Voltage Fault Detector Example Project
1.2

Features

- Monitor output voltages of 4 DC-DC power converters
- Detect over-voltage and under-voltage faults based on user-defined thresholds
- Programmable glitch filter lengths
- Configured to run on the PSoC Power Management Expansion Board Kit (CY8CKIT-035) plugged into the PSoC Development Kit (CY8CKIT-001)

General Description

This example project demonstrates the basic operation of the Voltage Fault Detector component.

Development Kit Configuration

1. The PSoC 3 Processor Module (CY8CKIT-009) must be installed on the PSoC Development Kit (DVK)
2. The PSoC DVK must be configured for 5V operation using SW3
3. All VDDIO banks must be set to VDD using J2 through J5 on the PSoC DVK
4. Connect SW1 button of the PSoC DVK to P1[7], SW2 button to P1[6]
5. *Do not connect the PSoC Power Management EBK yet*
6. Build the project and program the CY8C3866AXI-040 using a MiniProg3 programmer
7. Remove power from the PSoC DVK and attach the PSoC Power Management EBK to Port A of the PSoC DVK
8. The PSoC Power Management Expansion Board Kit (EBK) must be configured to draw power from the PSoC DVK (J5 jumper shorting positions 2 and 3)
9. Apply power to the PSoC DVK

Project Configuration

The example project consists of the Voltage Fault Detector, Trim Margin, Power Monitor, Status Register, Control Register and Character LCD components. The design schematic is shown in Figure 1. The blue annotation components used in the middle of the schematic show the relevant

components that are installed on the PSoC Power Management EBK, most notably the power converters and the components used for voltage sensing. The Power Monitor component is used to monitor the power converter output voltages to generate the power good (PGOOD) signals. The Status Register is used to monitor the state of the power system.

The four power converter enables are mapped to PSoC GPIO pins P3[4], P3[5], P3[6] and P3[7] respectively. The four power converter output voltages are mapped to PSoC GPIO pins P4[0], P4[2], P4[4] and P4[6] respectively. The 2 switches and the 4 LED's on the development kit should be wired up as shown in Figure 1.

