

# MRM Quick Start Guide

5/4/2017  
SSID.SRP

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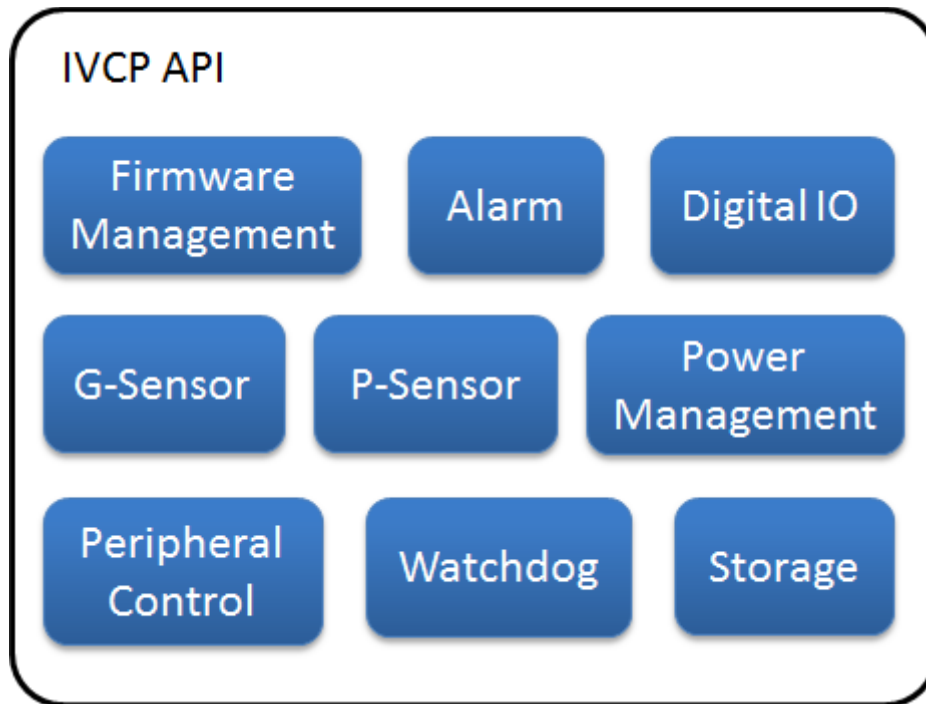
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## 1 MRM SDK Software Overview

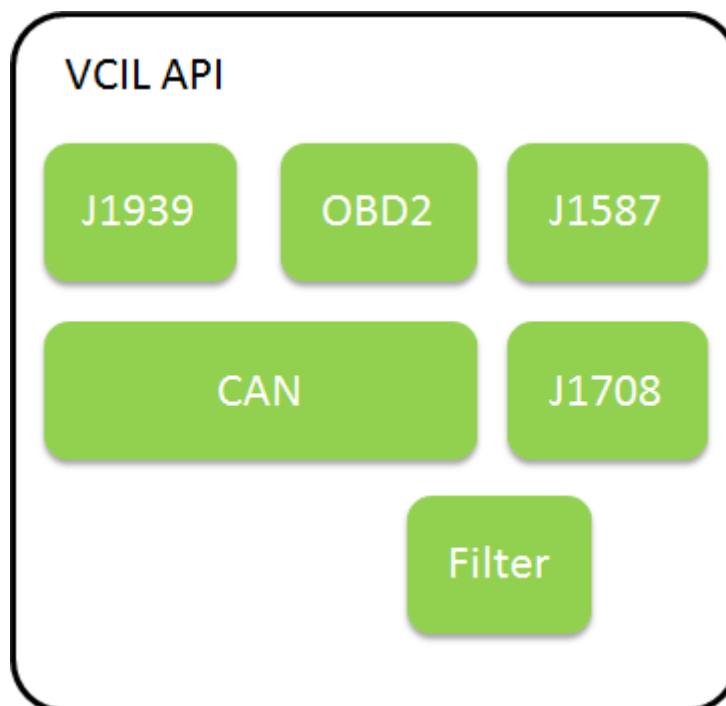
MRM SDK provided many function for user customize control such as Power management, DIO, CAN, Display etc.

The function is split in 3 category: IVCP( Intelligent Vehicle Co-Processor) , VCIL(Vehicle Communication Interface layer) , SDP(Smart Display Port) and GPS

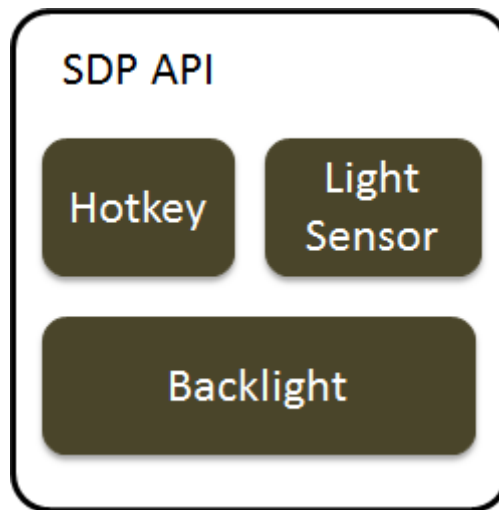
The detail software stack like below



Overview of IVCP Software Stack



Overview of VCIL Software Stack



Overview of SDP Software Stack

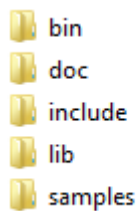
## 2 Installation of the MRM SDK

The install package is named **MRM\_SDK\_<PLATFORM NAME>\_<PLATFORM>.4.xx.yy.zz.zip**. The steps are listed below to setup MRM SDK package on the Windows host machine.

- Copy package to installation folder
- Right click to zip file and select Extract All..
- Enter the password. The password is same as the filename

**Note:** "xx", "yy" and "zz" in MRM\_SDK\_<PLATFORM NAME>\_<PLATFORM>.4.xx.yy.zz.zip need to be replaced with the correct mirror version, revision version and build version in the release package.

Once the package is installed the directory structure seen on <MRM\_SDK\_BASE>/sdk folder should look like below

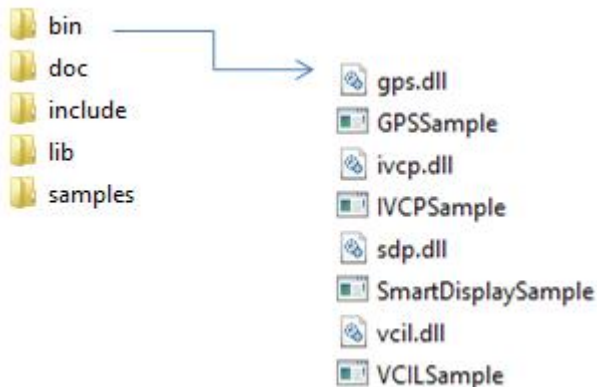


The description of each of the folder at the top level is listed below:

Files/Directories	Description
bin	Sample execution file and DLL binary file
doc	Document and Release Note
include	The library C header file
lib	Library file
samples	Sample code source

## 3 Running the pre-build sample on the target platform

The pre-build sample is placed on bin folder as below. Double click to binary file to execution pre-build sample.

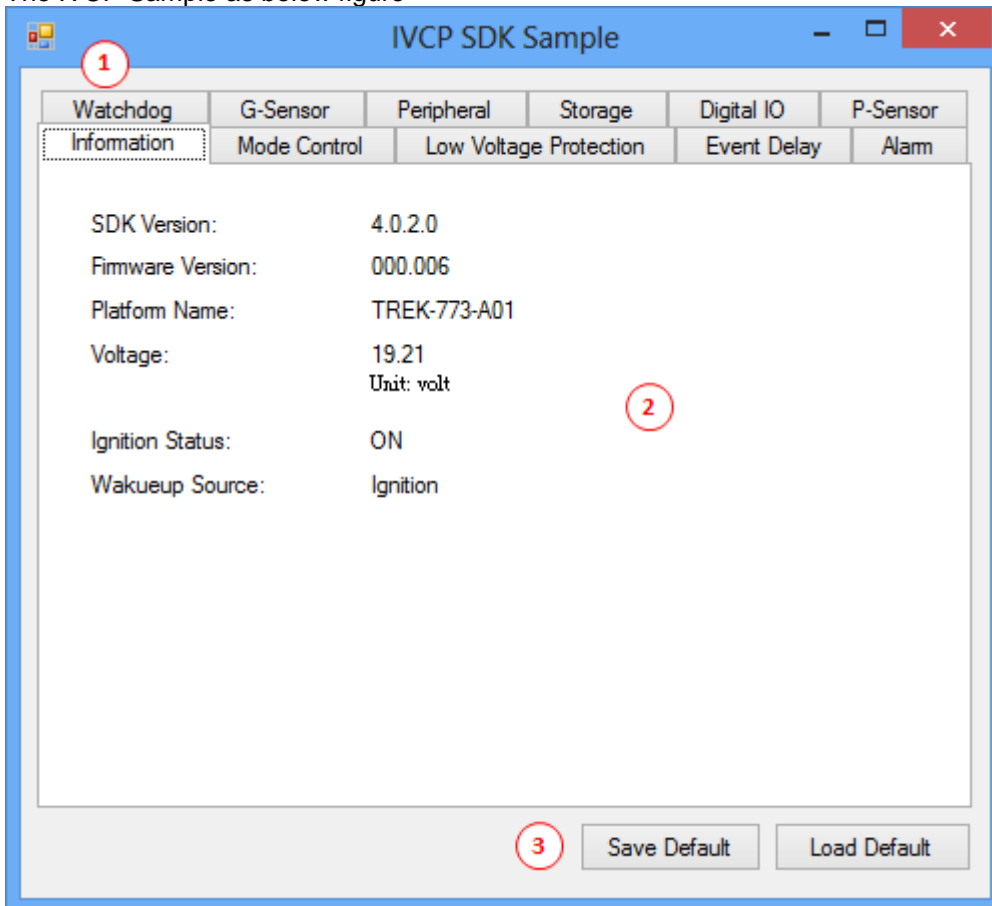


## 4 IVCP Demonstration

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.

