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## ClockMatrix

### SPI Connections to ClockMatrix Evaluation Board

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#### Abstract

This document explains how to connect the FTDI or Aardvark cards to the 8A340xx (ClockMatrix) EVB for SPI access.

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## 1. Introduction

The 8A340xx evaluation boards, by default, were designed to function in I<sup>2</sup>C mode using the on-board FTDI chip. However, they have an option for I<sup>2</sup>C/SPI support using either an external FTDI dongle or an Aardvark Total Phase I<sup>2</sup>C card. Timing Commander natively supports the FTDI dongle for both I<sup>2</sup>C and SPI. It also supports the Aardvark I<sup>2</sup>C card for I<sup>2</sup>C only. For Aardvark access via SPI, instead of using Timing Commander, use the Total Phase GUI.

For more information on I<sup>2</sup>C hardware options for Timing Commander, see the [Timing Commander Hardware Interfaces User Guide](#).

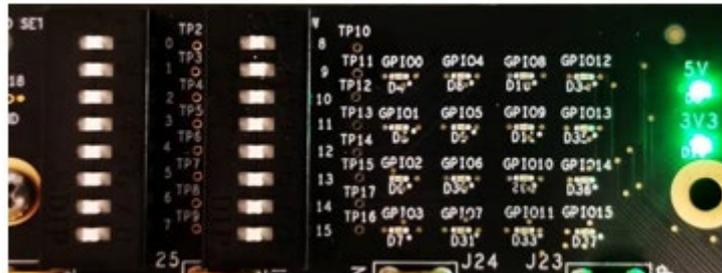
## 2. Ordering Information

Hardware	Description	Link
<p data-bbox="288 734 413 763">FTDI Dongle</p> 	<p data-bbox="639 734 943 763">FTDI C232HM-DDHSL-0 Cable</p>	<p data-bbox="1018 734 1310 763"><a href="http://www.digikey.com/short/pzbfwf">www.digikey.com/short/pzbfwf</a></p>
<p data-bbox="260 1182 442 1211">Aardvark I2C Card</p> 	<p data-bbox="663 1182 919 1211">Total Phase Aardvark card</p>	<p data-bbox="1018 1182 1453 1234"><a href="http://www.totalphase.com/products/aardvark-i2cspi/">http://www.totalphase.com/products/aardvark-i2cspi/</a></p> <p data-bbox="1018 1267 1453 1319"><a href="https://www.totalphase.com/products/grabber-cable/">https://www.totalphase.com/products/grabber-cable/</a></p>

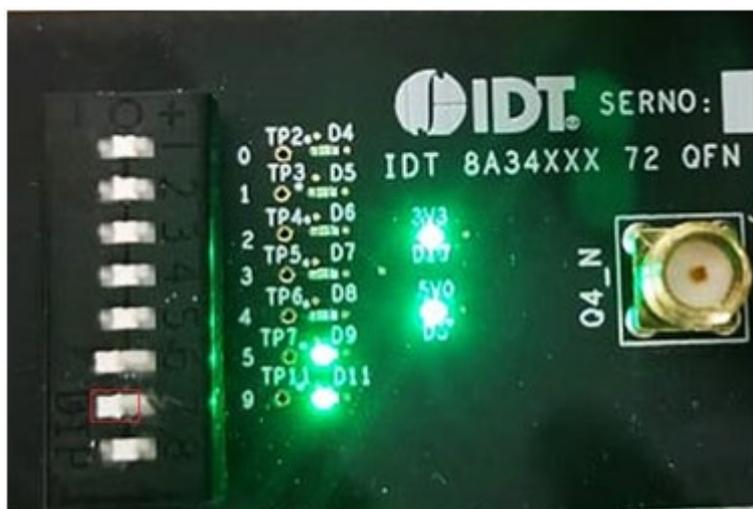
### 3. Evaluation Board I<sup>2</sup>C Mode selection

Depending on the evaluation board (EVB), the GPIO9 setting may need to be changed as follows:

1. If you are using the **144BGA EVB**, do nothing. The default setting for GPIO9 is in the middle position. That sets the main serial port to I<sup>2</sup>C and the Aux Serial port to SPI. In section 4, the FTDI cables are connected to the Auxiliary port by changing the position of the jumpers on J12 to J15. The following figure shows how the default settings appear.



