19-5048; Rev 2; 6/11

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**

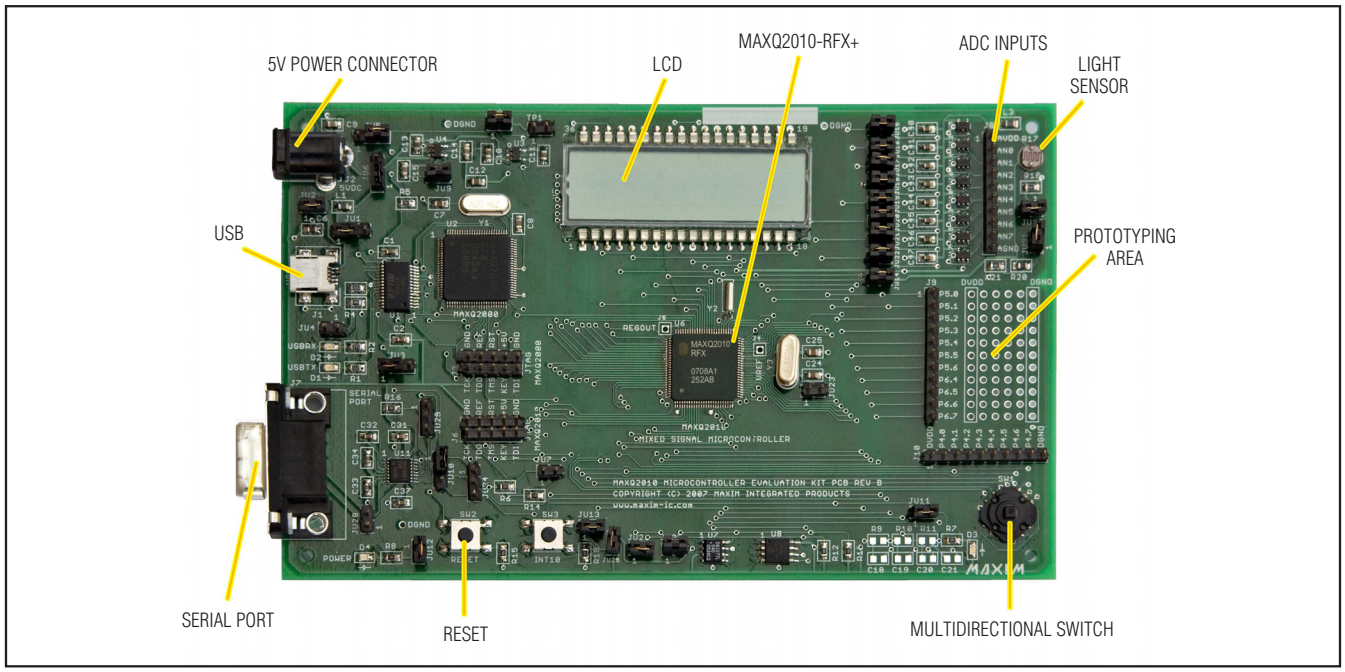

Figure 1. MAXQ2010 EV Kit Board

MAXQ2010 Evaluation Kit

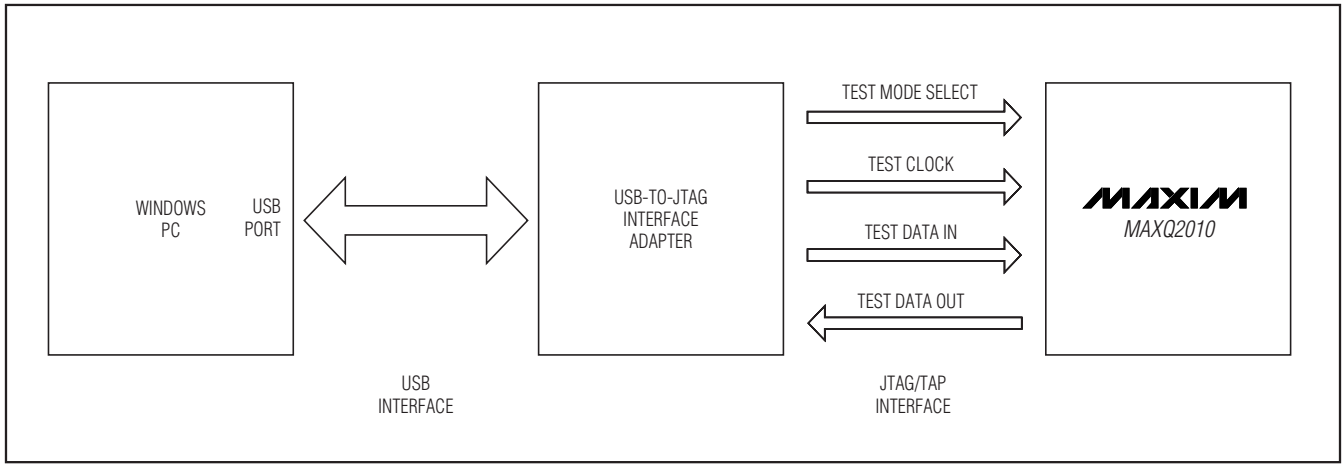

Figure 2. MAXQ2010 USB-to-JTAG Interface

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

Component List (continued)

DESIGNATION	QTY	DESCRIPTION
R3	1	4.7kΩ ±5%, 1/8W resistor (0805) Yageo RC0805JR-074K7L
