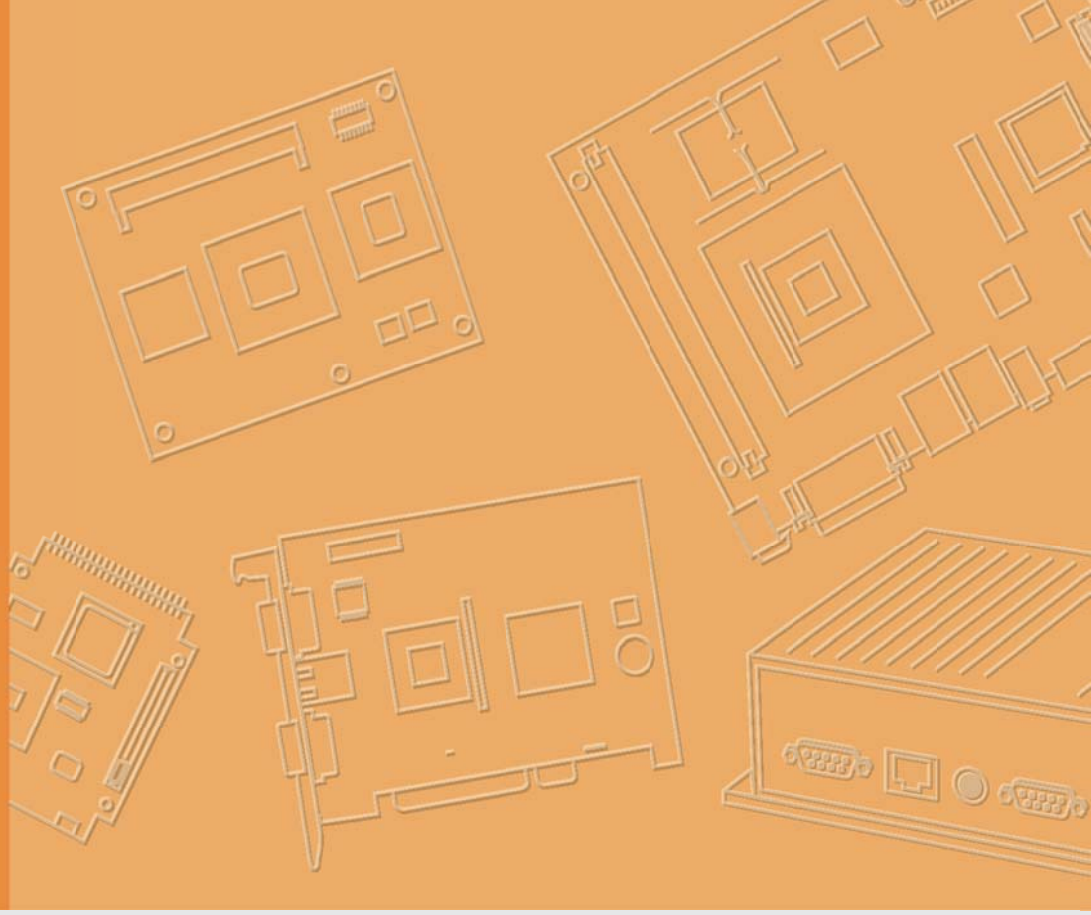

User Manual

IVU-4000

Computing Box for Fleet management & surveillance

Copyright

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Product Warranty (2 year)

Xerox warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of pur- chase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Xerox, or which have been subject to misuse, abuse, accident or improper installation. Xerox assumes no liability under the terms of this warranty as a consequence of such events.

Because of Xerox's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Xerox product is defec tive, it will be repaired or replaced at no charge during the warranty period. For out- of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU speed, Xerox products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandize authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Part No. Edition 1

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Declaration of Conformity

For FCC Class A digital device or peripheral
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

- Any changes or modifications not expressly approved by the party responsible for compliance could void the authority to operate equipment.

- This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

FCC RF Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

For IC

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions: (1) This device may not cause interference; and (2) This device must accept any interference, including interference that may cause undesired operation of the device.
Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

For RSS-247 6.4(5) WLAN 11a

(i)the device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;
(ii) for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall be such that the equipment still complies with the e.i.r.p. limit;
(iii) for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits specified for point-to-point and non-point-to-point operation as appropriate; and
(iv) the worst-case tilt angle(s) necessary to remain compliant with the e.i.r.p. elevation mask requirement set forth in Section 6.2.2(3) shall be clearly indicated.

Users should also be advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

(i) l'appareil pour fonctionner dans la bande 5150-5250 MHz est réservé à une utilisation en intérieur afin de réduire les risques d'interférences nuisibles à la co-canal systèmes mobiles par satellite;

(ii) pour les appareils avec antenne (s) détachable, le gain d'antenne maximal autorisé pour les appareils dans les bandes 5250-5350 MHz et 5470-5725 MHz doit être telle que l'équipement satisfait encore la pire limite;
(iii) pour les appareils avec antenne (s) détachable, le gain d'antenne maximal autorisé pour les appareils dans la bande 5725-5850 MHz doit être telle que l'équipement satisfait encore la pire limites spécifiées pour le point-à-point et non point-à-point, le cas échéant; opération et
(iv) l'angle d'inclinaison du pire (s) nécessaire pour rester conforme à la pire exigence de masque d'élévation énoncées dans la section 6.2.2 (3) doit être clairement indiqué.

Devraient également être informés les utilisateurs que les radars à haute puissance sont désignés comme utilisateurs principaux (c.-à-utilisateurs prioritaires) des bandes 5250-5350 MHz et 5650-5850 MHz et que ces radars pourraient provoquer des interférences et / ou endommager les appareils LE-LAN.

IC Radiation Exposure Statement:

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Technical Support and Assistance

1. Visit the Xerox web site at http://support.Xerox.com where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Xerox's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages

Warnings, Cautions and Notes

Warning! *Warnings indicate conditions, which if not observed, can cause personal injury!*

Caution! *Cautions are included to help you avoid damaging hardware or losing data. e.g.*

There is a danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Note! *Notes provide optional additional information.*

Document Feedback

To assist us in making improvements to this manual, we would welcome comments and constructive criticism. Please send all such - in writing to: support@advantech.com

Packing List

Before setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

Part number	Description	Q`ty
410000-AAAAAX	IVU MP unit, 16GB mSATA, 4GB Cfast, 1x WiFi, 1x4G, Baytrail	1
410001	MDT Display MP unit	1
To be update	MDT Cable	1

Ordering Information

P/N	Description
410000-AAAAAX	Atom E3827 /LTE/GPS/WLAN/WE8S 32bit
410000-AAAXAX	Atom E3827 /GPS/WLAN/WE8S 32bit
410000-AABAAX	Atom E3827 /LTE/GPS/WLAN*2/WE8S 32bit

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. Do not leave this equipment in an environment unconditioned where the storage temperature under -40° C (-40° F) or above 80° C (176° F), it may damage the equipment. Operating temperature: -30° C ~65° C.
8. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.
9. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
10. Position the power cord so that people cannot step on it. Do not place anything over the power cord. The voltage and current rating of the cord should be greater than the voltage and current rating marked on the product.
11. All cautions and warnings on the equipment should be noted.
12. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
13. Never pour any liquid into an opening. This may cause fire or electrical shock.
14. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
15. If one of the following situations arises, get the equipment checked by service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated into the equipment.
    - The equipment has been exposed to moisture.
    - The equipment does not work well, or you cannot get it to work according to the user's manual.
    - The equipment has been dropped and damaged.
    - The equipment has obvious signs of breakage.
16. CAUTION: The computer is provided with a battery-powered real-time clock circuit. There is a danger of explosion if battery is incorrectly replaced. Replace

only with same or equivalent type recommended by the manufacture. Discard used batteries according to the manufacturers instructions.

17. THE COMPUTER IS PROVIDED WITH CD DRIVES COMPLY WITH APPROPRIATE SAFETY STANDARDS INCLUDING IEC 60825.

18. This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:
    (1) this device may not cause harmful interference, and
    (2) this device must accept any interference received, including interference that may cause undesired operation.
19. CAUTION: Always completely disconnect the power cord from your chassis whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges.
20. CAUTION: Always ground yourself to remove any static charge before touching the motherboard, backplane, or add-on cards. Modern electronic devices are very sensitive to static electric charges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when they are not in the chassis.
21. CAUTION: Any unverified component could cause unexpected damage. To ensure the correct installation, please always use the components (ex. screws) provided with the accessory box.
22. Caution text concerning lithium batteries:

23. "Rack Mount Instructions - The following or similar rack-mount instructions are included with the installation instructions:
    A) Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.
    B) Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
    C) Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
    D) Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on over current protection and supply wiring. Appropriate consid-

eration of equipment nameplate ratings should be used when addressing this concern.

E) Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips)."

24. CAUTION :

    To avoid any possible accident, please following instructions to operate this unit.

25. CAUTION :

    Only the qualified engineer by Xerox Transportation Management Solution can perform the installation in a vehicle. Improper installation can injure the operator or damage the vehicle and/or IVU4000 computer system.

    Follow the installation as below to avoid overloading the circuit after adding this device.

    Follow the instructions below to properly install the IVU4000 computing system in a vehicle.

    - Determine the best location for mounting the unit taking into consideration the driver`s field of view and ease of accessing the unit. (Only install this unit in the car passenger compartment. Suggested locations are next to driver`s seat or located on center console.)
    - Connect the vehicle computer to the vehicle`s wiring system as below.

      Routing Electrical Cables

      - Establish a near route for the cable, staying clear of moving parts or hot surfaces whenever possible.
      - Fix the cable to existing cable runs inside the vehicle using cable ties, but make sure they are away from any moving or hot surfaces.
      - When the cabling must go through a panel, use a suitable cable gland.
      - Ensure the cable does not have tight bends. The minimum recommended radius is 2.5”.
      - Ensure cables do not swing or chafe on the structure.
      - DO NOT wind a cable in and out of the mesh on a cage.
      - Ensure that all fuses installed as instruction. 32 Volt is suitable for unit.
      - All power wiring must use the supplied power cable comply with intended applications of SAE with suitable ratings of electrical, temperature, exposure and flammability.

        
        CAUTION

        Do not open the cover on the front side as illustration as below before turning off the power.

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

„ To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other

cards while the PC is on.

„ Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

This product is intended to be supplied by a Listed DC power source, rated 9~32Vdc, 10A minimum and Tma 65 degree C, if need further assistance with purchasing the DC power source, please contact Xerox Transportation Management Solution for further information.

Warning!

1. *Input voltage rated: 9 ~ 32 Vdc.*
2. *Transport: carry the unit with both hands and handle with care.*
3. *Maintenance: to properly maintain and clean the surfaces, use only approved products or clean with a dry applicator.*
4. *CompactFlash: Turn off the power before inserting or removing CompactFlash storage cards.*

Contents

Chapter 1

General Information

This chapter gives background information on the IVU4000 Premium Computing Box.

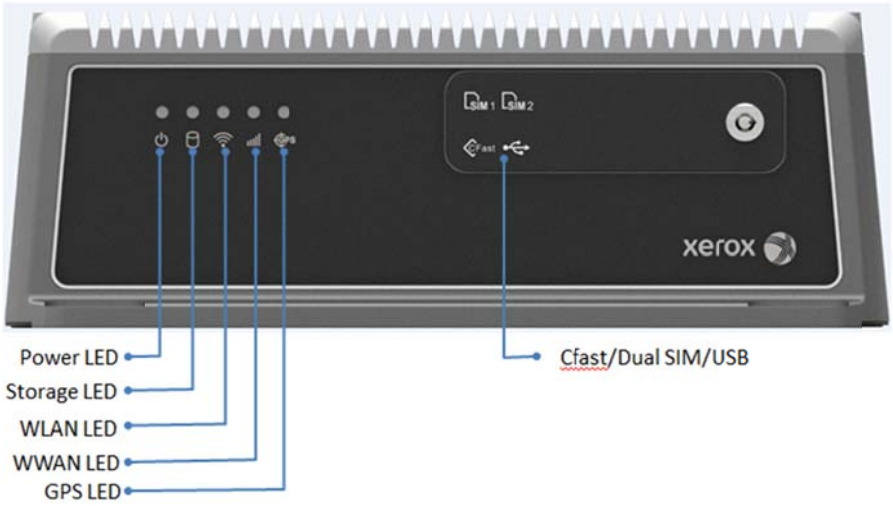
Sections include:

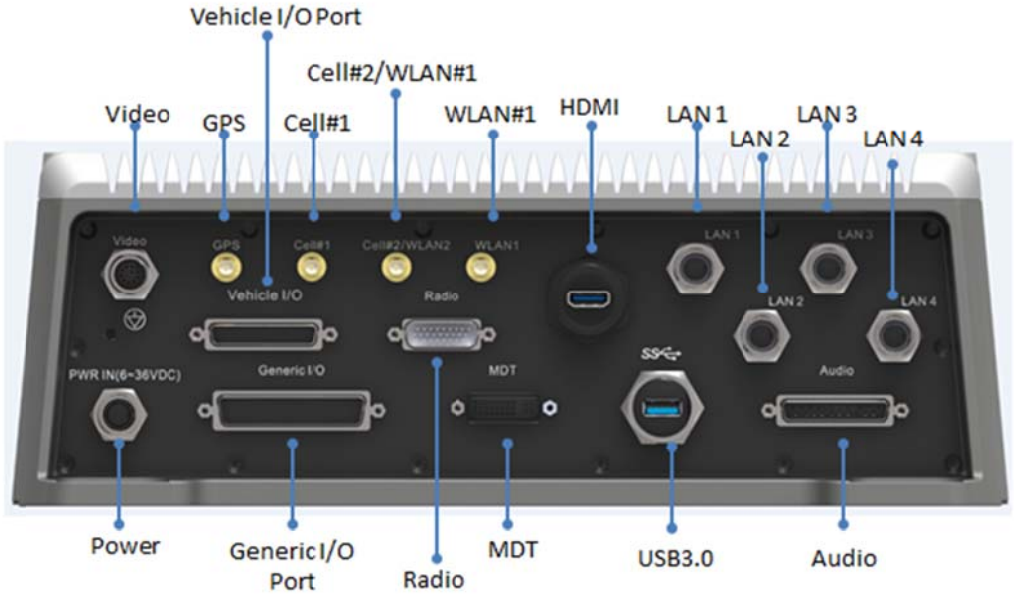
- **Introduction**
- **General Specifications**
- **Dimensions**

1.1 Introduction

IVU4000 is an industrial-grade, powered by Intel® Atom™ E3827 SOC dual core CPU computing box designed to provide high quality video surveillance and fleet management for eBus and BRT(Bus Rapid Transit). It can work in extreme environments with features like the wide working temperature range (-30℃-65℃) and anti-shock/vibration to pass MIL-STD-810G and 5M3 standard. Its special power protection surges from impacting the system. Guarding against damage from transient car power.
IVU4000 combined with variety of I/O connectors can be connected to devices like TPMS (Tire Pressure Monitoring System), Rear view Camera (for parking monitoring) and CAN Bus devices. It has dual CAN BUS ports and support several kind of vehicle protocols (e.g. J1939,OBD-II) for vehicle diagnostics and driver behavior management. Build-in wireless communication (WWAN, WLAN) enable IVU4000 to send important driver/vehicle/location/cargo information back to the control center. Furthermore, IVU4000 also reserved two displays/dual audio interfaces supporting different resolutions can deliver different applications to different displays; eg:one application to a fleet driver and another to passenger to IVI and digital signage application.

IVU4000 I/O Overview




Vehicle I/O Port
Cell#2/WLAN#1
Video
GPS
Cell#1
WLAN#1
HDMI
LAN 1
LAN 2
LAN 3
LAN 4
Video
GPS
Cell#1
Cell#2/WLAN2
WLAN1
LAN 1
LAN 3
Vehicle I/O
Radio
LAN 2
LAN 4
PWR IN(6~36VDC)
Generic I/O
MDT
Audio
Power
Generic I/O Port
Radio
MDT
USB3.0
Audio

1.2 General Specifications

Features

- Intel® Atom™ E3827 SOC Dual core high performance processor for multitasking.
- Embedded video encoder supports up to 4 analog video inputs for D1, 30fps resolution and 4 audio inputs
- Cfast tray with key-lock protection.
- Easily paired with MDT in-vehicle smart displays via a single-cable connection.
- Intelligent vehicle power management system for ignition on/off/delay and power protection functions.
- Vehicle diagnostic interface with configurable dual CAN(J1939,OBD-II/ISO 15765) and J1708 protocols.
- Built-in LTE/GNSS/WLAN (with dual SIM cards) modules.
- Advanced Shock & anti-vibration certified by MIL-STD-810G, EN60721-3(5M3)
- Rich management & video SDK , test utility for customer evaluating.

Specifications

Core	Processor	Intel Bay Trail SOC, Atom E3827
	Memory	1 x SO-DIMM socket 4GB DDR3L-1600 Non-ECC memory module;
	Graphic	Intel HD graphics 4400 1.1GHz
	Video HW Encoder	Stretch S7, support H.264, MJPEG format; Resolution up to D1, 30fps per channel
	O.S	WE8S 32 bits as default.
Storage	CFast	1 x external accessible CFast slot with cover, Default configuration: 4GB, SLC SQFlash CFast card
	mSATA	1 x mSATA slot, support system boot up Default configuration: 16 GB;
Display	DVI-I (*1)	15V/1.2A power output for MDT smart display unit 1 x 18-bits LVDS (1024 x768 MDT) 1 x Line-Out (*2) (For Speakers on MDT) ~~2 x UART (TX/RX, TX/RX/RTS) (For T/S, Hot keys, brightness, light sensor control)~~ 1 x USB 2.0 Type A 1 x Reset Button Signal 1 x MIC-in
	HDMI	1 x HDMI 1.3b (Resolution up to 1920 x 1080)
I/O	Vehicle I/O Port	2 x CAN Bus (Support Raw CAN, J1939, OBD-II/ISO 15765; FW configurable) 2 x J1708 (Support J1587) 1 x 4-wire RS-232/422/485 (Default RS-485, by software setting)
	Generic I/O Port	2 x 4-wire RS-232 4 x Isolated DI (Dry Contact) 4 x Isolated DO (Open collector output, driving by relay) 1 x Line-Out (*2) 1 x Mic-In
	Audio I/O	4 X codec
	Radio I/O	TBC
	Standard I/O Port	1 x USB 2.0 Type A (Front side) 1 x USB 3.0 Type A (Rear side, with cable clip)

		1 x High Speed Full RS-232, DB-9 (Pin 9 = Ring, 12V/5V @ 0.5A is BOM optional by jumper setting) 4 x Giga LAN, with 4-pin M12 connector
	Video / Audio input (AV1 & AV2, via dual DVI-I connector)	4-ch Video inputs, Video Compression: support H.264, MJPEG format; Resolution up to D1, 30fps per channel 4-ch mono Audio inputs, Audio Compression: G.711
	LED	5 x LEDs (PWR(Red), Storage(Green), WLAN(Green),WWAN(Green),GPS(Yellow)
	Power Button	Via MDT(In-Vehicle Smart Display); System is powered on by Ignition in default
	Reset Button	Via MDT 1 x Reset button (Rear side)
RF	WLAN	IEEE 802.11a/b/g/n via Full Mini-PCIe Slot
	WWAN	4G (LTE,HSPA+,GSM/GPRS/EDGE, EV-DO Rev a1, 1xRTT): Sierra Wireless MC73xx via Full Mini-PCIe Slot (Default: MC7354 for US)
	GNSS	Build-in u-blox MAX-M8L GPS/Glonass/Beidou module, support AGPS
	Antenna	4 x SMA type antenna hole for GPS, WiFI, WWAN/Cell#1 ,) WiFi#2/Cell#2
Power	Voltage input	Supports 12/24 V car power system. (9V ~ 32V wide DC input 10A, ISO 7637-2 & SAE J1113 compliant.)
	Intelligent Vehicle Power Management (iVPM 2.0)	System power on/off/hibernate management (e.g. Programmable Ignition On/Off Time delay) Support Wake up Events: - Alarm (RTC) Wake up. - Wake up by Call/SMS. - Wake up by G-sensor. System power protection (e.g.Car Battery Low Voltage Protection) System monitoring and diagnostic
Mechanical	Dimensions (W x H x D)	4.92" x 13.86" x 11.44" (125mm x 352mm x 290.5mm);
	Weight	17lb (7.72Kg)
Environment	IP Rating	IP54
	Vibration/Shock	MIL-STD-810G, EN60721-3(5M3)
	EMC	FCC
	Safety	UL/cUL, CB
	Vehicle Regulation	SAE J1455 class C, ISO 7637-2,
	RF Regulation	FCC ID
	Operating Temperature	-30° C ~ 65° C
	Storage Temperature	-40° C ~ 80° C

*1: To be paired with MDT directly. (Single-cable connection)

*2: Support dual independent audio streams. (i.e. The Line-Out interface in "Smart Display Port" and "Generic I/O Port" are driven by different Audio codecs.)

