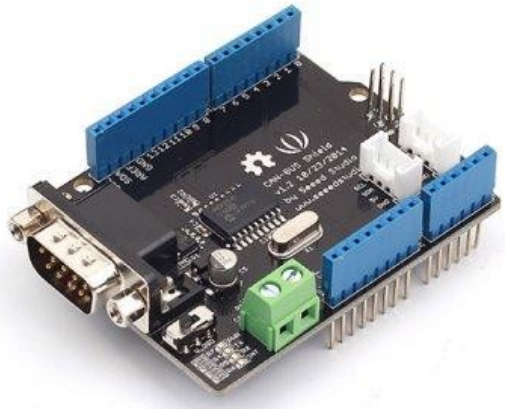
CAN-BUS Shield



CAN-BUS is a common industrial bus because of its long travel distance, medium communication speed and high reliability. It is commonly found on modern machine tools and as an automotive diagnostic bus. This CAN-BUS Shield adopts MCP2515 CAN Bus controller with SPI interface and MCP2551 CAN transceiver to give your Arduino/Seeeduino CAN-BUS capibility. With an OBD-II converter cable added on and the OBD-II library imported, you are ready to build an onboard diagnostic device or data logger.

Note: We are trying our best to make a better document syste, if you have any suggestion, please feel free to contact loovee@seeed.cc.

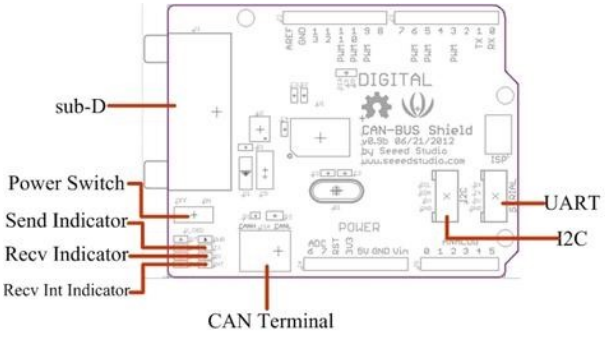
Get One Now

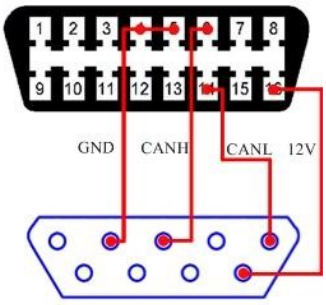
Features

- Implements CAN V2.0B at up to 1 Mb/s
- SPI Interface up to 10 MHz
- Standard (11 bit) and extended (29 bit) data and remote frames
- Two receive buffers with prioritized message storage
- Industrial standard 9 pin sub-D connector
- LED indicators

Hardware Overview

Voltage：5V
Dimensions： 68x53mm
Net Weight：50g





Note:

When you use more than two CAN Bus Shield in one net, you should think about the impedance.

You can just cut P1 in the PCB with a knife, or just remove R3 on the PCB.

Digital Pin Used

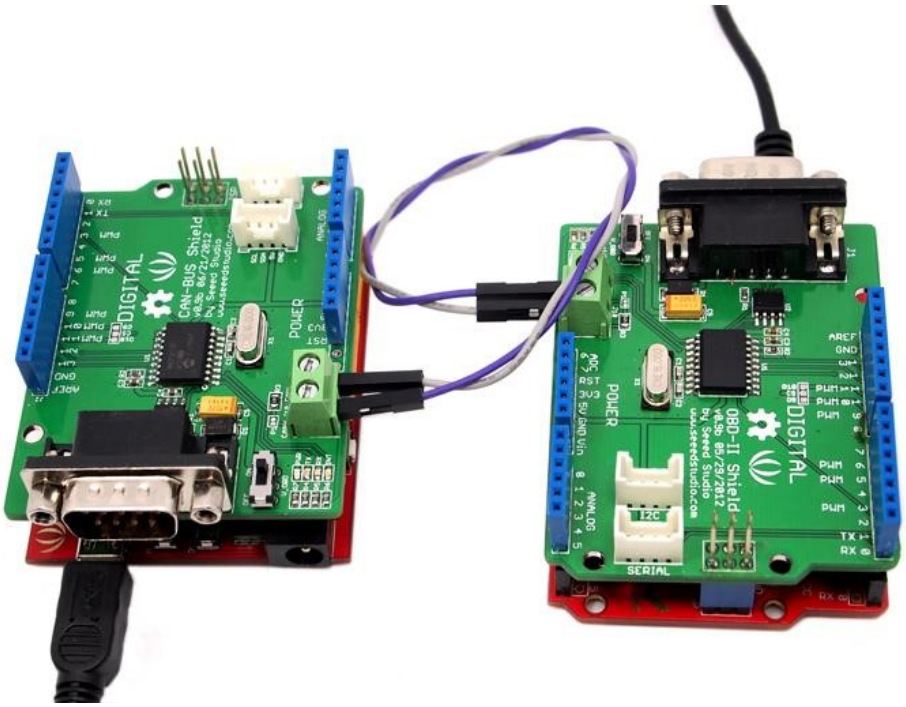
Arduino Pin	Function
D0	Not Used
D1	Not Used
D2	**Receive Interrupt**
D3	Not Used
D4	Not_Used
D5	Not Used
D6	Not Used
D7	Not Used
D8	Not Used
D9	**SPI_CS(default)**
D10	**SPI_CS(selectable)**
D11	**SPI_MOSI**
D12	**SPI_MISO**
D13	**SPI_SCK**

