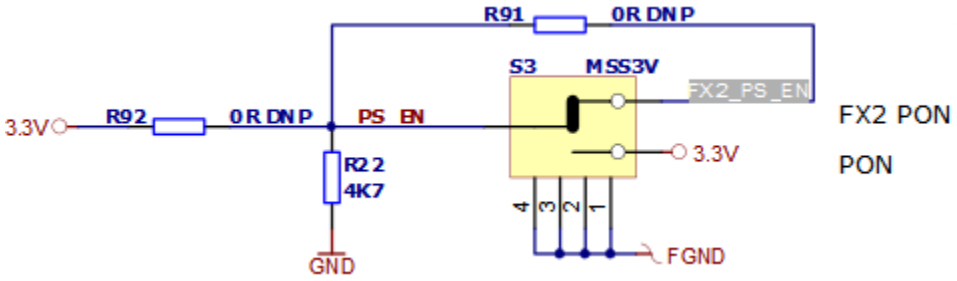
# TE0300 DIP Slide Switch S3 (Configuration)

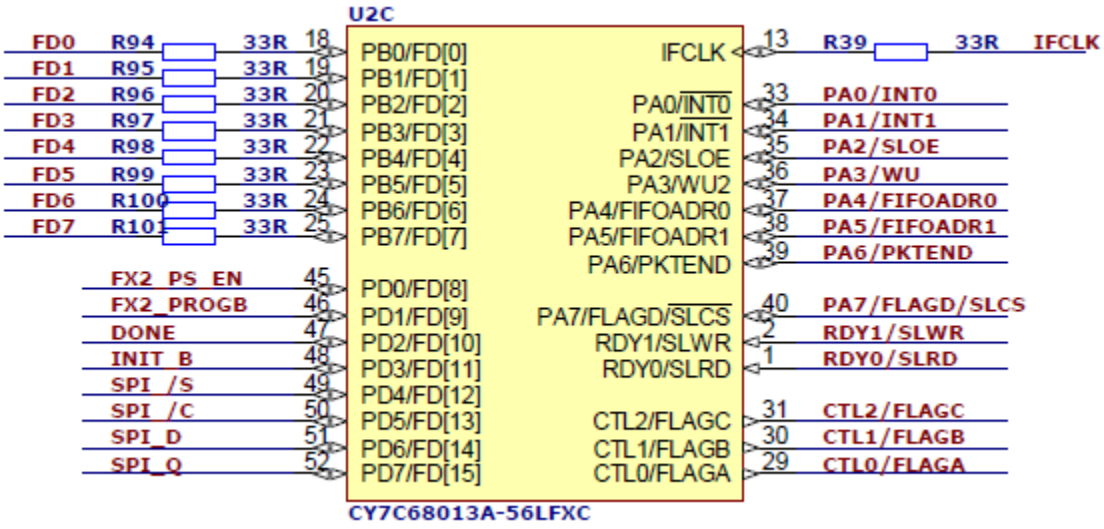
TE0300 is provided with a slide switch S3.
Slide switch S3 conditions the value of signal PS_EN.
In this way, S3 conditionally/unconditionally enables the power rails 1.2 V and 2.5 V.

Note. DNP: Do Not Populate aka Do Not Solder the Component associated to DNP label.

**Slide switch S3 (angle view)**




**Slide switch S3 schematic**




**When slide switch S3 = 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 S3 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 power rails 1.2 V and 2.5 V and starts up the module in low-power mode. After enumeration, the USB microcontroller firmware enables (switches on) the power rails 1.2 V and 2.5 V, if enough current is available from the USB bus.

When S3 is turned **off** (**open**, **PON**), the power rails 1.2 V and 2.5 V are always enabled (switched on).

