# I-2533CS series
# User Manual

## Version 1.1.0, Jan. 2023



## Service and usage information for

I-2533CS / I-2533CS-60 / I-2533CS-A / I-2533CS-B

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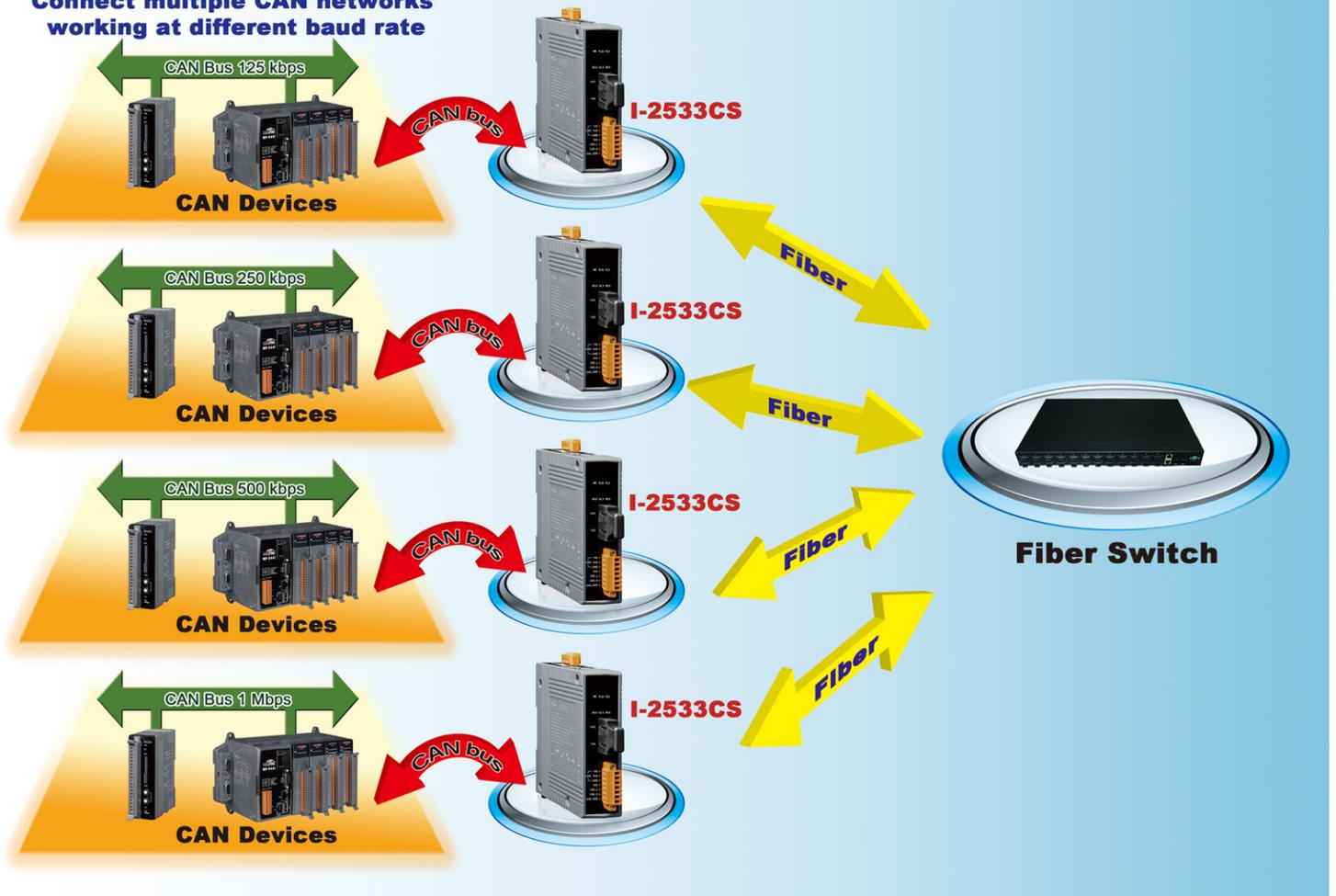Email: service@icpdas.com

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# 1. Introduction

I-2533CS series (I-2533CS, I-2533CS-60, I-2533CS-A and I-2533CS-B) is a local CAN bridge used to establish a connection between two CAN bus system via single mode fiber optic transmission medium. In order to solve the problem between CAN and fiber transmission medium, I-2533CS series is specially designed for converting the electrical CAN bus signal to fiber optic cables. Besides, I-2533CS series has three more important features.

First, the transmission distance limitation of the CAN bus system will not affected due to the different CAN baud rate. It means that the total CAN bus working distance can be extended. Second, the bus error on one CAN network will not affect the operation of another CAN network. Finally, the two CAN network can communication with each other by using different CAN baud rate for highly flexibility.
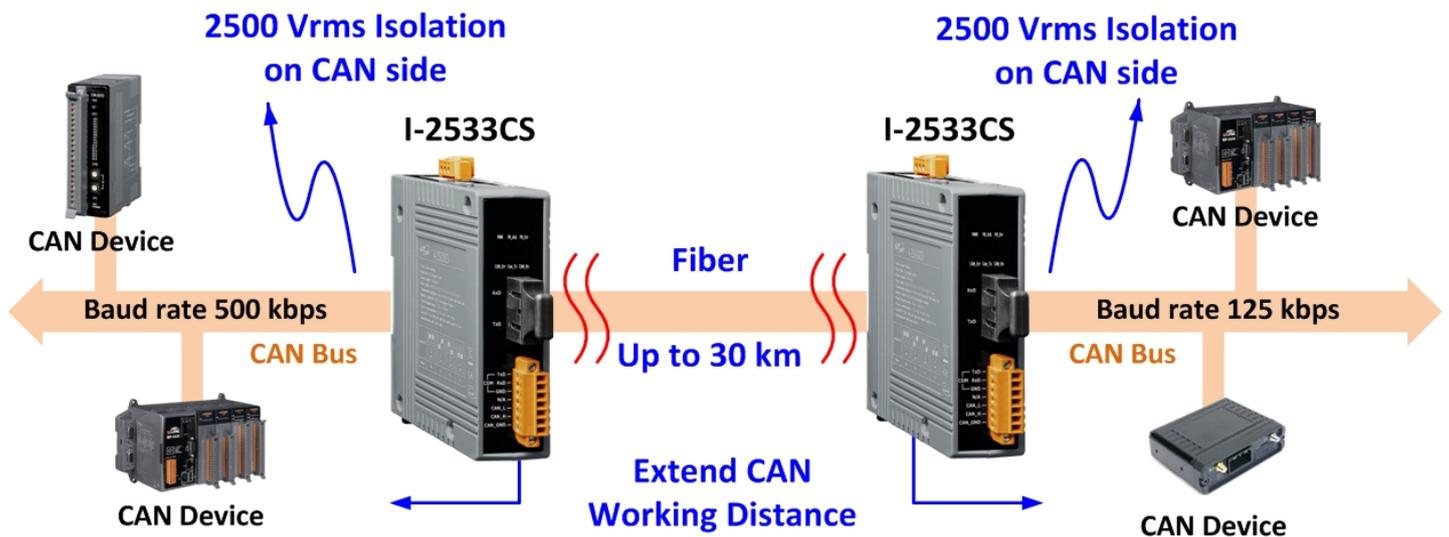


The mainly difference between I-2533 and I-2533CS series are fiber connectors and transmission distance. I-2533CS series is designed for single mode fiber, and allow to extern CAN bus to maximum 30 km (I-2533CS-60: 60 km, I-2533CS-A/I-2533CS-B: 15 km). Besides, I-2533CS provides the group function, which is the basic message router. Users can decide the CAN message flows between several CAN bus systems. I-2533CS series also provides the utility tool for user-defined baud rate and filter configuration. By using this tool, it is allowed to have user-defined baud rate and CAN message filter. When users use the I-2533CS series on two CAN network with different CAN baud rate, it may be useful to reduce the bus loading of the network which has low baud rate.

**Connect multiple CAN networks working at different baud rate**

CAN Bus 125 kbps — CAN Devices — CAN bus — I-2533CS

CAN Bus 250 kbps — CAN Devices — CAN bus — I-2533CS

CAN Bus 500 kbps — CAN Devices — CAN bus — I-2533CS

CAN Bus 1 Mbps — CAN Devices — CAN bus — I-2533CS

Fiber — Fiber Switch

# 1.1. Specifications

| Model Name | I-2533CS | I-2533CS-60 | I-2533CS-A / I-2533CS-B |
|---|---|---|---|
| **CAN Interface** | | | |
| Connector | Screwed terminal block (CAN_GND, CAN_L, CAN_H) | | |
| Baud Rate (bps) | 10 k ~ 1 M | | |
| Transmission Distance (m) | Depend on baud rate | | |
| Terminator Resistor | Switch for 120Ω terminator resistor | | |
| Isolation | 3000 $V_{DC}$ for DC-to-DC, 2500 Vrms for photo-couple | | |
| Specification | ISO 11898-2, CAN 2.0A and CAN 2.0B | | |
| **Fiber Interface** | | | |
| Type | SC type ; Single mode ; 100 Base-FX | | |
| Wave Length (nm) | 1310 | | TX: 1310, RX: 1550 for I-2533CS-A<br>TX: 1550, RX: 1310 for I-2533CS-B |
| Fiber Cable (µm) | 8.3/125, 8.7/125, 9/125 or 10/125 | | |
| Transmission Distance (km) | 30 (indicative only) | 60 (indicative only) | 15 (indicative only), (9/125 µm recommended) |
| Min. TX Output (dBm) | -15 | -5 | -8 |
| Max. TX Output (dBm) | -8 | 0 | -14 |
| Max. RX Sensitivity (dBm) | -34 | -35 | -31 |
| Max. RX Overload (dBm) | -5 | | 0 |
| Budget (dBm) | 19 | 30 | 23 |
| **UART Interface** | | | |
| COM1 | RS-232 (configuration only) | | |
| COM1 Connector | Screwed terminal block (RXD, TXD, GND) | | |
| **LED** | | | |
| Round LED | PWR, FB_Ack, FB_Err, CAN_Err, CAN_Tx and CAN_Rx LEDs | | |
| **Power** | | | |

| Power supply | Unregulated +10 ~ +30 $V_{DC}$ |
|---|---|
| Protection | Power reverse polarity protection, Over-voltage brown-out protection |
| Power Consumption | 0.125 @ 24$V_{DC}$ |
| **Mechanism** | |
| Installation | Wall Mount |
| Dimensions | 33.0 mm x 126 mm x 101 mm (W x L x H) |
| **Environment** | |
| Operating Temp. | -25 ~ 75 ℃ |
| Storage Temp. | -30 ~ 80 ℃ |
| Humidity | 10 ~ 90% RH, non-condensing |

**Note:**

I-2533CS-A and I-2533CS-B is a couple. Users must use pair in the applications. Due to this characteristic, the Group ID of the I-2533CS-A and I-2533CS-B is useless.

## 1.2. Features

- Fiber Type: SC ; Single mode ; 100 Base-FX
- Maximum transmission distance up to 30 km (60km for I-2533CS-60, 15km for I-2533CS-A and I-2533CS-B) at any CAN baud rate
- 2500 Vrms isolation on the CAN side
- Supports both CAN 2.0A and CAN 2.0B
- Fully compatible with the ISO 11898-2 standard
- Rotary switch for CAN baud rate configuration
- Build-in switch for 120 Ω terminator resistor
- Removable terminal block, Mount easily on DIN-Rail
- Allows user-defined CAN baud rate
- Fiber broken line detection
- Utility tool for CAN message filter configuration
- The CAN port with the same Group ID can communicate with each other

# 2.  Technical data

## 2.1.  Block Diagram

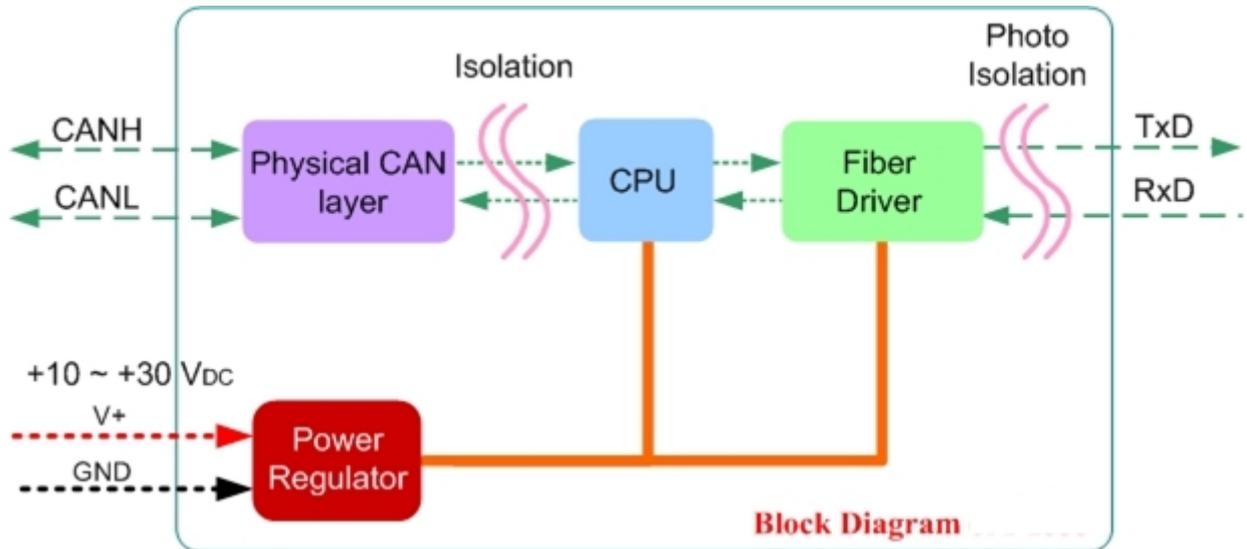The following figure is the block diagram illustrating the functions of the I-2533CS series.



