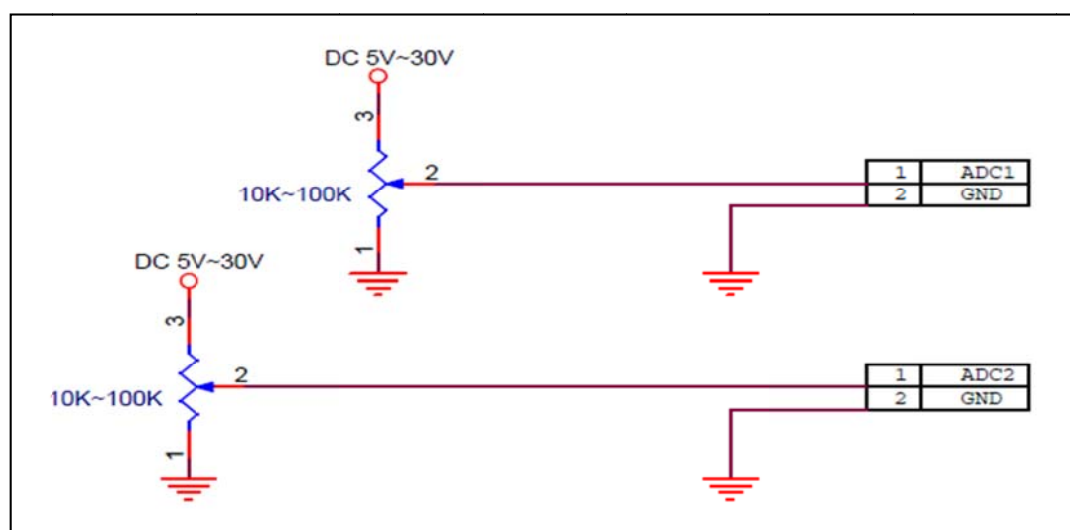
The tolerance range of accuracy of ADC

Channel	Tolerance Range of Accuracy
CH1	+0.1V
CH2	+0.1~0.3V

GPIO Interface

BE905A2 offers 4 GPIO programmable ports (2x Inputs and 2x outputs), as illustrated below. The following table lists the pin-out definitions of this interface. To verify the functionality of this interface, we provide a test utility for developers. Please refer to Section 4.5 for more details.

KIT-09

4x GPIO

GPIO power

pitch = 2.5 mm
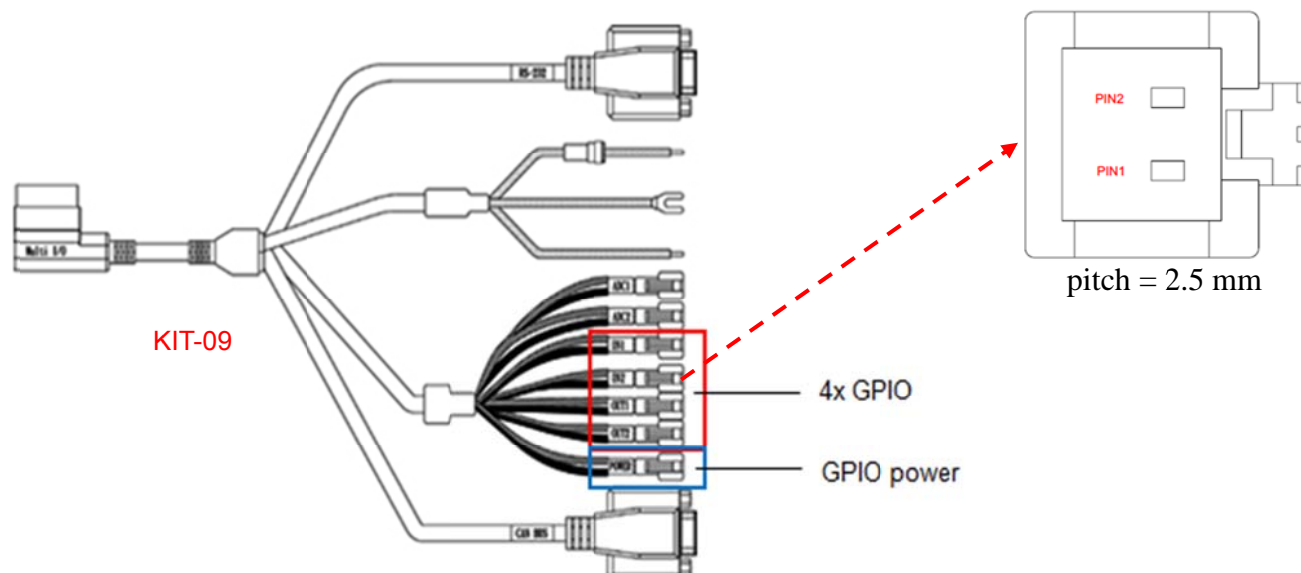
PORT		No	Description
GPIO	GPIO IN1	1	IN1
		2	GND
	GPIO IN2	1	IN2
		2	GND
	GPIO OUT1	1	OUT1
		2	GND
	GPIO OUT2	1	OUT2
		2	GND
	GPIO POWER	1	GPIO POWER (DC 5~30V)
		2	GND

Please also be noted that, before the testing you need to make a hardware GPIO test board by yourself and connect it to the GPIO JST male connector (**JST SMR-02V-B**). In addition, the logic high voltage of GPIO OUT1 and GPIO OUT2 are dependent on GPIO POWER supply voltage, which ranges from 5V to 30V. Below is the circuit diagram for your reference.

GPIO Input Test Schematic (for reference)
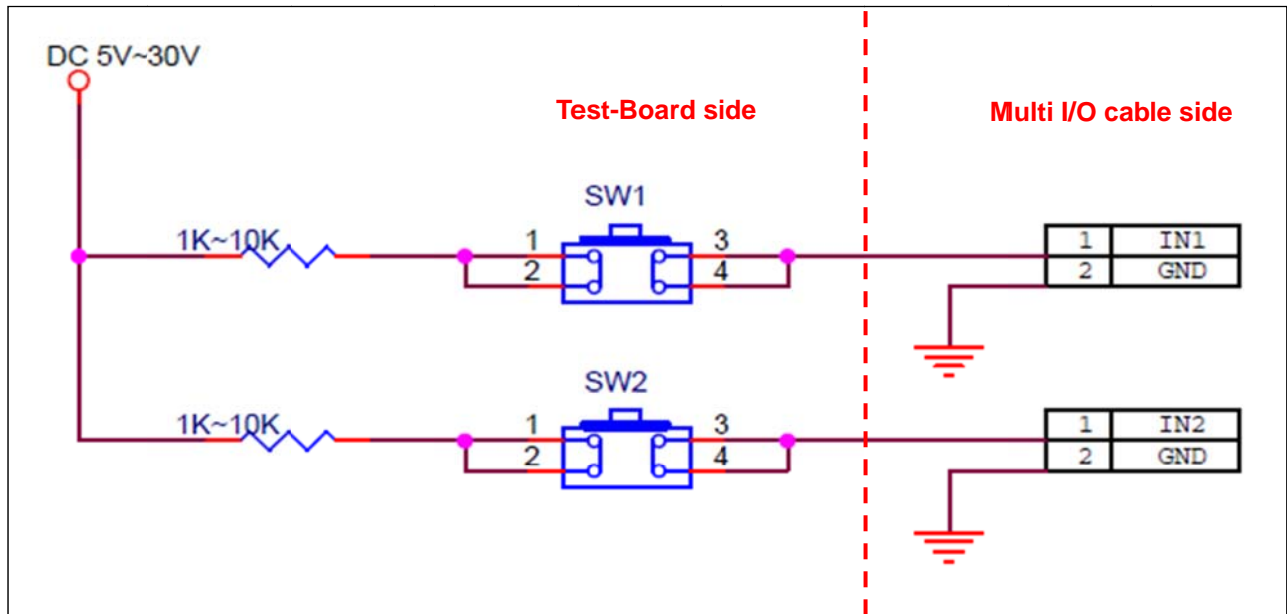
GPIO Output Test Schematic (for reference)
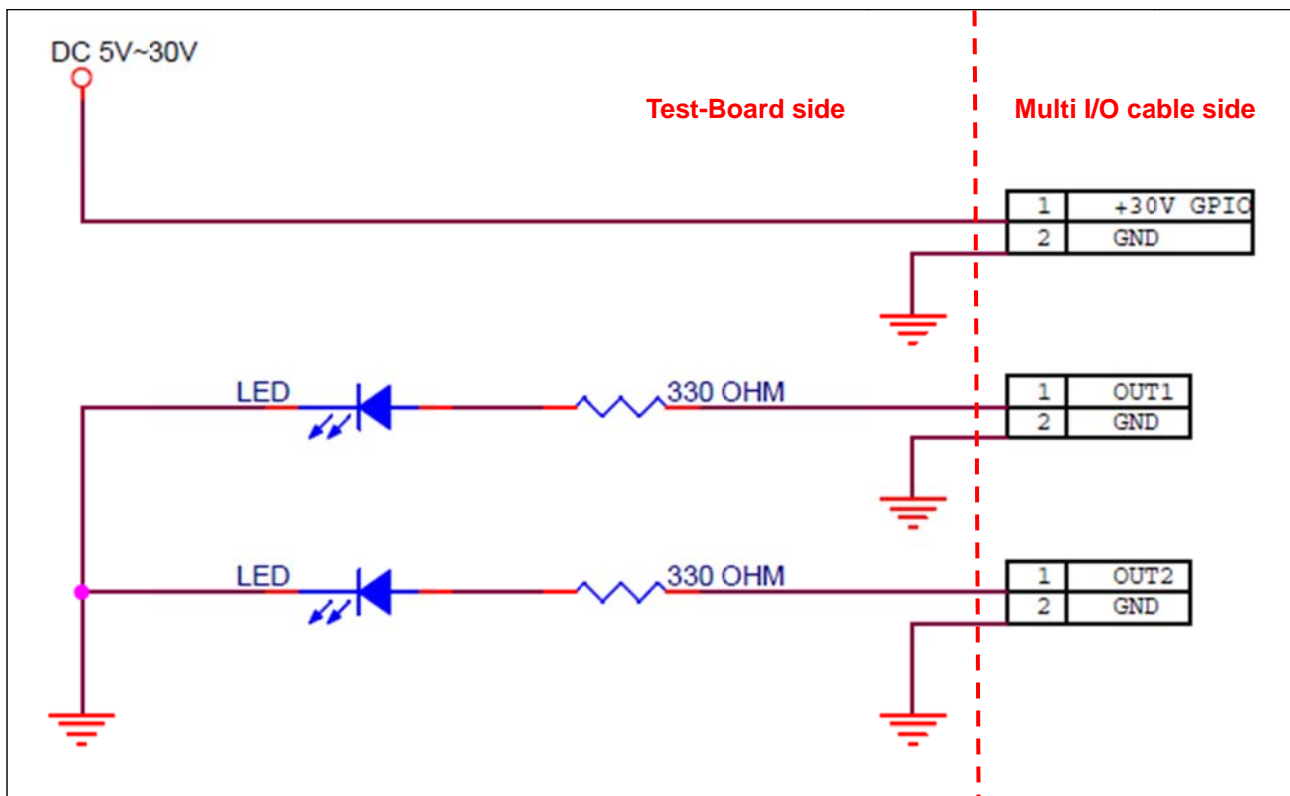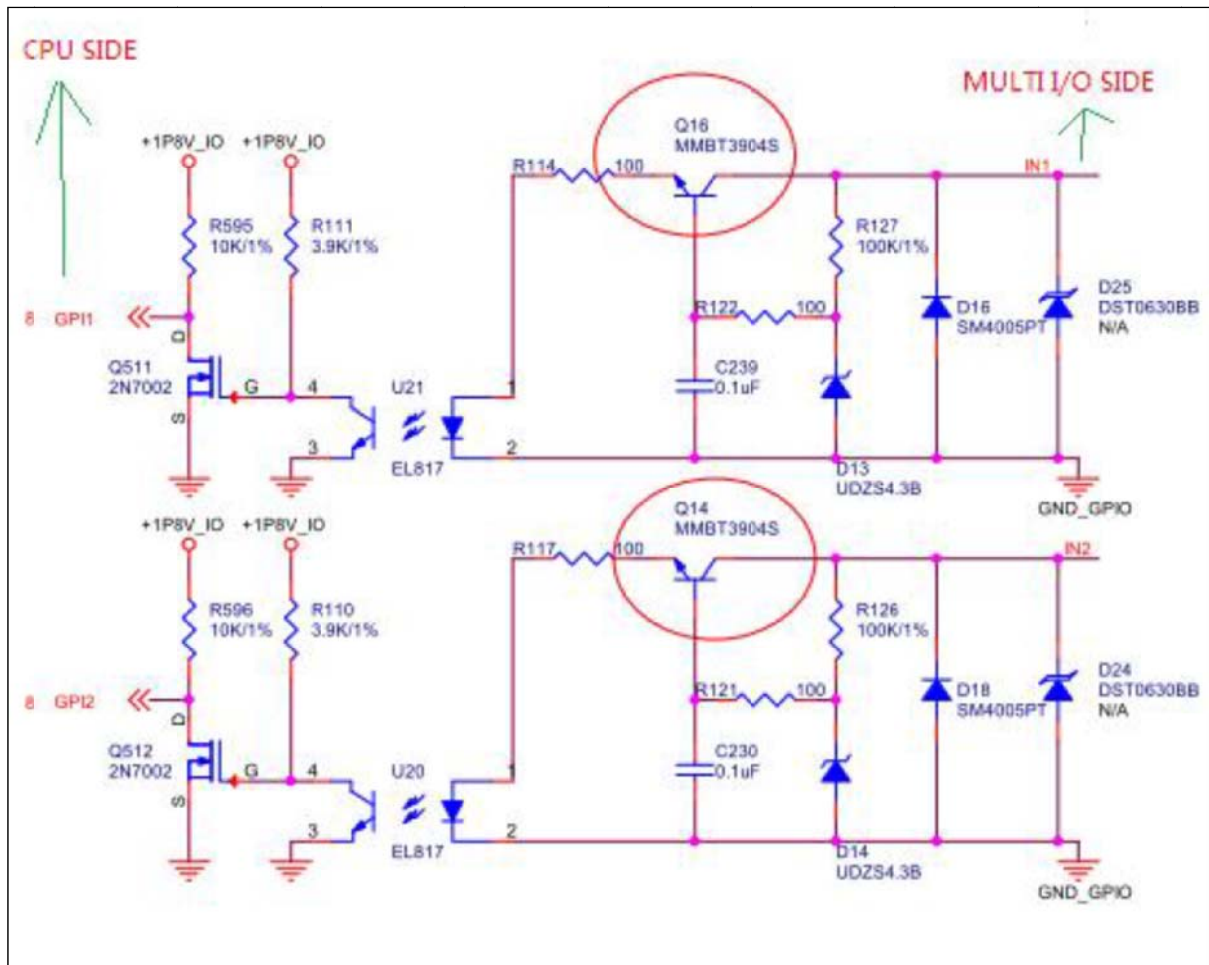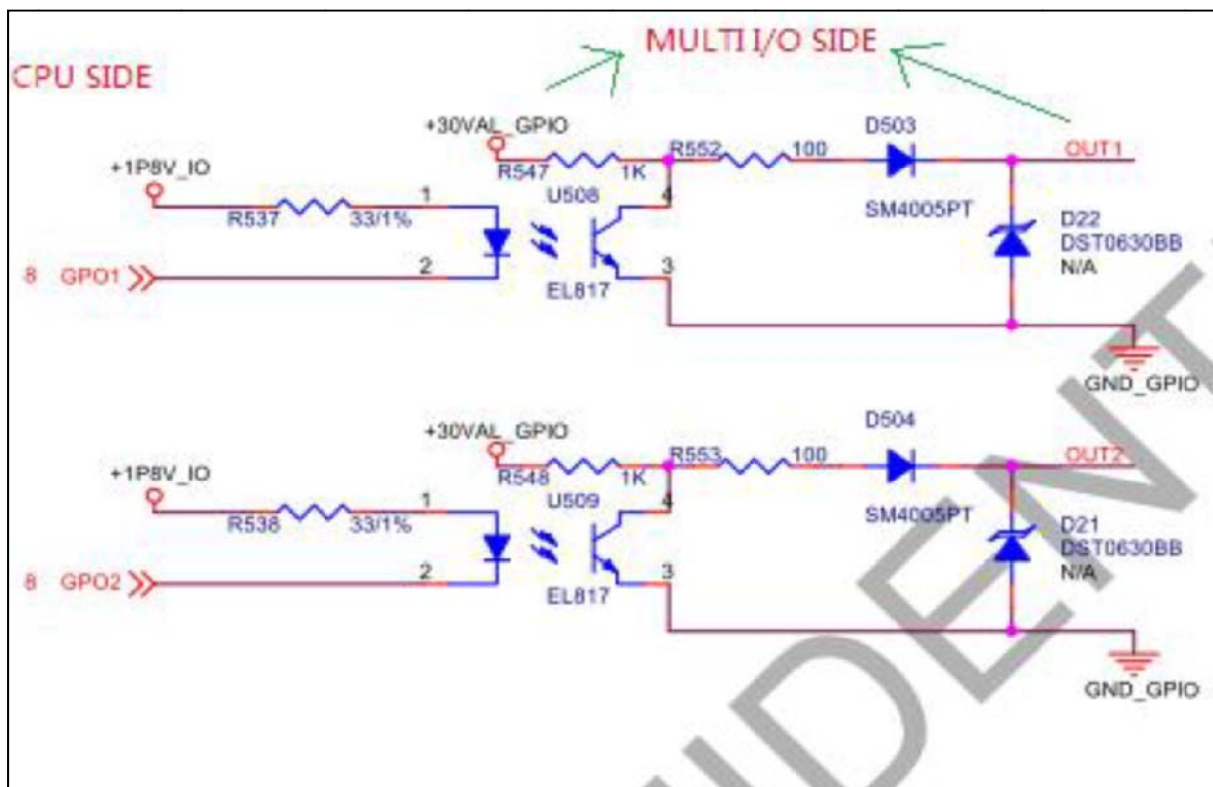
Q: How fast does it work on external GPIO pin via the Multi-IO Cable?
A: Sometimes it is handy to use some GPIO pins to implement a second or third port, such as I2C, SPI, UART or PWM etc., called software I2C, software SPI, software UART, software PWM for software real-time requirement application, even if running at low speed. BE905A2 also can support this application. However, The toggle switch speed of GPIO pin is 200Hz (max), so we don't suggest using it on simulate I2C application. The reason is the maximum physical speed is lower than standard I2C's speed. Even though, you still can use it on low PWM control application, but please note that his speed is 200Hz (max).   For reference: The official I2C bus protocol supports three modes of transfer rates: ● Standard Mode — Up to 100 Kbps   ● Fast Mode — Up to 400 Kbps   ● High-Speed Mode — Up to 3.4 Mbps
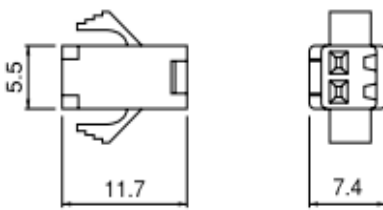
Connector type of ADC and GPIO