2. If using the **72QFN EVB**, set GPIO9 **Low** and **Power Cycle** the board. This ClockMatrix variant only has one serial port. When GPIO9 floats (center position), it is high and the default mode is I<sup>2</sup>C. In section 4, the FTDI cable is connected to the Main port, so that means that the GPIO9 setting must be updated so that the port runs in SPI mode. The power-cycle is necessary to re-latch the GPIO9 and switch to SPI mode.

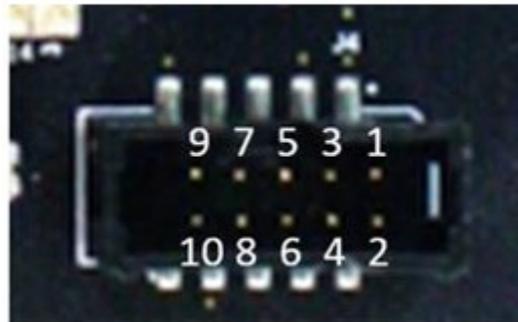


## 4. FTDI Dongle Hardware Connection

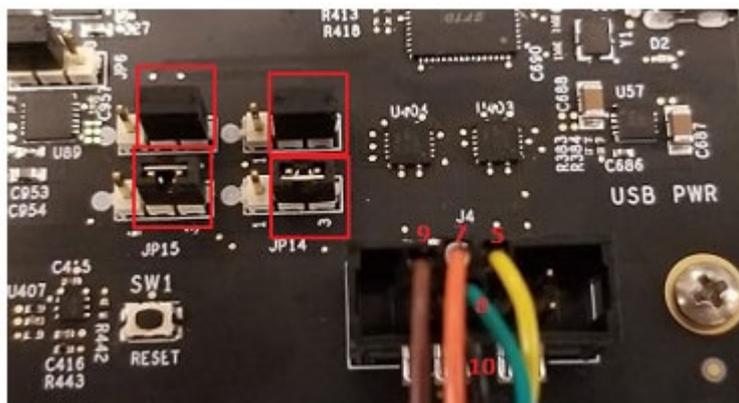
Connect the FTDI cable to the evaluation board as follows:

1. Connect the wires as follows to J4. This applies whether you are using the 144BGA or the 72QFN EVB.

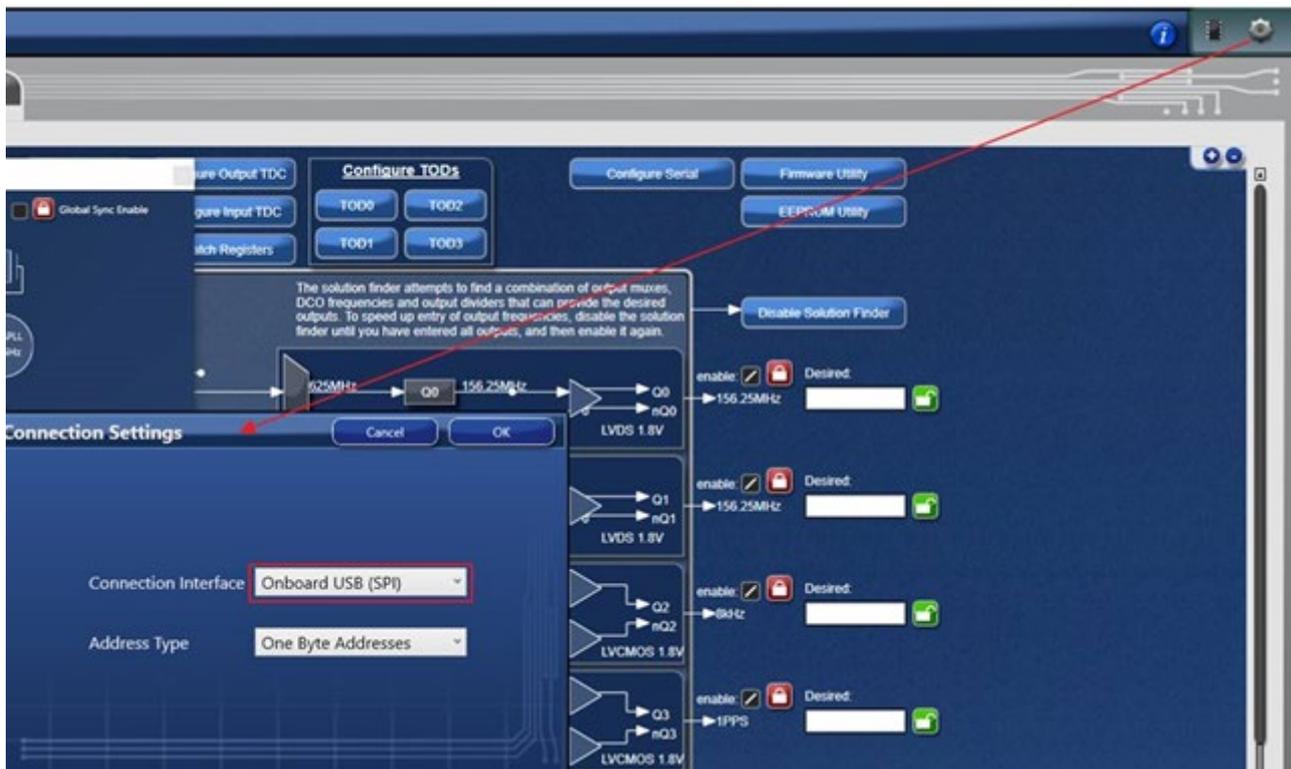
- 5 = Yellow
- 6 = No connect
- 7 = Orange
- 8 = Green
- 9 = Brown
- 10 = Black