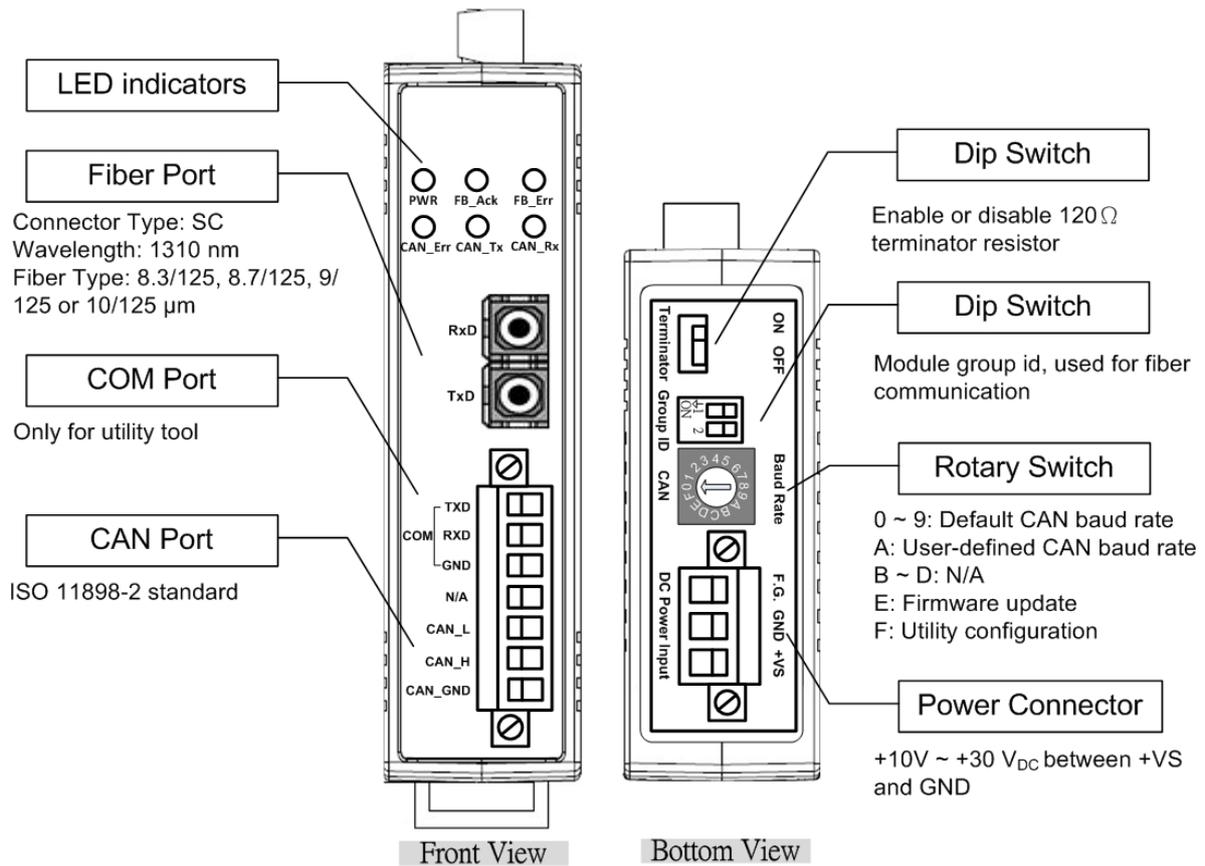*Figure 2-1 Block Diagram of I-2533CS series*

## 2.2. Appearance



LED indicators

Fiber Port

Connector Type: SC
Wavelength: 1310 nm
Fiber Type: 8.3/125, 8.7/125, 9/125 or 10/125 μm

COM Port

Only for utility tool

CAN Port

ISO 11898-2 standard

PWR  FB_Ack  FB_Err
CAN_Err CAN_Tx CAN_Rx

RxD

TxD

TXD
COM RXD
GND
N/A
CAN_L
CAN_H
CAN_GND

Dip Switch

Enable or disable 120 Ω terminator resistor

Dip Switch

Module group id, used for fiber communication

Rotary Switch

0 ~ 9: Default CAN baud rate
A: User-defined CAN baud rate
B ~ D: N/A
E: Firmware update
F: Utility configuration

Power Connector

+10V ~ +30 $V_{DC}$ between +VS and GND

Terminator  Group ID  CAN  Baud Rate
ON OFF
ON 1 2
DC Power Input   F.G. GND +VS

Front View    Bottom View

*Figure 2-2 Appearance of I-2533CS and I-2533CS-60*



LED indicators

Fiber Port

Connector Type: SC
Wavelength:
  TX: 1310, RX: 1550 nm for I-2533CS-A
  TX: 1550, RX: 1310 nm for I-2533CS-B
Fiber Type: 8.3/125, 8.7/125, 9/125 or 10/125 μm

COM Port

Only for utility tool

CAN Port

ISO 11898-2 standard

PWR  FB_Ack  FB_Err
CAN_Err CAN_Tx CAN_Rx

TxD/RxD

TXD
COM RXD
GND
N/A
CAN_L
CAN_H
CAN_GND

Dip Switch

Enable or disable 120 Ω terminator resistor

Dip Switch

Module group id, used for fiber communication

Rotary Switch

0 ~ 9: Default CAN baud rate
A: User-defined CAN baud rate
B ~ D: N/A
E: Firmware update
F: Utility configuration

Power Connector

+10V ~ +30 $V_{DC}$ between +VS and GND

Terminator  Group ID  CAN  Baud Rate
ON OFF
ON 1 2
DC Power Input   F.G. GND +VS
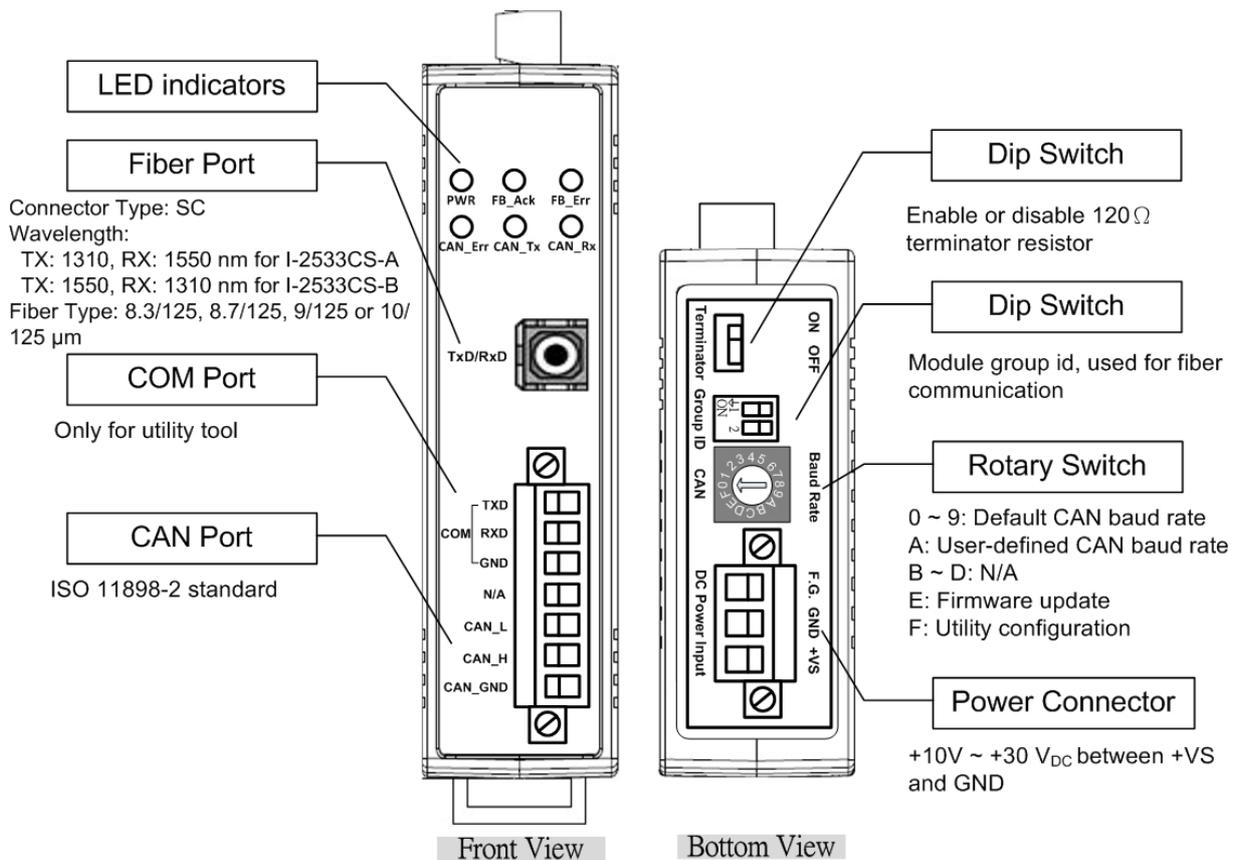
Front View    Bottom View

*Figure 2-3 Appearance of I-2533CS-A and I-2533CS-B*

## 2.3. Pin Assignment

The pin assignments of COM port, CAN port, fiber port and power connector of I-2533 series are shown in the following tables.

Table 2-1 Pin Assignment

| Port | Name | Description |
|------|------|-------------|
| COM | TXD | TXD pin of RS-232 port. |
| | RXD | RXD pin of RS-232 port. |
| | GND | SG (or GND) pin of RS-232 port. |
| CAN | CAN_L | CAN_Low, signal line of CAN port. |
| | CAN_H | CAN_High, signal line of CAN port. |
| | CAN_GND | CAN_Ground, ground voltage level of CAN port. |
| Fiber | TxD | Transmit optic data. |
| | RxD | Receive optic data. |
| Power | +VS | Voltage Source Input. +10$V_{DC}$ ~ +30$V_{DC}$. |
| | GND | Power Ground. |
| | F.G. | Frame Ground. |

Sometimes, the CAN_GND voltage level of different CAN devices on a CAN bus system are not equal. In this case, it could cause some problems and derogate the system stability. There is one way to relieve this situation; users can connect the CAN_GND of different CAN devices with each other to balance the voltage level of CAN_GND.

Electronic circuits are always influenced by different levels of Electro-Static Discharge (ESD), which become worse in a continental climate area. F.G. provides a path for conducting the ESD to the earth ground. Therefore, connecting the F.G correctly can enhance the capability of the ESD protection and improve the module's reliability.

Wiring of CAN_GND and F.G. is not necessary; users can modify the configuration of wiring according to real applications.

# 2.4. Rotary Switch

When users would like to update the module's firmware or set the CAN baud rate, message filter of the I-2533CS series, use the rotary switch on the upper of the power connector to achieve this purpose. Users can find it on the top of the power connector.
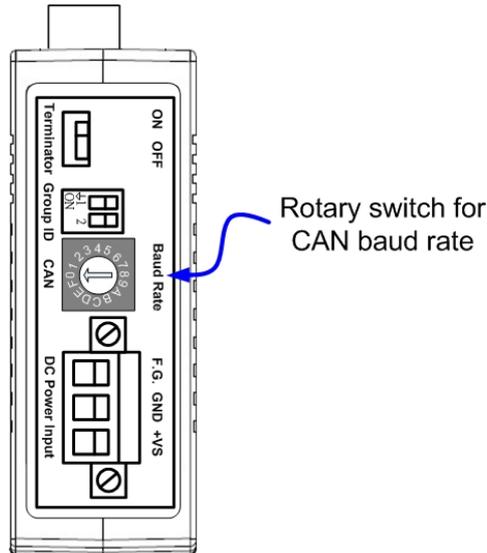


*Figure 2-4 Location of Rotary Switch*

There are 16 sections on the rotary switch. They are described on the following table.

Table 2-2 Description of Rotary Switch

| Switch Value | Description |
|:---:|:---|
| 0 | Set baud rate to 10 kbps |
| 1 | Set baud rate to 20 kbps |
| 2 | Set baud rate to 50 kbps |
| 3 | Set baud rate to 80 kbps |
| 4 | Set baud rate to 100 kbps |
| 5 | Set baud rate to 125 kbps |
| 6 | Set baud rate to 250 kbps |
| 7 | Set baud rate to 500 kbps |
| 8 | Set baud rate to 800 kbps |
| 9 | Set baud rate to 1 Mbps |
| A | Set baud rate to user-defined baud rate which is configured by I-2533CS utility. |
| B~D | N/A |
| E | Set I-2533CS into firmware update mode. |
| F | Set I-2533CS into configuration mode. |

# 2.5. LED Indicator

There are 6 LEDs on the I-2533CS series. One for power indication, two for fiber indication and three for CAN bus indication. The LED assignment and description are shown as follows.



*Figure 2-5 LED Assignment of I-2533CS*

Table 2-3 LED Description

| LED Name | Color | Description |
|---|---|---|
| PWR | Red | When power on the I-2533CS series, this LED is turned on. |
| FB_Ack | Green | When the I-2533CS series sends/receives one message to/from the fiber, this LED flashes once. |
| FB_Err | Orange | If the I-2533CS series detects the RXD line of the fiber is off, this LED is always on. |
| CAN_Err | Red | 1. If the I-2533CS series detects the bus-off status on the CAN bus, this LED is always on.<br>2. If the CAN data buffer is full, this LED flashes once per second.<br>3. If the I-2533CS series can't send CAN messages successfully because the bus connector is off or some errors happen, this LED flashes five times per second. |
| CAN_Tx | Green | When the I-2533CS series sends one CAN message to CAN bus, this LED flashes once. Therefore, if bus loading is heavy, the LED will be always on. |
| CAN_Rx | Green | When the I-2533CS series receives one CAN message from CAN bus, this LED flashes once. Therefore, if bus loading is heavy, the LED will be always on. |

**NOTE:**

In "Firmware Update Mode", the CAN_Err, CAN_Tx, CAN_Rx and FB_Err LEDs will flash per 500 milliseconds.
In "Configuration Mode", the CAN_Err, CAN_Tx, CAN_Rx and FB_Err LEDs will take turns to flash per 500 milliseconds.