Analog Pin Used

Arduino Pin	Function
A0	Not_Used

A1	Not_Used
A2	Not_Used
A3	Not_Used
A4	Not Used
A5	Not Used

Getting Started

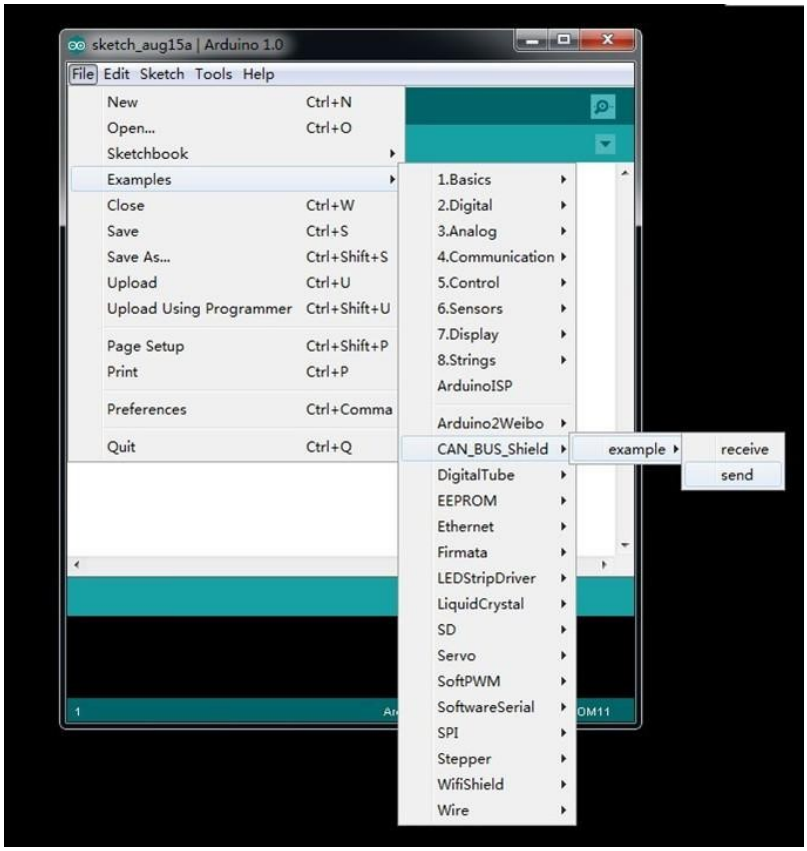


1. Download the CAN-BUS Source code file for Arduino 1.0 and release it in the libraries file in the Arduino-1.0 program.: **..\arduino-1.0\libraries**.

If the folder name include "-master", just remove it.

