QuickSTART

ispMACH® 4000ZE Pico Development Kit

This document provides a brief introduction and instructions to install and run the ispMACH 4000ZE Pico Development Kit on Windows 7/Vista/XP. Please refer to the complete documentation at www.latticesemi.com/4000ze-pico-kit.

1 Check Kit Contents

The ispMACH 4000ZE Pico Development Kit contains the following items:

- ispMACH 4000ZE Pico Evaluation Board pre-loaded with the Pico Power Demo
- Battery
- USB connector cable
- QuickSTART Guide

Note: Detailed information about the evaluation board is provided in the user's guide at www.latticesemi.com/4000ze-pico-kit.

Storage and Handling Tips:

Static electricity can shorten the lifespan of electronic components. Please observe these tips to prevent damage that could occur from electro-static discharge:

- Use anti-static precautions such as operating on an anti-static mat and wearing an anti-static wristband.
- Store the evaluation board in the pink anti-static packaging foam provided.
- Touch a metal USB housing to equalize voltage potential between you and the board.

2 Run the Pico Power Demo

Follow the procedure below to explore the Pico Power Demo on the evaluation board. The CPLD design logic integrates an I^2C master controller, a counter, a 21-bit shift register and other control logic. The table below describes each demo feature. To indicate a logical 0, depress a switch. Switches 1, 2, 3 and 4 are marked on the case. Press the board pushbutton to reset counter and shift register modules or trigger a meter reading. The internal clock operates at <2Hz unless otherwise noted.

Switch 1234	Pico Power Demo Features
0000	**Decimal Up Counter** - Display counter range (0.0 to 9.9).
0001	**Decimal Down Counter** - Display counter range (9.9 to 0.0).
1000	**CPLD Core Current (High Speed)** - Display current at VMON1 (µA), 5MHz internal clock.
1100	**CPLD Core Current** - Display current at VMON1 (µA).
1001	**CPLD I/O Current** - Display current at VMON2 (µA).
0010	**Left Shift** - Light up one segment at a time for the three LCD digits.
0011	**Right Shift** - Light up one segment at a time for the three LCD digits.
1010	**USB Voltage** - Display voltage at VMON5.
1011	**Battery Voltage** - Display voltage at VMON6.
1111	**Standby** - Disable the CPLD internal oscillator, low power mode.
Others	**Reserved**

This procedure is continued on the next page.

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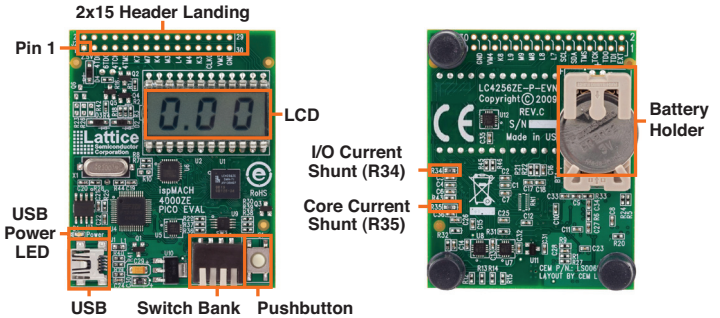
Run the Pico Power Demo (Cont.)

1. **Remove the protective storage sleeves from the battery and place into the battery holder positive (+) side up**. To avoid battery leakage, set the Pico board for Standby as described below or remove the battery.

2. **Select Switch bank pattern 1111 (Standby)**. Pico board activates the ispMACH 4256ZE Standby mode. To measure the current draw of the CPLD core (Icccore), touch voltmeter leads across R35, read the voltage drop, then divide by 50 Ohms (I=V/R). The ispMACH 4256ZE draws 15µA or less in Standby mode. Given a new cell battery, the Pico board should be operational for approximately one year in Standby mode.



3. **Select Switch bank pattern 1100 (low-speed CPLD core current meter)**. The LCD displays CPLD core current (Icccore) in microamp (µA) units. The CPLD control logic performs the following operations to arrive at the result. First, the counter and the shift register modules of the CPLD are enabled by the internal slow clock (>2Hz) and the ispPAC®-POWR6AT6 power supply rail is enabled. Next, the I²C master module issues three I²C bus cycles to read the analog-to-digital conversion result of the POWR6AT6 voltage monitor input (VMON1). Finally, the data is displayed on the LCD in microamp units. The POWR6AT6 VMON1 is driven by a high-side current sense circuit connected to the CPLD Vcccore supply rail. Power consumption of the CPLD in the slow speed operation is in the µA range. Note that a volt meter reading will reflect current draw after the POWR6AT6 has powered off.

4. **Select Switch bank pattern 0000 (decimal up counter)**. The LCD displays a decimal up-counter. The counter uses a divided OSCTIMER clock source set for 5 kHz nominal (TIMER_DIV=1024). 5 kHz is further divided to produce a count frequency of < 2 Hz. Use the voltmeter technique in step 2 to measure core current.

