



MAXQ2010 Evaluation Kit

Evaluates: MAXQ2010

General Description

The MAXQ2010 evaluation kit (EV kit) is a proven platform to conveniently evaluate the capabilities of the MAXQ2010 ADC microcontroller. The kit contains the MAXQ2010 with unused GPIO pins brought out to headers, a USB-to-JTAG programming interface, on-board power regulators, buffered ADC inputs, and an 8-digit LCD display. With the included software, and USB cable connected to a personal computer, the EV kit provides a completely functional system ideal for evaluating the capabilities of the MAXQ2010.

EV Kit Contents

- ◆ MAXQ2010 EV Kit Board
- ◆ MAXQ2010 EV Kit CD
- ◆ IAR Embedded Workbench CD
- ◆ MAXQ2010 Quick Start Guide
- ◆ USB Cable

Ordering Information

| PART | TYPE |
|---------------|-----------------|
| MAXQ2010-KIT# | MAXQ2010 EV Kit |

#Denotes a RoHS-compliant device that may include lead(Pb) that is exempt under the RoHS requirements.

Features

- ◆ Easily Load Code and Debug Using On-Board USB Interface
- ◆ USB-to-JTAG Interface Provides In-Application Debugging Features
 - Step-by-Step Execution Tracing
 - Breakpointing by Code Address, Data Memory Address, or Register Access
 - Data Memory View and Edit
- ◆ 8-Digit, 14-Segment, x4 Multiplexed LCD Display Driven Directly by MAXQ2010
- ◆ On-Board 3.3V and 2.5V Linear Regulators
- ◆ EV Kit Board Can Be Powered from USB Interface, JTAG Interface, or DC Power Supply
- ◆ 5-Way (Up, Down, Left, Right, and Push to Select) Navigation Switch
- ◆ Pushbuttons for Reset and Interrupt Lines
- ◆ Level-Shifted RS-232 Interface Included for Serial Port 1
- ◆ Test/Expansion Headers Include All Unused Device GPIO Pins
- ◆ Included Board Schematics Provide a Convenient Reference Design