### 4.1 System Menu

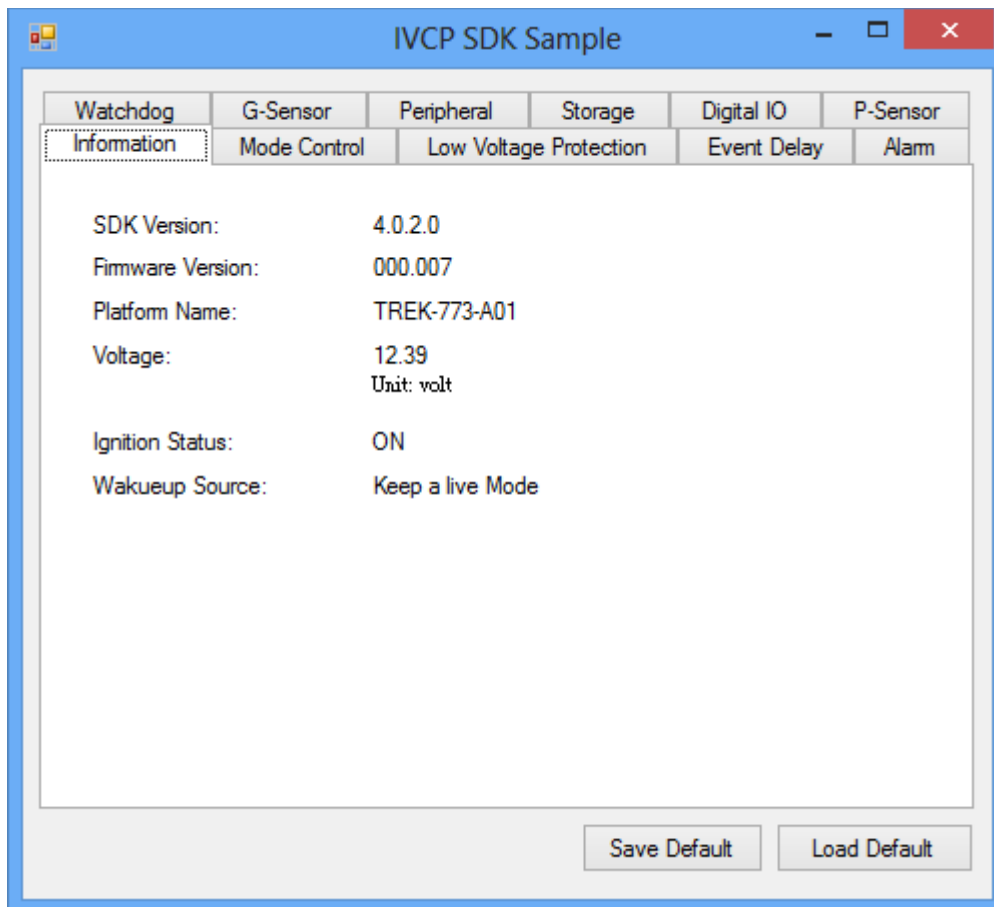
The IVCP Sample as below figure



1. Function demonstration selection
2. Function page
3. Configuration Save/Load

## 4.2 Information

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

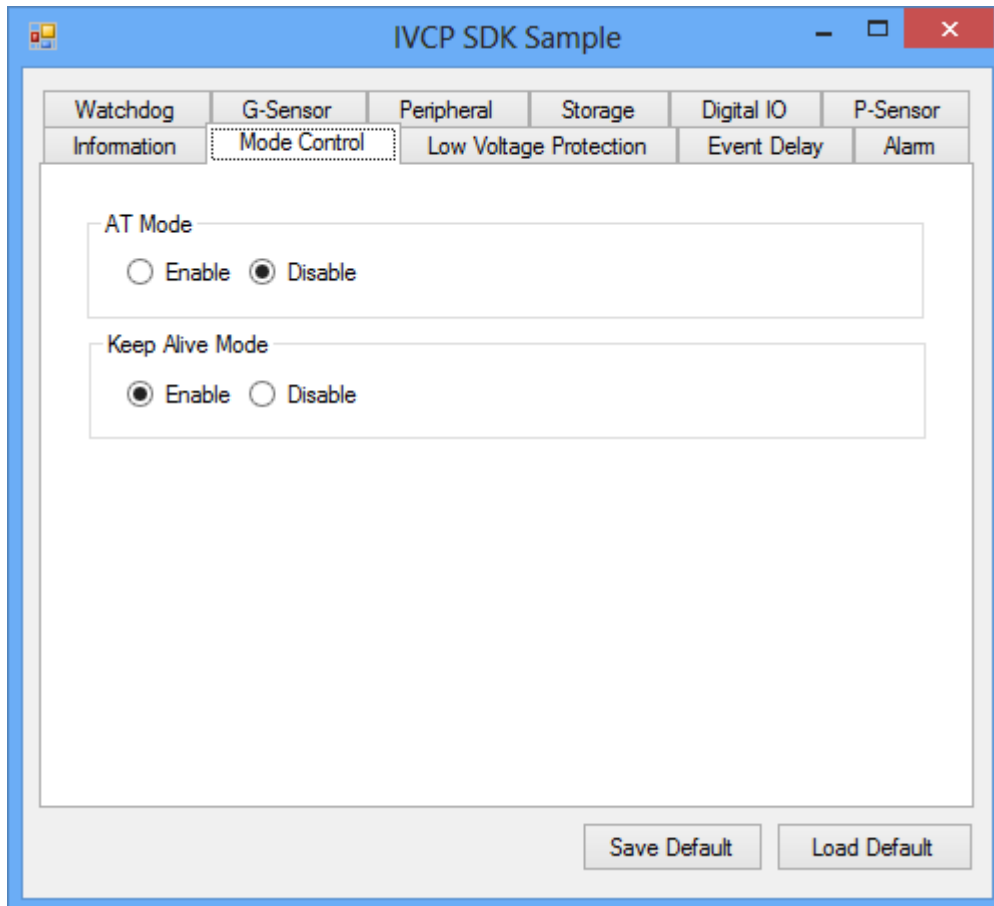




### 4.3 Mode Control

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.



The screenshot shows a window titled "IVCP SDK Sample" with a blue title bar. Inside the window, there is a tabbed interface with the following tabs: Watchdog, G-Sensor, Peripheral, Storage, Digital IO, P-Sensor, Information, Mode Control (selected), Low Voltage Protection, Event Delay, and Alarm. The "Mode Control" tab is active and contains two sections: "AT Mode" and "Keep Alive Mode".

**AT Mode**

☐ Enable ☒ Disable

**Keep Alive Mode**

☒ Enable ☐ Disable

At the bottom right of the window, there are two buttons: "Save Default" and "Load Default".

## 4.4 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.

The screenshot shows a software window titled "IVCP SDK Sample". It features a tabbed interface with the following tabs: Watchdog, G-Sensor, Peripheral, Storage, Digital IO, and P-Sensor. The "Peripheral" tab is selected, and within it, the "Low Voltage Protection" sub-tab is active. The main content area displays the following settings:

- Low Voltage Protection Range:** A box containing "Min: 10.1135", "Max: 12.2632", "Default: 11.4266", and "Unit: volt".
- Pre-boot Low Voltage Protection:** Includes radio buttons for "Enable" and "Disable" (with "Disable" selected), a "Threshold:" label, a text input field containing "11.4266", and "Get" and "Set" buttons.
- Post-boot Low Voltage Protection:** Includes radio buttons for "Enable" and "Disable" (with "Enable" selected), a "Threshold:" label, a text input field containing "11.4266", and "Get" and "Set" buttons.

At the bottom of the window, there are three buttons: "Reset Threshold", "Save Default", and "Load Default".

## 4.5 Event Delay

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/Ignition off 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.

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

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

The screenshot shows the 'IVCP SDK Sample' application window. The 'Event Delay' tab is selected under the 'Digital IO' category. The interface is divided into two main sections: 'Low Voltage Event' and 'Ignition Event'. Each section contains input fields for 'Delay' and 'Hard Delay' (or 'Off Delay' and 'Hard Off Delay' for the Ignition Event), along with 'Get' and 'Set' buttons. The 'Unit: second' label is located at the bottom right of the configuration area. At the bottom of the window, there are 'Save Default' and 'Load Default' buttons.

