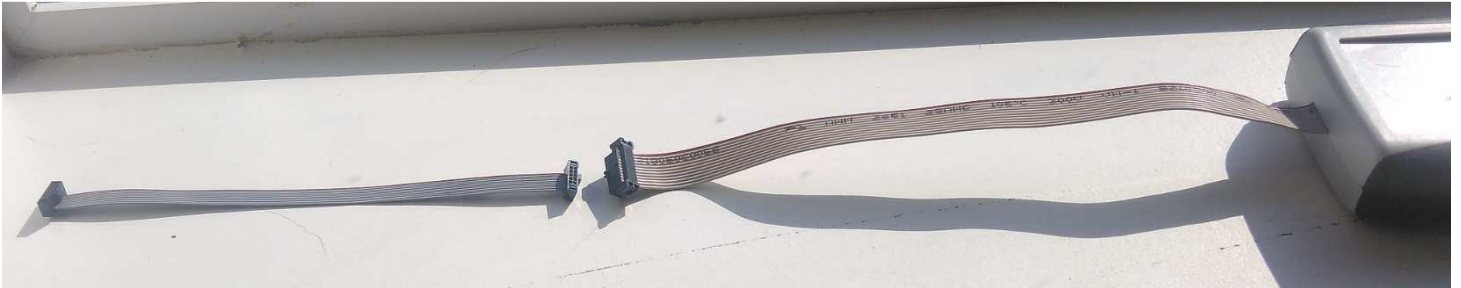


## VCU1525 – DC1613A Cable Adapter

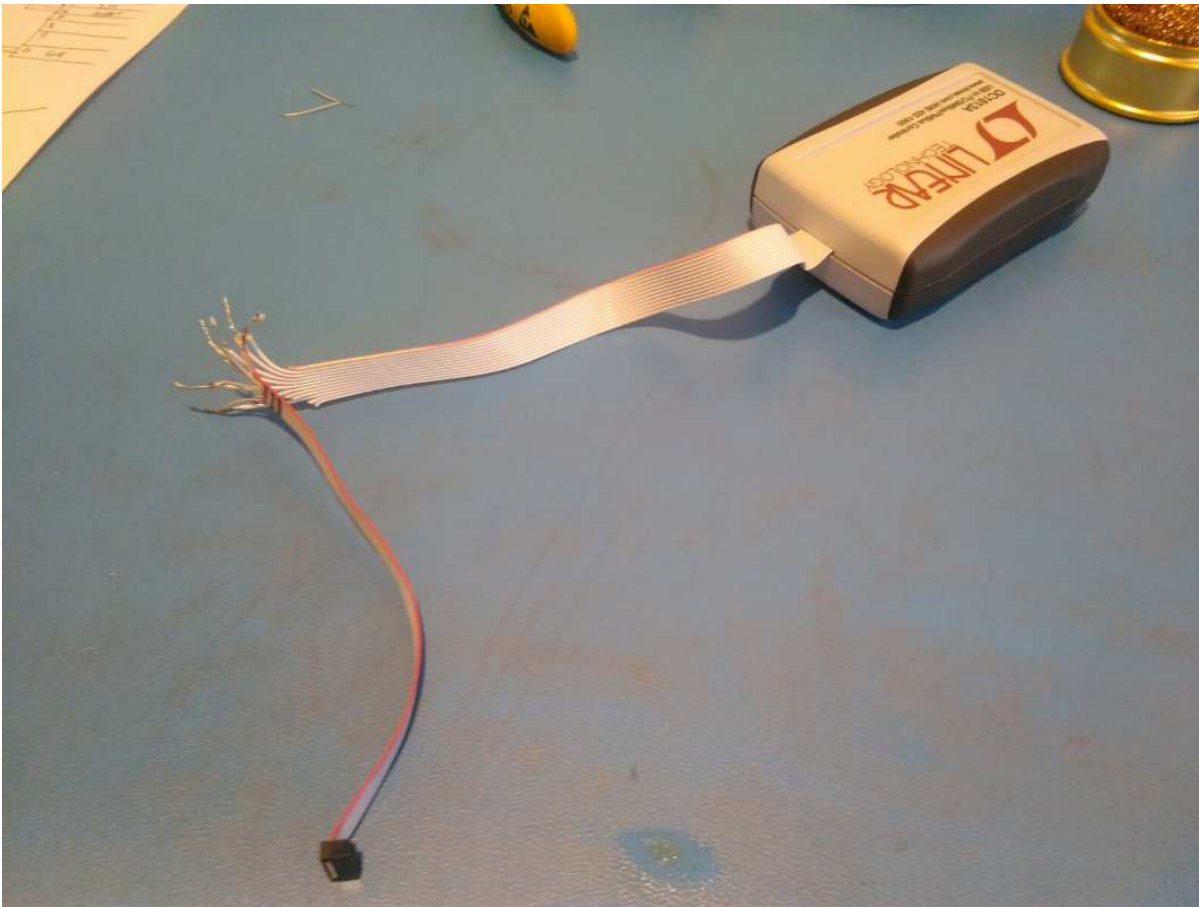
The Linear Technology DC1613A dongle allows the LTPowerPlay software to modify the core voltage on the VCU1525 FPGA board, and also monitor current levels. However, the cable does not fit the connector on the VCU1525 and an adapter needs to be built. You can also just order a Zetheron Dynavolt device which does the same thing (and much more) for the same price and it doesn't need a complicated adapter built. Anyway, if you have a DC1613A and want to build an adapter, here is the procedure.