Since the connector type of both GPIO and ADC on the Multi I/O cable is the JST male connector (it's the **JST SMR-02V-B** precisely), users should look for the corresponding plug-in connector (the **JST SMP-02V-BC**) for their oppositely connected devices. Please refer to below table for the details. It is suggested to use **JST SMP-02V-BC** to connect to **JST SMR-02V-B,** which is the connector used for GPIO and ADC among the Multi I/O cable.

Receptacle housing (for pin contact)	Plug housing (for socket contact)
SMR-02V-B, black **SMR-02V-N,** white (natural) 	**SMP-02V-BC,** black **SMP-02V-NC,** white (natural)

CAN BUS

There is another DB-9 male connector marked "**CAN BUS**" among the multi I/O cable. The table below lists the pin-out definitions of this interface. To verify the functionality of this interface, we provide a test utility for developers. Please refer to Section 4.9 for more details.
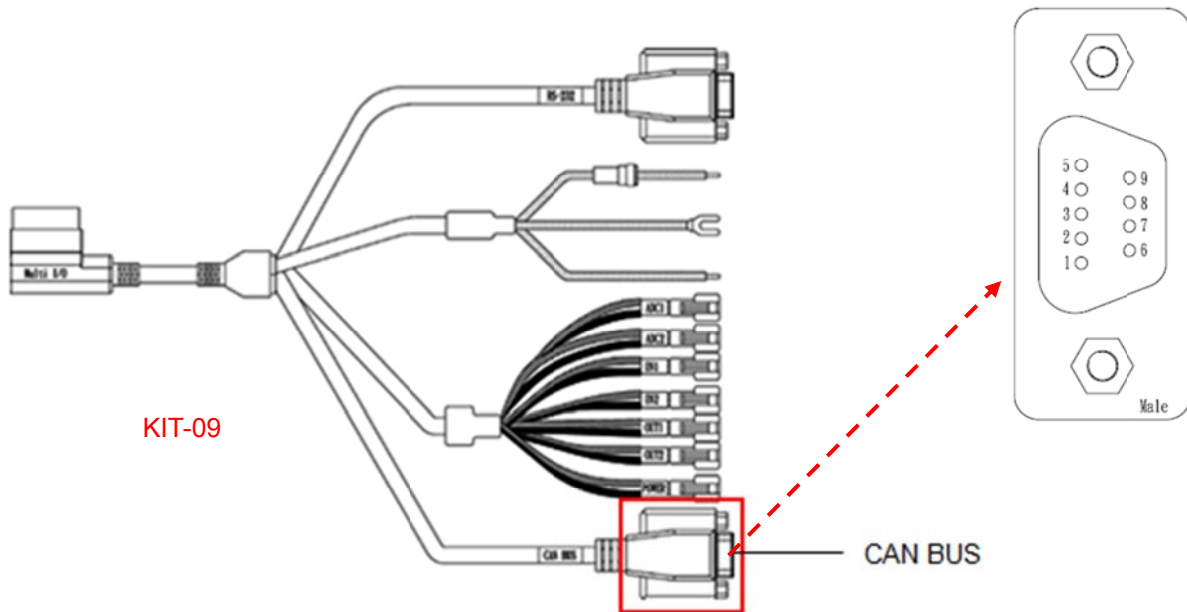
PORT	No	Description
CAN BUS Male	1	NC
	2	CANL
	3	GND
	4	NC
	5	NC
	6	NC
	7	CANH
	8	NC
	9	NC

A reference test for users to test the CAN Bus data transmission via the CAN Bus utility (please refer to Section 4.9) can be carried out by connecting two BE905A2 devices. If you only have one(1) MDT, you should find another CAN Bus device to complete test.

Physical Measured valid transmitted distance of all interfaces of Multi I/O cable and USB port

Interface	Max Data Transmission Distance (meter) With Additional Cable
RS232	15
CAN Bus	35
GPIO	2.3
ADC	2.3
USB	5

2.15 Kensington Security Slot

On the right side of back panel of BE905A2, you would find a slot of Kensington lock to provide a deterrent to theft. This slot is compatible with all kinds of Kensington locks. When using this lock in the vehicle, you can attach it around the steering wheel or other suitable position.

Kensington slot

2.16 Rubber Cover

BE905A2 is waterproof and dust resistant in compliance with the Ingress Protection (IP) ratings IP54, which means it has undergone certified tests to measure its resistance levels to both dust and water. IP54 ratings mean that BE905A2 is dust resistant to limited ingress (no harmful deposit) and is protected against splashing water.

IPX4. Protected against splashing water
IP5X. Protected against dust; limited ingress (no harmful deposit)

To ensure the water resistance in BE905A2, all rubber covers, including the right side and left side rubber covers, battery-room rubber cover, SMA-CAP for unused antenna connector, power-in connector rubber cover and Multi-IO connector rubber cover, must be firmly closed.

Power-in connector rubber

Multi I/O connector rubber

Right-side rubber

Left-side rubber

Battery room rubber

SMA-CAP rubber
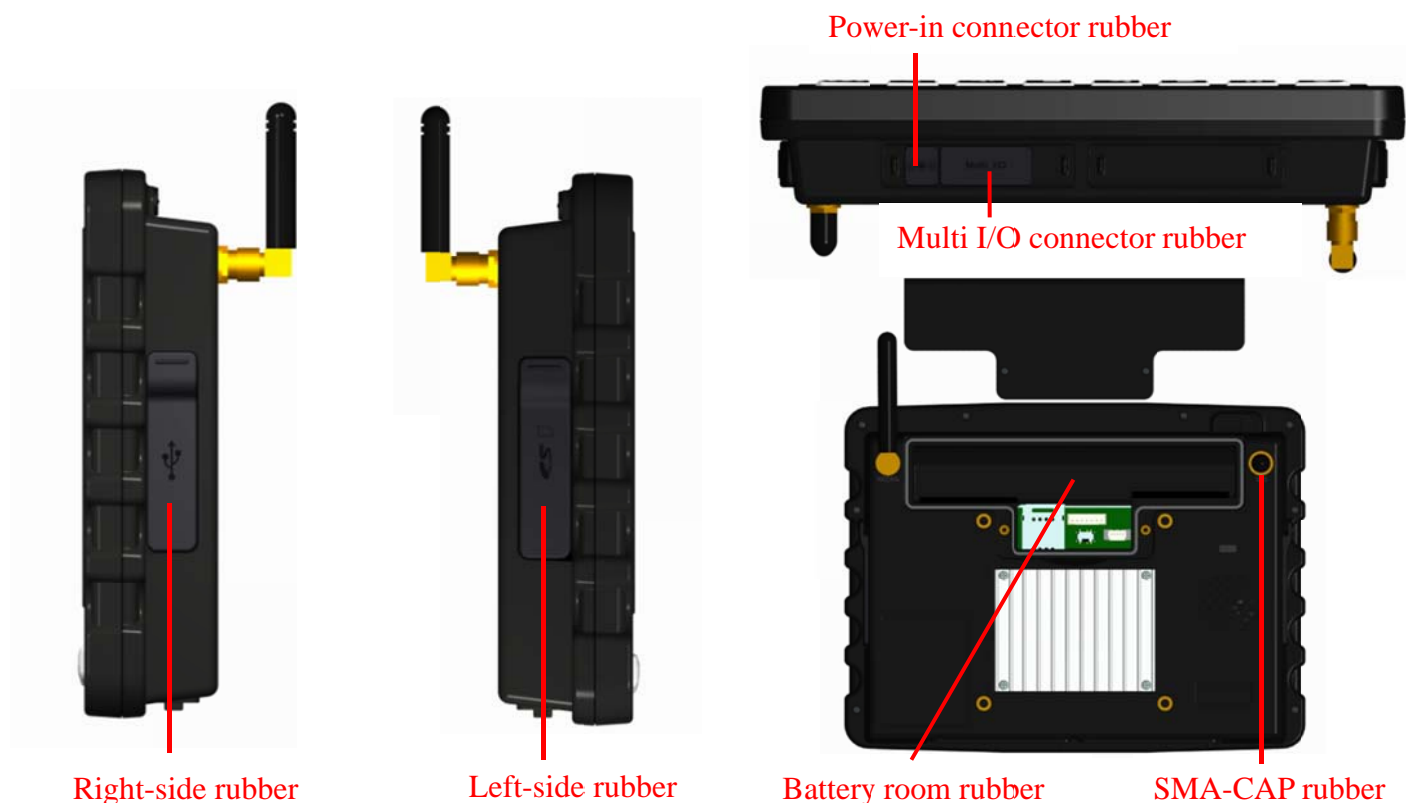
You can use BE905A2:

- In dusty environments, for example, on a construction site.
- When your fingers are wet.

Even if BE905A2 is resistant to dust and water, you should avoid exposing it unnecessarily to environments with excessive dust, sand and mud or to moist environments with extreme high or low temperatures. The waterproof ability of all rubber covers cannot be guaranteed in all environment or conditions.