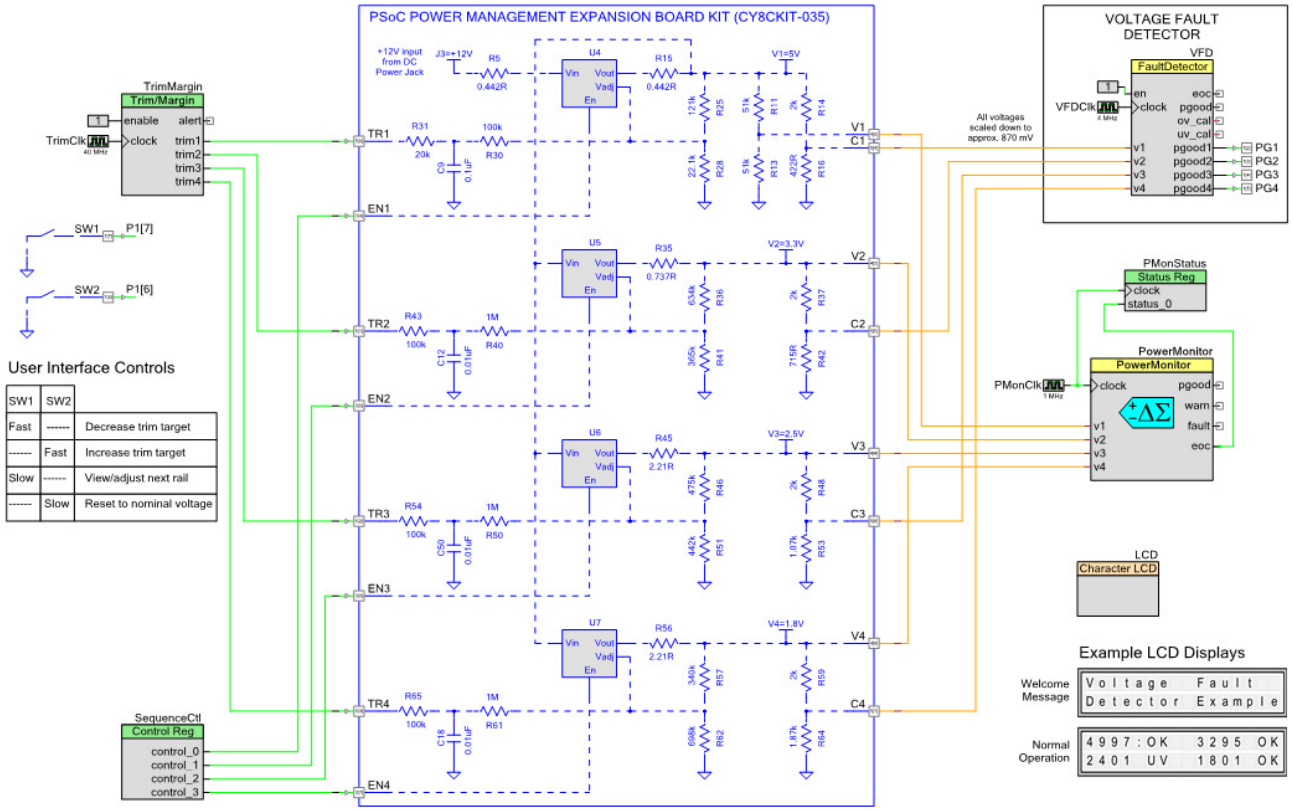


Figure 1. Example project design schematic

The Voltage Fault Detector, Trim Margin and the Power Monitor components are all configured to support the 4 power converters installed on the PSoC Power Management EBK. The component configuration windows are shown below.