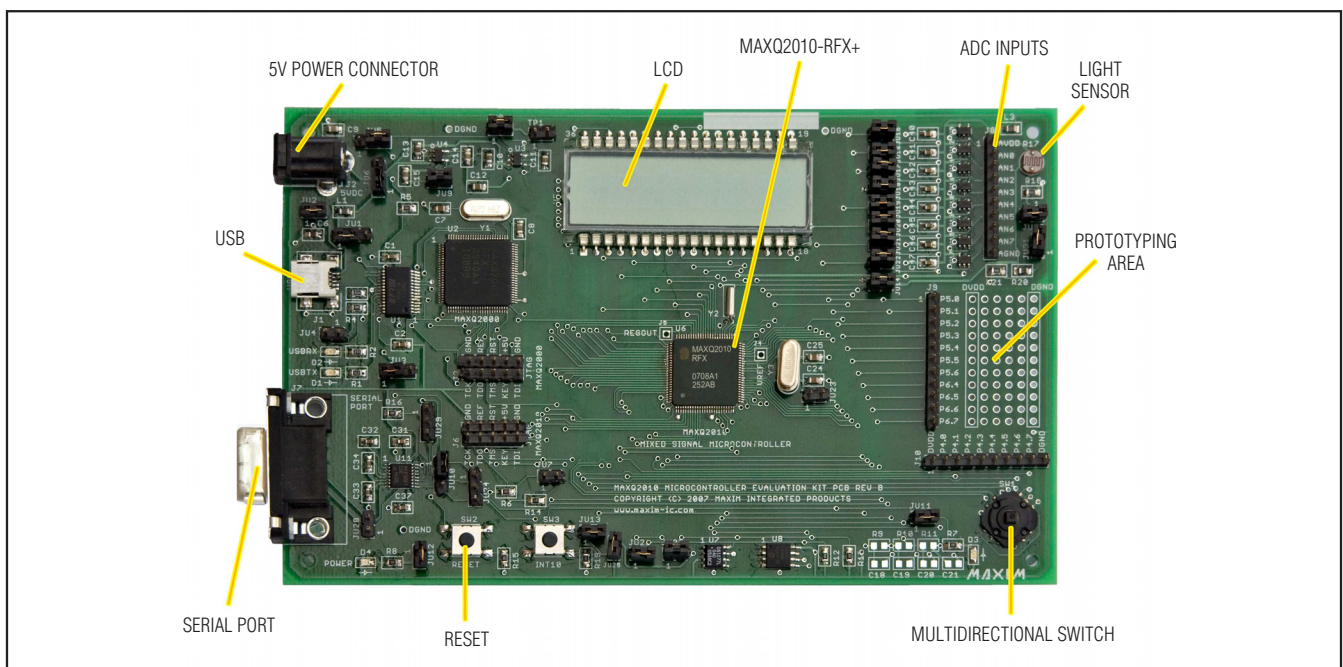


Figure 1. MAXQ2010 EV Kit Board



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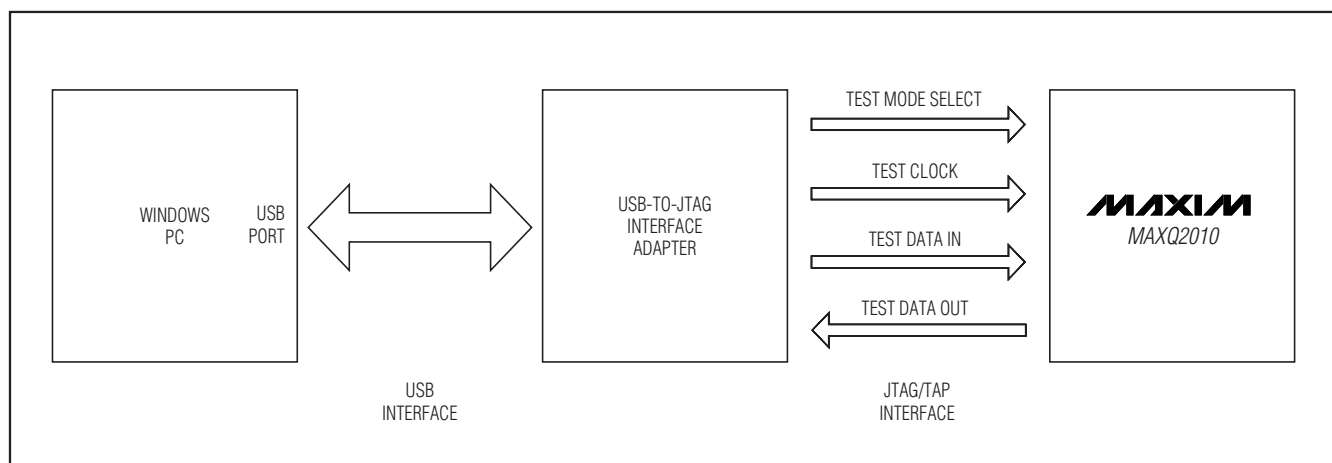


Figure 2. MAXQ2010 USB-to-JTAG Interface

Component List

| DESIGNATION | QTY | DESCRIPTION |
|---|-----|--|
| C1–C5, C17, C27, C29–C34, C36, C37, C39–C47, C49, C51 | 26 | 100nF ±10%, 10V ceramic capacitors (0805) Murata GRM219R71C104KA01D |
| C6, C23 | 2 | 10nF ±5%, 10V ceramic capacitors (0805) Murata GRM21BR72A103KA01L |
| C7, C8, C24, C25 | 4 | 22pF ±5%, 10V ceramic capacitors (0805) Murata GRM2195C2A220JZ01D |
| C9–C15 | 7 | 4.7µF ±10%, 10V ceramic capacitors (0805) Murata GRM219R61A475KE19D |
| C16, C26 | 2 | 10µF ±10%, 10V capacitors (0805) Murata GRM21BR61A106KE19L |
| C18–C21, C35, C38, C48, C50 | 8 | Empty capacitor footprint (0805) |
| C22, C28 | 2 | 1µF ±10%, 10V ceramic capacitors (0805) Murata GRM21BR71C105KA01L |
| D1, D2, D3 | 3 | Green surface-mount LEDs Lumex SML-LX0805SUGC-TR |
| D4 | 1 | Red surface-mount LED Lumex SML-LX0805SIC-TR |

| DESIGNATION | QTY | DESCRIPTION |
|---|-----|---|
| J1 | 1 | USB Mini B type connector Hirose Electric UX60-MB-5ST |
| J2 | 1 | DC power jack (2mm) CUI Inc. PJ-002A |
| J3, J6 | 2 | 2 x 5, 0.1in spaced headers (JTAG) Sullins PEC05DAAN |
| J4, J5 | 2 | Test points (unpopulated) |
| J8, J10 | 2 | 1 x 10, 0.1in spaced headers Sullins PEC10SAAN |
| J7 | 1 | DB-9 female right-angle RS-232 connector Norcomp 182-009-213R531 |
| J9 | 1 | 1 x 11, 0.1in spaced headers Sullins PEC10SAAN |
| JU1, JU3, JU5, JU6, JU10, JU24, JU29 | 7 | 1 x 3, 0.1in spaced jumpers Sullins PEC03SAAN |
| JU2, JU4, JU7, JU8, JU9, JU11–JU23, JU25–JU28, JU30, JU31 | 24 | 1 x 2, 0.1in spaced jumpers Sullins PEC02SAAN |
| L1–L4 | 4 | 600Ω, 500mA ferrite beads (0805) Steward HZ0805E601R-10 |
| R1, R2 | 2 | 270Ω ±5%, 1/8W resistors (0805) Yageo RC0805JR-07270RL |