1.3 Dimensions (inches)

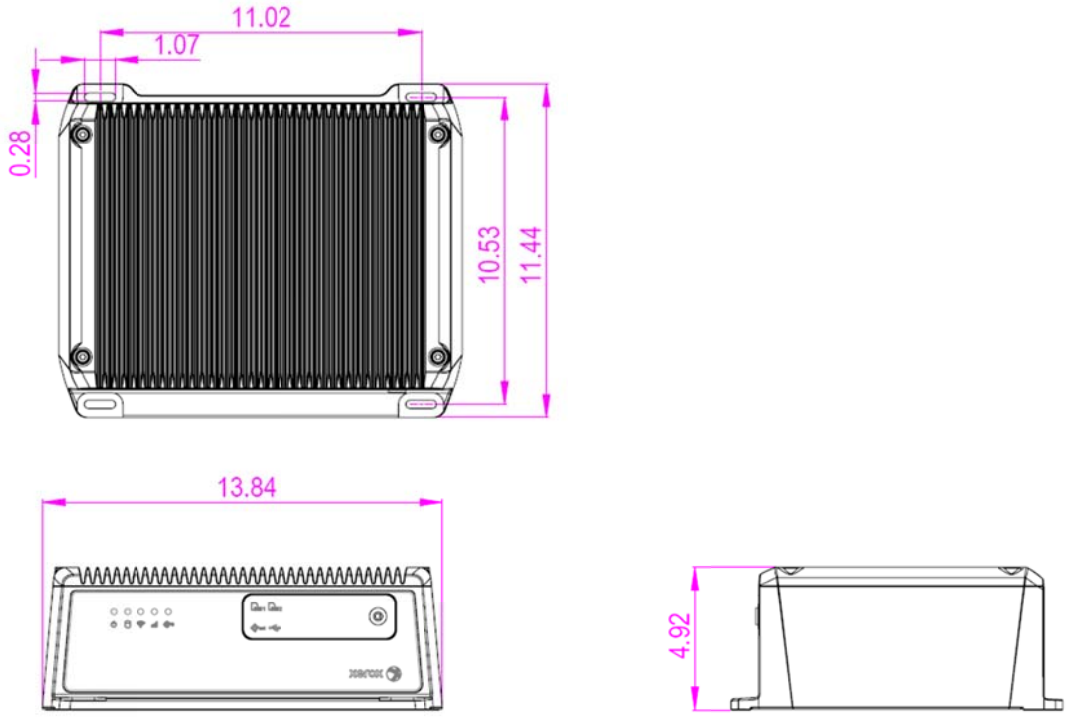


Figure 1.1 IVU4000 dimensions

Chapter 2

System Setup

This chapter details system setup on IVU4000

Sections include:

- **A Quick Tour of the Computer Box**
- **Installation Procedures**
- **Running the BIOS Setup Program**

2.1 A Quick Tour of the IVU4000 Computing Box

Before starting to set up the In-Vehicle Computing Box, take a moment to become familiar with the locations and functions of the controls, drives, connectors and ports, which are illustrated in the figures below.

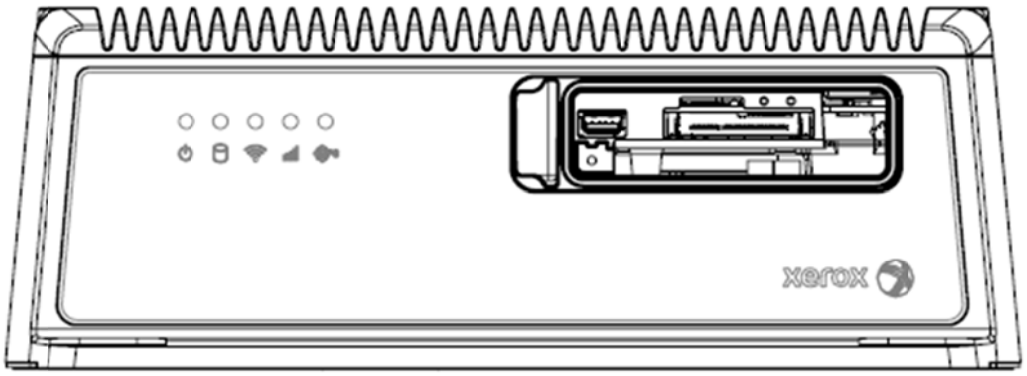


Figure 2.1 Front view of IVU4000

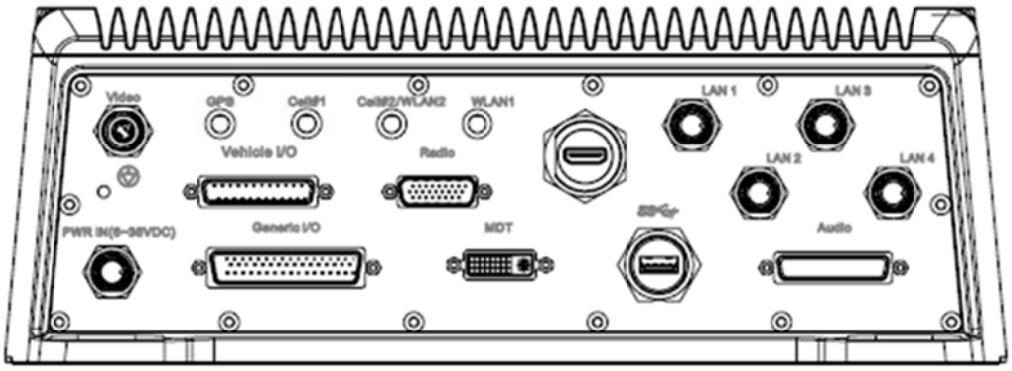


Figure 2.2 Rear view of IVU4000

2.1.1 Installing CFast Card & SIM card

Remove CFast door screw and can install CFast Card & SIM Card directly. Please insert SIM Card from SIM1 slot because default priority is SIM1. If you insert to SIM2 slot, you have to modify setting of SDK.

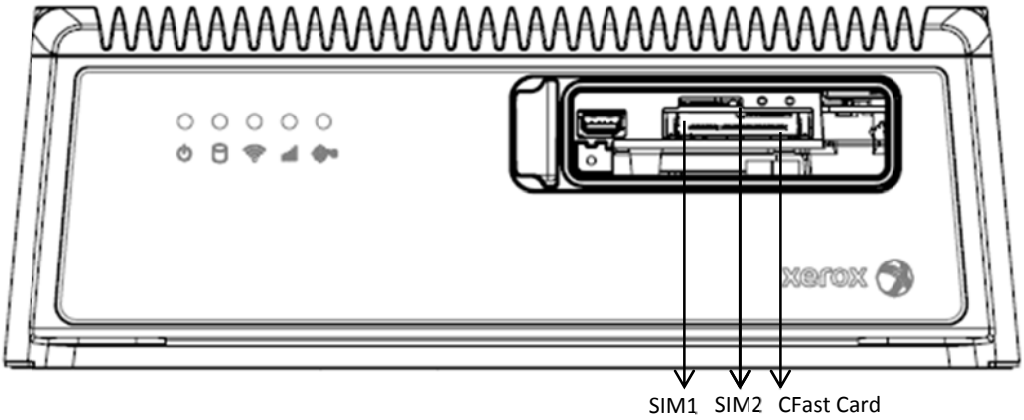


Figure 2.3 Installing CFast card & SIM card

Memory and WWAN WIFI installation

2.2 Installation Procedures

2.2.1 Connecting the Power Cord

Connect the three pin waterproof power cord to the DC inlet of the In-Vehicle Computing Box. On the open-wire end, one pin is reserved for positive voltage and is marked, "+"; one pin is reserved for ground and is marked, "-"; and, one pin is reserved for the ignition signal with an “ignition” mark.

Note! *Ignition on/off setting: The IVU4000 supports an ignition on/off function so that you can power on/off the IVU4000 via the ignition signal/voltage and connect the IVU4000 vehicle ignition switch.*

Pin	Definition	Color
1	GND	TBC
2	Car Power +	TBC
3	GND	TBC
4	IGNITION	TBC

2.2.2 Power Connector

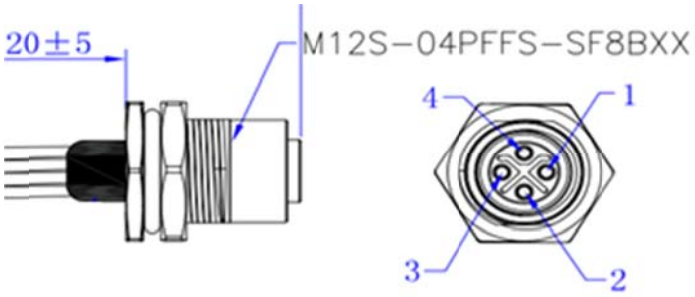


Figure 2.4 Power connector outlook

Power input connector	
1	DC-IN_-
2	DC-IN_+
3	DC-IN_-
4	IGNITION_SENSE

2.3 Running the BIOS Setup Program

In most cases, the computer will have been properly set up and configured by the dealer or SI prior to delivery. However, it may still be necessary to adjust some of the computer's BIOS (Basic Input-Output System) setup programs to change the system configuration data, like the current date and time, or the specific type of hard drive currently installed.

The setup program is stored in read-only memory (ROM). It can be accessed either when turning on or resetting the computer, by pressing the “Del” key on the keyboard immediately after powering up the computer.

The settings that are specified with the setup program are recorded in a special area of the memory called CMOS RAM. This memory is backed up by a battery so that it will not be erased when turning off or resetting the system. Whenever the power is turned on, the system reads the settings stored in CMOS RAM and compares them to the equipment check conducted during the power on self-test (POST). If an error occurs, an error message is displayed on screen, and the user is prompted to run the setup program.

Chapter 3

Switches Setting and Connectors

This chapter explains how to set up the In-Vehicle Computing Box hardware, including instructions on setting and how to set switches and read indicators.

Sections include:

- **Setting Switches**
- **Indicators introduction**
- **I/O connectors pin assignment**

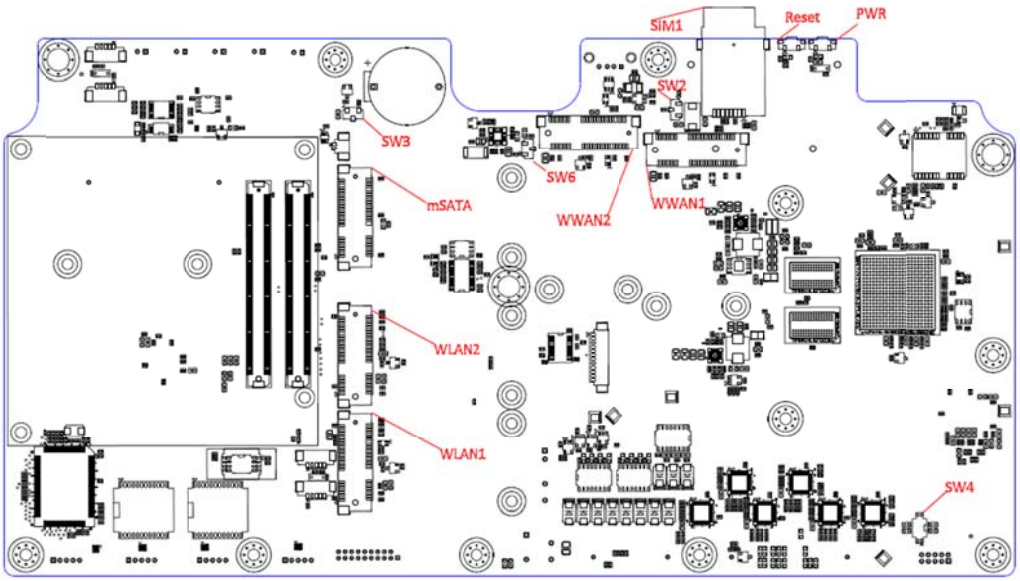
3.1 Setting Switches

It is possible to configure the In-Vehicle Computing Box to match the needs of the application by resetting the switches.

3.1.1 Switches List

Switches	Description
SW2	MiniPCIe (WWAN1) Power Voltage Setup
SW3	Clear CMOS
SW4	CAN BUS Termerater (Only for test use)
SW6	MiniPCIe (WWAN2) Power Voltage Setup

3.1.2 Switches Location



3.1.2 Switches Setting

3.1.3.1 MiniPCIe (WWAN1) Power Voltage Setup **(SW2)**

	SW2.1	SW2.2	SW2.3
3.8V	OFF	OFF	ON
3.5V	ON	OFF	OFF
3.3V	OFF	ON	OFF

3.1.3.2 Clear CMOS

SW3.1	SW3.2	SW3.3	Description
ON	OFF	OFF	Clear CMOS
OFF	ON	OFF	Normal
OFF	OFF	ON	Clear CMOS

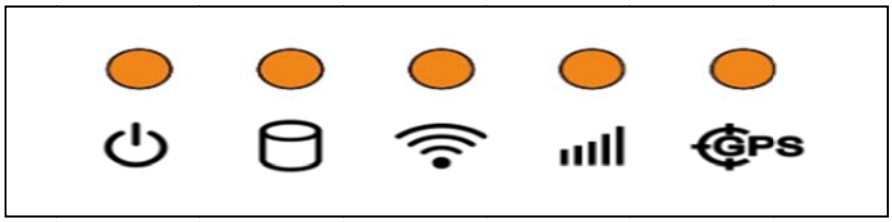
3.1.3.3 CAN BUS Termination (Only for test use) (SW4)

ON/ON	**Disable (Default)**
OFF/OFF	**Enable CAN BUS Terminator(120ohm)**

3.1.3.4 MiniPCIe (WWAN2) Power Voltage Setup **(SW6)**

	SW6.1	SW6.2	SW6.3
3.8V	OFF	OFF	ON
3.5V	ON	OFF	OFF
3.3V	OFF	ON	OFF

3.2 LED Indicator



	Power Activity indicator LED	When the system is in NORMAL mode, this LED will be light up.(Red color)
	WLAN Activity Indicator LED	The WLAN activity indicator is an orange LED, and flashes to show the activity of the WLAN module.(Green color) This LED is controlled directly by the WLAN module.
	WWAN Activity Indicator LED	The WWAN activity indicator is a green LED, and flashes to show the activity of the WWAN module.(Green color) This LED is controlled directly by the WWAN module.
	GPS Activity Indicator LED	The GPS activity indicator is an orange LED, and is used to show GPS activity. This LED is controlled directly by the GPS chips.(Yellow color)

	Storage Access Indicator LED	The Storage Access indicator is a green LED, and flashes to show the activity of the Storage transportation. (Green color)

System power indicator LED

	Red LED keep light Normal mode System is in NORMAL mode
	Red LED flashing Boot loader mode F/W can be update

3.3 I/O Connectors Pin Assignment

3.3.1 Power connector

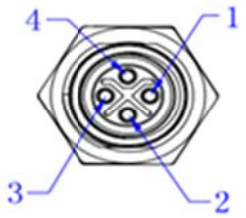
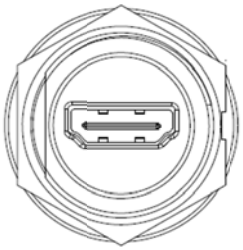


Figure 2.4 Power connector outlook

Power input connector	
1	DC-IN_-
2	DC-IN_+
3	DC-IN_-
4	IGNITION_SENSE

3.3.2 HDMI Connector



Connector type: HDMI Conn. 19P 0.5mm 180D(F)

Table HDMI Connector Pin Assignment			
Pin	**Signal Depiction**	**Pin**	**Signal Depiction**
1	TMDS_DATA2+	11	TMDS_Clock Shield
2	TMDS_DATA2+ Shield	12	TMDS Clock-
3	TMDS_DATA2-	13	CEC
4	TMDS_DATA1+	14	Reserved
5	TMDS_DATA1 Shield	15	SCL
6	TMDS_DATA1-	16	SDAA
7	TMDS_DATA0+	17	GND
8	TMDS_DATA0 shield	18	HDMI_Power(5V)
9	TMDS_DATA0-	19	HDMI_HPD
10	TMDS Clock		

3.3.3 MDT Connector (DVI-I)

Pin	Signal	Pin	Signal
1	LVDS1_p/[D0]	2	LVDS1_n
3	LVDS1_RTN	4	LVDS2_p/[D1]
5	LVDS1_n	6	MDT_DET#
7	Vdd_en	8	VBL_en
9	LVDS3_p/[D3]	10	LVDS3_n
11	LVDS3_RTN	12	LVDS4_p/[CLK]
13	LVDS4_n	14	LVDS4_RTN
15	BTN_RST	16	RTN
17	USB_P	18	USB_N
19	USB_RTN	20	RTN
21	AUD_RTN	22	Cover_MIC
23	SPK	24	AUD_RTN

