
I-2534 & I-5534-M

Industrial 4-port CAN bus switch

User Manual

Warranty

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Revision

| Version | Firmware Version | Date | Author | Description |
|---------|------------------|---------------|--------|----------------|
| 1.1 | 1.0 | 2012 09/14 | Johney | Update errata. |
| 1.0 | 1.0 | 2012 05/25 | Johney | New release. |

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1 Introduction

The I-2534 and I-5534-M are both CAN switch used to establish a connection among four CAN bus sub-networks. In order to solve the problem of the star topology within the CAN network, the I-2534 and I-5534-M are specially designed for integrating four CAN networks or solving the star topology. Not just like general CAN repeater, the I-2534 and I-5534-M have three more important features.

- (1) Extends the CAN bus working distance.
- (2) Connects four CAN sub-networks with the different baud rate.
- (3) Enhances the capacity of CAN network.

The limitation of the CAN bus transmission distance on each CAN port is independent, which means the total CAN network distance can be extended by the routing mechanism as the figure 1-1.

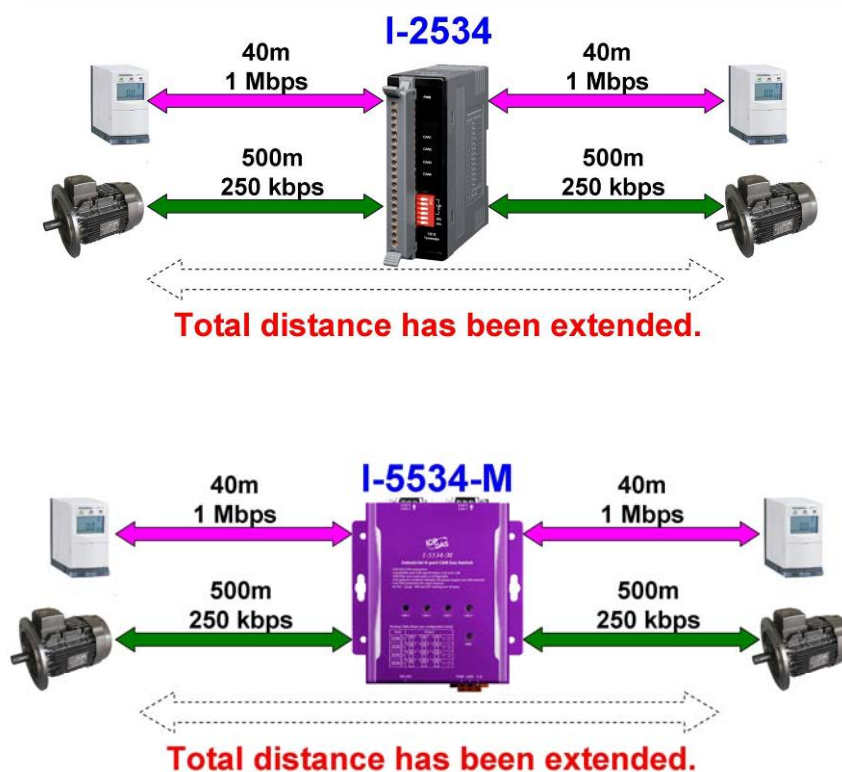


Figure 1-1: Application to extern the transmission distance

The I-2534 and I-5534-M could transfer the CAN messages among four independent CAN networks. When the CAN bus system on one port of the I-2534 or I-5534-M has some errors (e.g. short circuit), it will not affect the system on the other three ports. Besides, the I-2534 and I-5534-M both provide the message filters; this feature is useful while there are different bus loadings and baud rates on these CAN ports. The baud rate of four CAN ports can be different for highly flexibility as shown in the figure 1-2.

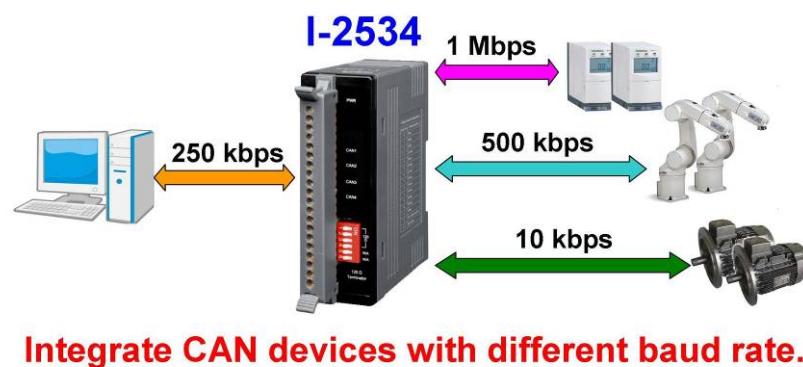
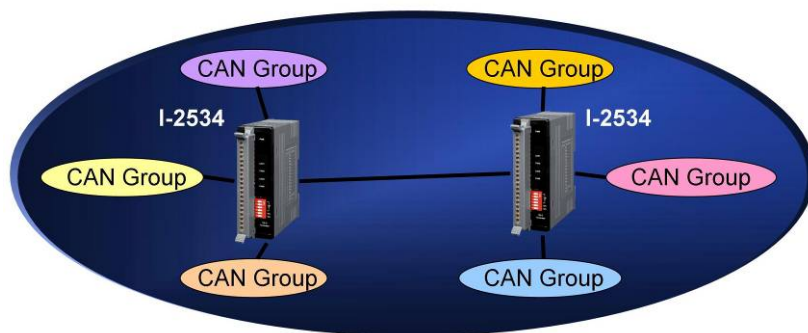
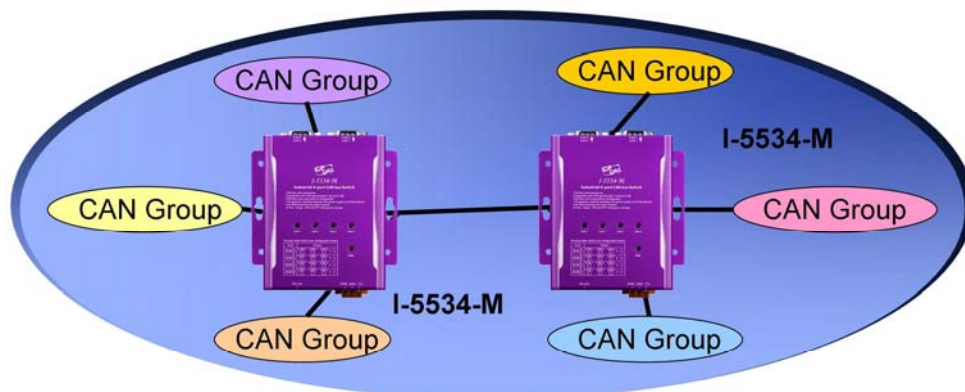


Figure1-2: Application to integrate the devices with the different baud rates.

The I-2534 and I-5534-M could combine the different CAN sub-networks, so it enhances the maximum capacity in the single CAN network. The application likes figure 1-3.



Enhance CAN capacity in single network.



Enhance CAN capacity in single network.

Figure1-3: Application to enhance the capacity of the CAN network.

1.1 Specifications

| Module Name | I-2534 | I-5534-M |
|--------------------------------|--|---|
| CAN Interface | | |
| Transceiver | NXP TJA1042 | |
| Channel number | 4 | |
| Specification | ISO-11898-2, CAN 2.0A and CAN 2.0B | |
| Baud Rate (bps) | 5k, 10 k, 20 k, 33.3 k, 50 k, 62.5 k, 83.3 k, 125 k, 250 k, 500 k, 800 k, 1 M bps and user-defined | |
| Baud Rate Selection | Selectable by rotary switch | |
| Isolation | 3000 V _{DC} for DC-to-DC, 2500 V _{rms} for photo-couple | |
| Terminator Resistor | Selectable 120Ω terminator resistor by DIP switch | Selectable 120Ω terminator resistor by internal jump |
| CAN Connector | 3-pin screwed terminal with CAN_L, CAN_H, CAN_GND | 9-pin male D-Sub with CAN_GND, CAN_SHLD, CAN_H, CAN_L |
| CAN Filter | Configurable by user | |
| RS-232 Configuration Interface | | |
| RS-232 Connector | 3-pin screwed terminal block (TxD, RxD, GND) | 9-pin female D-Sub with (TxD, RxD, GND) |
| Power | | |
| Input range | Unregulated +10 ~ +30 VDC | |
| Consumption | 3W | 1.5W |
| Mechanism | | |
| Installation | DIN-Rail | Wall-Mounting |
| Casing | Flame-Resistant plastic case | aluminum metallic case |
| Dimensions (W x L x H) | 32.3 x 99 x 77.5 mm | 116.5 x 127 x 61.3 mm |
| Environment | | |
| Operating Temp. | -25 ~ 75 °C | |
| Storage Temp. | -30 ~ 80 °C | |
| Humidity | 10 ~ 90% RH, non-condensing | |
| ESD protection | 4 kV Contact for each channel | |
| EFT protection | 500V for signal, 1000V for power | |
| EMI certification | 30M ~ 1G pass | |
| Hi-pot protection | 1kV pass | |
| Surge protection | 1kV pass | |

1.2 I-2534 & I-5534-M Features

- 4 CAN communication ports with screw terminal connector for I-2534 or with 9-Pin D-Sub connector for I-5534-M.
- Flame-Resistant plastic case (I-2534) or aluminum metallic case (I-5534-M).
- TJA1042 CAN transceiver.
- Compatible with CAN specification 2.0A and 2.0B.
- Fully compatible with the ISO 11898-2 standard.
- Baud rate : 5 k, 10 k, 20 k, 33.3 k, 50 k, 62.5 k, 83.3 k, 125 k, 250 k, 500 k, 800 k, 1 M bps and user-defined.
- Configurable CAN message filter.
- Configurable CAN message route path.
- 100-frame buffer for each CAN channel.
- Max data flow up to 2500 fps for total CAN channels.
- Selectable baud rate by the rotary switch.
- 120Ω terminator resistors selected by the DIP switch (I-2534) or by the jumper (I-5534-M).
- LED indication for the CAN status.
- Utility tool for the CAN filter, route path and user-defined baud rate configuration.
- 2500 Vrms isolation on the CAN side
- 3 kV galvanic isolation between the power supply and CAN channel
- 4 kV ESD protection for each CAN channel

1.3 Product Check List

The package of the I-2534 includes the following items:

- ☐ I-2534 module;
 - ☐ Software CD ROM;
 - ☐ Quick Start manual;
 - ☐ Release Note
-

The package of the I-5534-M includes the following items:

- ☐ I-5534-M module;
- ☐ Software CD ROM;
- ☐ Quick Start manual;
- ☐ Release Note

It is recommended that users should read the quick start manual first. All of the important information needed will be provided in the quick start as follows:

- ☐ Where you can find the software driver, utility and demo programs.
- ☐ How to install software & utility.
- ☐ Where is the diagnostic program?
- ☐ FAQs and answers.

Attention !

If any of these items are missing or damaged, please contact your local field agent. Keep aside the shipping materials and carton in case you want to ship or store the product in the future.

2 Technical data

2.1 Block Diagram

The figure 2-1 is the block diagram illustrating the functions of the I-2534 and I-5534-M module.

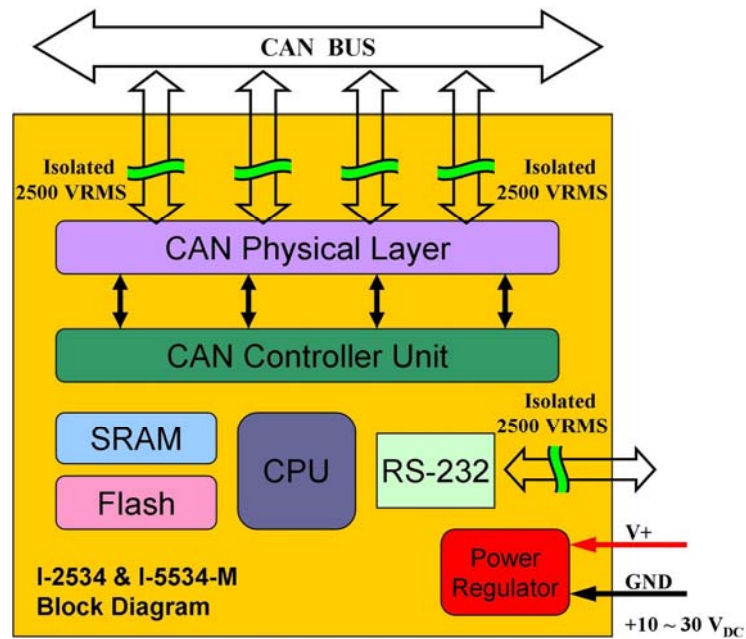


Figure 2-1 Block Diagram of the I-2534 & I-5534-M

2.2 CAN bus Pin Assignment of the I-2534

The figure 2-2 illustrates the CAN bus pins.

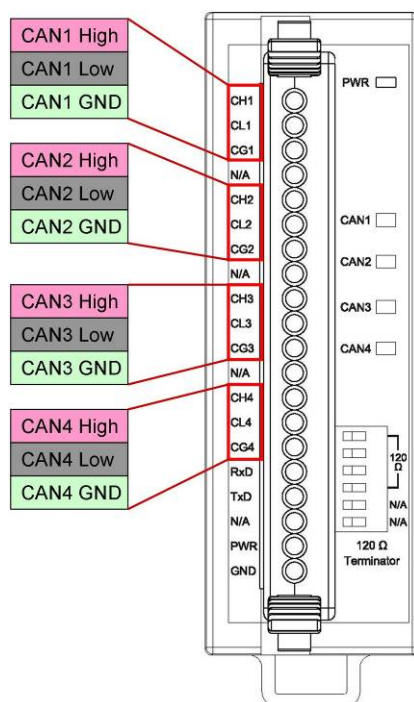


Figure 2-2 CAN bus pins of the I-2534

| Name | Port | Description |
|------|------|---|
| CH1 | 1 | CAN_High, signal line of CAN port. |
| CL1 | | CAN_Low, signal line of CAN port. |
| CG1 | | CAN_Ground, ground voltage level of CAN port. |
| CH2 | 2 | CAN_High, signal line of CAN port. |
| CL2 | | CAN_Low, signal line of CAN port. |
| CG2 | | CAN_Ground, ground voltage level of CAN port. |
| CH3 | 3 | CAN_High, signal line of CAN port. |
| CL3 | | CAN_Low, signal line of CAN port. |
| CG3 | | CAN_Ground, ground voltage level of CAN port. |
| CH4 | 4 | CAN_High, signal line of CAN port. |
| CL4 | | CAN_Low, signal line of CAN port. |
| CG4 | | CAN_Ground, ground voltage level of CAN port. |

2.3 CAN bus Pin Assignment of the I-5534-M

The figure 2-3 illustrates the CAN bus pins.