To build an adapter that allows you to use the DC1613A USB dongle with the VCU1525, start with Digikey part number: SAM8218-ND

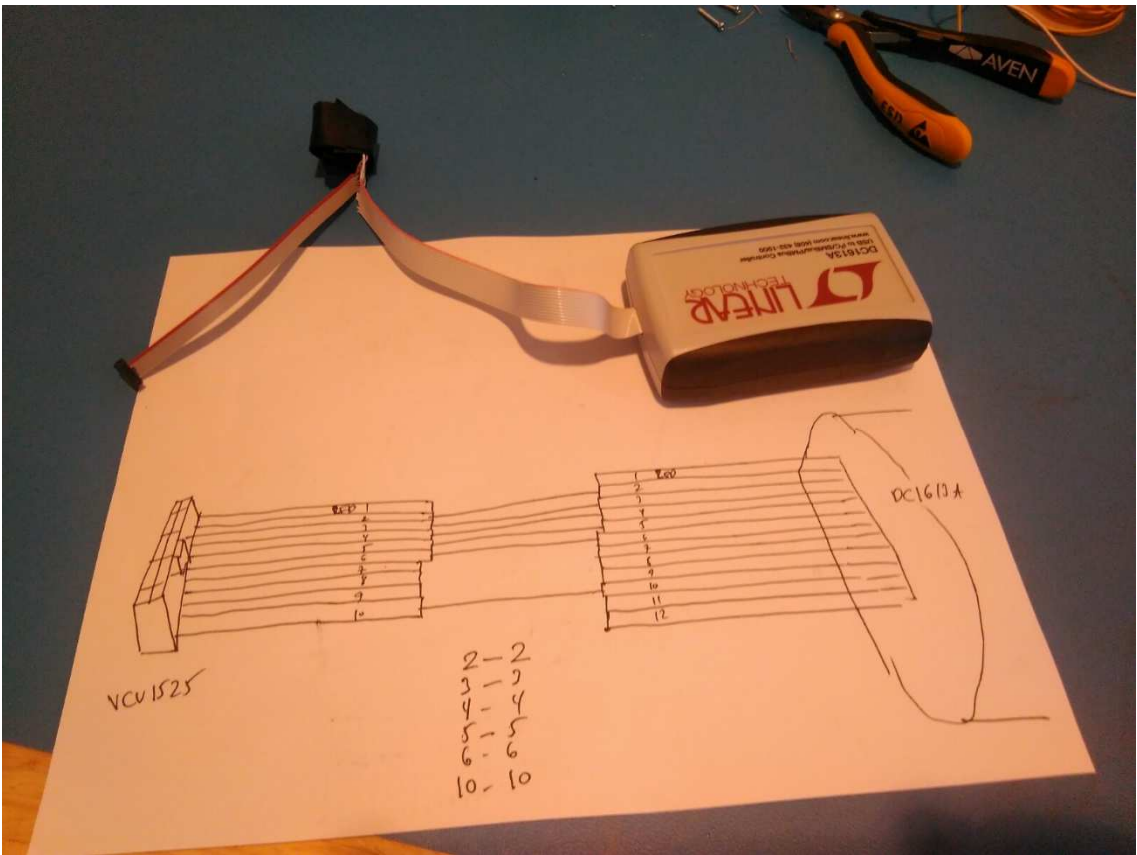
The cable must be this particular series (Samtec FFSD); other cables or manufacturers will not fit securely on the VCU1525. Below is an image of the SAM8218-ND cable (left) and the stock DC1613A (right). Note the important orientation of the cable on the left; connectors pointing up, red line near the top of the screen.



