

EF_QSPI_FLASH_WRITER

A Quad SPI Flash Writer used to program flash. It can be used along with flash controller to program the flash then read from it.

The wrapped IP

The IP comes with an AHBL Wrapper

Wrapped IP System Integration

```
EF_QSPI_FLASH_WRITER_APB INST (  
    .HCLK(CLK),  
    .HRESETn(RESETn),  
    .HADDR(HADDR),  
    .HWRITE(HWRITE),  
    .HSEL(HSEL),  
    .HTRANS(HTRANS),  
    .HWDATA(HWDATA),  
    .HRDATA(HRDATA),  
    .HREADY(HREADY),  
    .HREADYOUT(HREADYOUT),  
    .fr_sck(fr_sck)  
    .fr_ce_n(fr_ce_n)  
    .fr_din(fr_din)  
    .fr_dout(fr_dout)  
    .fr_douten(fr_douten)  
    .fm_sck(fm_sck)  
    .fm_ce_n(fm_ce_n)  
    .fm_din(fm_din)  
    .fm_dout(fm_dout)  
    .fm_douten(fm_douten)  
);
```

Implementation example

The following table is the result for implementing the EF_QSPI_FLASH_WRITER IP with different wrappers using Sky130 PDK and [OpenLane2](#) flow.

Module	Number of cells	Max. freq
EF_QSPI_FLASH_WRITER	N/A	N/A
EF_QSPI_FLASH_WRITER_AHBL	TBD	TBD

The Programmer's Interface

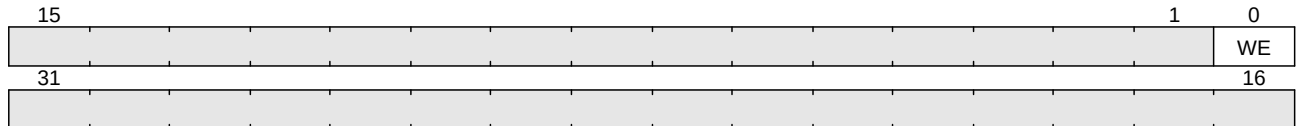
Registers

Name	Offset	Reset Value	Access Mode	Description
WE	0000	0x00000000	w	Write Enable; enables flash writer to write to flash
SS	0004	0x00000000	w	Slave Select; flash SS signal value
SCK	0008	0x00000000	w	Slave Clock; flash SCK signal value

Name	Offset	Reset Value	Access Mode	Description
OE	000c	0x00000000	w	Output enable for the four flash IOs
DATAO	0010	0x00000000	w	Output Data from the flash writer or controller going to flash
DATAI	0014	0x00000000	r	Input Data coming from flash flash

WE Register [Offset: 0x0, mode: w]

Write Enable; enables flash writer to write to flash



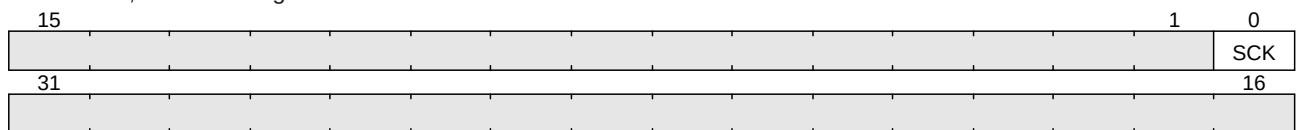
SS Register [Offset: 0x4, mode: w]

Slave Select; flash SS signal value



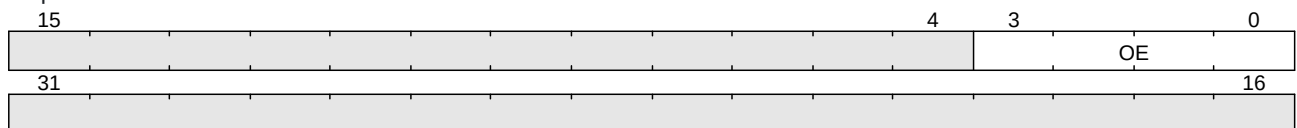
SCK Register [Offset: 0x8, mode: w]