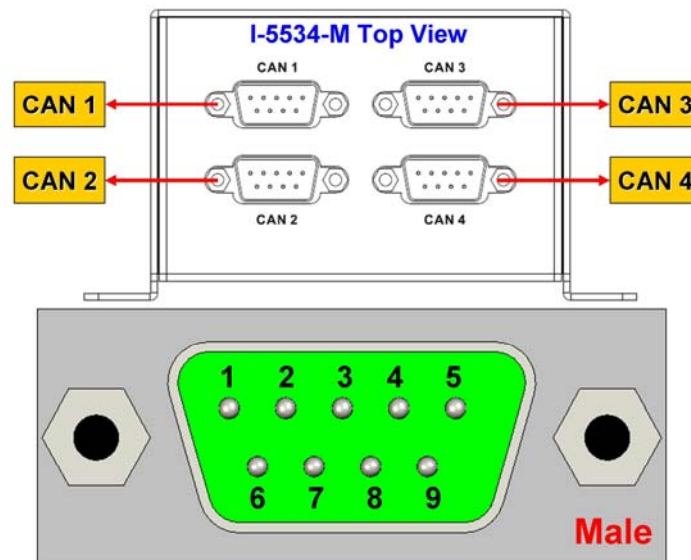


Figure 2-3 CAN bus pins of the I-5534-M

| Port | Pin | Description |
|------|-----|---|
| CAN1 | 2 | CAN_Low, signal line of CAN port. |
| | 3 | CAN_Ground, ground voltage level of CAN port. |
| | 5 | CAN_Shield which connected to the F.G. |
| | 7 | CAN_High, signal line of CAN port. |
| CAN2 | 2 | CAN_Low, signal line of CAN port. |
| | 3 | CAN_Ground, ground voltage level of CAN port. |
| | 5 | CAN_Shield which connected to the F.G. |
| | 7 | CAN_High, signal line of CAN port. |
| CAN3 | 2 | CAN_Low, signal line of CAN port. |
| | 3 | CAN_Ground, ground voltage level of CAN port. |
| | 5 | CAN_Shield which connected to the F.G. |
| | 7 | CAN_High, signal line of CAN port. |
| CAN4 | 2 | CAN_Low, signal line of CAN port. |
| | 3 | CAN_Ground, ground voltage level of CAN port. |
| | 5 | CAN_Shield which connected to the F.G. |
| | 7 | CAN_High, signal line of CAN port. |

2.4 Power & RS-232 Pin Assignment of the I-2534

The figure 2-4 shows the pin assignment of the power and the RS-232 port. Take a note that the GND pin of the RS-232 port and CAN 4 share one GND pin.

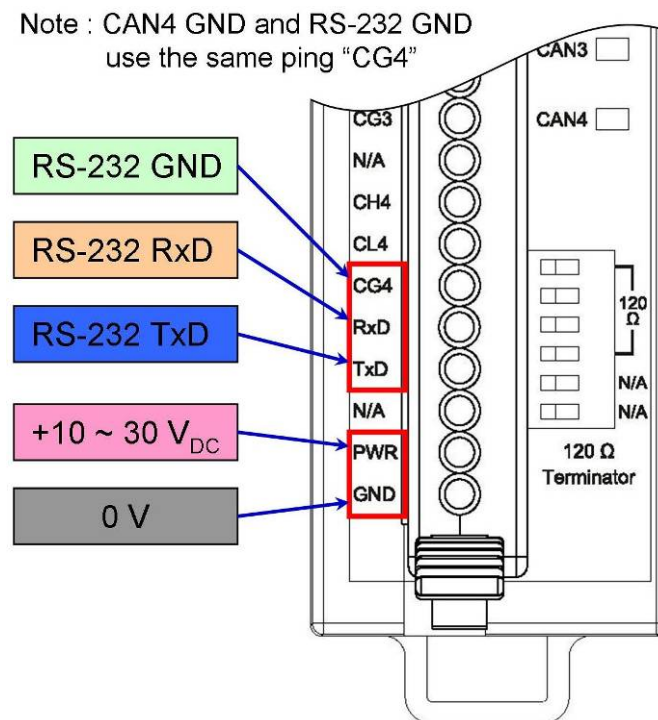


Figure 2-4 RS-232 and Power pin assignment of the I-2534

| Name | Description |
|----------|--|
| TxD | TXD pin of RS-232 port. |
| RxD | RXD pin of RS-232 port. |
| CG4(GND) | SG (or GND) pin of RS-232 port. CAN4 GND and RS-232 GND use the same pin "CG4". |

| Name | Description |
|------|---|
| PWR | Voltage Source Input. +10V _{DC} ~ +30V _{DC} . |
| GND | Power Ground. |

2.5 Power & RS-232 Pin Assignment of the I-5534-M

The figure 2-5 shows the pin assignment of the power and the RS-232 port.

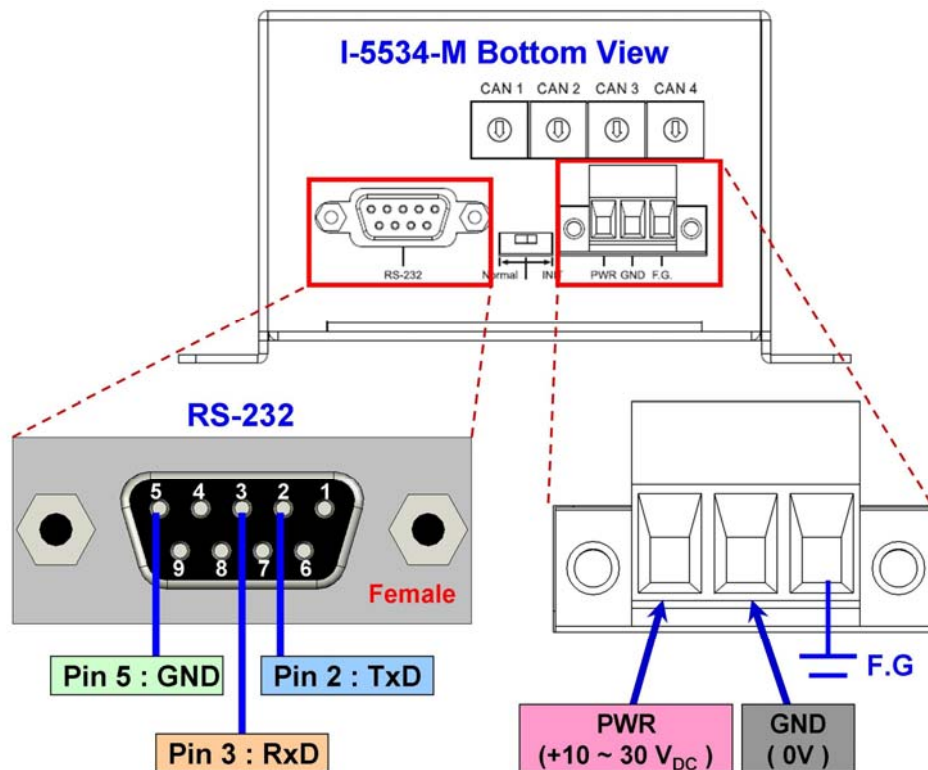


Figure 2-5 RS-232 and Power pin assignment of the I-5534-M

| Name | Description |
|------|--|
| TxD | RS-232 TXD pin of the I-5534-M. Connect to PC's RxD pin. |
| RxD | RS-232 RXD pin of the I-5534-M. Connect to PC's TxD pin. |
| GND | RS-232 GND pin of the I-5534-M. Connect to PC's GND pin. |

| Name | Description |
|------|---|
| PWR | Voltage Source Input. +10V _{DC} ~ +30V _{DC} . |
| GND | Power Ground. |
| F.G | Frame Ground. |

2.6 LED Indicator of the I-2534

The figure 2-6 shows the names and statuses of the LEDs.

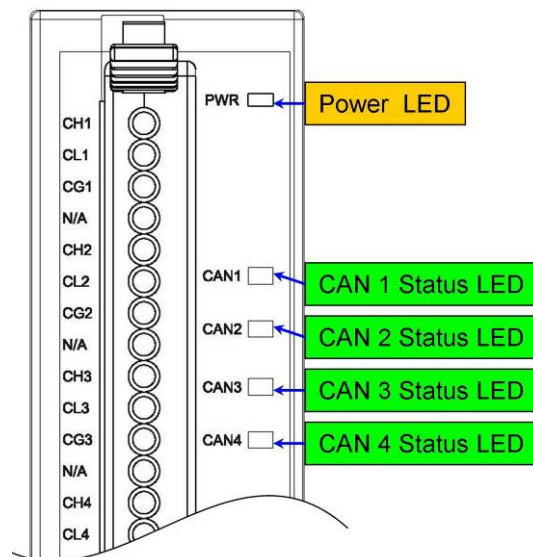


Figure 2-6 CAN LED and Power LED of the I-2534

| LED Name | LED Color | Description |
|----------|-----------|--------------------------|
| PWR LED | OFF | The I-2534 has no power. |
| | RED | The I-2534 has power. |

| LED Name | LED Color | CAN Status Description |
|----------|-----------|--|
| CAN1 | OFF | The CAN port doesn't transmit or receive message now. |
| CAN2 | GREEN | The CAN port is transmitting or receiving message now. |
| CAN3 | RED | The CAN port have some errors when transmitting message. |
| CAN4 | | |

Note: In the initial mode, the CAN1 ~ CAN4 LEDs will be all twinkled once per second.

2.7 LED Indicator of the I-5534-M

The figure 2-7 shows the LED name and its status.

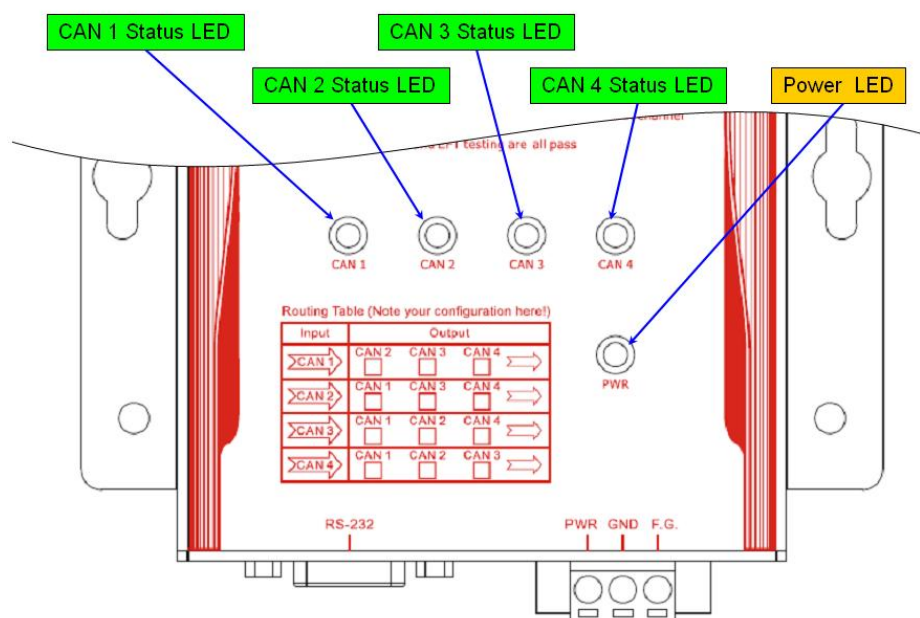


Figure 2-7 CAN LED and Power LED of the I-5534-M

| LED Name | LED Color | Description |
|----------|-----------|-----------------------------------|
| PWR LED | OFF | The I-5534-M has no power source. |
| | RED | The I-5534-M has power. |

| LED Name | LED Color | CAN Status Description |
|----------|-----------|--|
| CAN1 | OFF | The CAN port doesn't transmit or receive message now. |
| CAN2 | GREEN | The CAN port is transmitting or receiving message now. |
| CAN3 | RED | The CAN port have some errors when transmitting message. |
| CAN4 | | |

Note: In the initial mode, the CAN1 ~ CAN4 LEDs will be all twinkled once per second.

2.8 Terminal Resistors to the I-2534

Each CAN port of the I-2534 includes one built-in 120 Ω terminal resistor, users can decide whether it is enable or not. The DIP switch for terminal resistor is shown in the figure 2-8.

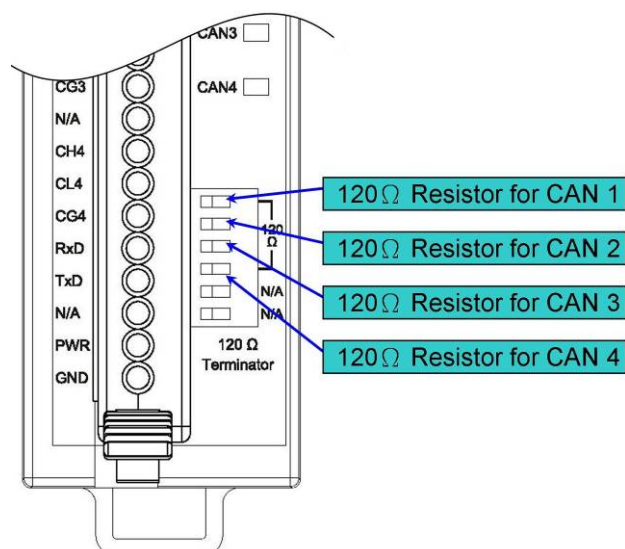


Figure 2-8 120 Ω terminal resistors of the I-2534

| DIP No. | Switch status | CAN bus resistor status |
|---------|---------------|--|
| 1 | ON | CAN 1 with 120 Ω terminal resistor. |
| | OFF | CAN 1 without terminal resistor. |
| 2 | ON | CAN 2 with 120 Ω terminal resistor. |
| | OFF | CAN 2 without terminal resistor. |
| 3 | ON | CAN 3 with 120 Ω terminal resistor. |
| | OFF | CAN 3 without terminal resistor. |
| 4 | ON | CAN 4 with 120 Ω terminal resistor. |
| | OFF | CAN 4 without terminal resistor. |
| 5 | N/A | Not Available |
| 6 | N/A | Not Available |

2.9 Terminal Resistor to the I-5534-M

Each CAN port of the I-5534-M includes one built-in 120Ω terminal resistor, users can decide whether it is enable or not. After removing the upper cover, the jumpers of the terminal resistors are shown in the figure 2-9 and figure 2-10.

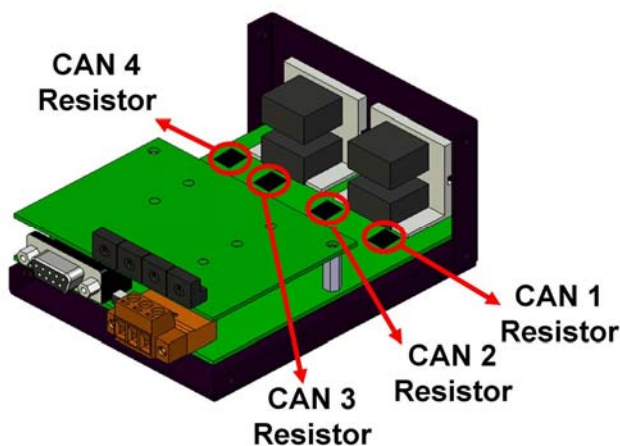


Figure 2-9 120Ω terminal resistors of the I-5534-M

| Jump No. | CAN bus120Ω resistor |
|----------|--------------------------|
| JP3 | CAN 1 terminal resistor. |
| JP4 | CAN 2 terminal resistor. |
| JP5 | CAN 3 terminal resistor. |
| JP6 | CAN 4 terminal resistor. |

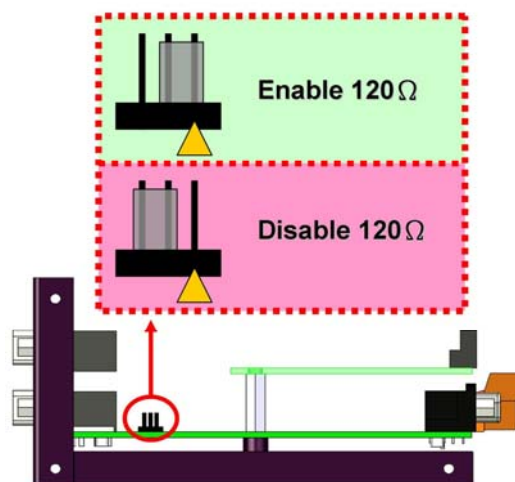


Figure 2-10 Enable / Disable 120Ω terminal resistors of the I-5534-M

In order to reduce the reflection effects on the CAN bus line, the CAN bus line has to be terminated at both ends by two terminator resistors. 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 the figure 2-11.