Near the center of the image, using scissors, cut off the two black connectors. With the same scissors, cut carefully between each wire, separating them into individual wires. Wearing nitrile gloves, strip and twist each wire in preparation for mating/soldering. A diagram below will show the exact mating, but when you are done it will look like this:

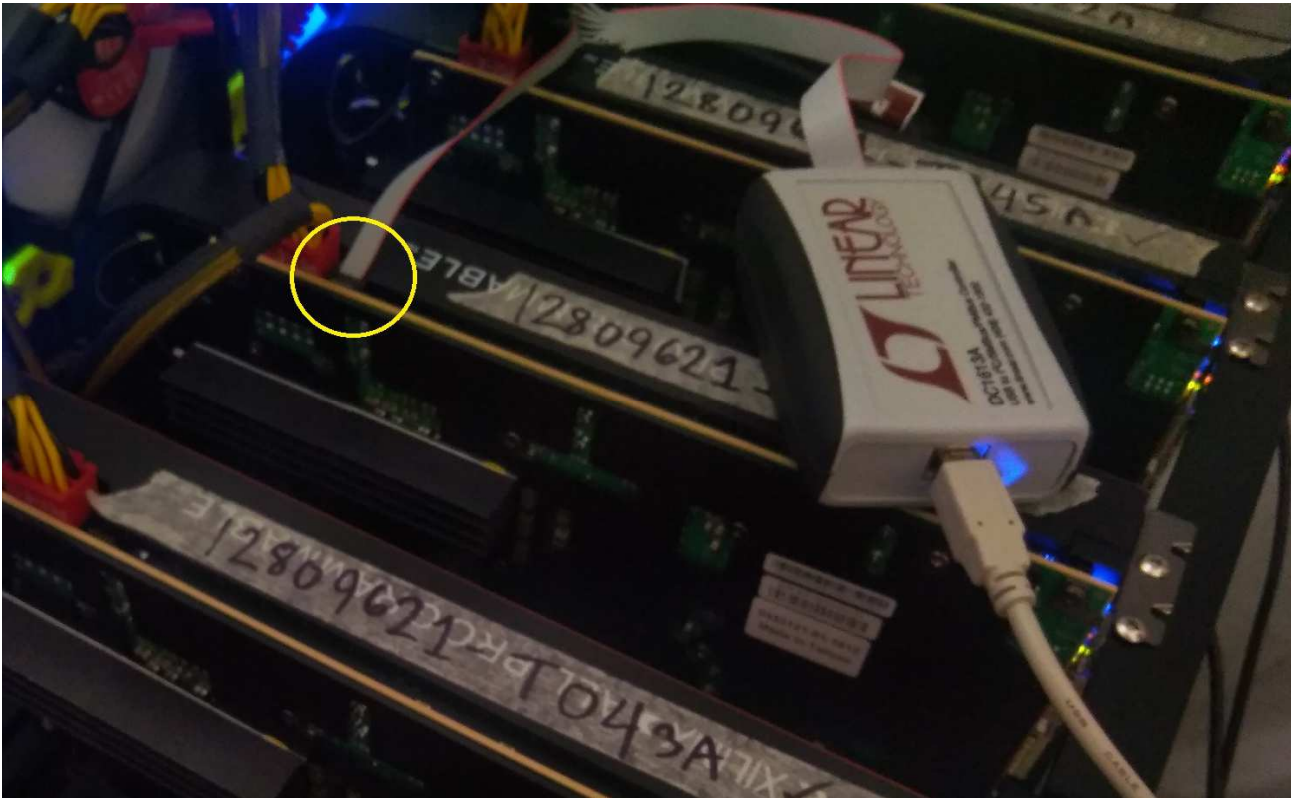


The mating diagram is below. The wires are numbered starting at the red wire at the top, from 1 to 10 on the left cable, and 1 to 12 on the right cable. You must mate 2 to 2, 3 to 3, 4 to 4, 5 to 5, 6 to 6 and 10 to 10. The others are left unconnected:



Twist the wires together (wearing gloves, never do this with bare fingers or the oil from your hands will prevent soldering). Solder the pairs together, then use heat shrink tubing or electrical tape to insulate the wires from each other.

