
The I-7532 CAN Bridge

User's Manual

Warranty

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1 Introduction

I-7532 is a local CAN bridge used to establish a connection between two CAN bus system in a CAN network. I-7532 stands by itself connecting adjacent wiring segments together as in the case of a CAN repeater (I-7531). Not just like a CAN repeater, I-7532 has two more powerful features (Extend Network Distance and Connect two networks with different baud rate).



Figure 1-1 I-7532

The I-7532 is an optically isolated CAN bridge which provides 2500V_{RMS} optical isolation allowing users to separate and protect critical segments of the CAN network. And it is 3000V_{DC} galvanic isolation isolates both CAN channels from each other as well as from the power supply. The CAN connection of I-7532 is by terminal blocks. A power supply of 10 ~ 30V_{DC} is required. I-7532 is housed in a rugged DIN-Rail mountable box, making it easy to install in an industrial cabinet.

Extend The Communication Network Distance



Figure 1-2 Application of I-7532 Extend Distance.

The transmission distance limitation of the CAN bus system on each side of I-7532 are independent, which means the total network distance can be extended

Connected Two Different Baudrate Network

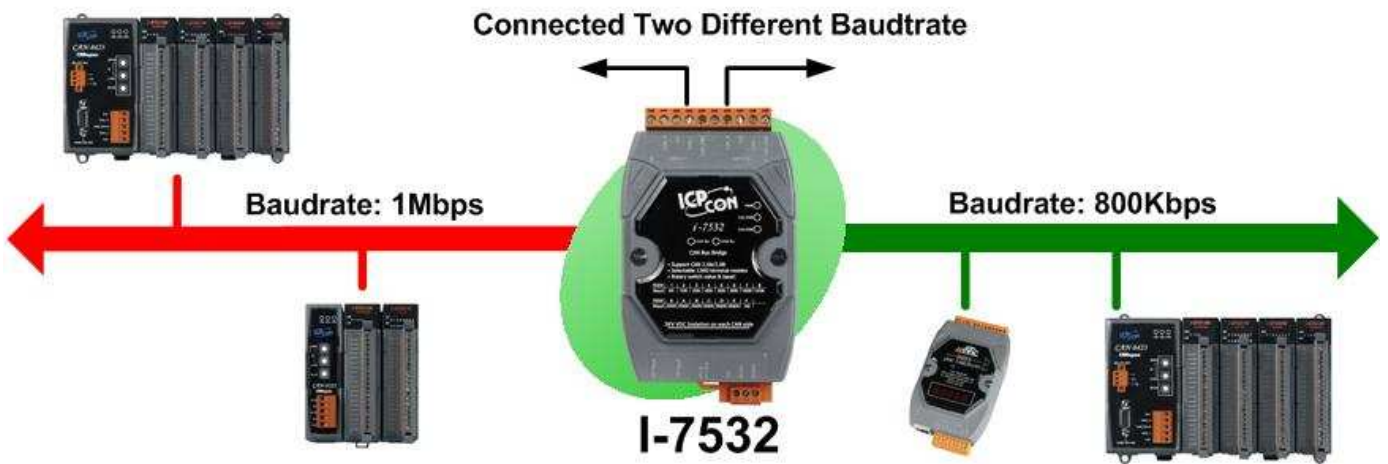


Figure 1-3 Application of I-7532 Different Baud Connected.

The baud rate of two channels on I-7532 can be different for highly flexibility. On the other hand, when the CAN bus system on one side of I-7532 happens some error (e.g. bit error), the system on other side can still work on correctly