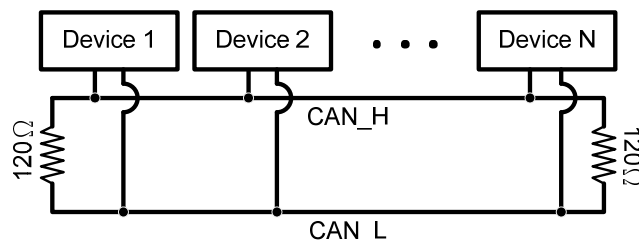


Figure 2-11 120Ω terminal resistor position

Generally, if your application is as the figure 2-12, we recommend you to enable the terminator resistor.

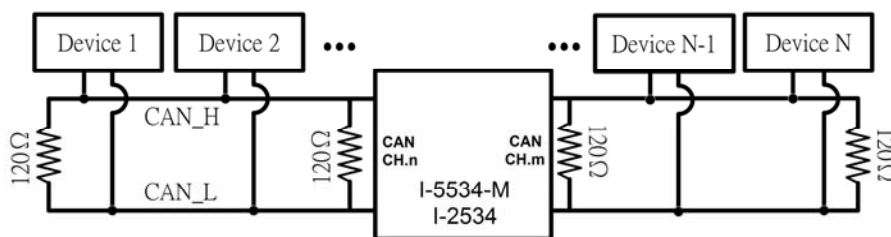


Figure 2-12 Enable the 120Ω terminal resistors of the I-2534 / I-5534-M

If your application is like the structure as the figure 2-13, the terminator resistor is not needed.

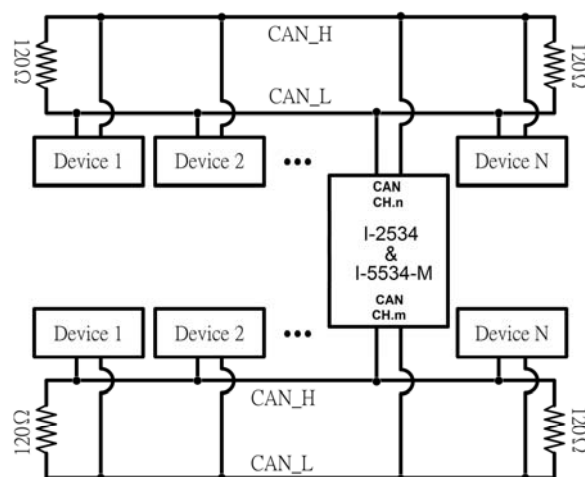


Figure 2-13 Disable the 120Ω terminal resistors of the I-2534 / I-5534-M

2.10 Rotary Switch & CAN Baud Rate of the I-2534

The figure 2-14 illustrates where to set the CAN bus baud rate of four CAN ports in the I-2534 module.

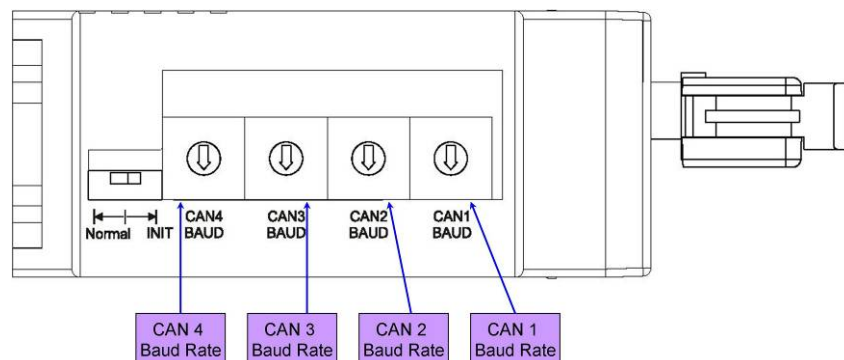


Figure 2-14 CAN baud rate configuration

| Switch Value | CAN bus Baud Rate |
|--------------|-------------------------|
| 0 | 5 kbps |
| 1 | 10 kbps |
| 2 | 20 kbps |
| 3 | 33.3 kbps |
| 4 | 50 kbps |
| 5 | 62.5 kbps |
| 6 | 83.3 kbps |
| 7 | 100 kbps |
| 8 | 125 kbps |
| 9 | 250 kbps |
| A | 500 kbps |
| B | 800 kbps |
| C | 1 Mbps |
| D | User-defined baud rate. |
| E~F | Not available |

2.11 Rotary Switch & CAN Baud Rate of the I-5534-M

The figure 2-15 illustrates where to set the CAN bus baud rate of four CAN ports in the I-5534-M module.

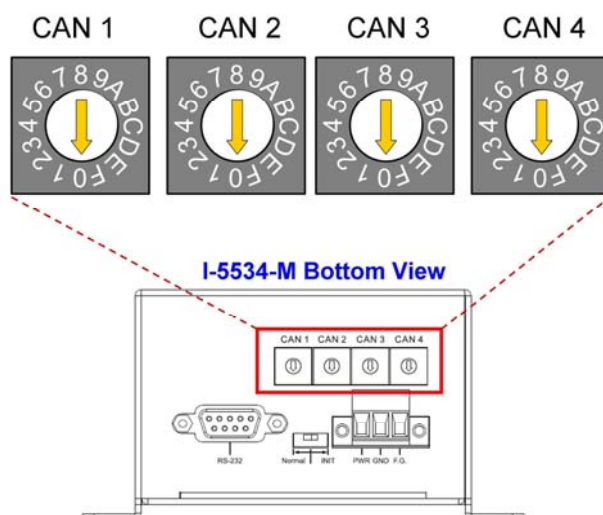


Figure 2-15 CAN baud rate configuration

| Switch Value | CAN bus Baud Rate |
|--------------|-------------------------|
| 0 | 5 kbps |
| 1 | 10 kbps |
| 2 | 20 kbps |
| 3 | 33.3 kbps |
| 4 | 50 kbps |
| 5 | 62.5 kbps |
| 6 | 83.3 kbps |
| 7 | 100 kbps |
| 8 | 125 kbps |
| 9 | 250 kbps |
| A | 500 kbps |
| B | 800 kbps |
| C | 1 Mbps |
| D | User-defined baud rate. |
| E~F | Not available |

2.12 Normal / Initial Mode Switch of the I-2534

The figure 2-16 illustrates the mode of the I-2534 module. In general usage, users should take care about the position of this switch.

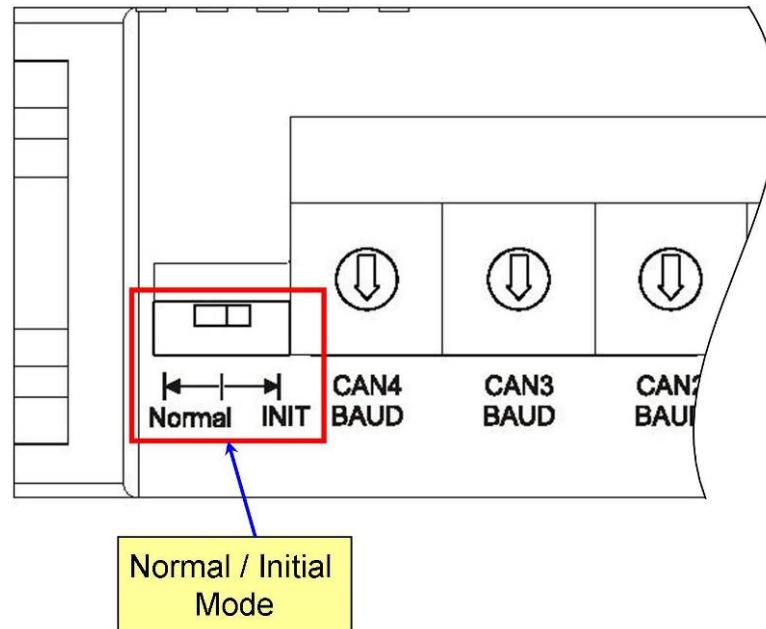


Figure 2-16 Operation Mode of the I-2534 module

| Mode Name | The I-2534 Status Description |
|-----------|---|
| Normal | The I-2534 is in the normal mode. |
| Initial | The I-2534 is in the configurable status. Users could use the “I2534_Utility” to configure the route path, CAN filter or user-defined CAN baud rate. In the initial mode, the CAN1 LED ~ CAN4 LED will be all twinkled once per second. |

2.13 Normal / Initial Mode Switch of the I-5534-M

The figure 2-17 illustrates the mode of the I-5534-M module. In general usage, users should take care about the position of this switch.

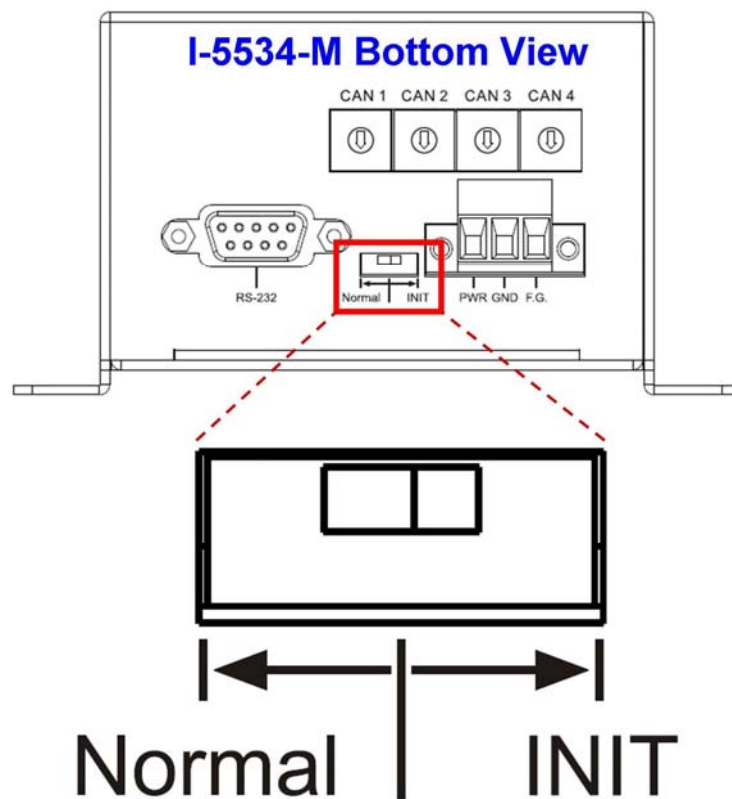


Figure 2-17 Operation Mode of the I-5534-M module

| Mode Name | The I-5534-M Status Description |
|-----------|---|
| Normal | The I-5534-M is in the normal mode. |
| Initial | The I-2534 is in the configurable status. Users could use the "I2534_Utility" to configure the route path, CAN filter or user-defined CAN baud rate. In the initial mode, the CAN1 LED ~ CAN4 LED will be all twinkled once per second. |

2.14 CAN bus Wire Connection of the I-2534

The CAN bus wire connection of the I-2534 is displayed in the figure 2-18.

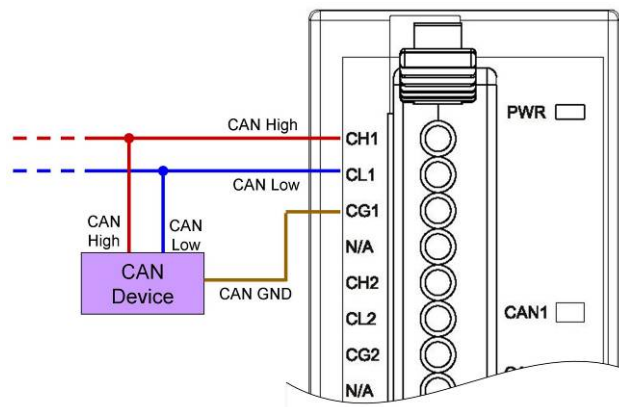


Figure 2-18 CAN bus wire connection with the I-2534 module

The I-2534 has a metallic board attached to the back of the plastic frame. When users mount the I-2534 onto a metal DIN-Rail, users can connect the DIN-Rail to Earth Ground. The figure 2-19 shows the detail.

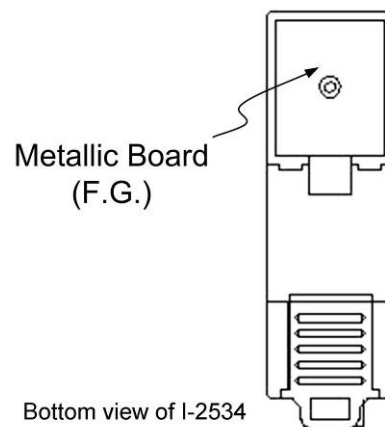


Figure 2-19 Metallic Board at Back of the I-2534

3 Network Deployment

3.1 Driving Capability

Before introducing the driving capability of the I-2534 or I-5534-M, some characteristics of copper cable must be assumed. The AC parameters are 120Ω impedance and 5 ns/m line delay, and the DC parameter follows the table shown below.

Table 3-1 Recommended DC parameters 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 conditions described above, users can refer to the following table to know the maximum node numbers in each segment 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 Star / Tree Topology

In general, users use the daisy-chain method to connect all CAN devices in their applications. In some cases, the “Star” or “Tree” topology may be needed. The I-2534 or I-5534-M which has four independent CAN ports could solve the topology problem of the CAN network. The figure 3-1 shows the CAN network with “Star” topology and the figure 3-2 illustrates “Tree” topology.

