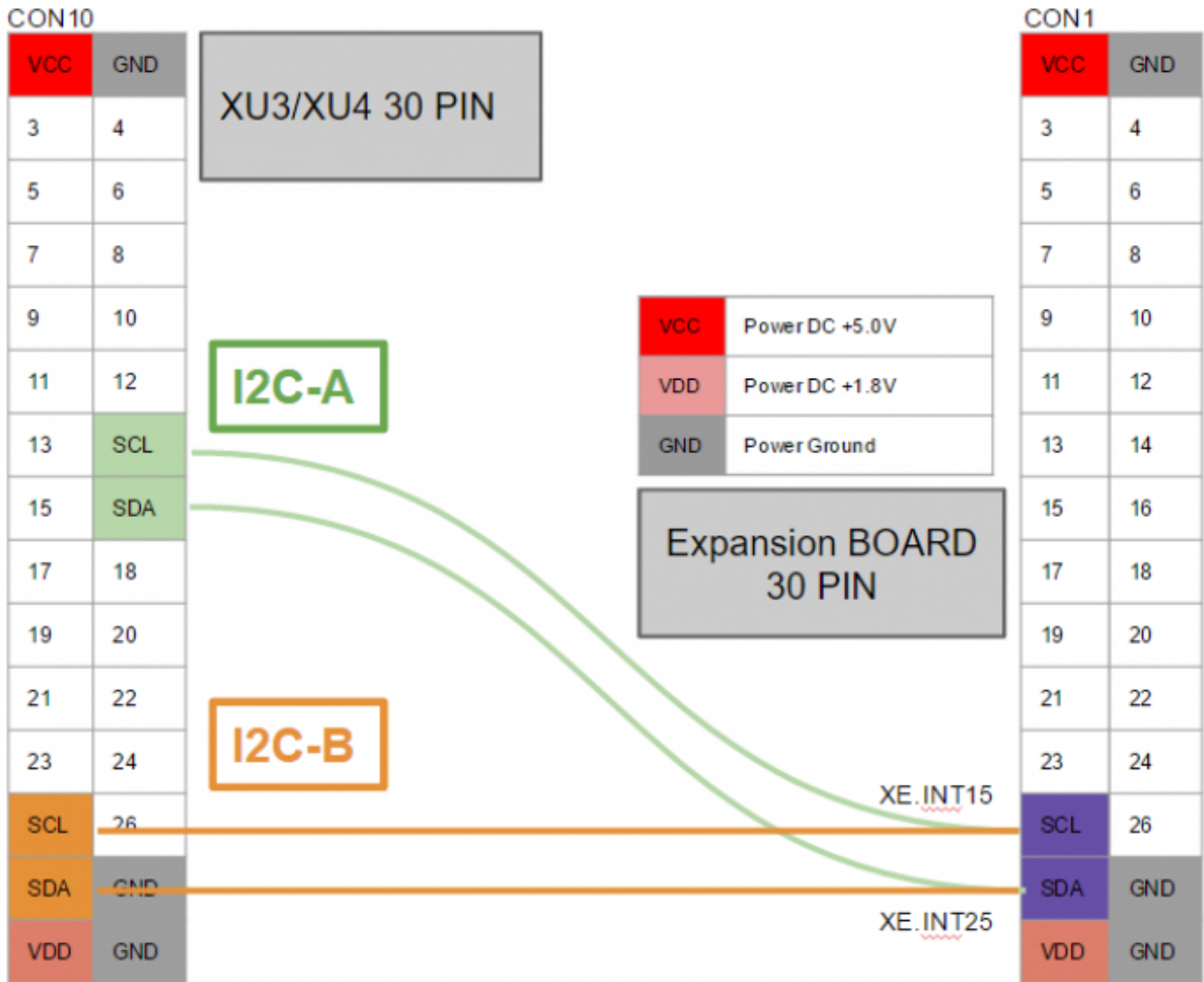


I2C

How you can I2C interface using the Expansion Board.

The Expansion Board has two I2C devices.



You can use the devices via H/W I2C(I2C-A) or S/W I2C(I2C-B : GPIO-I2C).

H/W I2C (I2C-A)

Kernel 3.10.y (node name)	Kernel 4.9.y (node name)	Pin Number (XU3/XU4 - CON10)	Net Name	Export Number	Description
/dev/i2c-4	/dev/i2c-1	16	GPB3[2](I2C_1.SDA)	209	SDA
		14	GPB3[3](I2C_1.SCL)	210	SCL

S/W I2C (I2C-B)

Kernel 3.10.y (node name)	Kernel 4.9.y (node name)	Pin Number (XU3/XU4-CON10)	Net Name	Export Number	Description
/dev/i2c-10		27	GPX3[1](XEINT_25)	33	SDA
		25	GPX1[7](XEINT_15)	23	SCL

How to check Expansion board with i2c-tools.

Install I2C-tools package.

```
odroid@odroid:~$ sudo apt-get install i2c-tools
```

I2C Device check command

- Usage : i2cdetect -y -r [i2c node name]