Never immerse BE905A2 in salt water or let all metal connectors in contact with salt water. Never expose BE905A2 to any liquid chemicals. For example, if you're washing windshield or dashboard by hand using liquid detergent, avoid bringing BE905A2 in contact with the detergent. After exposure to non-fresh water, wipe BE905A2 using fresh water.

Normal wear and tear along with damage to BE905A2 can reduce its ability to resist dust or moisture. After using BE905A2 in water, dry off the areas around all rubber covers. If all connectors get wet, their function may be impacted until the water has completely dried. All compatible accessories, including batteries, chargers, and hands free devices and micro USB cables, are not waterproof and dust resistant on their own.

Your warranty does not cover damage or defects caused by abuse or improper use of BE905A2 (including use in environments where the relevant IP rating limitations are exceeded). If you have any further questions about the use under IP rating of BE905A2, please call our sales for help.

3 Basic Setting On Android 2.3.4

In this chapter, we will illustrate the basic settings on BE905A2 MDT with Android 2.3.4.

3.1 Using the BE905A2's buttons

Button	Press	Press & hold
	Turn on/off the screen.	Open a menu with options for Airplane mode, for Silent mode, and for powering off the MDT
	Open the Home screen. If you're view in the left or right extended Home screen, opens the central Home screen.	Open the most recently used applications screen.
	Open the previous screen you were working in. If the on screen keyboard is open, closes the keyboard.	
	On the Home screen, open Google search for searching your MDT and the web. In many applications, opens a search box for searching within the application.	
	Open a menu with items that affect, the current screen or application.	
	Adjust the volume(louder)	
	Adjust the volume(in whispers)	
	User defined key	

NOTE: There are 6 user keys, to be defined by programming ,but we suggest developers only to **customized the leftmost three buttons** as other keys such as MENU, SERACH, BACK has common operations in most Android Apps.

3.2 System Properties

From the Home screen, tap [icon] to switch to all apps view, and then tap **Settings➔ About phone** to view the android version.
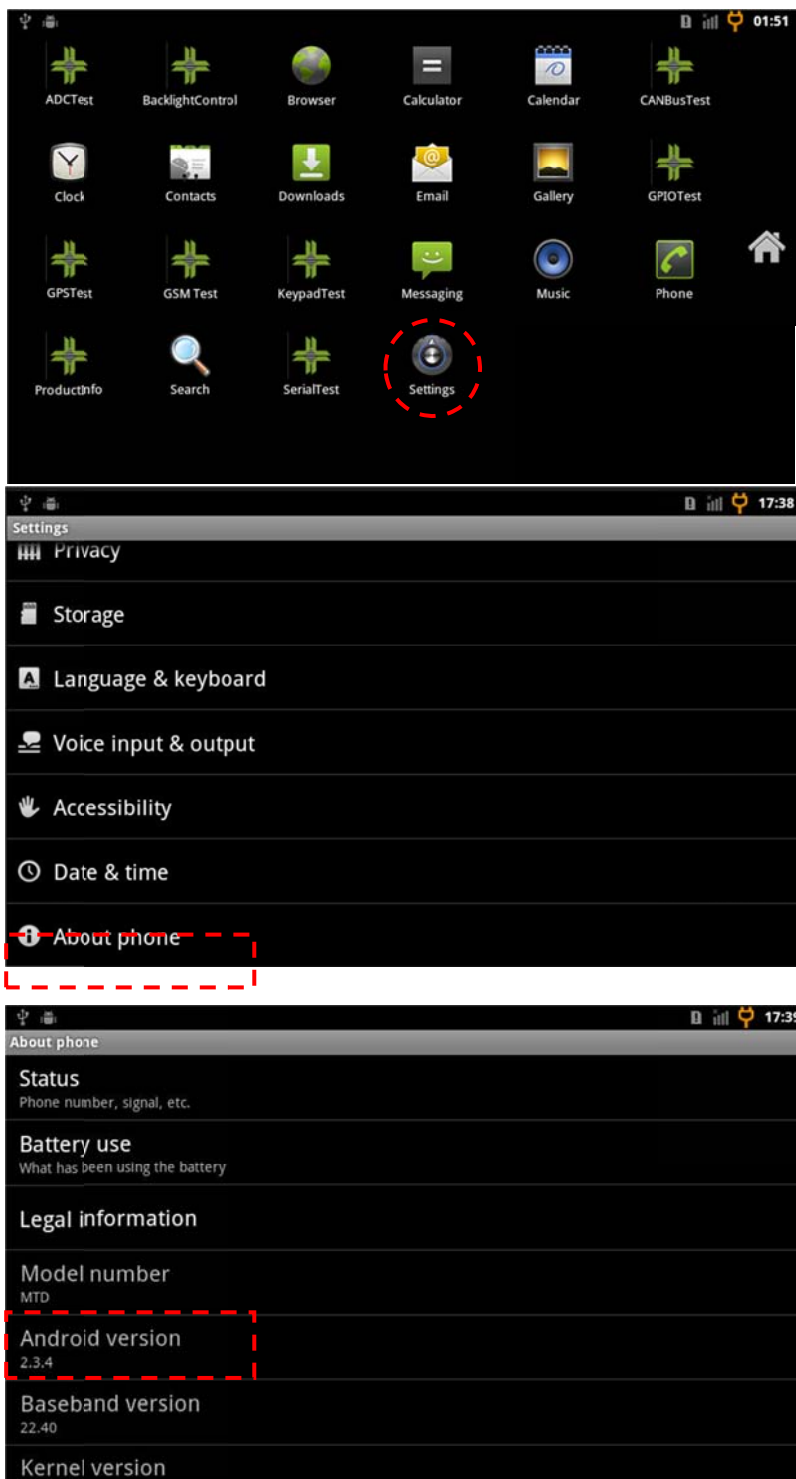
Build number

In the about phone tab page, it shows you the Kernel version and Build number that are pre-configured by Bolymin. The Build number is used to identify this BE905A2 device to others computers and the string as "**E1.07**" in the Device description field is the released revision of OS image from Bolymin.
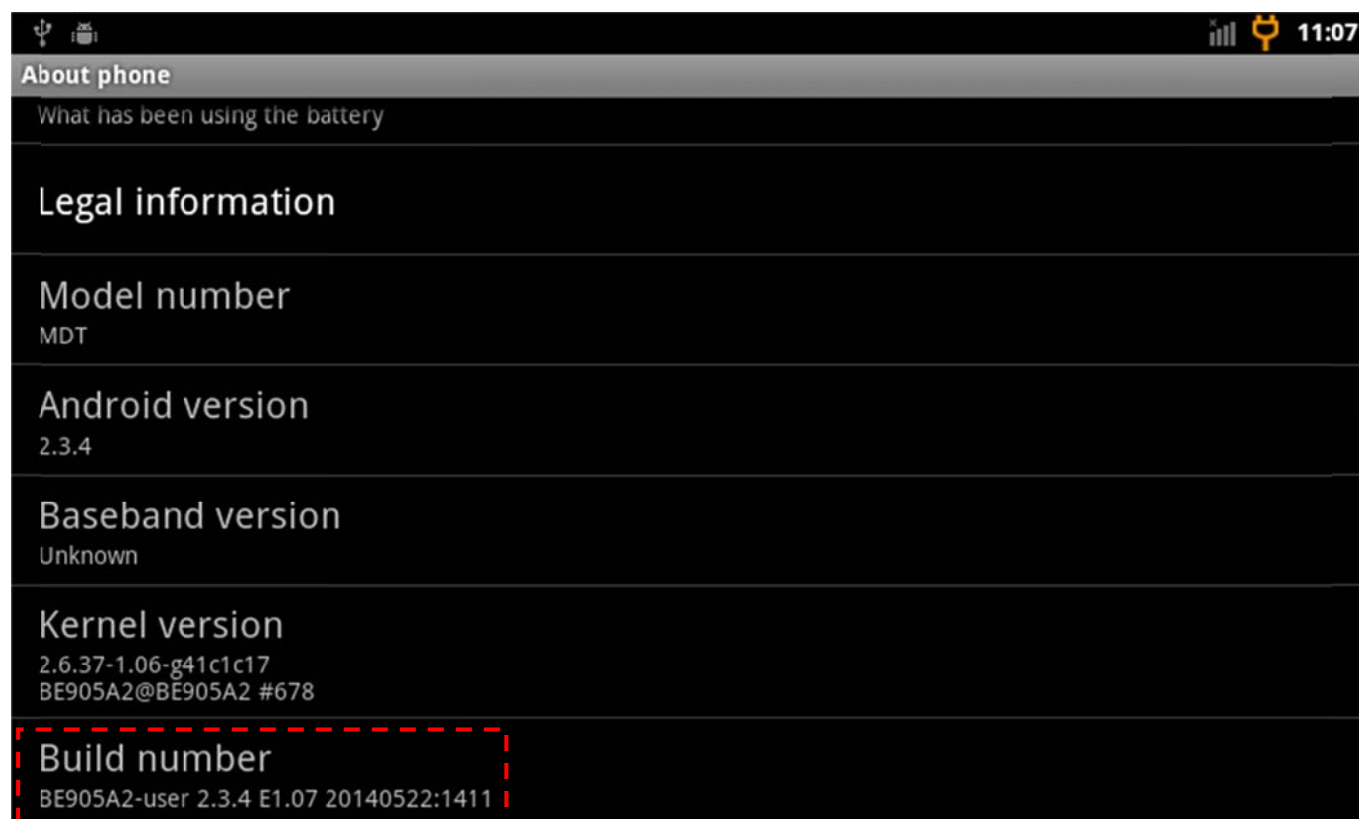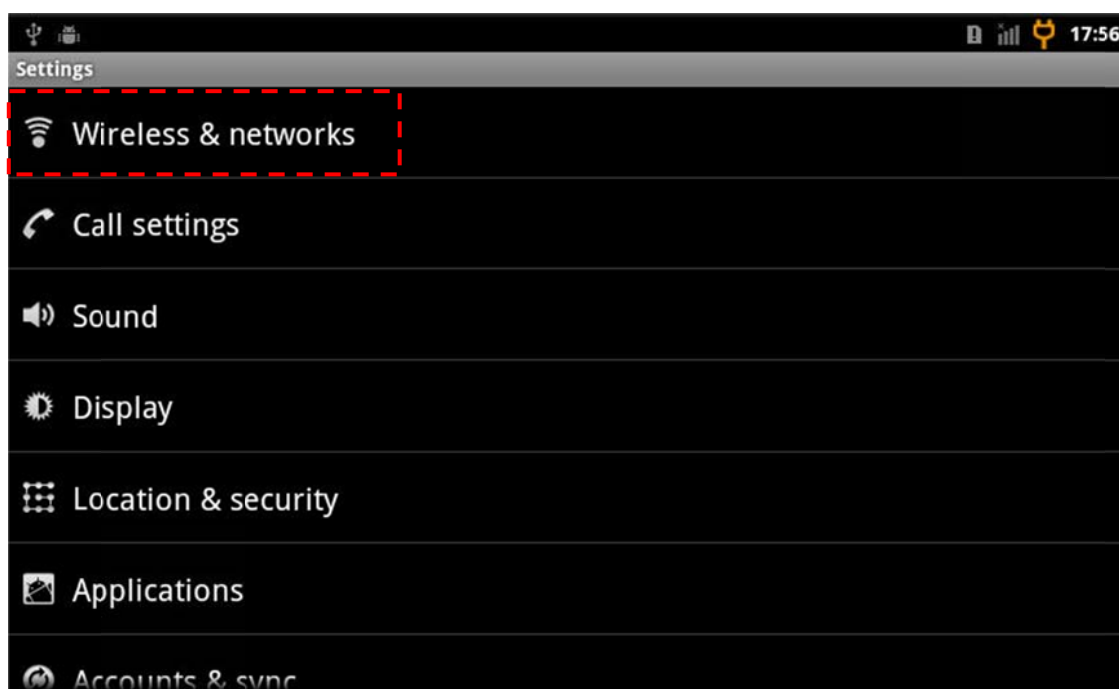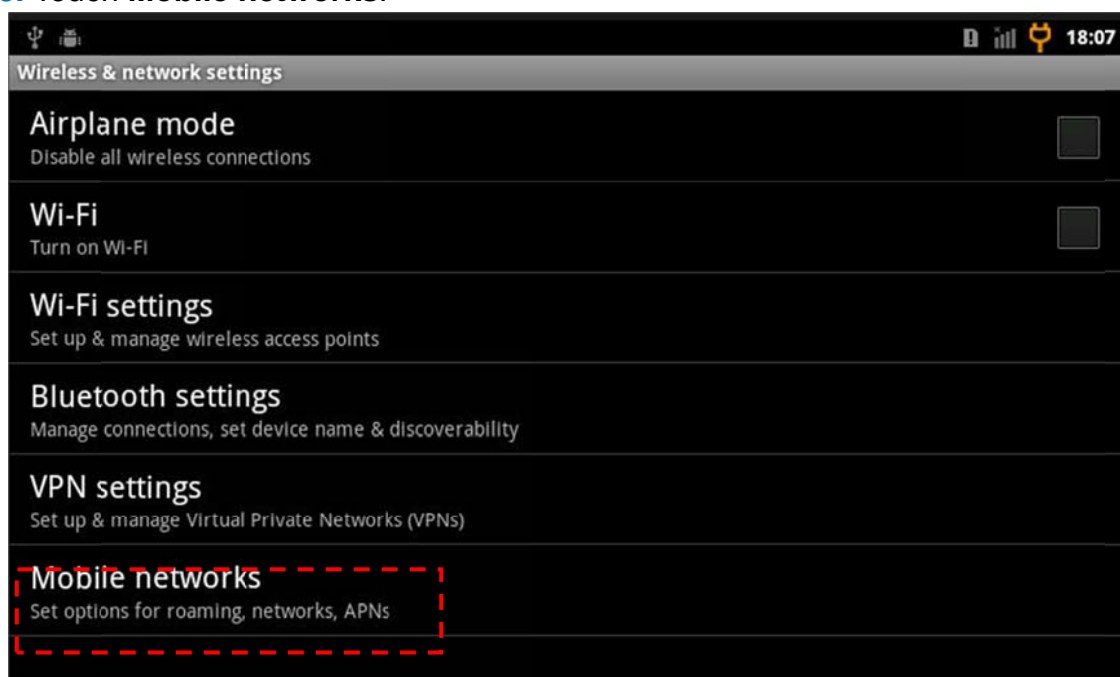
3.3 Connecting to mobile networks

The BE905A2 can connect to Internet via the built-in 2G/3G cellular data network module.
When you assemble BE905A2 with a SIM card from your wireless service provider, BE905A2 is configured to use your provider's mobile networks for voice calls and for transmitting data. Different locations may have different mobile networks available. You may need to configure BE905A2 to use the fastest (3G) networks. You can also configure BE905A2 to use only a slower 2G network for data to extend the life of your battery between charges.