C1	DC-IN
C2	DC-IN
C3	DC-IN
C4	PWR_RTN
C5	PWR_RTN

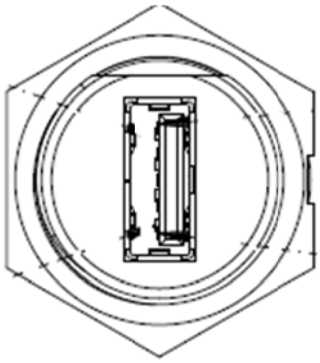
3.3.4 USB Connector (Front side)

Connector type: Single USB A-Type

Table 3. : USB Connector

Pin	Signal Depiction
1	Vcc
2	USB_Data-
3	USB_Data+
4	GND

3.3.5 USB Connector (Rear side)



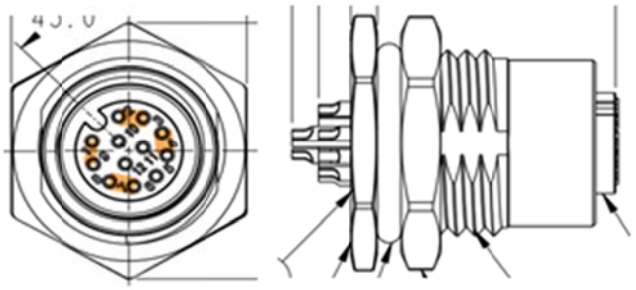
Connector type: Single USB A-Type with water-proof housing

Table 3. : USB Connector

Pin	Signal Depiction
1	Vcc
2	USB_Data-
3	USB_Data+

4	GND

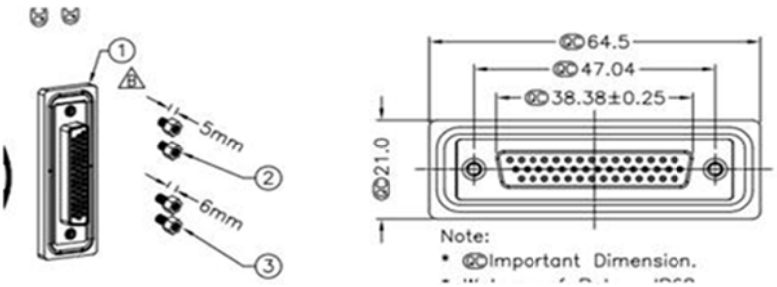
3.3.6 Video Input Connector



Connector type : M12 12PIN
Female right angle

Table VIO Connector Pin Assignment	
1	Video_RTN1
2	Video_RTN4
3	Video_IN4
4	Video_RTN3
5	Video_IN3
6	Shielding (if needed)
7	Video_IN2
8	Video_RTN2
9	Video_IN1
10	Shielding (if needed)
11	NC
12	NC

3.3.7 Vehicle I/O Connector

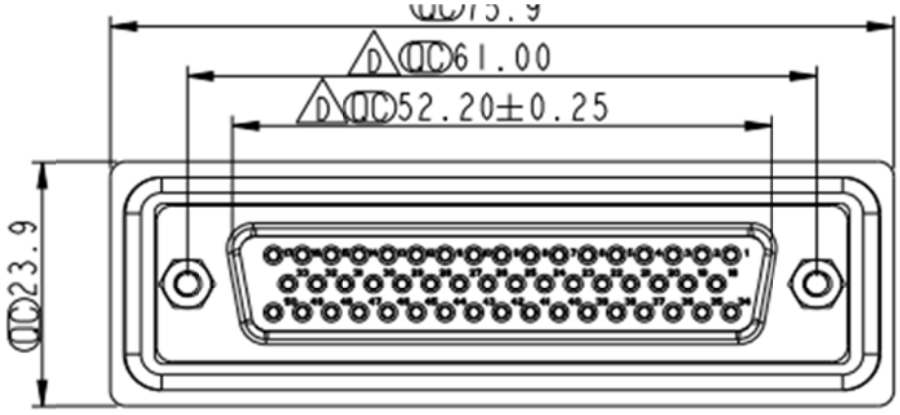


VI/O Port is TREK's next generation communication interface connector which contains Dual CAN Bus and Dual J1708 interface.

Connector type: 44PIN D-SUB FEMALE CONNECTOR

Table VIO Connector Pin Assignment			
1	COM1_RX	23	Vehicle_RTN
2	COM1_CTS	24	COM4_RX
3	COM1_TX	25	COM4_CTS
4	COM1_RTS	26	COM4_TX
5	COM1_RTN	27	COM4_RTS
6	COM2_RX	28	COM4_RTN
7	COM2_CTS	29	RTN
8	COM2_TX	30	RTN
9	COM2_RTS	31	COM5_RX
10	COM2_RTN	32	COM5_CTS
11	COM3_RX	33	COM5_TX
12	COM3_CTS	34	COM5_RTS
13	COM3_TX	35	COM5_RTN
14	COM3_RTS	36	ODBII_P
15	COM3_RTN	37	ODBII_N
16	CAN_P	38	ODBII_RTN
17	CAN_N	39	J1708_P2_P
18	CAN_RTN	40	J1708_P2_N
19	J1708_P1_P	41	J1708_RTN
20	J1708_P1_N	42	RTN
21	J1708_RTN	43	RTN
22	Dallas Vehicle ID	44	RTN

3.3.8 Generic I/O Connector

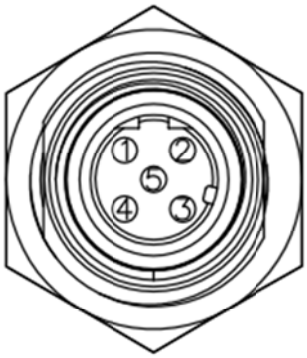


Generic I/O Port is a high density connector which provides several common I/O interface for peripheral control but it is more compact and cost effective than the HDC connector (a.k.a. Extended I/O Port) on IVU4000.

Connector type: FEMALE D-SUB Conn. 50P

Table GIO Connector Pin Assignment			
1	SIO_IN_C0	26	ISO_OUT0_COL
2	SIO_RTN_C0	27	ISO_OUT_RTN
3	SIO_IN_C1	28	ISO_OUT1_COL
4	SIO_RTN_C1	29	ISO_OUT_RTN
5	SIO_IN_C2	30	ISO_OUT2_COL
6	SIO_RTN_C2	31	ISO_OUT_RTN
7	SIO_IN_C3	32	ISO_OUT3_COL
8	SIO_RTN_C3	33	ISO_OUT_RTN
9	SIO_INC0:3_shield	34	EMER
10	SIO_IN_C4	35	EMER_RTN
11	SIO_INC_RTNC4	36	Odometer
12	SIO_IN_C5	37	Odometer_RTN
13	SIO_INC_RTNC5	38	RES_DRY_IN_0
14	SIO_IN_C6	39	RES_DRY_IN_1
15	SIO_INC_RTNC6	40	RES_DRY_IN_2
16	SIO_IN_C7	41	RES_DRY_IN_3
17	SIO_INC_RTNC7	42	RES_DRY_IN_RTN
18	SIO_IN_A0	43	RES_DRY_OUT_0
19	SIO_INA_RTN_A0	44	RES_DRY_OUT_RTN
20	SIO_IN_A1	45	RES_DRY_OUT_1
21	SIO_INA_RTN_A1	46	RES_DRY_OUT_RTN
22	SIO_IN_A2	47	RES_DRY_OUT_2
23	SIO_INA_RTN_A2	48	RES_DRY_OUT_RTN
24	SIO_IN_A3	49	RES_DRY_OUT_3
25	SIO_INA_RTN_A3	50	RES_DRY_OUT_RTN

3.3.9 LAN Connector

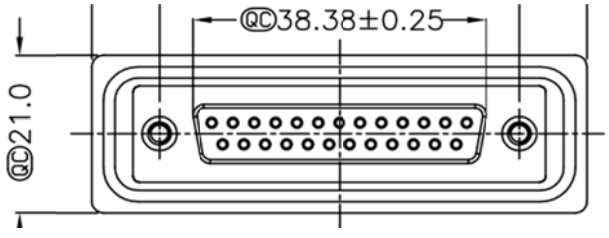


Pin Assignment
Front View

Connector type: FEMALE M12 4P

Table LAN Connector Pin Assignment	
1	TX+
2	RX+
3	TX-
4	RX-
5	Shielding

3.3.10 Audio connector

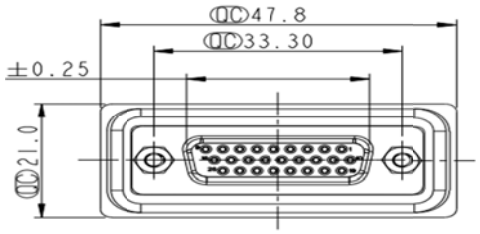


Connector type: FEMALE D-SUB Conn. 25P

Table Audio Connector Pin Assignment			
1	Handset SPK_p	14	Handset_MIC
2	Handset_SPK_n	15	Handset_MIC_RTN
3	Gooseneck MIC	16	Interior AGC MIC
4	Gooseneck_RTN	17	Interior AGC MIC_RTN
5	SPARE Audio In	18	Exterior AGC MIC
6	Spare_Audio_In_RTN	19	Exterior AGC MIC_RTN
7	SPARE Audio OUT	20	HOOK_OFF
8	SPARE Audio_OUT_RTN	21	GooseNeck_PTT_N
9	INTERIOR LINE OUT	22	MIC_PTT

10	INTERIOR LINE OUT RTN	23	PTT_RTN
11	Sheilding (PA signal)	24	Exterior Speaker_p
12	Interior Speaker_p	25	Exterior Speaker_n
13	Interior Speaker_n		

3.3.11 Radio connector



Connector type: FEMALE D-SUB Conn. 26

Table Radio Connector Pin Assignment

1	Voice Radio TX	14	RADIO_CHAN_SEL_2
2	Voice Radio RTN (analog)	15	RADIO_CHAN_RTN 2
3	Voice Radio RX	16	RADIO_CHAN_SEL_3
4	Voice Radio RTN (analog)	17	RADIO_CHAN_RTN 3
5	RADIO_EMER	18	RTN
6	RADIO_VOL_CON/BUSY	19	Radio_Power_Control
7	RTN	20	RADIO_PTT_N
8	RADIO_CTS	21	RTN
9	RADIO_READY	22	COM6_RX
10	RADIO_CHAN_SEL_0	23	COM6_CTS
11	RADIO_CHAN_RTN 0	24	COM6_TX
12	RADIO_CHAN_SEL_1	25	COM6_RTS
13	RADIO_CHAN_RTN 1	26	COM6_RTN

P

Chapter 4

Software Demo Utility Setup

This appendix explains the software demo utility for IVU4000

Sections include:

- **Introduction**
- **How to Set up Demo Utility**

4.1 Introduction

Xerox has developed demo utilities based on Xerox provided SDK APIs to let user test the functions on IVU4000. This document describes the usage of each demo utilities and also provide a basic concept of the application development on IVU4000.

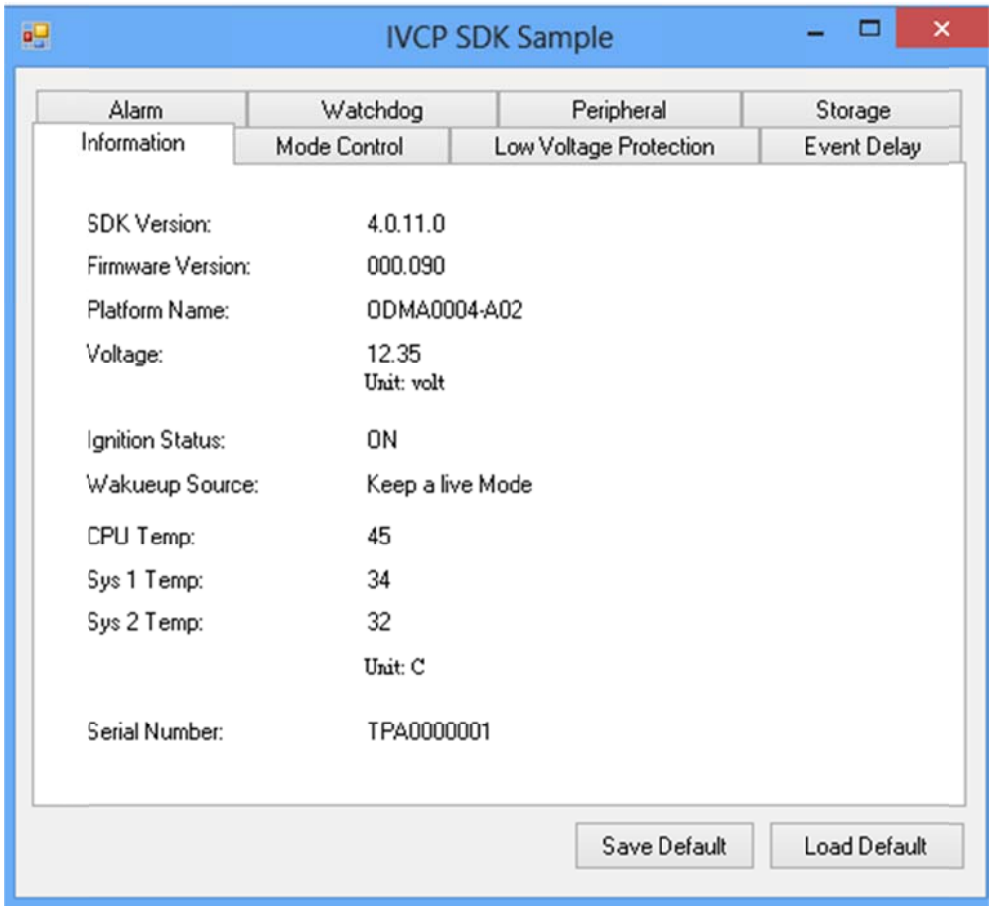
For technical support, contact Xerox application engineers worldwide. For news updates, please visit our website : www.Xerox.com and MRM forum : http://mrmforum.Xerox.com/index.aspx

4.2 IVCP Demonstration

The IVCP demonstration application demonstrate the usage of MRM IVCP API which is a lightweight interface between OS (Operating system) and IVCP (Intelligent Vehicle Co-Processor) allow user to access the status of machine and change machine behavior such as power management, boot behavior, peripheral control etc.

4.2.1 Information

In this page, the demo application shows the current status and basic information.

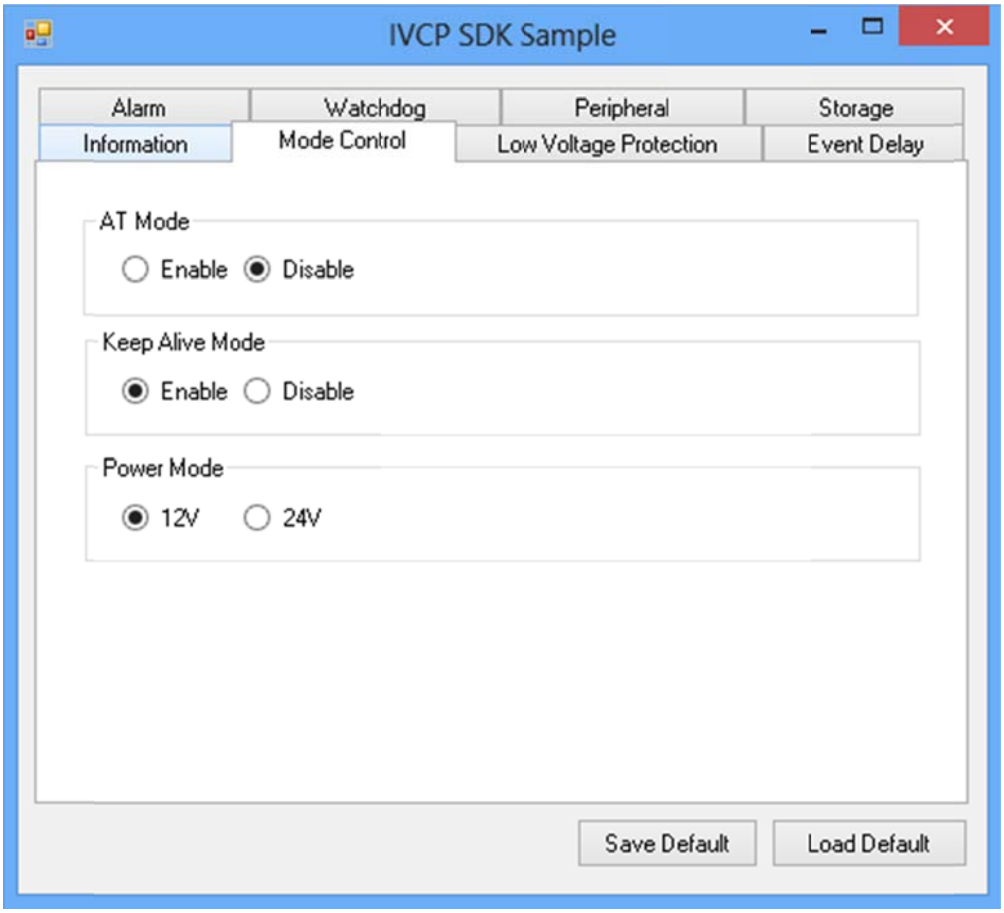

IVCP SDK Sample
Alarm
Watchdog
Peripheral
Storage
Information
Mode Control
Low Voltage Protection
Event Delay
SDK Version:
4.0.11.0
Firmware Version:
000.090
Platform Name:
ODMA0004-A02
Voltage:
12.35
Unit: volt
Ignition Status:
ON
Wakueup Source:
Keep a live Mode
CPU Temp:
45
Sys 1 Temp:
34
Sys 2 Temp:
32
Unit: C
Serial Number:
TPA0000001
Save Default
Load Default

4.2.2 Mode Control

In this page, you can toggle “AT Mode” and “Keep Alive Mode”.

Press “Save Default” to set current settings as default value of VPM(Vehicle Power Management) controller.

Press “Load Default” to load the default values.