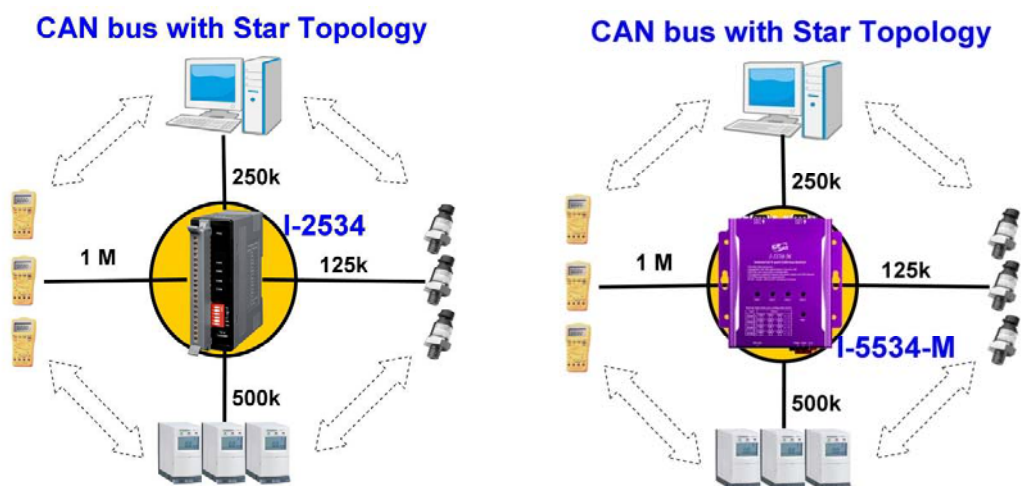


Figure 3-1 Star topology with the I-2534 & I-5534-M

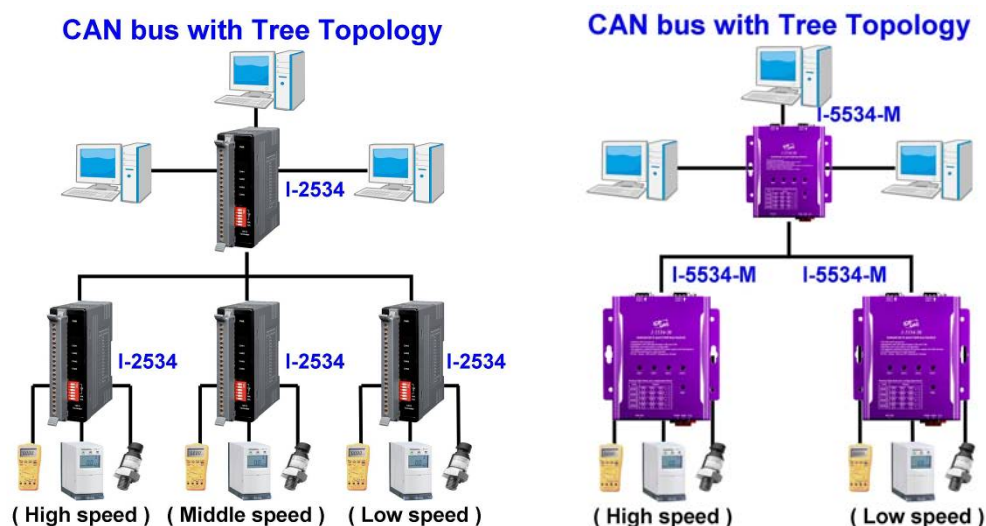


Figure 3-2 Tree topology with the I-2534 and I-5534-M

3.3 I2534_I5534M Utility Tool & RS-232 Cable

The I2534_I5534M utility tool can be free downloaded from the following web site or get it in the product CD (path: CAN\Converter\I-2534\):

http://www.icpdas.com/products/Remote_IO/can_bus/i-2534.htm

After getting the utility tool, please follow the following steps to set up the communication between the utility and the I-2534 or I-5534-M.

Step0: Power off the I-2534 or I-5534-M.

Step1: Set the Normal / Initial mode switch to the "INIT" position. The figure 3-3 and 3-4 show the detail.

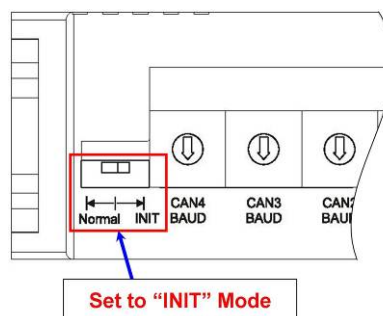


Figure 3-3 Set the I-2534 into the initial mode

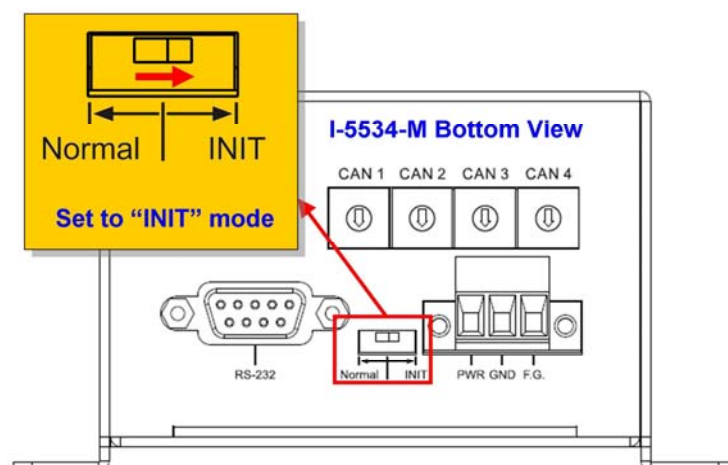


Figure 3-4 Set the I-5534-M into the initial mode

Step2: Connect the PC available COM port with the COM port of the I-2534 or I-5534-M. When connecting to the COM port of the I-2534, the TxD pin of the cable is connected to the TxD pin of the I-2534, RxD pin of the cable is connected to the RxD pin of the I-2534, and GND pin of the cable is connected to the CG4 pin of the I-2534. The figure 3-5 and 3-6 illustrates the detail.

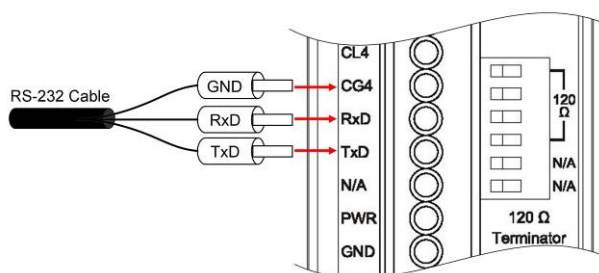


Figure 3-5 RS-232 wire connection of the I-2534

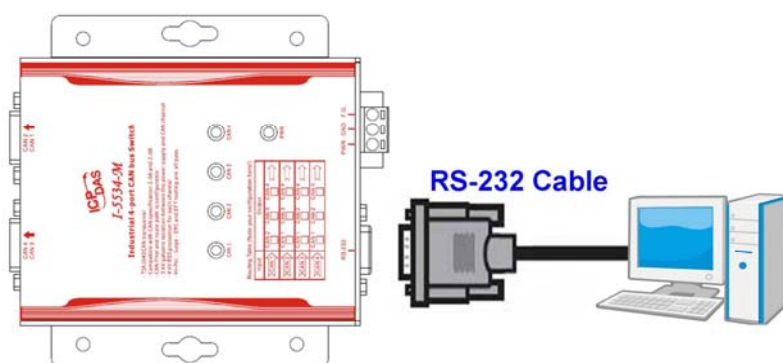


Figure 3-6 RS-232 wire connection of the I-5534-M

Step3: Power on the I-2534 or I-5534-M. Then, the CAN 1~ CAN 4 LEDs are all twinkled once per second.

Step4: Execute the I2534_I5534M_Utility.exe.

3.4 Route Path Configuration

The I-2534 or I-5534-M is an intelligent CAN bus switch module. Users could configure the route path of each CAN port. The route path could be imaged as pipe line. Users could configure where the pipe line connects to in different applications. The figure 3-7 illustrates the abstract idea.

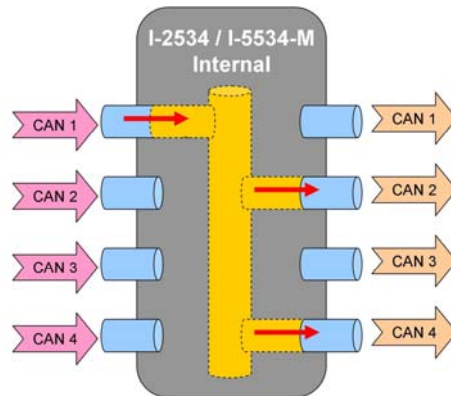
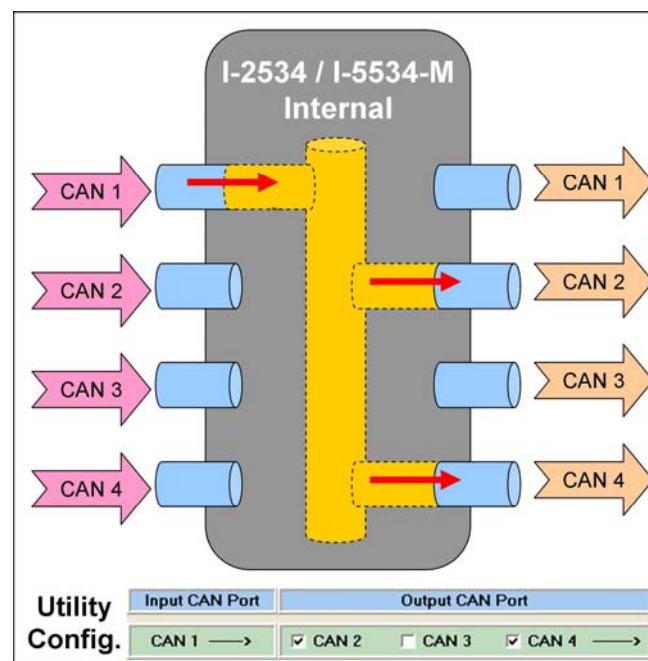
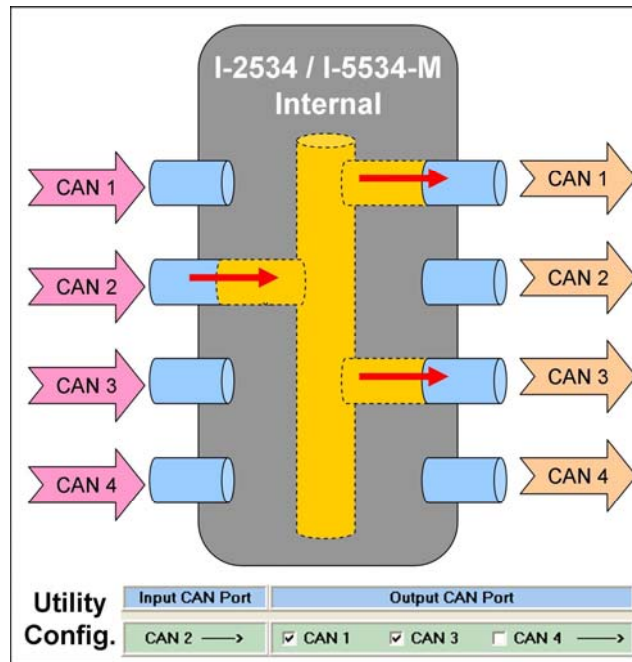


Figure 3-7 Abstract idea of the route path within the I-2534 or I-5534-M

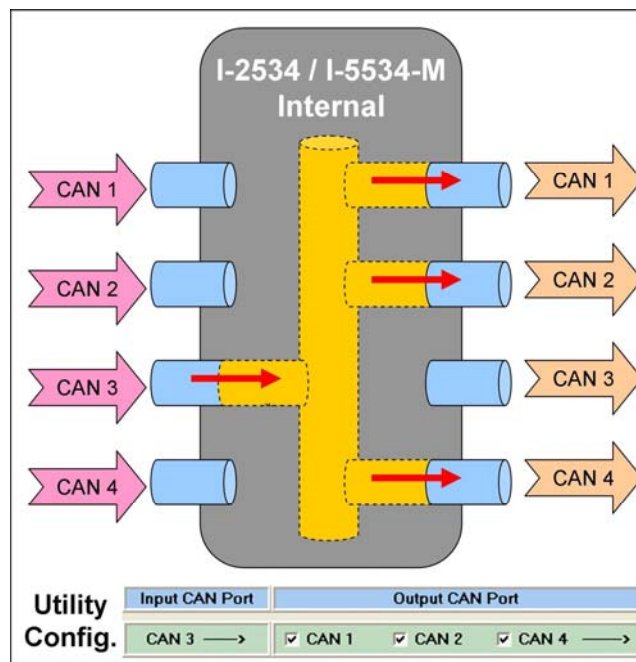
The figure 3-7 illustrates that the CAN message from CAN port 1 transfers to CAN port 2 and CAN port 4. Users could configure each CAN port by the “I2534_I5534M_Utility”. Take a look at an example. We assume that users want the follow setting.



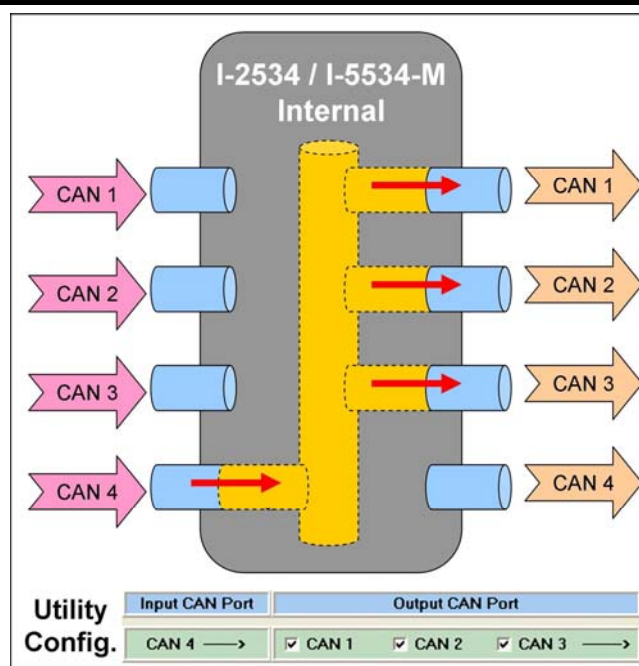
CAN 1



CAN 2



CAN 3



CAN 4

Figure 3-8 Example of the route path

After finishing the wire connection as the section 3.3, users could set the configuration in the “I2534_I5534M_Utility”. The figure3-9 below shows the corresponding setting.

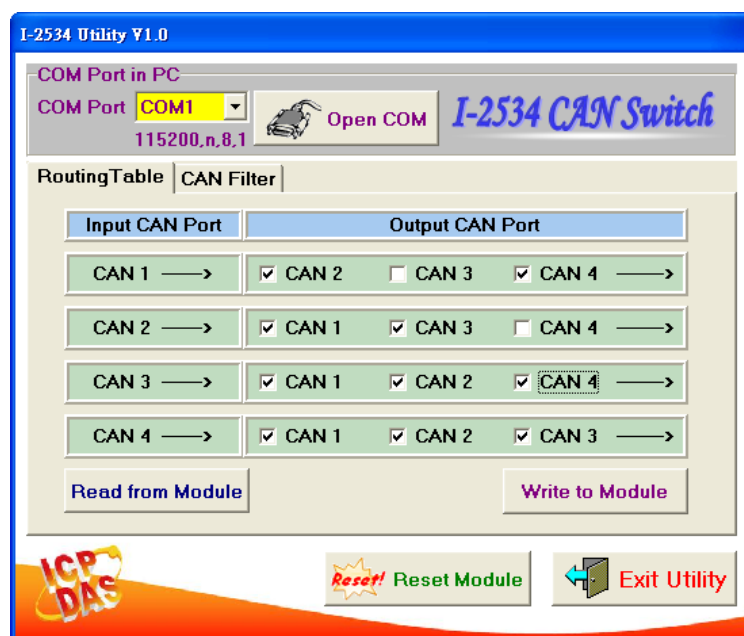


Figure 3-9 Example of the route path configuration

After setting the route table, users should click the “Write to Module” button

to save the configuration to the I-2534 or I-5534-M. Users can reset the module to enable the configuration by clicking the “Reset Module” button or 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.

3.5 CAN User-defined Baud Rate Configuration

The I-2534 or I-5534-M allows users to set the special CAN baud rate by using the “User-defined CAN Baud Rate” field of the Utility. Before configuring the user-defined baud, turn off the I-2534 or I-5534-M, adjust the rotary switch of baud to ‘D’ position, and then turn on it. After building the connection between the Utility and the I-2534 or I-5534-M, fill your expected baud in the field of User Define CAN Baud Rate. For example, fill the value “33.2” in the “CAN 1” field for setting the baud of “CAN 1” to 33.2 kbps, and click the “Download User Baud Rate” button to save into the I-2534 or I-5534-M. Then, Users can reset the module to enable the configuration by clicking the “Reset Module” button or 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.

