

```
*****Default*****
Testing pico-examples/spi/spi_master_slave/spi_master/spi_master.c on the left pico.
Testing pico-examples/spi/spi_master_slave/spi_slave/spi_slave .c on the right pico.
09/16/24
*****Default*****
```

Unknown issues for pico-ice

ice40\_ultraplus\_examples

pins used in ice40\_ultraplus\_examples/spi

#spi	pico-ice schematic	rp2040
set_io SPI_SS 16	IOB_35b_SPI_SS	???
set_io SPI_SCK 15	IOB_34b_SPI_SCK	???
set_io SPI_MOSI 17	IOB_33b_SPI_SI	???
set_io SPI_MISO 14	IOB_32a_SPI_SO	???

ice40\_ultraplus\_examples/spi/top.v

//0x06 write vector, the computer will send 4 \* 24bit values

//0x07 read vector, the fpga will send 4 \* 24bit values

```
spi_slave spi_slave_inst(.clk(clk), .reset(spi_reset),
    .SPI_SCK(SPI_SCK), .SPI_SS(SPI_SS), .SPI_MOSI(SPI_MOSI), .SPI_MISO(SPI_MISO),
    .wr_buffer_free(spi_wr_buffer_free), .wr_en(spi_wr_en), .wr_data(spi_wr_data),
```

// receive: byte2 | byte1 | byte0 | opcode/status

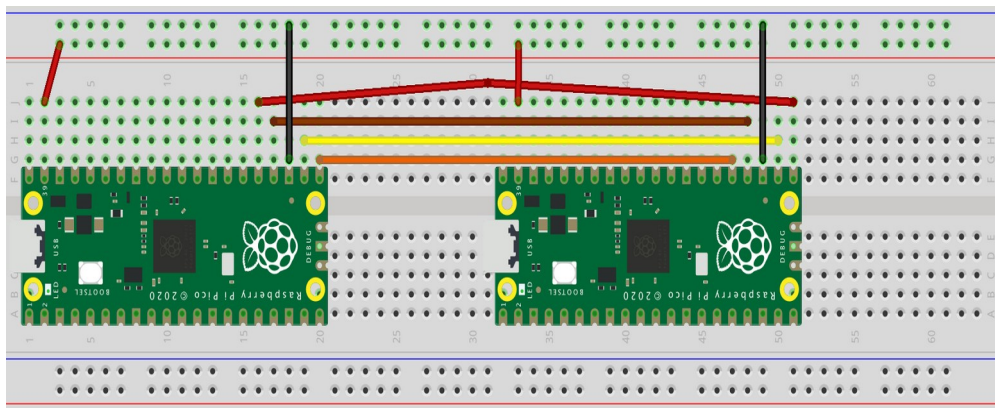
//read all the data, but can write only the two bytes as opcode contains metadata

```
module spi_slave(input wire clk, input wire reset,
    input wire SPI_SCK, input wire SPI_SS, input wire SPI_MOSI, output wire SPI_MISO,
    output wire wr_buffer_free, input wire wr_en, input wire [23:0] wr_data,
    output reg rd_data_available, input wire rd_ack, output reg [31:0] rd_data
);
```

ice40\_ultraplus\_examples uses a host program

pico-ice will use the rp2040 to communicate with ice40UP5K FPGA.

With the spi master on the left and spi slave on the right. The uart connection of the spi master is connected to “/dev/ttyUSB1”. The uart connection of the spi slave is connected to “/dev/ttyUSB0”.



fritzing

Fig spi\_master left

spi\_slave right

“/dev/ttyUSB1”

SPI master says: read page 118 from the MISO line:

```
ff fe fd fc fb fa f9 f8 f7 f6 f5 f4 f3 f2 f1 f0
ef ee ed ec eb ea e9 e8 e7 e6 e5 e4 e3 e2 e1 e0
df de dd dc db da d9 d8 d7 d6 d5 d4 d3 d2 d1 d0
cf ce cd cc cb ca c9 c8 c7 c6 c5 c4 c3 c2 c1 c0
bf be bd bc bb ba b9 b8 b7 b6 b5 b4 b3 b2 b1 b0
af ae ad ac ab aa a9 a8 a7 a6 a5 a4 a3 a2 a1 a0
9f 9e 9d 9c 9b 9a 99 98 97 96 95 94 93 92 91 90
8f 8e 8d 8c 8b 8a 89 88 87 86 85 84 83 82 81 80
7f 7e 7d 7c 7b 7a 79 78 77 76 75 74 73 72 71 70
6f 6e 6d 6c 6b 6a 69 68 67 66 65 64 63 62 61 60
5f 5e 5d 5c 5b 5a 59 58 57 56 55 54 53 52 51 50
4f 4e 4d 4c 4b 4a 49 48 47 46 45 44 43 42 41 40
3f 3e 3d 3c 3b 3a 39 38 37 36 35 34 33 32 31 30
2f 2e 2d 2c 2b 2a 29 28 27 26 25 24 23 22 21 20
1f 1e 1d 1c 1b 1a 19 18 17 16 15 14 13 12 11 10
0f 0e 0d 0c 0b 0a 09 08 07 06 05 04 03 02 01 00
```

“/dev/ttyUSB0”

SPI slave says: read page 137 from the MOSI line:

```
00 01 02 03 04 05 06 07 08 09 0a 0b 0c 0d 0e 0f
10 11 12 13 14 15 16 17 18 19 1a 1b 1c 1d 1e 1f
20 21 22 23 24 25 26 27 28 29 2a 2b 2c 2d 2e 2f
30 31 32 33 34 35 36 37 38 39 3a 3b 3c 3d 3e 3f
40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f
50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f
60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f
70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f
80 81 82 83 84 85 86 87 88 89 8a 8b 8c 8d 8e 8f
90 91 92 93 94 95 96 97 98 99 9a 9b 9c 9d 9e 9f
a0 a1 a2 a3 a4 a5 a6 a7 a8 a9 aa ab ac ad ae af
b0 b1 b2 b3 b4 b5 b6 b7 b8 b9 ba bb bc bd be bf
c0 c1 c2 c3 c4 c5 c6 c7 c8 c9 ca cb cc cd ce cf
d0 d1 d2 d3 d4 d5 d6 d7 d8 d9 da db dc dd de df
e0 e1 e2 e3 e4 e5 e6 e7 e8 e9 ea eb ec ed ee ef
f0 f1 f2 f3 f4 f5 f6 f7 f8 f9 fa fb fc fd fe ff
```