R4, R12, R13, R16, R18, R21	6	10kΩ ±5%, 1/8W resistors (0805) Yageo RC0805JR-0710KL
R5–R8, R14, R15, R19	7	1kΩ ±5%, 1/8W resistors (0805) Yageo RC0805JR-071KL
R9, R10, R11	3	Empty resistor footprint (0805)
R17	1	Photocell (16kΩ–33kΩ) Advanced Photonix PDV-P8013
R20	1	47kΩ ±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^2C 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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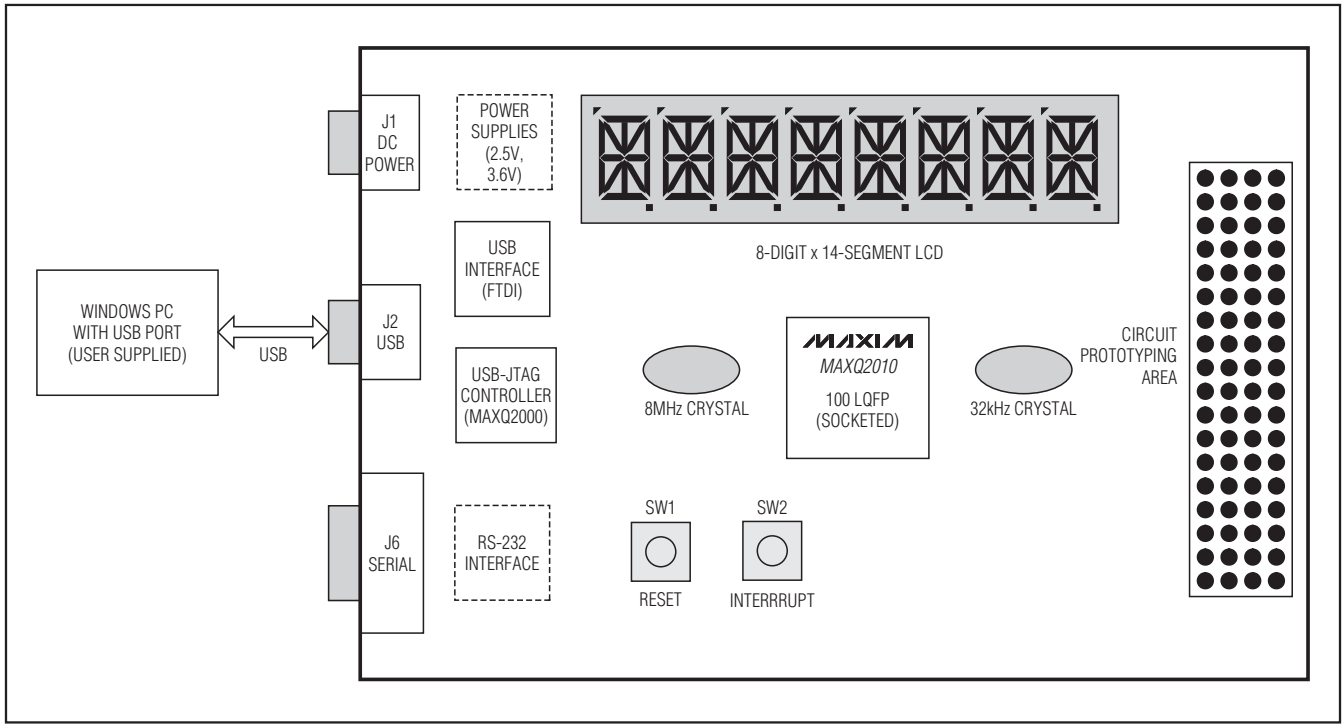