Raise the number of node in the bus

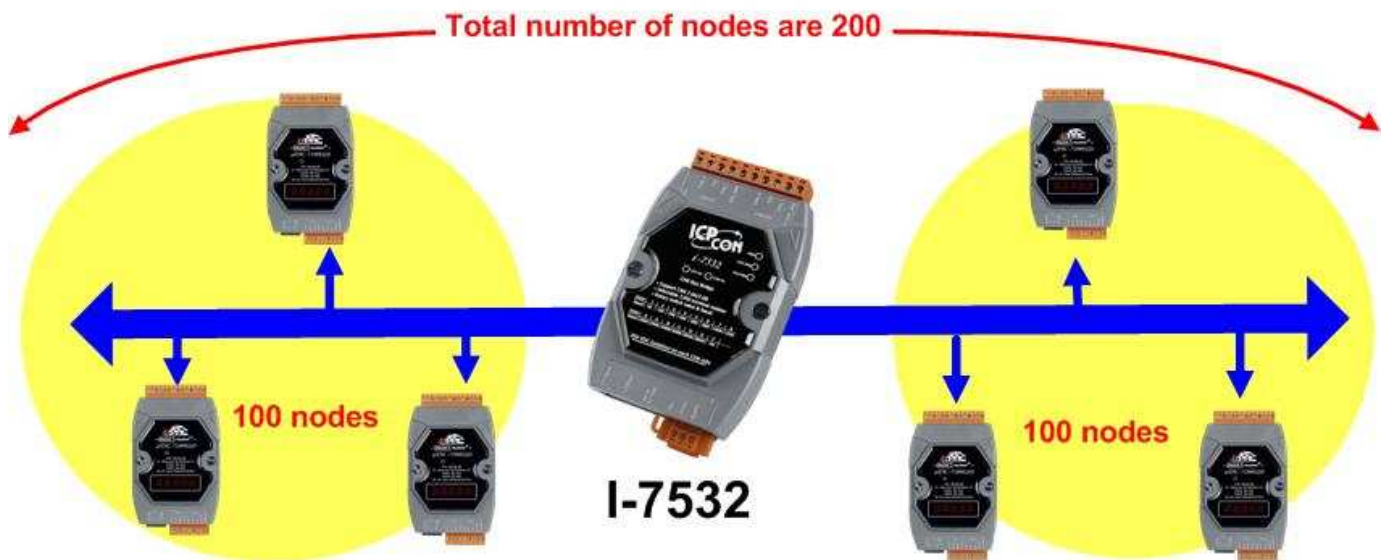


Figure 1-4 Application of I-7532 Raise node.

I-7532 can enhance the bus load capacity, and users can know how to increase driving capability by table 3-2.

1.1 Features

- Microprocessor inside with 72MHz.
- 82C250 CAN transceiver.
- 2500V_{RMS} photo couple isolation on the CAN side.
- 3000V_{DC} galvanic isolation among the power supply and 2 CAN channel.
- 120Ω CAN terminal resistors are integrated (can be disabled by jumper).
- Watchdog inside.
- Driving capability: Up to 100 nodes on each CAN channel.
- Transmission distance up to 1km on each CAN channel.
- Removable terminal block.
- Mountable on DIN Rail.
- 768 frames buffer for each CAN channel.
- The baud of each channel can be different for highly flexibility.

1.2 Specifications

- Support CAN 2.0A / CAN 2.0B.
- Fully compatible with ISO 11898-2.
- Communication baud : 5K, 10K, 20K, 50K, 80K, 100K, 125K, 200K, 250K, 400K, 500K, 600K, 800K and 1Mbps.
- Power consumption: 2W max.
- Power Supply: +10V_{DC} ~ +30V_{DC}.
- Operating temperature: -25°C ~ +75°C.
- Humidity: 5% ~ 95%.
- Dimensions: 122 mm x 72 mm x 35 mm.

1.3 Application

- Factory Automation.
- Building Automation.
- Home Automation.
- Vehicle Automation.
- Control system.
- Monitor system.

1.4 Information

For more information about the I-7532, please visit our website:

http://www.icpdas.com/products/Remote_IO/can_bus/i-7532.htm

2 Technical data

2.1 Block Diagram

The following block diagram illustrates the functions of I-7532 module. Power supply is with $3000V_{DC}$ galvanic isolated between each CAN port. Furthermore, there is photo-isolation $2500V_{RMS}$ between two CAN channels.