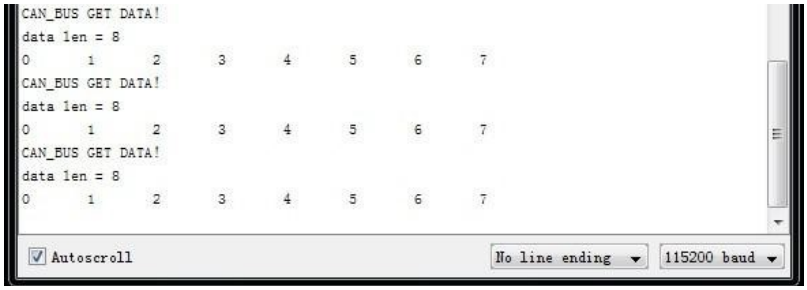
2. Open the Arduino-1.0, and you will find 3 examples: receive_check ,send and receive_interrupt. Here we'll use send

and receive_check, open it then you should get two programming windows now.



3. Upload two examples to two boards separately. Choose the board via the path: Tools -->Serial Port-->COMX. Note down which board is assigned as a "send" node and which board is assigned as a "receive" node.

4. Open the "Serial Monitor" on the "receive" COM, you will get message sent from the "send" node. Here we have the preset message "0 1 2 3 4 5 6 7" showing in the following picture.



APIs

1. Set the BaudRate

This function is used to initialize the baudrate of the CAN Bus system.

The available baudrates are listed as follws:

```
#define CAN_5KBPS    1
#define CAN_10KBPS   2
#define CAN_20KBPS   3
#define CAN_25KBPS   4
#define CAN_31K25BPS 5
#define CAN_33KBPS   6
#define CAN_40KBPS   7
#define CAN_50KBPS   8
#define CAN_80KBPS   9
#define CAN_83K3BPS  10
#define CAN_95KBPS   11
#define CAN_100KBPS  12
#define CAN_125KBPS  13
#define CAN_200KBPS  14
#define CAN_250KBPS  15
#define CAN_500KBPS  16
#define CAN_666kbps  17
#define CAN_1000KBPS 18
```

2. Set Receive Mask and Filter

There are 2 receive mask registers and 5 filter registers on the controller chip that guarantee you get data from the target device. They are useful especially in a large network consisting of numerous nodes.

We provide two functions for you to utilize these mask and filter registers. They are:

Mask:

```
init_Mask(unsigned char num, unsigned char ext, unsigned char ulData);
```

Filter

```
init_Filt(unsigned char num, unsigned char ext, unsigned char ulData);
```

"num" represents which register to use. You can fill 0 or 1 for mask and 0 to 5 for filter.

"ext" represents the status of the frame. 0 means it's a mask or filter for a standard frame. 1 means it's for a extended frame.

"ulData" represents the content of the mask of filter.

3. Check Receive

The MCP2515 can operate in either a polled mode, where the software checks for a received frame, or using additional pins to signal that a frame has been received or transmit completed. Use the following function to poll for received frames.

```
INT8U MCP_CAN::checkReceive(void);
```

The function will return 1 if a frame arrives, and 0 if nothing arrives.

4. Get CAN ID

When some data arrive, you can use the following function to get the CAN ID of the "send" node.

```
INT32U MCP_CAN::getCanId(void)
```

5. Send Data

CAN.sendMsgBuf(INT8U id, INT8U ext, INT8U len, data_buf);

is a function to send data onto the bus. In which:

"id" represents where the data come from.

"ext" represents the status of the frame. '0' means standard frame. '1' means extended frame.

"len" represents the length of this frame.

"data_buf" is the content of this message.

For example, In the 'send' example, we have:

```
unsigned char stmp[8] = {0, 1, 2, 3, 4, 5, 6, 7};

CAN.sendMsgBuf(0x00, 0, 8, stmp); //send out the message 'stmp' to the
```

6. Receive Data

The following function is used to receive data on the 'receive' node:

```
CAN.readMsgBuf(unsigned char len, unsigned char buf);
```

In conditions that masks and filters have been set. This function can only get frames that meet the requirements of masks and filters.

"len" represents the data length.

"buf" is where you store the data.