# 2.6. Terminator Resistor Setup

In order to minimize the reflection effects on the CAN bus line, the CAN bus line has to be terminated at both ends by two terminator resistors as in the following figure. According to the ISO 11898-2 spec, each terminator resistor is 120Ω (or between 108Ω~132Ω). The bus topology and the positions of these terminator resistors are shown as following figure.



*Figure 2.6 CAN bus network topology*

Each I-2533CS series includes one build-in 120Ω terminator resistor, users can decide if it is enabled or not. The DIP switch for terminator resistor is under the power connector.



*Figure 2-7 Location of Terminator Resistor DIP Switch*

The following DIP switch statuses present the condition if the terminator resistor is active (default) or inactive.



On
(Active)
(Default)

Off
(Inactive)
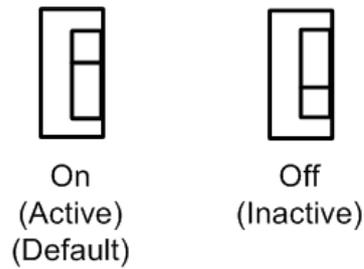
*Figure 2-8 Adjustment of Terminal Resistance*

Generally, if your application is as follows, we recommend you to enable the terminator resistor.
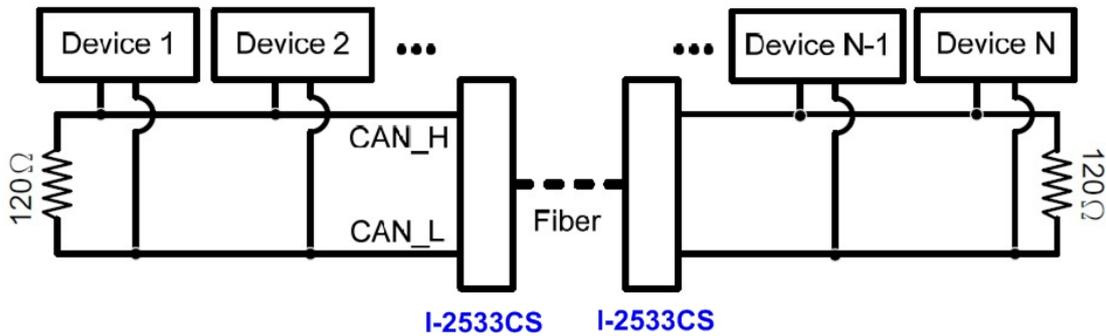


*Figure 2-9 Application 1*

If your application is like the structure as follows, the terminator resistor is not needed.
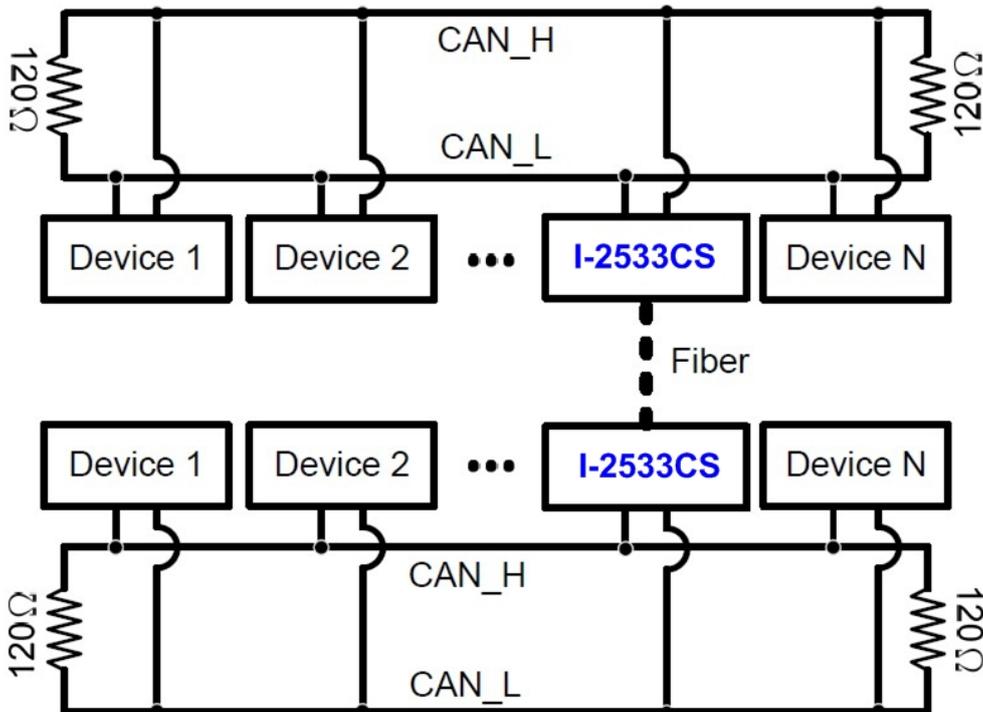


*Figure 2-10 Application 1*

# 2.7. Module Group ID

The CAN port with the same "Group ID" setting can communicate with each other via fiber optics. This setting is used for I-2533CS series to communicate with the others modules on star topology application.
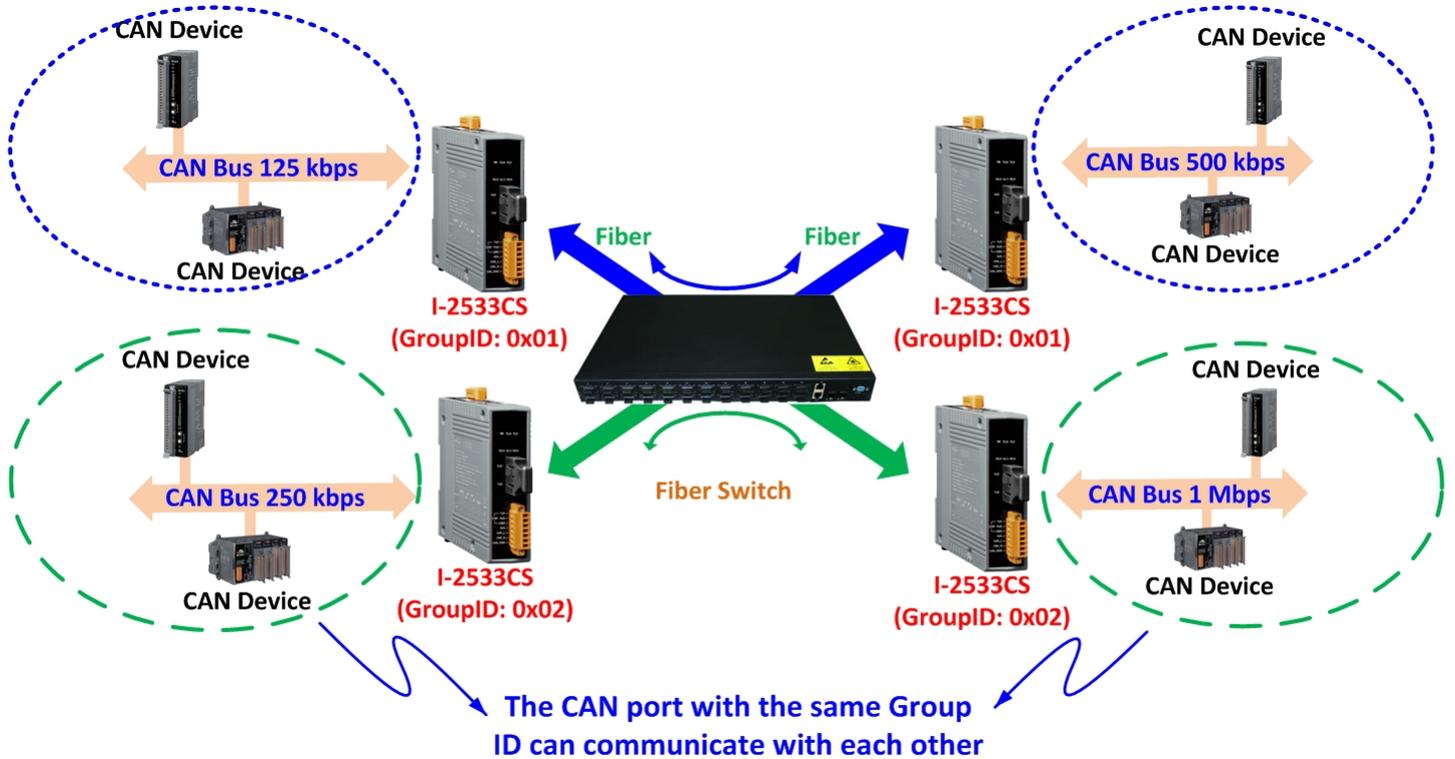


Each I-2533CS series includes one DIP switch for "Group ID". Users can decide the value from 0 to 3. The DIP switch for "Group ID" is under the power connector.
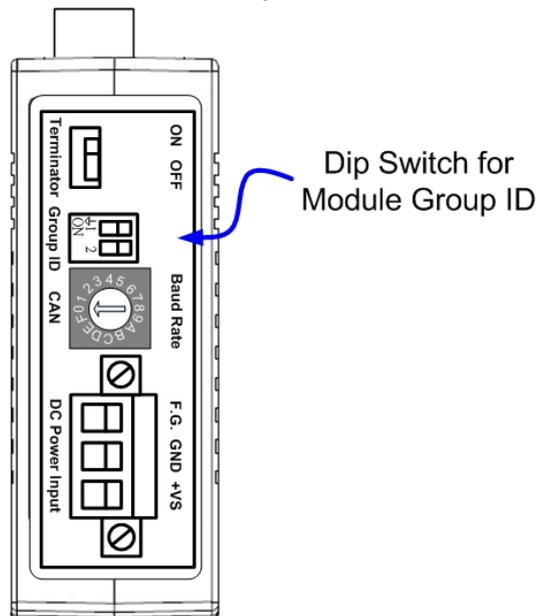


*Figure 2-11 Location of Group ID DIP Switch*

The following DIP switch statuses present the "Module Group ID" value.

Table 2-4 Group ID Description

| Dip switch statuses | Group ID value |
|---|---|
| | **00** |
| | **01** |
| | **02** |
| | **03** |
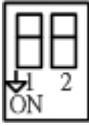
The following "Module Group ID" values of device A and B present these ID are in the same group which can communicate with each other.

Table 2-5 Group of "Module Group ID"

| Device A Group ID value | Device B Group ID value |
|---|---|
| **00** | **00** |
| **01** | **01 or 03** |
| **02** | **02 or 03** |
| **03** | **01 or 02 or 03** |

For example, there are three CAN networks, Network A, Network B and Network C, and each of them uses one I-2533CS. The Group IDs of the I-2533CSs are 1, 2, and 3 respectively. The Network A can exchange the data with Network C because the Group IDs of the I-2533CSs are in the same group (the second rule in the above table). The Network B can exchange the data with Network C, which follows the third rule in the above table. The Network A can't connect with the Network B because these two I-2533CSs are not in the same group.

**Note:**

I-2533CS-A and I-2533CS-B don't support the Group function. When using the I-2533CS-A and I-2533CS-B, the Group ID of them must be the same.

# 2.8. Wire Connection

The wire connection of the I-2533CS series is displayed below.
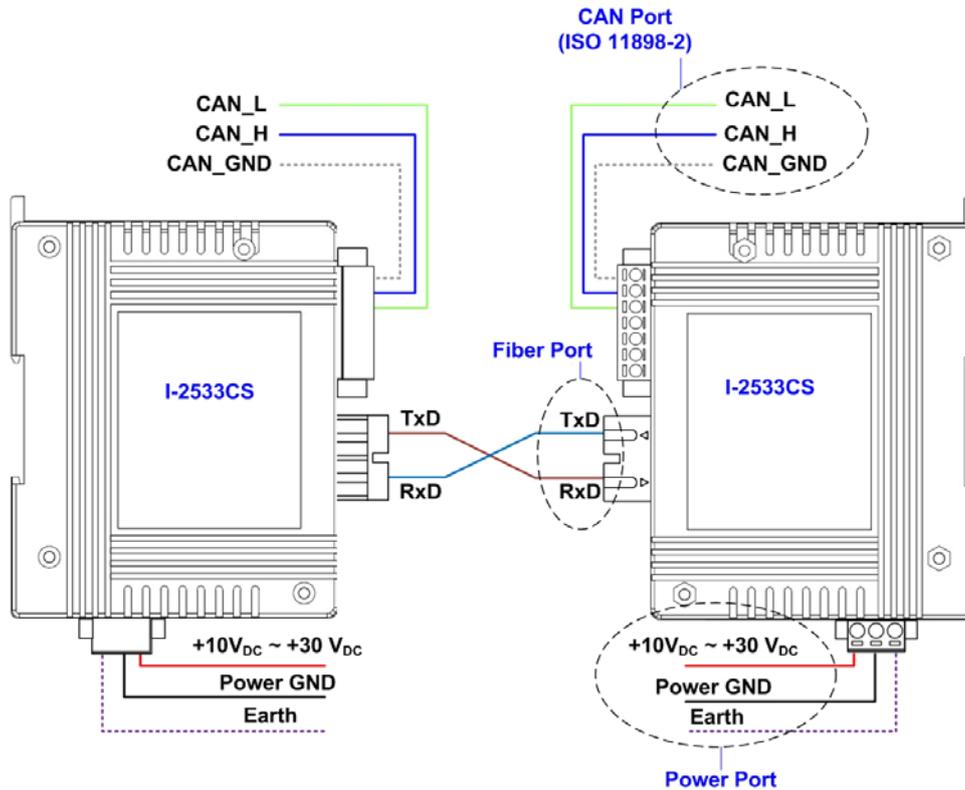