Step1. Press Home 🏠 , press Menu ⚏ , and touch **Settings** to open the Settings
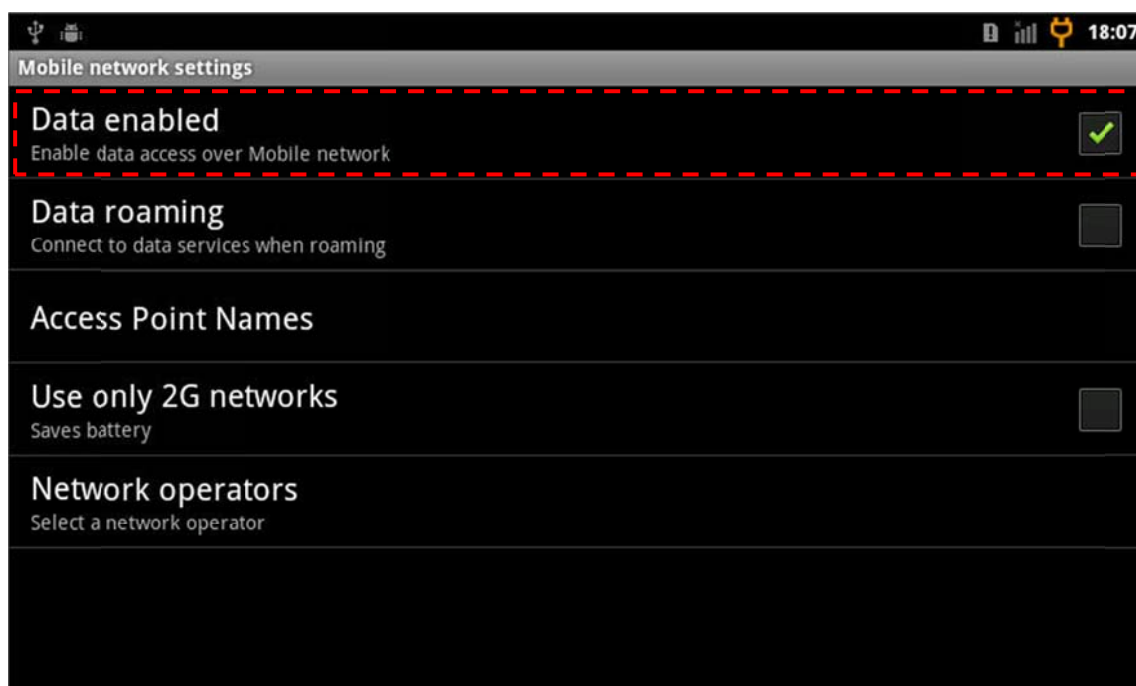application.

Step2. Touch **Wireless & networks**.

Step3. Touch **Mobile networks**.

Step4. Click **Data enabled** to connect to mobile network, also you can click **Use only 2G networks** to connect 2G networks only.


NOTE: BE905A2 support time zone auto-adjustment, but it is depend on telecommunications providers.

3.4 Communication with PC

As below illustrated, please connect BE905A2 to your PC by an USB cable. Note that on the BE905A2 side, you have to use Device USB port of mini-B type.
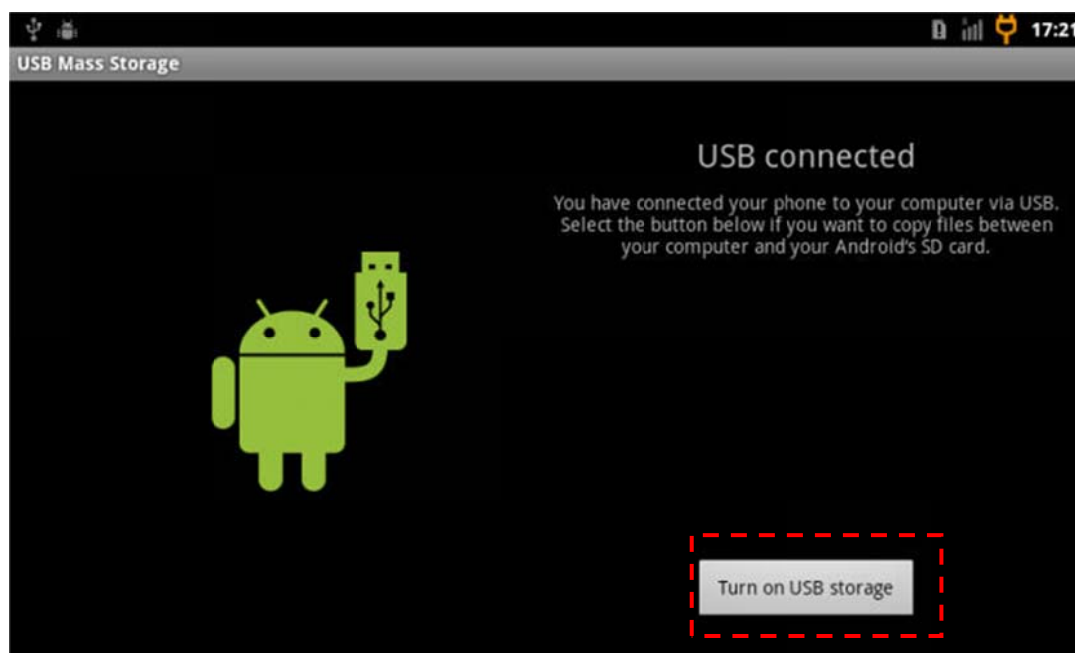

USB Cable

Device USB 2.0

BE905A2

Step1. Connect BE905A2 to PC via USB cable, you will see the USB icon on the upper left corner.
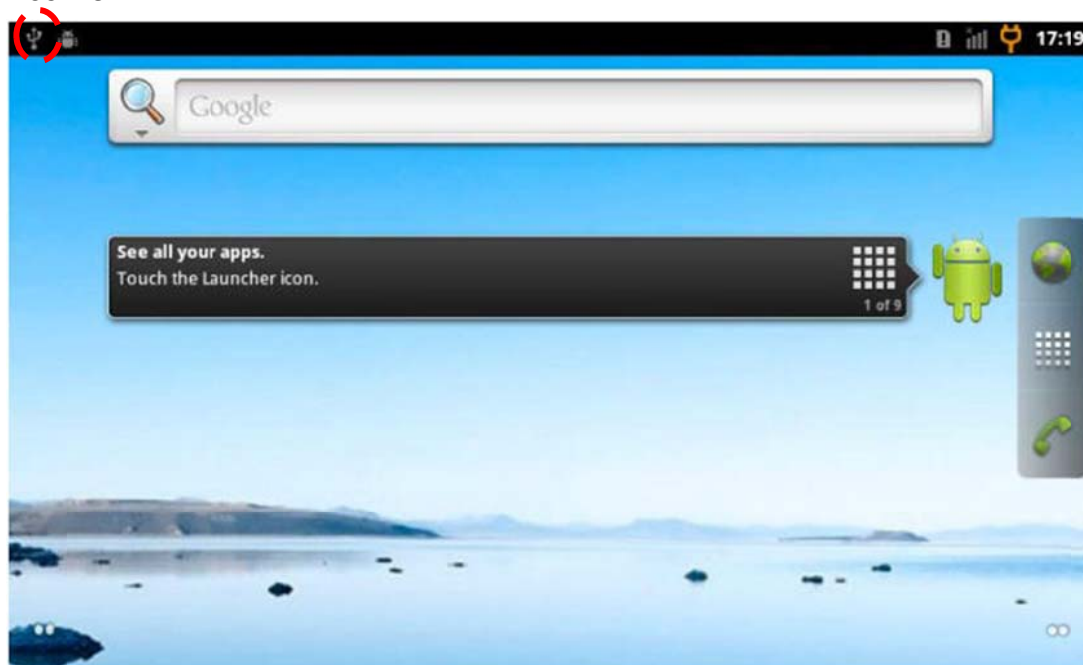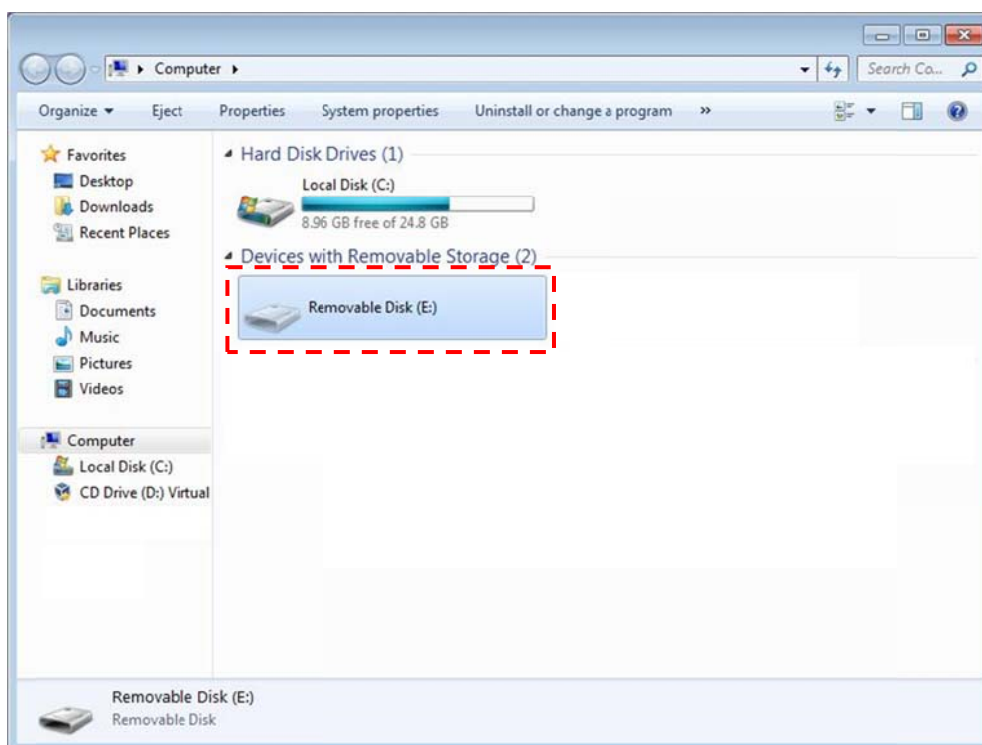
Step2. Slide down the notification bar and click "USB connected" message bar.
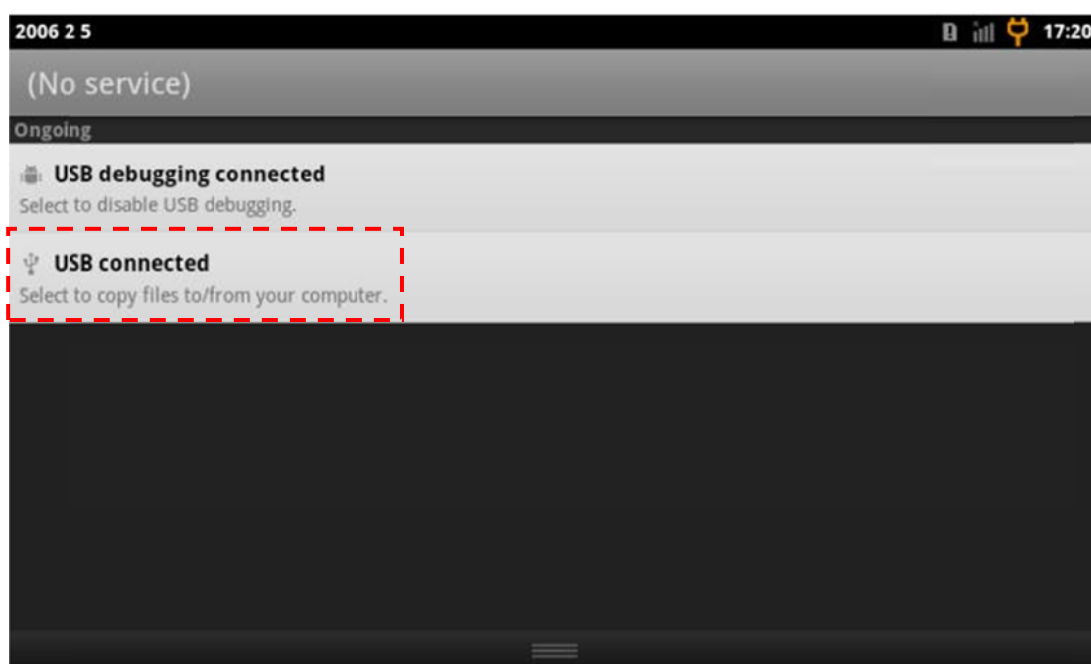
Step3. Click "Turn on USB storage" button.

Step4. Check your computer, and you will see the storage disk " Removable Disk ".