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Component List (continued)

| DESIGNATION | QTY | DESCRIPTION |
|--------------------------------|-----|---|
| R3 | 1 | 4.7k Ω \pm 5%, 1/8W resistor (0805) Yageo RC0805JR-074K7L |
| R4, R12, R13, R16, R18, R21 | 6 | 10k Ω \pm 5%, 1/8W resistors (0805) Yageo RC0805JR-0710KL |
| R5–R8, R14, R15, R19 | 7 | 1k Ω \pm 5%, 1/8W resistors (0805) Yageo RC0805JR-071KL |
| R9, R10, R11 | 3 | Empty resistor footprint (0805) |
| R17 | 1 | Photocell (16k Ω –33k Ω) Advanced Photonix PDV-P8013 |
| R20 | 1 | 47k Ω \pm 5% thermistor (0805) Murata NCP21WB473J03RA |
| SW1 | 1 | 5-way navigation switch Panasonic EVQ-Q5A05K |
| SW2, SW3 | 2 | SPST-NO pushbutton switches Omron B3FS-1000P |
| TP1 | 1 | Test point (unpopulated) |
| U1 | 1 | FTDI USB-to-UART converter (28-pin SSOP) FTDI FT232RL/Parallax 604-43 |
| U2 | 1 | Low-power LCD microcontroller (100-pin LQFP) Maxim MAXQ2000-RFX+ |
| U3 | 1 | 3.3V fixed linear regulator (5-pin SOT23) Maxim MAX8868EUK33+ |
| U4 | 1 | 2.5V fixed linear regulator (5-pin SOT23) Maxim MAX8868EUK25+ |

| DESIGNATION | QTY | DESCRIPTION |
|---------------------|-----|---|
| U5 | 1 | 8-character, 14-segment, 3V LCD Varitronix VIM-878-DP |
| U6 | 1 | 16-bit mixed-signal microcontroller with LCD (100-pin LQFP) Maxim MAXQ2010-RFX+ |
| U7 | 1 | 3V EconOscillator (8-pin SO) Maxim DS1077LZ-40+ |
| U8 | 1 | I ² C serial EEPROM (64K x 8) (8-pin SO) Microchip 24AA512-I/SM |
| U9, U10, U12–U17 | 8 | Single, micropower, single-supply, rail-to-rail, op amp (5-pin SOT23) Maxim MAX4091AUK+ |
| U11 | 1 | 1Tx/1Rx RS-232 transceiver (16-pin TSSOP) Maxim MAX3221CUE+ |
| Y1 | 1 | 12.000MHz, 18pF crystal Citizen HC49US12.000MABJ-UB |
| Y2 | 1 | 32.768kHz, 6pF crystal Citizen CFS206-32.768KDZB-UB |
| Y3 (socketed) | 1 | 10.000MHz crystal Citizen HC49US10.000MABJ-UB |
| | 1 | Crystal socket strip (strip of 64) (fits HC49US) Mill-Max 310-43-164-41-001000 |
| None | 1 | PCB: MAXQ2010 EV Kit Circuit Board |