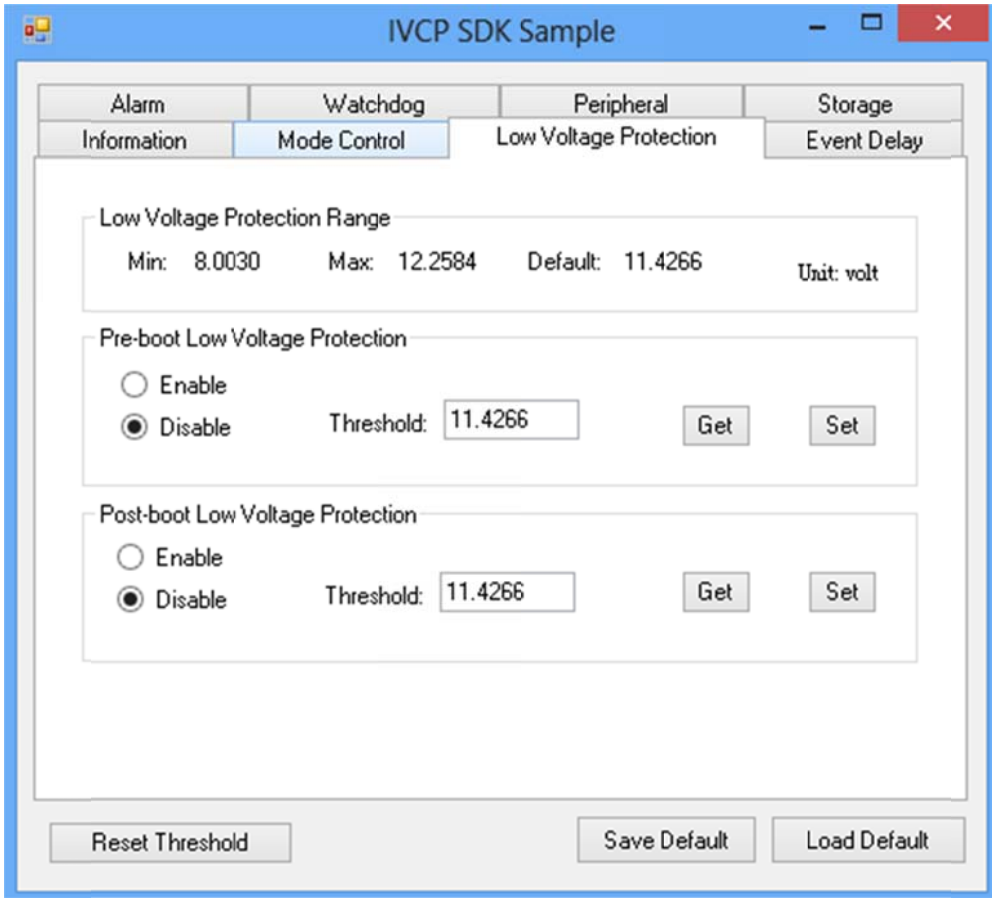
4.2.3 Low Voltage Protection

You can enable/disable and set the pre-boot/post-boot low voltage protection threshold in this page.

Press “Get” to get the current threshold value and Press “Set” to set the value.

Press “Save Default” to set current value as default value of VPM controller.

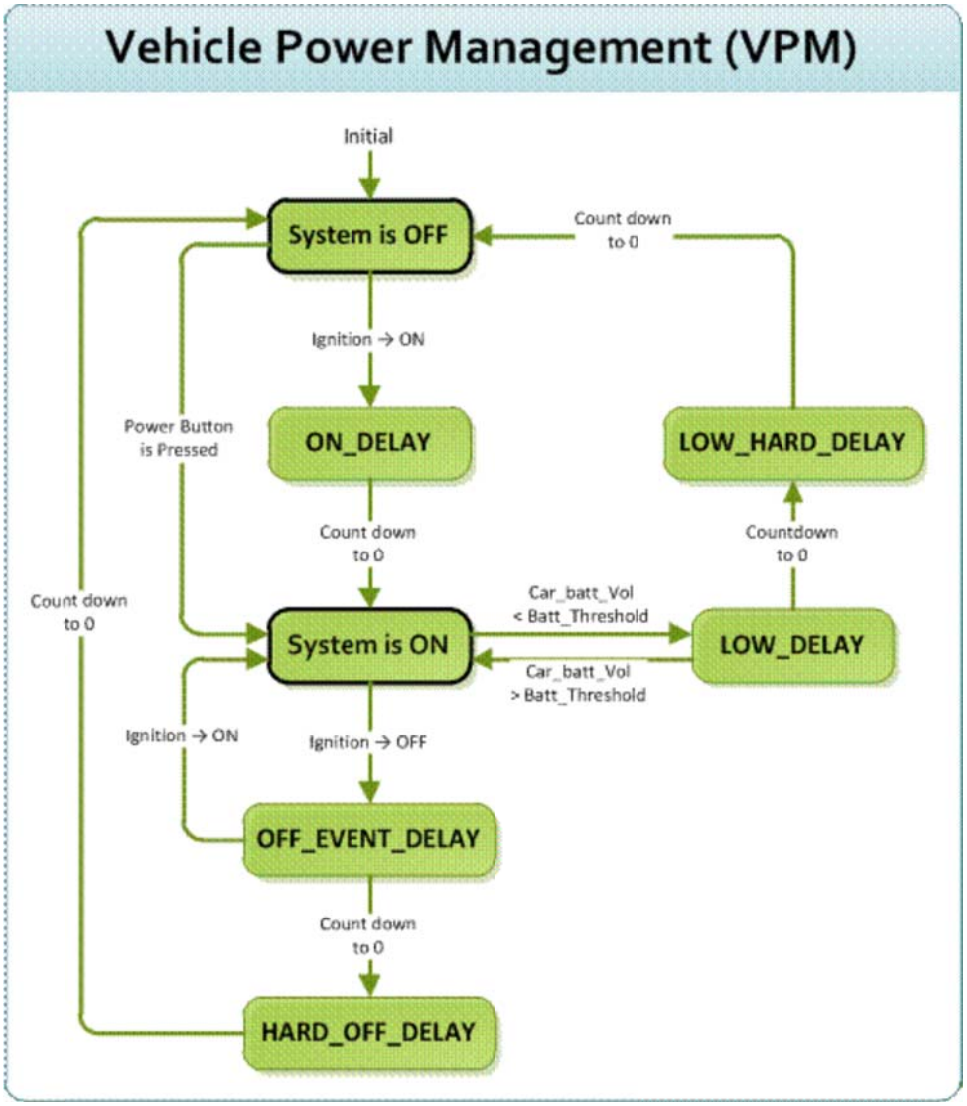
Press “Load Default” to load the stored default values.



4.2.4 Event Delay

4.2.4.1 Power control mechanism

IVU4000 provides VPM (Vehicle Power Management) features to fulfill specific requirements. The basic mechanism is shown in the following figure.



The power of system can be controlled with the following events:

- **Ignition ON**

The ignition signal can be used to power on or shutdown the system. When the system is in an OFF state and the ignition is turned ON, the VPM controller will countdown a delay period (ON_DELAY). Once it counts to zero, the system will be powered on.

- **Ignition OFF**

When the system is powered on and the ignition is turned off, the VPM controller will countdown a delay period(OFF_EVENT_DELAY). During this period, if the ignition

is switched back to ON, the VPM controller will stop countdown and reset the OFF_EVENT_DELAY. If OFF_EVENT_DELAY counts to zero, the VPM controller will trigger an power off event (i.e. power button press). System and applications which receives this event can do pre-defined tasks, like storing data and preparing to turn off the system.

After the event is triggered, VPM controller starts to countdown next delay period (HARD_OFF_DELAY). If HARD_OFF_DELAY counts to zero, the system power will be cut off abruptly to avoid unexpected

system hang. Aldo, once VPM controller enter the HARD_OFF_DELAY stage, the process cannot be reversed.

- **Low power protection**

To avoid draining power, low-power protection is to ensure that there is enough power

to start the machine. When the system is ON, the VPM controller will monitor the power voltage. If the voltage is lower than the programmable threshold (LOW_THRESHOLD), the VPM controller will start to countdown a delay(LOW_DELAY). During the stage of LOW_DELAY countdown, if voltage

goes back above LOW_THRESHOLD, the VPM controller will stop counting down and exit.

If LOW_DELAY counts to zero, the VPM controller will trigger an power off event (i.e. power button press) and starts to countdown next delay period (LOW_ HARD_DELAY). If LOW_ HARD_DELAY counts to zero, the system power will be cut off abruptly to avoid draining the power.

4.2.4.2 Demonstration

You can set the delay and hard delay time of the low voltage event and ignition event.

Low Voltage Event

- **Delay:**
  The delay time before VPM trigger a power off event (i.e. power button press).
- **Hard Delay:**
  The delay time counted down after a power off event is triggered. VPM will force power off the machine if the hard delay time is counted down to zero.

Ignition Event

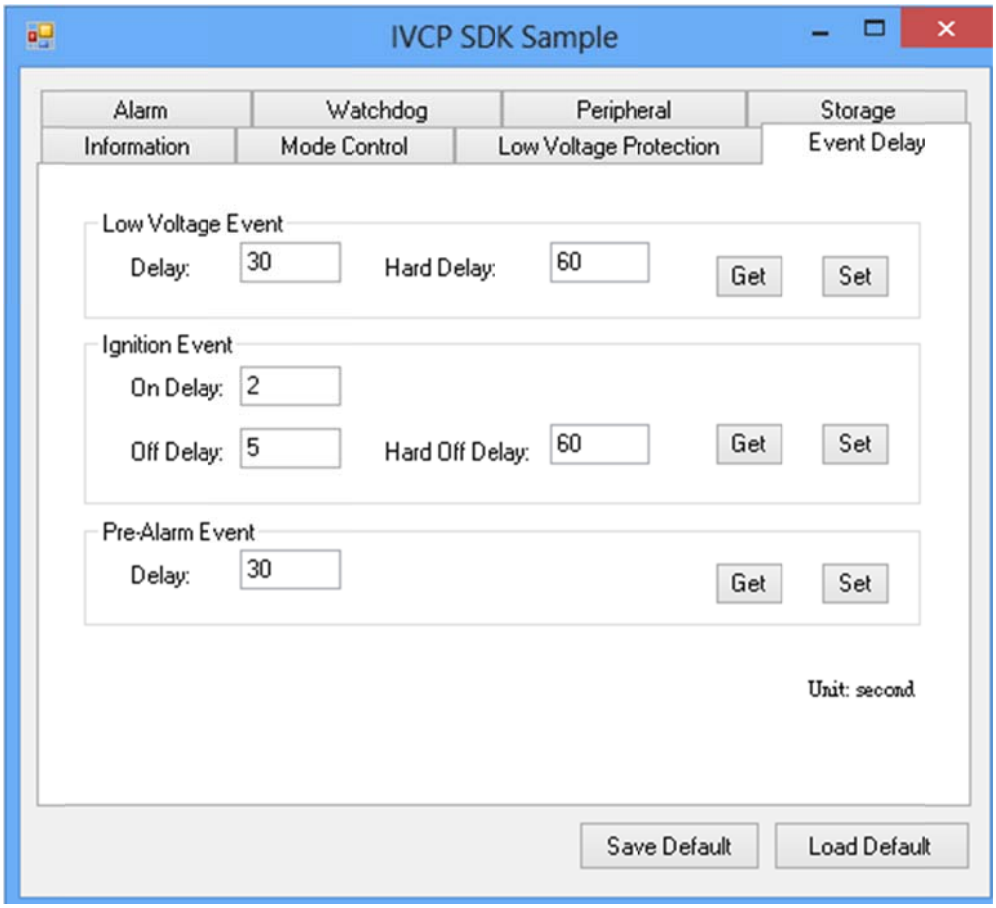
- **On Delay:**
  The delay time before VPM trigger an power on event (power on the machine).
- **Off Delay:**
  The delay time before VPM trigger an power off event (i.e. power button press).
- **Hard Off Delay:**
  The delay time counted after an power off event is triggered. VPM will force power off the machine if the hard delay time is counted down to zero.

Pre-Alarm Event

- **Delay: TBC**

Press “Save Default” to set current value as default value.

Press “Load Default” to load the stored default values.

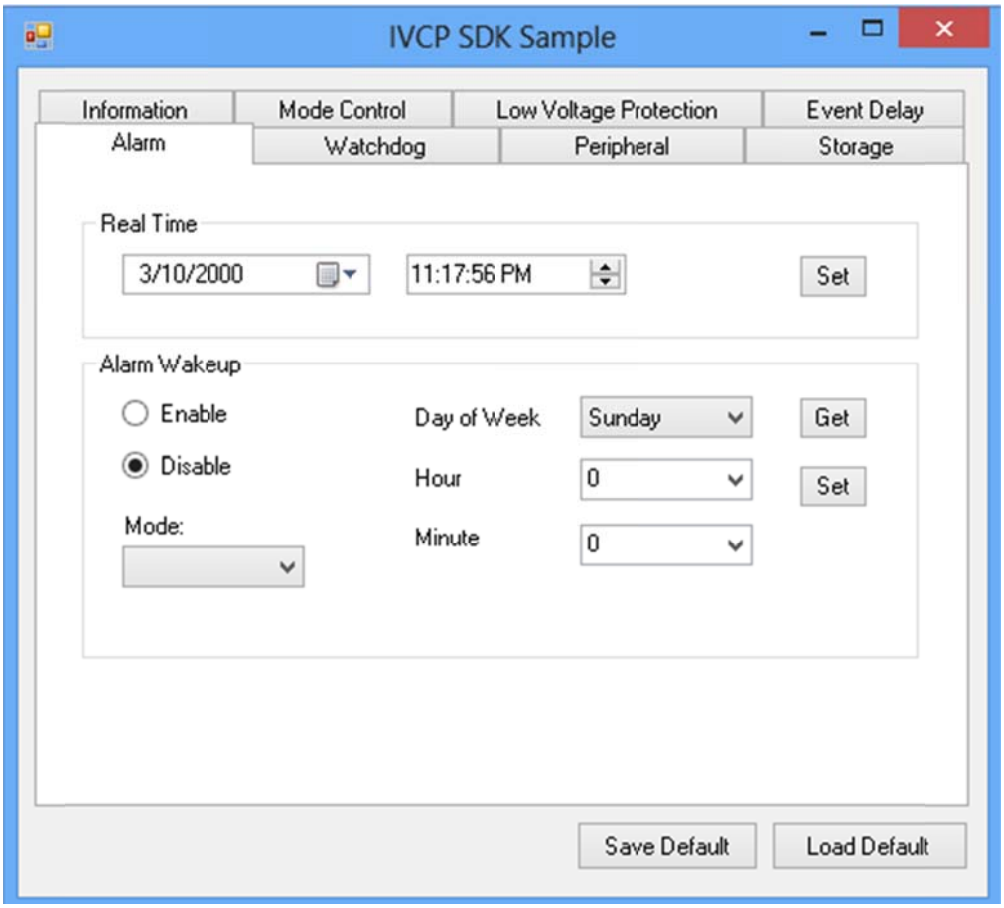


4.2.5 Alarm

In this page, you can set the time and set alarm wakeup time to VPM controller and enable/disable the alarm as a system wakeup source.

Press “Save Default” to set current value as default value.

Press “Load Default” to load the stored default values.



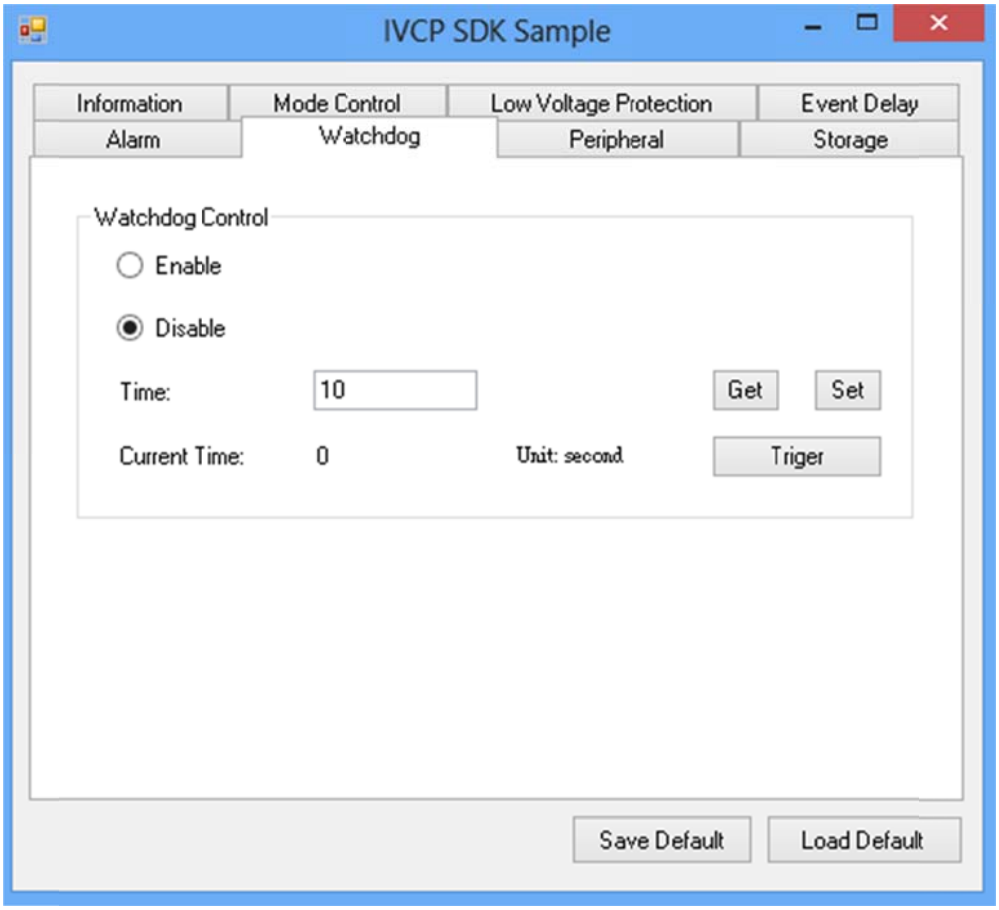
4.2.6 Watchdog

In this page, you can enable/disable the watchdog function and set the count time (second) for the watchdog to avoid unexpected system hang..

When watchdog is enabled, the VPM controller will start counting down the time set for watchdog and power off the machine if it is counted to 0. You can press “Trigger” button while watchdog is counting to reset the count down time and keep it counting.