NOTE: If you would like to use debug mode, you need install USB driver. Please refer to the BE905A2_Programming_Guide (section **1.3 Connect BE905A2 with PC**)
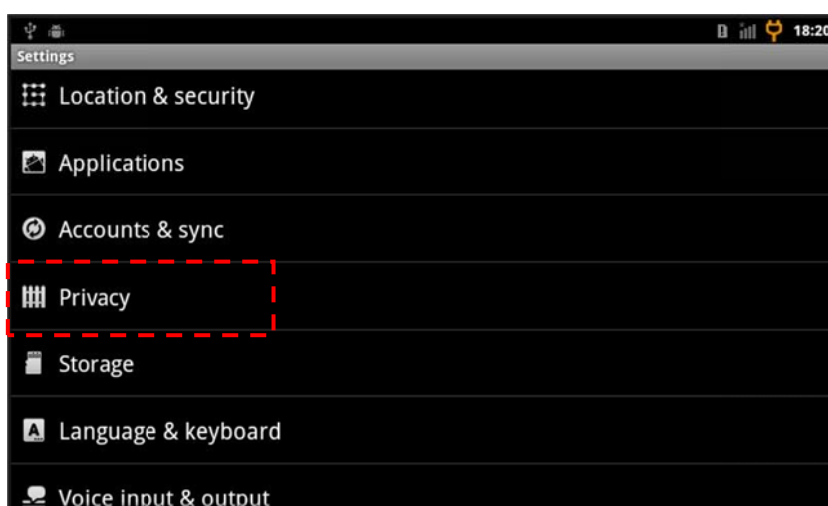
3.5 Factory Reset

Bolymin provides a Factory Reset program for customer to reset all registries to default value. The following picture shows the main screen of Factory Reset program.
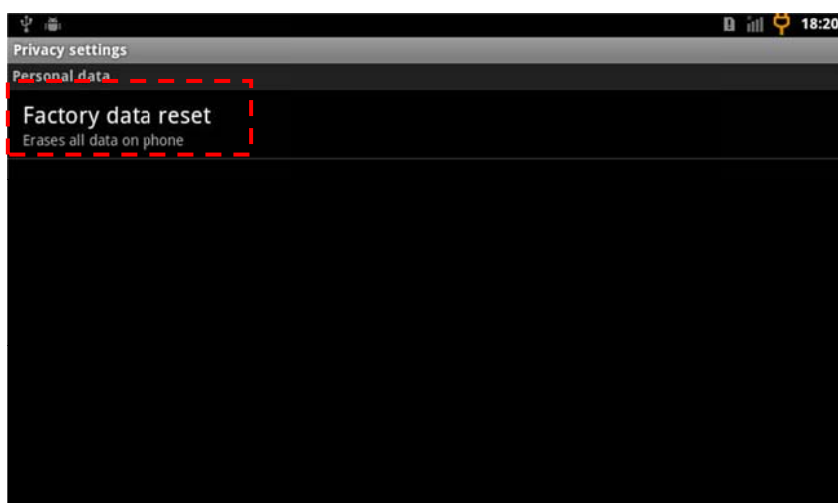
Operation procedures

Step1. Press Home   🏠 , press Menu   ⚏ , and touch **Settings** to open the Settings application.

Step2. Touch **Privacy**.

Step3. Touch **Factory data reset**.

Step4. Opens a dialog where you can erase all of your personal data from internal MDT storage, including information about your Google Account, any other accounts, your system and application settings, and any downloaded applications. Resetting the MDT does not erase any system software updates you've downloaded. Also includes a checkbox to erase the MDT's SD card, which can contain files you've downloaded or copied there, such as music or photos. If you reset the MDT in this way, the next time you turn on the MDT you're prompted to reenter the same kind of information as when you first started android.
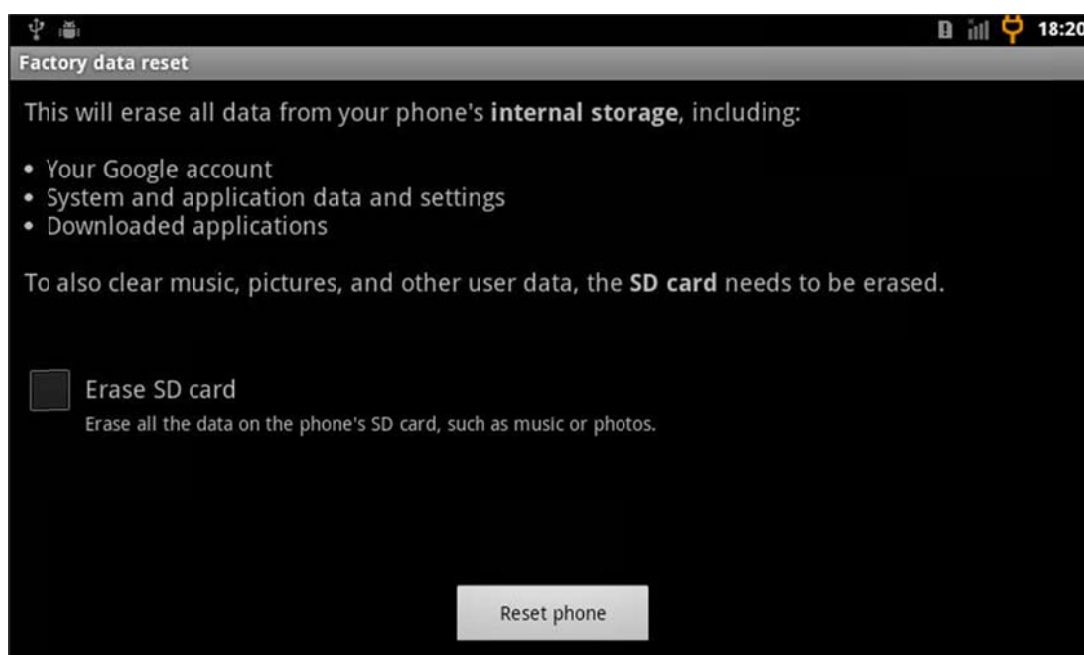
NOTE: If you want to calibrate Touch panel, you can use the Factory Reset to recalibrate.

4 Bolymin Test Utility

Bolymin provides several test utilities to help developers verify the correctness of hardware modules/peripherals function on BE905A2. Below table lists the current available test programs.

Please refer to the following sections for more details. From the Home screen, tap ⠿ , **Test Apps** icon to switch to all apps view.

Utility Name	Test Program Icon	Description
Serial Port Test	SerialTest	Send/Receive data through COM port
GPS Test	GPSTest	Setup the GPS connection to receive GPS message, display current GPS status
GSM Test	GSM Test	**GSM:** Test basic GSM functions, like phone call or SMS **GPRS:** Establish cellular data network connection to access Internet
GPIO Test	GPIOTest	Verify all GPIO functions
ADC Test	ADCTest	Verify each ADC channel functions
Keypad Test	KeypadTest	Verify 6 user-defined keys functions
Backlight Control	BacklightControl	Manual adjust the brightness of LCD backlight or to read illumination value from the built-in light sensor and adjust rightness automatically
CAN Bus Test	CANBusTest	Test basic CAN Bus functions like "transmit" or "receive" messages; set acceptance mask and filter for CAN Bus

4.1 Serial Port Test

About Serial Port Test

This program let user send/receive data through COM1 port, following table lists simple description of COM ports:

Port Name	Description	Working Parameters (Baud Rate/Data Bit/Parity/Stop Bit)
COM1	RS232 port	Baud rate (bps): 4800/9600/19200/38400/57600/115200

Utility Snapshot
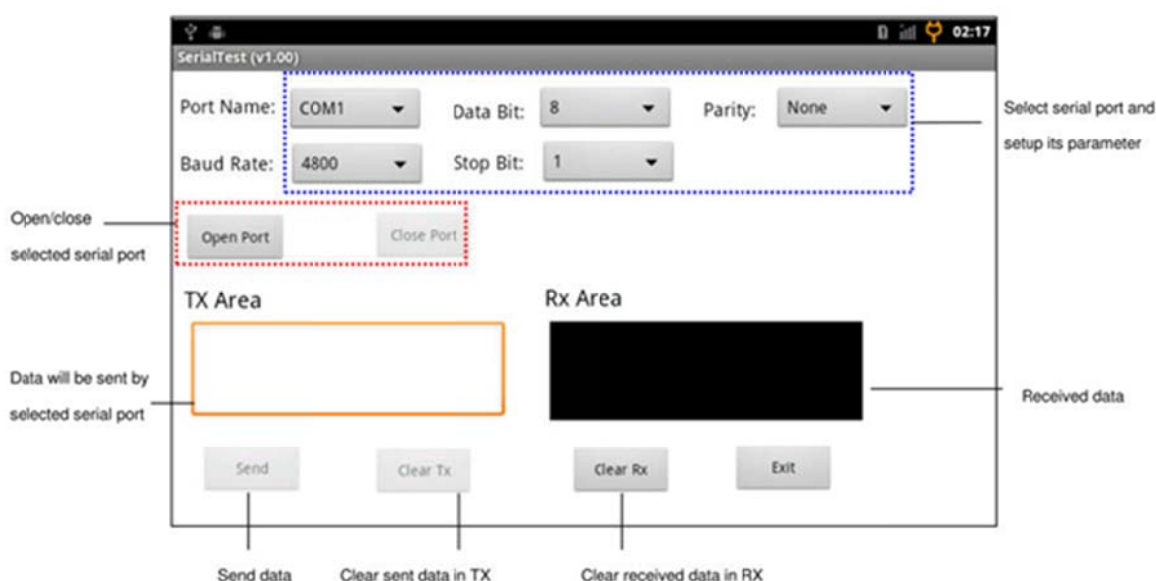
Operation Procedures

Step1. Connect BE905A2 to PC or another device by RS232 cable.

Step2. Select COM1 port from the drop-down list and then set all parameter values for example **Baud Rate / Data Bit / Parity / Stop Bit**.

Step3. Click "**Open Port**" button to open selected serial port.

Step4. To test the sending function, input data in "**TX Area**" text-box and then click "**Send**" button to send "**input data**" through selected serial port.

Step5. To test the receiving function, send data from the device connected to BE905A2, all "**receive data**" will be shown at "**RX Area**" text-box.

NOTE: To test the COM1 port, you must use the DB-9 male connector of the Multi I/O cable for this test utility.

4.2 GPS Test

About GPS Test

BE905A2 has a built-in GPS module, and by this program user can receive and parse GPS data to show related geographical information on the window.

Utility Snapshot

Data from GPS module

PRN: GPS Number

SNR : (Signal-Noise Ratio) of Satellite Vehicles. SV used to fixed position will be marked as blue.

Received GPS message will be shown here. This display area is updated automatically according to the value of Update rate.

Operation Procedures

Step1. Once the connection is set, the program will show SNR of Satellite Vehicles, date, time and acquiring status.

Step2. If the "**Show GPS message**" check-box is checked, all received GPS message will be shown in the message text-box.

Step3. User could change the value of update rate by clicking "**Update rate**" button to send the

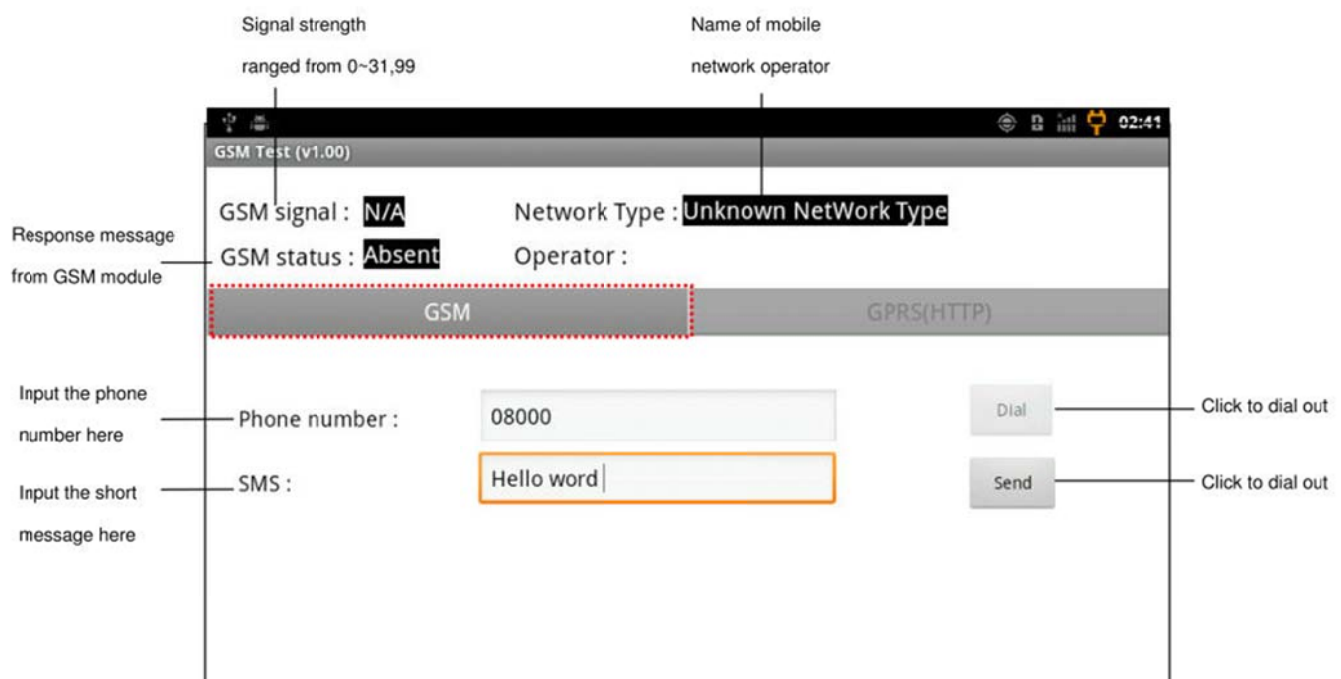value to GPS module to set the output frequency of GPS message.

NOTE: To test the GPS function, you should position the device on the place where the GPS satellite signal is well received, like open sky area.

4.3 GSM Test

About GSM Test

This program let user test the basic GSM functions such as phone call and SMS.

Utility Snapshot

Note. The 'Dial' button is disabled because the voice of GSM is not ready

Operation Procedures

**Step1.** User could dial or answer a phone call if the GSM Status shows "**OK**". If GSM Status shows "**Absent**" and GSM Signal is "**99**", please close this program and check if there is available SIM inserted into device.