2. Set the jumpers for J12, J13, J14, and J15 to connect pins 2 and 3, as shown in the following figure.



3. In the GUI, change the connection to “Onboard USB (SPI)” and connect to the evaluation board.



## 5. Aardvark Card Hardware Connection

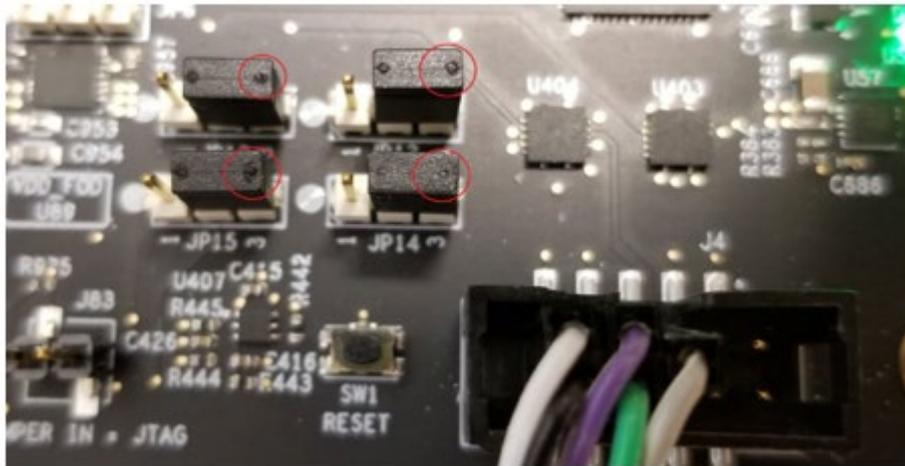
1. Connect the wires as follows to J4. This applies whether you are using the 144BGA or the 72QFN EVB.

- 5 = Grey
- 6 = No connect
- 7 = Purple
- 8 = Green
- 9 = White
- 10 = Black

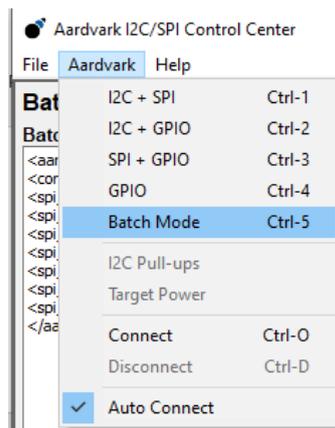


## SPI Connections to ClockMatrix Evaluation Board Application Note

- Set the jumpers for J12, J13, J14, and J15 to connect pins 2 and 3, as shown in the following figure.



- Install and start the Total Phase GUI. The Windows GUI can be downloaded [here](#). The Windows drivers can be downloaded [here](#). For more information, see the [Total Phase Aardvark Quick Start User Guide](#).
  - Open the GUI.
  - Switch to Batch Mode.

