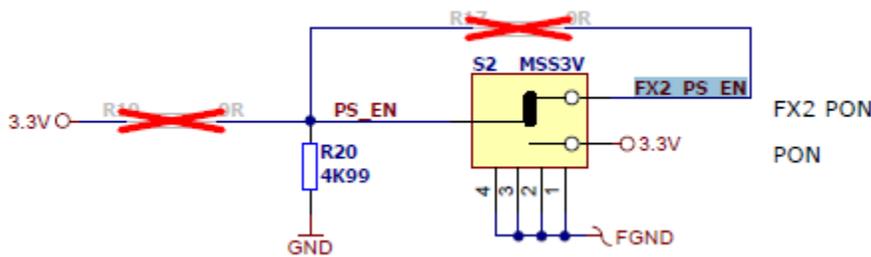


# TE0320 Slide Switch S2 (Configuration)

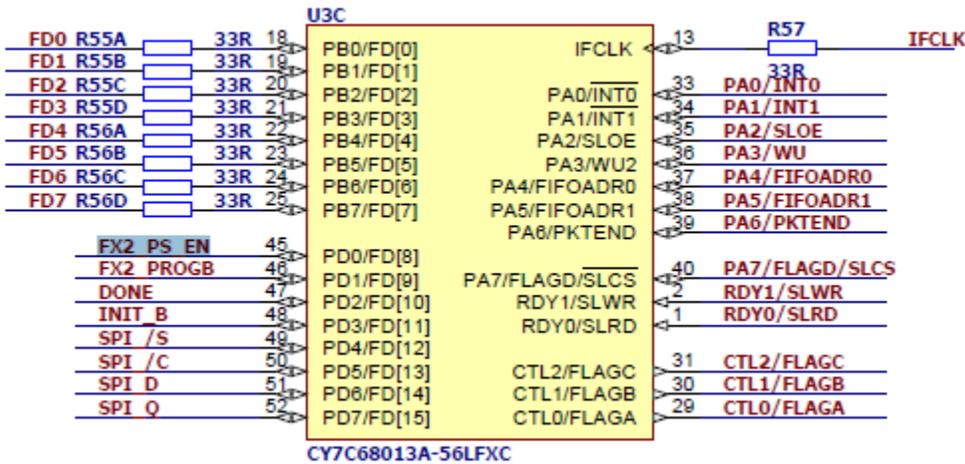
TE0320 is provided with a slide switch S2.  
 Slide switch S2 conditions the value of signal PS\_EN.  
 In this way, S2 conditionally/unconditionally enables the 1.2 V and 2.5 V power rails.



Slide switch S2 (angle view).



Slide switch S2 schematic



When slide switch S2 = FX2 PON, signal PS\_EN is set to signal FX2\_PS\_EN driven by the EZ-USB FX2LP USB FX2 microcontroller under user control

When S2 is turned on (closed, FX2 PON), the power rails 1.2 V and 2.5 V are controlled by the USB (EZ-USB FX2LP USB FX2) microcontroller. At start-up, the USB microcontroller switches off the 1.2 V and 2.5 V power rails and starts up the module in low-power mode. After enumeration, the USB microcontroller firmware enables (switches on) power rails 1.2 V and 2.5 V, if enough current is available from the USB bus.

When S2 is turned off (open, PON), the 1.2 V and 2.5 V power rails are always enabled (switched on).

**!** When S2 is turned on (FX2 PON), make sure that no signals are applied to the input pins when power-rails are disabled by the USB microcontroller (at start-up).

S2 position	Default position	Effect on 1.2 V and 2.5 V rails
-------------	------------------	---------------------------------

FX2 PON (on, closed)	✔	Power rails 1.2 V and 2.5 V controlled by USB FX2 microcontroller (signal <b>FX2_PS_EN</b> )  <b>PS_EN = FX2_PS_EN = 1 or 0</b>
PON (off, open)	✘	Power rails 1.2 V and 2.5 V always enabled ( <b>PS_EN = 1</b> )  <b>PS_EN FX2_PS_EN = 1 or 0</b>

Slide switch S2 settings overview (power rails 1.2 V and 2.5 V only)

## Signal FX2\_PS\_EN

To command signal **FX2\_PS\_EN**, read the [reference firmware code](#).