*Figure 2-12 Wire Connection for I-2533CS and I-2533CS-60*
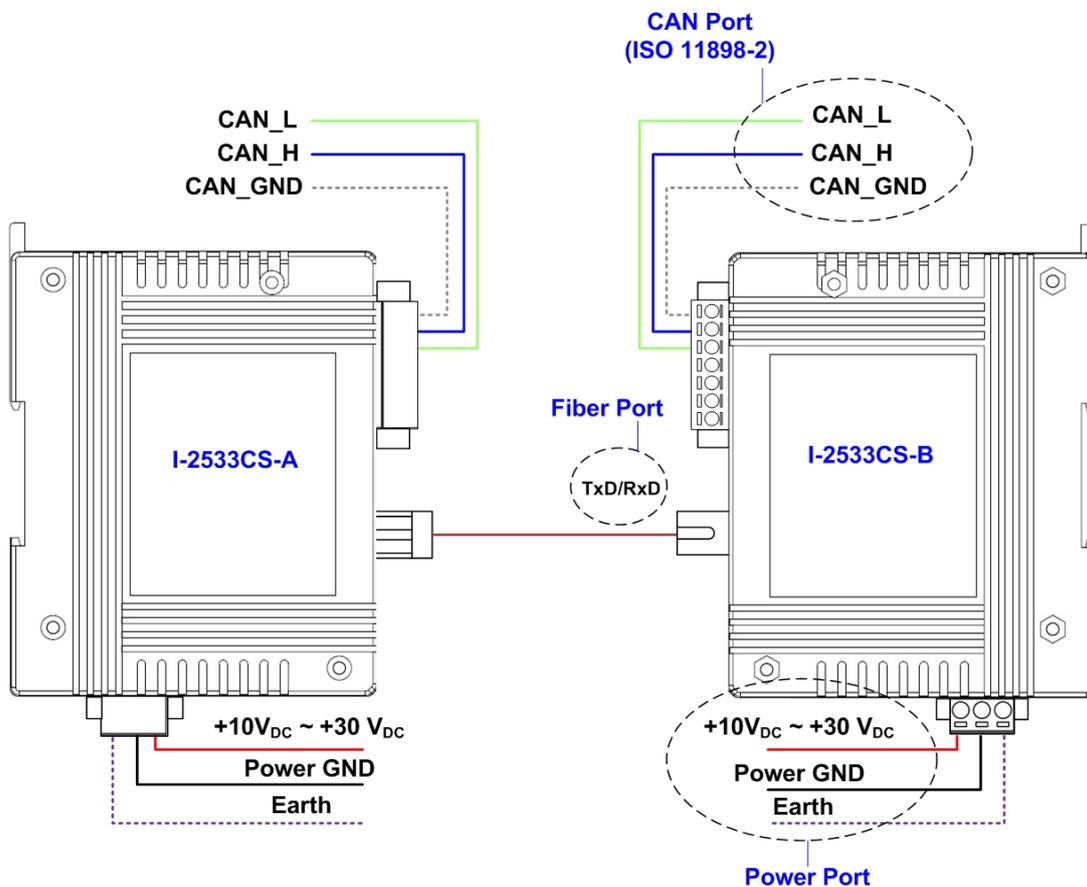


*Figure 2-13 Wire Connection for I-2533CS-A and I-2533CS-B*

# 3. Network Deployment

## 3.1. Driving Capability

Before introducing the driving capability of the I-2533CS series, some characteristics of copper cable must be assumed. The AC parameters are 120Ω impedance and 5ms/, line delay, and the DC parameter follows the table show below.

Table 3-1 Recommended DC parameter for CAN Bus Line

| Wire Cross-Section [mm$^2$] | Resistance [Ω/km] |
|---|---|
| ~0.25 (AWG23) | < 90 |
| ~0.5 (AWG20) | < 50 |
| ~0.8 (AWG18) | < 33 |
| ~1.3 (AWG16) | < 20 |

Under the condition described above, users can refer to the following table to know the maximum node number in each segment following ISO 11898-2 and the maximum segment length when using different type of wire.

Table 3-2 Driving Capability

| Wire Cross-Section [mm$^2$] | The maximum segment length [m] under the case of specific node number in this segment | | | |
|---|---|---|---|---|
| | 16 Nodes | 32 Nodes | 64 Nodes | 100 Nodes |
| ~0.25 (AWG23) | < 220 | < 200 | < 170 | < 150 |
| ~0.5 (AWG20) | < 390 | < 360 | < 310 | < 270 |
| ~0.8 (AWG18) | < 590 | < 550 | < 470 | < 410 |
| ~1.3 (AWG16) | < 980 | < 900 | < 780 | < 670 |

## 3.2. Fiber Selection & Fiber Length

The specification of fiber cable used to connect the I-2533CS series is shown as following table.

Table 3-3 Specification of Fiber

| Type | Diameter [µm] (Core/Cladding) | Operating Wavelength [nm] |
|---|---|---|
| Single mode | 8.3/125, 8.7/125, 9/125 or 10/125 | 1310 |

I-2533CS series allows maximum 30km fiber length for each kind of CAN baud. Although the maximum fiber length has no relationship with the CAN baud rate, but some fiber attributions, such as attenuation, still influence it. Higher attenuation of fiber will reduce the transmission distance. User can use following table to know the relationship between those two.

Table 3-4 The relationship between CAN baud rate and indicative Fiber length

| Module Name | CAN Baud Rate [bit/sec] | Allowed Fiber length [km] |
|---|---|---|
| I-2533CS | | 30 |
| I-2533CS-60 | 1 M ~ 10 k | 60 |
| I-2533CS-A / I-2533CS-B | | 15 |

Table 3-5 Attenuation & Fiber Length

| Module Name | Attenuation [dB/km] | Allowed Fiber length [km] |
|---|---|---|
| I-2533CS | 0.4 | 30 |
| | > 0.4 | < 30 |
| I-2533CS-60 | 0.4 | 60 |
| | > 0.4 | < 60 |
| I-2533CS-A / I-2533CS-B | 0.4 | 15 |
| | > 0.4 | < 15 |

# 4. Setup the I-2533CS series

When users want to use user-defined CAN baud rate and CAN message filter on the I-2533CS series, the I-2533CS Utility tool may be needed.

## 4.1. Install the I-2533CS Utility

Step 1: Get the I-2533CS Utility
The software is located at:
https://www.icpdas.com/en/download/show.php?num=511&model=I-2533CS

Step 2: Install .NET Framework 4 component
The I-2533CS Utility tool requires the .NET Framework 4 components. After executing the "Setup.exe" file, it will start to install .NET Framework 4 components.
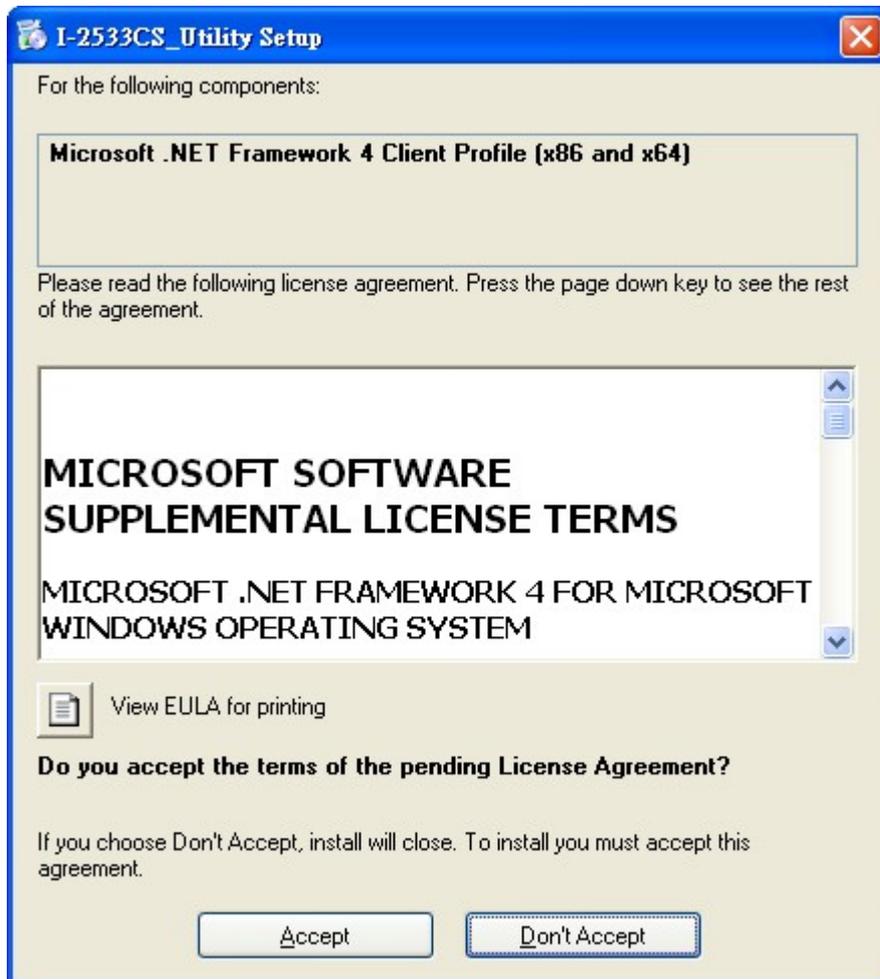
Step 3: Install Utility tool
   After installing the .Net Framework components, the software will continue to install the Utility tool.
   1.  Click the "Next" button to continue.
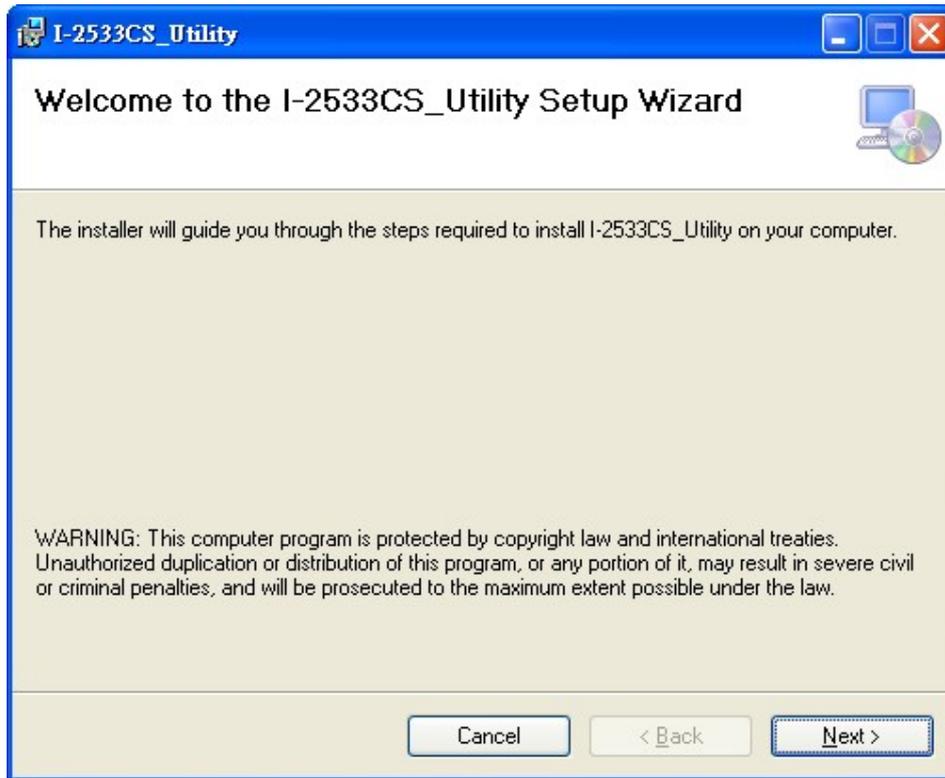