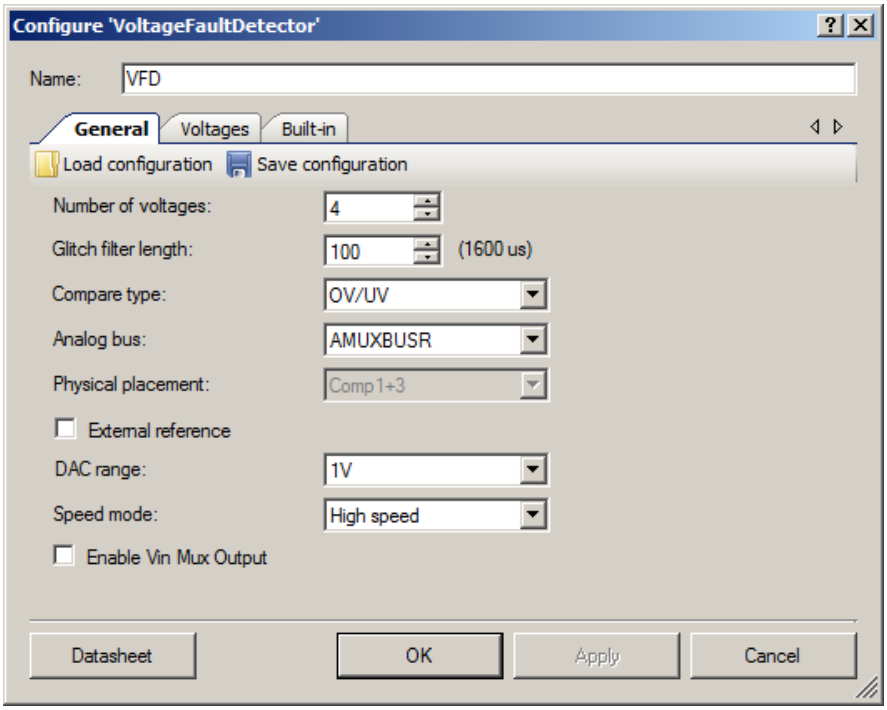


Figure 2. Voltage Fault Detector component configuration - General tab

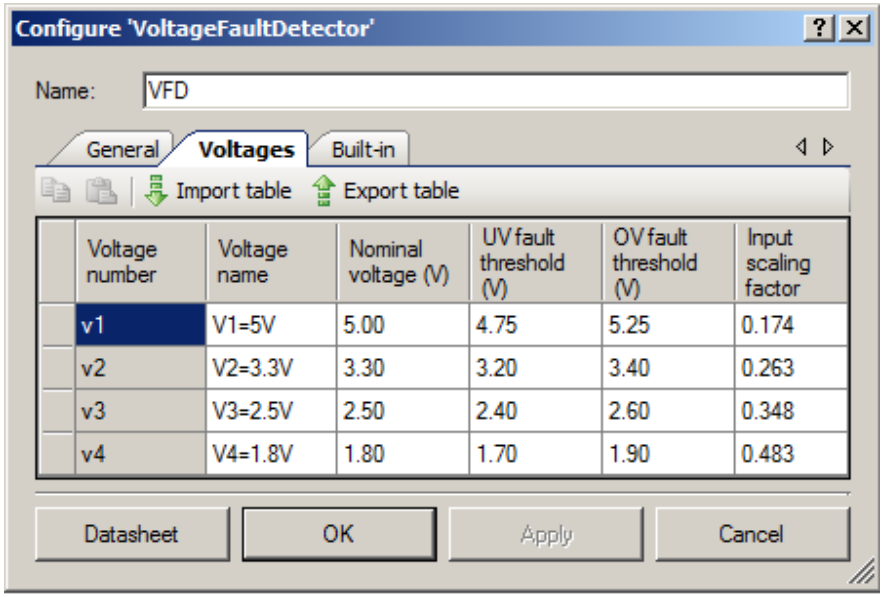


Figure 3. Voltage Fault Detector component configuration – Voltages tab

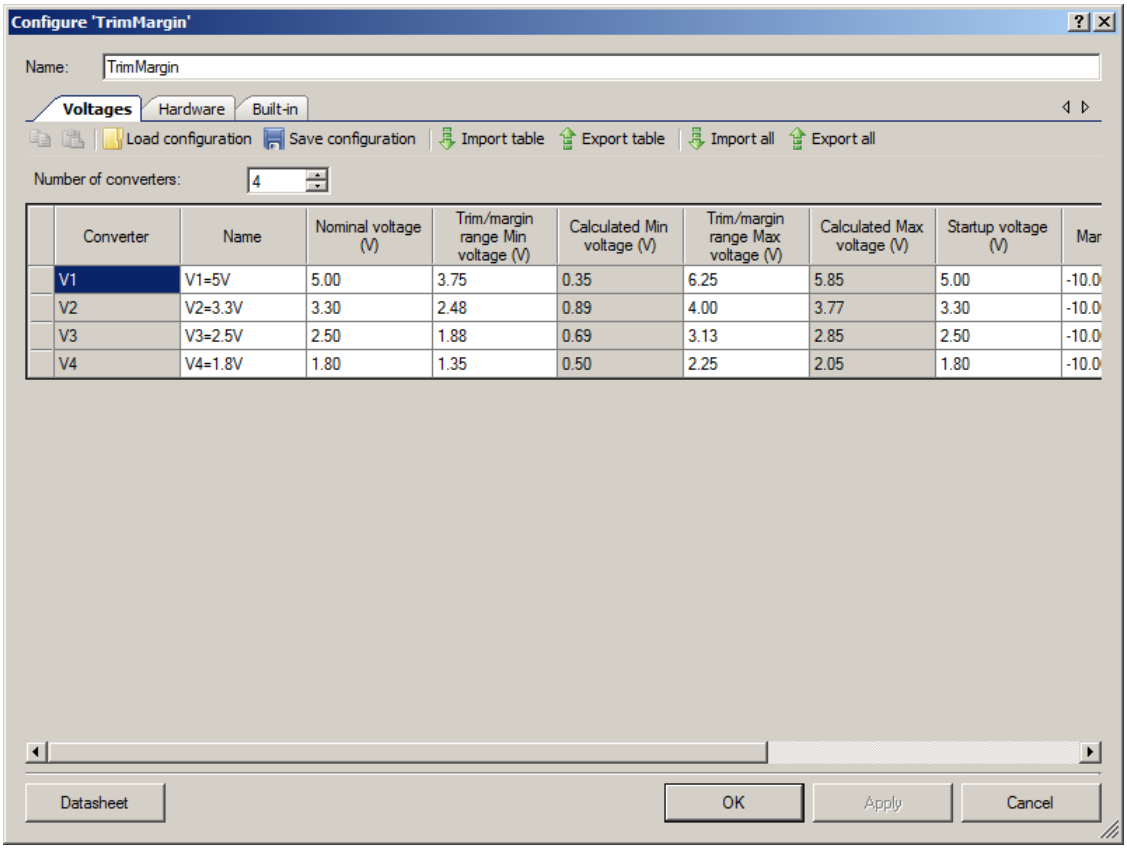


Figure 4. Trim Margin component configuration – Voltages tab

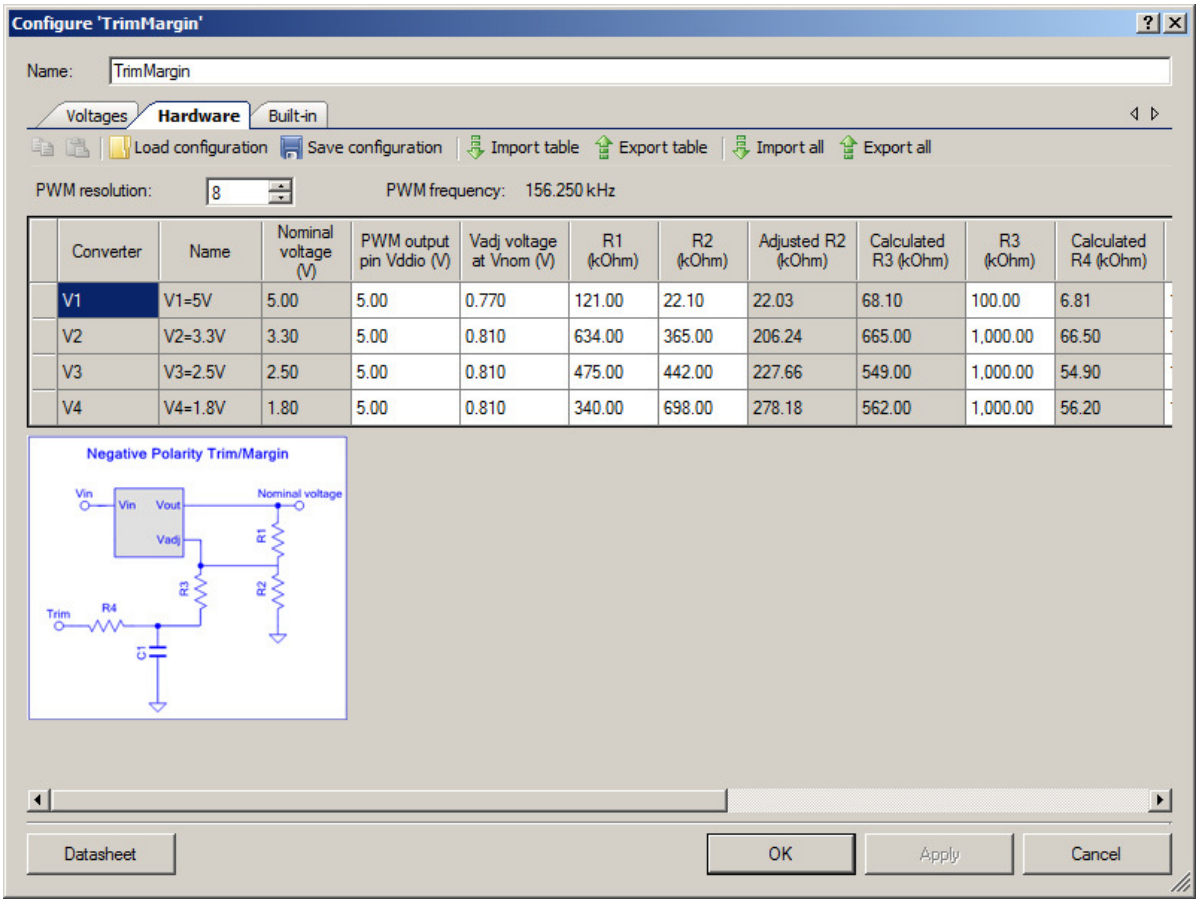


Figure 5. Trim Margin component configuration – Hardware tab

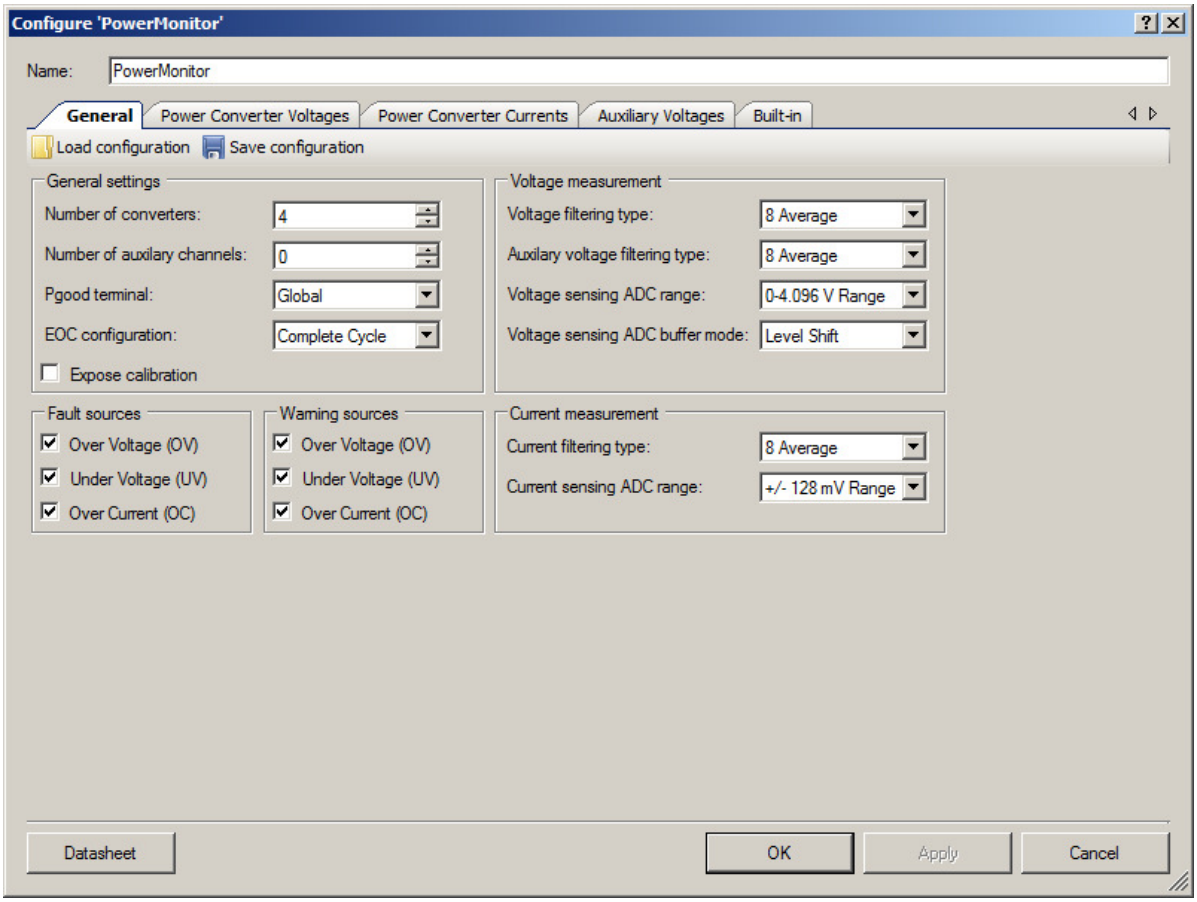


Figure 6. Power Monitor component configuration – General tab

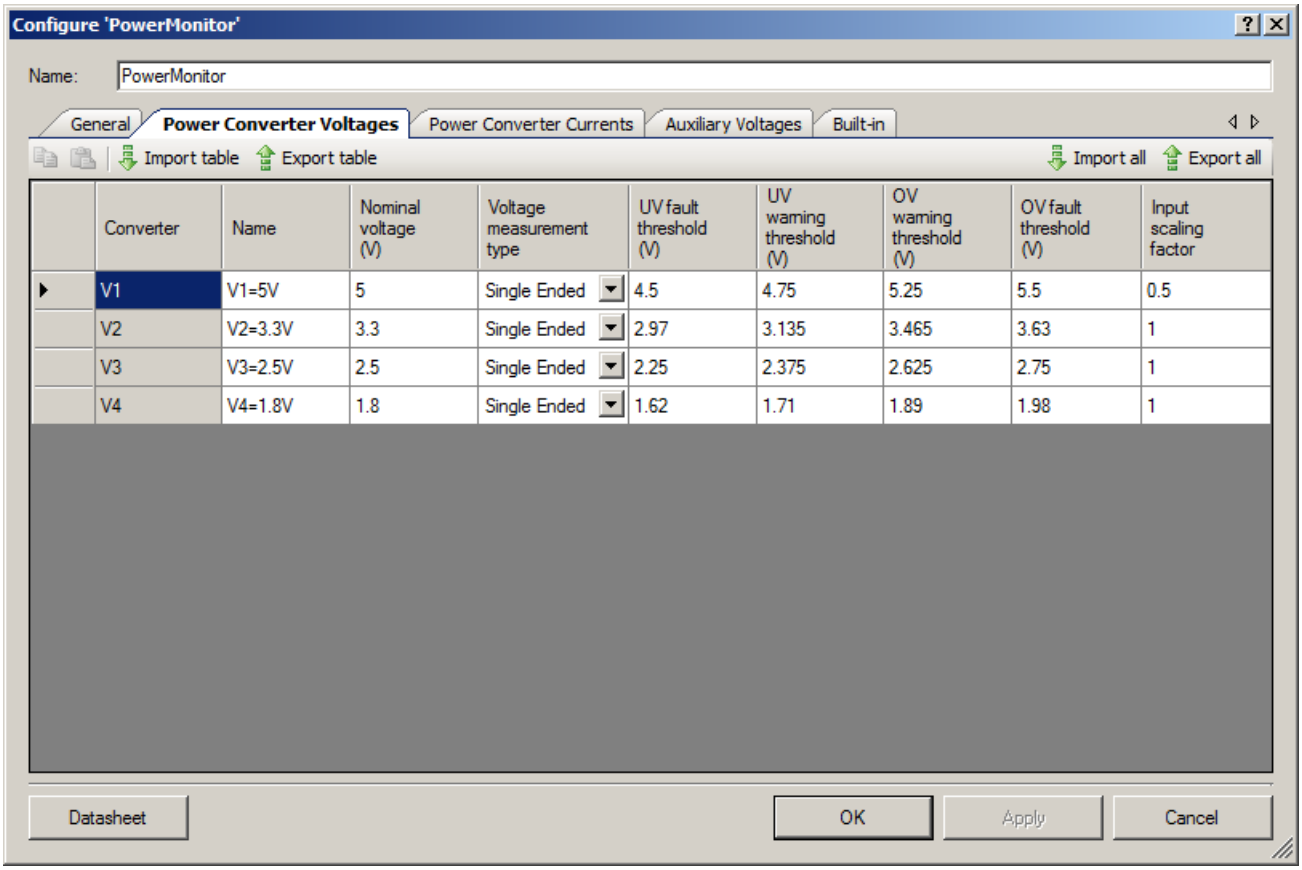