**IOD** = 0x03; // Enable PS\_EN and disable PROG\_B

**OED** = 0x03; // Configure PS\_EN and PROG as outputs

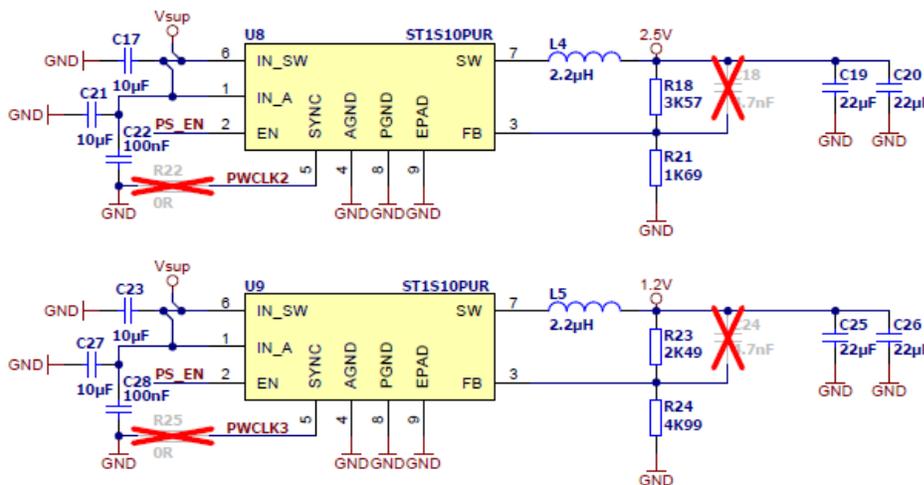
Table from **EZ-USB(R) Technical Reference Manual (EZ-USB\_TRM.pdf)**

Port D Pin	Alternate Function	Alternate Function is Selected By...	Alternate Function is Described in...
PD.7:0	FD[15:8]	IFCFG1 = 1 and any WORDWIIDE bit = 1	Slave FIFOs chapter 9 on page 99

Table from **EZ-USB(R) Technical Reference Manual**

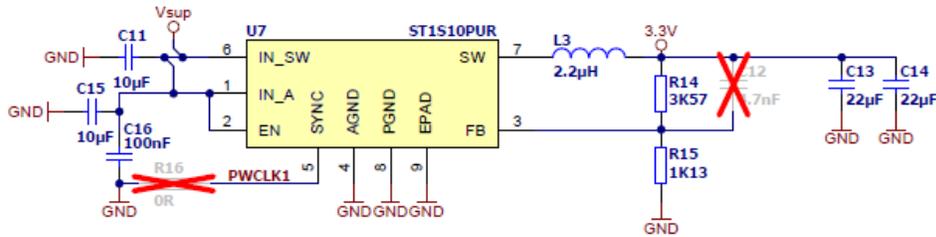
## Signal PS\_EN

- Signal PS\_EN enables (1) or disables (0) power rails 1.2 V and 2.5 V.



**Power rails 1.2 V and 2.5 V could be enabled/disabled by signal PS\_EN**

- Power-rail 3.3V is not controlled by signal PS\_EN and is unconditionally enabled.



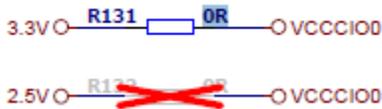
Power rail 3.3 V could not be enabled/disabled by signal PS\_EN

## VCCIO0 assembly options

According to the corresponding assembly option, power rail VCCIO0 can depend or not on the power rail 2.5V.

Voltage VccIO for bank B0 shall span from 2.5 V to 3.3 V. VccIO can be supplied either externally or internally to the micromodule.

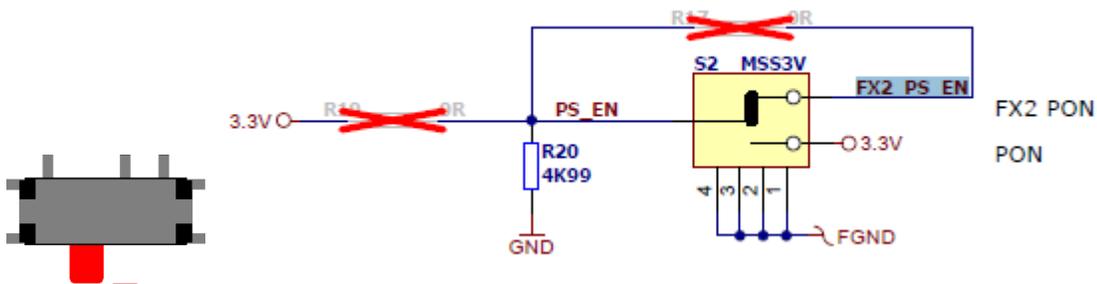
⚠ Spartan-3 I/Os are not 5 V tolerant. Applying more than the recommended operating voltages at any pin, results in a damaged FPGA (see [Xilinx Answer AR#19146](#)).