Category	Sub-category	Parameter	Value	Action
Low Voltage Event	Delay	Delay	30	Get / Set
		Hard Delay	90	Get / Set
	Ignition Event	On Delay	2	Get / Set
		Off Delay	5	Get / Set
Ignition Event	Hard Off Delay	Hard Off Delay	40	Get / Set

Unit: second

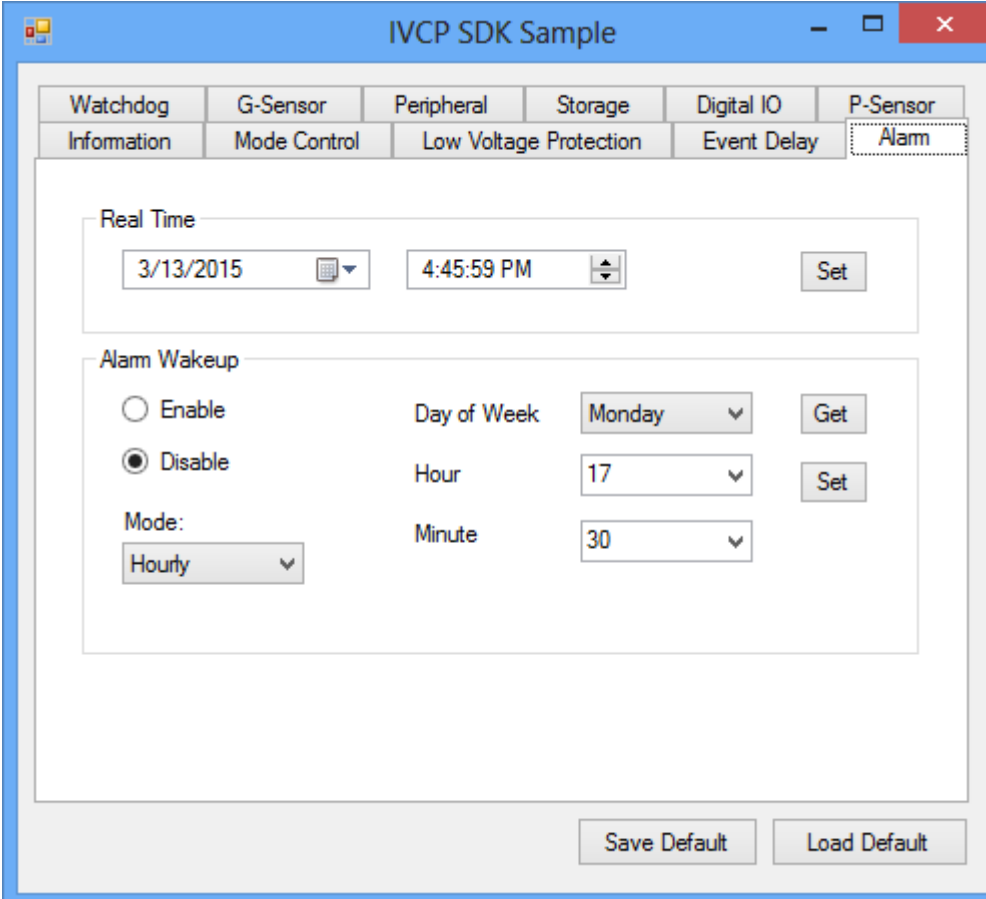
Save Default Load Default

## 4.6 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.



The screenshot shows a software window titled "IVCP SDK Sample" with a standard Windows-style title bar (minimize, maximize, close buttons). The window contains a tabbed interface with the following tabs: Watchdog, G-Sensor, Peripheral, Storage, Digital IO, P-Sensor, Information, Mode Control, Low Voltage Protection, Event Delay, and Alarm. The "Alarm" tab is currently selected and highlighted with a dashed border. Inside the "Alarm" tab, there are two main sections: "Real Time" and "Alarm Wakeup". The "Real Time" section includes a date field showing "3/13/2015" with a calendar icon, a time field showing "4:45:59 PM" with a spin button, and a "Set" button. The "Alarm Wakeup" section includes radio buttons for "Enable" and "Disable" (with "Disable" selected), a "Day of Week" dropdown menu set to "Monday" with a "Get" button, a "Hour" dropdown menu set to "17" with a "Set" button, a "Minute" dropdown menu set to "30", and a "Mode:" dropdown menu set to "Hourly". At the bottom of the window, there are two buttons: "Save Default" and "Load Default".

## 4.7 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.

The screenshot shows a software window titled "IVCP SDK Sample" with a standard Windows-style title bar (minimize, maximize, close buttons). The window contains a tabbed interface. The top row of tabs includes "Information", "Mode Control", "Low Voltage Protection", "Event Delay", and "Alarm". The "Information" tab is selected, and within it, the "Watchdog" sub-tab is active. Below the tabs, the "Watchdog Control" section contains two radio buttons: "Enable" (unselected) and "Disable" (selected). Below these are two rows of controls. The first row shows "Time:" followed by a text input field containing "65535", and two buttons labeled "Get" and "Set". The second row shows "Current Time:" followed by a text input field containing "0", the text "Unit: second", and a button labeled "Trigger". At the bottom of the window, there are two buttons: "Save Default" and "Load Default".

## 4.8 G-Sensor

In this page, you can enable/disable the G-sensor. Also, you can set G-sensor as a system wakeup source and set the threshold to trigger system wakeup.

The screenshot shows a window titled "IVCP SDK Sample" with a blue title bar. The window contains a tabbed interface with the following tabs: Information, Mode Control, Low Voltage Protection, Event Delay, Alarm, Watchdog, G-Sensor (selected), Peripheral, Storage, Digital IO, and P-Sensor. The "G-Sensor" tab is active, displaying three sections:

- G-Sensor Control:** Contains radio buttons for "Enable" and "Disable" (selected). Below them is a "Resolution:" label followed by a dropdown menu set to "16G". To the right are "Get" and "Set" buttons.
- G-Sensor Wakeup:** Contains radio buttons for "Enable" and "Disable" (selected). Below them is a "Threshold:" label followed by a text input field containing "125". To the right of the input field is the text "Unit: mg". Further right are "Get" and "Set" buttons.
- G-Sensor Value:** Contains three labels: "x: --", "y: --", and "z: --". To the right of these labels is the text "Unit: mg".

At the bottom of the window, there are two buttons: "Save Default" and "Load Default".

## 4.9 G-Sensor Alarm

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

The screenshot shows a software window titled "IVCP SDK Sample". It features a tabbed interface with the following tabs: Information, Mode Control, Low Voltage Protection, Event Delay, Alarm, Watchdog, G-Sensor, G-Sensor Alarm (selected), Peripheral, Storage, and Digital IO. The "G-Sensor Alarm" tab is active, displaying the following controls:

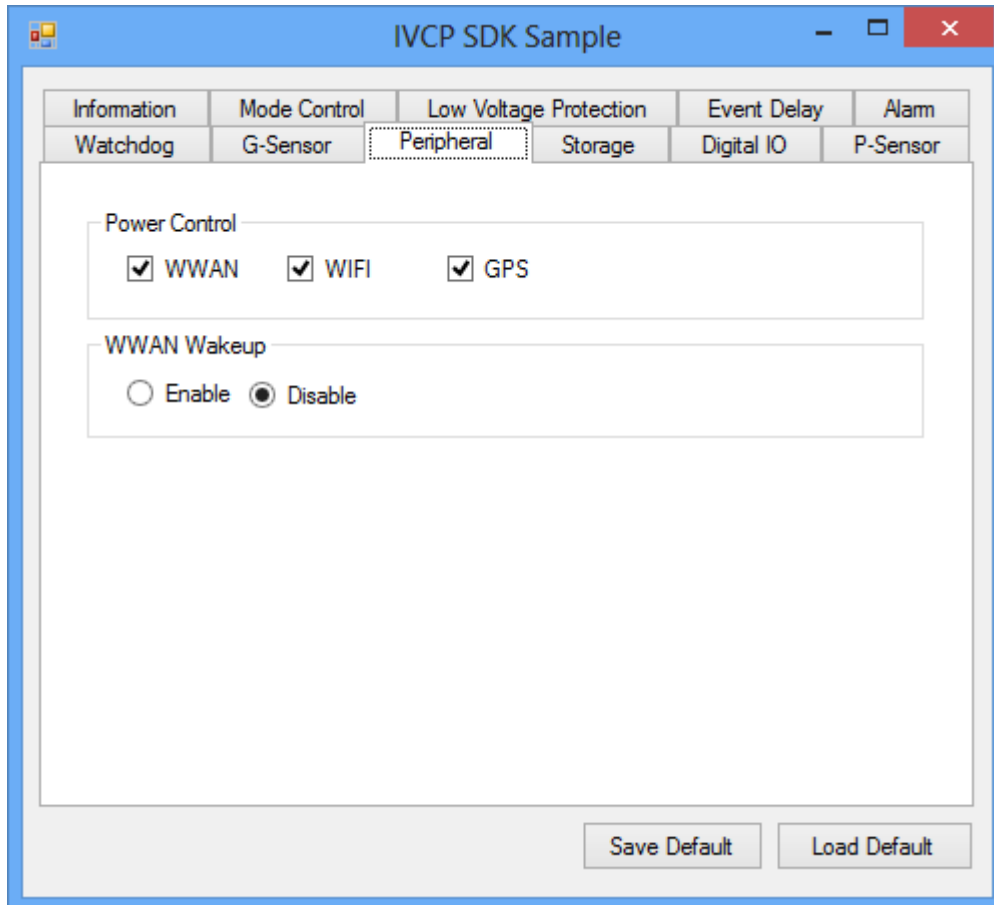
- G-Sensor Alarm** section:
  - Radio buttons for ☐ Enable and ☒ Disable.
  - Threshold:  Unit: mg
  - Buttons: Get, Set
- A table for alarm values:

X	Y	Z
- Buttons: Clear, Save Default, Load Default

## 4.10 Peripheral

In this page, you can enable/disable the peripheral functions and set WWAN as system wakeup source.