Step2. Input the phone number and click "**Dial**" button to create an outgoing call, also you can input the short message and click the send button send the SMS message.

Step3. If there is an incoming call, the ring sound will be played and the "**Answer call**" button will be activated. Click "**Answer call**" button to answer the incoming call.

Step4. The "**Decline call**" button will be activated while a call was set up. Click "**Decline call**" button to disconnect current call.

Step5. If there is an incoming short message, you will see the message icon on the upper left corner.
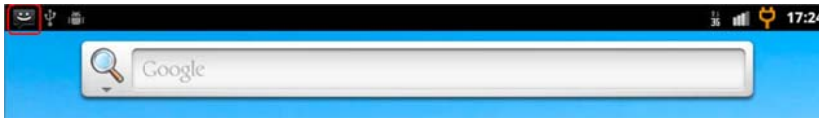
Step6. Slide down the notification bar and click " message " bar.
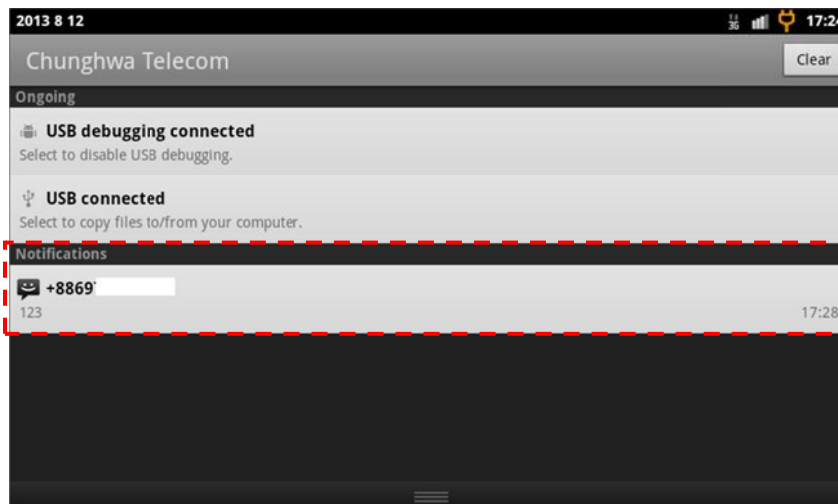
NOTE: You must insert SIM or USIM card in BE905A2 before launching this test utility.

4.4 GPRS Test

About GPRS Test

This program let user test if the 3G network data connection is available by valid URL.

Utility Snapshot
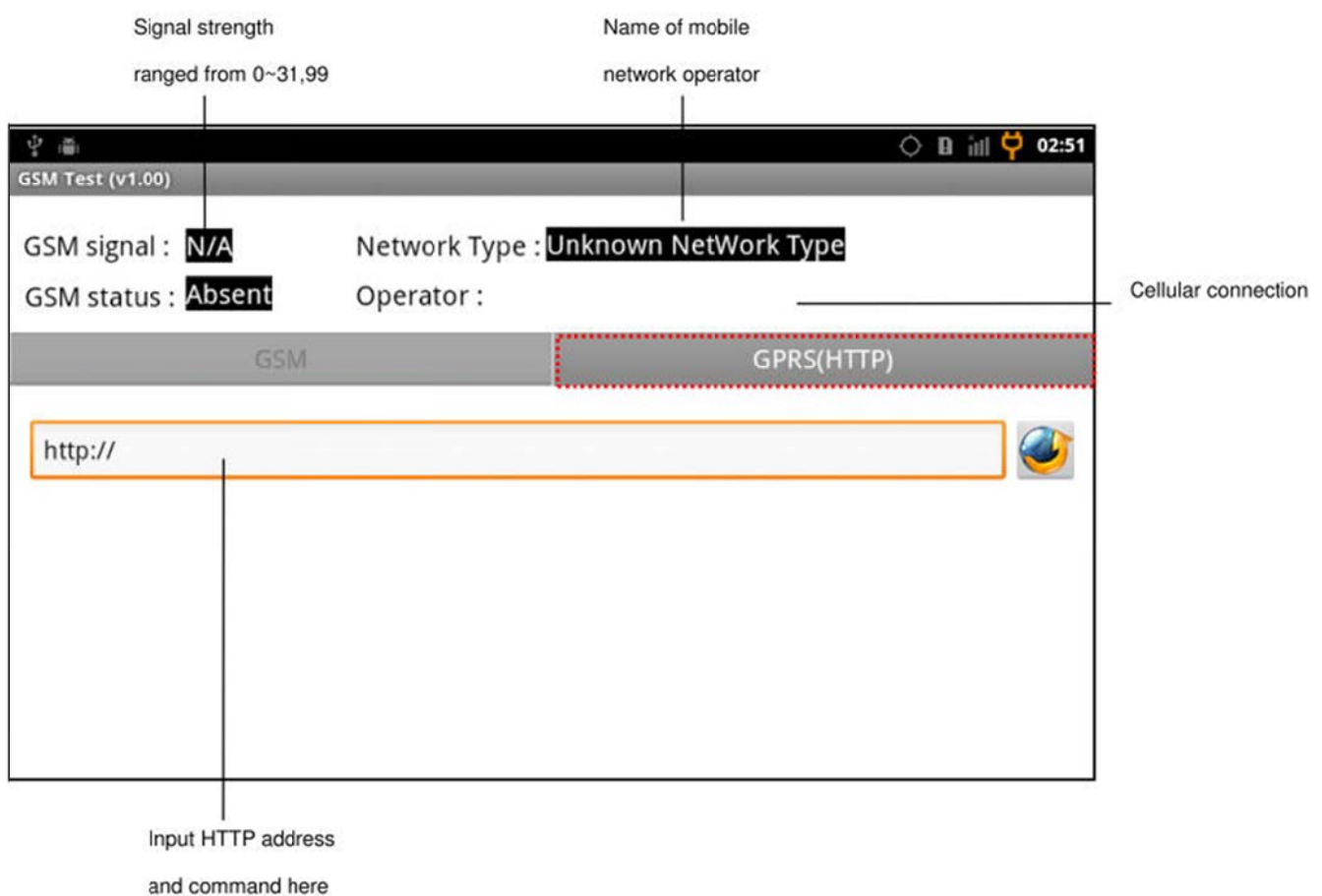
Operation Procedures

Step1. Input URL address, for example http://www.google.com. Then click icon " " to send out http address via GPRS connection.

Step2. Then the web page content would be shown in the web browser.

4.5 GPIO Test

About GPIO Test

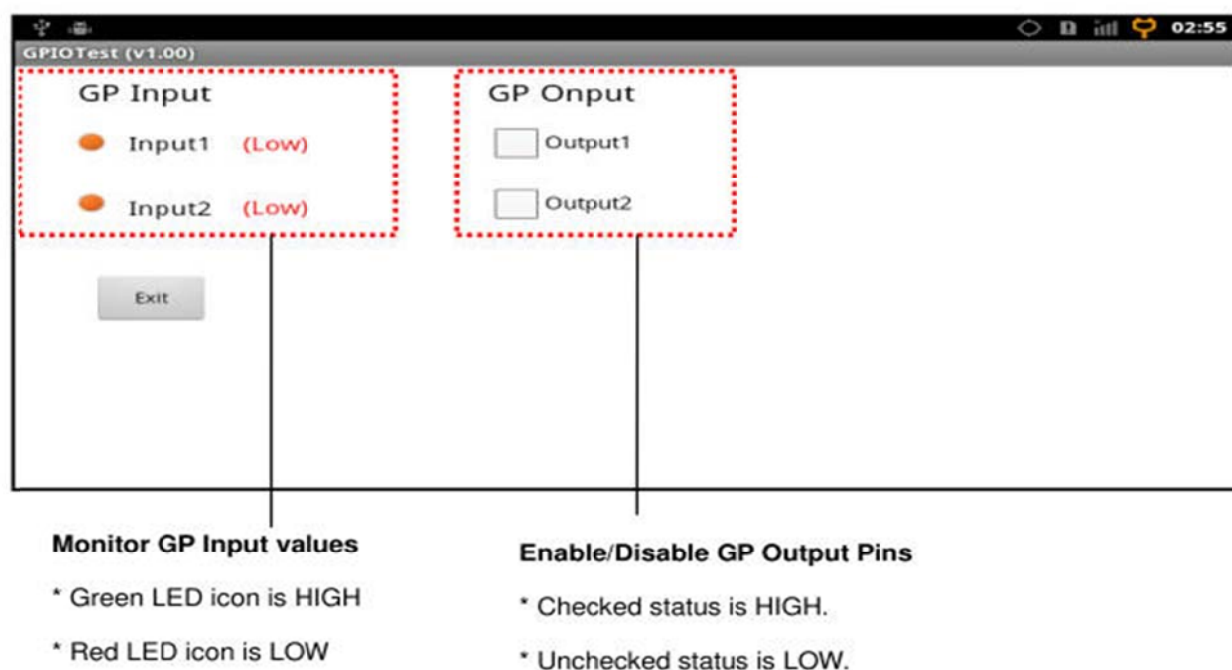The program will get the status of GP output pins at start up and update current value of all GP input pins every 0.5 second. For input values, green LED icon means HIGH and red LED icon means LOW. For output values, checked status means HIGH and unchecked status means LOW.

Utility Snapshot

Monitor GP Input values

* Green LED icon is HIGH

* Red LED icon is LOW

Enable/Disable GP Output Pins

* Checked status is HIGH.

* Unchecked status is LOW.

NOTE: You must use the JST male connector on the Multi I/O cable for this test utility. Moreover, an extra hardware board is needed. Please refer to Section 2.14 for GPIO paragraph.

Operation Procedures

**Step1.** Connect the extra hardware board to BE905A2.

Step2. User could click the check box to change the output value.

4.6 ADC Test

About ADC Test

This program will show the digital value (scaled from 0~1023) by converting input analog voltage (ranged from 0~30V).By default, this program will read ADC values per 0.5 second.

Utility Snapshot

here shows value read from ADC channel

press to start reading ADC value
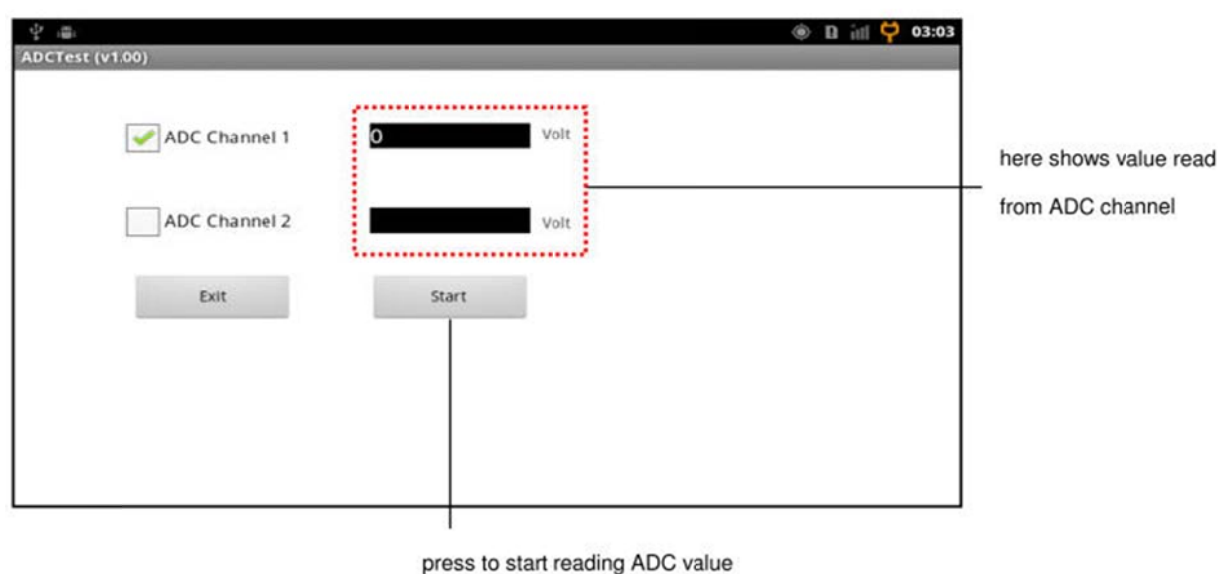
Operation Procedures

Step1. User needs to input a voltage (available from 0~30V) to the ADC channels.

Step2. Click check box to select the ADC channels to be read.

Step3. Click "**Start**" button to start read ADC values of selected channels. The program will read ADC values per 0.5 second. The "**Start**" button will become "**Stop**" button while start reading.

**Step4.** Click the "**Stop**" button will stop the reading action.

NOTE: You must use the JST male connector on the Multi I/O cable for this test utility. Please refer to Section 2.14 for ADC paragraph.

4.7 Keypad Test

About Keypad Test

The 6 icons on the program will mapped to 6 buttons of keypad from the leftmost. The icon status will be changed while there is any button is pressed or un-pressed. Icon enlarged means the related button is pressed and icon recovery means the related button is un-pressed. Please note that we suggest developers only to **customized the leftmost three buttons** as other keys such as MENU、SERACH、BACK has common operations in most Android Apps.