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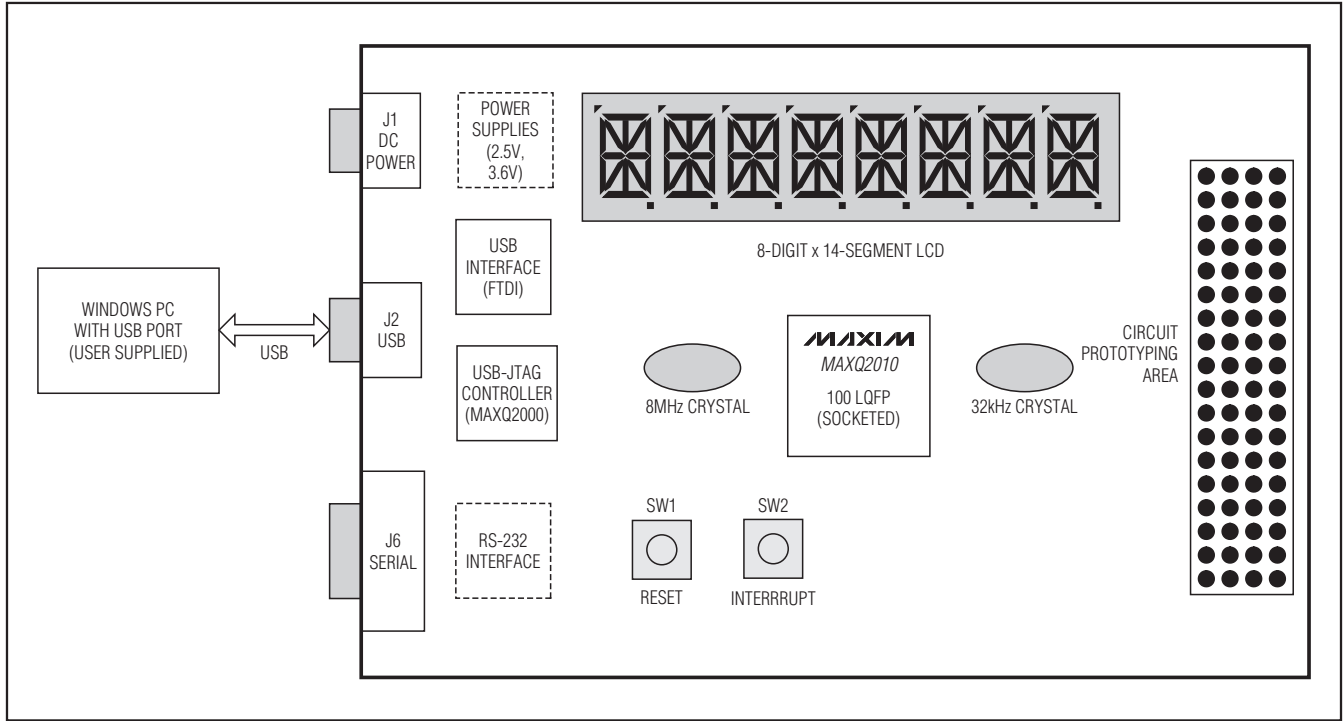


Figure 3. MAXQ2010 EV Kit Functional Layout

Detailed Description

Note: In the following sections, software-related items are identified by bolding. Text in **bold** refers to items directly from the EV kit software. Text in **bold and underlined** refers to items from the Windows® operating system.

This EV kit must be used in conjunction with the following documents, which are available at www.maxim-ic.com/microcontrollers.

- MAXQ Family User's Guide
- MAXQ2010 User's Guide Supplement
- MAXQ2010 Data Sheet

The MAXQ2010 EV kit board is fully defined in the schematic (Figure 6). However, a short description of the major components and connectors of the boards follow.

Power Supply

There are three ways to power the MAXQ2010 EV kit.

Powering the EV Kit from the USB Interface

The MAXQ2010 EV kit can run directly from the 5V supply provided from the USB interface. To run the board in this manner, set up connections and jumpers as follows.

- Connect the USB jack J1 to a USB board on the PC using the included USB cable.
- Make sure that no DC wall supply is connected to J2. (DC power is provided from the USB interface.)
- Connect the jumper JU6 from pins 1 to 2. This selects the USB interface as the power-supply input.

Windows is a registered trademark of Microsoft Corp.

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Powering the EV Kit from the JTAG Interface

If you are programming or debugging either the MAXQ2010 or the on-board MAXQ2000 directly over the JTAG interface, the MAXQ2010 EV kit can also be powered from that interface. To run the board in this manner, set up connections and jumpers as follows.

- Connect the JTAG interface cable to either J3 (to program the MAXQ2000) or J6 (to program the MAXQ2010). **Note: When a powered serial-to-JTAG board is connected to the J6 port on the MAXQ2010 EV kit, the on-board MAXQ2000 is automatically forced into reset to avoid conflicts on the JTAG interface.**
- Connect the other end of the JTAG interface cable to header P2 on the serial-to-JTAG board.
- Connect jumpers JH1, JH2, and JH3 on the serial-to-JTAG board, and connect a 5V DC regulated $\pm 5\%$ DC wall supply (center-post positive) to plug J2 on that board.
- Connect J1 on the serial-to-JTAG board to a COM port on your PC using a straight-through DB-9 serial cable.
- Make sure that no DC wall supply is connected to J2. (DC power is provided from the JTAG interface.)
- Connect the jumper JU6 from pins 2 to 3. This selects the JTAG interface as the power-supply input.
- Connect the jumper JU5 from pins 1 to 2. This disables the USB suspend mode power-down function.

Powering the EV Kit Using a DC Wall Supply

The MAXQ2010 EV kit can also be powered directly using a DC power supply, whether or not the USB interface is being used for loading or debugging. To run the board in this manner, set up connections and jumpers as follows.

- Connect a 5V DC regulated $\pm 5\%$ DC power supply (positive center polarization) to the plug J2.
- **Disconnect the jumper JU6.**

- Connect the jumper JU5 from pins 1 to 2. This disables the USB suspend mode power-down function.