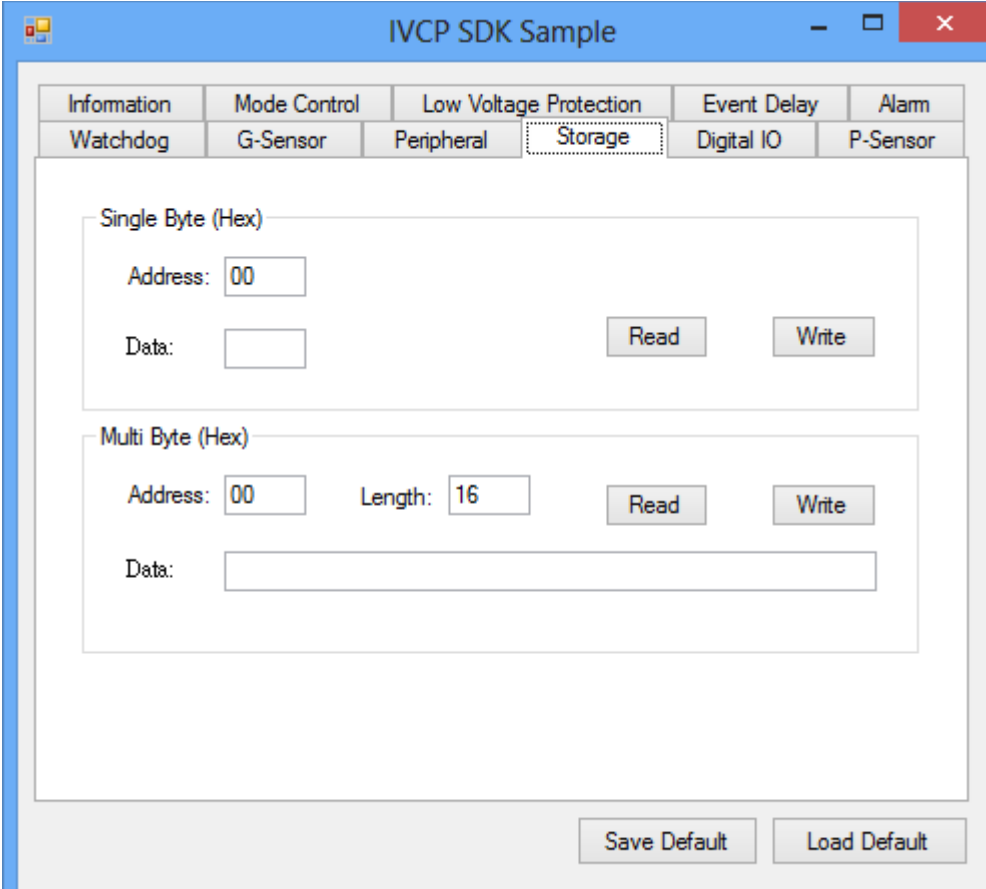
**Note:** Some device will not capability to control some peripheral





## 4.11 Storage

In this page, you can save/load arbitrary data to the private storage (256 byte) on the machine. This private storage not be affect external storage.



The image shows a software window titled "IVCP SDK Sample" with a standard Windows-style title bar (minimize, maximize, close buttons). Inside the window, there is a tabbed interface with the following tabs: Information, Mode Control, Low Voltage Protection, Event Delay, Alarm, Watchdog, G-Sensor, Peripheral, Storage (which is currently selected and highlighted with a dotted border), Digital IO, and P-Sensor. The main content area is divided into two sections: "Single Byte (Hex)" and "Multi Byte (Hex)". The "Single Byte (Hex)" section contains an "Address:" field with the value "00", a "Data:" field, and "Read" and "Write" buttons. The "Multi Byte (Hex)" section contains an "Address:" field with the value "00", a "Length:" field with the value "16", a "Data:" field, and "Read" and "Write" buttons. At the bottom of the window, there are two buttons: "Save Default" and "Load Default".

Information	Mode Control	Low Voltage Protection	Event Delay	Alarm
Watchdog	G-Sensor	Peripheral	<b>Storage</b>	Digital IO
P-Sensor				

Single Byte (Hex)

Address: 00

Data:

Read Write

Multi Byte (Hex)

Address: 00      Length: 16

Data:

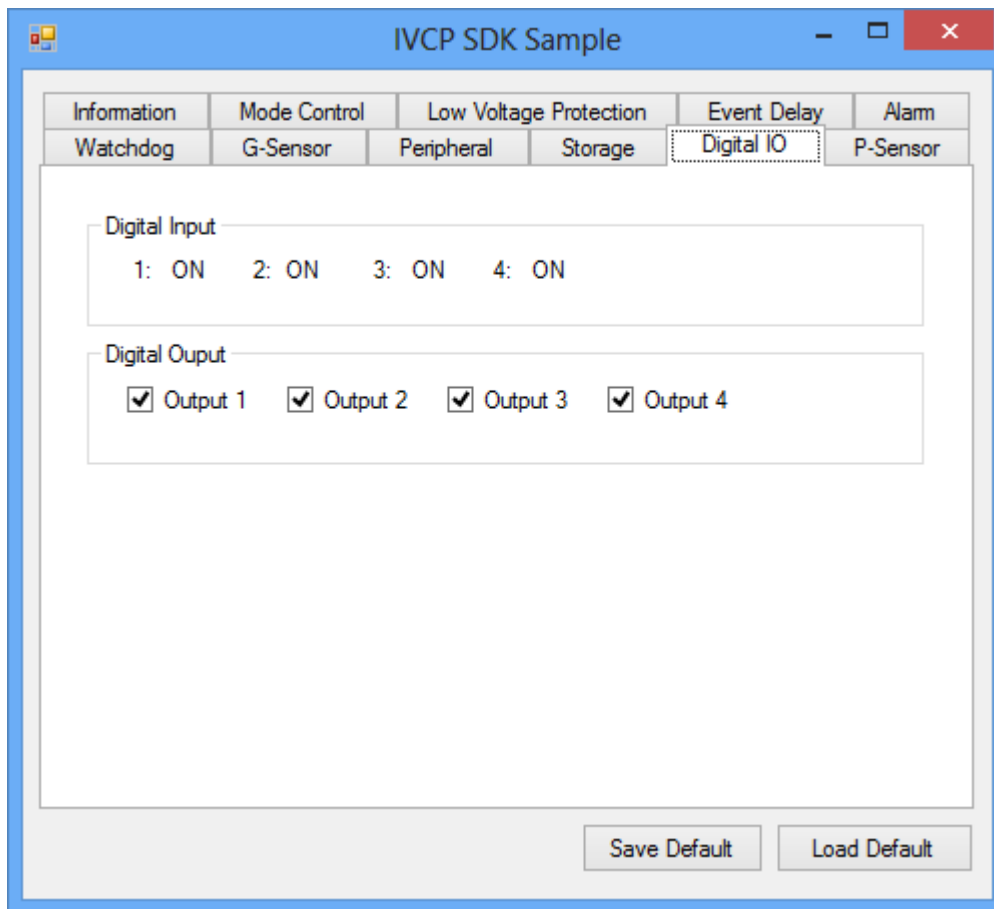
Read Write

Save Default      Load Default

## 4.12 Digital IO

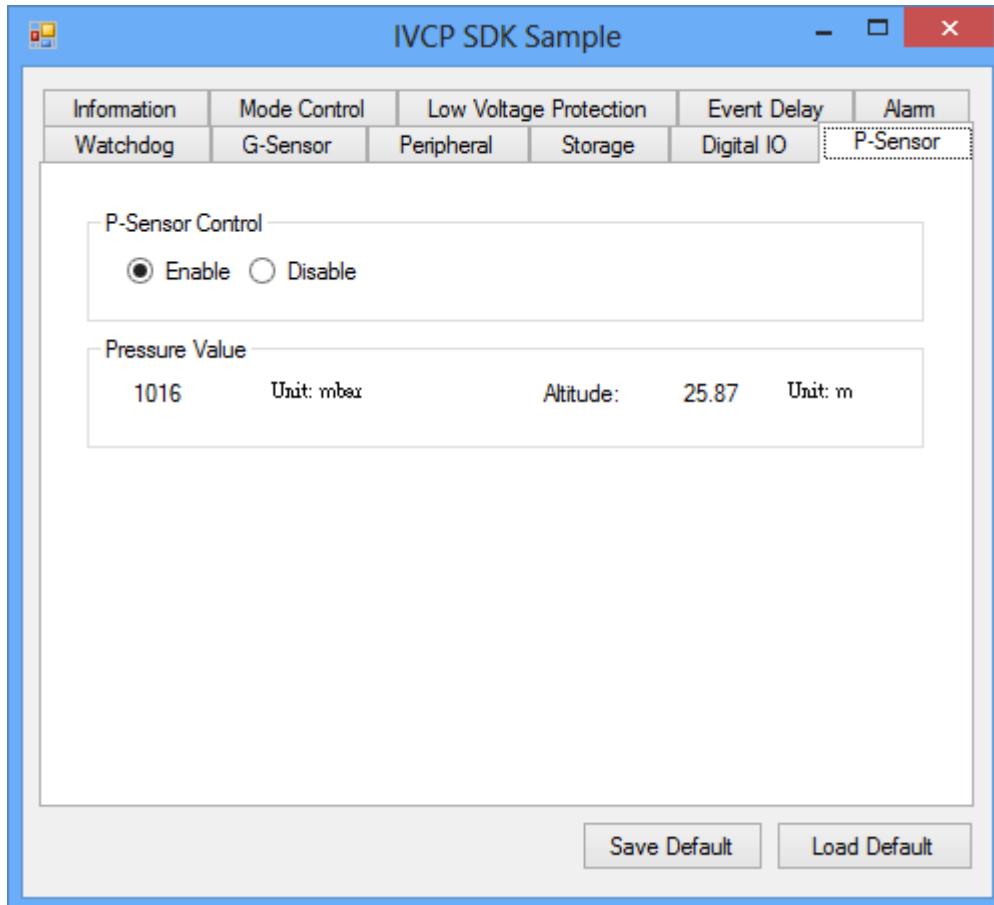
In this page, you can monitor the digital input status and enable/disable digital output.