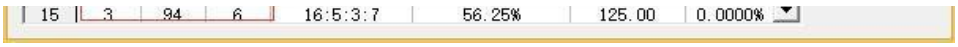
Set Baud Reate

We had provided many frequently-used baud rate, as below:

```
#define CAN_5KBPS    1
#define CAN_10KBPS   2
#define CAN_20KBPS   3
#define CAN_25KBPS   4
#define CAN_31K25BPS 5
#define CAN_33KBPS   6
#define CAN_40KBPS   7
#define CAN_50KBPS   8
#define CAN_80KBPS   9
#define CAN_83K3BPS  10
#define CAN_95KBPS   11
#define CAN_100KBPS  12
#define CAN_125KBPS  13
#define CAN_200KBPS  14
#define CAN_250KBPS  15
#define CAN_500KBPS  16
#define CAN_666kbps  17
#define CAN_1000KBPS 18
```

Yet you may still can't find the rate you want. Here we provide a software to help you to calculate the baud rate you need.

Click here to download the software, it's in Chinese, but never mind, it's easy to use. And the software **support Windows only**.



Open the software, what you need to do is set the baud rate you want, and do some simple setting, then click **calculate**

Then you will get some data, cfg1, cfg2 and cfg3.

You need to add some code to the library.

Open **mcp_can_dfs.h**, you need to add some code at about line 272,

```
#define MCP_16MHz_xxxkBPS_CFG1 (cfg1)    // xxx is the baud rate you n
#define MCP_16MHz_xxxkBPS_CFG2 (cfg2)
#define MCP_16MHz_xxxkBPS_CFG3 (cfg2)
```

Then let's go to about line 390, add some code:

```
#define CAN_xxxKBPS NUM       // xxx is the baudrate you need, and NUM
```

Open **mcp_can.cpp**, goto the function **mcp2515_configRate**(at about line 190), then add some code:

```
case (CAN_xxxKBPS):
    cfg1 = MCP_16MHz_xxxkBPS_CFG1;
    cfg2 = MCP_16MHz_xxxkBPS_CFG2;
    cfg3 = MCP_16MHz_xxxkBPS_CFG3;
    break;
```

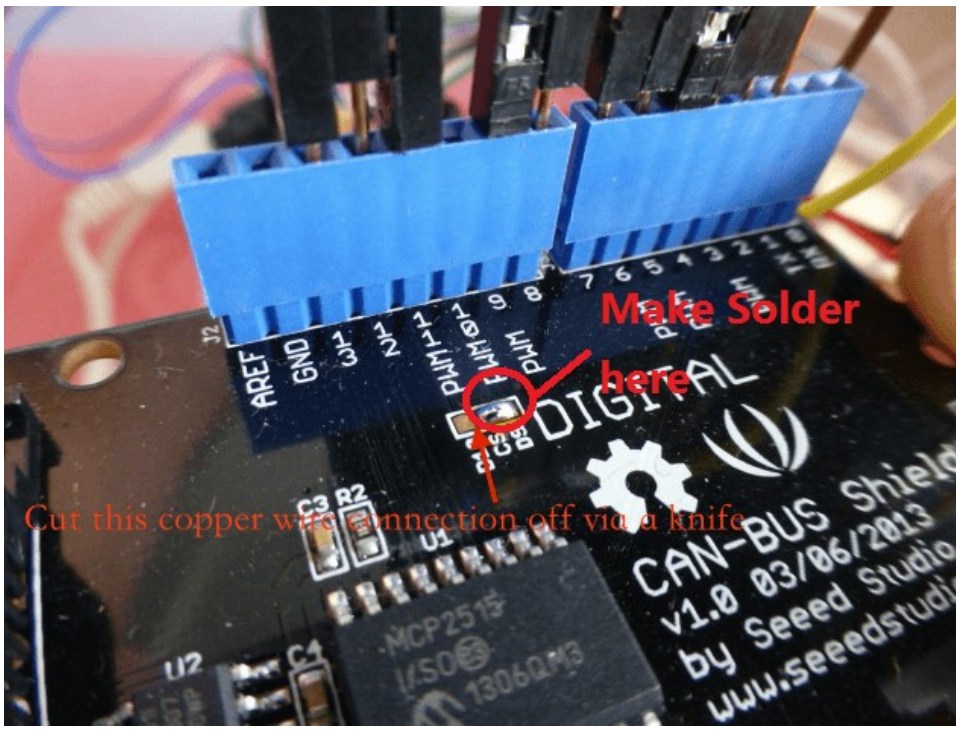
Then you can use the baud rate you need. And please give me a pull request at github when you use a new rate, so I can add it to the library to help the other guys.