Using the 8-Character LCD

The LCD display included on the MAXQ2010 EV kit board is a 1/4-duty (x4 multiplexed) 3V display with 8 digits of 14 segments each (Figure 4).

When the LCD controller is configured to x4 multiplexed mode, the segments for the display are memory mapped as shown in Table 1. (Refer to Table 36 in the *MAXQ Family User's Guide: MAXQ2010 Supplement* for more details.)

Enabling the USB Interface for Programming and Debug

With the USB-to-JTAG firmware loaded into the on-board MAXQ2000 microcontroller, the MAXQ2010's in-circuit bootloader and debugging functions are available over the USB interface. To use the USB interface in this manner, the MAXQ2010 EV kit must be configured as follows.

- Connect jumper JU3 from pins 1 to 2. This connects the USB-to-serial converter's Tx line to the serial port 0 Tx on the MAXQ2000.
- Connect jumper JU10 from pins 1 to 2. This connects the USB-to-serial converter's Rx line to the serial port 0 Rx on the MAXQ2000.

Enabling the USB Interface for Application Use

If the MAXQ2010 is being programmed and debugged directly using the JTAG interface, or if the MAXQ2010 has already been programmed, the USB interface can be used directly by the MAXQ2010. To use the USB interface in this manner, the MAXQ2010 EV kit must be configured as follows.

- Connect jumper JU3 from pins 2 to 3. This connects the USB-to-serial converter's Tx line to the serial port 0 Tx on the MAXQ2010.
- Connect jumper JU24 from pins 1 to 2. This connects the USB-to-serial converter's Rx line to the serial port 0 Rx on the MAXQ2010.

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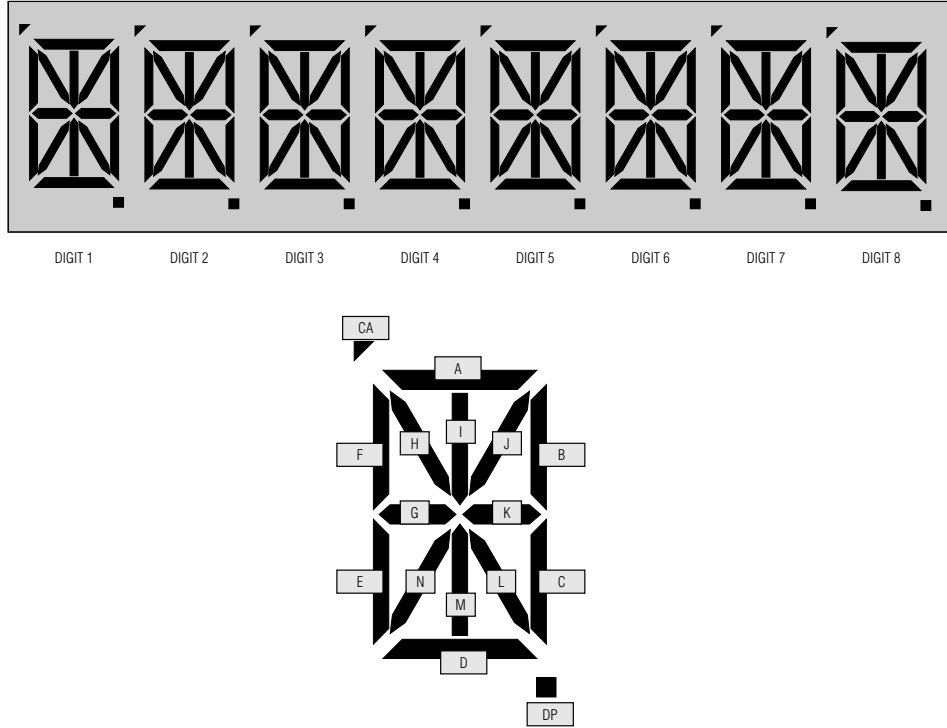


Figure 4. LCD Display Configuration

Table 1. LCD Display Memory Map (1/4 Duty)