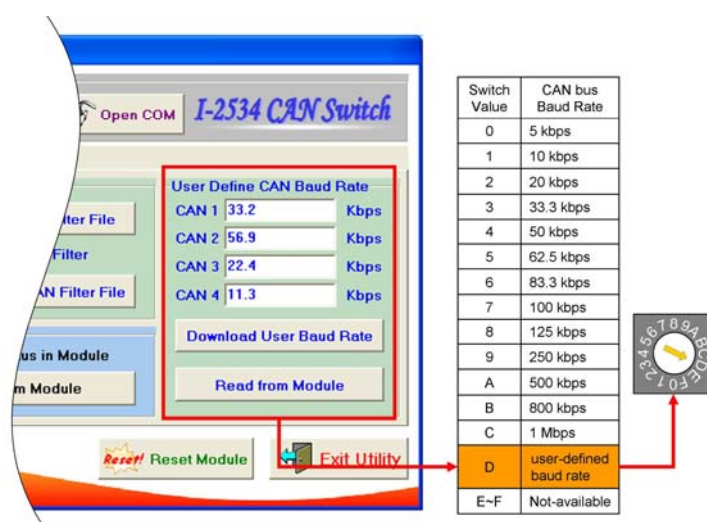


Figure 3-10 CAN user-defined baud rate configuration

3.6 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-2534 or I-5534-M. Another is “Read CAN Filter” which provides read back the CAN filter configuration from the I-2534 or I-5534-M module.

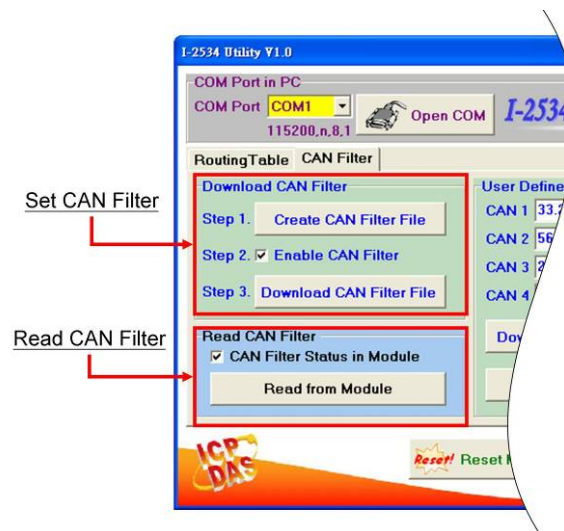


Figure 3-11 Set and read the CAN filter configuration

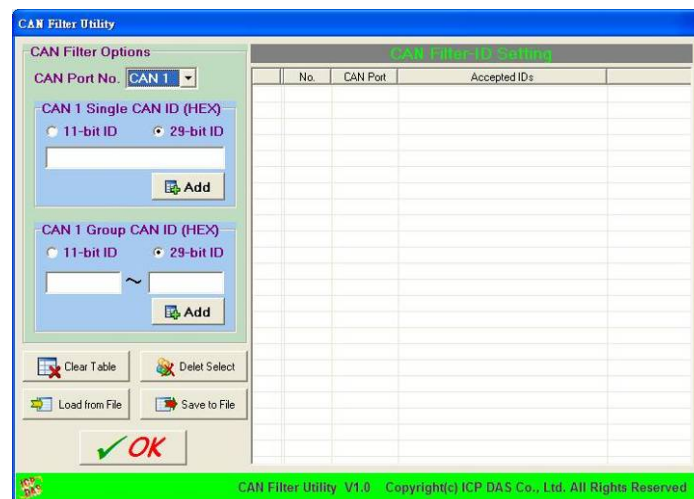


Figure 3-12 CAN filter configuration dialog

3.6.1 Apply a New CAN Filter to I-2534 or I-5534-M

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.

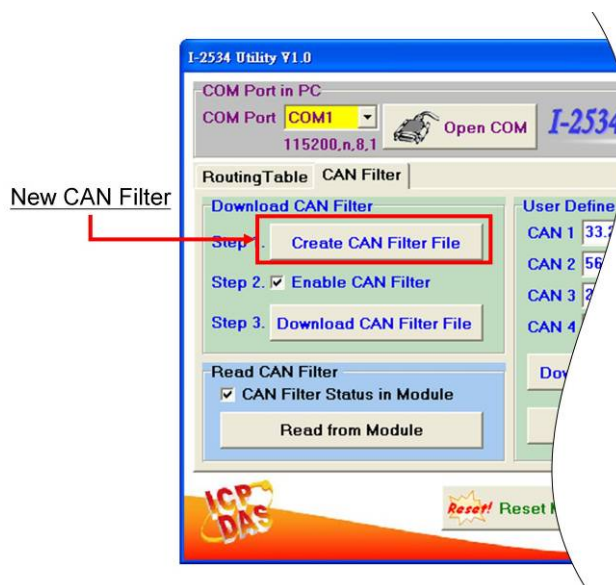


Figure 3-13 Create CAN filter file

Users would see the following window.

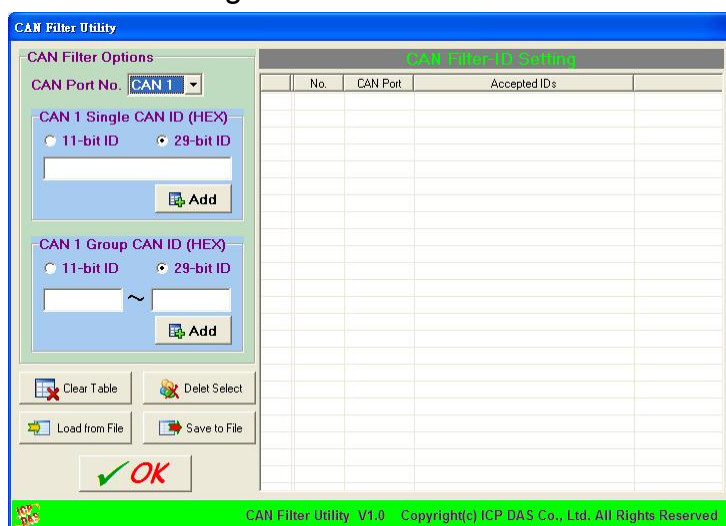


Figure 3-14 An new CAN filter configuration dialog

Step 2: Select the CAN port which users want to configure the CAN filter on.

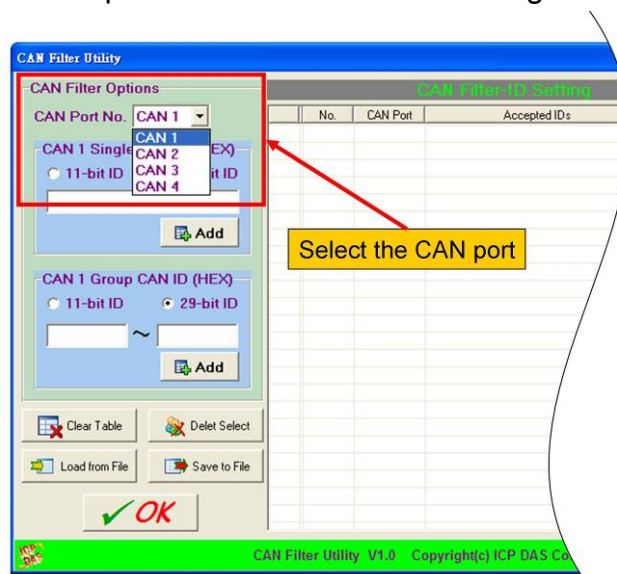


Figure 3-15 Select desired CAN port

Step 3: 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.

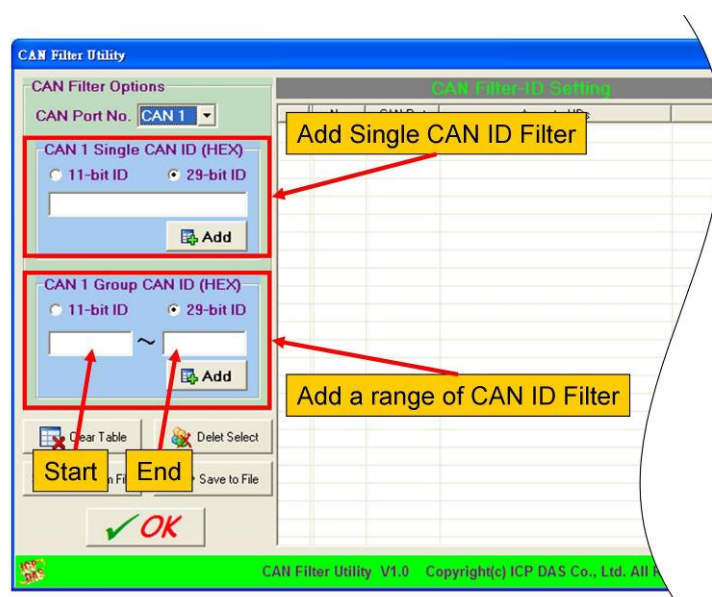
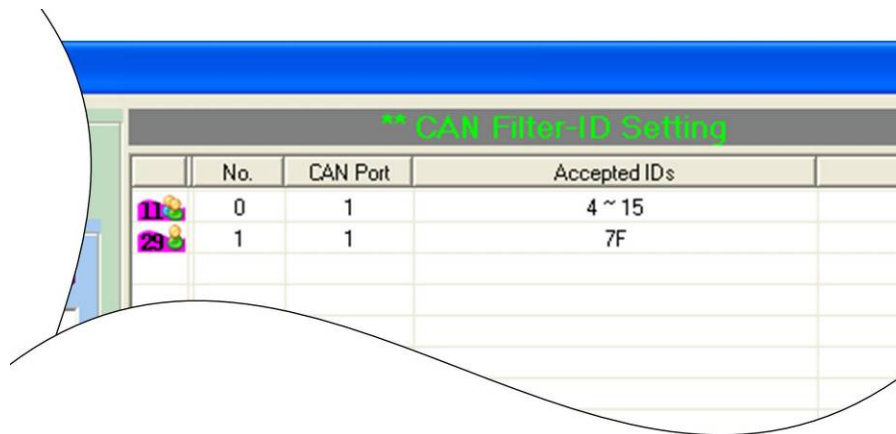


Figure 3-16 Add single or group of CAN filter

For example, if users want to pass the CAN port 1 with CAN ID 0x07F in the CAN 2.0B specification. Firstly, select “29-bit ID” item in the “CAN x 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.



| CAN Filter ID Setting | | | |
|-----------------------|-----|----------|--------------|
| | No. | CAN Port | Accepted IDs |
| 11 | 0 | 1 | 4 ~ 15 |
| 29 | 1 | 1 | 7F |

Figure 3-17 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 4: 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.

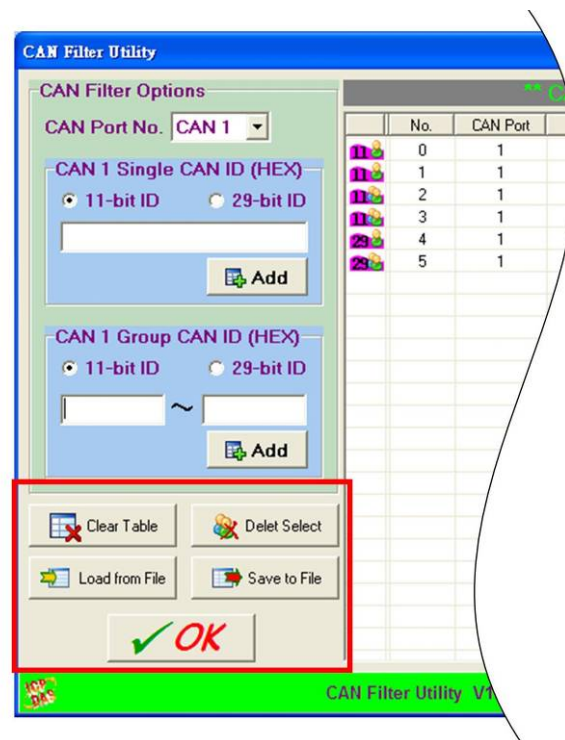


Figure 3-18 Five buttons in CAN filter configuration dialog

There are more five buttons to help users configuring the CAN filter.

1. “Clear Table” would delete all CAN filter records in the list.
2. “Delete Select” would delete the selected CAN filter record.
3. “Load from File” allow users to load the configuration from the existent CAN filter file (*.FLT).
4. “Save to File” provides the function to save the current CAN filter configuration into a file (*.FLT).
5. “OK” would exit the configuration dialog.

Step 5: Check the “Enable CAN Filter” item to make the CAN filter enable.

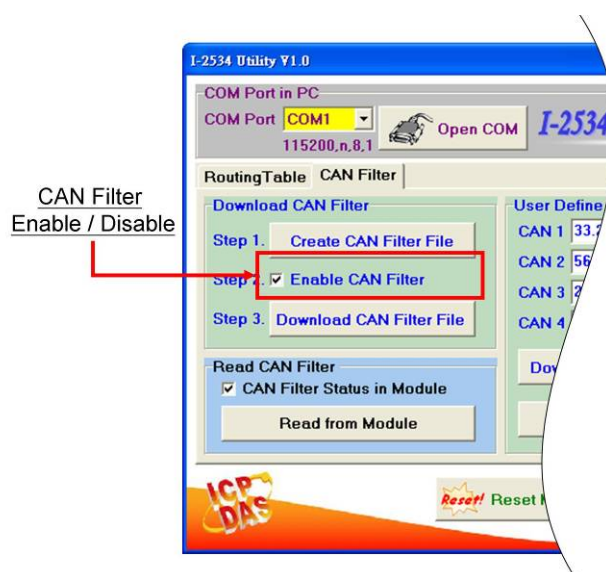


Figure 3-19 CAN filter status

Step 6: Click “Download CAN Filter File” to download the selected CAN filter file into the I-2534 or I-5534-M module.

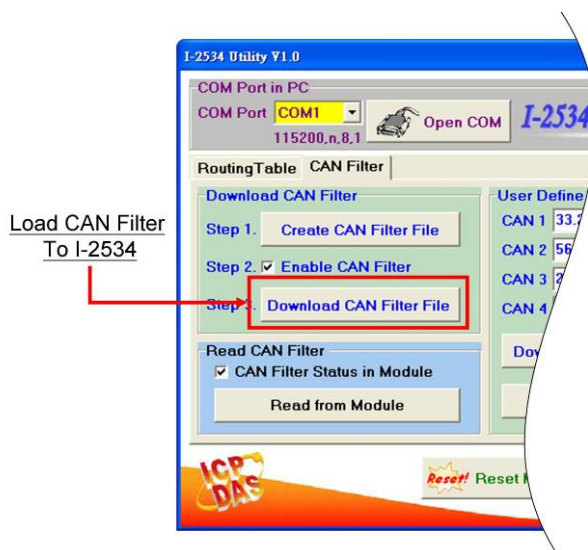


Figure 3-20 Download CAN filter data

After finishing all the steps above, users need to reset the module to enable the configuration by clicking the “Reset Module” button or 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.

3.6.2 Set the I-2534 or I-5534-M by Configuration File

The steps are the same as step 5 and 6 of the section 3.6.1.