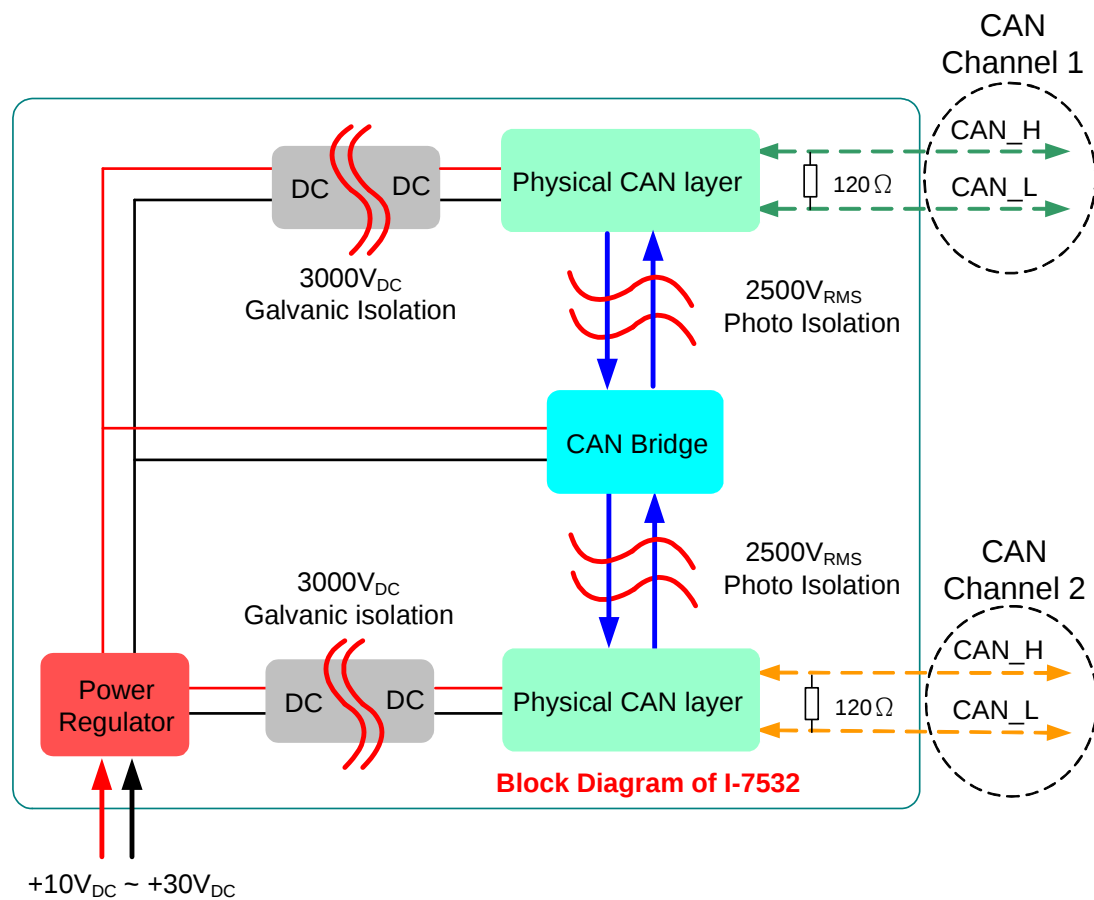


Figure 2-1 Block Diagram of I-7532

2.2 Appearance

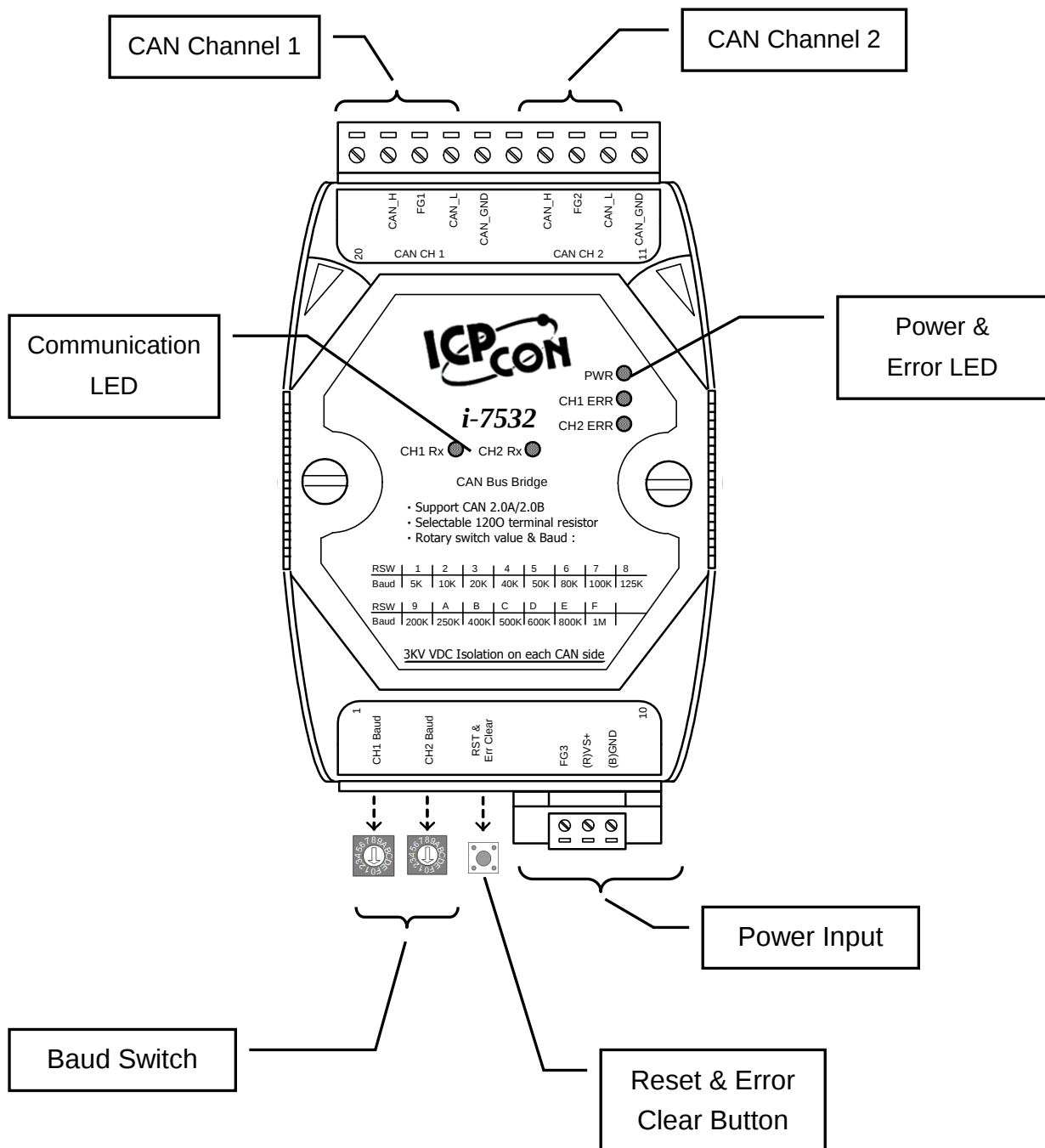


Figure 2-2 Appearance of I-7532

2.3 LED Status

- **Power LED(PWR LED) Status**

Table 2-1 Power LED Status

PWR LED(Red Light)	
ON	Power On
OFF	Power off

When I-7532 is active, the PWR LED will turn on with red light.

- **Communication LED(CH1RX,CH2RX) Status**

Table 2-2 Communication LED Status

Rx LED(Green Light)	
Flashing	Transmission
OFF	Bus Idle

If there is a message passing through I-7532 from channel 1 to channel 2, the CH1 Rx LED will flash once with green light, and vice versa.

