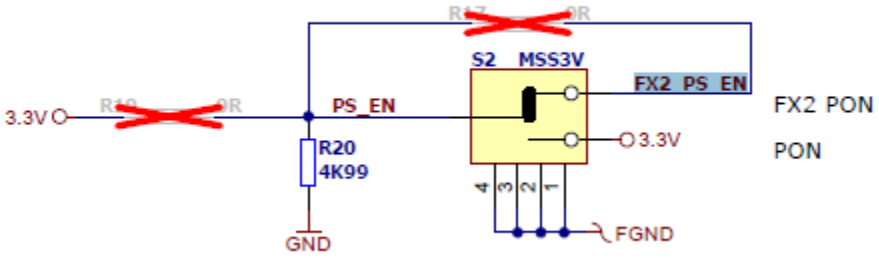
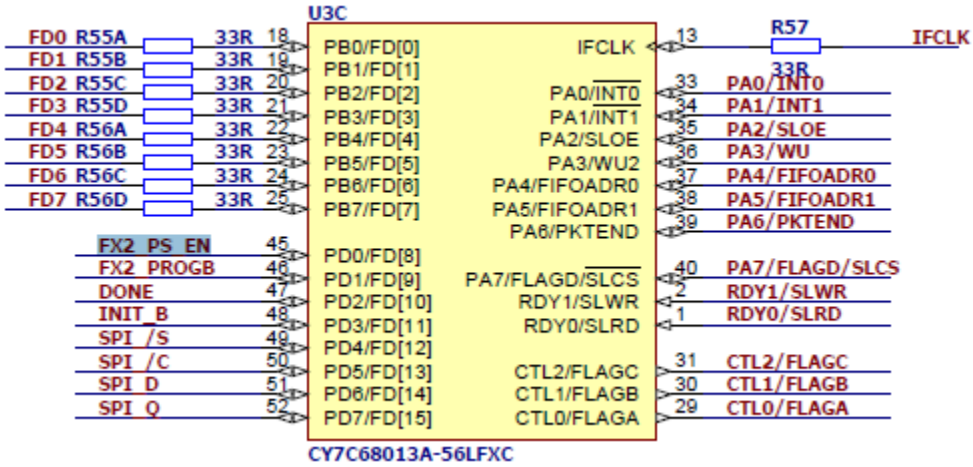
TE0320 Slide Switch S2 (Configuration)

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 **FX2_PS_EN**) **PS_EN** = **FX2_PS_EN** = 1 or 0
PON (**off**, **open**)	❌	Power rails 1.2 V and 2.5 V always enabled (**PS_EN** = 1) **PS_EN** **FX_PS_EN** = 1 or 0

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

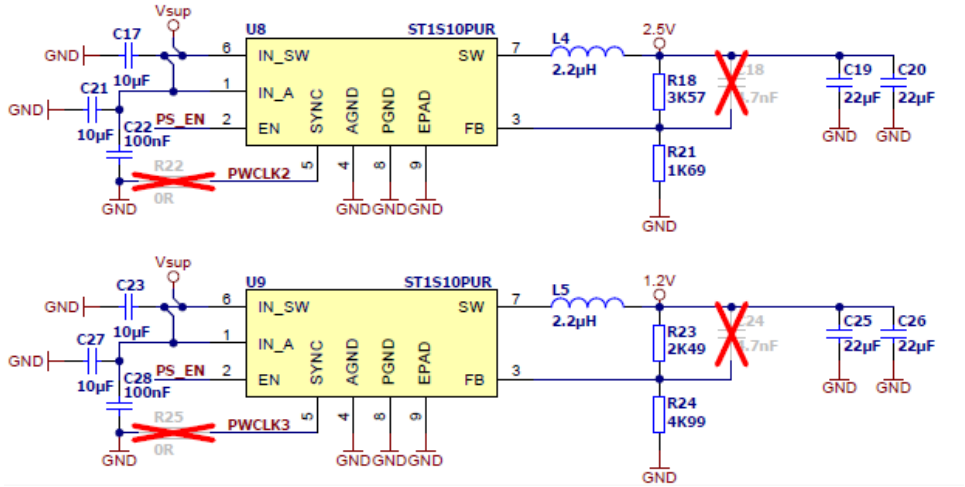
Table from **EZ-USB(R) Technical Reference Manual** (EZ-USB_TRM.pdf)