> When S3 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).

| S3 position | Default position | Effect on 1.2 V and 2.5 V power rails |
|---|---|---|
| **FX2 PON** (**on, closed**) | ✓ | 1.2 V and 2.5 V rails controlled by USB FX2 microcontroller (signal **FX2_PS_EN**)<br>**PS_EN** = **FX2_PS_EN** = 1 or 0 |
| **PON** (**off**, **open**) | ✗ | 1.2 V and 2.5 V rails always enabled (**PS_EN** = 1)<br>**PS_EN** **FX_PS_EN** = 1 or 0 |

**Slide switch S3 settings overview ( power rails 1.2 V and 2.5 V only)**

# Signal FX2_PS_EN

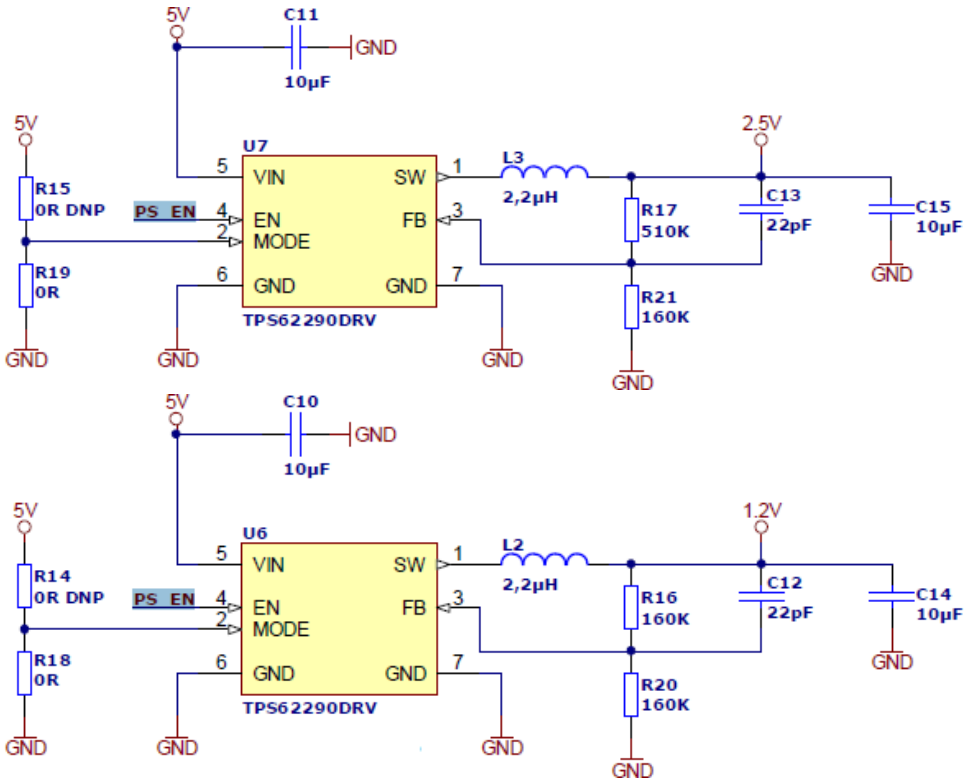
To command signal **FX2_PS_EN**, read the reference firmware code.
IOD = 0x03; // Enable PS_EN and disable PROG_B
OED = 0x03; // Configure PS_EN and PROG as outputs

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

Table from **EZ-USB(R) Technical Reference Manual** (EZ-USB_TRM.pdf).
**USB FX2 microcontroller configuration table**

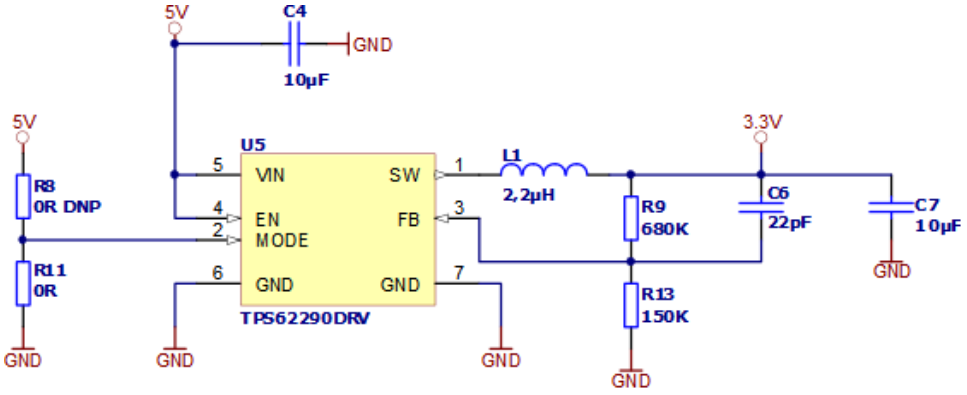
## Signal PS_EN

- 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.
  The power-rail 3.3 V though is out of the control of the USB-microcontroller and is supplied down-converting the power supply 5 V provided by either the USB-bus or the B2B receptacle connector. In this case, signals that are applied to the 3.3 V I/O banks do not need to be disconnected when power-rails are disabled by the USB microcontroller.