- **Error LED(CH1 ERR, CH2 ERR) Status**

Table 2-3 Error LED Status

ERR LED(Red Light)	
Flashing (100ms)	Transmission Fail
Flashing (1sec)	Buffer overflow
ON	Bus Off
OFF	No Error

(1).Transmission Fail :

If CAN transmission fails on channel (X), the CH(X) ERR LED will flash continuously and the flashing interval is about 100 ms.

(2).Buffer overflow :

If Tx buffer on channel (X) has been overflow, the CH(X) ERR LED would flash continuously and the flashing interval is about 1 second. No matter the status is already fixed or not, after user click the "RST" button, the Error LED will be off.

(3).Bus Off :

If Bus-Off condition happened on channel (X) of I-7532, the CH(X) ERR LED will be always ON until corrected.

2.4 Reset & Error Clear Button

Table 2-4 Reset & Error Clear Button

Reset & Error Clear Button	
Click once	Clear Error LED
Press 3 sec	Module Reset

(1).Error Clear :

Users can click this button to clear the ERR LED status.

(2).Module Reset :

If users want to reset I-7532, just press “RST & Error Clean” button until 3 sec, then all LEDs on I-7532 will flash once about 0.8 sec. After reset is finished, the PWR Led will be on and other LEDs will be off.

2.5 Baud Selection Switch

Users can use the “Baud Rotary Switch” to change the CAN1 and CAN2 baud of I-7532 and it supports 15 kinds of baud on below table. **After changing the rotary switch value, users need to reset I-7532 to take the setting effect (by pressing RST button until 3 sec).**

Table 2-5 Rotary Switch Value & Baud

Switch Value	0	1	2	3	4	5	6	7
Baud [bps]	NA.	5k	10k	20k	40k	50k	80k	100k
Switch Value	8	9	A	B	C	D	E	F
Baud [bps]	125k	200k	250k	400k	500k	600k	800k	1M

2.6 Pin Assignment

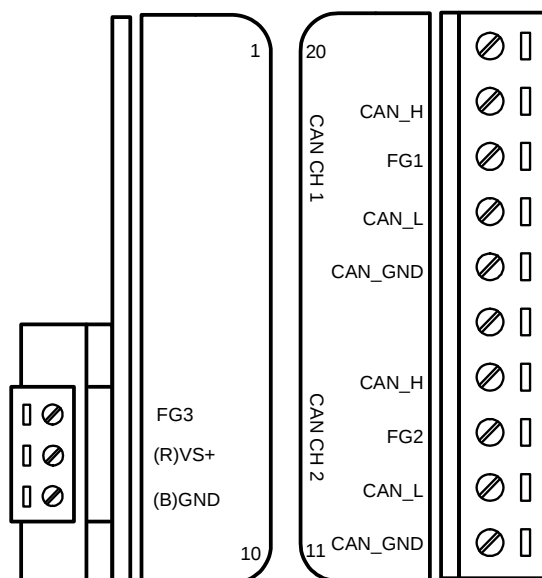


Figure 2-3 CAN & Power Connector of I-7532

Table 2-6 Pin Description of CAN Connector

Part	Name	Description
CAN CH 1	CAN_GND	CAN_Ground, ground voltage level of CAN channel 1.
	CAN_L	CAN_Low, signal line of CAN channel 1.
	FG1	Frame Ground of CAN channel 1.
	CAN_H	CAN_High, signal line of CAN channel 1.
CAN CH 2	CAN_GND	CAN_Ground, ground voltage level of CAN channel 2.
	CAN_L	CAN_Low, signal line of CAN channel 2.
	FG2	Frame Ground of CAN channel 2.
	CAN_H	CAN_High, signal line of CAN channel 2.

Table 2-7 Pin Description of Power Connector

Part	Name	Description
Power	(R)VS+	Voltage Source. It could be +10V _{DC} ~ +30V _{DC} .
	(B)GND	Power Ground.
	FG3	Frame Ground of Power.