   2.  Select the installation path of the I-2533CS Utility and click the "Next" button.
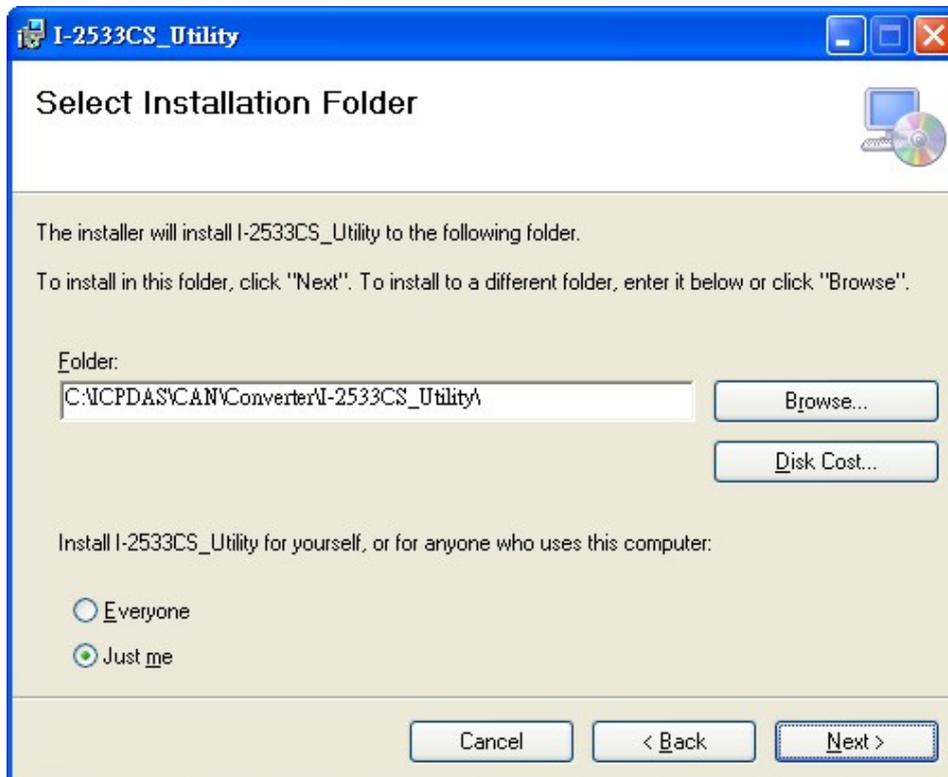
3. Confirm the installation. Click the "Next" button to start the installation
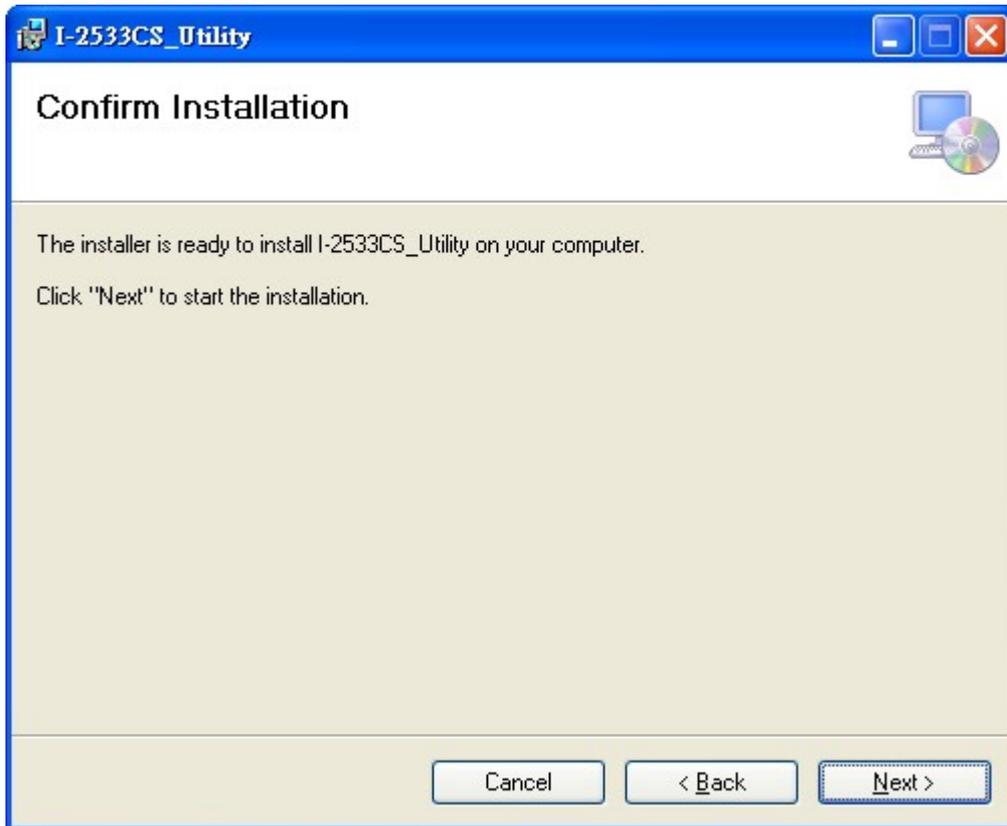


4. Installation complete. Click the "Close" button to exit
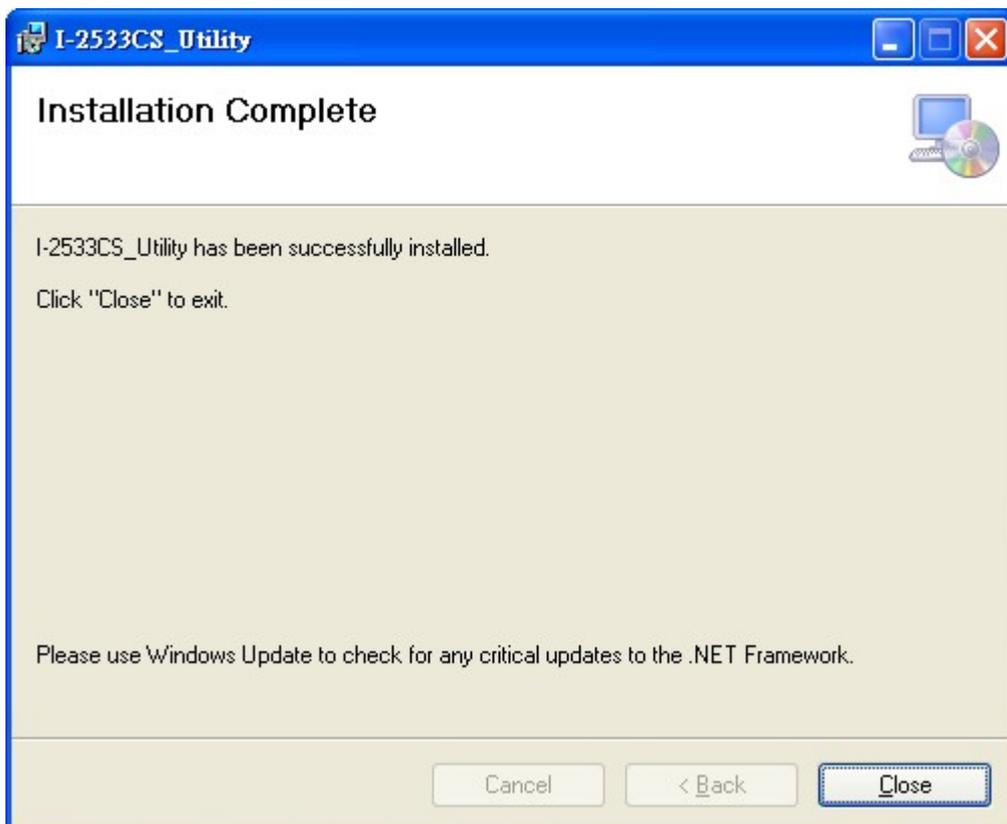
## 4.2.  Setting up the I-2533CS series

After installing the utility tool, please follow the following steps to set up the communication between the Utility and the I-2533CS series. Here is the example for the I-2533CS configuration.

Step 1: Power off the I-2533CS.

Step 2: Set the rotary switch to 'F' and connect the PC available COM port with the COM port of the I-2533CS. Users can find the communication cable (CA-0910) in the product box. When connecting to the COM port of I-2533CS, the TXD pin of the cable is connected to the TXD pin of the I-2533CS COM port, RXD pin of the cable is connected to the RXD pin of the I-2533CS COM port, and GND pin of the cable is connected to the GND pin of the I-2533CS COM port.
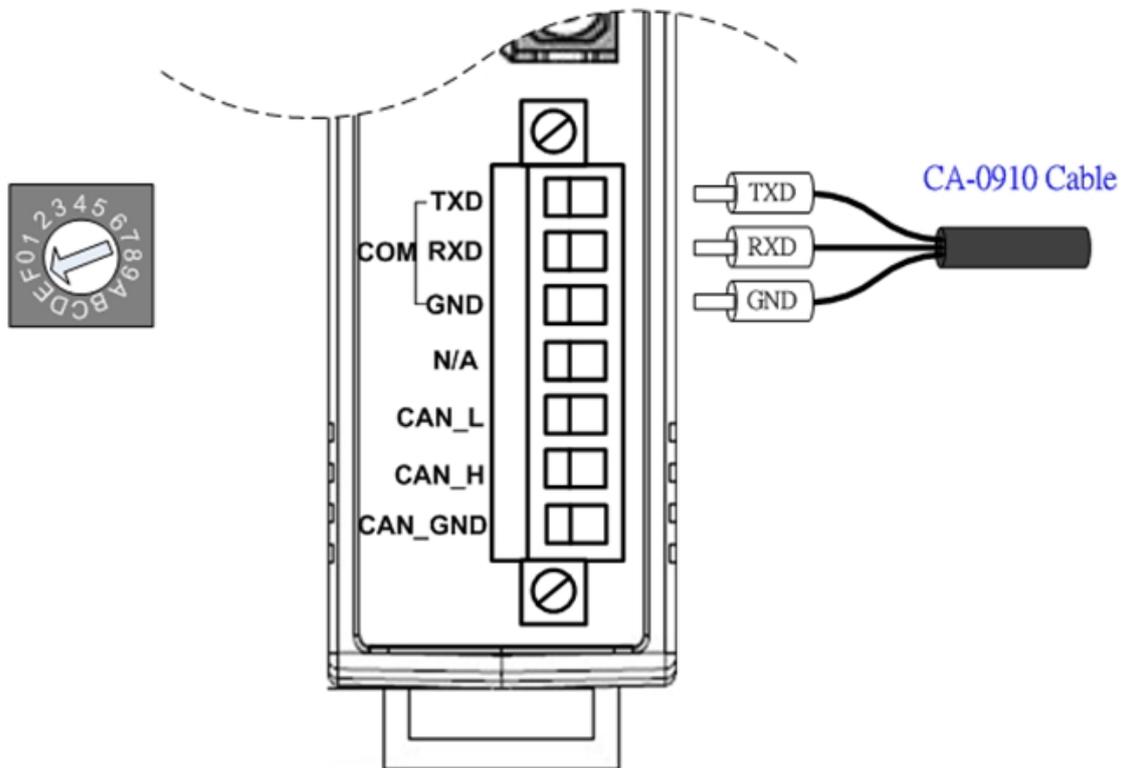


Figure 4-1 Wire connection of the RS-232

Step 3: Power on the I-2533CS. Then, the CAN_Err, CAN_Tx, CAN_Rx, FB_Err LEDs will take turns to flash per 500 milliseconds.

Step 4: Execute the I-2533CS Utility tool.

# 4.2.1. User-defined CAN Baud Rate Configuration

I-2533CS series allows users to set the special CAN baud rate by using the "User-defined CAN Baud Rate" field of the Utility.



Figure 4-2 Set and read the CAN filter configuration

The CAN bus baud rate is calculated by the parameter **BRP** (Baud Rate Prescaler), **TSEG1** (The delay from the nominal Sync point to the sample point minus one) and **TSEG2** (The delay from the sample point to the next nominal sync point minus one).

Please refer to the following formula to calculate the BRP, TSEG1 and TSEG2 parameters of your expected CAN baud rate and click the "Save" button to download this parameter into module.

**Expected CAN baud rate = 48000 / ((BRP +1) * (TSEG1 + TESG2 + 3))   (Kbps)**

**Note:**
**BRP:**     Baud Rate Prescaler.
           Range: **0x000 ~ 0x3FF**
**TSEG1**:   The delay from the nominal Sync point to the sample point minus one.
           Range: **0x0 ~ 0xF**
**TSEG2**:   The delay from the sample point to the next nominal sync point minus one.
           Range: **0x0 ~ 0x7**

**Example:**
Expected CAN baud rate = 1000 Kbps
BRP: 0x003
TSEG1: 0x9
TSEG2: 0x0

1000 (Kbps) = 48000 / ((3 +1) * (9 + 0 + 3))

# 4.2.2. CAN Filter Configuration

There are two parts of CAN filter configuration. One is "Download CAN Filter" which functions as setting the CAN filter and downloading the configuration to the I-2533CS. Another is "Read CAN Filter" which provides read back the CAN filter configuration form the I-2533CS series.



Figure 4-3    Set and read the CAN filter configuration



Figure 4-4    CAN filter configuration dialog

# 4.2.2.1. Configure a CAN Filter to the I-2533CS

When users set the CAN filter first time, they need use "Download CAN Filter" field.

Step 1: Click the "Create CAN Filter File" button to start setting CAN filter.



Figure 4-5 Create CAN filter file

Then users would see the following window pop-up.



Figure 4-6 CAN filter configuration dialog

Step 2: Add the CAN filter with single CAN ID or group of CAN ID. The CAN message with the ID in the list will be received, otherwise it will be dropped.
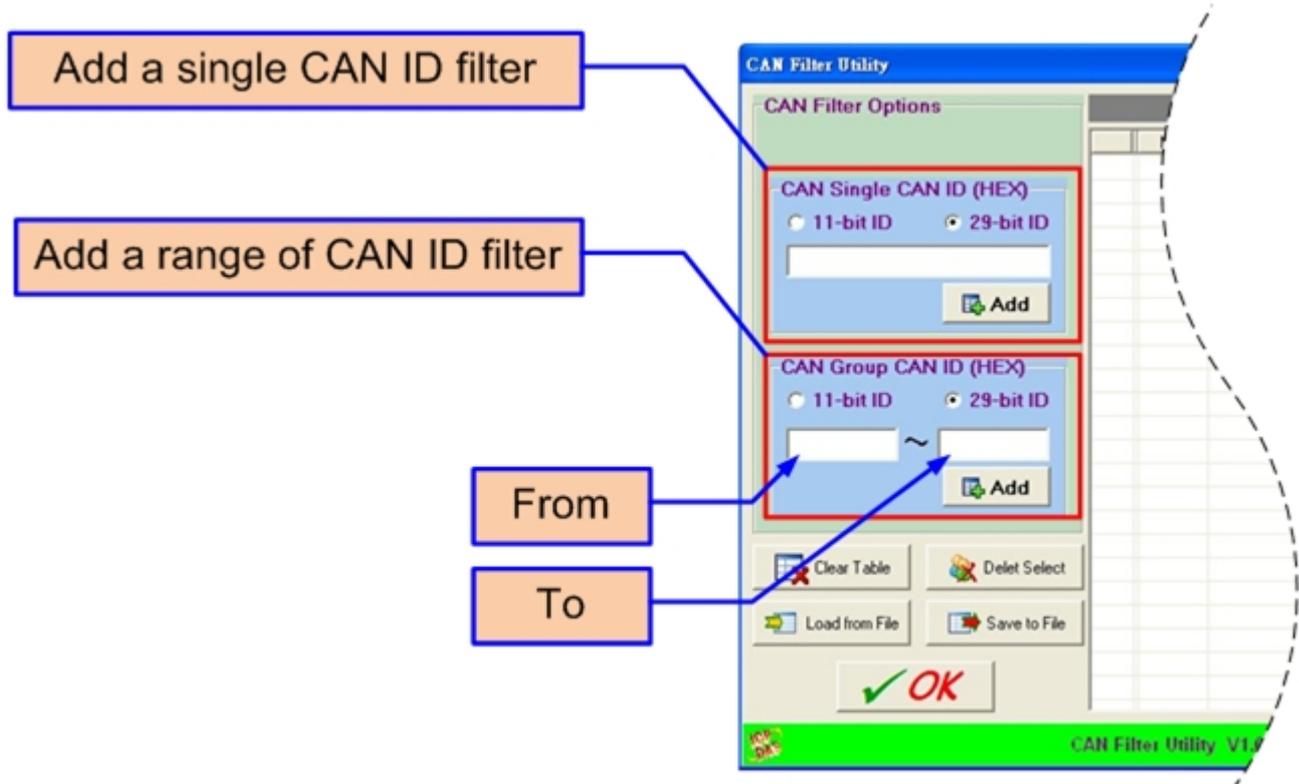


Figure 4-7 Add single or group of CAN filter

For example, if users want to pass the CAN ID 0x07F in the CAN 2.0B specification. Firstly, select "29-bit ID" item in the "CAN Single CAN ID" field. Secondly, fill the value "7F" in the edit box. Finally, click "Add" button in the "CAN x Single CAN ID" field.