| REGISTER | BIT 7 COM3 | BIT 6 COM2 | BIT 5 COM1 | BIT 4 COM0 | BIT 3 COM3 | BIT 2 COM2 | BIT 1 COM1 | BIT 0 COM0 |
|----------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| LCD0 | 2X | 1F | 1E | 1D | 1A | 1B | 1C | 1DP |
| LCD1 | 1I | 1J | 1K | 1L | 1H | 1G | 1N | 1M |
| LCD2 | 3X | 2F | 2E | 2D | 2A | 2B | 2C | 2DP |
| LCD3 | 2I | 2J | 2K | 2L | 2H | 2G | 2N | 2M |
| LCD4 | 4X | 3F | 3E | 3D | 3A | 3B | 3C | 3DP |
| LCD5 | 3I | 3J | 3K | 3L | 3H | 3G | 3N | 3M |
| LCD6 | 5X | 4F | 4E | 4D | 4A | 4B | 4C | 4DP |
| LCD7 | 4I | 4J | 4K | 4L | 4H | 4G | 4N | 4M |
| LCD8 | 6X | 5F | 5E | 5D | 5A | 5B | 5C | 5DP |
| LCD9 | 5I | 5J | 5K | 5L | 5H | 5G | 5N | 5M |
| LCD10 | 7X | 6F | 6E | 6D | 6A | 6B | 6C | 6DP |
| LCD11 | 6I | 6J | 6K | 6L | 6H | 6G | 6N | 6M |
| LCD12 | 8X | 7F | 7E | 7D | 7A | 7B | 7C | 7DP |
| LCD13 | 7I | 7J | 7K | 7L | 7H | 7G | 7N | 7M |
| LCD14 | 9X | 8F | 8E | 8D | 8A | 8B | 8C | 8DP |
| LCD15 | 8I | 8J | 8K | 8L | 8H | 8G | 8N | 8M |

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Enabling the Serial Port Interface on the MAXQ2010

The level-shifted serial port (J7) can be connected to serial port 0 on the MAXQ2010 by setting jumpers as follows.

- Connect jumper JU24 from pins 2 to 3.
- Connect jumper JU29 from pins 2 to 3.

Determining the Virtual COM Port Used by the USB-to-JTAG Interface

To configure programming or development tools (such as MTK, MAX-IDE, or IAR) to work with the Virtual COM Port (VCP) interface provided by the USB-to-JTAG interface, first determine to which COM port the USB serial port was assigned by the operating system. To do this, open the **Control Panel** and select **System** → **Hardware** → **Device Manager**, and then look in the **Ports (COM & LPT)** section to determine the COM port number assigned to the VCP (Figure 5).