Note 1: In some cases, the voltage level of CAN_GND of different CAN device in the same CAN bus system are not equal. At this time, it could cause some problems to derogate system stability of this CAN bus system.

There is one way to relieve this situation; user can connect the CAN_GND between those CAN devices to achieve equal voltage level of CAN_GND.

Wiring of CAN_GND is not necessary; user can modify the configuration of wiring according to actual applications.

Note 2: Electronic circuits are constantly vulnerable to Electro-Static Discharge (ESD), which become worse in a continental climate area. FG(Frame Ground) provides a path for bypassing ESD to earth ground, allowing enhanced static protection (ESD) capability and ensures that the module is more reliable.

If user wants to use FG, the FG1 and FG2 and FG3 should be connecting to earth ground. Within the I-7532, FG1 and FG2 and FG3 are not interconnected.

2.7 Wire Connection

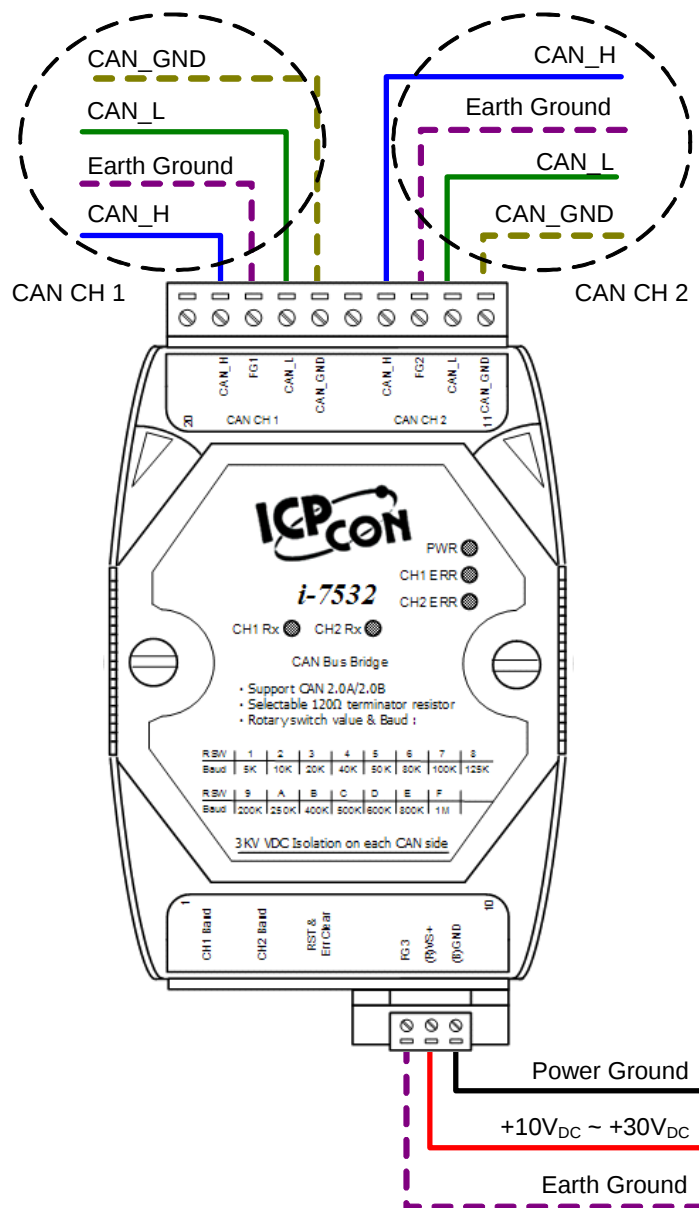


Figure 2-4 Wire Connection of I-7532

2.8 Terminator Resistor Setting

I-7532 includes two build-in 120Ω terminal resistors, users can decide to enable these two terminal resistors or not.

