

Geschwister Schneider Technologie-, Entwicklungs- und Vertriebs UG.

The Geschwister Schneider *USB to CAN* adapter is a usb device with two galvanically isolated *CAN 2.0 A/B* controllers. The Device is currently available in two variants; A) stand alone usb device in a ruggedised aluminium enclosure, *M12* connectors for *CAN*, and *USB B* connector. B) in mini pci form factor with pin header for *CAN* connection.

In either case, communication with the device is realized through the usb interface. Geschwister Schneider develops and maintains a *Linux SocketCan* driver for the device.

Features:

- Two independant CAN 2.0 A/B channels
- Full per channel Galvanic isolation
- Full ECHO support
- Ruggedized option for field environments
- Mini PCI option for system integrators and embedded systems
- Mainline Socket-can Linux driver Kernel Version greater than 3.17
- Gummi-bears on delivery ^_^



1 Quick Start

Under ideal circumstances¹ your distributions maintainers will have included in you distributions release a linux kernel with *Socket-can* support, and the mainline driver for this device *gs_usb*.

In this case make sure the device is connected and enumerates over usb:

```
$ sudo lsusb -v -d 1d50:606f

Bus 004 Device 008: ID 1d50:606f OpenMoko, Inc.
Device Descriptor:
  bLength                18
  bDescriptorType        1
  bcdUSB                  2.00
  bDeviceClass            0 (Defined at Interface level)
  bDeviceSubClass        0
  bDeviceProtocol        0
  bMaxPacketSize0       64
  idVendor                 0x1d50 OpenMoko, Inc.
  idProduct                0x606f
  bcdDevice                1.00
  iManufacturer           1 Geschwister Schneider Technologie-, Entwicklungs-
und Vertriebs UG.
  iProduct                 2 USB2CAN v1
  iSerial                  3 2BB144B14435524B41202020FF150B
  ...
```

If necessary load the kernel module for socket-can:

```
$ sudo modprobe can_dev
```

¹Most distributions will include Socketcan as a kernel module

If necessary load the `gs_usb` kernel module:

```
$ sudo modprobe gs_usb
```

List network interfaces:

```
$ ip link list
...
6: can0: <NOARP,ECHO> mtu 16 qdisc noop state DOWN mode DEFAULT qlen 10
   link/can
7: can1: <NOARP,ECHO> mtu 16 qdisc noop state DOWN mode DEFAULT qlen 10
   link/can
...
```

Configure and start CAN devices:

```
$ sudo ip link set can0 up type can bitrate 250000
$ sudo ip link set can1 up type can bitrate 250000
```

The CAN interfaces can now be used like any other socket-can interface.

```
$ candump can0
interface = can0, family = 29, type = 3, proto = 1
<0x002> [1] 00
<0x002> [1] 01
<0x002> [1] 02
...
```

2 Usage

The following examples show how to use the `ip` command and `socketcan` tools to configure and use the can interfaces.

```
$ ip link set can0 type can help
Usage: ip link set DEVICE type can
      [ bitrate BITRATE [ sample-point SAMPLE-POINT] ] |
      [ tq TQ prop-seg PROP_SEG phase-seg1 PHASE-SEG1
        phase-seg2 PHASE-SEG2 [ sjw SJW ] ]

      [ loopback { on | off } ]
      [ listen-only { on | off } ]
      [ triple-sampling { on | off } ]

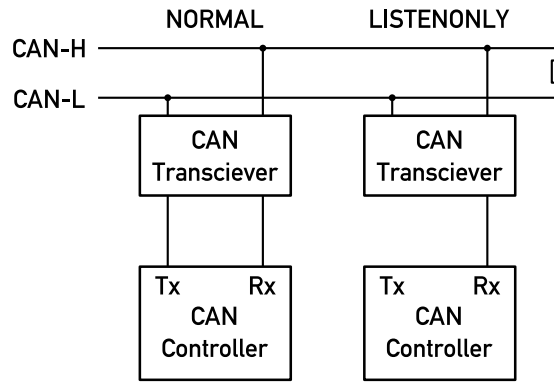
      [ restart-ms TIME-MS ]

      [ restart ]
Where: BITRATE      := { 1..1000000 }
       SAMPLE-POINT := { 0.000..0.999 }
       TQ           := { NUMBER }
       PROP-SEG     := { 1..8 }
       PHASE-SEG1   := { 1..8 }
       PHASE-SEG2   := { 1..8 }
       SJW          := { 1..4 }
       RESTART-MS   := { 0 | NUMBER }
```

...