## 4.13 P-sensor

In this page, you can monitor the p-sensor status and enable/disable it.

**Note:** Some device will not capability to read P-sensor



The screenshot shows a window titled "IVCP SDK Sample" with a blue title bar. Inside the window, there is a tabbed interface. The tabs are arranged in two rows: Information, Mode Control, Low Voltage Protection, Event Delay, Alarm (top row); and Watchdog, G-Sensor, Peripheral, Storage, Digital IO, P-Sensor (bottom row). The "P-Sensor" tab is selected and highlighted with a dotted border. The main content area of the "P-Sensor" tab contains two sections: "P-Sensor Control" and "Pressure Value". The "P-Sensor Control" section has two radio buttons: "Enable" (which is selected) and "Disable". The "Pressure Value" section displays two data points: "1016" with the unit "Unit: mbar" and "Altitude: 25.87" with the unit "Unit: m". At the bottom right of the window, there are two buttons: "Save Default" and "Load Default".

IVCP SDK Sample				
Information	Mode Control	Low Voltage Protection	Event Delay	Alarm
Watchdog	G-Sensor	Peripheral	Storage	Digital IO
P-Sensor				
<b>P-Sensor Control</b>				
<input checked="" type="radio"/> Enable <input type="radio"/> Disable				
<b>Pressure Value</b>				
1016	Unit: mbar	Altitude:	25.87	Unit: m
Save Default Load Default				

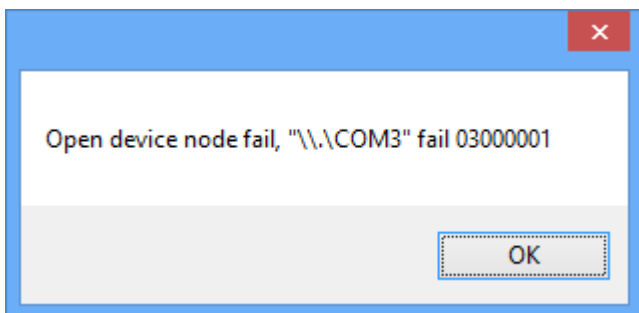
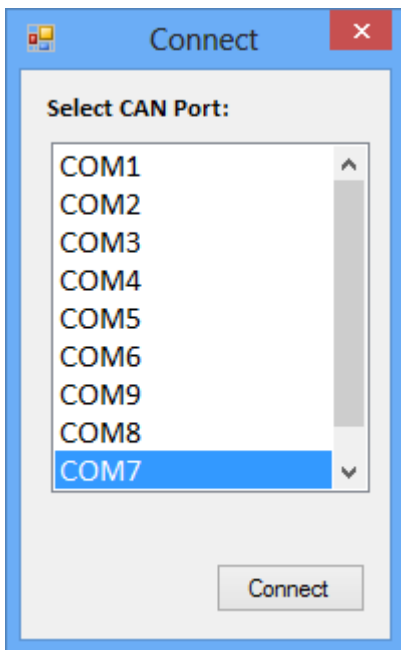
## 5 VCIL Demonstration

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

### 5.1 Port Selection

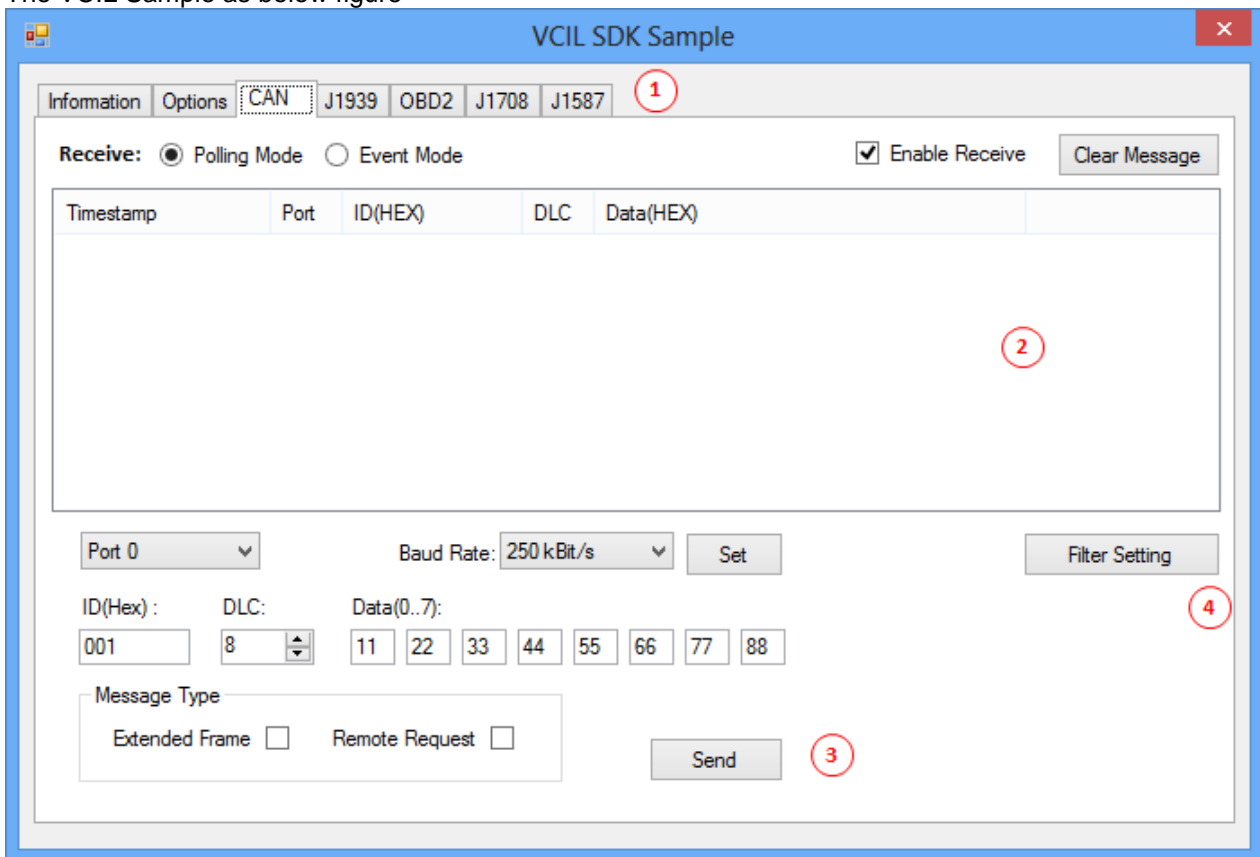
When first open VCIL demonstration app, you will see a port selection windows as following. Please select the VCIL port path and press **Connect** button.

**Note:** VCIL port path in different platforms have different nodes. The common path at Window is **COM7** and at Linux is **/dev/ttyA0**. If you open a error path, you will receive a read timeout or open device node fail message as below