The JP4 of I-7532 is used to adjust terminal resistor on CAN Channel 1, and the JP3 of I-7532 is used to adjust terminal resistor on CAN Channel 2.

Before adjusting JP3 or JP4 of I-7532, users need to open the cover of I-7532 first. The location of JP3 and JP4 is shown as follows:

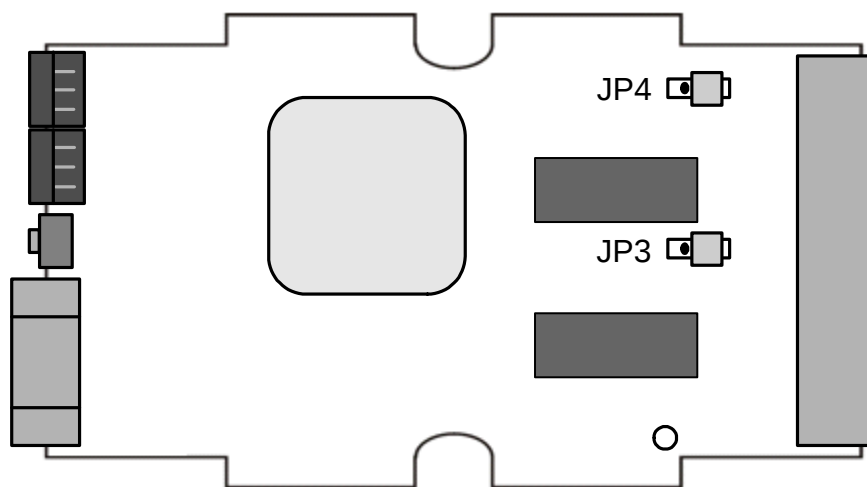


Figure 2-5 JP3 and JP4 positions

The following connection statuses present the condition if the terminal resistor is enabled (default) or disabled.

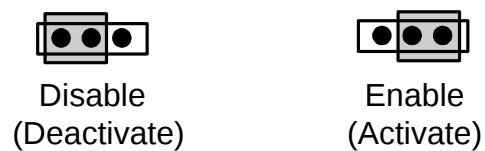


Figure 2-6 Adjustment of Terminator Resistor

3 Network deployment

3.1 Definition

Following figure is the relation among segments in CAN bus and CAN network.

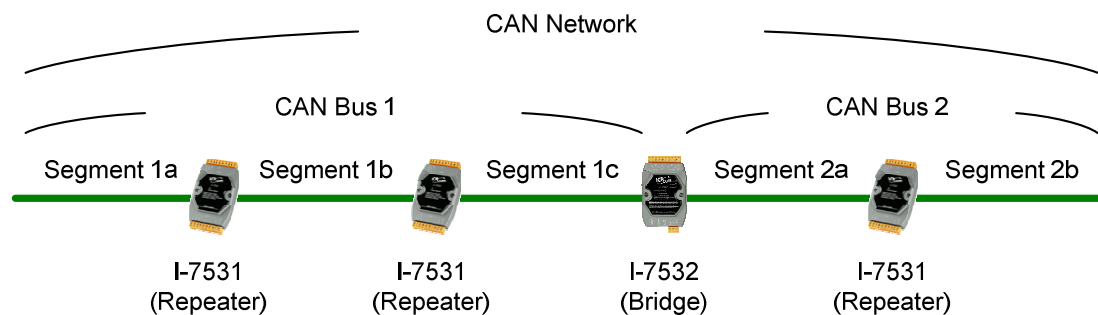


Figure 3-1 Segment, CAN Bus and CAN network

3.2 Cable Selection

The CAN bus following ISO 11898-2 is a balanced (differential) 2-wire interface running over either a Shielded Twisted Pair (STP), Un-shielded Twisted Pair (UTP), or Ribbon cable.

The table below shows the recommended DC parameters of CAN bus line.

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

The recommended AC parameters of CAN bus line are 120 Ω impedance and 5 ns/m specific line delay.