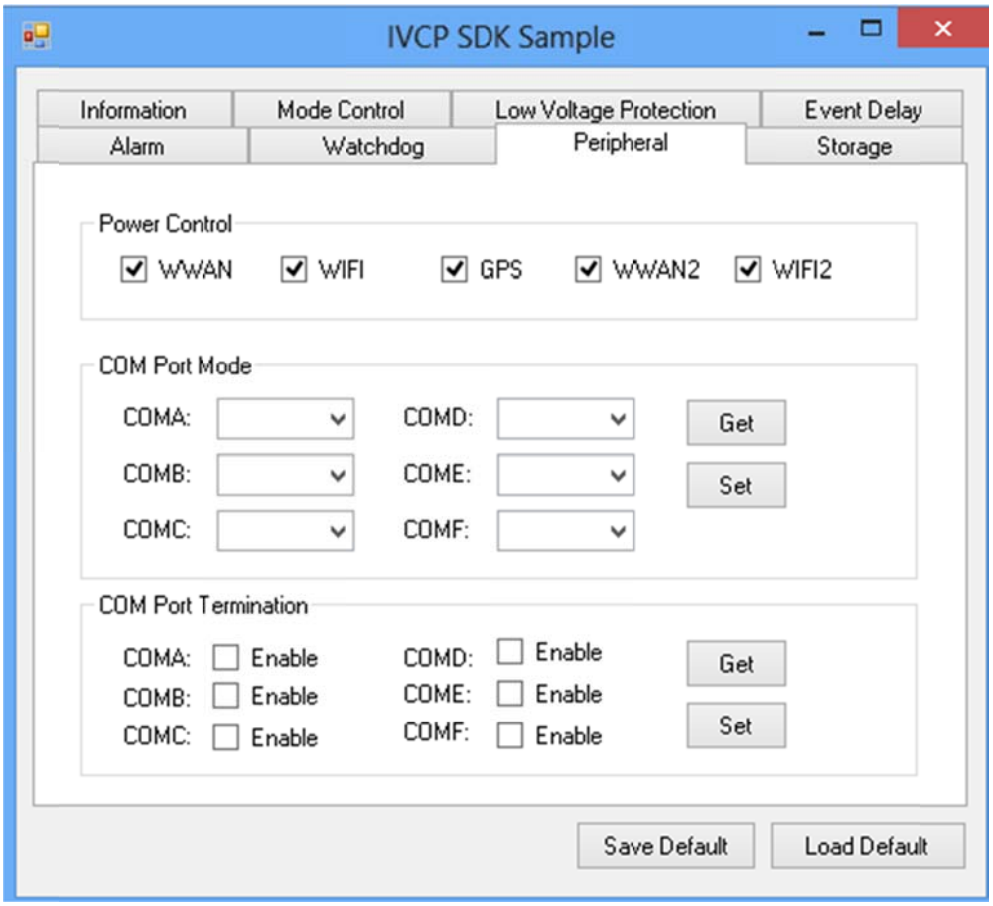
Press “Save Default” to set current value as default value.

Press “Load Default” to load the stored default values.



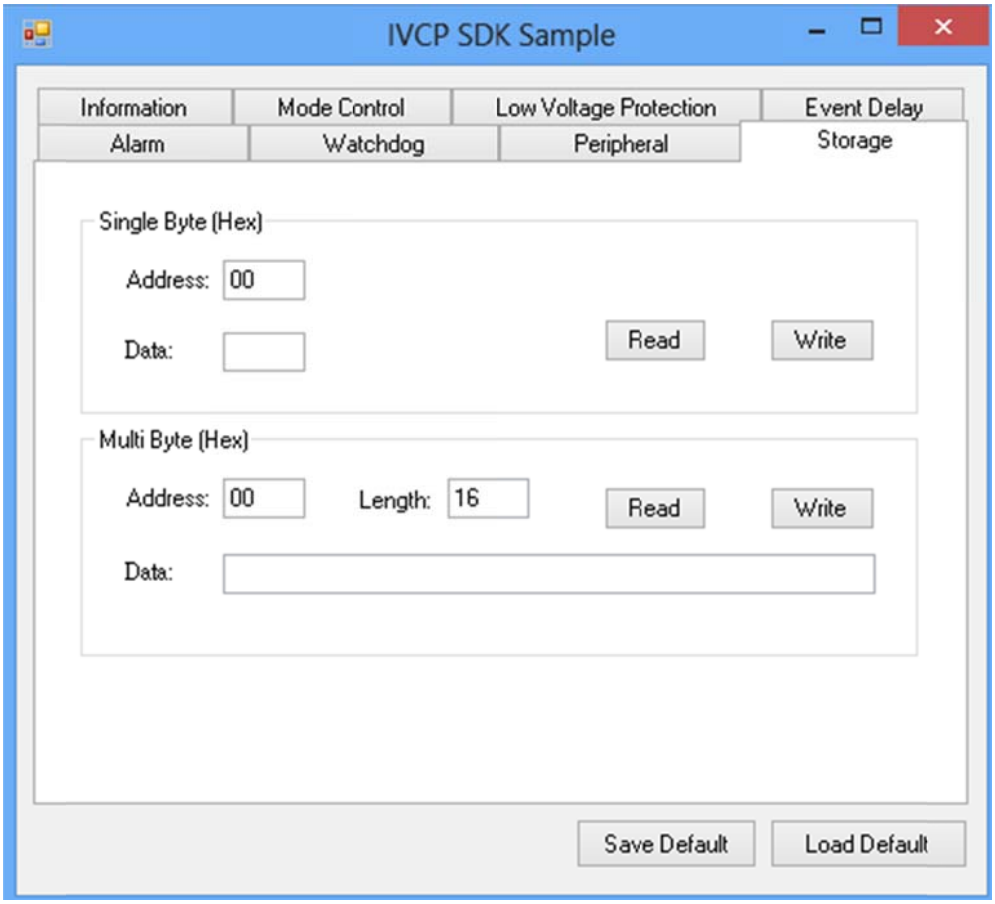
4.2.7 Peripheral

In this page, you can enable/disable the peripheral functions such as WiFi/WWAN/GPS and also configure each serial port functions such as RS-232/RS-485/RS-422 and enable/disable its termination.



4.2.8 Storage

In this page, you can save/load arbitrary data to the private storage (256 byte) on the machine.



4.3 VCIL Demonstration

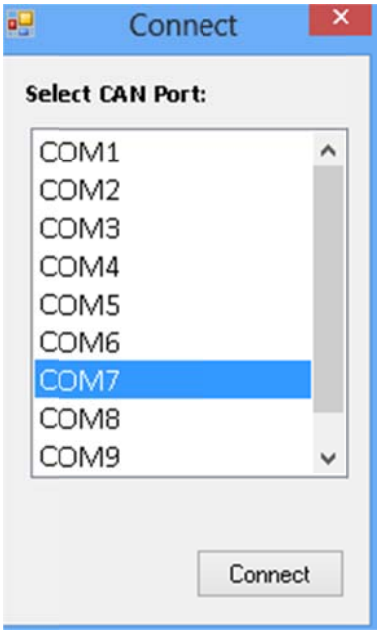
The VCIL demonstration application demonstrate the usage of MRM VCIL (Vehicle Communication Interface Layer) API which allow user to access vehicle protocol easily.

4.3.1 Port selection

When first open VCIL demonstration app, you will see a port selection windows as following.

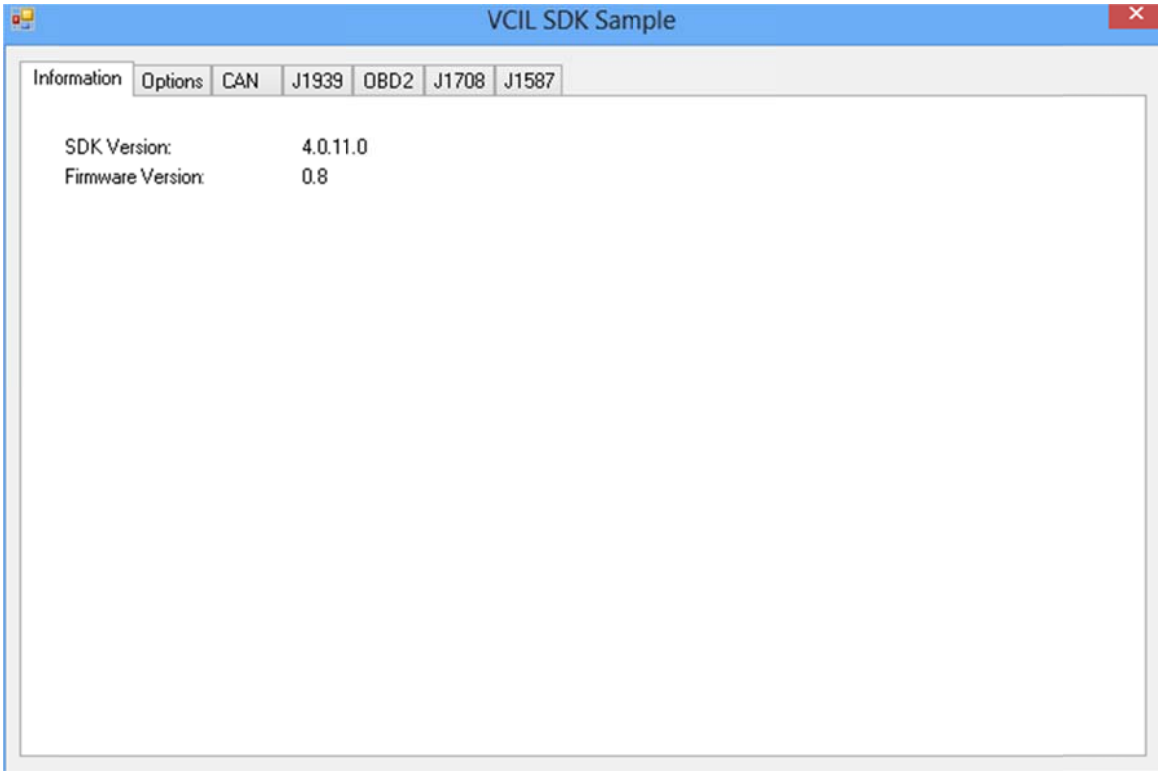
Please select the VCIL port path and press **Connect** button.

VCIL port path in different platforms have different nodes. The common path at Window is **COM7**.


Connect
Select CAN Port:
COM1
COM2
COM3
COM4
COM5
COM6
COM7
COM8
COM9
Connect

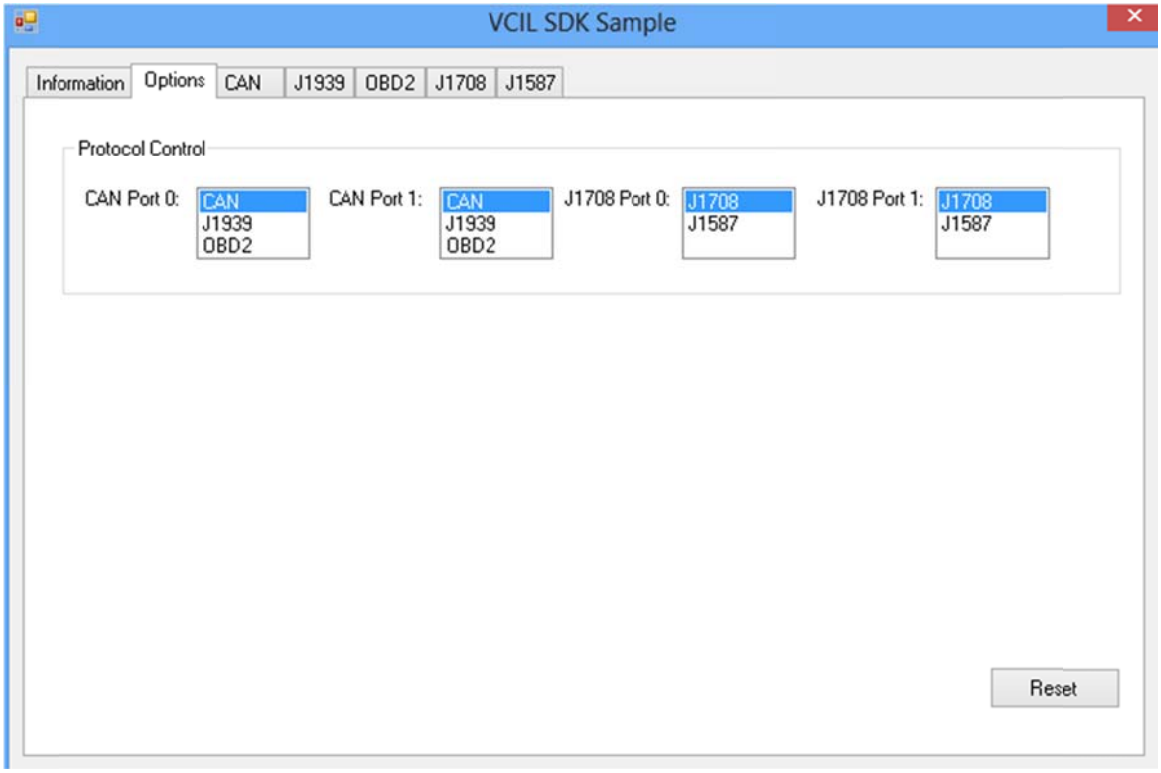
4.3.2 Information

In this page, the demo application shows the current status and basic information.



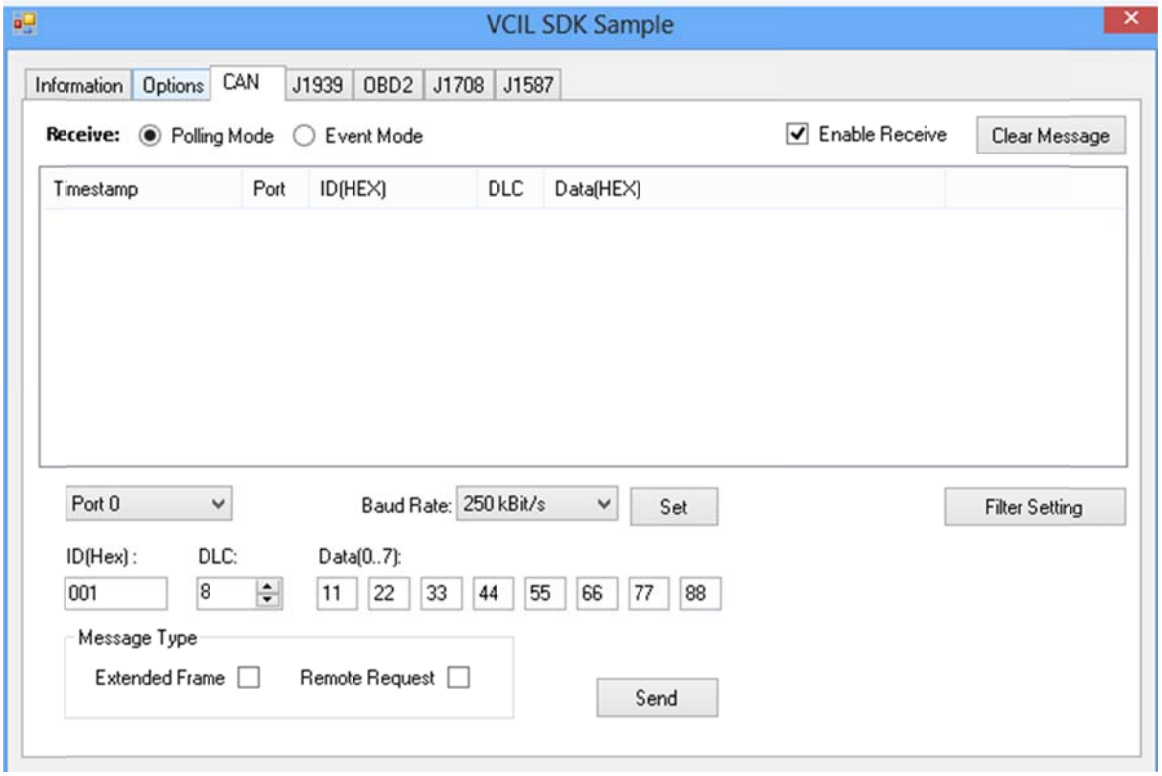
4.3.3 Option

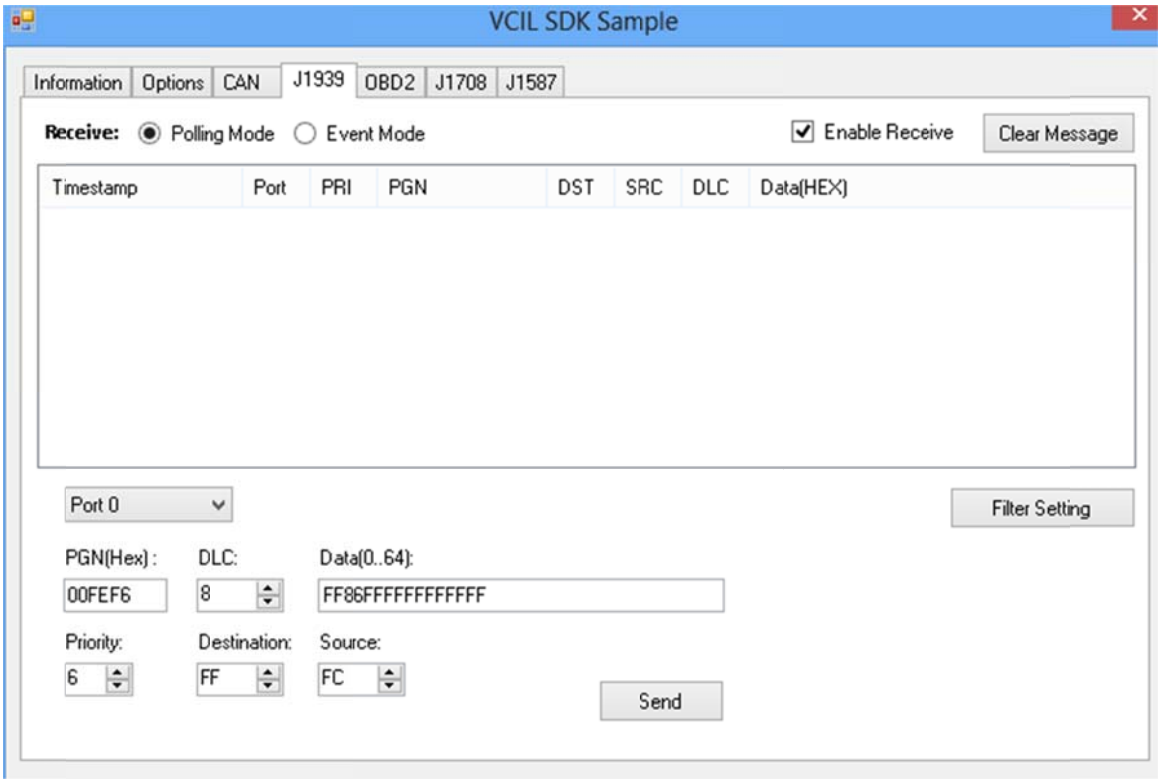
In this page, you can the set the protocol for each port.