Figure 7. Power Monitor component configuration – Power Converter Voltages tab

The Character LCD is used in its default configuration. For more information on the usage of the Character LCD, Control Register and Status Register components, please refer to the corresponding component datasheets.

Project Description

In the main firmware routine, all components are started and interrupts are enabled to the 8051 CPU core as required for the Power Monitor component.

The Power Monitor component is configured to monitor the output voltages of the 4 power converters installed on the PSoC Power Management EBK for display on the LCD. The Trim Margin component is used to adjust the power converter output voltages by pressing the 2 switches on the development kit. Pressing SW1 on the development kit reduces the output of the selected power converter (indicated on the LCD by the colon ":") by 20 mV. Pressing SW2 increases the output of the selected power converter by 20 mV.

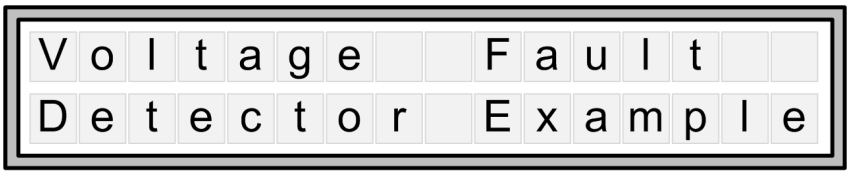
The LCD displays the over-voltage (OV) and under-voltage (UV) status of each rail reported by the Voltage Fault Detector component. These thresholds are configurable through the Voltages tab of the Voltage Fault Detector component. The power