Using the HW I2C(I2C-A) with Expansion Board

I2C Device check

```
odroid@odroid:~$ sudo i2cdetect -y 4

    1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:  -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
10:  -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
20:  -- -- -- -- -- -- -- -- 29 -- -- -- -- -- --
30:  -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
40:  -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
50:  -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
60:  -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
70:  -- -- -- -- -- -- -- -- 77 -- -- -- -- -- --

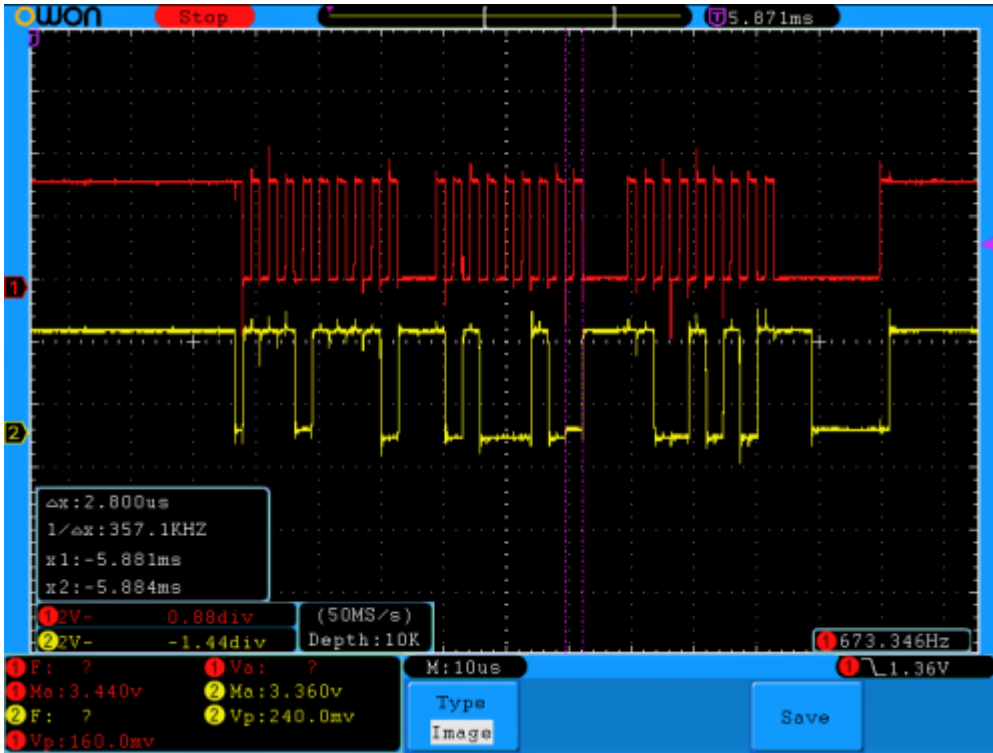
odroid@odroid:~$
```

- The 0x29 is BH1780 slave address.
- The 0x77 is BMP180 slave address.

Get BMP180 ID using i2cget.

```
odroid@odroid:~$ sudo i2cget 4 0x77 0xD0
```

H/W I2C Signals



Using the S/W I2C(I2C-B) with Expansion Board

Upload the module

GPIO-i2c driver probe [i2c-gpio-custom driver option :
id,sda,scl[,udelay,timeout,sda_open,scl_open,scl_outonly]

```
odroid@odroid:~$ sudo modprobe i2c-gpio-custom bus0=10,33,23,10,10
```

I2C Device check

```
odroid@odroid:~$ sudo i2cdetect -y -r 10

      1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
10:  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
20:  -  -  -  -  -  -  -  29  -  -  -  -  -  -  -
30:  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
40:  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
50:  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
60:  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
70:  -  -  -  -  -  -  -  77  -  -  -  -  -  -  -

odroid@odroid:~$
```

- The 0x29 is BH1780 slave address.
- The 0x77 is BMP180 slave address.

Get BMP180 ID using i2cget.

```
odroid@odroid:~$ sudo i2cget 10 0x77 0xD0
```

How to change the I2C clock speed

To change the I2C clock speed, you need to modify the DT(Device Tree) file.

Install required packages.

```
$ sudo apt-get install device-tree-compiler i2c-tools
```

Make a backup of DTB file.

- kernel 4.9.y

```
$ cp /media/boot/exynos5422-odroidxu4.dtb /media/boot/exynos5422-odroidxu4.dtb.org
```

- kernel 3.10.y

```
$ cp /media/boot/exynos5422-odroidxu3.dtb /media/boot/exynos5422-odroidxu3.dtb.org
```

Using dtc command, you can make “dts” type of device tree from “dtb” type.

- kernel 4.9.y

```
$ dtc -I dtb -O dts -o exynos5422-odroidxu4.dts exynos5422-odroidxu4.dtb
```

- kernel 3.10.y

```
$ dtc -I dtb -O dts -o exynos5422-odroidxu3.dts exynos5422-odroidxu3.dtb
```

And, open by an editor you like it and check the i2c path.

```
$ vi exynos5422-odroidxu4.dts
```

```
-----  
..  
/ {  
..  
    soc {  
..  
    i2c@12C70000 {  
..  
-----
```

Check current maximum bus frequency of i2c@12C70000

- kernel 4.9.y

```
$ fdtget /media/boot/exynos5422-odroidxu4.dtb /soc/i2c@12C70000 samsung,i2c-max-bus-freq
```

- kernel 3.10.y

```
$ fdtget /media/boot/exynos5422-odroidxu3.dtb /soc/i2c@12C70000 samsung,i2c-max-bus-freq
```

Change the DTB file for i2c-1 (i2c channel #1)

- kernel 4.9.y

```
$ fdtput -t i /media/boot/exynos5422-odroidxu4.dtb /soc/i2c@12C70000
samsung,i2c-max-bus-freq "10000"
sync
reboot
```

- kernel 3.10.y

```
$ fdtput -t i /media/boot/exynos5422-odroidxu3.dtb /soc/i2c@12C70000
samsung,i2c-max-bus-freq "10000"
$ sync
$ reboot
```

If you want to go back to original 400Khz mode, change "10000" to "400000".

Actual I2C clock speed (Measured with an oscilloscope)

In 400Khz mode : 344.8khz

In 100Khz mode : 63.7khz

In 10Khz mode : 9.3Khz

Default I2C clock speed

XU4 : 400Khz mode

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