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

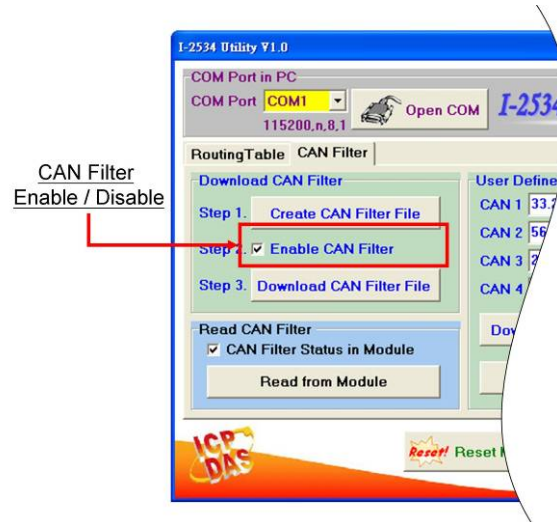


Figure 3-21 CAN filter status

Step 2: Click “Download CAN Filter File” to download the selected CAN filter file into the I-2534 or I-5534-M.

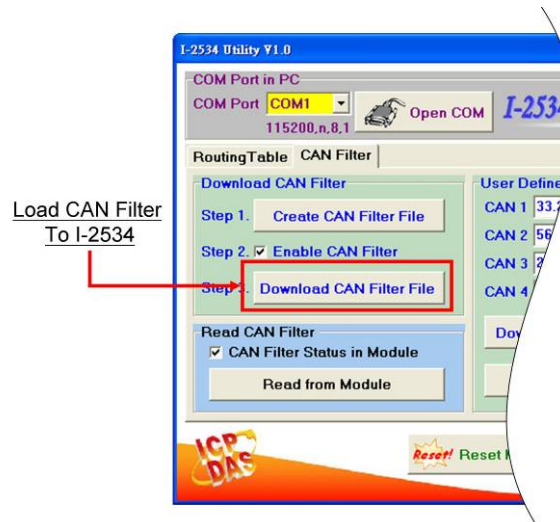


Figure 3-22 Download CAN filter data

Afterwards, users need to reset the module to enable the configuration by clicking the “Reset Module” button or 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.

3.6.3 Read I-2534 or I-5534-M CAN Filter Configuration

Click the “Read from Module” to read the CAN filter setting from the I-2534 or I-5534-M.

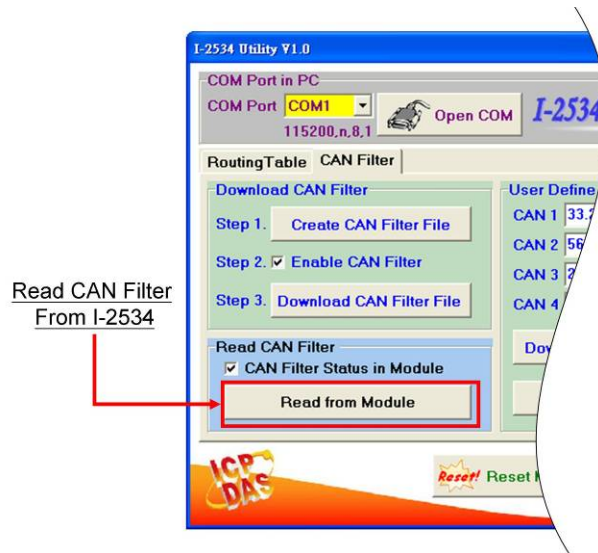


Figure 3-23 Read CAN filter form the I-2534 or I-5534-M

If reading the CAN filter data successfully, users would see whether the CAN filter setting is enable or not from the following figure 3-24.

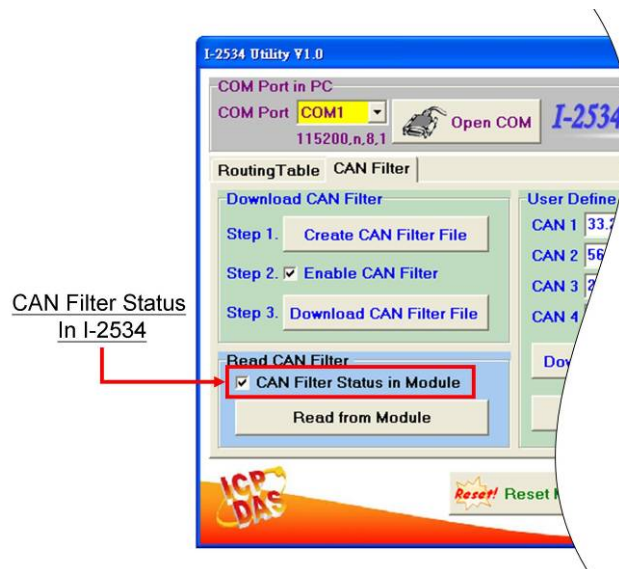


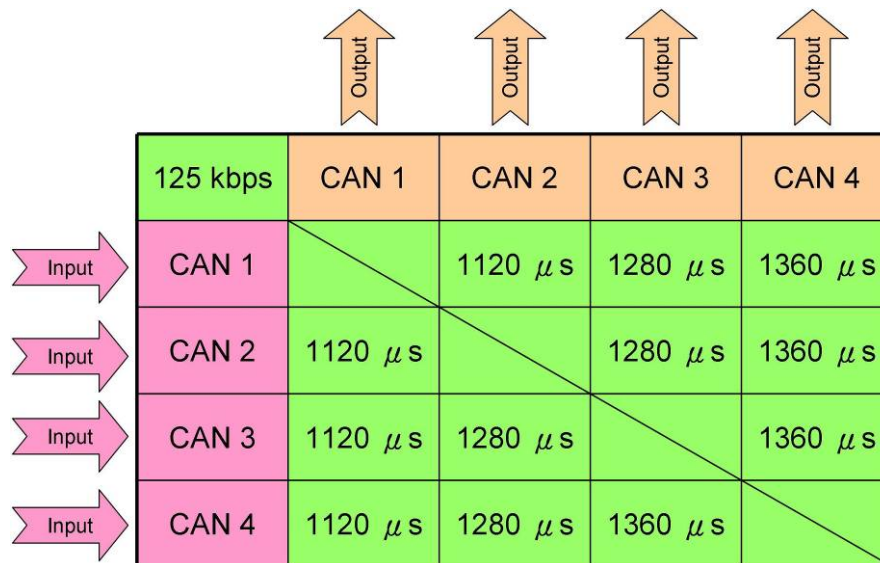
Figure 3-24 CAN filter status in the I-2534 or I-5534-M module

If the CAN filter status is enabled, 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.

4 Propagation Delay of the I-2534 and I-5534-M

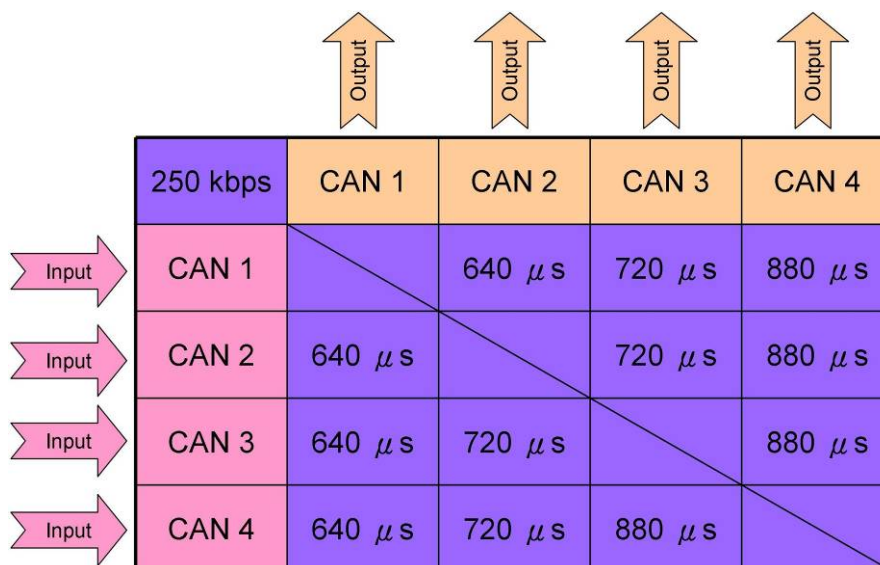
We used the longest CAN data which the CAN ID is 29-bit and carries 8 bytes data. Here shows the different propagation delay in different CAN baud rate.

CAN Baud Rate is 125k bps. The table below shows the delay time is between 1120 μ s and 1360 μ s.



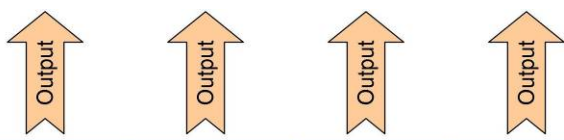
| | 125 kbps | CAN 1 | CAN 2 | CAN 3 | CAN 4 |
|-------|----------|--------------|--------------|--------------|--------------|
| Input | CAN 1 | | 1120 μ s | 1280 μ s | 1360 μ s |
| Input | CAN 2 | 1120 μ s | | 1280 μ s | 1360 μ s |
| Input | CAN 3 | 1120 μ s | 1280 μ s | | 1360 μ s |
| Input | CAN 4 | 1120 μ s | 1280 μ s | 1360 μ s | |

CAN Baud Rate is 250k bps. The table below shows the delay time is between 640 μ s and 880 μ s.



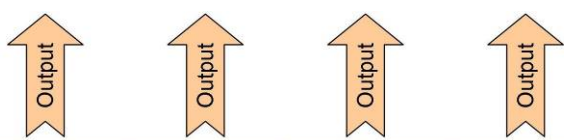
| | 250 kbps | CAN 1 | CAN 2 | CAN 3 | CAN 4 |
|-------|----------|-------------|-------------|-------------|-------------|
| Input | CAN 1 | | 640 μ s | 720 μ s | 880 μ s |
| Input | CAN 2 | 640 μ s | | 720 μ s | 880 μ s |
| Input | CAN 3 | 640 μ s | 720 μ s | | 880 μ s |
| Input | CAN 4 | 640 μ s | 720 μ s | 880 μ s | |

CAN Baud Rate is 500k bps. The table below shows the delay time is between 360 μ s and 560 μ s.



| | | | | | |
|---------|----------|-------------|-------------|-------------|-------------|
| | 500 kbps | CAN 1 | CAN 2 | CAN 3 | CAN 4 |
| Input → | CAN 1 | | 360 μ s | 480 μ s | 560 μ s |
| Input → | CAN 2 | 360 μ s | | 480 μ s | 560 μ s |
| Input → | CAN 3 | 360 μ s | 480 μ s | | 560 μ s |
| Input → | CAN 4 | 360 μ s | 480 μ s | 560 μ s | |

CAN Baud Rate is 1M bps. The table below shows the delay time is between 240 μ s and 440 μ s.



| | | | | | |
|---------|--------|-------------|-------------|-------------|-------------|
| | 1 Mbps | CAN 1 | CAN 2 | CAN 3 | CAN 4 |
| Input → | CAN 1 | | 240 μ s | 320 μ s | 440 μ s |
| Input → | CAN 2 | 240 μ s | | 320 μ s | 440 μ s |
| Input → | CAN 3 | 240 μ s | 320 μ s | | 440 μ s |
| Input → | CAN 4 | 240 μ s | 320 μ s | 440 μ s | |

5 Dimension of the I-2534

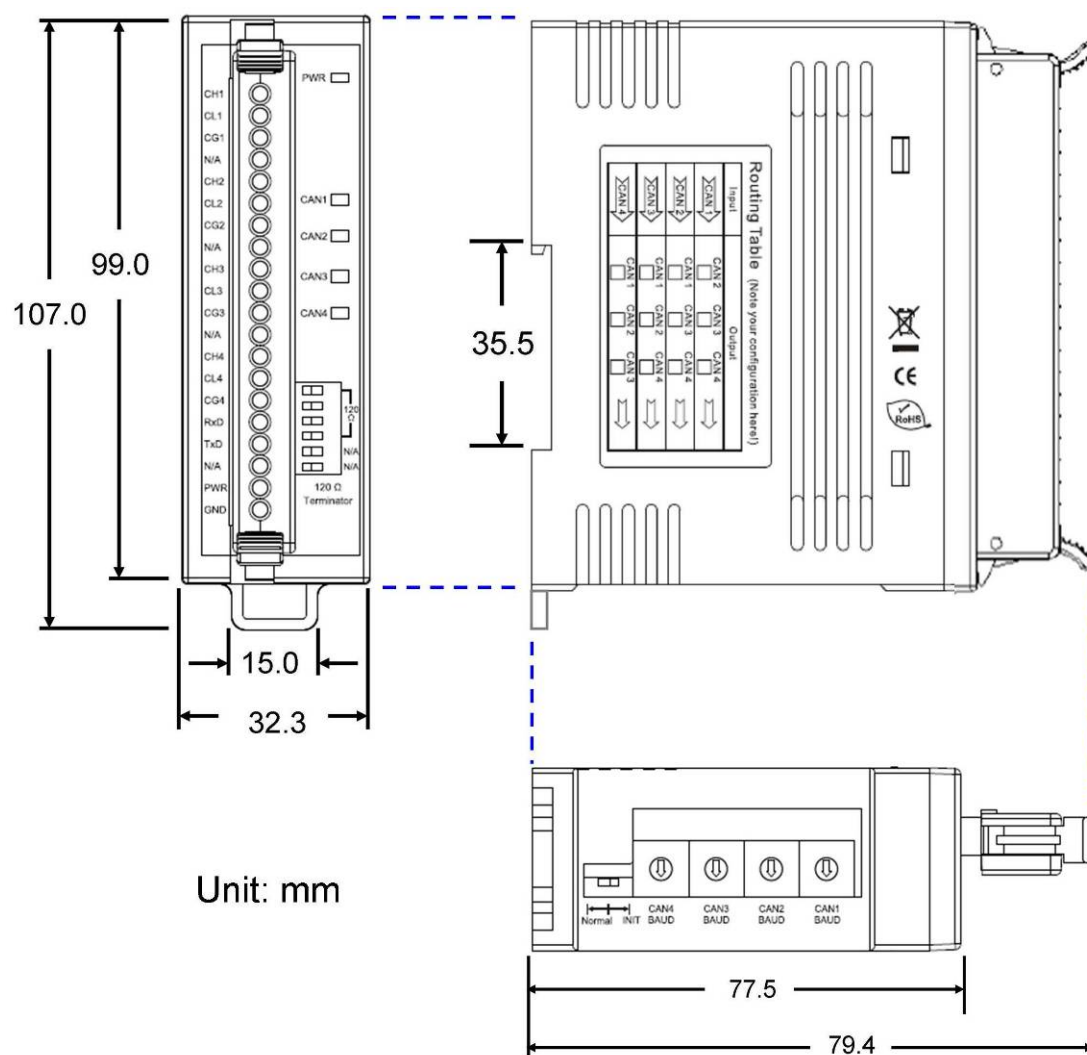
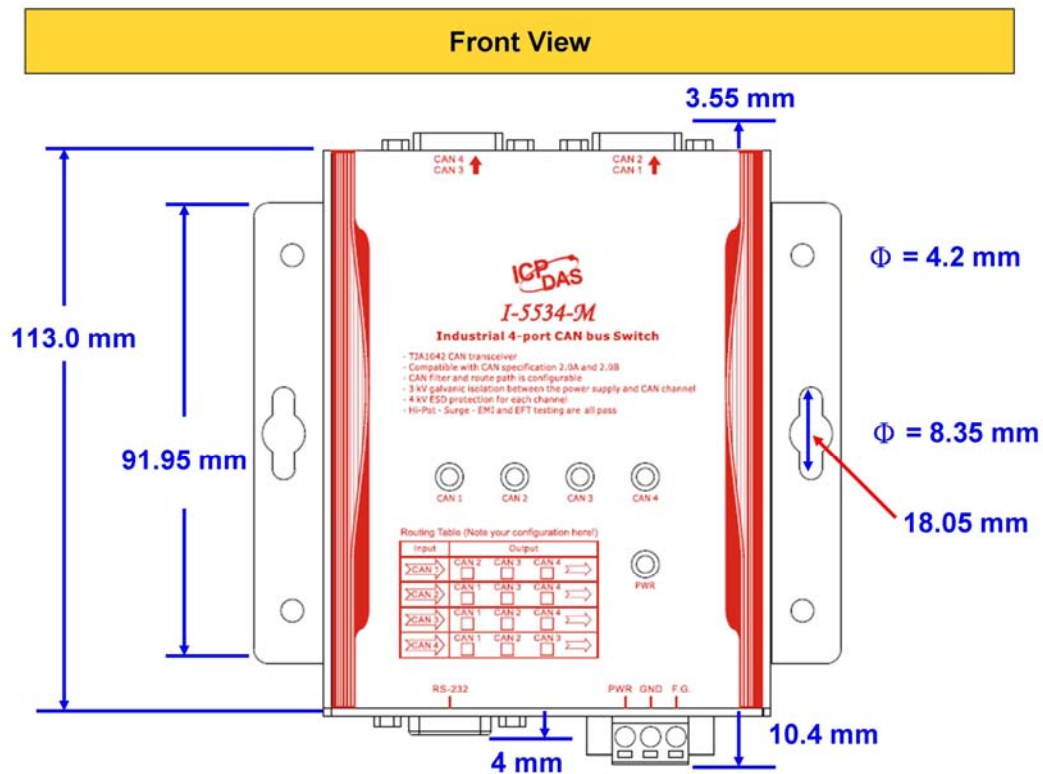
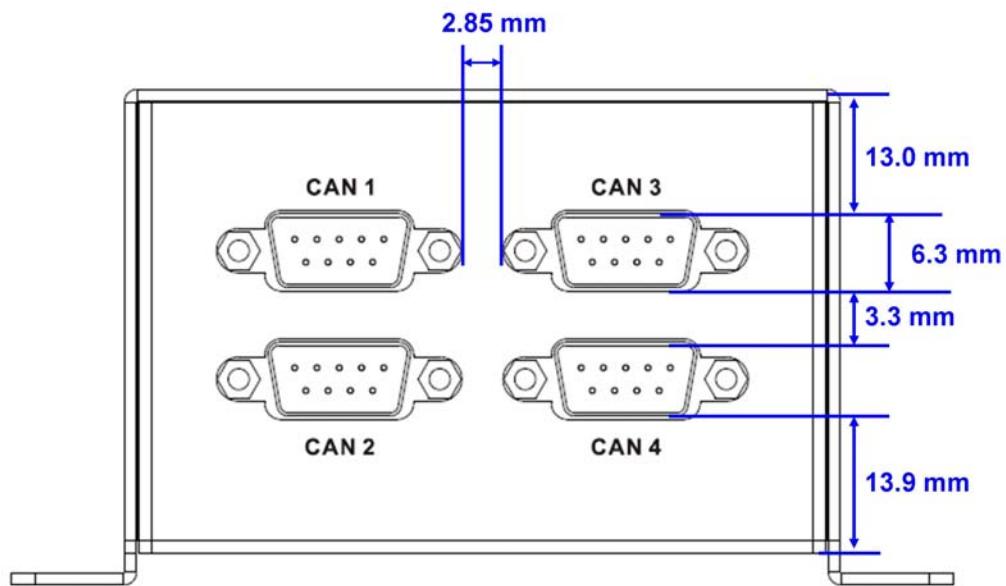