Moreover, if users want to pass the CAN 2.0A messages with CAN ID 0x04 ~ 0x15 while these messages are received by the CAN port 1 Firstly, select "11-bit ID" item in the "CAN x Group CAN ID" field. Secondly, fill the value "4" in the "Start" field and the value "15" in the "End" field. Finally, click "Add" button in the "CAN x Group CAN ID" field.

After completing those two examples, users could see the follow picture.



Figure 4-8 Two CAN filter data

The "No." field shows the sequential number for each record of the CAN filter configuration.
The "CAN Port" field indicates the record is belong to which CAN port.
The "Accepted IDs" field displays that which CAN ID would be received.
An icon in the head of the line may represent the following information.

: This record is the CAN filter of 11-bit and single CAN ID.

: This record is the CAN filter of 11-bit and group CAN ID.

: This record is the CAN filter of 29-bit and single CAN ID.

: This record is the CAN filter of 29-bit and group CAN ID.

Step 3: When completing the CAN filter configuration, click the "Save to File" button to save it by using a record file with "*.FLT" extension file name.
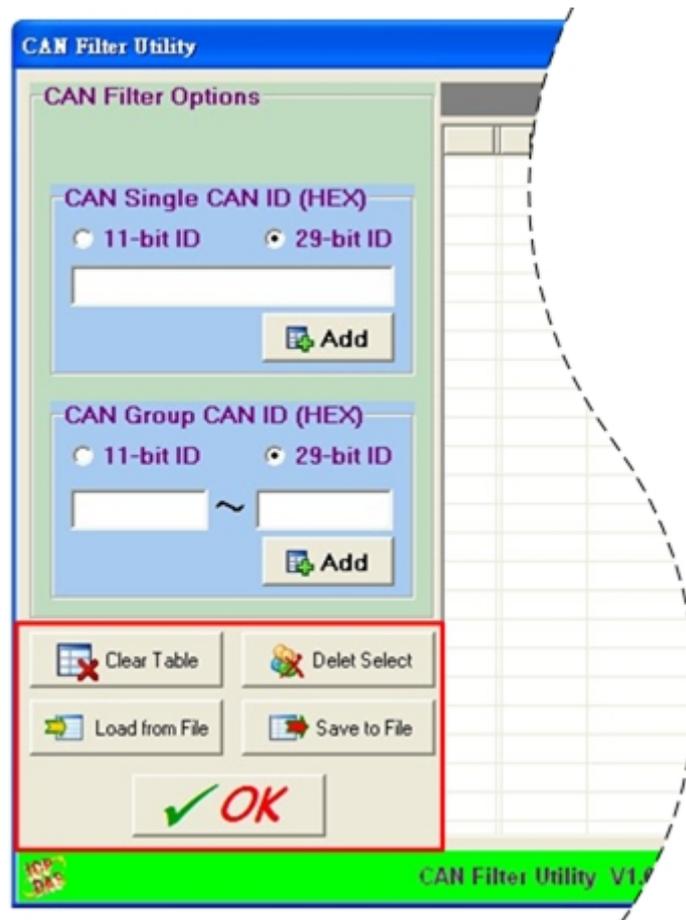


Figure 4-9 Five buttons in CAN filter configuration dialog

There are more five buttons to help users configuring the CAN filter.
1. "Clear Table" button would delete all CAN filter records in the list.
2. "Delete Select" button would delete the selected CAN filter record.
3. "Load from File" button allows users to load the configuration from the existent CAN filter file (*.FLT).
4. "Save to File" button provides the function to save the current CAN filter configuration into a file (*.FLT).
5. "OK" button would exit the configuration dialog.

Step 4: Check the "Enable CAN Filter" item to make the CAN filter enable.
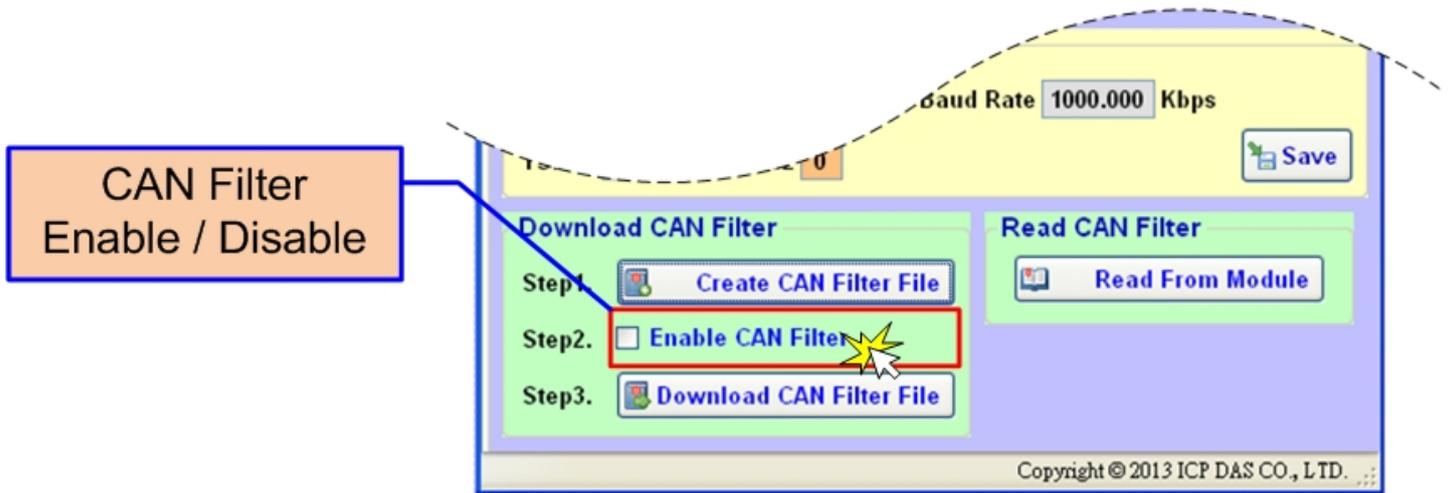


Figure 4-10 CAN filter status

Step 5: Click "Download CAN Filter File" to download the selected CAN filter file into the I-2533CS series.
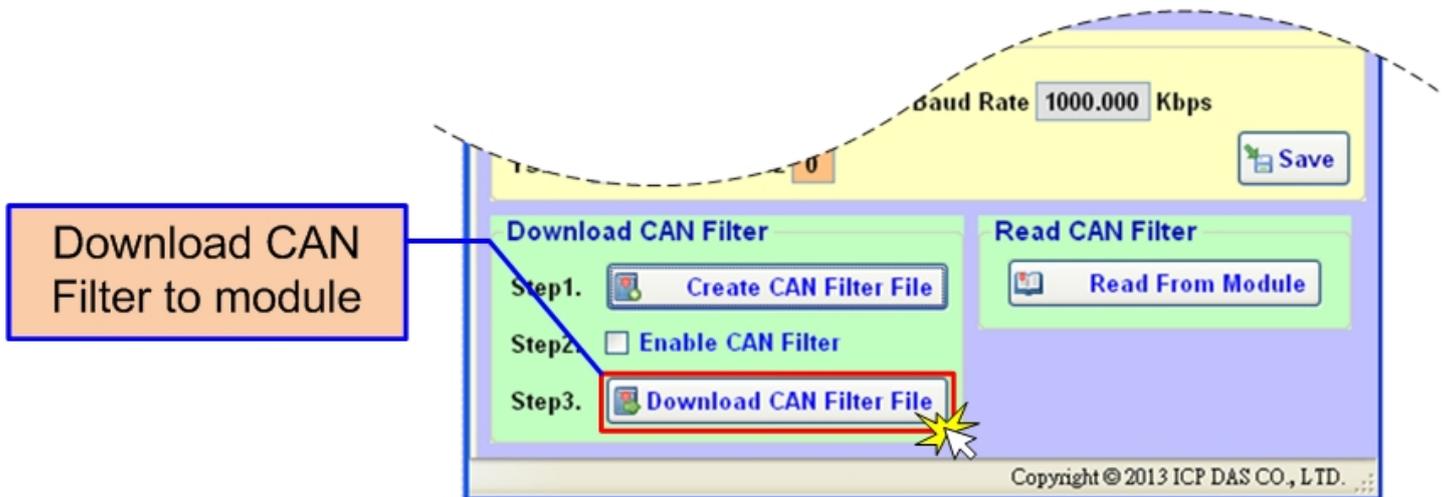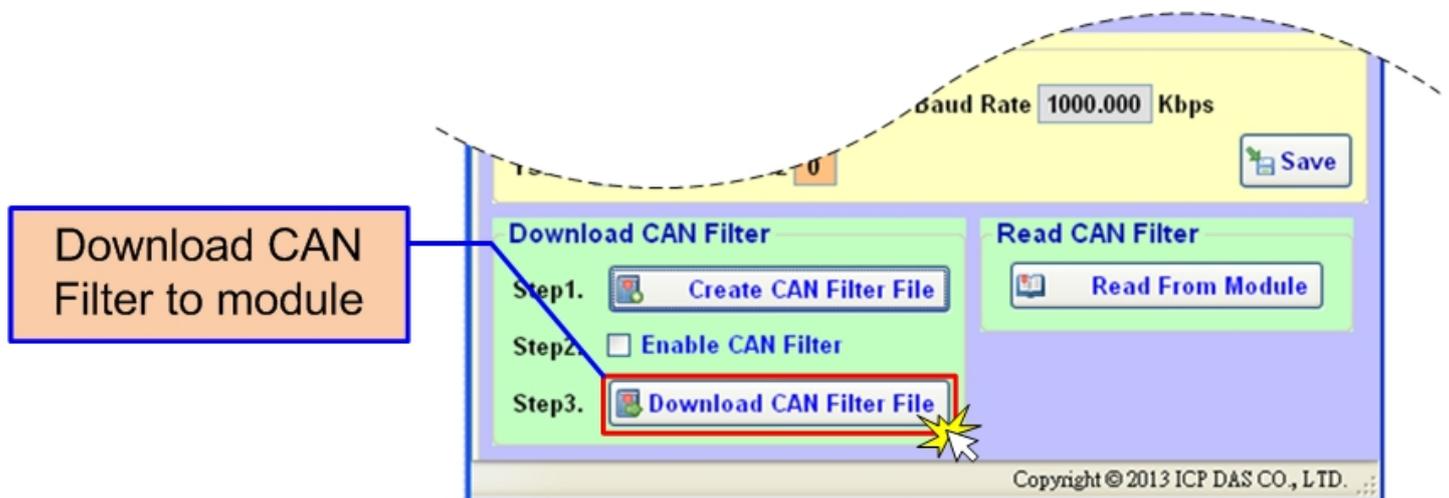


Figure 4-11 Download CAN filter data

After finishing all the steps above, users need to reset the module to enable the configuration by turning it off and then turning it on. If users want to review the configuration, click "Read From Module" button to read back the information.

# 4.2.2.2. Download Existent CAN Filter File to the I-2533CS

The steps are the same as step 4 and 5 of the section 4.2.2.1.