3.3 Driving Capability

Users can use the following table to know the maximum node number in each segment and the maximum segment length when using different type of wire in the CAN network

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 m	<200 m	<170 m	<150 m
~0.5 (AWG20)	<390 m	<360 m	<310 m	<270 m
~0.8 (AWG18)	<590 m	<550 m	<470 m	<410 m
~1.3 (AWG16)	<980 m	<900 m	<780 m	<670 m

3.4 Baud and Bus Length

The relationship between ideal bus length and baud in the CAN bus system is displayed below.

Table 3-3 Baud, Bus Length

Baud [bit/sec]	Ideal Bus Length[m]
1M	< 40
800K	< 50
500K	< 100
250K	< 250
125K	< 500
50K	< 1000
20K	< 2500
10K	< 5000

When users want to calculate the bus length, the device used to connect CAN segment must be considered too. User can check the specification of the device and find the equivalent bus length of the device. For example, the equivalent bus length of CAN repeater (I-7531) is 40m.

3.5 Terminator Resistor

According to the ISO 11898-2 specifications, the bus line of CAN_H and CAN_L must be terminated by a terminal resistor for proper operation. The equivalent resistance between CAN_H and CAN_L should be 60Ω . There are some examples below.

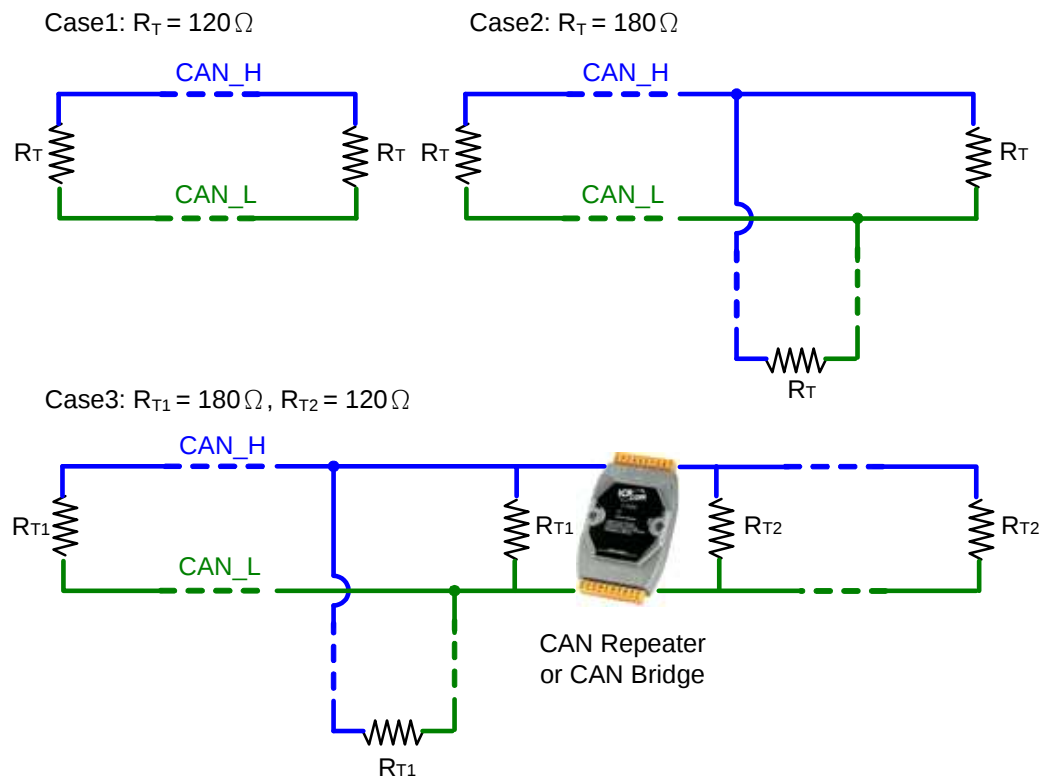


Figure 3-2 Terminator Resistor