Slave Clock; flash SCK signal value



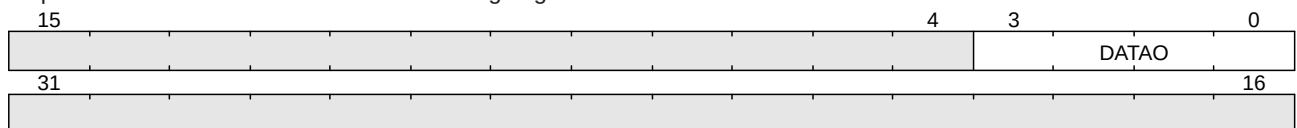
OE Register [Offset: 0xc, mode: w]

Output enable for the four flash IOs



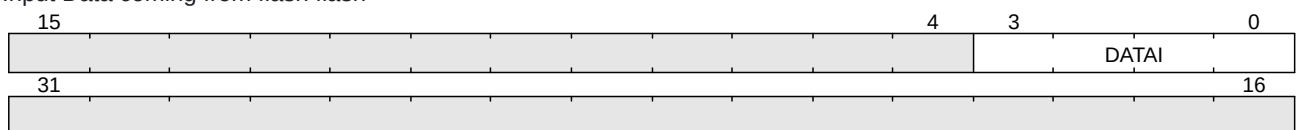
DATAO Register [Offset: 0x10, mode: w]

Output Data from the flash writer or controller going to flash

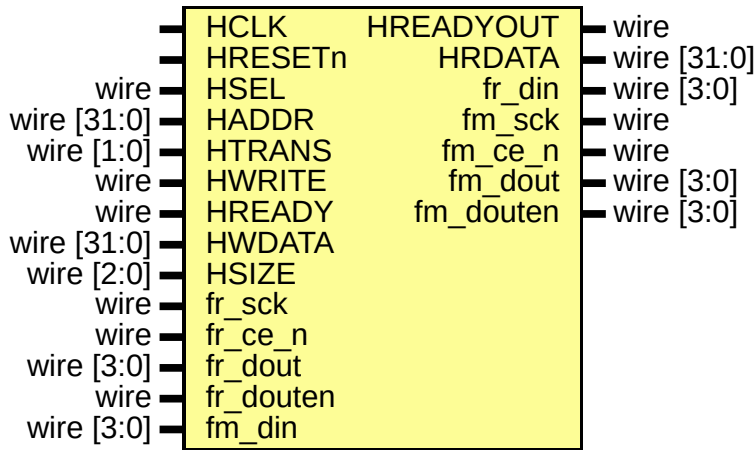


DATAI Register [Offset: 0x14, mode: r]

Input Data coming from flash flash



The Interface



Ports

Port	Direction	Width	Description
fr_sck	input	1	spi clock coming from flash reader
fr_ce_n	input	1	spi slave select coming from flash reader
fr_din	output	4	spi master data in going to the flash reader
fr_dout	input	4	spi master data out coming from flash reader
fr_douten	input	4	spi master data out enable coming from flash reader
fm_sck	output	1	spi clock going to flash (slave)
fm_ce_n	output	1	spi slave select going to flash (slave)
fm_din	input	4	spi master data in coming from flash (slave)
fm_dout	output	4	spi master data out going to flash (slave)
fm_douten	output	4	spi master data out enable going to flash (slave)

Firmware Drivers:

Firmware drivers for EF_QSPI_FLASH_WRITER can be found in the [fw](#) directory. EF_QSPI_FLASH_WRITER driver documentation is available [here](#). You can also find an example C application using the EF_QSPI_FLASH_WRITER drivers [here](#).

Installation:

You can install the IP either by cloning this repository or by using [IPM](#).

1. Using IPM:

- [Optional] If you do not have IPM installed, follow the installation guide [here](#)
- After installing IPM, execute the following command `ipm install EF_QSPI_FLASH_WRITER`.

Note: This method is recommended as it automatically installs [EF_IP_UTIL](#) as a dependency.

2. Cloning this repo:

- Clone [EF_IP_UTIL](#) repository, which includes the required modules from the common modules library, [ef_util_lib.v](#).

```
git clone https://github.com/efabless/EF_IP_UTIL.git
```

- Clone the IP repository `git clone github.com/efabless/EF_QSPI_FLASH_WRITER`