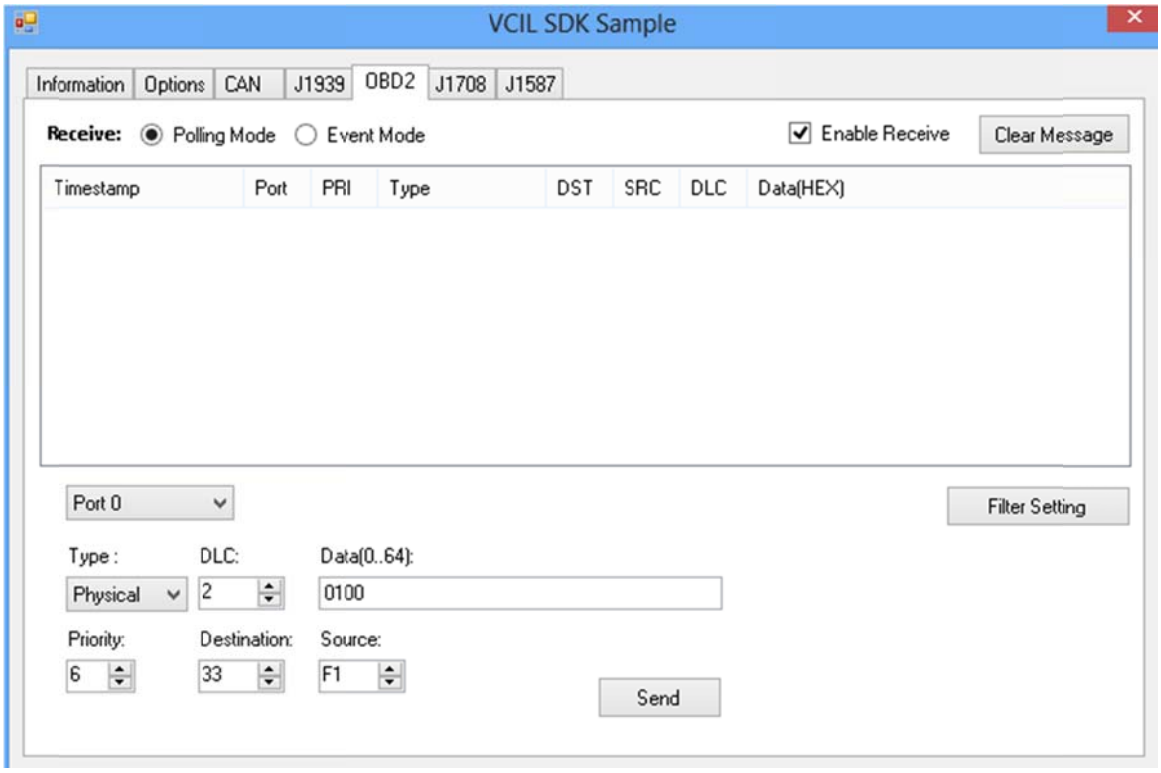


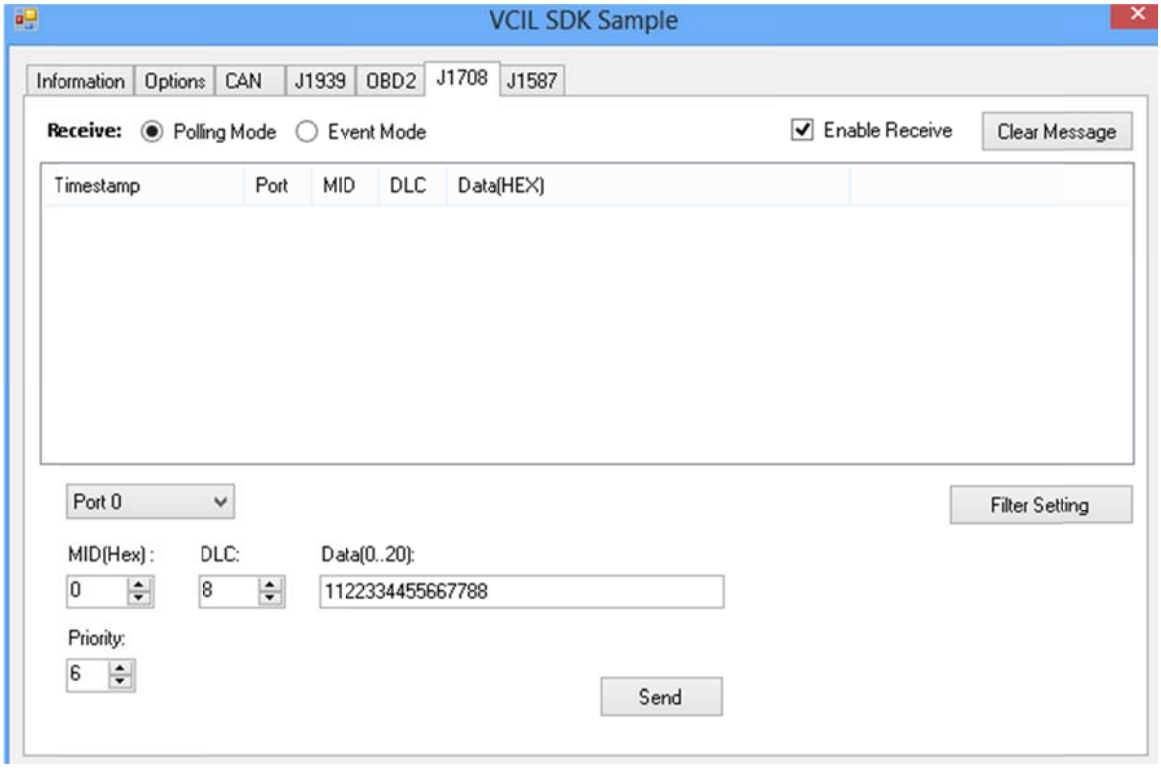
4.3.4 CAN / J1939 / OBD2 / J1708 / J1587

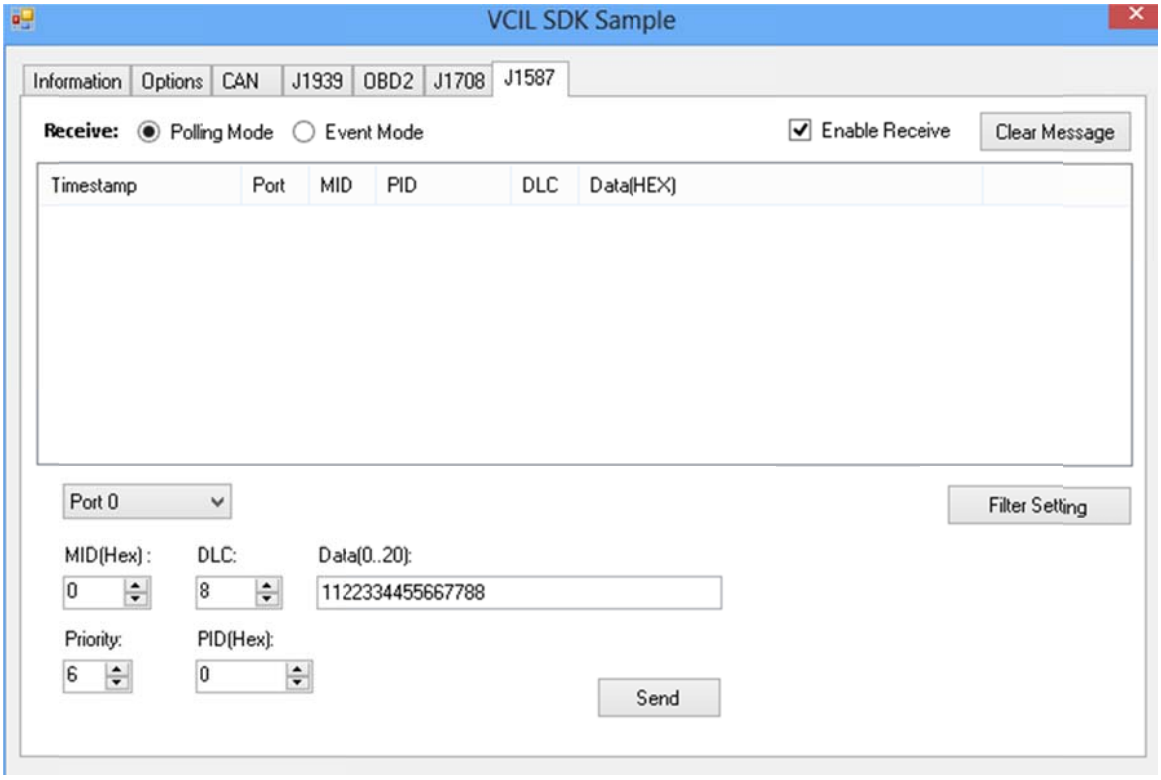
To use CAN / J1939 / OBD2 / J1708 / J1587 protocol on each port, please click on corresponding tab to switch to the page of specific protocol, then you can send/read message on specific port by setting the detail items.






VCIL SDK Sample
Information
Options
CAN
J1939
OBD2
J1708
J1587
Receive:
Polling Mode
Event Mode
Enable Receive
Clear Message
Timestamp
Port
PRI
Type
DST
SRC
DLC
Data(HEX)
Port 0
Filter Setting
Type :
DLC:
Data(0..64):
Physical
2
0100
Priority:
Destination:
Source:
6
33
F1
Send


VCIL SDK Sample
Information
Options
CAN
J1939
OBD2
J1708
J1587
Receive:
Polling Mode
Event Mode
Enable Receive
Clear Message
Timestamp
Port
MID
DLC
Data(HEX)
Port 0
Filter Setting
MID(Hex) :
DLC:
Data(0..20):
0
8
1122334455667788
Priority:
6
Send

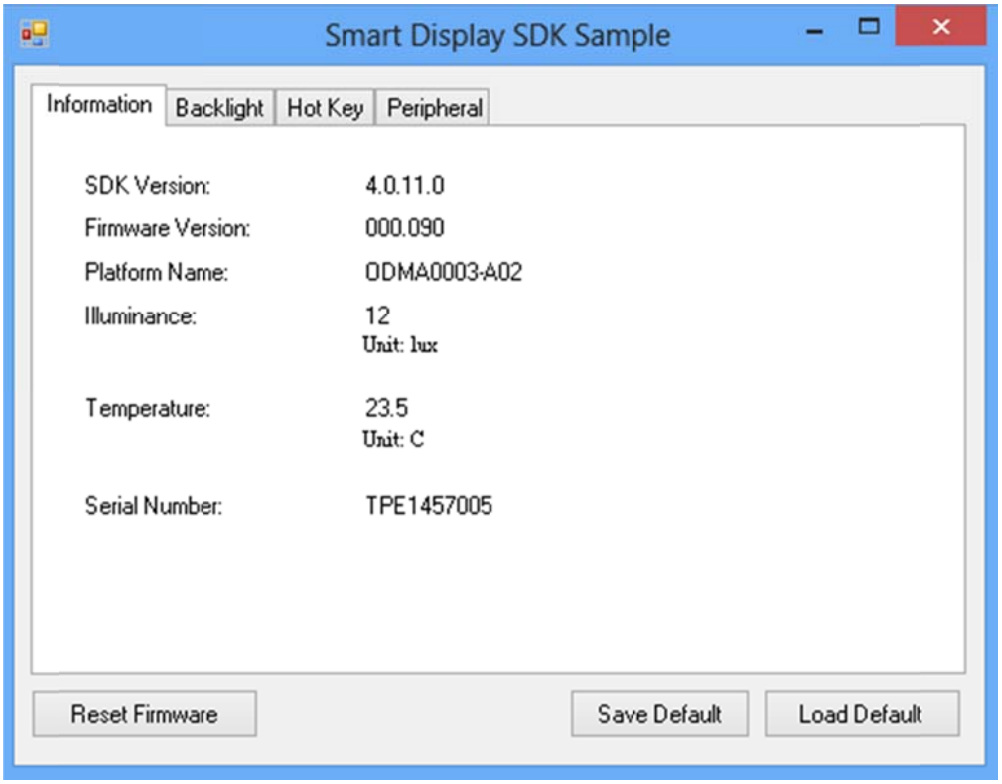


4.4 Smart Display Demonstration

The smart display demonstration application demonstrate the usage of MRM SDP API which is a lightweight interface between OS (Operating system) and SDP (Smart Display Co-Processor) allow user to control the font-end display, backlight setting, hotkey, peripheral control, etc.

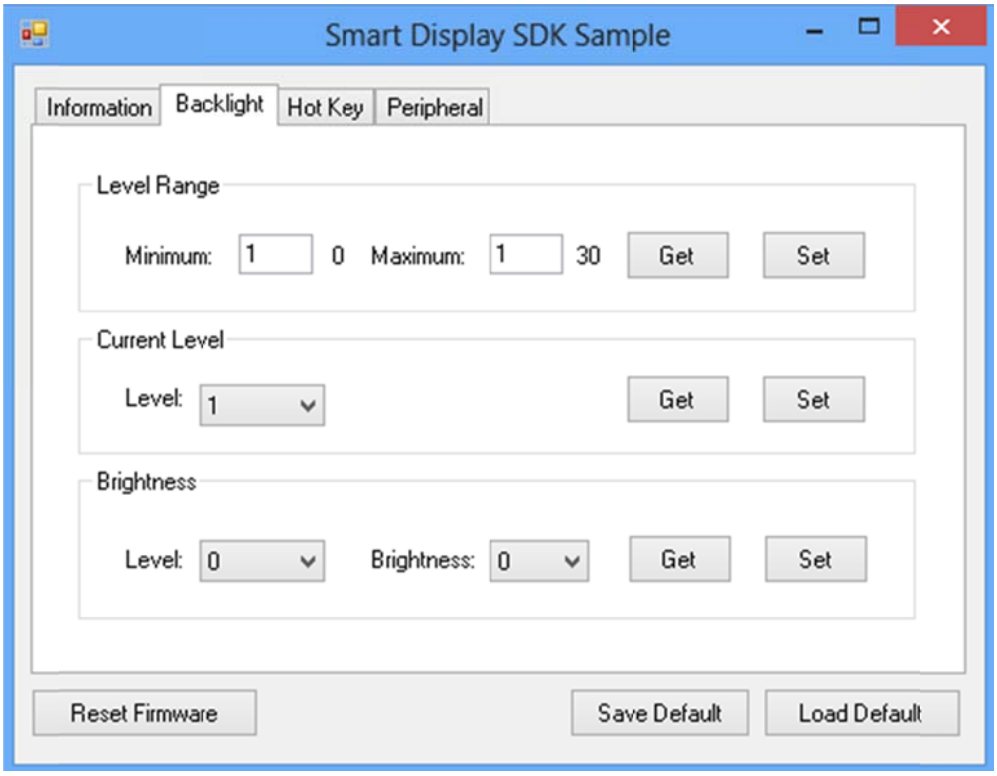
4.4.1 Information

In this page, the demo application shows the current status and basic information.


Smart Display SDK Sample
Information
Backlight
Hot Key
Peripheral
SDK Version:
4.0.11.0
Firmware Version:
000.090
Platform Name:
ODMA0003-A02
Illuminance:
12
Unit: lux
Temperature:
23.5
Unit: C
Serial Number:
TPE1457005
Reset Firmware
Save Default
Load Default

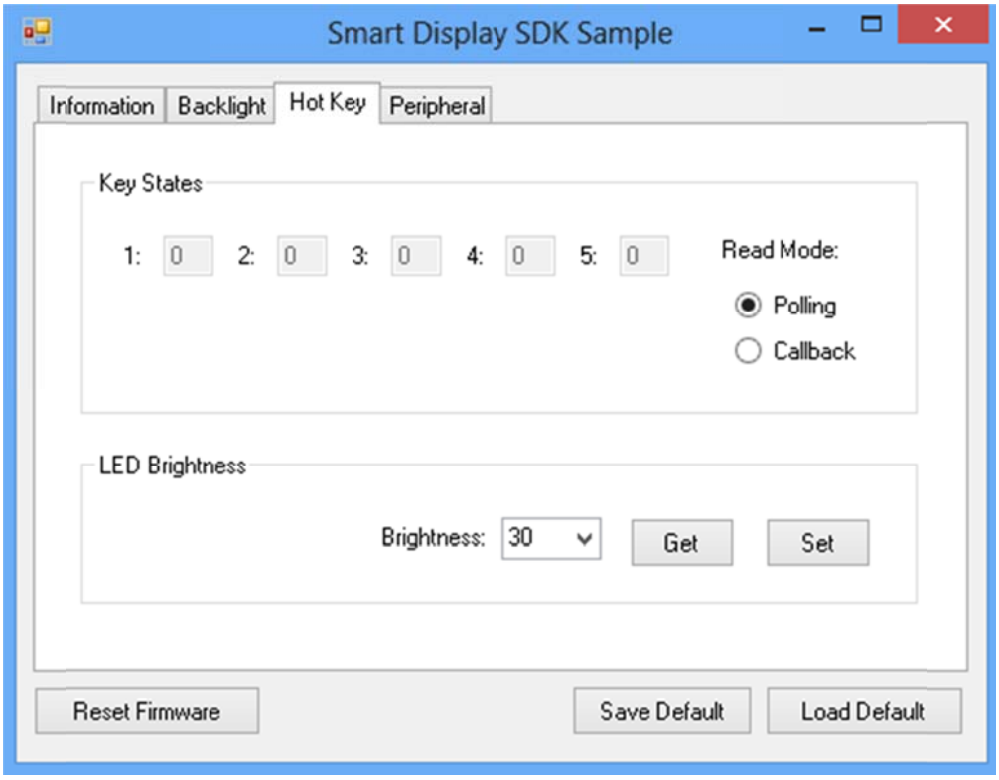
4.4.2 Backlight

In this page, you can set the levels for backlight, the brightness for each level and the current brightness level.



4.4.3 Hot key

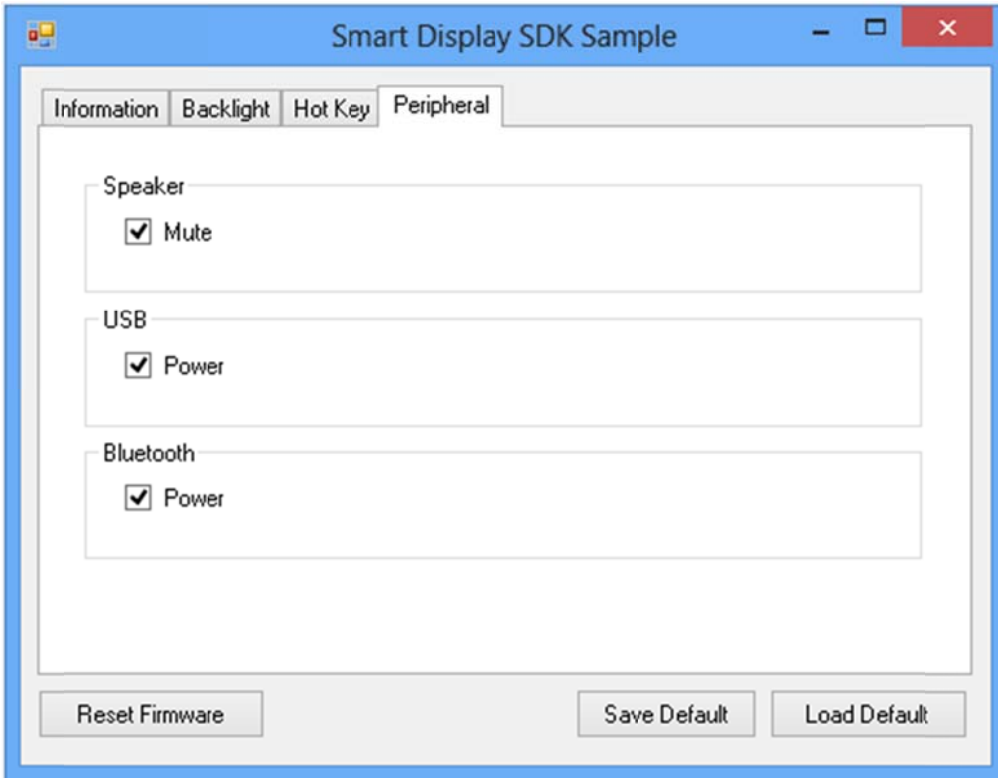
In this page, you can monitor the press state of each hot key and set the LED brightness of the hot keys.