**Power rail 3.3V 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 1.2 V to 3.3 V. VccIO can be supplied either externally or internally to the micromodule.

> **Warning!** 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).

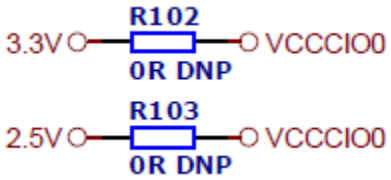
## Externally Supplied VCCIO

VccIO can be externally supplied over the B2B connector J4. If bank B0 is not used, then VccIO can be left open.

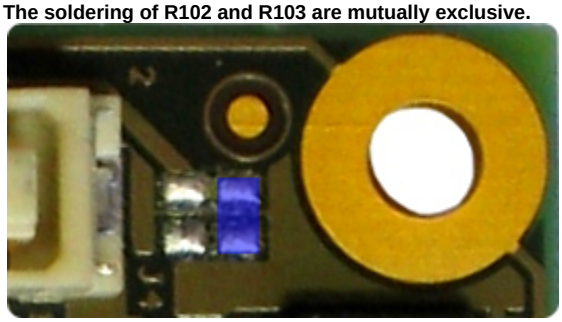
## Internally Supplied VCCIO

If VccIO is **not** externally supplied, it can be internally supplied by **one** of the internal power rails of 2.5 V and 3.3 V. This is possible by short-circuiting **one** of the two pad pairs placed on the right of connector J4 at the top right corner of the bottom side of the micromodule.

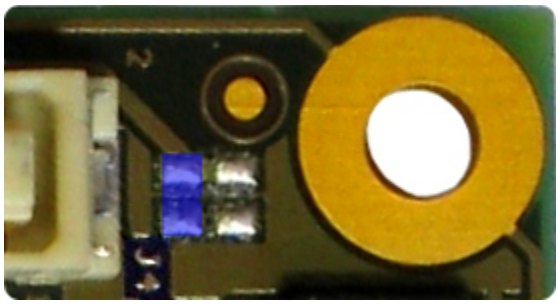
Two suitable ways of shirt-circuiting the paid pair are by means of a zero-ohm 0603 (1608 metric) chip resistor or a solder blob.




**The soldering of R102 and R103 are mutually exclusive.**



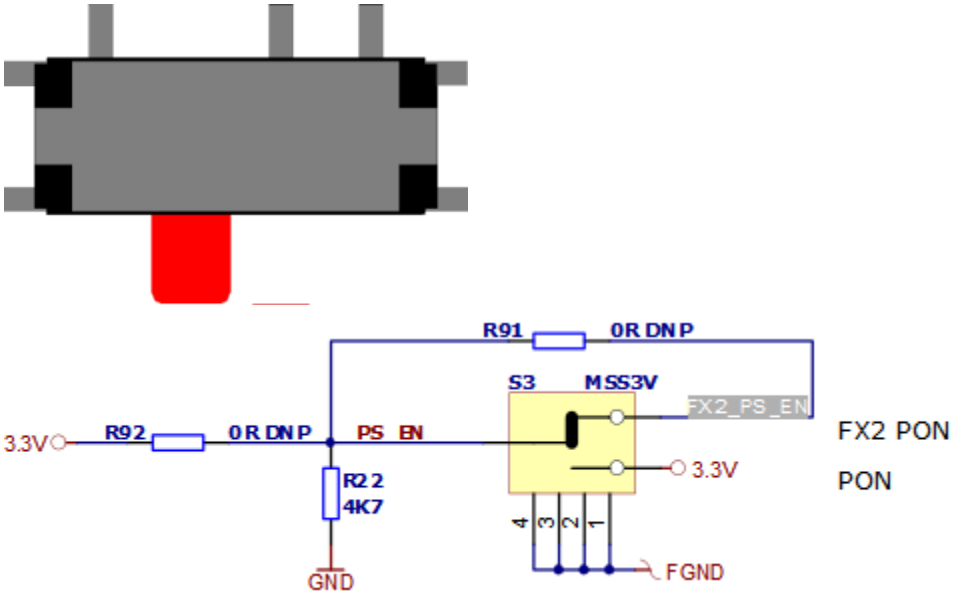
**The figure shows how to short-circuit VccIO to internal power rail 3.3 V. FX2_PS_EN does not control VCCCIO0 (3.3V) FPGA bank 0**



**The figure shows how to short-circuit VccIO to internal power rail 2.5 V. FX2_PS_EN does control VCCCIO0 (2.5V) FPGA bank 0**

# Slide Switch S3 = FX2 PON

When slide switch **S3 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).