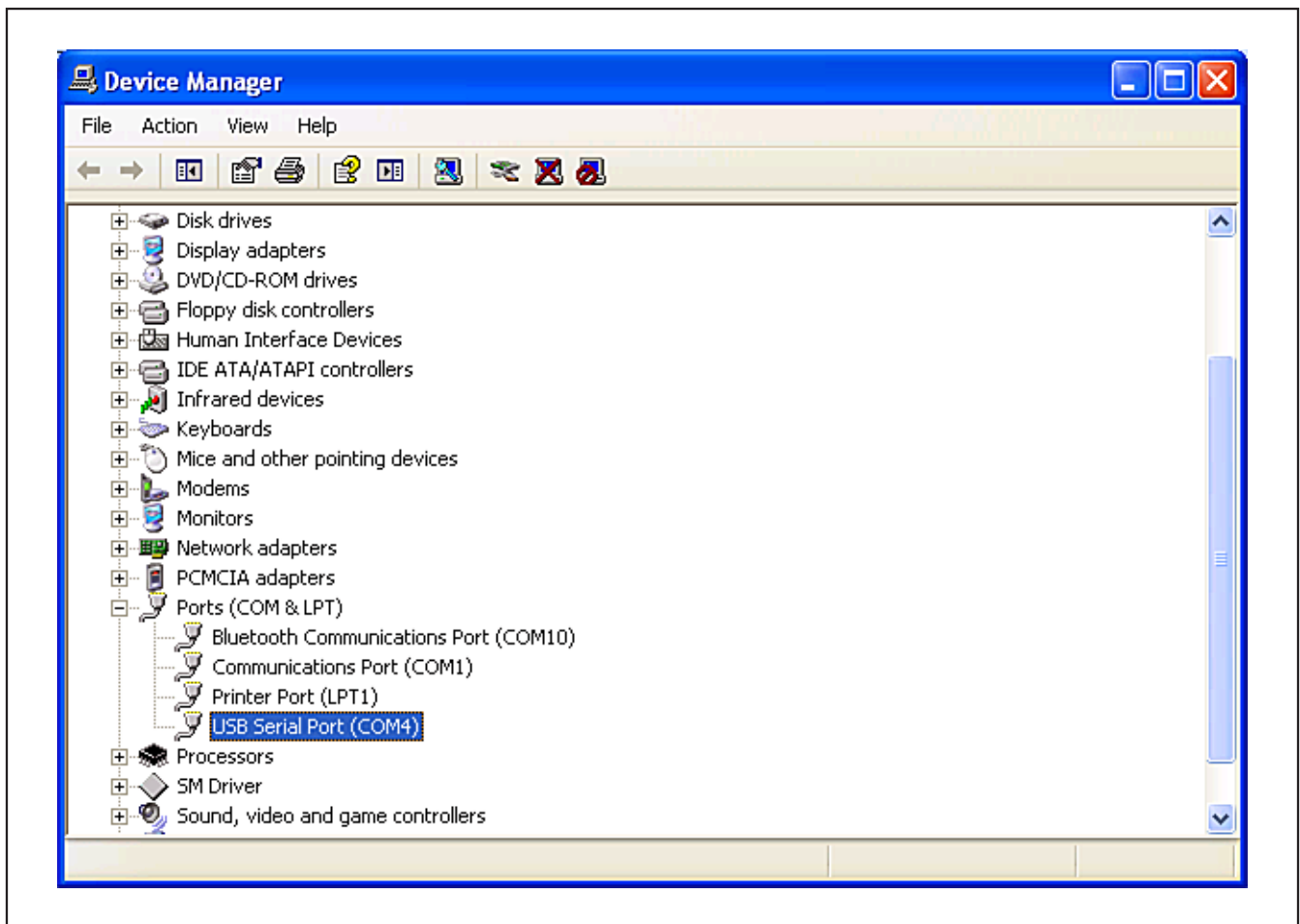


Figure 5. USB Serial Port (COM4) Location in Device Manager

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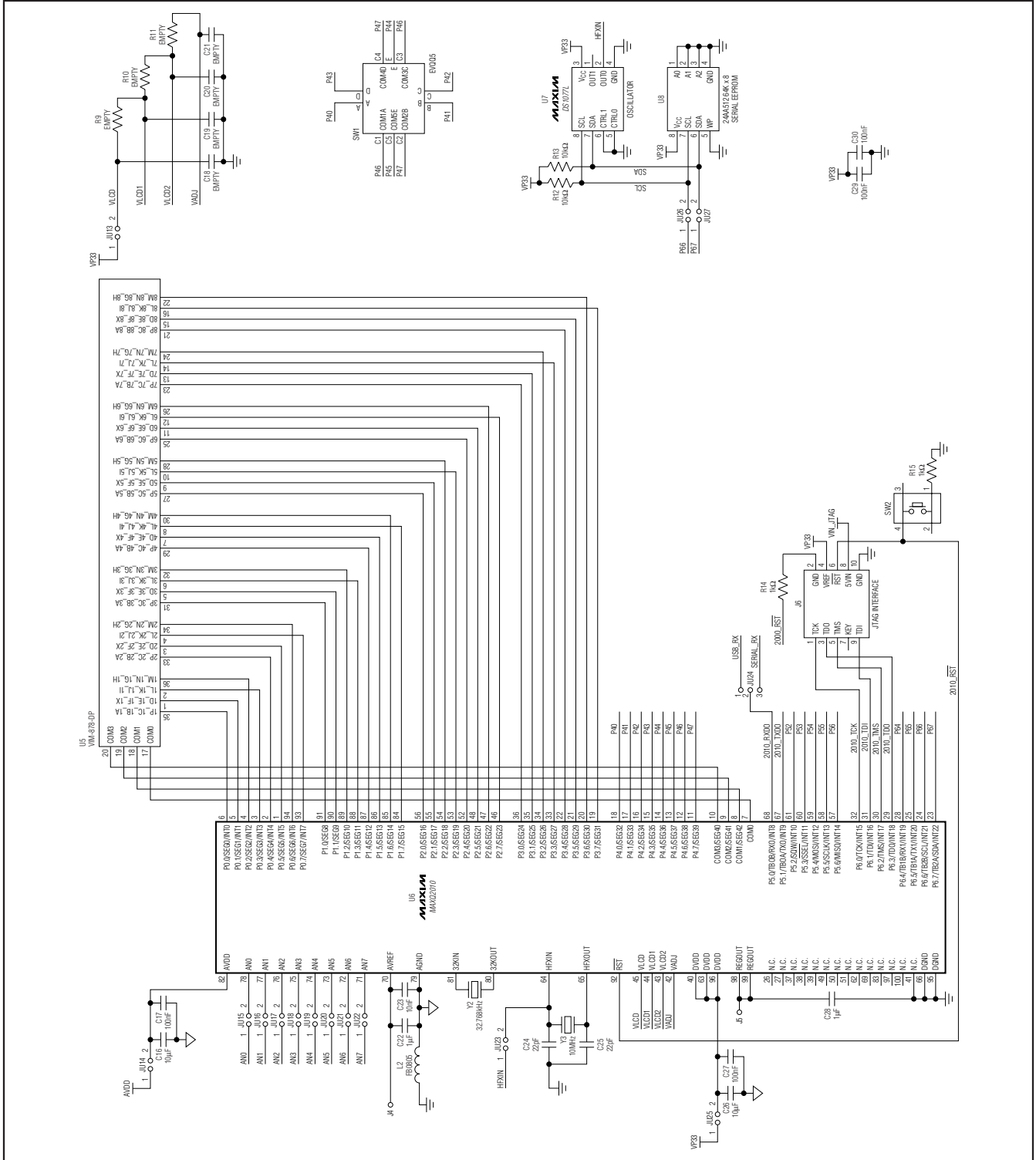