Operating modes

The device can be used in two different operating modes.



Normal mode :

Both the Tx line and the Rx line are connected to the transceiver. The controller can transmit, receive, and acknowledge can frames.

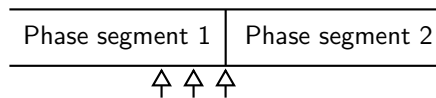
Listen only mode :

The tx line is disconnected from the transceiver. The controller can not transmit or acknowledge can frames, but can still receive can frames acknowledged by others. This mode lets you sniff can traffic.

```
$ ip link set can0 type can listen-only on
```

Triple Sampling

Triple sampling can be useful in extremely noisy environments. Bus level sampling is normally done between the first and second phase segment of a bit time. When triple sampling is used; three samples are acquired, and a majority vote is used to determine bus level.



```
$ ip link set can0 type can triple-sampling on
```

3 Kernel module from source

If the target system does support Socket-can but does not yet include the *gs_usb* driver, the *gs_usb* kernel module can be compiled from source.

Get the module source fi. via wget

```
$ wget http://schneidersoft.net/resource/USB2CAN/gs_usb_kernel_module_latest.tgz
```

Extract the archive

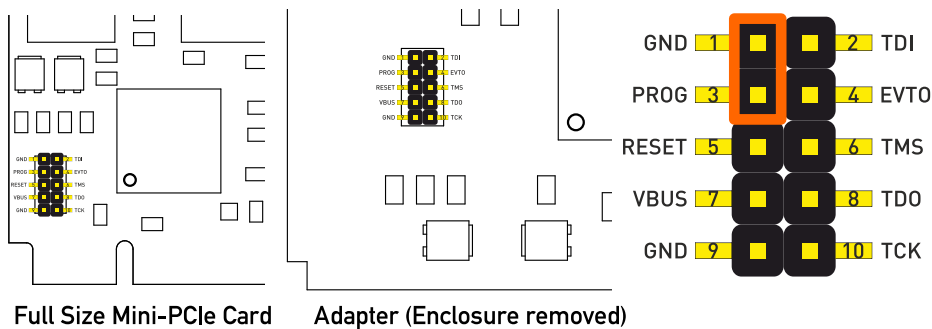
```
$ tar -xzf gs_usb_kernel_module_latest.tgz  
$ cd gs_usb_kernel_module_latest
```

Build and install. Building the kernel module will require the linux build essentials, kernel build environment, and the kernel source files for your kernel.

```
$ make  
$ ./loadmod.sh
```

4 Firmware update

Firmware upgrade can be performed through usb DFU. To get the device into DFU mode; Make sure the device is unplugged and set the DFU enable jumper by shorting pins PROG and GND. Reconnect the USB cable, and check to make sure the device is in DFU mode.



```
$ lsusb
```

Firmware is flashed to the device using the DFU-Programmer tool from:

dfu-programmer.sourceforge.net.