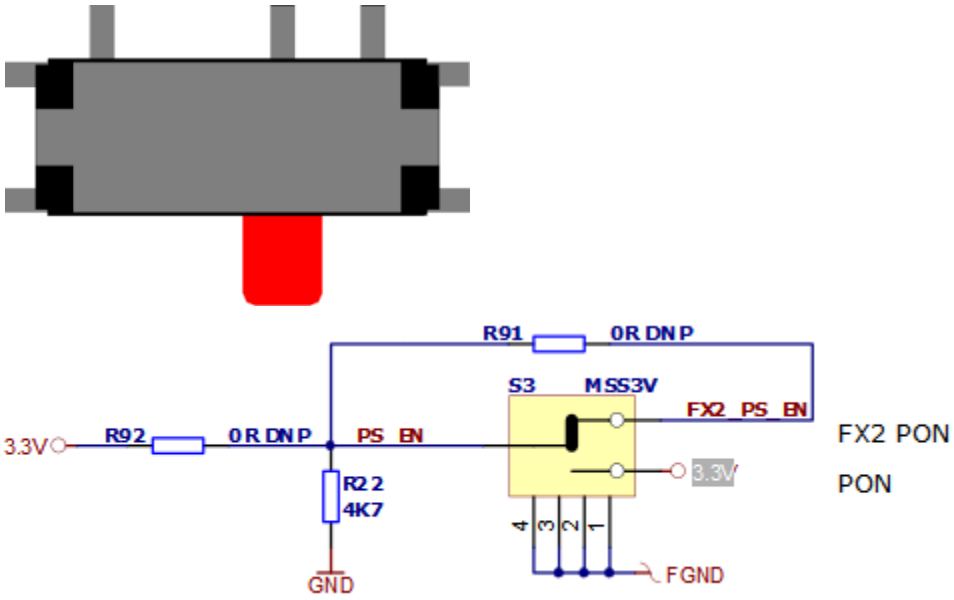

**S3 on position FX2 PON (PS_EN = FX2_PS_EN = 1 or 0 ).**

1. Dynamic **full power** operation (**PS_EN = 1**): when the EZ-USB FX2LP USB FX2 microcontroller sets signal **PS_EN = FX2_PS_EN = 1**, 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 = 0**, the following components are switched off:

   - FPGA core logic (1.2V)
   - DDR SDRAM (2.5V)
   - FPGA bank 1 (2.5V)
   - VREF (2.5V)
   - VCCCIO0 (2.5V) FPGA bank 0 (if R102+R103- assembly)

# Slide Switch S3 = PON

Full power operation (**PS_EN = 1**): when slide switch S3 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.




**S3 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 S3 and firmware signal FX2_PS_EN (under the standard assembly option).

| power rail | S3= PON<br>(PS_EN = 1)<br>(PS_EN  FX2_PS_EN)<br>(Full power) | S3 = FX2 PON and<br>PS_EN = FX2_PS_EN = 1<br><br>(Dynamic full power) | S3 = FX2 PON and<br>PS_EN = FX2_PS_EN = 0<br><br>(Dynamic low power) |
|---|---|---|---|
| 1.2V | **on** | **on** | **off** |
| 2.5V | **on** | **on** | **off** |
| VCCCIO0 (= 2.5V)<br>R102+R103- assembly [(1)] | **on** | **on** | **off** |
| VCCCIO0 (= 3.3V)<br>R102-R103+ assembly [(2)] | **on** | **on** | **on** |

**[(1)] R102 populated / R103 unpopulated**

**[(2)] R102 unpopulated / R103 populated**
**Slide switch S3 settings overview ( 1.2V , 2.5V, VCCIO0).**