4.4.4 Peripheral

In this page, you can control the status of peripheral devices.

- **Speaker**
  Enable/disable speaker volume.
- **USB**
  Enable/disable power of Rear-end USB port.
- Bluetooth
  Enable/disable power of the Bluetooth function built in MDT system.



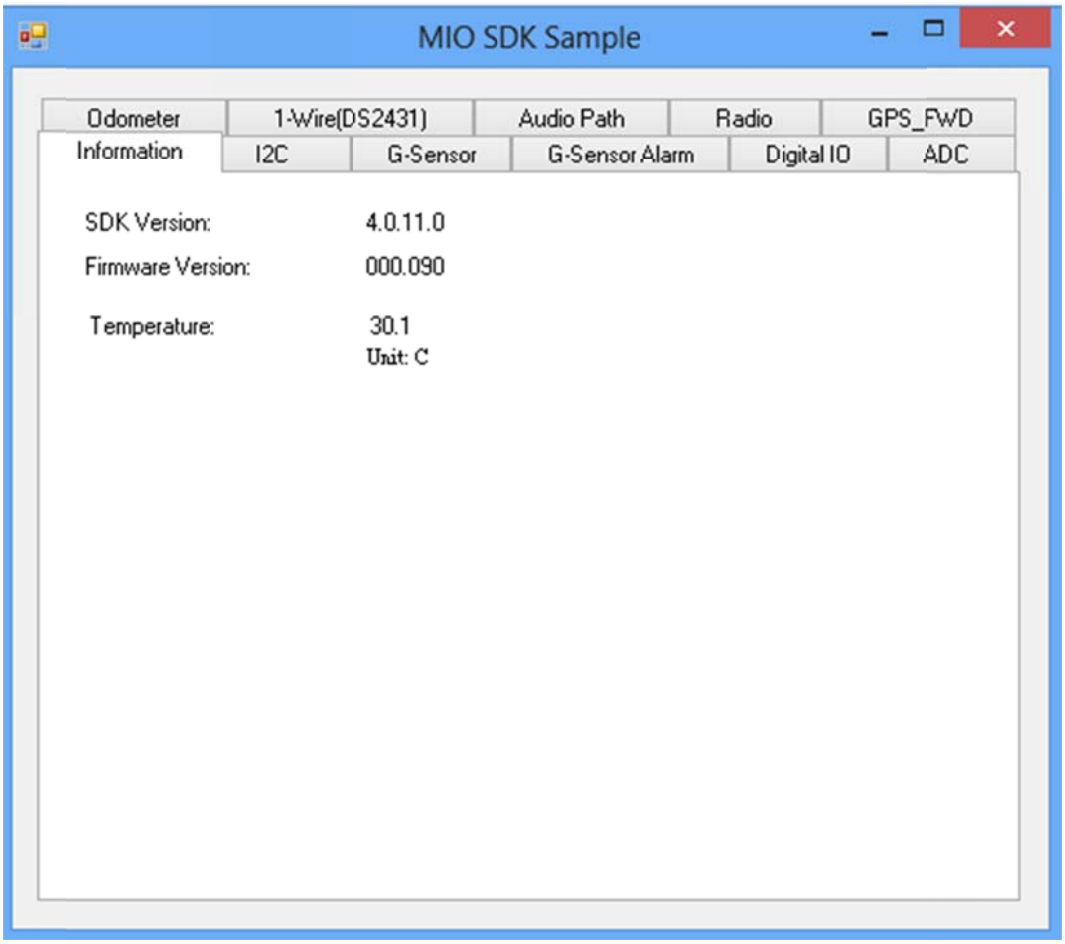
4.5 Multi-purpose Input Output Demonstration

The MIO (Multi-purpose Input Output) demonstration application demonstrate the usage of MRM MIOAPI which is a lightweight interface between OS (Operating system) and MIO module allows user to easily control Multi-purpose Input Output setting (Ex: Odometer, I2C, Audio, Radio, GPS and etc.).

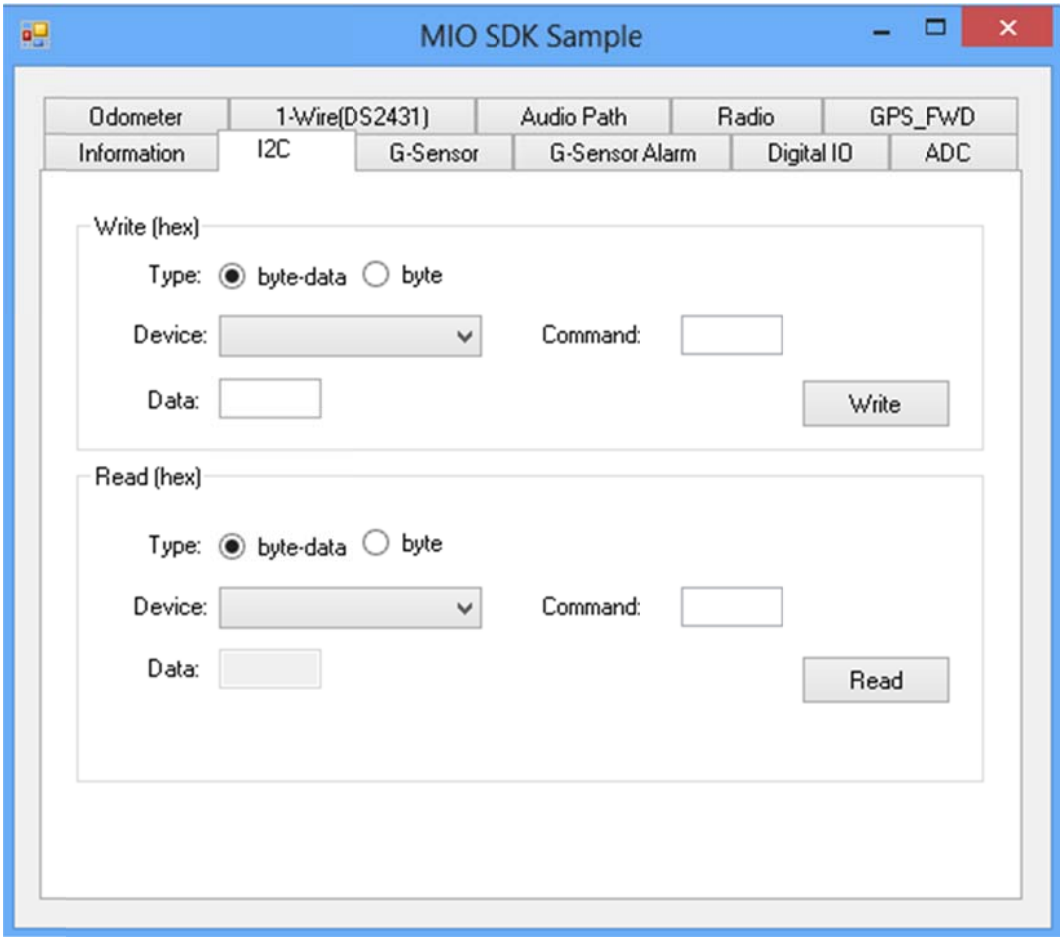
~~The GPS demonstration application demonstrate the usage of MRM GPS API which is a lightweight interface between OS (Operating system) and GPS module allows user to easily get GPS information.~~

4.5.1 Information

In this page, the demo application shows the current status and basic information.

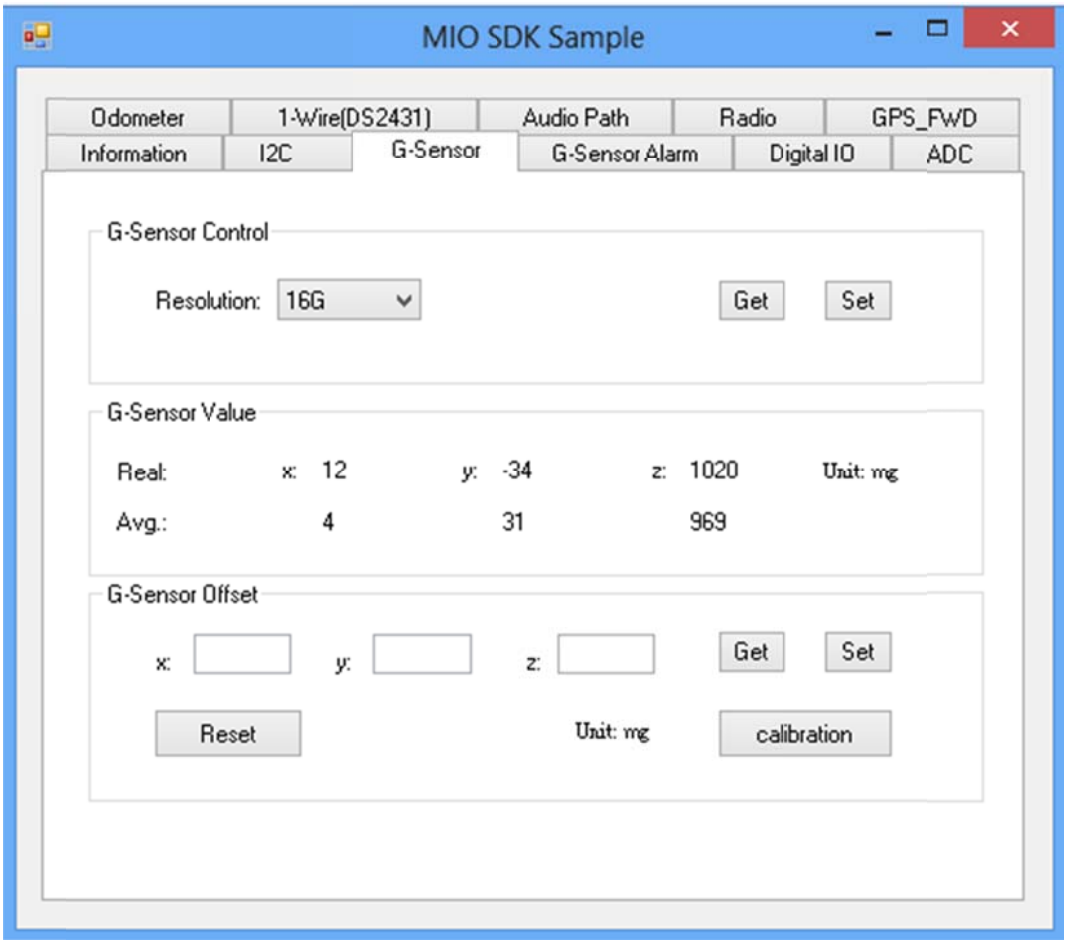


4.5.2 I2C



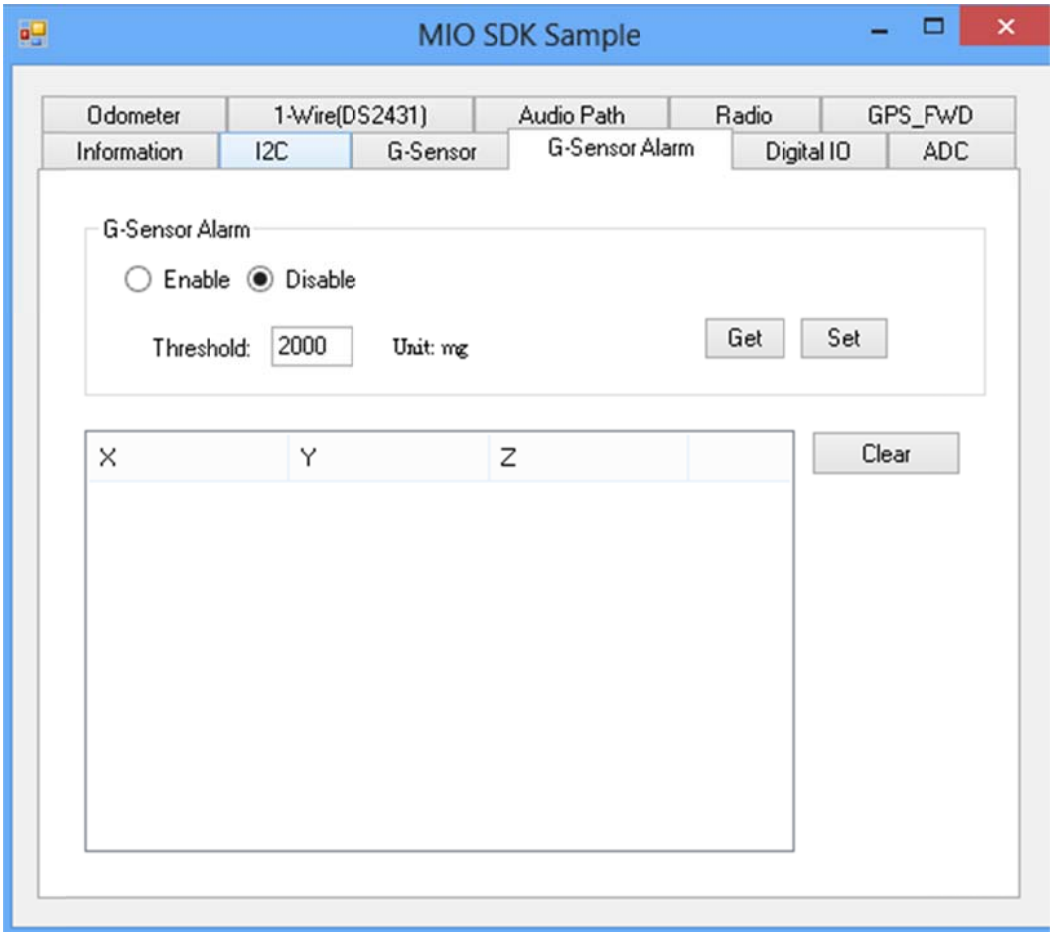
4.5.3 G-Sensor

In this page, you can et resolution and get value of G-sensor



4.5.4 G-Sensor Alarm

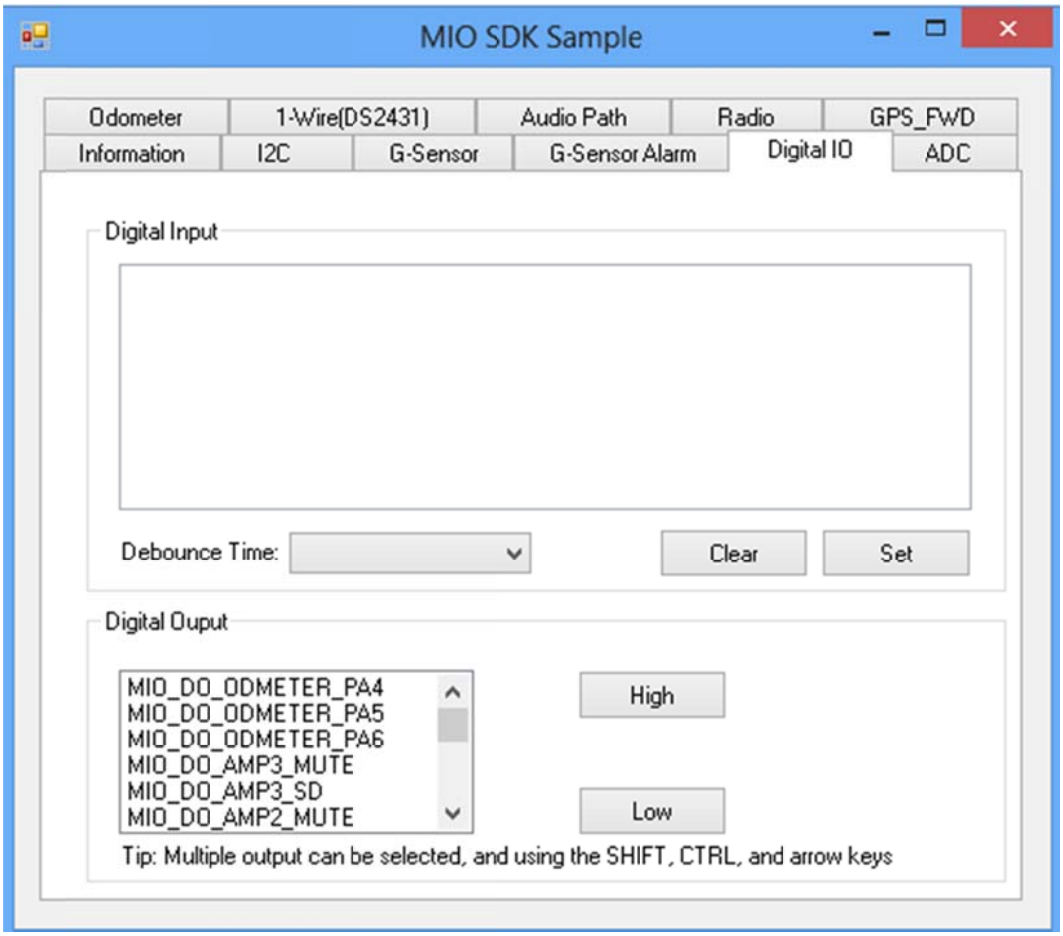
In this page, you can enable/disable the G-sensor Alarm function and set the threshold to trigger G-sensor alarm (2000mg to 16000mg). When you enable the alarm function, you can see the alarm value when the target machine receives greater than alarm threshold.