5. **Select Switch bank pattern 1000 (CPLD core current meter)**. The LCD displays the VMON1 Icccore in µA units as the CPLD OSCTIMER clocks the counter and shift register design modules at 5 MHz and the LCD at < 2 Hz.

6. **Select Switch bank pattern 0010 (left shift)**. The LCD displays the 21-bit shift register module operating on each segment at < 2 Hz.

7. **Experiment with other functions and measurements of the Pico Power Demo**. If the Pico board battery is missing you may connect the Pico board to a USB socket with the cable provided to enable the USB 5V supply rail.

3 Reprogramming the Pico Evaluation Board

To reprogram the Pico board, use ispVM™ System software version 17.5 or later. For more information see www.latticesemi.com/products/designsoftware/ispvmsystem/.

1. Browse to www.latticesemi.com/4000ze-pico-kit. Select the PicoView software and the I²C GPIO Expansion Demo downloads. Save each ZIP file to your system and unzip each to a location on your PC. For example: c:\4000ze-pico-kit.
2. Connect one USB cable from a USB port on your PC to the board's USB-to-I²C interface socket on the side of the board, as shown in the PCB diagram. After connection is made, a blue Power LED will light up indicating the board power is now supplied from the USB cable.
3. From the **Start** menu, run ispVM System. ispVM appears.
4. Choose **Options > Cable and IO Port Setup...** The Cable and IO Port Setup dialog appears.
5. Click **Auto Detect**. ispVM will detect Cable Type **USB2** and Port Setting **FTUSB**. Click **OK**.
6. Choose **ispTools > Scan Chain**. The New Scan Configuration Setup window appears. Both the LC4256ZE and ispPAC-POWR6AT6 appear in the device list.
7. Right-click the **LC4256ZE** entry and choose **Edit Device...** The Device Information dialog appears.
8. From the Data File section, click the **Browse** button. The Open Data File dialog appears.
9. Browse to the **c:\4000ze-pico-kit\gpio-demo** folder, select **gpio-demo.jed**, and click **Open**. From the Operation list choose **Erase, Program, Verify** and click **OK**.
10. Right-click the **ispPAC-POWR6AT6** row, choose **Set Device Operations > Bypass**.
11. Choose **Project > Download**. ispVM reprograms the Pico board. Programming requires about 20-40 seconds. A small timer window will appear to show elapsed programming time. At the end of programming, the configuration setup window should show a "PASS" in the "Status" column.

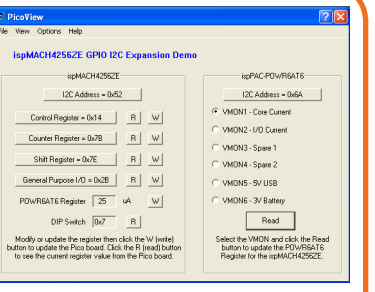
4 Run the GPIO I²C Expansion Demo

This demo illustrates I²C traffic between a PC host running an I²C hardware verification program (PicoView) and the Pico board. Data is available at the expansion header landing or LCD display. Control and status registers of the I²C Master and Peripheral modules can be read or written via PicoView. These instructions highlight the ispMACH 4256ZE, providing general purpose I/O for an I/O-constrained microprocessor.

1. Start a Command Prompt and run the PicoView program (c:\4000ze-pico-kit\picoview.exe). When PicoView initializes, all device registers are read and the dialog is refreshed. A column of "R" and "W" buttons in the ispMACH 4256ZE section provides read or read/write control over individual registers of the CPLD. A column of radio buttons in the ispPAC-POWR6AT6 section indicates which VMON inputs of the POWR6AT6 will be read.

This procedure is continued on the next page.

2. Click the **Control Register** button. The PicoView Control Register dialog appears.
3. From the Counter/Shift Control section of the dialog select **Count Down/Shift Right**, from the LCD Display section, select **Shift Register**, and click **OK**.
4. Click the **Control Register W** button. PicoView writes the control settings to the Pico board to initiate the embedded shift register and displays the results to the LCD panel.



5. From the ispPAC-POWR6AT6 section of the dialog, select **VMON1 – Core Current**, and click the **Read** button. PicoView updates the POWR6AT6 register display in the ispMACH 4256ZE section of the dialog with the core current in microamp (µA) units.
6. Experiment with other functions and measurements of the PicoView interface.

5 Done!

Congratulations! You have successfully completed the ispMACH 4000ZE Pico Development Kit Demo. Please refer to the kit user's guide available at www.latticesemi.com/4000ze-pico-kit for the following:

- Running advanced demos
- Details on additional development board features and operation
- Modifying the generating the demo program files from the ispLEVER® Classic project sources
- Schematics

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