example of VCCIO0 assembly not dependent on power rail 2.5V. The other way is also possible

## Slide Switch S2 = FX2 PON

When slide switch **S2** is in the **left position** (= FX2 PON : power rails conditionally on depending on signal FX2\_PS\_EN), signal **PS\_EN** is set to signal **FX2\_PS\_EN** ( $PS\_EN = FX2\_PS\_EN$ ) driven by the EZ-USB FX2LP USB FX2 microcontroller under user control (IOD and OED of fw.c).

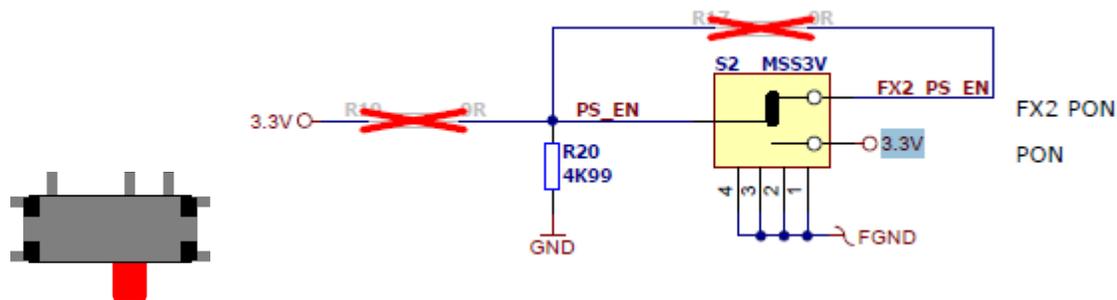


S2 on position FX2 PON ( $PS\_EN = FX2\_PS\_EN = 1$  or 0)

1. Dynamic **full power** operation (**PS\_EN = 1**): when the EZ-USB FX2LP USB FX2 microcontroller sets signal **PS\_EN = FX2\_PS\_EN = high**, power rails 1.2 V and 2.5 V are enabled.  
This setting can be useful for .
2. Dynamic **low power** operation (**PS\_EN = 0**): when the EZ-USB FX2LP USB FX2 microcontroller resets signal **PS\_EN = FX2\_PS\_EN = low**, the following components are switched off:
  - FPGA core logic (1.2V)
  - DDR SDRAM (2.5V)
  - FPGA bank 3 (2.5V)
  - VREF (2.5V)
  - VCCCIO0 (2.5V) FPGA bank 0 (if R131+R132- assembly)

## Slide Switch S2 = PON

Full power operation (**PS\_EN = 1**): when slide switch S2 is in the right position (PON = power rails unconditionally on), signal PS\_EN is set to power rail 3.3 V. Thus power rails 1.2 V and 2.5 V are unconditionally enabled.



S2 on position PON (PS\_EN FX2\_PS\_EN = x; PS\_EN = high )

## Summary table

The table below summarizes all switching options implied by slide switch S2 and firmware signal FX2\_PS\_EN (under the standard assembly option).

power rail	S2= PON (PS_EN = 1) (PS_EN FX2_PS_EN) (Full power)	S2 = FX2 PON and PS_EN = FX2_PS_EN = 1 (Dynamic full power)	S2 = FX2 PON and PS_EN = FX2_PS_EN = 0 (Dynamic low power)
1.2V	on	on	off
2.5V	on	on	off
VCCCIO0 (= 2.5V) R131+R132- assembly (1)	on	on	off
VCCCIO0 (= 3.3V) R131-R132+ assembly (2)	on	on	on

(1) R131 populated / R132 unpopulated

(2) R131 unpopulated / R132 populated

Slide switch S2 settings overview ( 1.2 V , 2.5 V , VCCIO0)

## Alternate Assembly Options for Slide Switch S2

Slide switch S2 can be replaced by one resistor in the following cases:

- cost sensitive applications
- applications where just one position of S2 is required
- application where switching of S2 is not allowed.

Assembly option when resistor R17 not populated and R19 populated is equivalent to slide switch S2 permanently set to PON.



**Assembly option: S2 = PON**

Assembly option when resistor R17 populated and R19 not populated is equivalent to slide switch S2 permanently set to FX2 PON.



**Assembly option: S2 = FX2 PON**

 Any other assembly options of R17 and R19 are not allowed.