Utility Snapshot
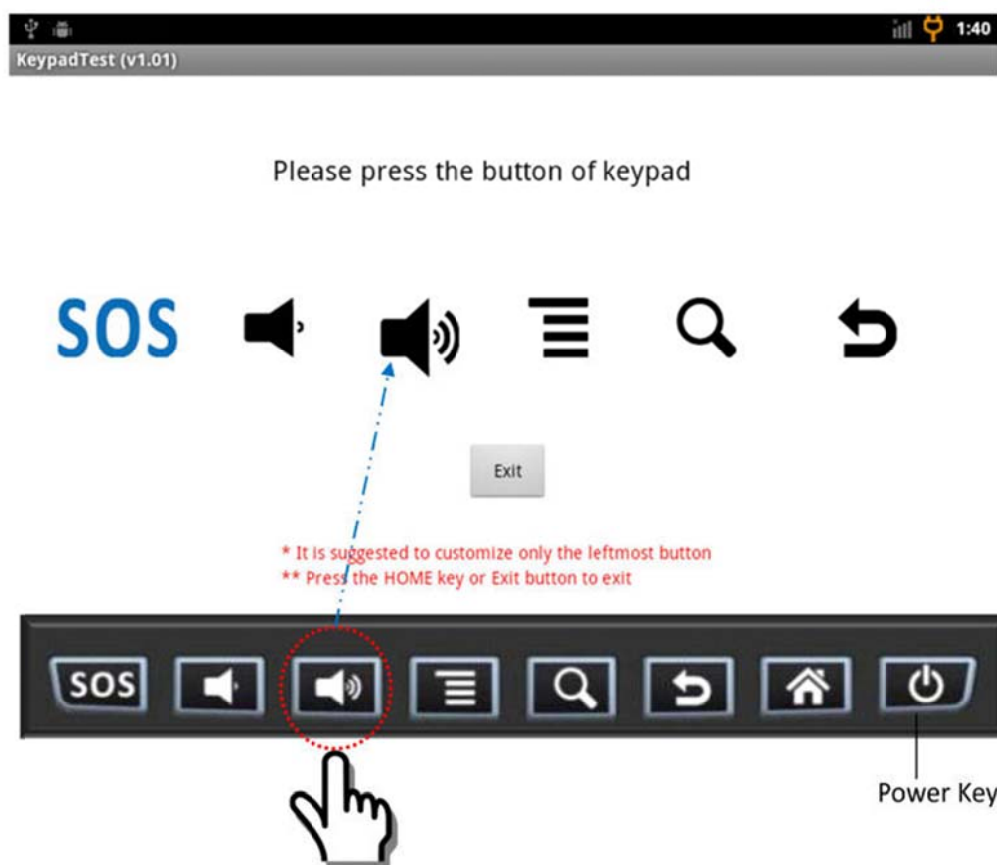
Operation Procedures

Step1. User could press 6 buttons of keypad from the leftmost and see if the status is correct or not. If user press the Home key will be exit or press the power key will be turn off the screen.
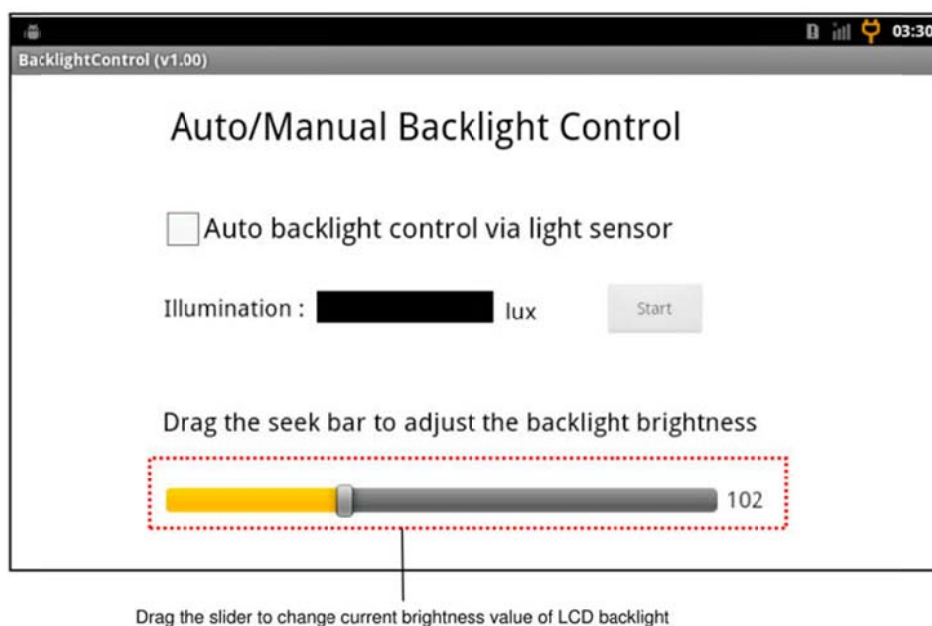
4.8 Backlight Control

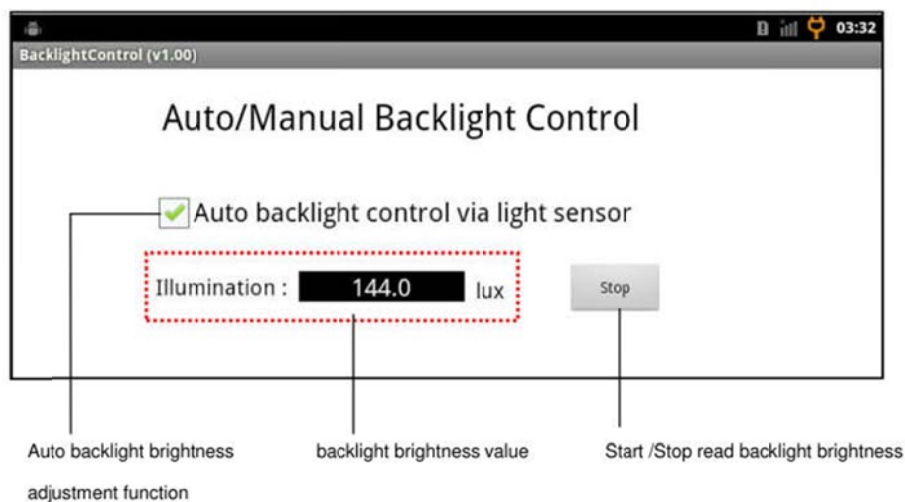## About Backlight Control

User could use this program to adjust the brightness of LCD backlight. The adjustment value is from 30 to 255.

Utility Snapshot

Manual backlight control

Drag the slider to change current brightness value of LCD backlight

Auto backlight control

Auto backlight brightness adjustment function   backlight brightness value   Start /Stop read backlight brightness

Operation Procedures

Step1. Check/Uncheck the "**Auto backlight control via light sensor**" check box to enable / disable the auto backlight brightness adjustment function.

Step2. If the auto backlight brightness adjustment function is enabled, the backlight brightness value will be update automatically. Click "Start" button to read illumination value from built-in light sensor. The "Start" button will become "Stop" button op the read action.

Step3. If the auto backlight brightness adjustment function is disabled, a slider bar will be shown and user can drag the slider to change current brightness value of LCD backlight.

Step4. User could use the first button of keypad to ON/OFF backlight.

4.9 CAN Bus Test

About CAN Bus Test

CAN Bus Test program let user test basic CAN Bus functions such as transmit or receive messages via CAN Bus and set acceptance mask and filter for CAN Bus. Below snapshot shows the main operation screen of CAN Bus test program:

Utility Snapshot

Setting Area

Definition of CAN bus operation mode

Operation mode	Description
NORMAL_MODE	Actively monitor all bus messages and generates acknowledge bits, error frames, etc. This is also the only mode in which the BE905A2 could transmit message over the CAN Bus.
LOOKBACK_MODE	Internal transmission of messages from the transmit buffers to the receive buffers without actually transmitting messages on the CAN Bus. The acceptance filters and masks can be used to allow particular messages only.
LISTEN_MODE	No messages will be transmitted in this mode (including error flags or acknowledge signals). The acceptance filters and masks can be used to allow particular messages only.

Acceptance Mask and Filter

BE905A2 provides acceptance mask and filter for user to sieve out necessary messages from incoming messages. Following table is the truth table of mask and filter value:

Mask Bit n	Filter Bit n	Message Identifier bit	Accept or Reject bit n
0	x	x	Accept
1	0	0	Accept
1	0	1	Reject
1	1	0	Reject
1	1	1	Accept

Note: X = don't care

Status Area

The program will show current status of CAN Bus at status area as below:
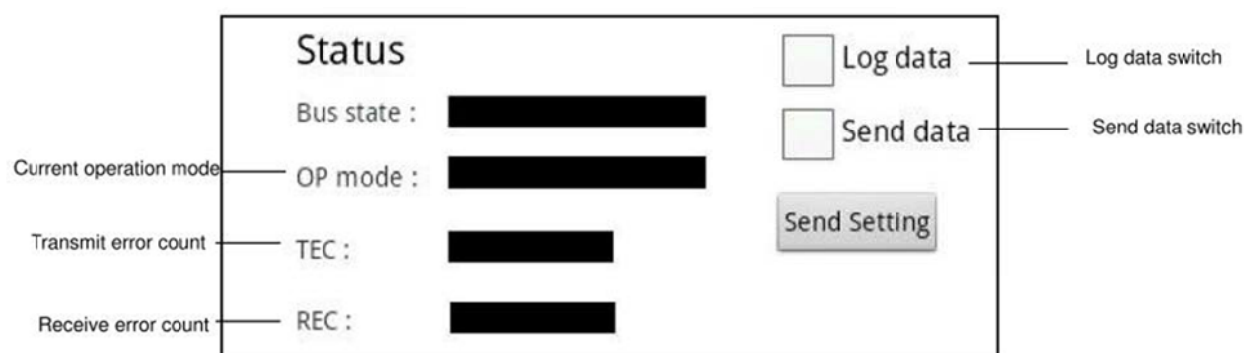
CAN Bus of BE905A2 will switch its state automatically based on the value of TEC and REC. Below diagram shows the bus state transition:
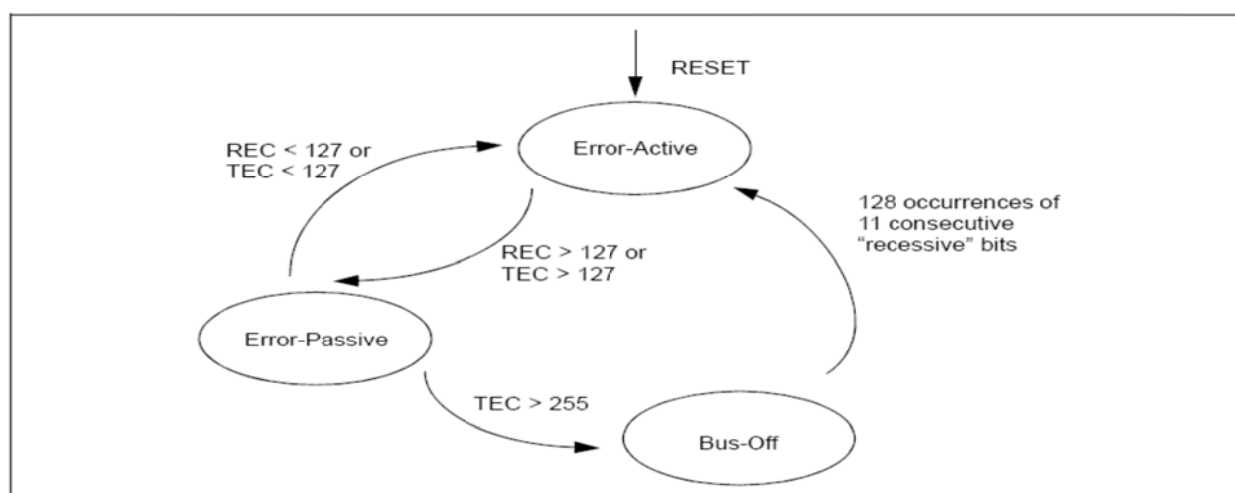
Following table lists the definition of each bus state:

Definition of Bus state

Bus state	Description
ERROR_ACTIVE	BE905A2 is on active state or active warning state if TEC < 127 and REC < 127. The active state is usual state when the node can transmit or receive messages and active error frames (made of dominant bits) without any restrictions.
ERROR_ACTIVE_WARNING	BE905A2 will switch to active warning state if TEC or REC > 96.

ERROR_PASSIVE	BE905A2 will switch to passive state if TEC > 127 or REC > 127. In this state, BE905A2 can transmit messages and passive error frames (made of recessive bits).
TX_BUS_OFF	Only transmitters can switch to bus-off state. A transmitters will become bus off state if TEC > 255. The bus-off state makes it temporarily impossible for the station to participate in the bus communication. During this state, messages can neither be received nor transmitted.

Log data switch

If user checks the Log data switch, the program will save all transmitted and received data in file named as "**CANLogyyyymmddhh.txt**" at the folder of this program.

Send data switch

A checked "*Send data*" switch means the program will transmit user defined message based on the transmit data setting. More detail information about transmit data setting could be found in the <Transmit Data Setting> paragraph.

Message List

The program will display all transmitted and received messages in Message list as below:

Time	ID	Tx/Rx	RTR	DLC	Data	Index
2013-10-30 05:56:09	0x00000234	Tx	N	3	11-22-33	750
2013-10-30 05:56:09	0x00000234	Tx	N	3	11-22-33	751
2013-10-30 05:56:10	0x00000234	Tx	N	3	11-22-33	752
2013-10-30 05:56:10	0x00000234	Tx	N	3	11-22-33	753
2013-10-30 05:56:10	0x00000234	Tx	N	3	11-22-33	754
2013-10-30 05:56:10	0x00000234	Tx	N	3	11-22-33	755
2013-10-30 05:56:10	0x00000234	Tx	N	3	11-22-33	756
2013-10-30 05:56:10	0x00000234	Tx	N	3	11-22-33	757
2013-10-30 05:56:10	0x00000234	Tx	N	3	11-22-33	758

Following table lists the description of each field in the Message list:

Field	Description

Time	Receive or Transmit time of message.
ID	Target ID of this message. (Hexadecimal value)
Tx/Rx	Tx: Transmit message, Rx: Receive message.
RTR	Indicate this message is Remote Transmit Request or not.
DLC	Data length (UNIT : bytes)
Data	Data content of this message (Hexadecimal value).

Operation procedures for main screen

Step1. Select CAN Bus baud rate and mode, click "**Open**" button to open CAN Bus. The text of button will become "**Close**" and the program will start to update information in status area if CAN Bus is opened successfully.

Step2. Mask/filter setting values then click "**Set**" button to change current filter setting of CAN Bus.

Step3. All transmit and receive messages will be shown in the message list. Click "**Clear data**" button could clear content of message list.

Step4. Click "**Send setting**" button to set up transmit data. More detail information about transmit data setting could be found in the <Transmit Data Setting> paragraph. User could pause or resume the transmit by Send data switch.