Figure 5-1 Dimension of the I-2534

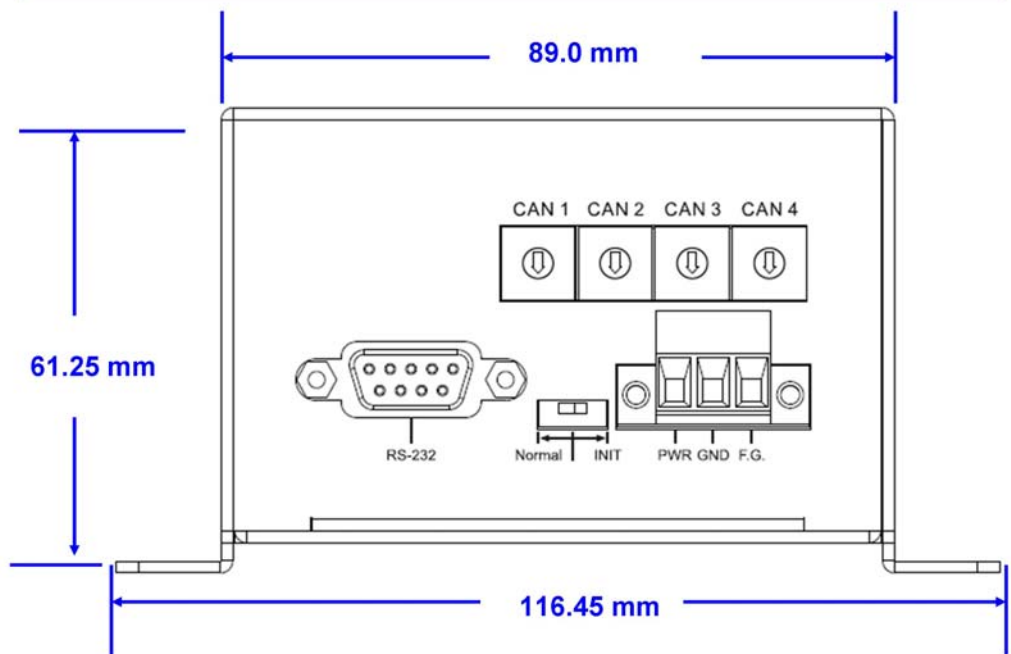
6 Dimension of the I-5534-M

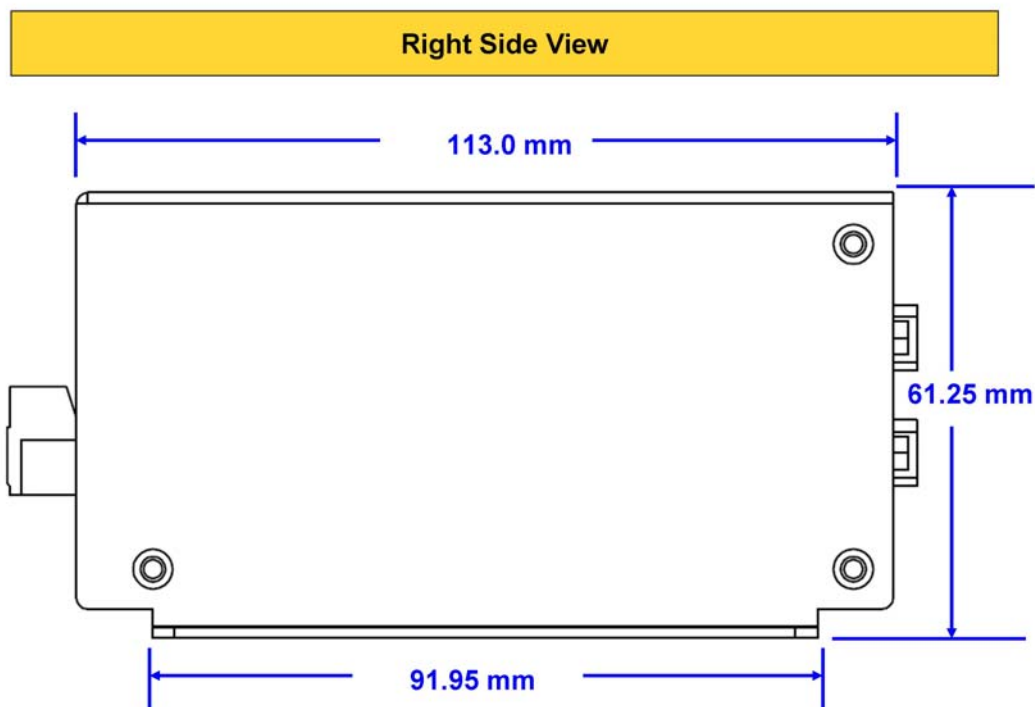
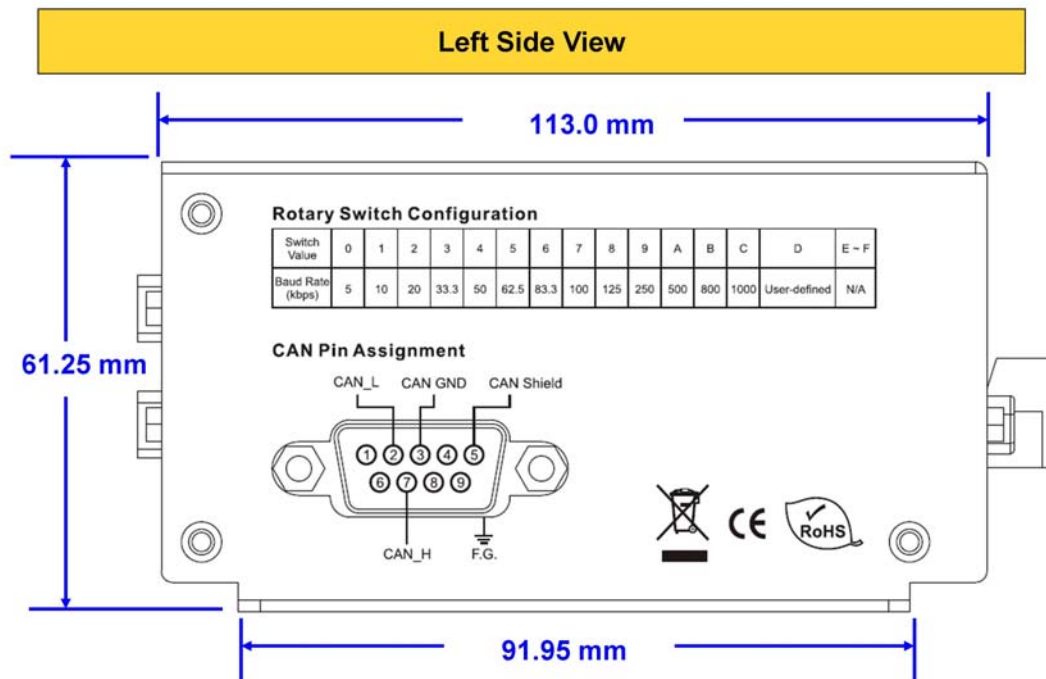


Top View

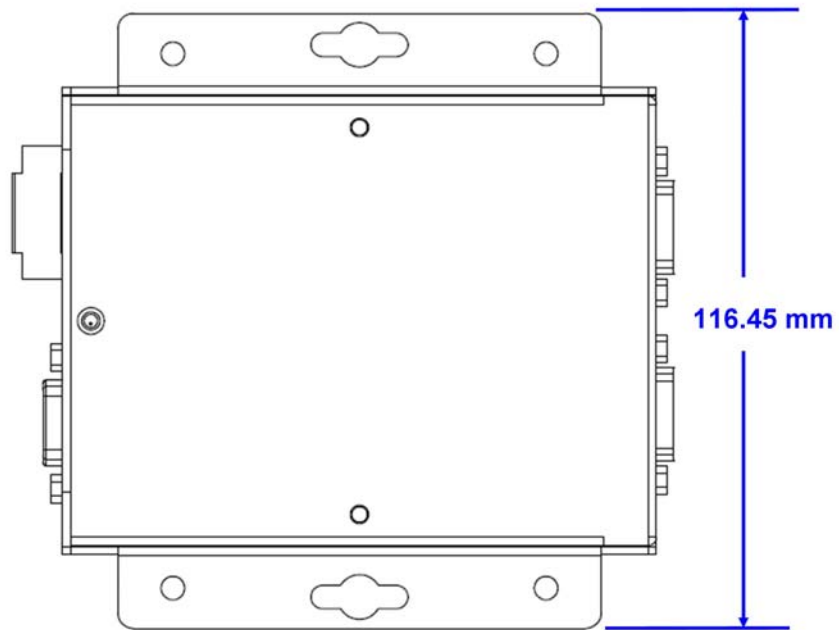


Bottom View





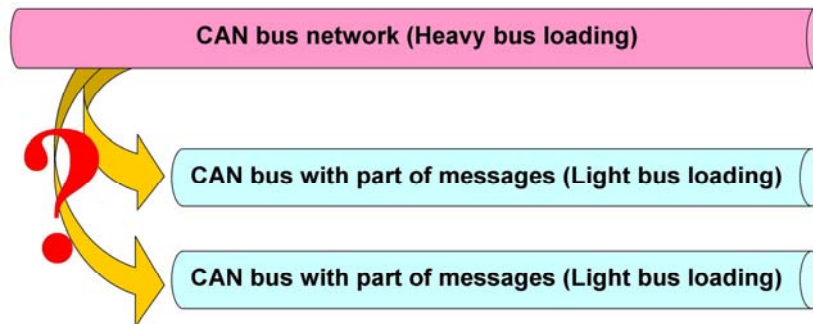
Rear Side View



7 Appendix A : Frequency Ask Questions

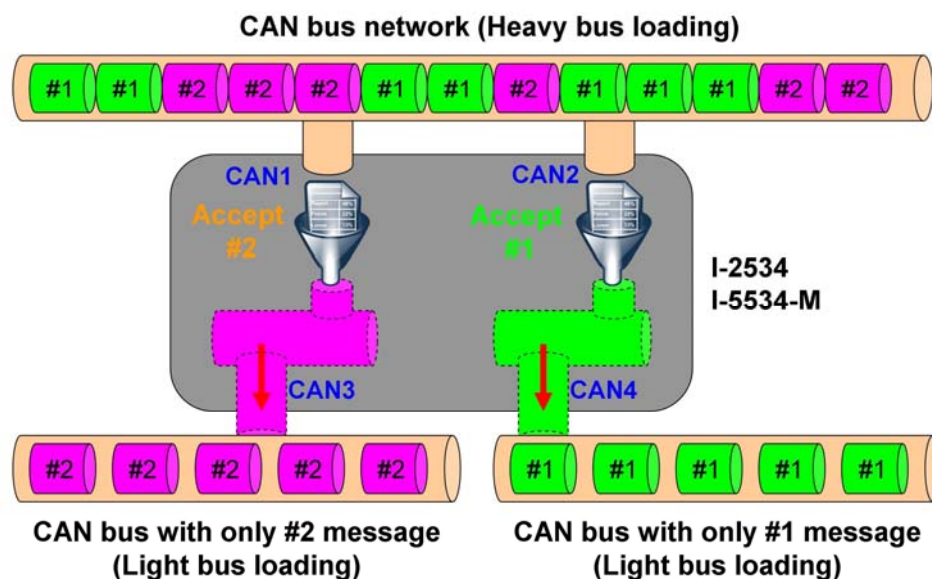
7.1 How to share the loading of the CAN bus?

The problem would be shown as the figure below.



