

ft245_sync_to_axis.v

AUTHORS

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DATES

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INFORMATION

Brief

Converter FT245 sync FIFO interface to AXIS.

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ft245_sync_to_axis

```
module ft245_sync_to_axis #(
    parameter
    BUS_WIDTH
    =
    1
) ( input rstn, input ft245_dclk, inout [BUS_WIDTH-1:0] ft245_ben, inout [
```

Converter FT245 sync FIFO interface to AXIS.

Parameters

BUS_WIDTH Width of the FT245 and AXIS bus.
parameter

Ports

| | |
|----------------------|--|
| rstn | Negative reset |
| ft245_dclk | Input clock from FIFO. |
| ft245_ben | Byte enable used in FT60x, similar to AXIS tkeep in 1 is a valid byte for each bit. |
| ft245_data | FIFO data bus |
| ft245_rdn | Enable read on active low |
| ft245_wrn | Enable write on active low |
| ft245_siwun | Send Immediate / Wakeup for USB suspend. Active low. |
| ft245_txen | When low, write data to the fifo. |
| ft245_rxfn | When low, read data from the fifo. |
| ft245_oen | Output enable active low |
| ft245_rstn | Negative Reset |
| ft245_wakeupn | Sleep ft245 active low |
| s_axis_tdata | Input axis data |
| s_axis_tkeep | Input axis data bytes that are valid. Each bit equals one byte. |
| s_axis_tvalid | Input axis data is valid when active high. |
| s_axis_tready | Input data bus is ready when signal is active high. |
| m_axis_tdata | Output axis data |
| m_axis_tkeep | Output what axis data bytes are valid. Each bit equals one byte. |
| m_axis_tvalid | Output is active high when axis data is valid. |
| m_axis_tready | Output data bus is told that the receive device is ready. The device is ready if it asserts this signal active high. |

DATA STORE REGISTERS

Register data based upon ft245 clocks.

r_oen

reg r_oen

output enable registers

rr_oen

reg rr_oen

output enable registers registers

rrr_oen

```
reg rrr_oen
```

output enable registers registers registers

r_m_axis_tdata

```
reg [(  
  BUS_WIDTH*8  
)-1:0] r_m_axis_tdata
```

master axis register to hold tdata for tready not ready at end condition

r_m_axis_tkeep

```
reg [BUS_WIDTH-1:0] r_m_axis_tkeep
```

master axis register to hold tkeep for tready not ready at end condition

r_m_axis_tvalid

```
reg r_m_axis_tvalid
```

master axis register to hold tvalid for tready not ready at end condition

ASSIGNMENTS

How various combinations of logic are created and data dealt with.

ft245_data

```
assign ft245_data = (  
  s_axis_tdata  
  : '0'  
  bz  
)  
rr_oen & r_oen ?
```

combinational signals to convert registers and axis to and from ft245. tristate ft245 based on output enable state

ft245_ben

```
assign ft245_ben = (  
  s_axis_tkeep  
  : '0'  
  bz  
)  
rr_oen & r_oen ?
```

tristate ft245 based on output enable state

ft245_wrn

```
assign ft245_wrn = ft245_txen | ~ft245_rxfn | ~s_axis_tvalid | ~rr_oen
```

only allow write if there is space, nothing available to read, valid data available, and output enable is timed correctly.

ft245_oen

```
assign ft245_oen = rr_oen
```

output enable

ft245_rdn

```
assign ft245_rdn = ~m_axis_tready | rrr_oen | rr_oen & r_oen
```

only ready when output enable is correctly timed and we are ready for data ft245 will output data as soon as oen is applied (FWFT).

ft245_wakeupn

```
assign ft245_wakeupn = 1'b0
```

always keep it awake

ft245_siwn

```
assign ft245_siwn = 1'b0
```

always keep it awake

ft245_rstn

```
assign ft245_rstn = rstn
```

apply system reset to ft245

s_axis_tready

```
assign s_axis_tready = (  
ft245_txen &
```

```
ft245_rxfn  
) & rr_oen
```

convert ft245 to ready. only ready when write buffer is available, nothing is incoming, and output enable is set correctly.

m_axis_tdata

```
assign m_axis_tdata = (  
    r_m_axis_tdata  
    :  
    ft245_data  
)
```

rr_oen | r_oen ?

output ft245 to master axis. at end, output registers incase next core was not ready.

m_axis_tkeep

```
assign m_axis_tkeep = (  
    r_m_axis_tkeep  
    :  
    ft245_ben  
)
```

rr_oen | r_oen ?

output ft245 to master axis. at end, output registers incase next core was not ready.

m_axis_tvalid

```
assign m_axis_tvalid = (  
    r_m_axis_tvalid  
    : ~  
    rrr_oen | ft245_rxfn  
)
```

rr_oen | r_oen ?
(

data is only valid in the correct output enable register state and is no longer valid if rxfn indicates the receive exhausted.