up_gpio.v

AUTHORS

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DATES

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INFORMATION

Brief

uP Core for interfacing with general purpose input/output.

License MIT

up_gpio

```
module up_gpio #(
parameter
ADDRESS_WIDTH
 =
32,
parameter
BUS_WIDTH
 =
4,
parameter
GPIO_WIDTH
 =
32,
parameter
```

```
 IRQ_ENABLE
  =
 0
) ( input clk, input rstn, input up_rreq, output up_rack, input [ADDRESS_WID
```

uP based GPIO device.

Parameters

ADDRESS_WIDTH	Width of the uP address port, max 32 bit.
parameter		
BUS_WIDTH	Width of the uP bus data port.
parameter		
GPIO_WIDTH	Width of the GPIO for inputs and outputs
parameter		
IRQ_ENABLE	Enable interrupt
parameter		

Ports

clk	Clock for all devices in the core
rstn	Negative reset
up_rreq	uP bus read request
up_rack	uP bus read ack
up_raddr	uP bus read address
up_rdata	uP bus read data
up_wreq	uP bus write request
up_wack	uP bus write ack
up_waddr	uP bus write address
up_wdata	uP bus write data
irq	Interrupt when data is received
gpio_io_i	Input for GPIO
gpio_io_o	Output for GPIO
gpio_io_t	Tristate for GPIO

DIVISOR

```
localparam DIVISOR = BUS_WIDTH/2
```

Divide the address register default location for 1 byte access to multi byte access. (register offsets are byte offsets).

REGISTER INFORMATION

Core has 4 registers at the offsets that follow.

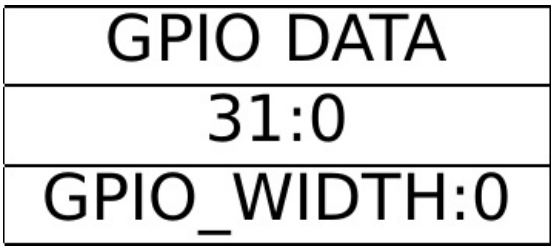
GPIO_DATA	h000
GPIO_TRI	h004
GPIO2_DATA	h008 N/A
GPIO2_TRI	h00C N/A
GIER	h11C

IP_ISR	h120
IP_IER	h128

GPIO_DATA

```
localparam GPIO_DATA = 12'h000 >> DIVISOR
```

Defines the address offset for GPIO DATA



Valid bits are from GPIO_WIDTH:0, input or output data.

GPIO_TRI

```
localparam GPIO_TRI = 12'h004 >> DIVISOR
```

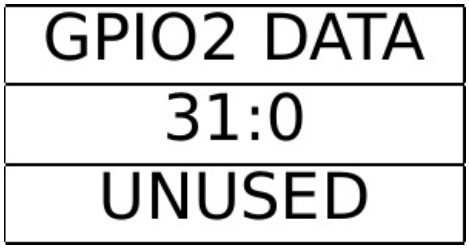
Defines the address offset for GPIO TRI.

Valid bits are from GPIO_WIDTH:0, 1 indicates input, 0 is output.

GPIO2_DATA

```
localparam GPIO2_DATA = 12'h008 >> DIVISOR
```

Defines the address offset for GPIO2 DATA

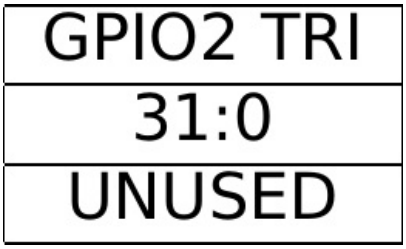


Valid bits are from GPIO2_WIDTH:0, input or output data. This Register is not implimented in this design.

GPIO2_TRI

```
localparam GPIO2_TRI = 12'h00C >> DIVISOR
```

Defines the address offset for GPIO2 TRI.

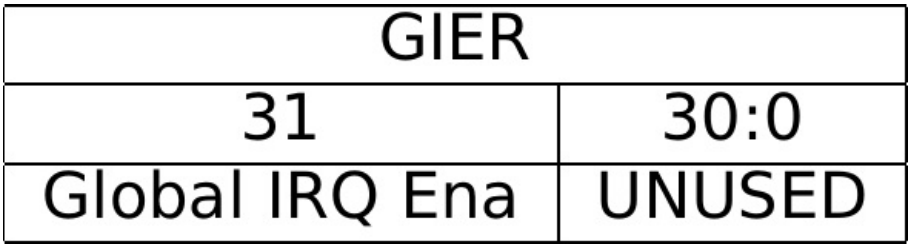


Valid bits are from GPIO2_WIDTH:0, 1 indicates input, 0 is output. This register is not implimented in this design.

GIER

```
localparam GIER = 12'h11C >> DIVISOR
```

Defines the address offset for GIER.



Bit 31 is the Global interrupt enable. Write a 1 to enable interrupts.

IP_ISR

```
localparam IP_ISR = 12'h120 >> DIVISOR
```

Defines the address offset for IP_ISR.

IP ISR	
31:1	0
UNUSED	IRQ Status

Bit 0 is GPIO IRQ status, On write this will toggle(acknowledge) the interrupt.

IP_IER

```
localparam IP_IER = 12'h128 >> DIVISOR
```

Defines the address offset to set the control bits.

IP IER	
31:1	0
UNUSED	IRQ Ena

Bit 0 is GPIO IRQ enable interrupt. Write a 1 to bit 0 to enable interrupt.