4.5.5 Digital IO

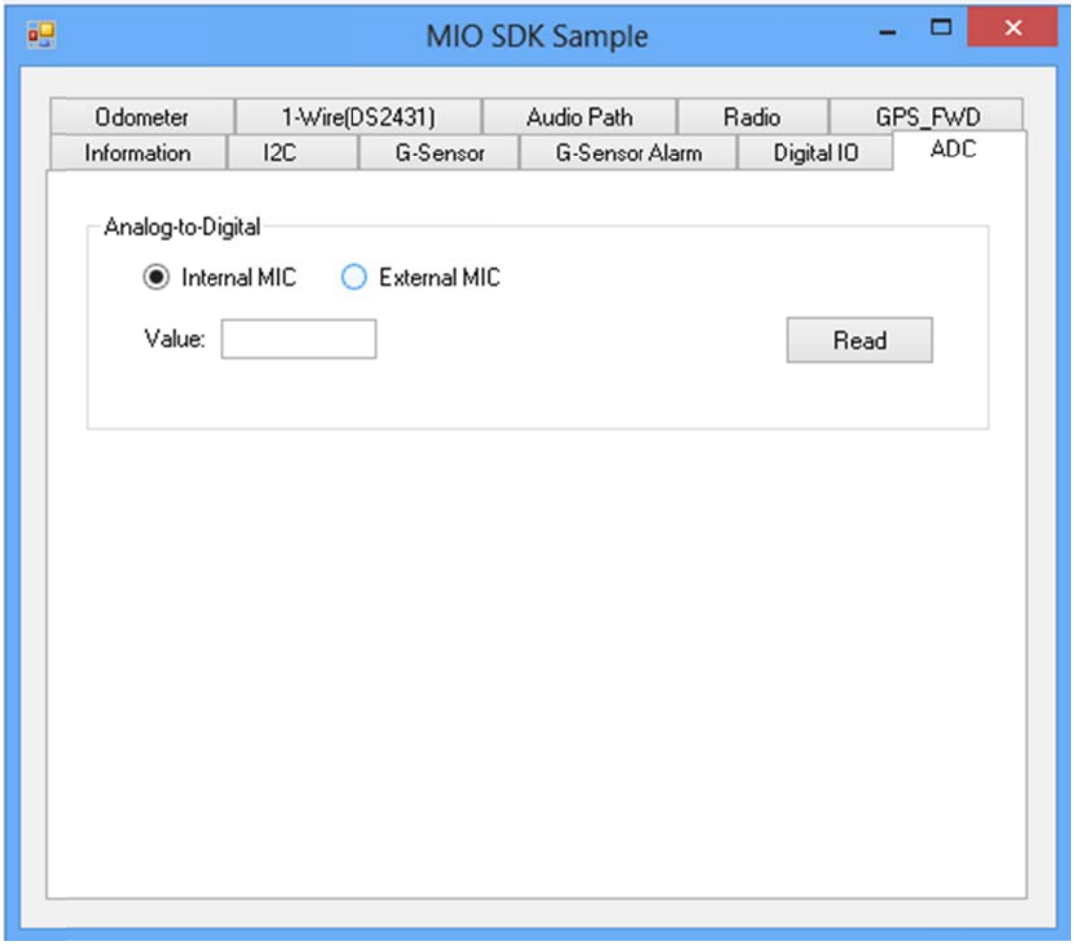
In this page, you can monitor the digital input status and enable/disable digital output.

DI1 default is normal digital input and can be set as dedicated reverse signal input.



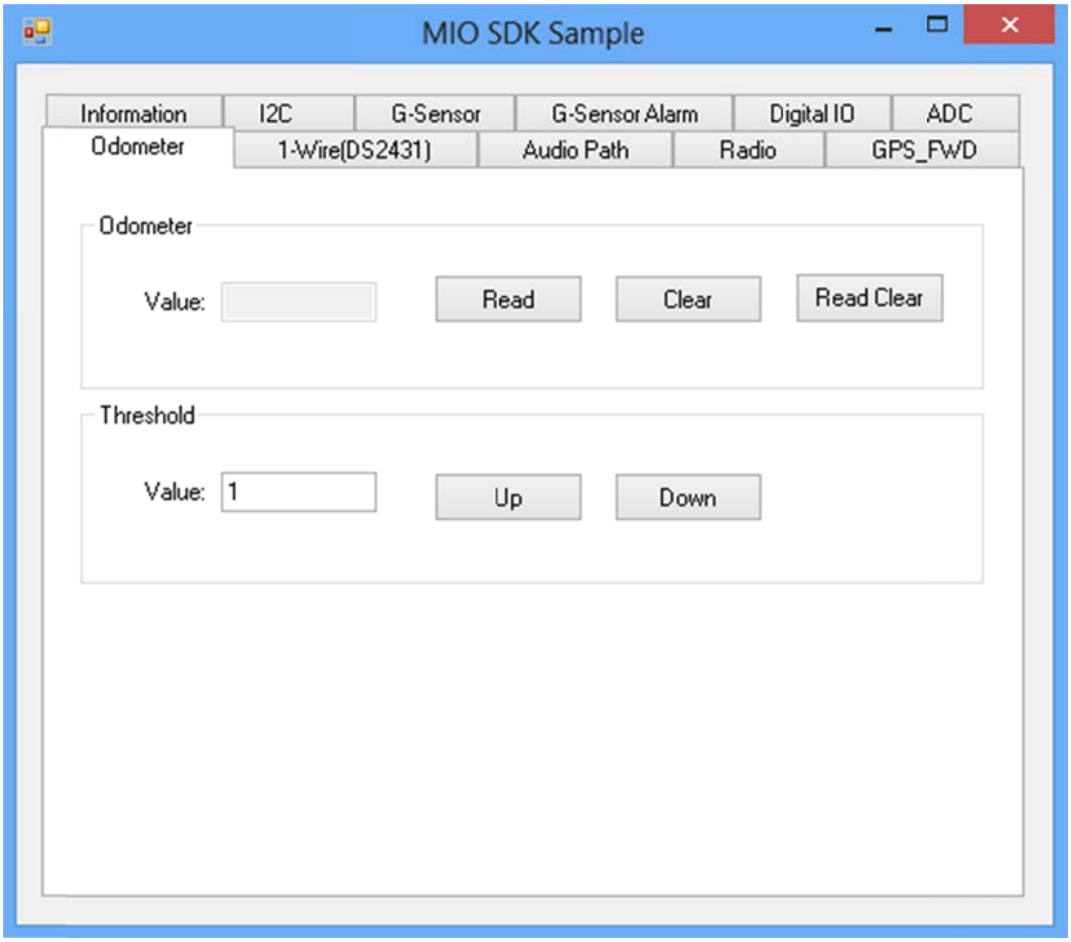
4.5.6 ADC

In this page, you can read the specific analog to digital signal value of internal MIC or External MIC..



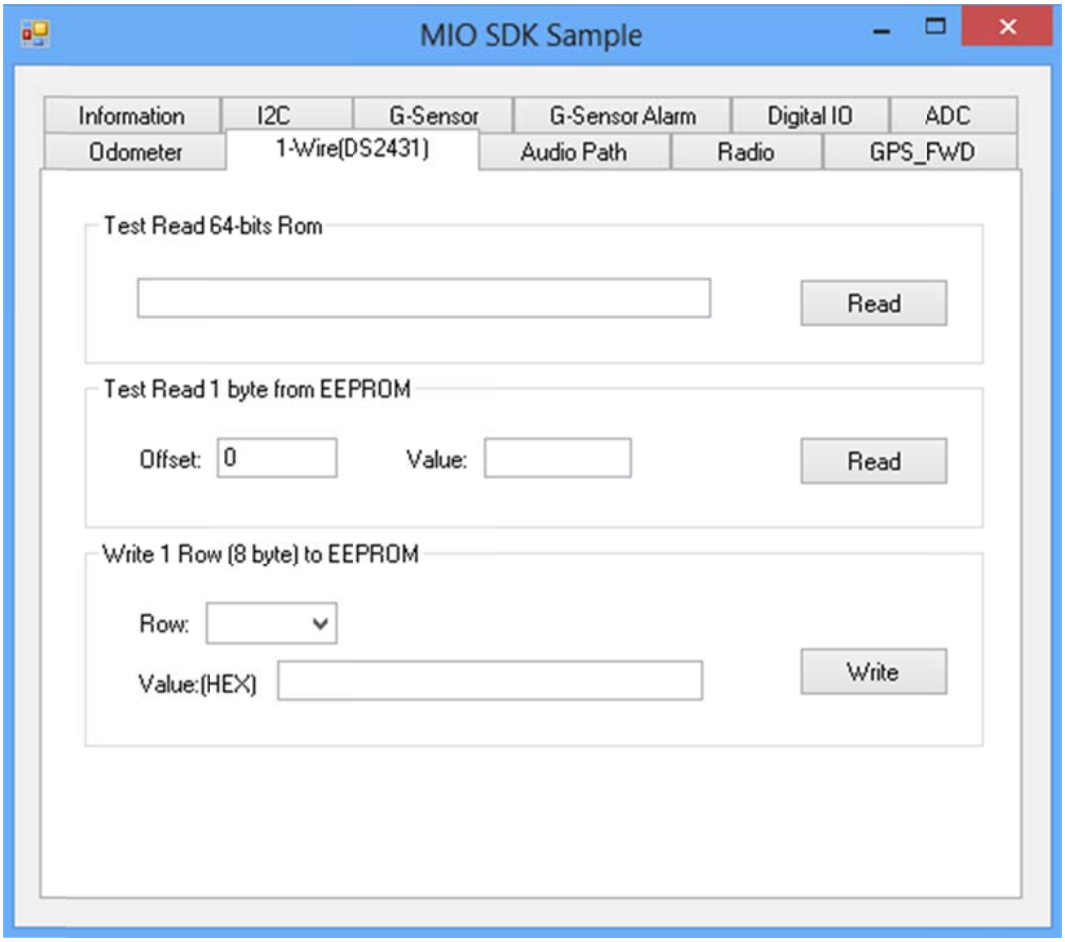
4.5.7 Odometer

In this page, you can read and clear the odometer value. In addition, you also can set the odometer's threshold value for controlling vehicle status.



4.5.8 1-Wire (DS2431)

In this page, you can read/write 1_wire EEPROM (DS2431) ID and EEPROM data.

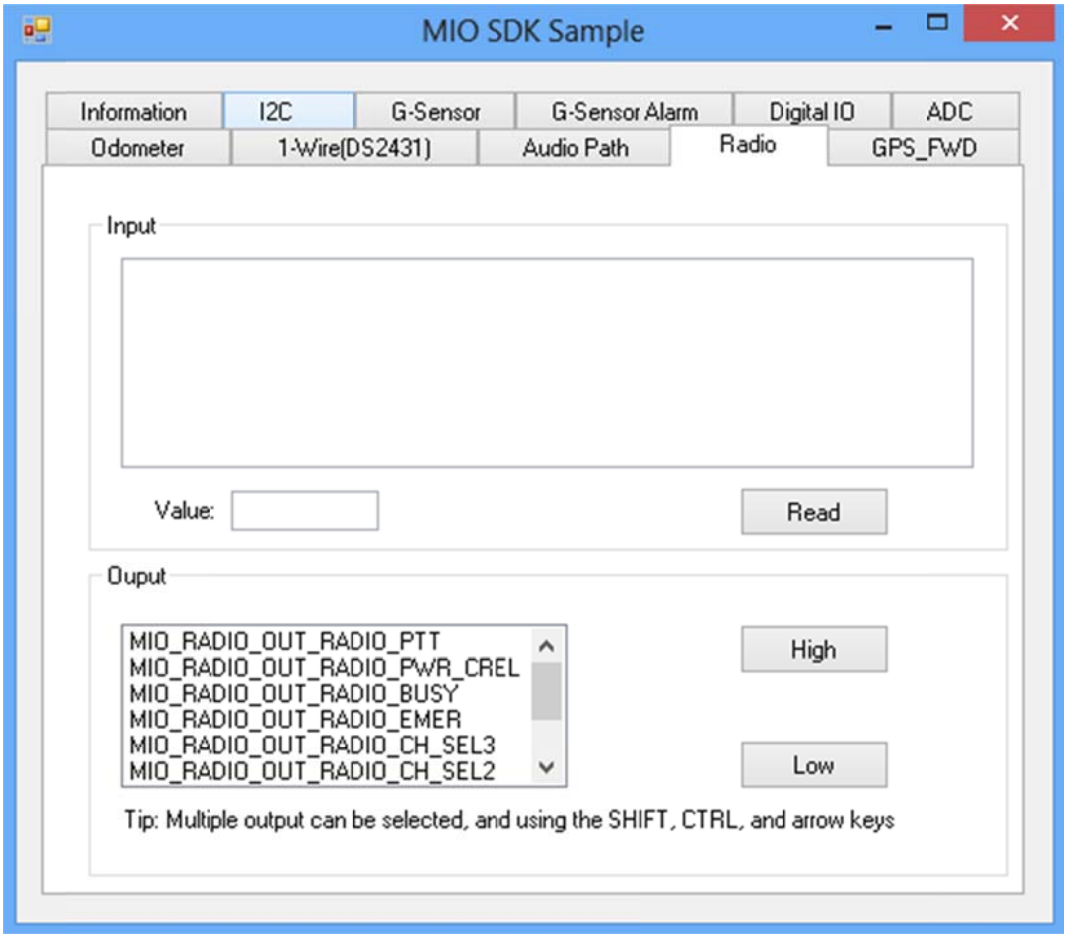


4.5.9 Audio Path

In this page, you can set the audio value for each audio path, and check the behavior for each setting.

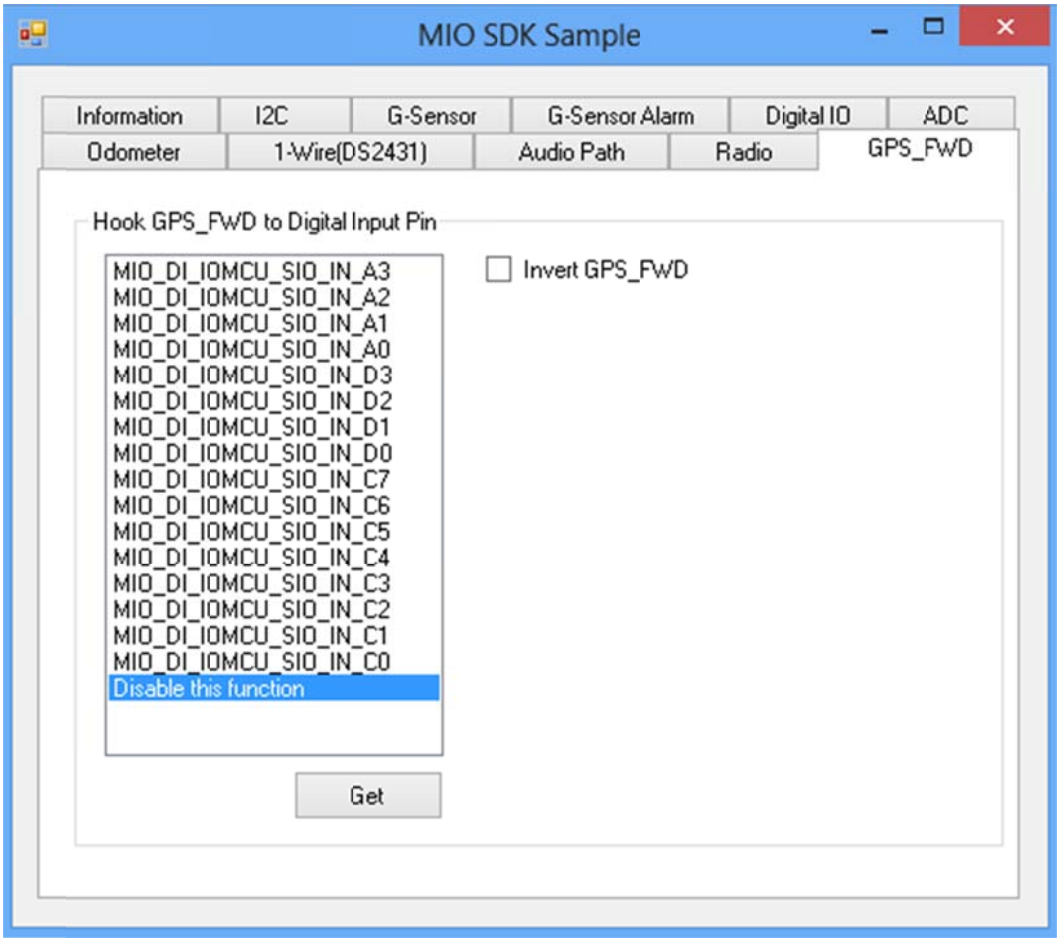
4.5.10 Radio

In this page, you can read/set the radio I/O and GPS FWD functions.



4.5.11 GPS_FWD

In this page, you can set the specific DI pin mapping to GPS FWD, this will link GPS FWD signal to vehicle by that specific DI pin.


MIO SDK Sample
Information
I2C
G-Sensor
G-Sensor Alarm
Digital IO
ADC
Odometer
1-Wire(DS2431)
Audio Path
Radio
GPS_FWD
Hook GPS_FWD to Digital Input Pin
MIO_DI_IOMCU_SIO_IN_A3
MIO_DI_IOMCU_SIO_IN_A2
MIO_DI_IOMCU_SIO_IN_A1
MIO_DI_IOMCU_SIO_IN_A0
MIO_DI_IOMCU_SIO_IN_D3
MIO_DI_IOMCU_SIO_IN_D2
MIO_DI_IOMCU_SIO_IN_D1
MIO_DI_IOMCU_SIO_IN_D0
MIO_DI_IOMCU_SIO_IN_C7
MIO_DI_IOMCU_SIO_IN_C6
MIO_DI_IOMCU_SIO_IN_C5
MIO_DI_IOMCU_SIO_IN_C4
MIO_DI_IOMCU_SIO_IN_C3
MIO_DI_IOMCU_SIO_IN_C2
MIO_DI_IOMCU_SIO_IN_C1
MIO_DI_IOMCU_SIO_IN_C0
Disable this function
Invert GPS_FWD
Get

Appendix A

MDT

This appendix explains the MDT detailed information.

A.1 MDT Specifications

MDT Specifications		
Display	Model	MDT
	Design Compatible Models	Paired with IVU 4000
	Resolution	1024*768
	Brightness (cd/m^2)	1000 (typical) without touchscreen
	Viewing Angle	-80° ~80° (H) / -80° ~80° (V)
	Lamp Life (hrs)	10,000hrs (TYP. @IF=120mA, Ta=25℃)
	Lamp type	LED
Touchscreen	Touchscreen	Resistive, 5-Wire, Anti-glare
Front plane	Speaker	2 watts
	Hotkeys	Supports 5 hotkeys (user defined)
	Brightness Control	Light sensing (default), manually controlled by button (optional)
Back plane	USB Port	X2
	MDT Port (DVI-I)	X1
	Mic in	X1
	Rest Button	X1
Power	DC input	15V± 5%
	Power Consumption(Max.)	16W
Mechanical	Mounting	Design compatible with RAM mount
	Material	PC+ABS
	Weight	4.3 lbs
	Dimension	9.53” x 11.1”x 1.85" inch
	IP Rating	IP55
Environment	Operating Temperature	-30 to 65°C
	Storage Temperature	-40 to 85°C
	Vibration	MIL-STD-810G

Note: The Brightness control is adjusted by the auto light sensor in the front panel as default; it is also defined by button on the front panel by manual.

Figure A.1 MDT Front View

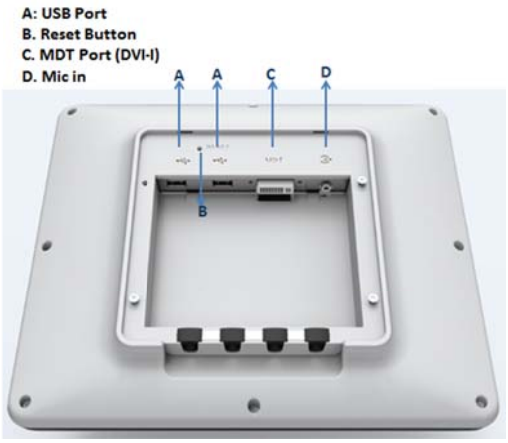


Figure A.2 MDT Rear View

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