The connector is polarized so it will only fit into the VCU1525 one way:



Install the LTPowerPlay software:

<http://www.ltpowerplay.com/download/>

Please note that you **MUST** have the DC1613A dongle installed before you launch the software, otherwise it will ask you for a license which is not necessary.

Once you plug the DC1613A into the VCU1525 and launch the LTPowerPlay software, you will see a window like this:

LTpowerPlay® v1.2.163.0 [Unlicensed]

File View Configuration Utilities Custom Scripts Help

GO (Unlabeled) PC RAM PC RAM VERIF. CF CF PL RESET RAM (VIO) RAM (VIO) PL V Group

(Edit Groups...)

System (Ungrouped) U0 (7h44) -LTC3884 Rail A #1 Rail A #2

P Config Capture/Replay Config: U0 (7h44) -LTC3884

Lookup: [ ]

Setup All Global All Paged Addressing/WP General Config On/Off/Margin PWM Configuration Voltage Current

Temperature Timing Fault Responses Fault Sharing Scratchpad Identification

**General Configuration Registers**

- MFR\_CHAN\_CONFIG\_LTC388X (0x1F) DisableRunLow, Shortcycle, Sha...
- Addressing and Write Protect**
  - MFR\_RAIL\_ADDRESS\_LTC 0x30
- On/Off Control and Margining**
  - ON\_OFF\_CONFIG OPERATION (0x1E) controlled\_on, use\_pmbus, use...
    - (0x00) ImmediateOff
    - (0x04) Softoff
    - (0x80) On/Nominal Voltage
    - (0x98) MarginLow
    - (0xA8) MarginHigh
- PWM Related Configuration**
  - MFR\_PWM\_MODE\_LTC3884 (0xC7) ILM H1 Range, Servo Enbled, U1...
  - MFR\_PWM\_COMP (0x56) GM\_2P3S, R\_ITH\_15P00
- Fault Responses -- Input Voltage**
  - VIN\_OV\_FAULT\_RESPONSE\_PAGED (0x80) Immediate Off, No\_Retry
- Output Voltage**
  - VOUT\_OV\_FAULT\_LIMIT +10.0 % above/below VOUT
  - VOUT\_OV\_WARN\_LIMIT +7.5 % above/below VOUT
  - VOUT\_MARGIN\_HIGH +5.0 % above/below VOUT
  - VOUT\_COMMAND **0.7400 V**
  - VOUT\_MARGIN\_LOW -5.0 % above/below VOUT
  - VOUT\_UV\_WARN\_LIMIT -7.5 % above/below VOUT
  - VOUT\_UV\_FAULT\_LIMIT -10.0 % above/below VOUT
- Fault Responses -- Output Voltage**
  - TON\_MAX\_FAULT\_RESPONSE (0x88) Immediate Off, Infinite\_Retry
  - VOUT\_UV\_FAULT\_RESPONSE (0x00) Ignore
  - VOUT\_OV\_FAULT\_RESPONSE (0x7A) Deglitched Off, 2, Infinite\_Retry
- Output Voltage -- Miscellaneous**
  - VOUT\_MAX 1.5000 V
  - VOUT\_MODE (0x14) Linear, 1sb\_size = 2^(-12)
  - VOUT\_TRANSITION\_RATE 0.250 V/ms
- Output Current Calibration**
  - IOUT\_CAL\_GAIN 0.700 mOhms
  - MFR\_IOUT\_CAL\_GAIN\_TC 3900 ppm/°C
- Output Current**
  - IOUT\_OC\_FAULT\_LIMIT 55.000 A
  - IOUT\_OC\_WARN\_LIMIT 45.000 A
- Fault Responses -- Output Current**
  - IOUT\_OC\_FAULT\_RESPONSE (0x00) Current limit only
- External Temperature Calibration**
  - MFR\_TEMP\_1\_GAIN 1.0000 mV/°C
  - MFR\_TEMP\_1\_OFFSET 0.0000 °C
- External Temperature Commands and Limits**
  - OT\_FAULT\_LIMIT\_PAGED 123.0 °C
  - OT\_WARN\_LIMIT\_PAGED 110.0 °C
  - UT\_FAULT\_LIMIT\_PAGED -40.0 °C
- Fault Responses -- External Temperature**
  - UT\_FAULT\_RESPONSE\_PAGED (0x88) Immediate Off, Infinite\_Retry
  - OT\_FAULT\_RESPONSE\_PAGED (0x00) Ignore
- Fault Responses -- ALERTB Masking**
  - MASK\_STATUS\_IOUT (0x00) 0

**VOUT\_COMMAND**  
(Press F1 for More Detailed Information on this Register)  
Nominal DC/DC converter output voltage setpoint.