Step5. If user wants to change baud rate, please close CAN Bus by click "**Close**" button first.

Step6. Click "**Exit**" button to close CAN bus and exit the program.

Transmit Data Setting

When user clicks the "**Send setting**" button, following dialog will be shown for user to setup the transmit data rule:
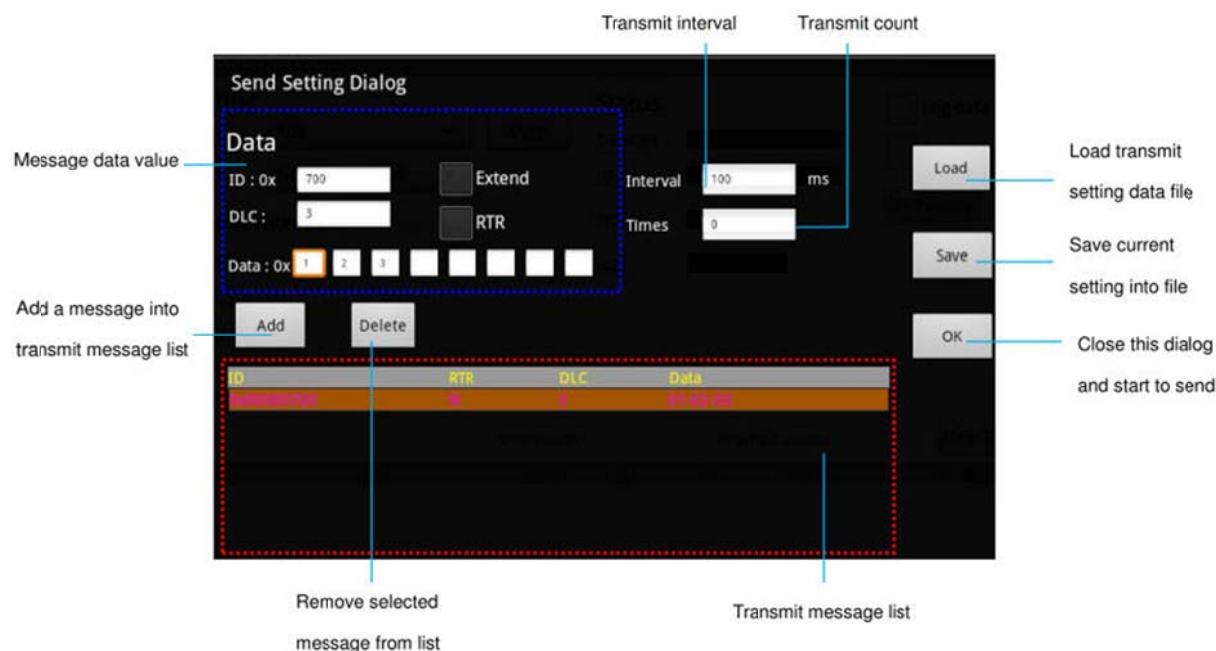
Message data value definition

Field	Description
ID	Target ID of this message. (Hexadecimal value).
RTR	Indicate this message is Remote Transmit Request or not.
DLC	Data length in this message (UNIT : bytes)
Data	Data content of this message (Hexadecimal value).

Operation procedures for transmit setting dialog

Step1. Fill message data value and click "**Add**" button to add current message data into transmit message list.

Step2. If there are messages in the transmit message list, user could select a message in the list and the data of selected message will be shown at above area.

Step3. User could click "**Delete**" button to remove a selected message from transmit message list.

Step4. "**Save**" button could be used to save all messages in the list and current transmit setting into a file.

Step5. User could click "**Load**" button to load transmit messages and transmit setting from a file.

Step6. Change the transmit interval and count value, then click "**OK**" button to close the dialog. The program will start to transmit data via CAN bus base on the setting.

Appendix A - Dump Boot Message of BE905A2

As illustrated below, first connect BE905A2 and PC via RS232 debug kit. On PC side, you should launch terminal emulation program, e.g. **Hyper Terminal** in Windows XP system, to communicate with BE905A2 so that you can capture the boot message. If your PC is with Windows 7, the Hyper Terminal is not included by default, you can either use the 3rd party software like **Putty** or copy the **hypertrm.exe** and **hypertrm.dll** from one XP system to your target Windows 7 PC.

On the terminal emulation program, here we take Hyper Terminal on Windows XP for example, set up the COM port parameters : **115200** baud rate, **8** data bits, **None** parity, **1** stop bit and **None** flow control.

Then power on BE905A2. You should see the boot message as below example shown on the screen of Hyper Terminal program.

NOTE: Please refer to Section 2.12 for how to connect your PC and BE905A2 via Debug Kit
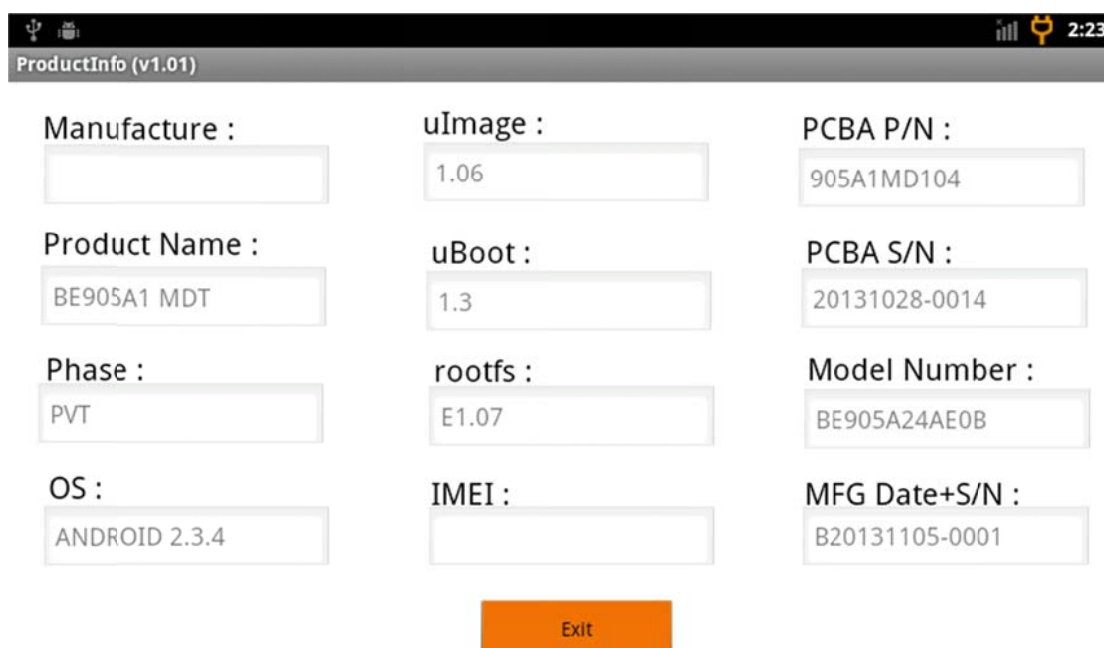

RS232 debug kit
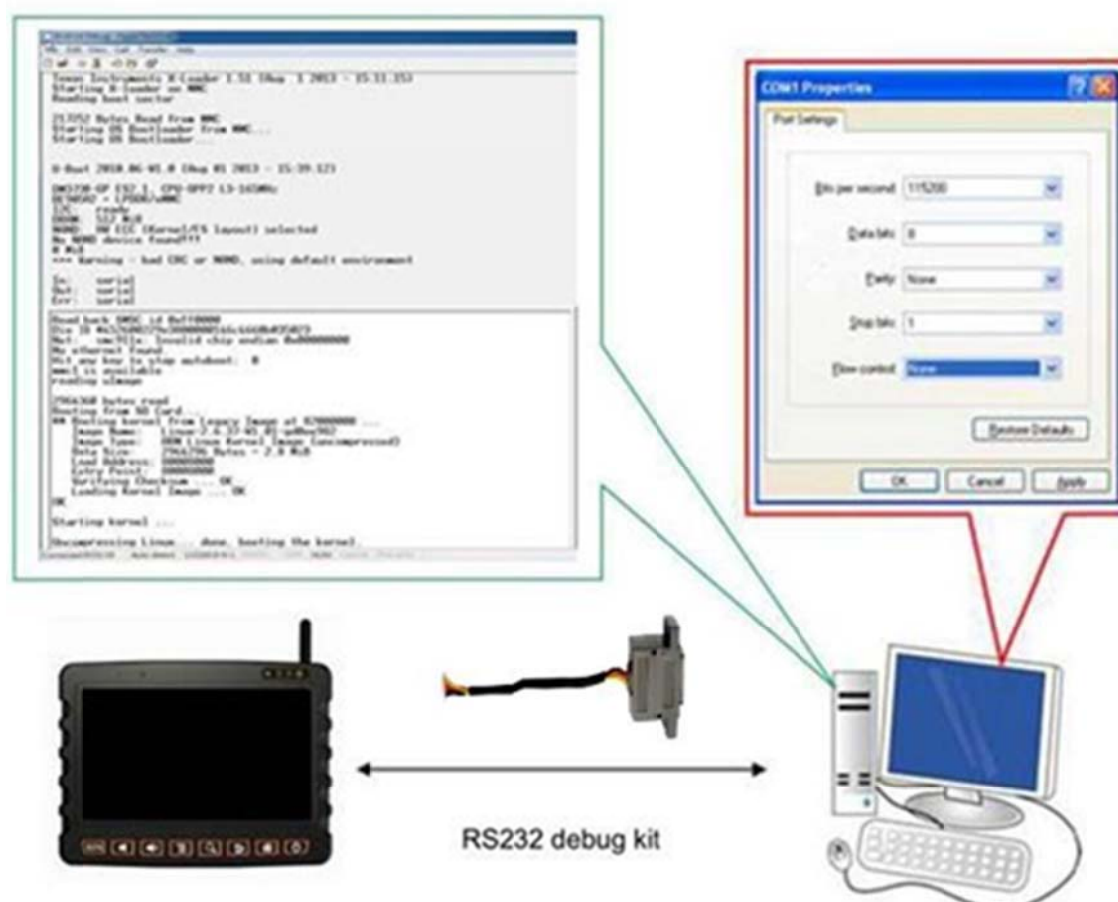
Appendix B - Product Information of BE905A2

We provide a simple utility for viewing the product information, like the product name, model number, IMEI, OS image built version and etc.

From the Home screen, tap ⚏ to switch to All apps view, and then tap icon named "**ProductInfo**" to launch this utility.
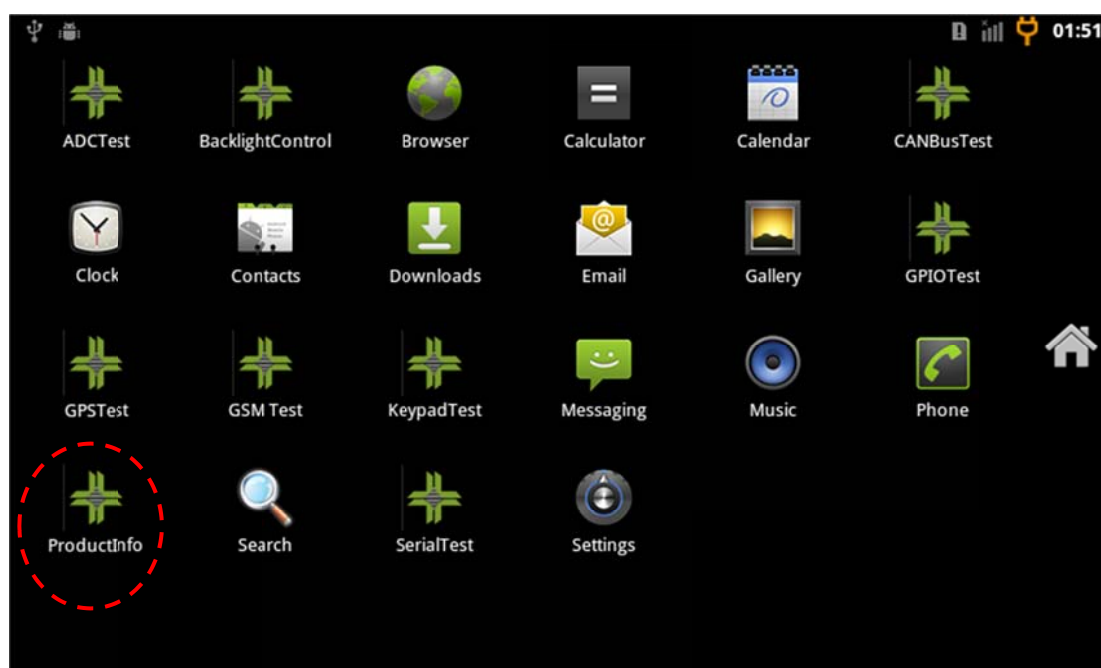
Product information of BE905A2.

Appendix C – DGPS

BE905A2 supports DGPS to get more accurate data. It uses SBAS engine technology, the accuracy is about 2.0m.

DGPS [RTCM, SBAS (WAAS, EGNOS, MSAS)]

Ionospheric corrections such as those received from local SBAS geostationary satellites (WAAS, EGNOS, MSAS)
The maximum improvement of positioning accuracy is reached with SBAS and can only be expected in an environment with unobstructed sky view during a period in the order of minutes.

Several countries and regions have implemented their own satellite-based augmentation system.
For example, The North American SBAS component, WAAS (Wide Area Augmentation System), covers the continental United States (CONUS), Canada and Mexico.
The Europeans, for their part, have EGNOS (the European Geostationary Navigation Overlay Service), which covers Europe's "ECAC" area, while Japan is covered by MSAS (Multi-functional Satellite Augmentation System).

GPS L1 and GLONASS L1 receiver & SBAS. GPS accuracy < 2 m SBAS accuracy < 1-2 m DGPS accuracy < 0.5 m	DPS Engine comprises an 'All in One' signal processing core with advanced algorithms and true parallel processing of all available signals including SBAS (e.g. WAAS, EGNOS, MSAS). DGPS / DGLONASS corrections from different sources are combined by the unique MULTIREF capability.