## 5.2 System Menu

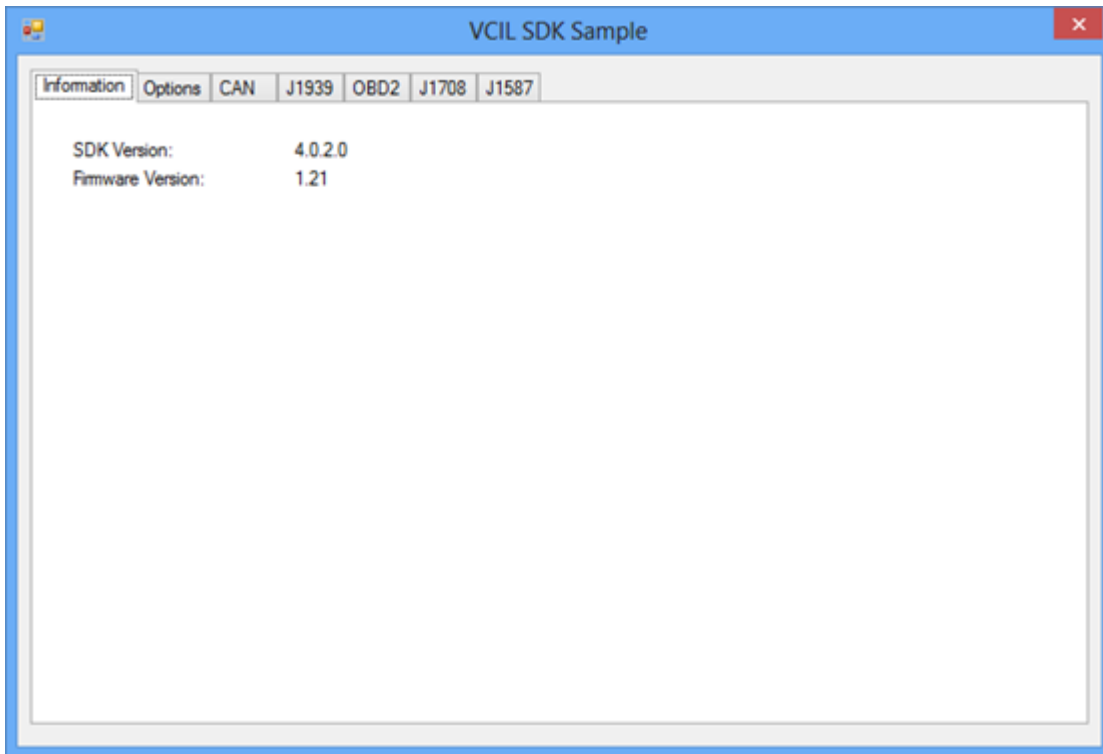
The VCIL Sample as below figure



1. Function demonstration selection
2. Receive list
3. Send
4. Filter setting

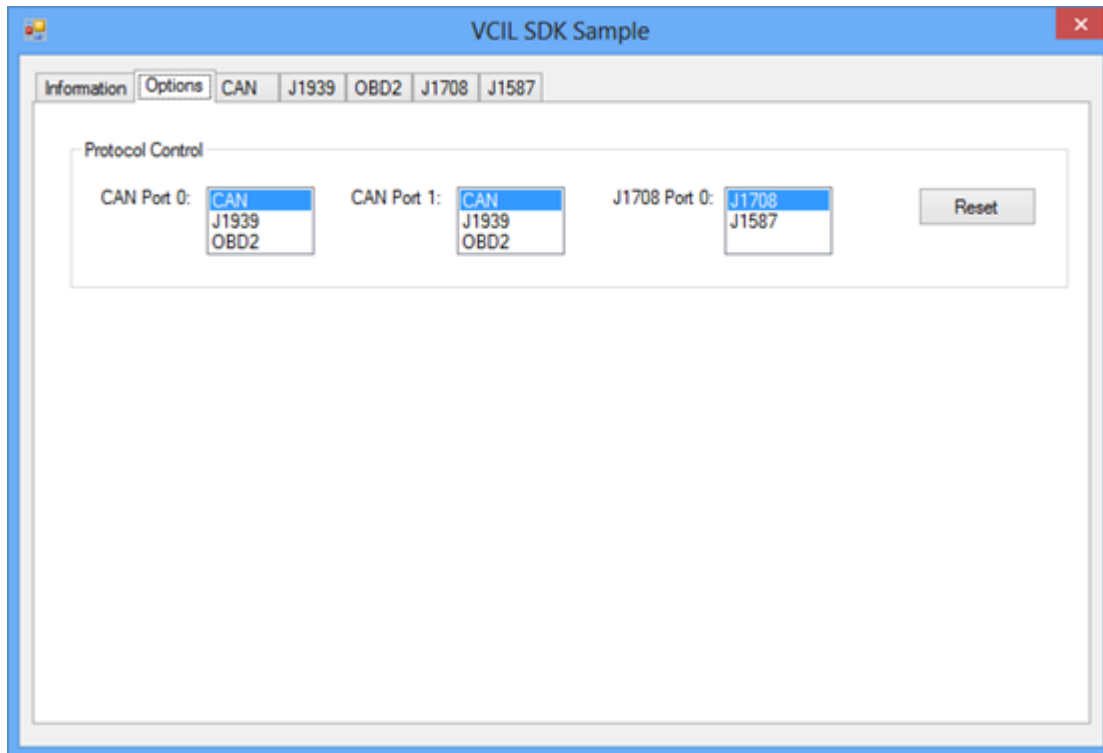
## 5.3 Information

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



## 5.4 Option

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



## 5.5 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.

The screenshot shows the 'VCIL SDK Sample' application window with the 'CAN' tab selected. The interface includes a 'Receive' section with 'Polling Mode' selected and 'Enable Receive' checked. Below this is a table for received messages with columns: Timestamp, Port, ID(HEX), DLC, and Data(HEX). The 'Send' section includes a 'Port' dropdown set to 'Port 0', a 'Baud Rate' dropdown set to '250 kBit/s', and a 'Set' button. The 'ID(HEX)' field is set to '001', the 'DLC' field is set to '8', and the 'Data(0..7)' field contains eight hex digits: 11, 22, 33, 44, 55, 66, 77, 88. The 'Message Type' section has 'Extended Frame' and 'Remote Request' checkboxes, both of which are unchecked. A 'Send' button is located at the bottom right of the 'Message Type' section.

This screenshot is identical to the one above, showing the 'VCIL SDK Sample' application window with the 'CAN' tab selected. The interface includes a 'Receive' section with 'Polling Mode' selected and 'Enable Receive' checked. Below this is a table for received messages with columns: Timestamp, Port, ID(HEX), DLC, and Data(HEX). The 'Send' section includes a 'Port' dropdown set to 'Port 0', a 'Baud Rate' dropdown set to '250 kBit/s', and a 'Set' button. The 'ID(HEX)' field is set to '001', the 'DLC' field is set to '8', and the 'Data(0..7)' field contains eight hex digits: 11, 22, 33, 44, 55, 66, 77, 88. The 'Message Type' section has 'Extended Frame' and 'Remote Request' checkboxes, both of which are unchecked. A 'Send' button is located at the bottom right of the 'Message Type' section.



VCIL SDK Sample

InformationOptionsCANJ1939OBD2J1708J1587

Receive: ☒ Polling Mode ☐ Event Mode

☒ Enable Receive

Clear Message

Timestamp	Port	PRI	Type	DST	SRC	DLC	Data(HEX)

Port 0

Filter Setting

Type : 

Physical

DLC: 

2

Data(0..64): 

0100

Priority: 

6

Destination: 

33

Source: 

F1

Send

VCIL SDK Sample

InformationOptionsCANJ1939OBD2J1708J1587

Receive: ☒ Polling Mode ☐ Event Mode

☒ Enable Receive

Clear Message

Timestamp	MID	DLC	Data (HEX)

Filter Setting

MID(Hex) : 

0

DLC: 

8

Data(0..20): 

1122334455667788

Priority: 

6

Send

VCIL SDK Sample

Information Options CAN J1939 OBD2 J1708 J1587

Receive: ☒ Polling Mode ☐ Event Mode ☒ Enable Receive Clear Message

Timestamp	MID	PID	DLC	Data (HEX)