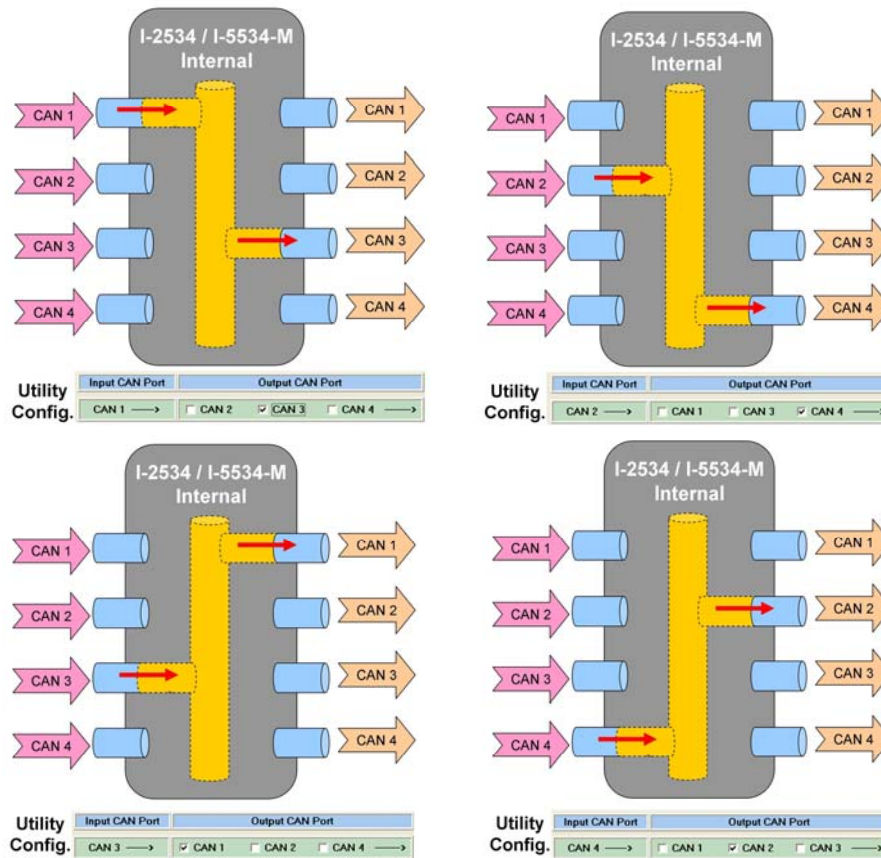
Solution:

1. The users can divide those CAN messages which are in the heavy CAN bus into two groups (ex. Group #1 and Group #2).
2. Connecting the CAN bus to both CAN1 port and CAN2 port of the I-2534 or I-5534-M.
3. Configure the CAN filter of CAN1 port and CAN2 port as the figure below. CAN 1 port only accept the messages of the Group #2 and CAN 2 port only accept the messages of the Group #1.

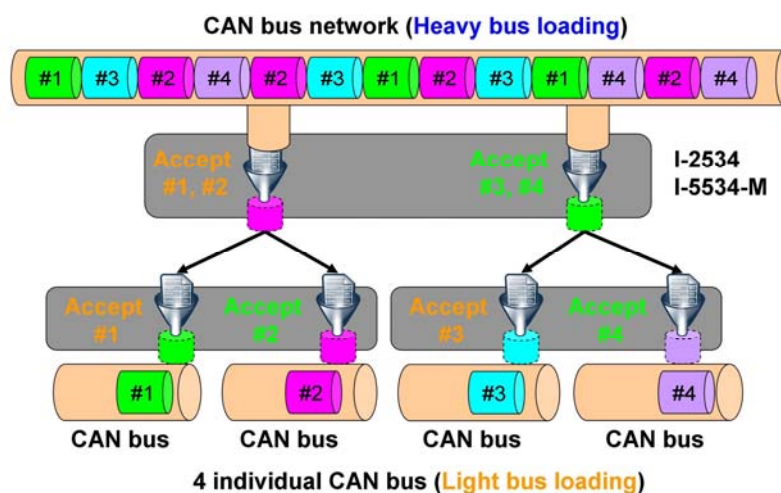


4. The route path needs to be configured as CAN1 <-> CAN 3, CAN2 <-> CAN 4.

Here shows the configurations of the route path.

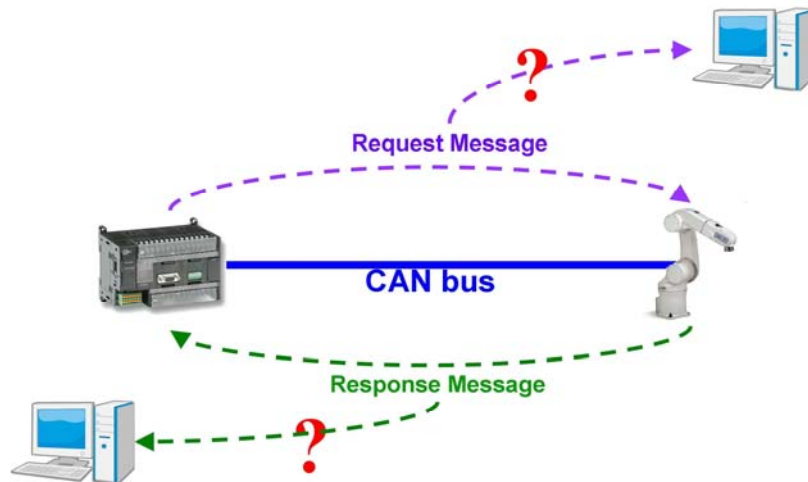


Furthermore, how to share the CAN bus into four or more CAN networks? The users can use three I-2534 or I-5534-M modules to achieve this requirement. Here shows the figure.



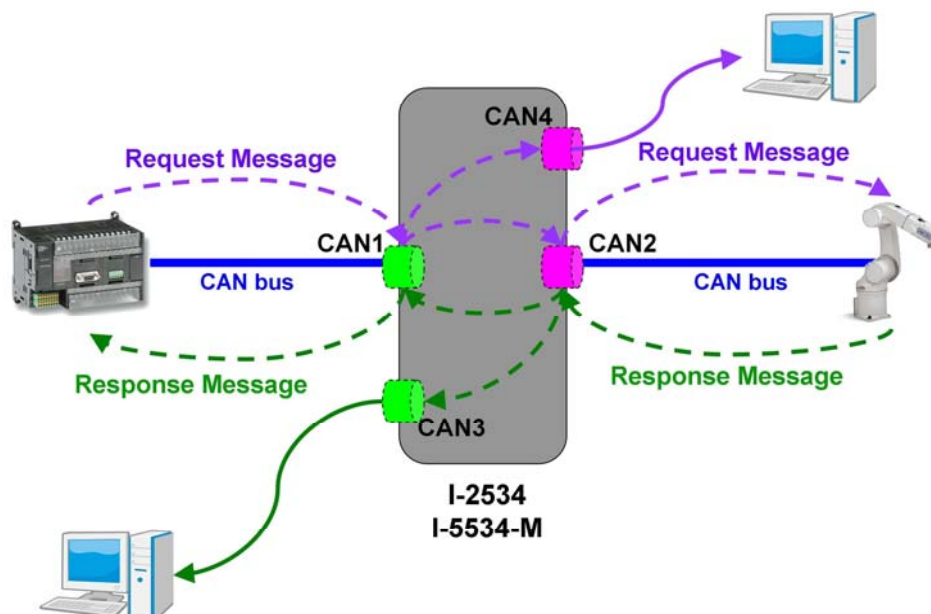
7.2 How to listen the single direction CAN messages?

The problem would be shown as the figure below.



Solution:

1. The users can put the I-2534 or I-5534-M between the controller and device.
2. Configure the route path as below to distinguish the request messages from response messages.

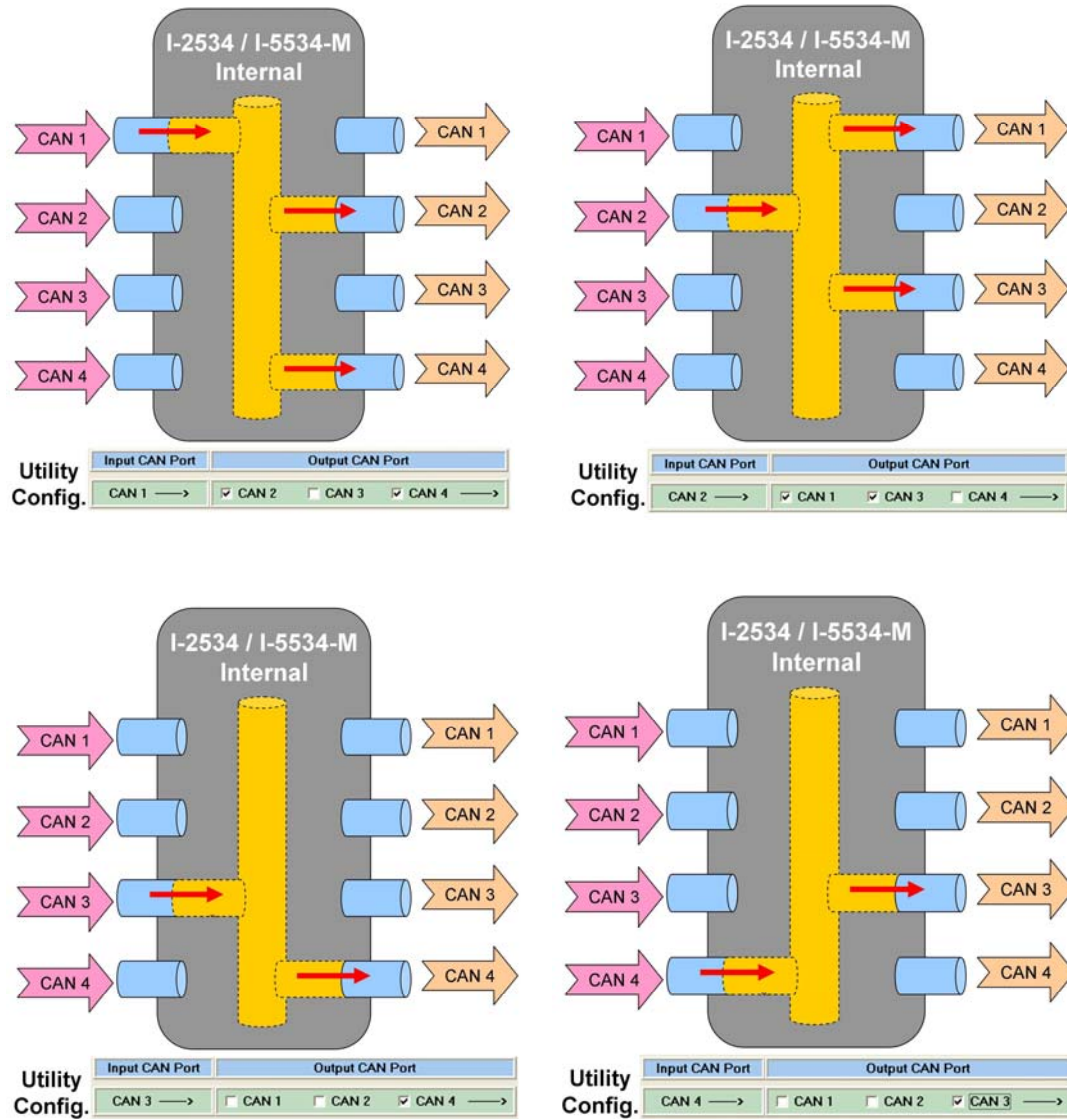


3. The route path needs to be configured as bellow

CAN1 <--> CAN 2 and CAN 4

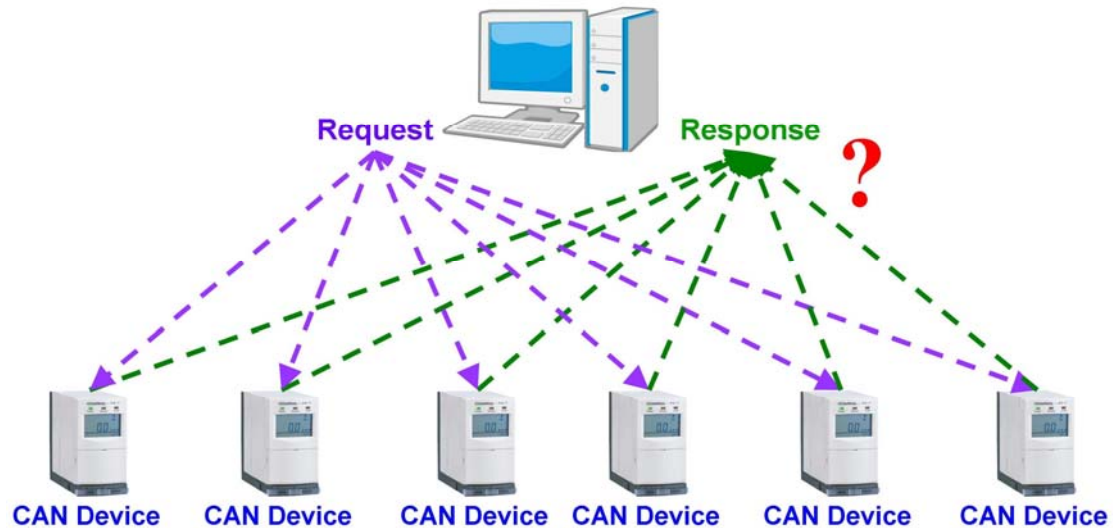
CAN2 <--> CAN 1 and CAN 3.

Here shows the configurations of the route path.



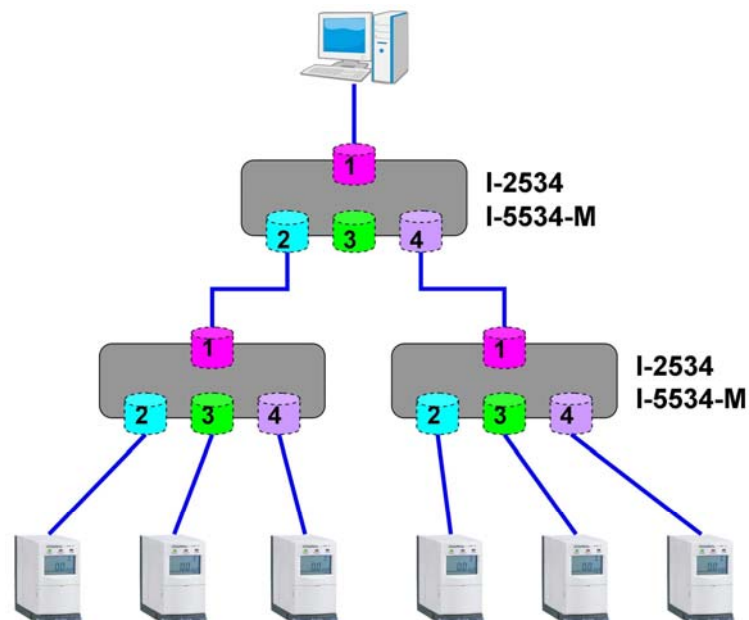
7.3 How to reduce the devices loading?

The problem would be shown as the figure below.



Solution:

1. Each CAN device should connect a single CAN bus to avoid processing the CAN messages from other slave devices. Using the I-2534 or I-5534-M is the efficient solution. The bus topology is shown below.



2. Configure the route path to make the response message only send to the PC side. All of the I-2534s or I-5534-Ms can be configured as follows.