Step 1: Check the "Enable CAN Filter" item to make the CAN filter enable.
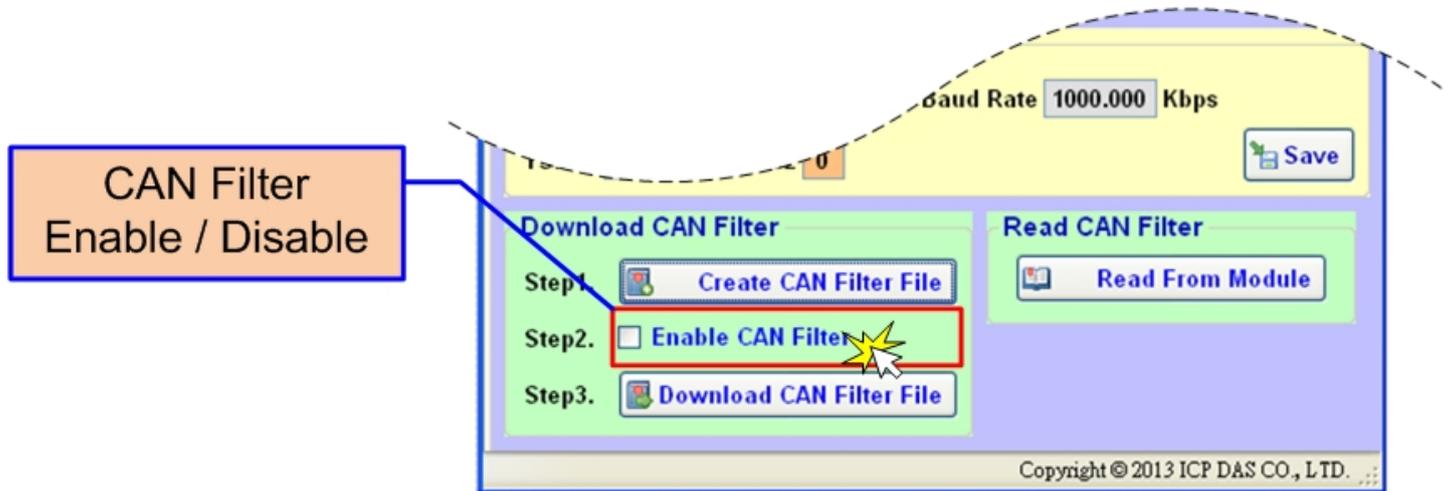


Figure 4-12 CAN filter status

Step 2: Click "Download CAN Filter File" to download the selected CAN filter file into the I-2533CS series.



Figure 4-13 Download CAN filter data

After finishing all the steps above, users need to reset the module to enable the configuration by turning it off and then turning it on. If users want to review the configuration, click "Read From Module" button to read back the information.

# 4.2.2.3. Read the I-2533CS CAN Filter Configuration

Click the "Read from Module" to read the CAN filter setting from the I-2533CS series.
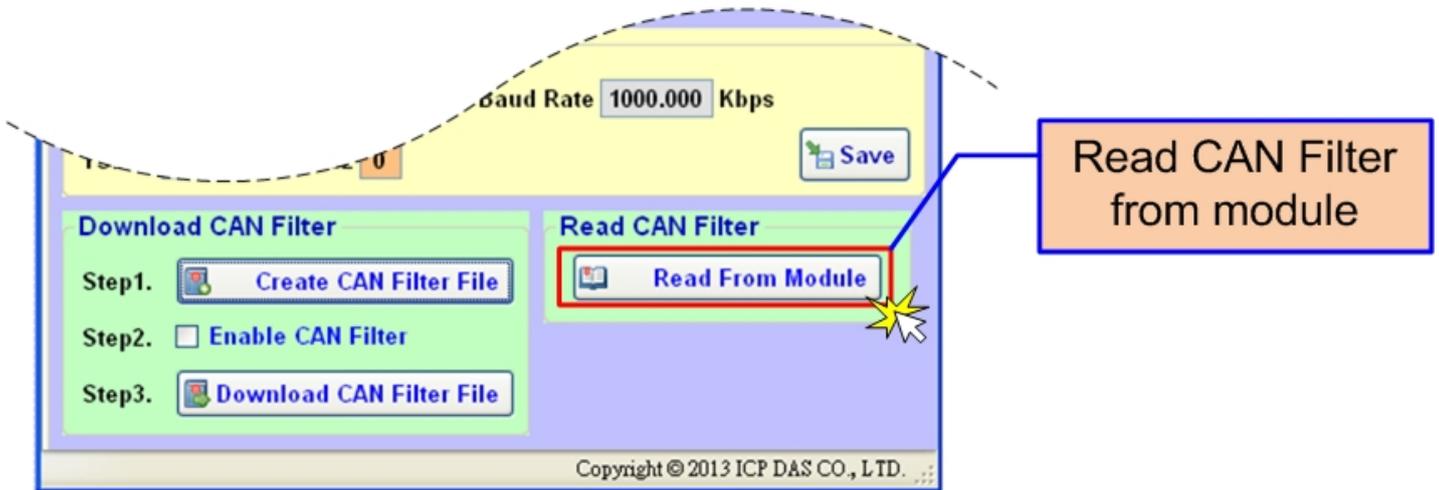


Figure 4-14 Read CAN filter form the I-2533CS

If reading the CAN filter data successfully, users would see the configuration dialog such as "Create CAN Filter File". Users can modify the CAN filter setting if necessary, or save it into a file.
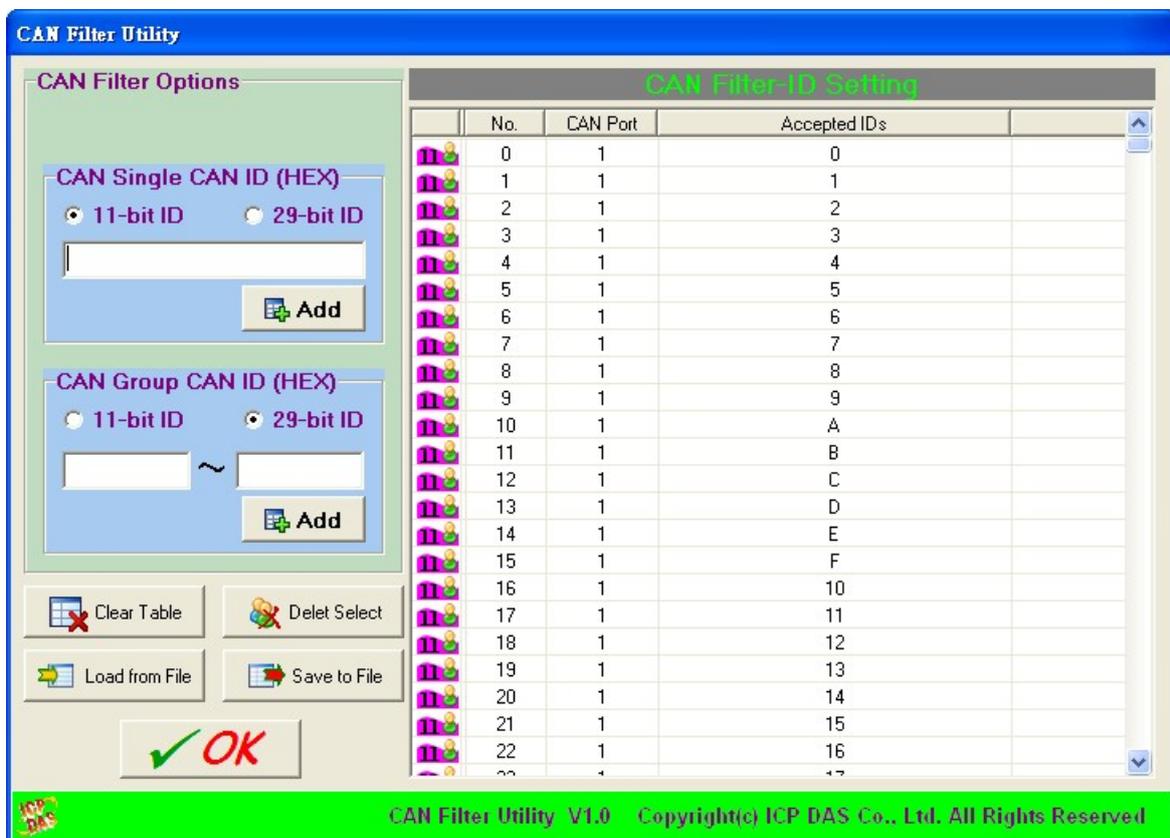


Figure 4-15 CAN filter id setting

# 5. Firmware Upgrade

Please refer to the following steps to upgrade the firmware of module. Here uses the I-2533CS for example.

Step 1: Power off the I-2533CS.

Step 2: Set the rotary switch to 'E' and connect the PC available COM port with the COM port of the I-2533CS. Users can find the communication cable (CA-0910) in the product box. When connecting to the COM port of I-2533CS, the TXD pin of the cable is connected to the TXD pin of the I-2533CS COM port, RXD pin of the cable is connected to the RXD pin of the I-2533CS COM port, and GND pin of the cable is connected to the GND pin of the I-2533CS COM port.
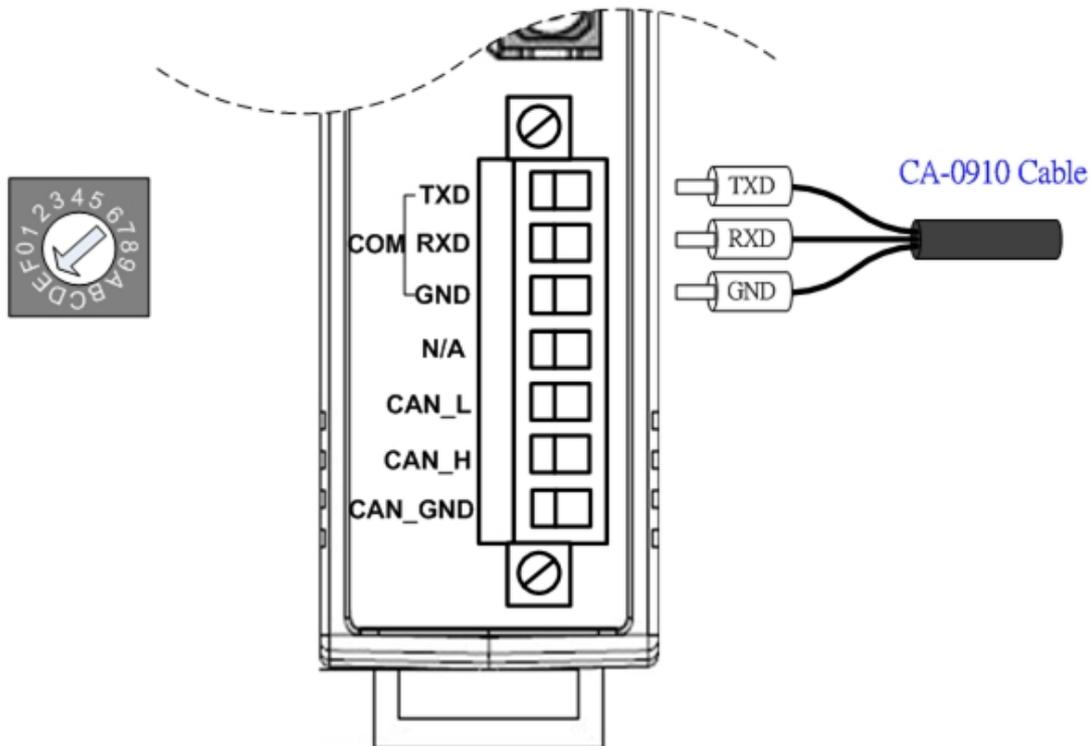


Figure 5-1 Wire connection of the RS-232

Step 3: Power on the I-2533CS. Then, the CAN_Err, CAN_Tx, CAN_Rx, FB_Err LEDs will flash per 500 milliseconds.

Step 4: Get the "Firmware Update Tool" and firmware fire.
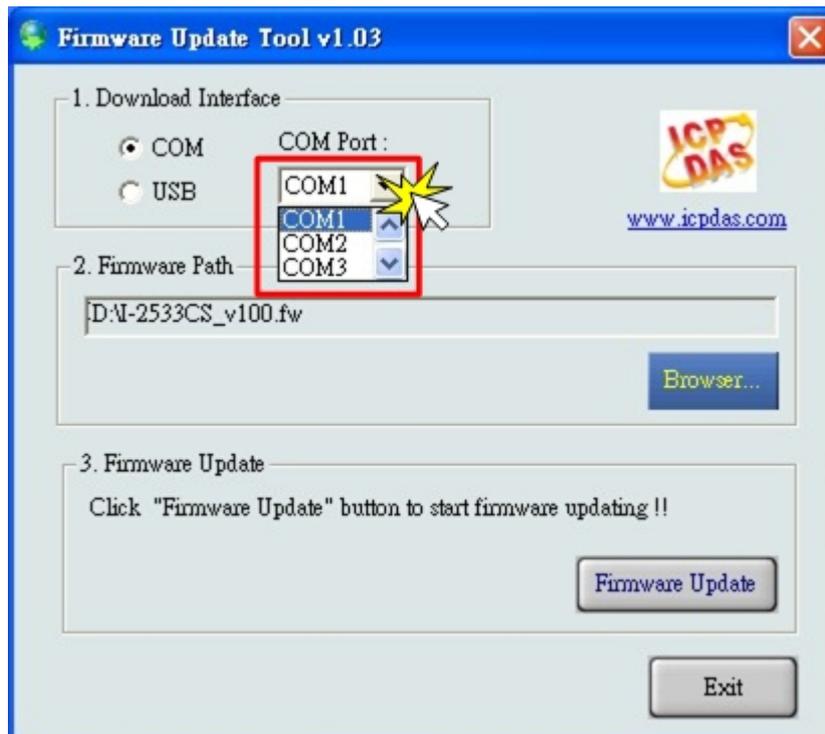The software is located at:
https://www.icpdas.com/en/download/show.php?num=511&model=I-2533CS