Figure 3. MAXQ2010 EV Kit Functional Layout

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.

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 ±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 ±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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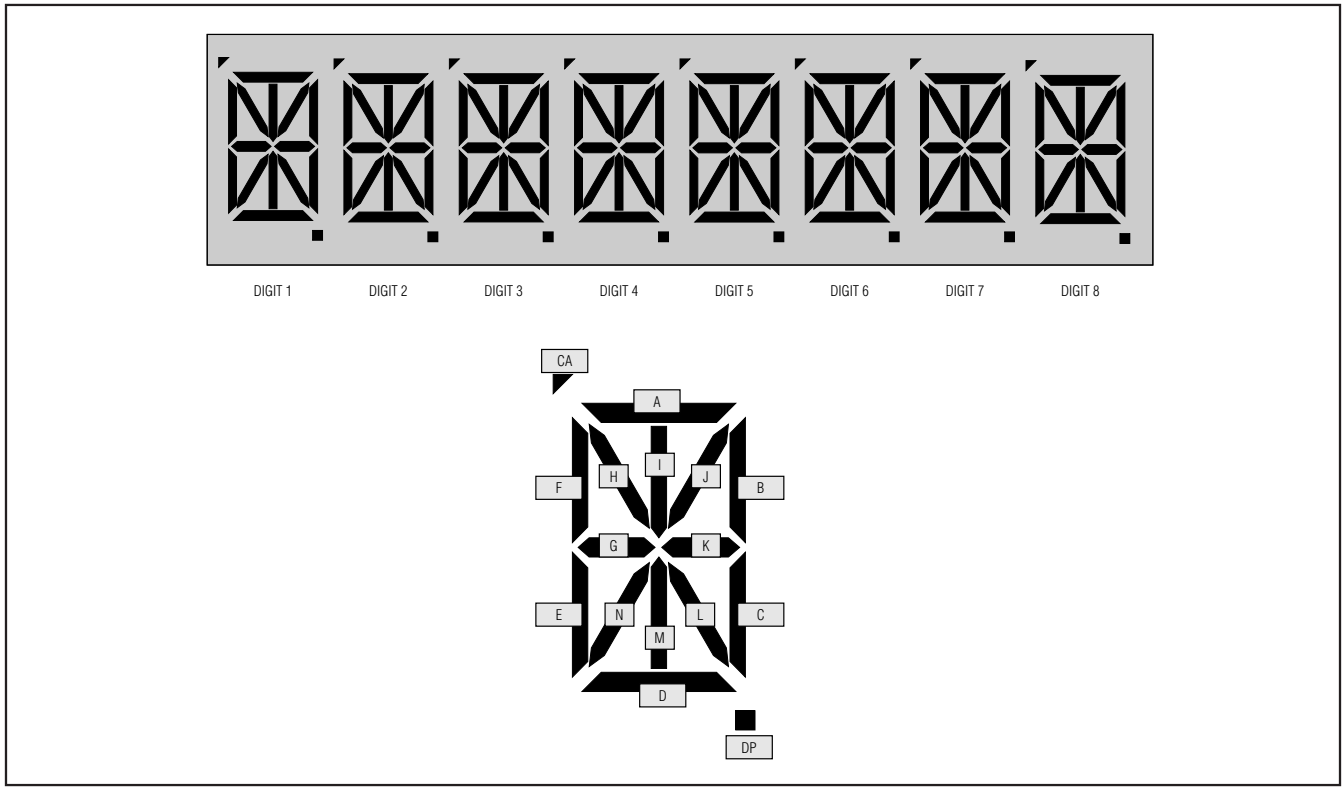

Figure 4. LCD Display Configuration

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

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).