Simple Mode  
Advanced Mode

Telemetry: Rail A #1  
No Custom Scaling is Enabled. Telemetry values shown are as reported by the device.  
[Click Here to View Custom Scaling Parameters...](#)

**Telemetry -- PWM**

- READ\_FREQUENCY 427.0 kHz

**Telemetry -- Input Voltage**

- MFR\_VIN\_PEAK\_LTC 12.1094 V
- READ\_VIN 11.5313 V

**Telemetry -- Input Current**

- READ\_IIN 3.9766 A
- MFR\_READ\_IIN\_PEAK\_LTC 4.3047 A
- MFR\_READ\_IICHIP\_LTC 0.0118 A

**Telemetry -- Input Power**

- READ\_PIN 45.813 W

**Telemetry -- Output Voltage (V)**

- MFR\_VOUT\_PEAK\_LTC 0.7422 V
- READ\_VOUT 0.7131 V

**Telemetry -- Output Voltage (%)**

- MFR\_VOUT\_PEAK\_LTC\_PERCENT +0.30 % above/below VOUT
- READ\_VOUT\_PERCENT -3.63 % above/below VOUT

**Telemetry -- Output Current**

- MFR\_IOUT\_PEAK\_LTC 35.563 A
- READ\_IOUT 33.563 A
- PMBUS\_RAIL\_CURRENT 62.813 A
- TOTAL\_RAIL\_CURRENT 62.813 A
- PHASE\_CURRENT\_DEVIATION 6.922 %

**Telemetry -- Temperature**

- MFR\_TEMPERATURE\_1\_PEAK\_LTC\_PAGED 136.8 °C
- READ\_TEMPERATURE\_1\_PAGED 136.0 °C
- READ\_TEMPERATURE\_2 134.8 °C
- PHASE\_TEMP\_DEVIATION 0.000 %

**Telemetry -- Output Power**

- READ\_POUT 23.938 W
- TOTAL\_RAIL\_POUT 44.813 W

**Telemetry -- General**

- MFR\_REAL\_TIME\_LTC 0000 Days, 00h : 15m : 30.6112s

**Status Summary**

- FAULT\_WARN\_LIST 'OT\_FAULT, OT\_WARN, VOUT\_UV\_FAULT...
- STATUS\_BYTE (0x15) IOUT\_OC, TEMPERATURE, NON...
- STATUS\_WORD (0x015) VOUT, IOUT\_POUT, MFR, ...

**Status -- Details**

- STATUS\_INPUT (0x00) 0
- STATUS\_TEMP\_PAGED (0x00) OT\_FAULT, OT\_WARN
- STATUS\_OWL (0x00) 0
- STATUS\_VOUT (0x10) VOUT\_UV\_FAULT