good (PG1..PG4) outputs of the Voltage Fault Detector are routed to PSoC pins P1[2] through P1[5]. These can be connected to the LEDs on the development kit for visual status monitoring, or be connected to an oscilloscope.

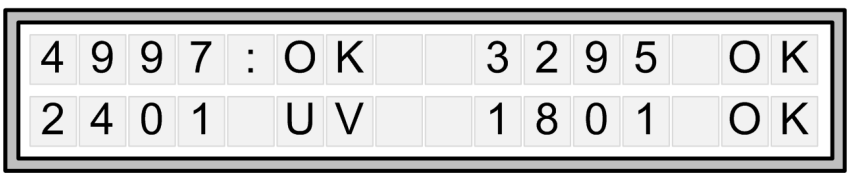
Expected Results

On power up, the power converters on the Power Management EBK are turned on and the Trim Margin component will assist in regulating them to their nominal voltages. The LCD will display the voltage readings from all power converters as measured by the Power Monitor component. The status for each converter is displayed as either "OK", "UV" or "OV" as reported by the Voltage Fault Detector component.

SW1 and SW2 can be used to adjust the selected power converter (indicated on the LCD by the colon ":") output voltage down and up respectively. To change to one of the other converters, press and hold SW1 until the colon moves to the next converter. At that point SW1 and SW2 will enable you to trim the highlighted converter. Press and hold SW2 to set all power converters back to their nominal voltage levels.

Examples of what you should see on the LCD in various situations are shown below:





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