Filter Setting

MID(Hex): 0 DLC: 8 Data(0..20): 1122334455667788

Priority: 6 PID(Hex): 0

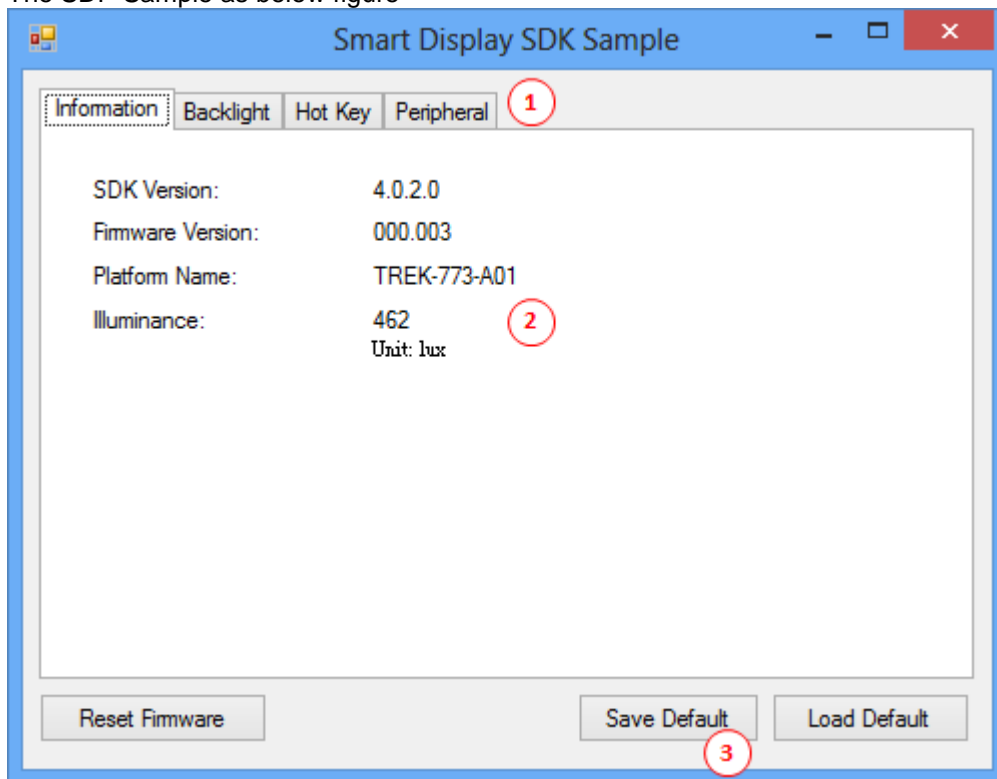
Send

## 6 SDP 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.

### 6.1 System Menu

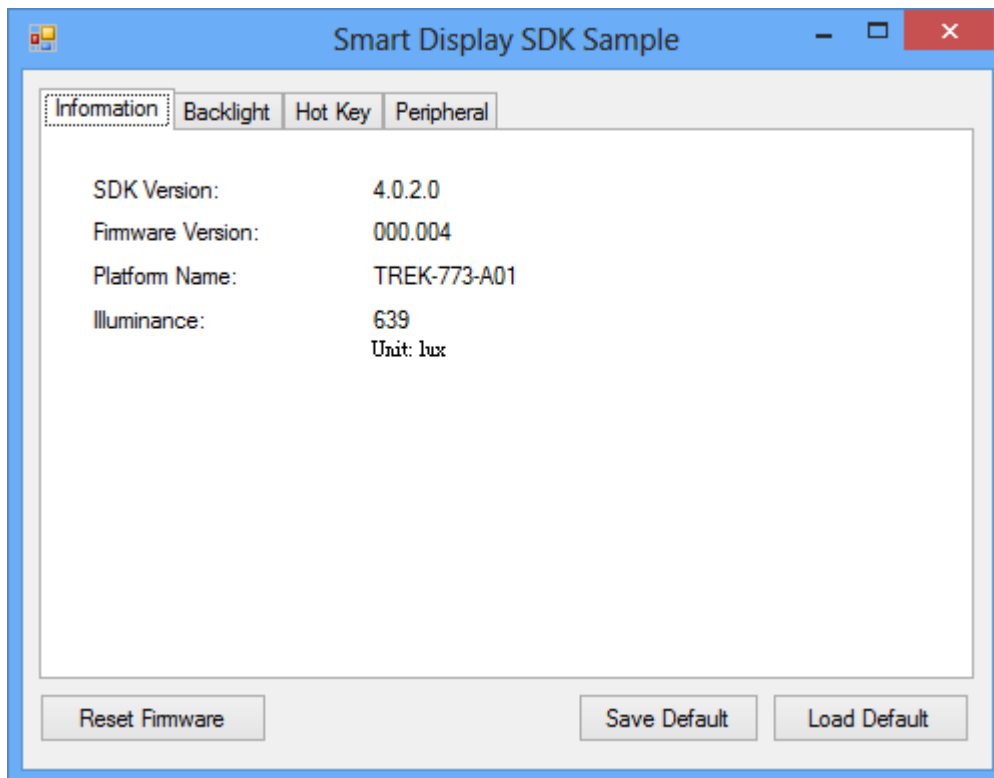
The SDP Sample as below figure



1. Function demonstration selection
2. Function page
3. Configuration Save/Load

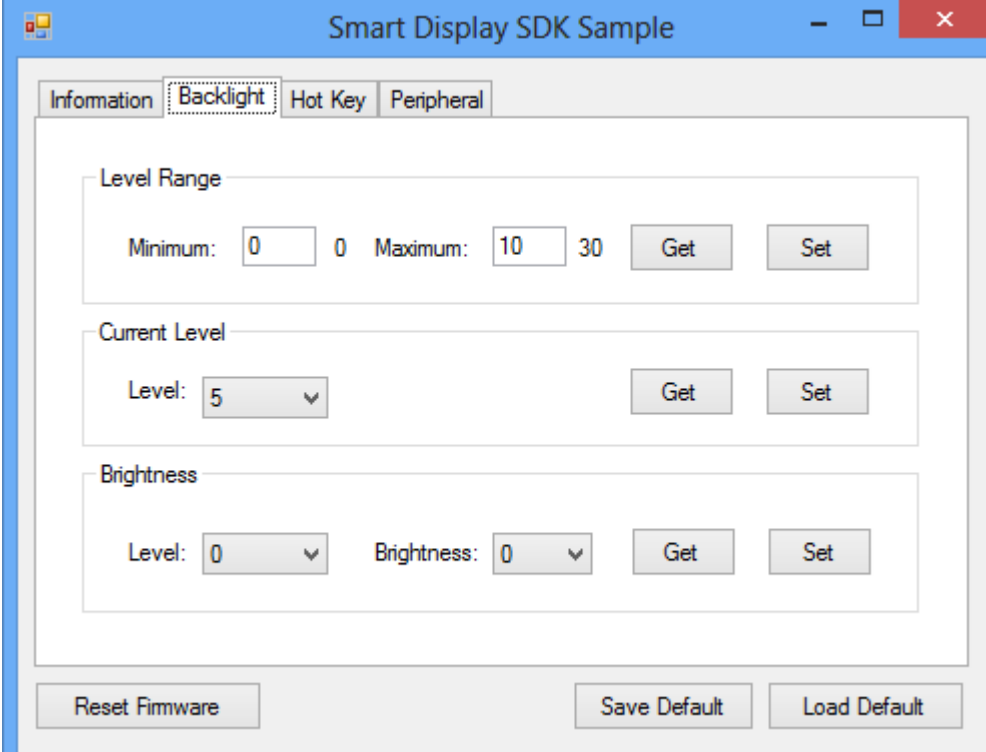
## 6.2 Information

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



## 6.3 Backlight

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



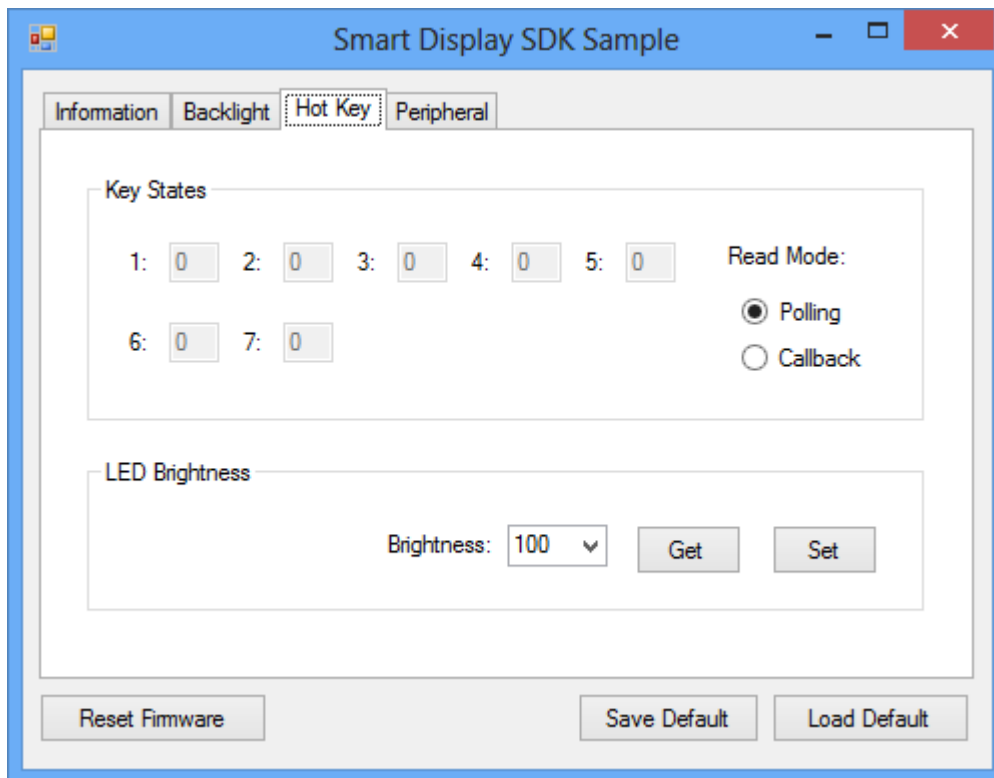
The image shows a software window titled "Smart Display SDK Sample" with a blue title bar and standard Windows window controls. Inside the window, there are four tabs: "Information", "Backlight", "Hot Key", and "Peripheral". The "Backlight" tab is currently selected and highlighted. The main content area of the "Backlight" tab is divided into three sections: "Level Range", "Current Level", and "Brightness".

- Level Range:** This section contains two input fields for "Minimum" (set to 0) and "Maximum" (set to 10), followed by two "Get" and "Set" buttons.
- Current Level:** This section contains a "Level" dropdown menu (set to 5) and two "Get" and "Set" buttons.
- Brightness:** This section contains a "Level" dropdown menu (set to 0) and a "Brightness" dropdown menu (set to 0), followed by two "Get" and "Set" buttons.

At the bottom of the window, there are three buttons: "Reset Firmware", "Save Default", and "Load Default".

## 6.4 Hot key

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



The image shows a software window titled "Smart Display SDK Sample" with a blue title bar and standard Windows window controls. Inside the window, there are four tabs: "Information", "Backlight", "Hot Key" (which is selected and highlighted with a dotted border), and "Peripheral".

The "Hot Key" tab contains two main sections:

- Key States:** This section displays the press state of seven hot keys. Keys 1 through 5 are shown in the first row, and keys 6 and 7 are in the second row. Each key is represented by a label (e.g., "1:") followed by a small rectangular display showing the value "0". To the right of these displays is a "Read Mode:" section with two radio buttons: "Polling" (which is selected) and "Callback".
- LED Brightness:** This section contains a "Brightness:" label followed by a dropdown menu currently set to "100". To the right of the dropdown are two buttons labeled "Get" and "Set".