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

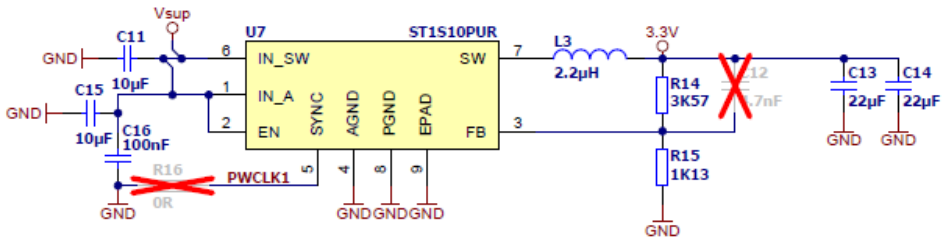
Signal PS_EN

- 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.



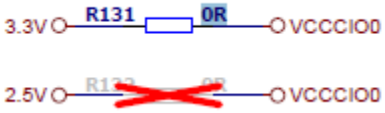
Power rail 3.3 V could not be enabled/disabled by signal PS_EN

VCCIO0 assembly options

According to the corresponding assembly option, power rail VCCCIO0 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.

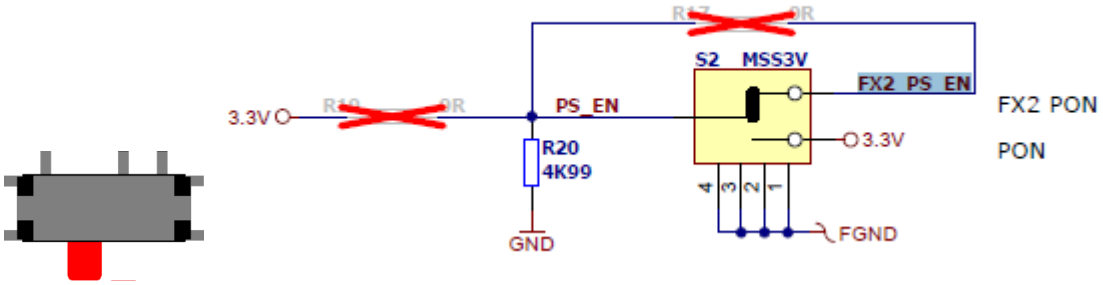
> Spartan-3 I/Os are not 5 V tolerant. Applying more than the recommended operating voltages at any pin, results in a damaged FPGA (see Xilinx Answer AR#19146).



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).



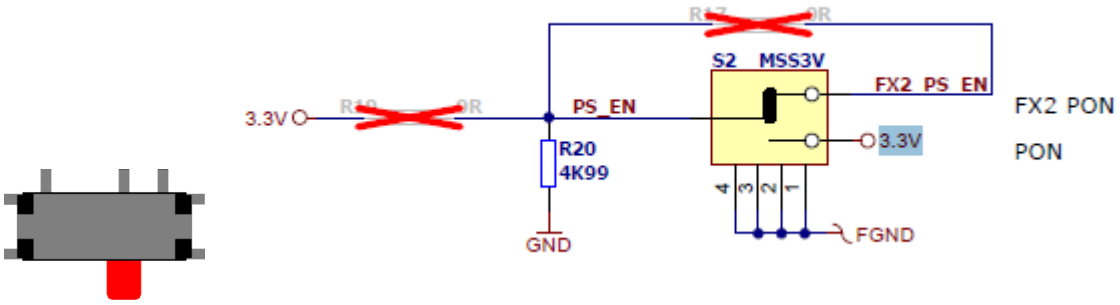
S2 on position FX2 PON (PS_EN = FX2_PS_EN = 1 or 0)

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 resistors 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.