FAQ

How to Change SS Pin

The SPI SS pin is default D10, you can change it to D9 easily.

Firstly, cut off the copper wire between CS and digital 10 via a knife, then do some soldering just like the following image



Then, you need to change the SS Pin in the library.

You can refer to here

CAN BUS Shield init fail

As from CAN BUS shield V1.1 to latest version, we changed CS pin from D10 to D9 by default.

So please do this modification

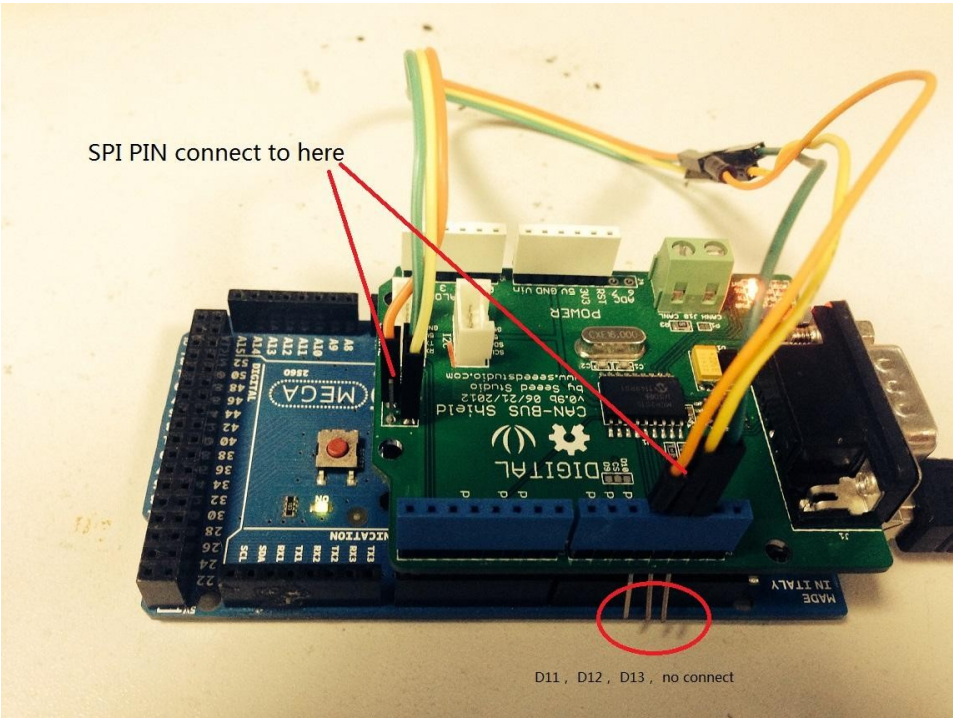
```
MCP_CAN CAN(9); // Set CS to pin 9
```

How to Compatible With Arduino Mega and Leonardo

In the old version(this bug had been fixed on 1.1 and the later version) of CAN BUS Shield, SPI pin only connect to D11~D13. For Arduino UNO(all board based on Atmega328), it works fine.

But for the others Arduino boards, it doesn't work, because SPI pin of those board was no D11~D12, so you need to do some hacking.

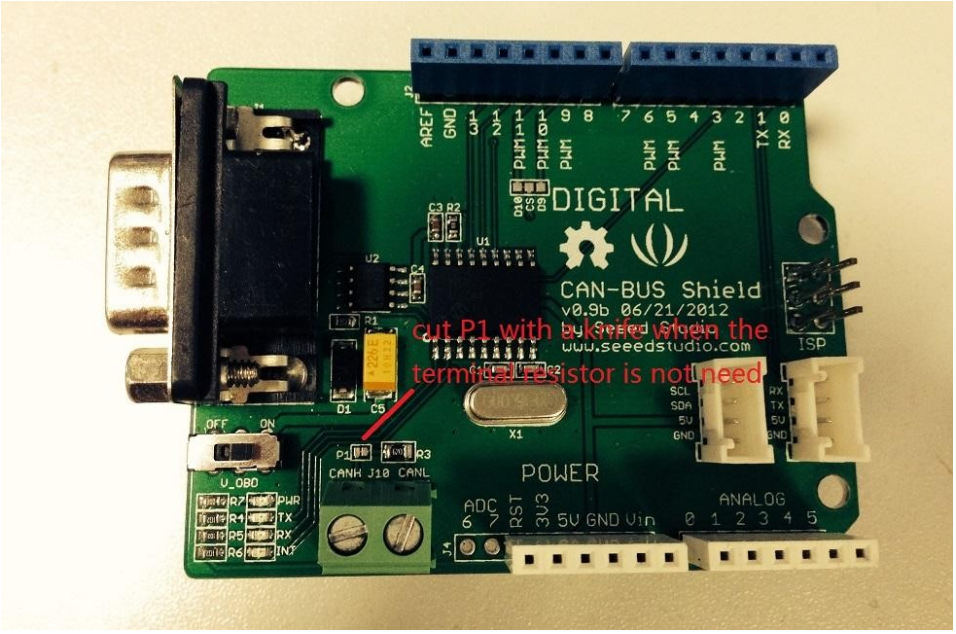
Just as following:



More details refer to here

How to remove the terminal resistor

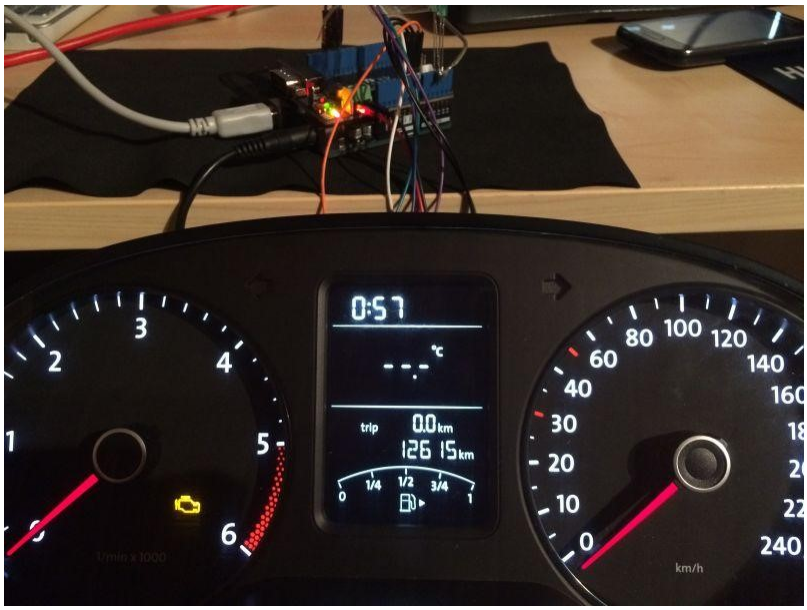
There's a 62 Ohm(120 Ohm in version 1.1 hardware) on CAN BUS Shield. Sometime it's not need. You can remove it easily, just as follow:



Related Projects

If you want to make some awesome projects with CAN-BUS shield, here's one example.

Volkswagen CAN BUS Gaming



Ever wanted to play a car/truck simulator with a real dashboard on

your PC? Me too! I'm trying to control a VW Polo 6R dashboard via CAN Bus with an Arduino Uno and a Seeed CAN Bus Shield. Inspired by Silas Parker. Thanks to Sepp and Is0-Mick for their great support!

Make It Now

Hack your vehicle CAN-BUS

Modern Vehicles all come equipped with a CAN-BUS Controller Area Network, Instead of having a million wires running back and forth from various devices in your car to the battery, its making use of a more clever system.

All electronic functions are connected to the TIPM, (Totally integrated Power Module), such as solenoids/relays to lock the doors or mini motors to wind the windows ect ect.

From each node (IE Switch pod that controls your windows or electric door locks) it broadcasts a message across the CAN. When the TIPM detects a valid message it will react accordingly like, lock the doors , switch on lights and so on.

Make It Now

Resources

- CAN-BUS Shield V1.2 Schmatics
- CAN-BUS Shield V1.2 eagle file
- CAN-BUS Source code file for Arduino 1.0
- MCP2515 datasheet
- MCP2551 datasheet
- An OBD Demo
- MCP2515 Baud Rate Tool

Help us to make it better

Seeed CAN Bus Shield

1. Is this wiki helpful for you?

- ◯ YES
- ◯ NO

2. Give us some suggestion to make it better

3. What will you make with CAN Bus Shield

Done