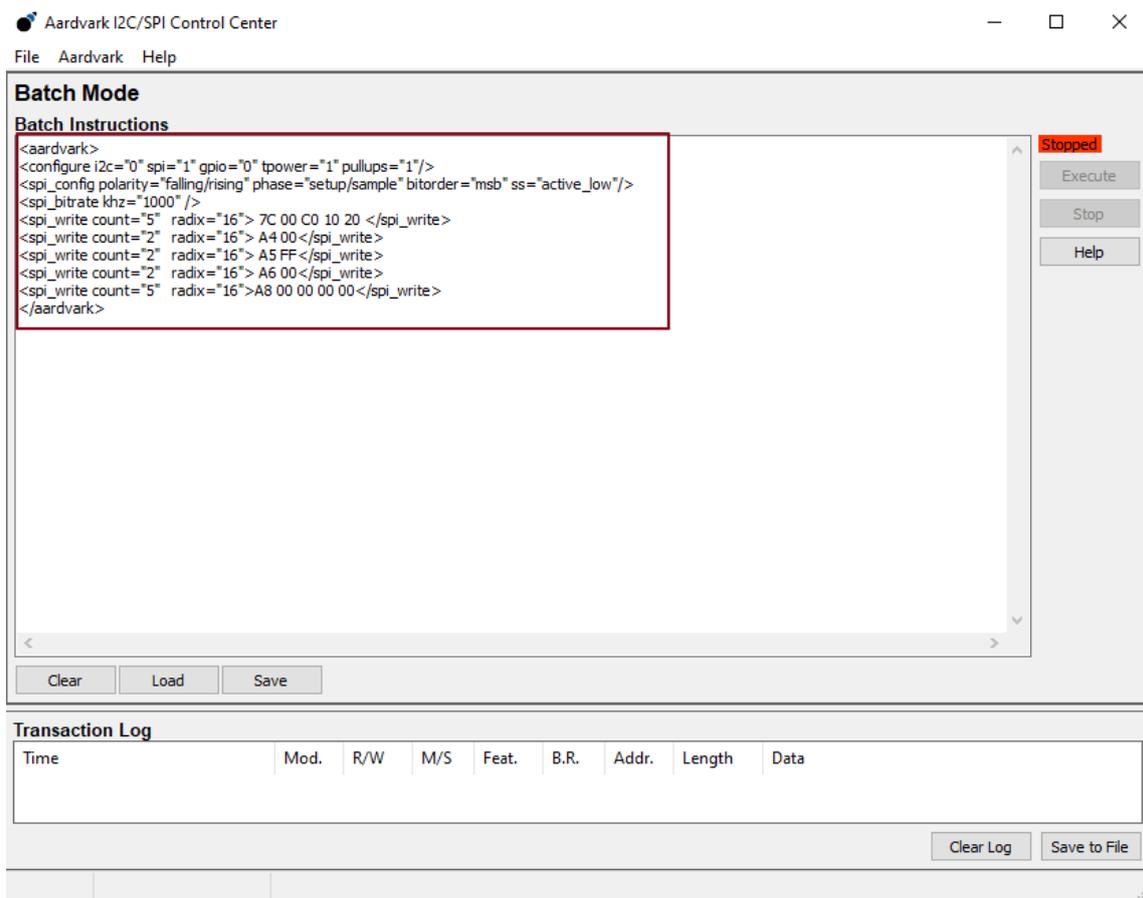


- Connect the Aardvark card.

- Copy the following code into the GUI and execute it. It will read back the firmware version (major, minor, hotfix, and pipeline):

```
<aardvark>
<configure i2c="0" spi="1" gpio="0" tpower="1" pullups="1"/>
<spi_config polarity="falling/rising" phase="setup/sample" bitorder="msb"
ss="active_low"/>
<spi_bitrate khz="1000" />
<spi_write count="5" radix="16"> 7C 00 C0 10 20 </spi_write>
<spi_write count="2" radix="16"> A4 00</spi_write>
<spi_write count="2" radix="16"> A5 FF</spi_write>
<spi_write count="2" radix="16"> A6 00</spi_write>
<spi_write count="5" radix="16">A8 00 00 00 00</spi_write>
</aardvark>
```

The following figure shows the Total Phase GUI batch mode:



## 6. Revision History

Revision	Date	Description
1.0	Dec.14.20	Initial release.

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