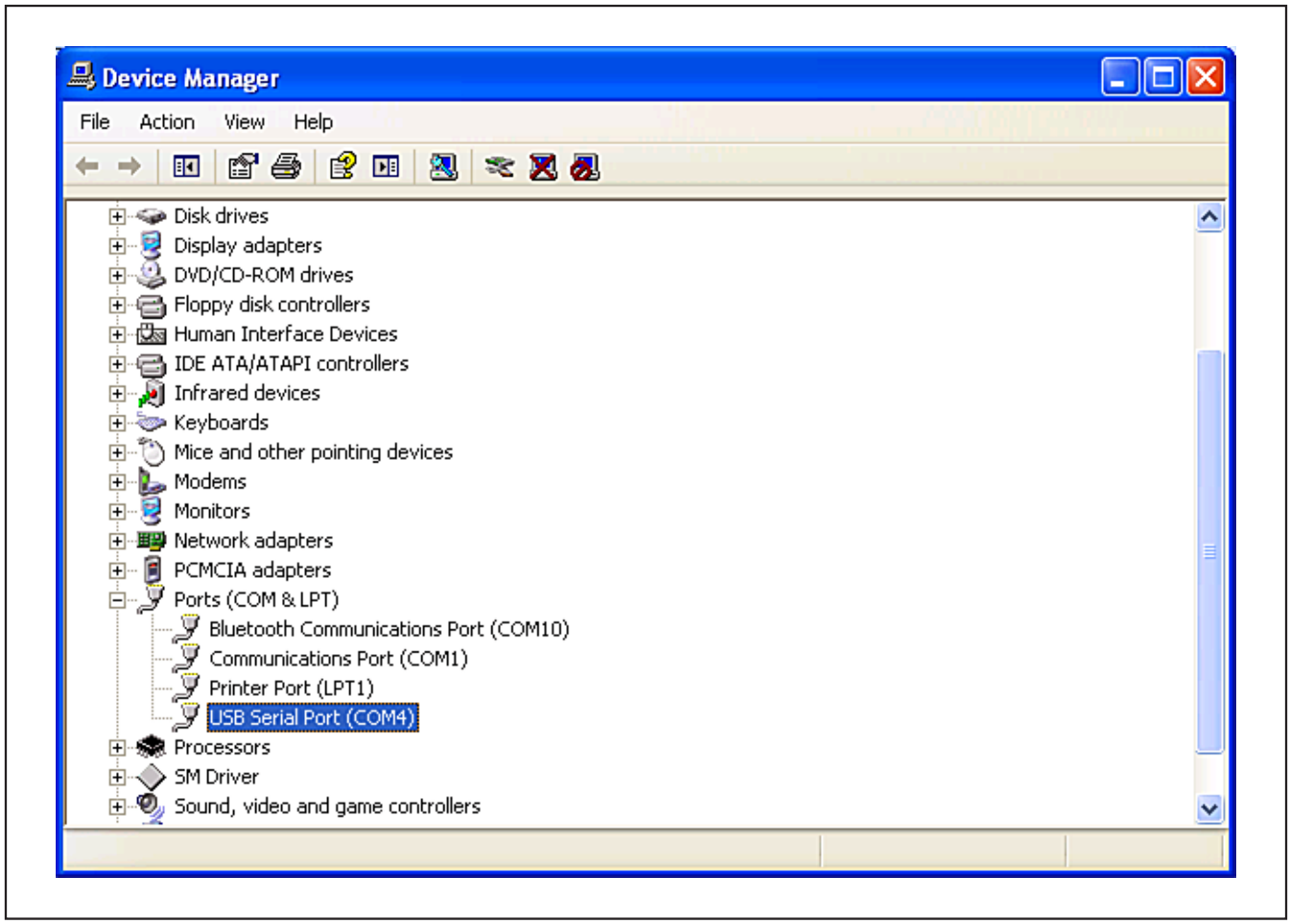

Figure 5. USB Serial Port (COM4) Location in Device Manager