Figure 6. MAXQ2010 EV Kit Schematic—Microcontroller/LCD (2 of 3)

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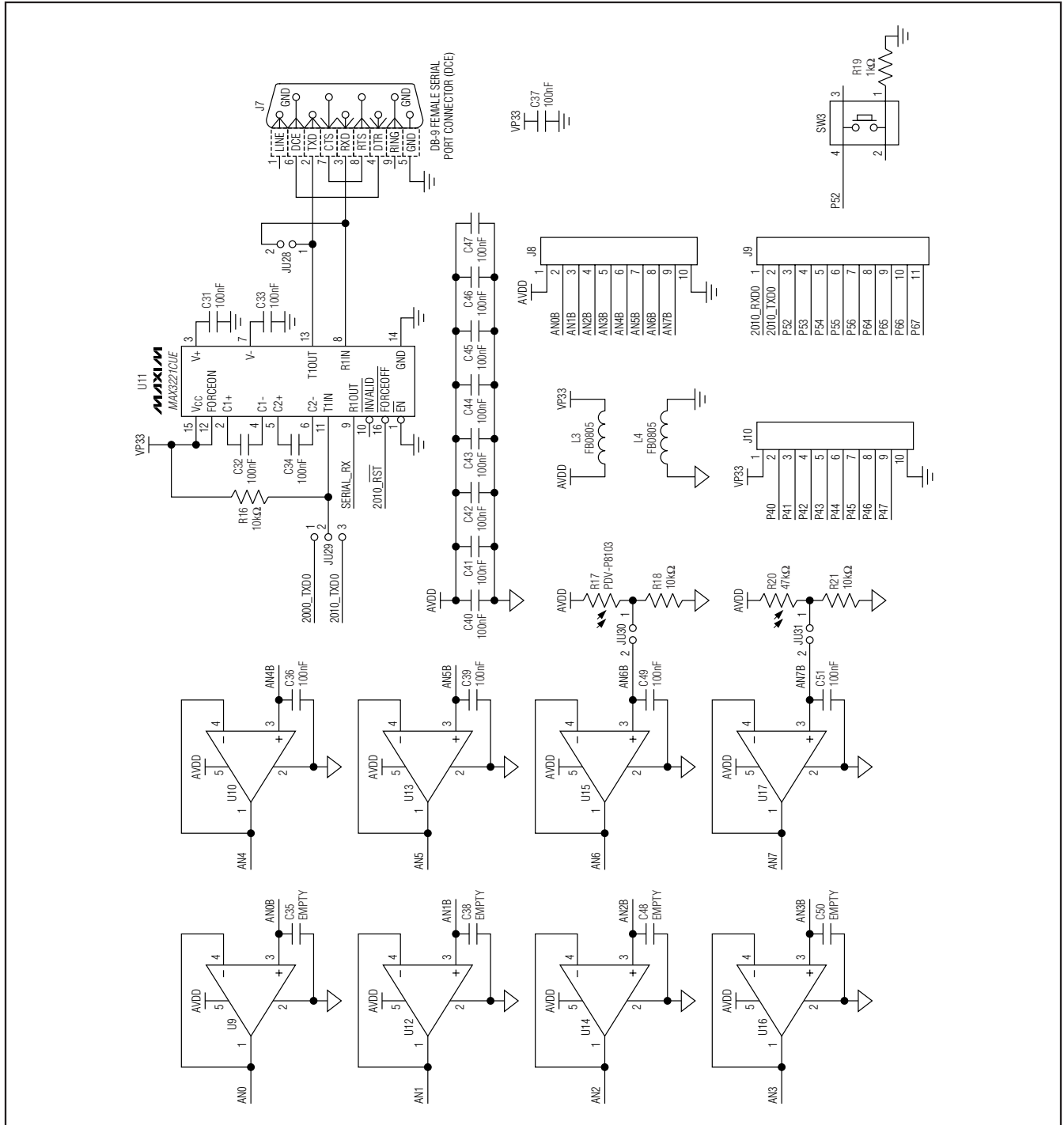


Figure 6. MAXQ2010 EV Kit Schematic—Serial/ADC (3 of 3)

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Revision History

| REVISION NUMBER | REVISION DATE | DESCRIPTION | PAGES CHANGED |
|-----------------|---------------|---|---------------|
| 0 | 8/08 | Initial release | — |
| 1 | 11/09 | Changed the part number in the <i>Ordering Information</i> table to show the # for RoHS status | 1 |
| 2 | 6/11 | Removed references to implied included power supply in the <i>General Description</i> , <i>EV Kit Contents</i> , and <i>Power Supply</i> sections | 1, 4 |

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