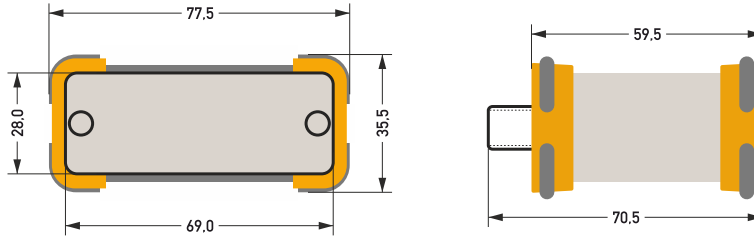
```
$ wget http://schneidersoft.net/resource/USB2CAN/gs_usb_firmware_latest.hex  
$ dfu-programmer uc3c2512c reset  
$ dfu-programmer uc3c2512c erase  
$ dfu-programmer uc3c2512c flash latest_firmware.hex --suppress-bootloader-memory  
$ dfu-programmer uc3c2512c start
```

Once the new firmware is uploaded. Unplug the device, remove the short, and plug the device in again. You should now see the device and be able to use it.

```
$ lsusb
```

5 Form Factors

Ruggedised Adapter



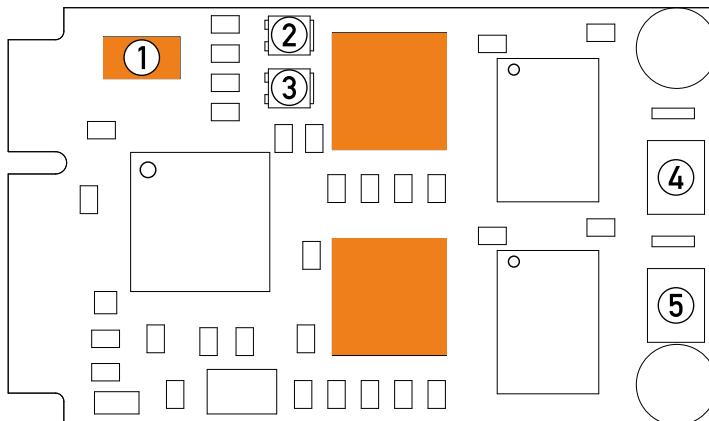
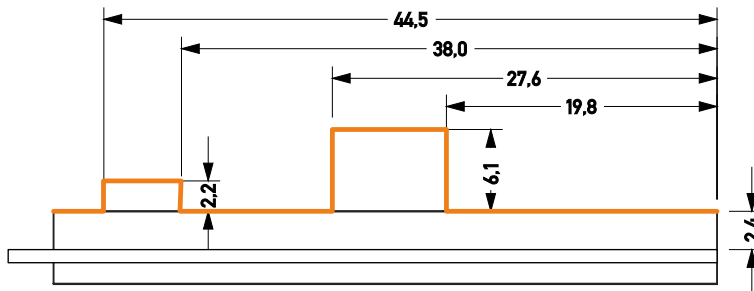
* Dimensions in mm.

The ruggedized adapter version weighs 120g.



3: Ground 4: CAN-High 5: CAN-Low

Full size Mini PCIe Card



* Dimensions in mm.

1. DFU connector
2. Channel A indicator
3. Channel B indicator
4. Channel A connector
5. Channel B connector

The Mini PCIe version of the adapter mates with and fits into a standard full size Mini PCIe card slot. Some components, namely those used to implement galvanic isolation, are taller than standard PCIe. Under normal circumstances these components protrude up and away from the host board without interfering with the host or device operation.

6 Trouble shooting

Problem

Possible Cause/remedy

Device does not enumerate

Device not powered or usb cable damaged.

Driver does not recognize device

Device stuck in DFU mode due to failed DFU process. check lsusb output, and reperform DFU.

LED Indicators

The two dual color LEDs mounted on the device indicate state and traffic according to the following table.

LED A	LED B	Meaning
amber steady	amber steady	device under power. no driver present, usb not enabled.
amber blinking	amber blinking	device under power. no driver present, usb enabled.
Off	Off	device under power. driver present, usb enabled.
green steady	n/a	channel A configured.
n/a	green steady	channel B configured.
red blinking	n/a	channel A successfully sending frames.
n/a	red blinking	channel B successfully sending frames.
green blinking	n/a	channel A successfully receiving frames.
n/a	green blinking	channel B successfully receiving frames.

7 Document revision

Date	Notes
2013.06.08	Initial revision
2013.01.18	Updated DFU pinouts. Added form factor descriptions

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