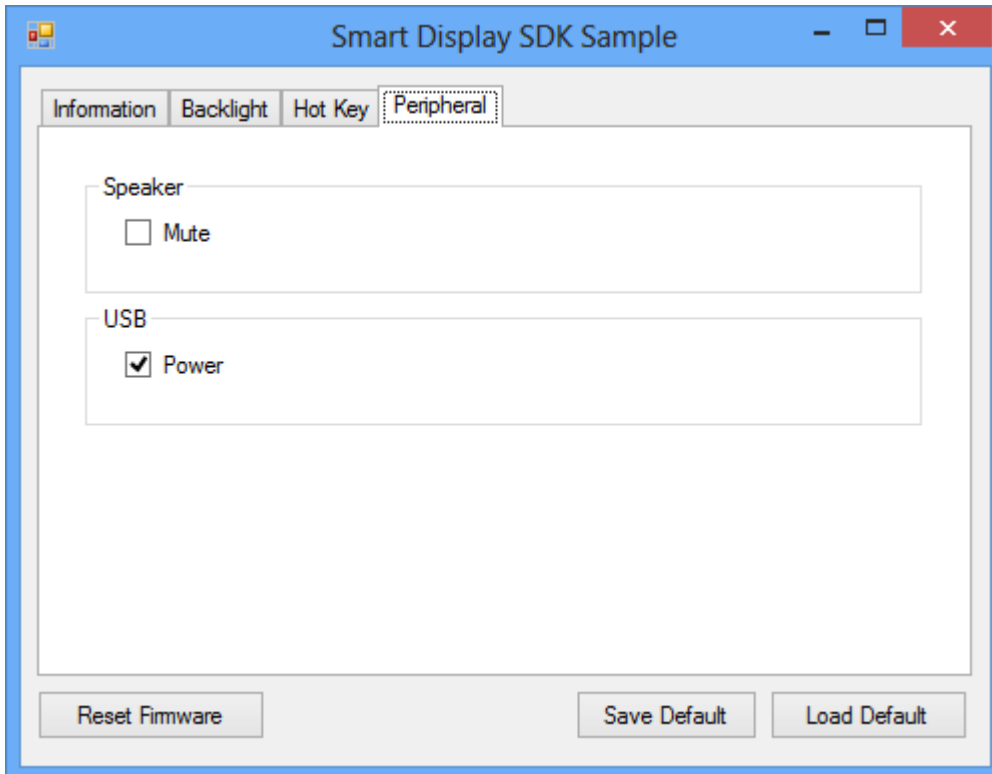
At the bottom of the window, there are three buttons: "Reset Firmware", "Save Default", and "Load Default".

## 6.5 Peripheral

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

**Note:** Some device will not capability to control some peripheral

- Speaker  
Enable/disable speaker volume.
- USB  
Enable/disable power of front-end USB.port.



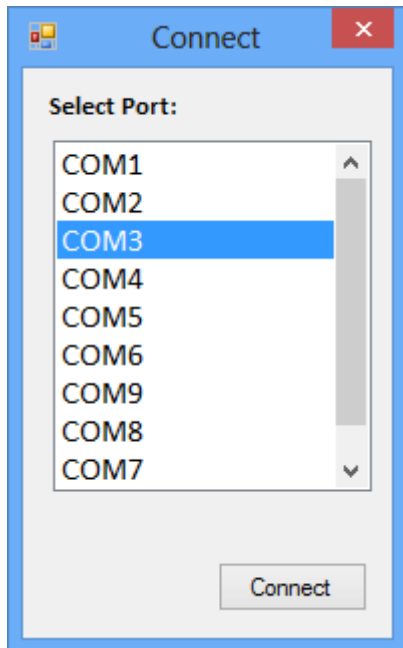
## 7 GPS Demonstration

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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.

### 7.1 Port selection

When first open GPS demonstration app, you will see a port selection windows as following. Please select the GPS port path and press **Connect** button. The common path at Window is **COM3**.

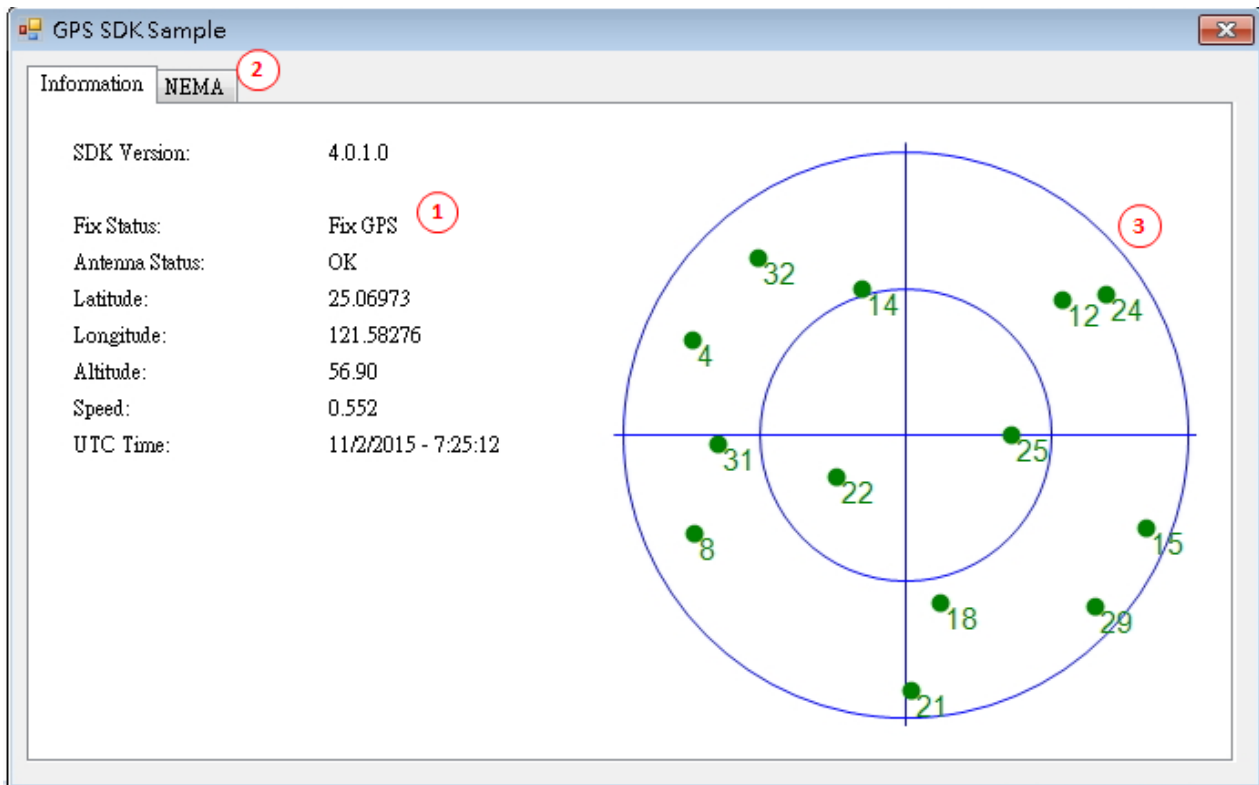




## 7.2 Information

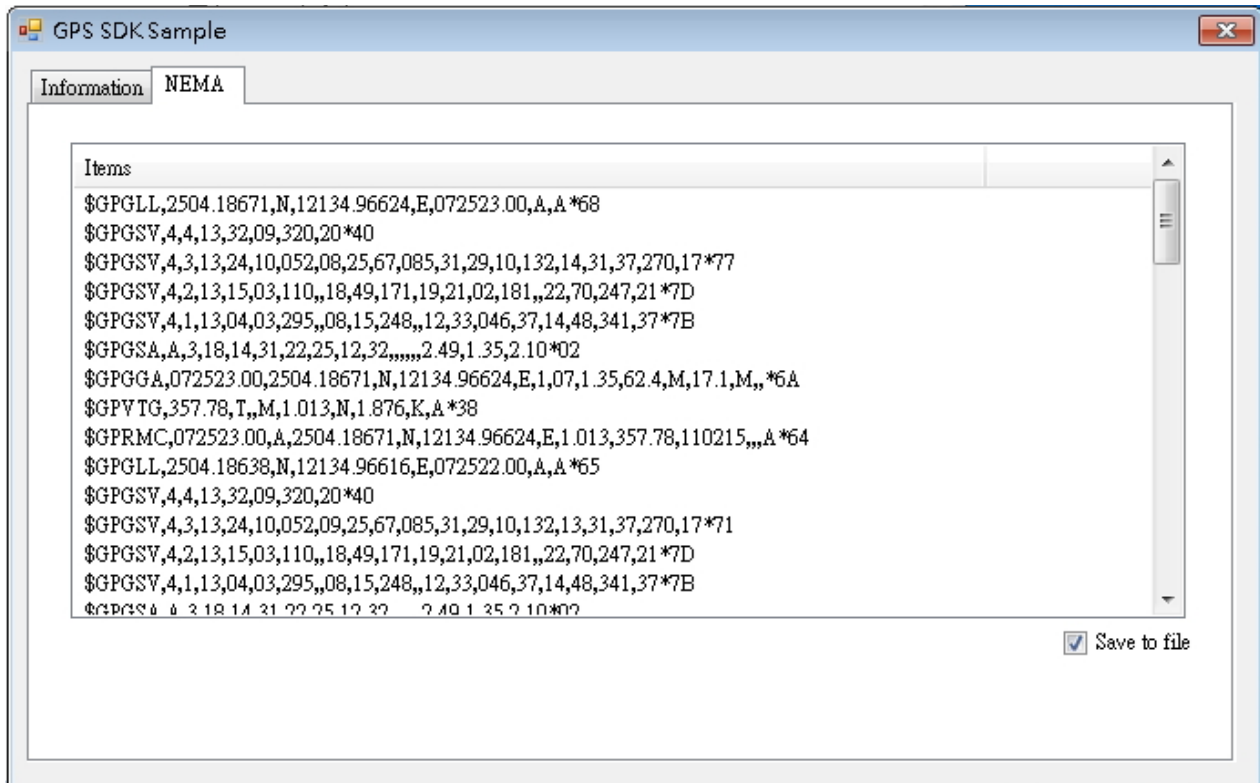
In this page, the demo application shows the current GPS status.

1. GPS Status
2. Function demonstration selection
3. Satellite location Information



## 7.3 NMEA Code Callback Demonstration

In this page, the demo application shows the incoming NMEA code. Check ' Save to file ' to logging the NMEA code to file.



## 8 Trouble Shooting

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- Q: Why do I not see NMEA code in GPS demonstration incoming?
- A: Please check your port is right and make sure the GPS module is open by EC.
- Q: Why do I open VCIL demonstration always get fail?
- A: Please check your port is right and make sure your device connect to the cradle device.