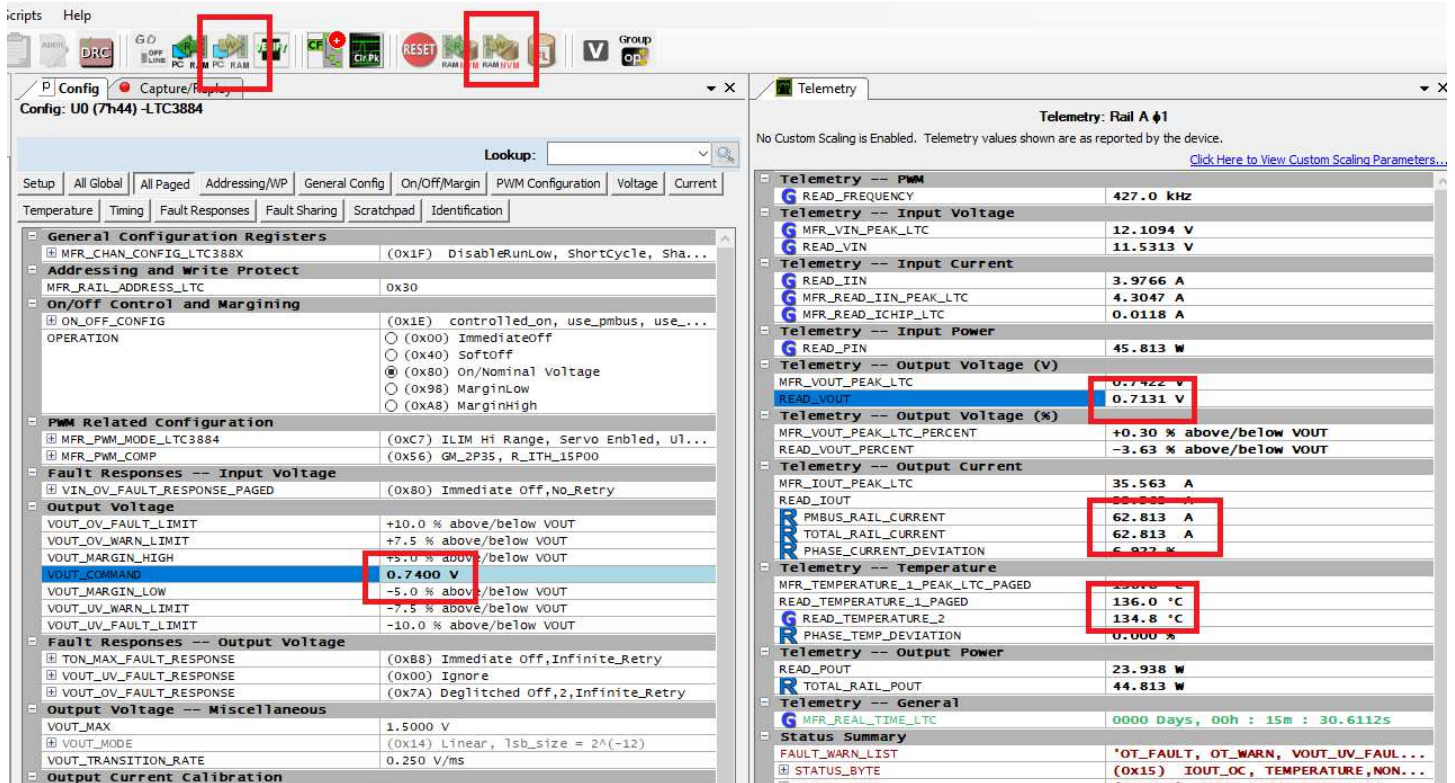
Idealized On/Off Waveforms

**Rail A #1**

ON

Below you will see highlighted in red the important fields:





VOUT\_COMMAND = the value you would like to use for the FPGA core voltage

READ\_VOUT = the value that the FPGA core voltage is current operating at (this is often 0.02V less than the VOUT\_COMMAND due to conduction losses)

TOTAL\_RAIL\_CURRENT = triple this number to get the total current being consumed by the FPGA

READ\_TEMPERATURE = these values are the temperatures of the LTC3884/LTC3784/LTC3784 regulators. This should be held at LESS THAN 120C. In this diagram they are beyond their maximum operating temperature and could fail.

To change the core voltage, change the VOUT\_COMMAND field, then click the PC->RAM button highlight in red above. Wait for a few seconds then you should see the READ\_VOUT change to the value you asked for.

If you want to store the voltage into NON-VOLATILE memory so that it will retain your choice after a power loss, then AFTER READ\_VOUT shows the number you want, click RAM->NVM button highlighted above.

You can run the VU9P FPGA from 0.62V to 0.95V. At 0.62V you will see a lot of errors during hashing, but power consumption and heat will very low. The lowest value that the FPGA will easily program at is 0.72V. If you want to operate at less than 0.72V, you should first set the voltage to 0.72V, program the FPGA, THEN set the voltage to 0.65V or so, and start mining. If you try to program the FPGA at 0.65V (for example), the programming will often fail.

Please note that the LTPowerPlay software interferes with the FTDI drivers. You should close LTPowerPlay before launching the FX Miner software. If you want to monitor current & voltage while mining, you must close LTPowerPlay, then launch FX Miner, then once you start mining launch LTPowerPlay again.