The firmware is located at:
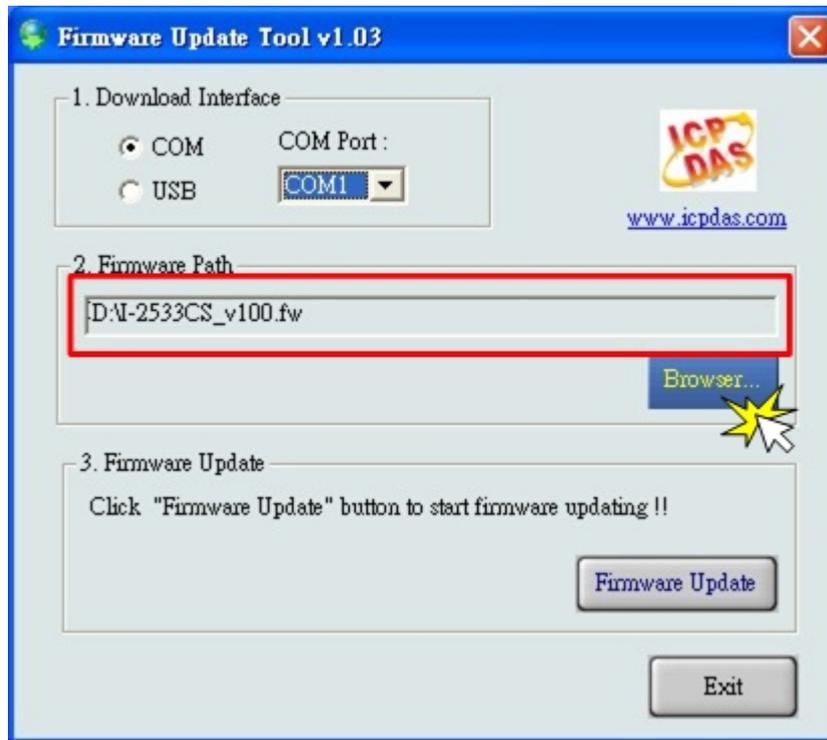https://www.icpdas.com/en/download/show.php?num=506&model=I-2533CS
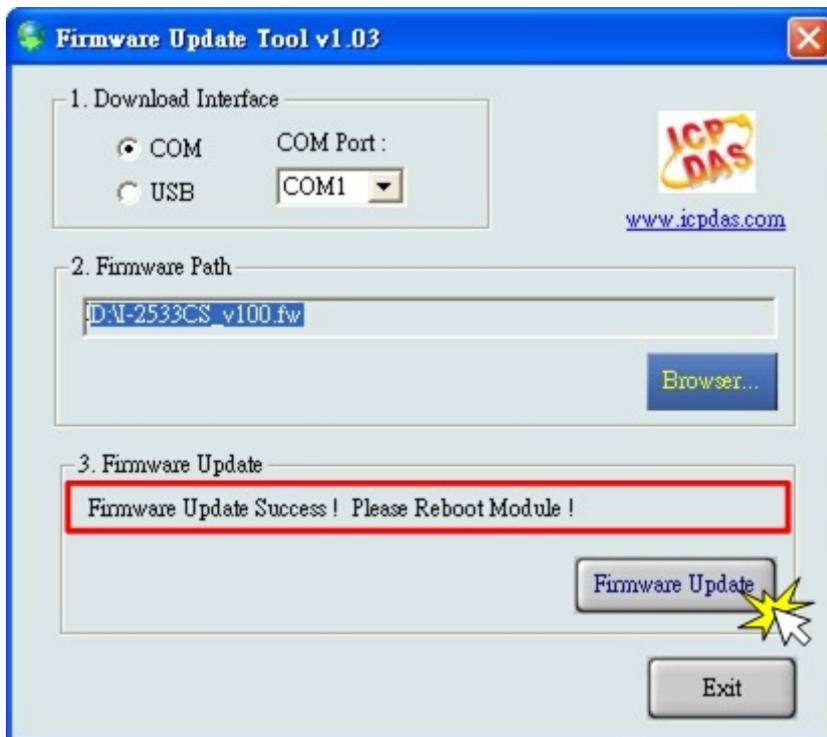
Step 5: Execute the "Firmware Update Tool".
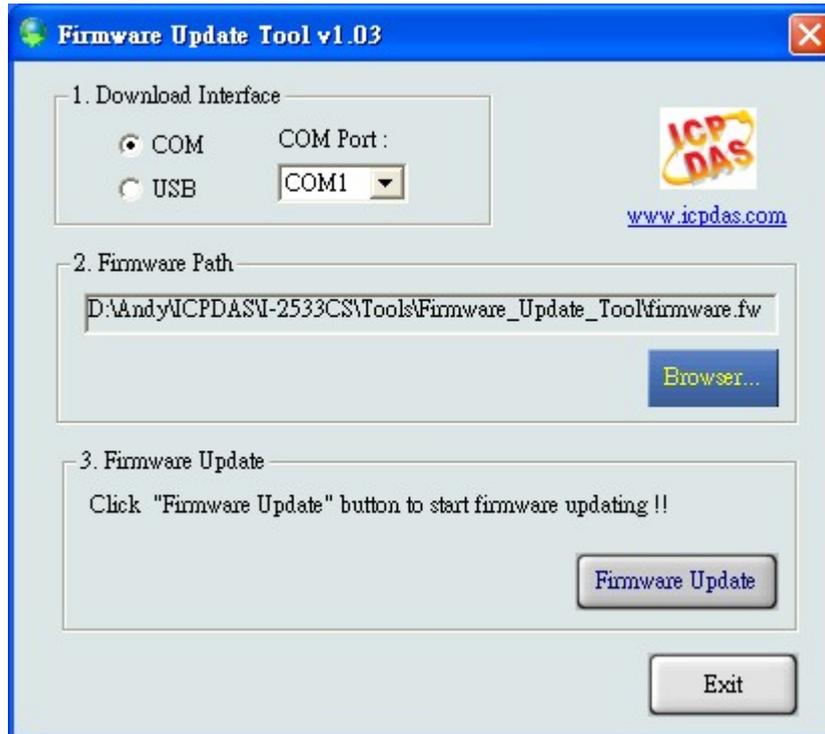


Step 6: Select the necessary COM port of PC.

Step 7: Press the "Browser…" button and select the firmware file (*.fw).
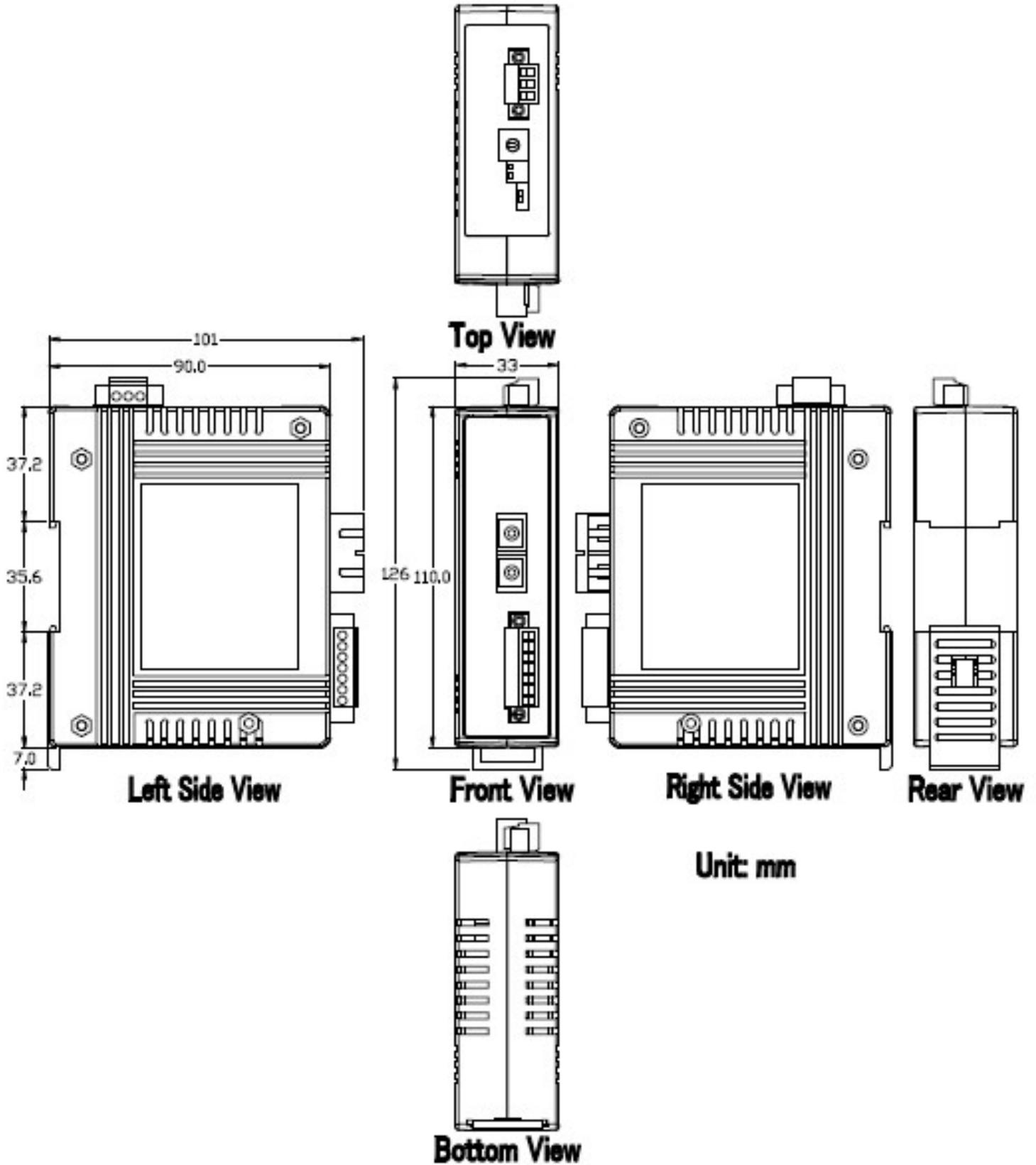


Step 8: Press the "Firmware Update" button to update the firmware. After successfully to update the firmware, the "Firmware Update Success! Please Reboot Module!" information will be display on the "3. Firmware Update" frame.



Step 9: Reboot the module and press the "Exit" button to exit.

# 6. Dimension



Top View

Left Side View

Front View

Right Side View

Rear View

Bottom View

Unit: mm

# 7. EMI Ferrite Split/Snap-On Core

EMI Ferrite Split/Snap-On Core

## ■ Features

- Aimed to suppress low frequency noise generated by engine control units, inverters, and motors
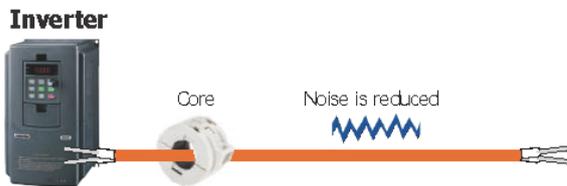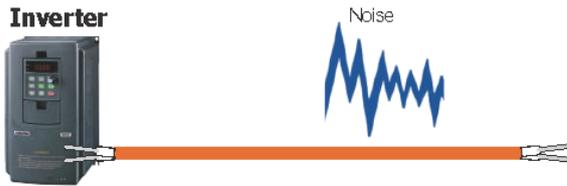- Split type
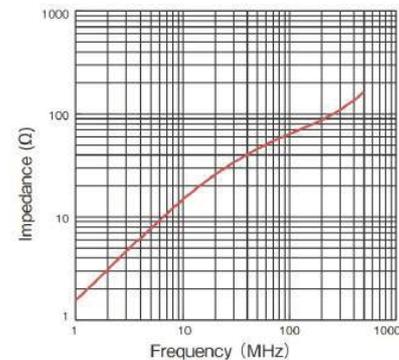- Operation Temperature: -40 °C ~ 75 °C

## ■ Introduction

The split ferrite cable cores are designed to significantly reduce EMI/RFI for round cables.

The hinged plastic case surrounding the split core is designed to clamp onto the cable to provide a secure fixture of the ferrite onto the cable. The cores can be retrofitted onto existing installations or used in post-assembly operations on the data and power cables of electronic equipment. Ferrite cores are important for ensuring strong electronic signals through cables in environments where EMI or RFI can be an issue.

## ■ Applications

**RS-232, RS-422, RS-485, CAN bus, FRnet, PROFIBUS, Ethernet, USB, AC/DC Power line..etc**

Inverter — Noise

Inverter — Core — Noise is reduced

RS-232

PROFIBUS

## ■ Specifications

| Max. Cable Diameter | Ø13 mm |
| --- | --- |
| Material Type | Board Band Material |
| Additional Description | Plastic Case |
| Case Color | White |

## ■ Dimensions (Units: mm)

Ø13.6

28.9

31.1

Front View

17.8

Left Side View
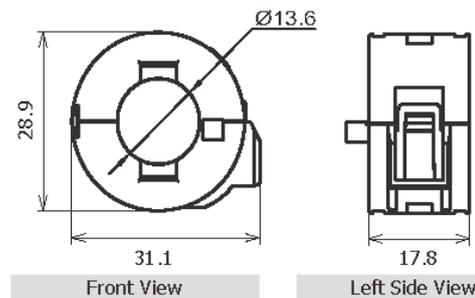
## ■ Characteristic

Test condition:
Wire: UEWφ0.5 mm / Length 50 mm / 1 Turn

## ■ Installation

| A | B | C | D |
| --- | --- | --- | --- |
| | | The folder laps more the better | Add Tie to prevent core open |
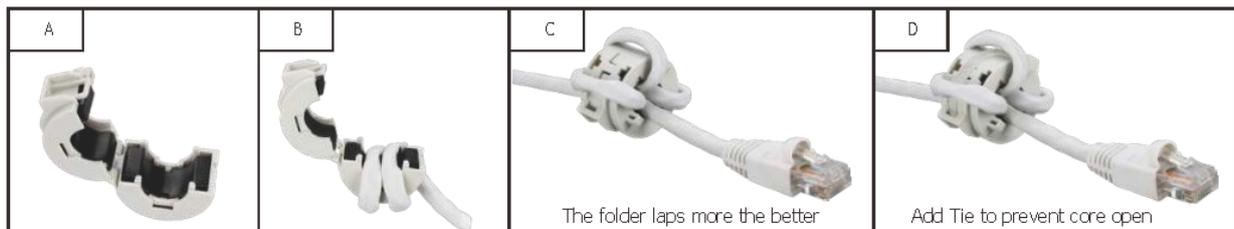
## ■ Ordering Information

| CD-002 CR | 10 ferrite cores in one package (RoHS) |
| --- | --- |