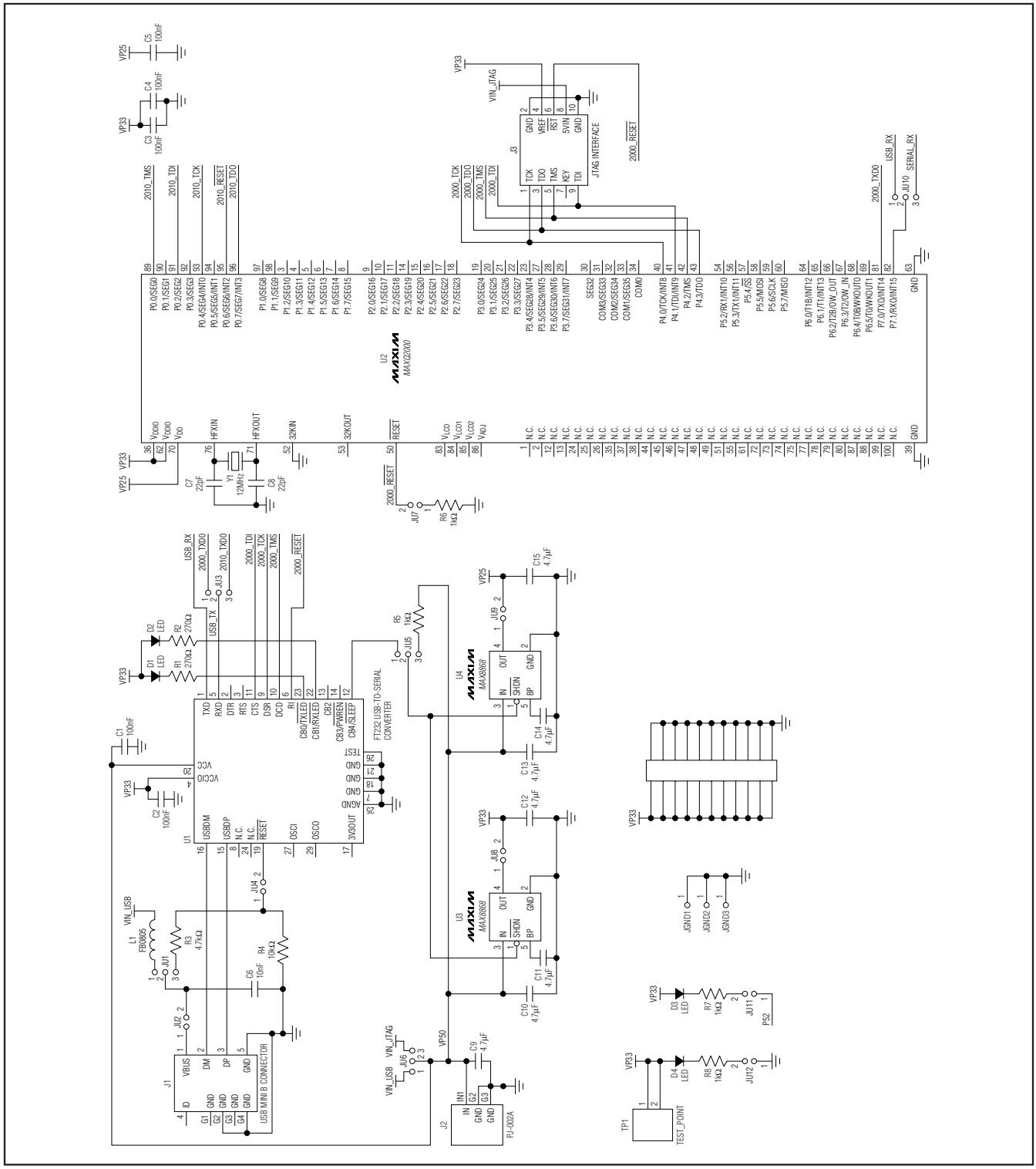

Figure 6. MAXQ2010 EV Kit Schematics—USB/JTAG (1 of 3)

