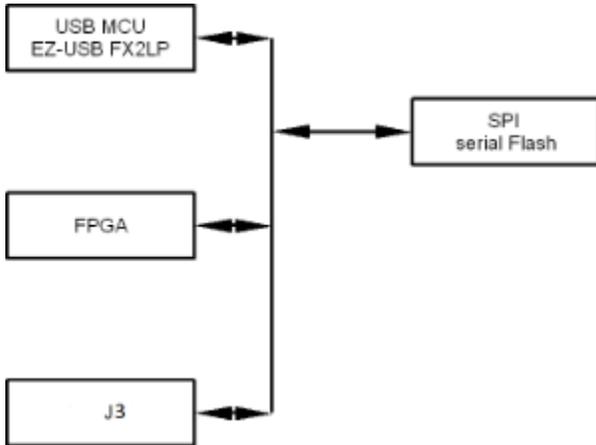


# TE0300 SPI Interface

TE0300 has a flexible SPI bus on-board as outlined in the figure below.



## SPI bus topology.

SPI signals on the TE0300 are listed and described in the table below.

name	definition	description
SPI_Q	serial data output	This output signal is used to transfer data serially out of the device. Data is shifted out on the falling edge of SPI_C.
SPI_D	serial data input	This input signal is used to transfer data serially into the device. It receives instructions, addresses, and the data to be programmed. Values are latched on the rising edge of SPI_C
SPI_C	serial clock	This input signal provides the timing of the serial interface. Instructions, addresses, or data present at SPI_D are latched on the rising edge of SPI_C. Data on SPI_Q changes after the falling edge of SPI_C.
SPI_S	chip select	When this input signal is <b>high</b> , the device is <b>disabled</b> and SPI_Q is at high impedance (Z). When this input signal is <b>low</b> , the device is <b>enabled</b> . After power-up, a falling edge on SPI_S is required prior to the start of any instruction to the Flash memory.

## SPI signals summary.

SPI signals are routed to / from bank 2 of the FPGA of the TE0300 is as detailed in the table below.

name	FPGA ball	FPGA pin	J5 pin	J3 pin
SPI_Q	T4	IO_L03N_2	no	see figure below
SPI_D	N10	IO_L16N_2	no	see figure below
SPI_C	U16	IO_L26N_2	no	see figure below
SPI_S	U3	IO_L01P_2	no	see figure below

## SPI pin-out summary; SPI signal details (bank 2).

 SPI pins on connector J3 cannot be used as GPIOs (general purpose I/Os).

The SPI bus can be used during configuration and operation in a plurality of ways as summarized respectively in Table A (SPI bus for configuration) and Table B (SPI bus for operation).

 Any other usage of the SPI bus is neither supported nor recommended.

## SPI bus for configuration

The SPI bus is used for configuration in two ways by default:

1. EZ-USB  $\hat{\text{a}}^{\circ}$  Flash the USB FX2 microcontroller (master) writes the PROM file (containing the FPGA configuration bitstream) to the SPI serial Flash memory (slave)
2. FPGA  $\hat{\text{a}}^{\circ}$ , Flash the FPGA (master) configures itself in Master SPI mode from the SPI serial Flash memory (slave).

In case (a), the FPGA shall be turned off to release its shared SPI pins.

In case (b), the USB FX2 microcontroller shall three-state (Z = high impedance) its shared SPI pins.

description	usage	EZ-USB FX2LP	FPGA	J3	serial Flash
EZ-USB $\hat{\text{a}}^{\circ}$ Flash	OpenFU T API	<b>master</b>	off (S3 = FX2PON, FX2_PS_EN = 0)	deselected	slave
FPGA $\hat{\text{a}}^{\circ}$ , Flash	OpenFU T API	inactive SPI_* = Z	<b>master</b> (SPI_/S = 1)	deselected	slave
J3 $\hat{\text{a}}^{\circ}$ Flash	custom	inactive SPI_* = Z	off (S3 = FX2PON, FX2_PS_EN = 0)	<b>master</b> (SPI_/S = 0)	slave

**Table A: SPI bus modes for configuration.**

The PROM file (containing the FPGA configuration bitstream) can be written to the SPI serial Flash memory (slave) also through the SPI pins of J3 (attached device set to master mode). In this case, the FPGA shall be turned off or three-stated to release its shared SPI pins and the USB FX2 microcontroller shall three-state (Z = high impedance) its shared SPI pins.

## SPI bus for operation

A plurality of usage combinations of the SPI bus during operation is made available to the user as suggested in Table B below.

description	usage	EZ-USB FX2LP	FPGA	J3	serial Flash
EZ-USB $\hat{\text{a}}^{\circ}$ , $\hat{\text{a}}^{\circ}$ Flash	custom	<b>master</b>	off (S3 = FX2PON, FX2_PS_EN = 0)	deselected	slave
FPGA $\hat{\text{a}}^{\circ}$ , $\hat{\text{a}}^{\circ}$ Flash	custom	inactive SPI_* = Z	<b>master</b> (SPI_/S = 1)	deselected	slave
J3 $\hat{\text{a}}^{\circ}$ , $\hat{\text{a}}^{\circ}$ Flash	custom	inactive SPI_* = Z	off (S3 = FX2PON, FX2_PS_EN = 0)	<b>master</b> (SPI_/S = 0)	slave
EZ-USB $\hat{\text{a}}^{\circ}$ , $\hat{\text{a}}^{\circ}$ J3	custom	<b>master</b> SPI_/S = 1	off (S3 = FX2PON, FX2_PS_EN = 0)	slave	deselected
EZ-USB $\hat{\text{a}}^{\circ}$ , $\hat{\text{a}}^{\circ}$ J3	custom	slave SPI_/C = Z	off (S3 = FX2PON, FX2_PS_EN = 0)	<b>master</b> (SPI_/S = 1)	deselected

**Table B: SPI bus modes for operation.**

⚠ Other combinations of master and slave units are neither supported nor recommended.

## SPI Header Connector J3

The offset holes of header J3 allow a removable press fit of standard 0.100 inch header pins to connect flying leads without any soldering necessary.

SPI signals are made available on the dedicated header J3 accessible through an SPI programmer with flying leads as described in the table below.

Signal	J3 pin
SPI /S	
SPI D	
SPI Q	
SPI /C	
GND	
Vref (3.3 V)	

SPI header (J3).