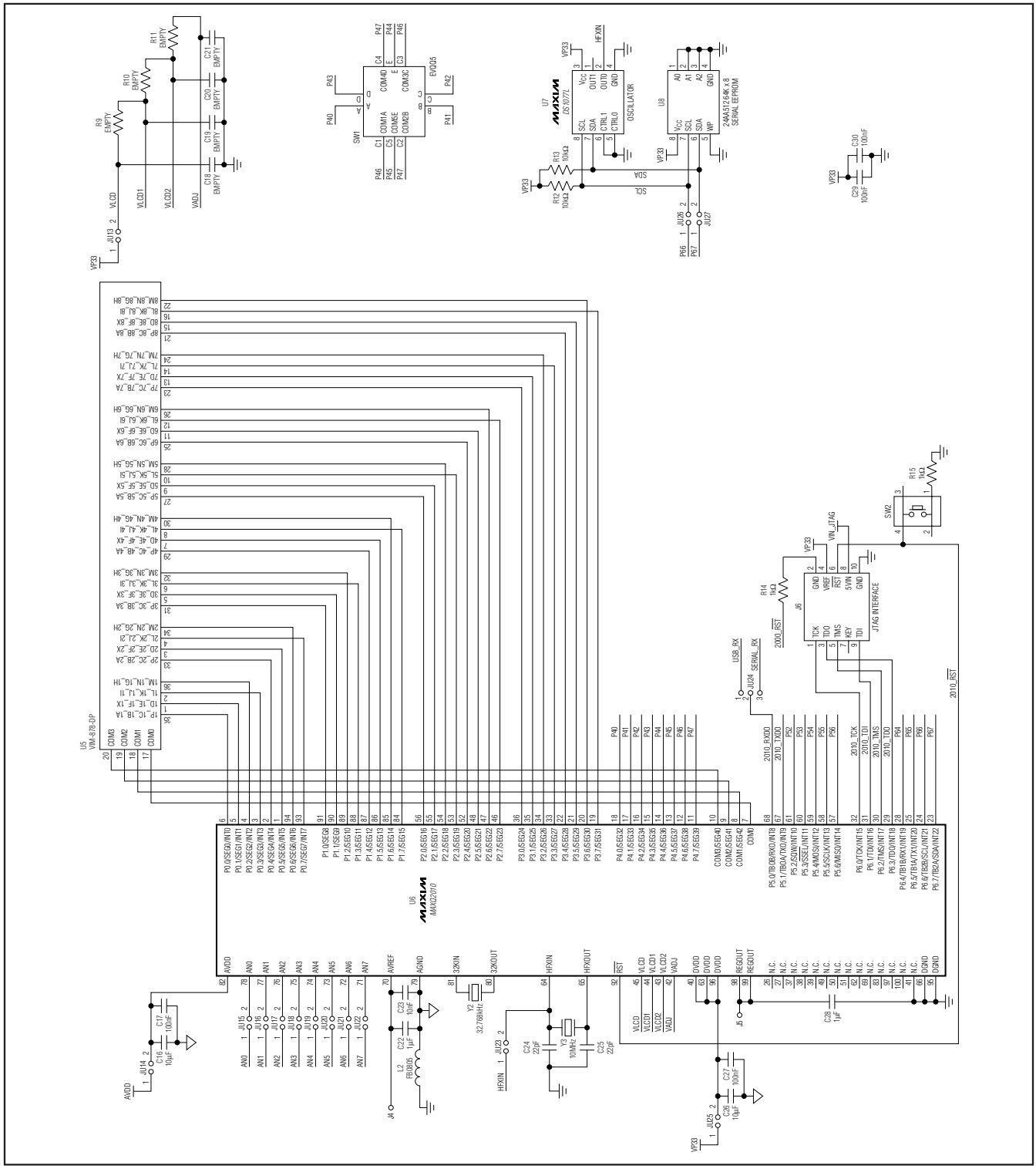

Figure 6. MAXQ2010 EV Kit Schematic—Microcontroller/LCD (2 of 3)

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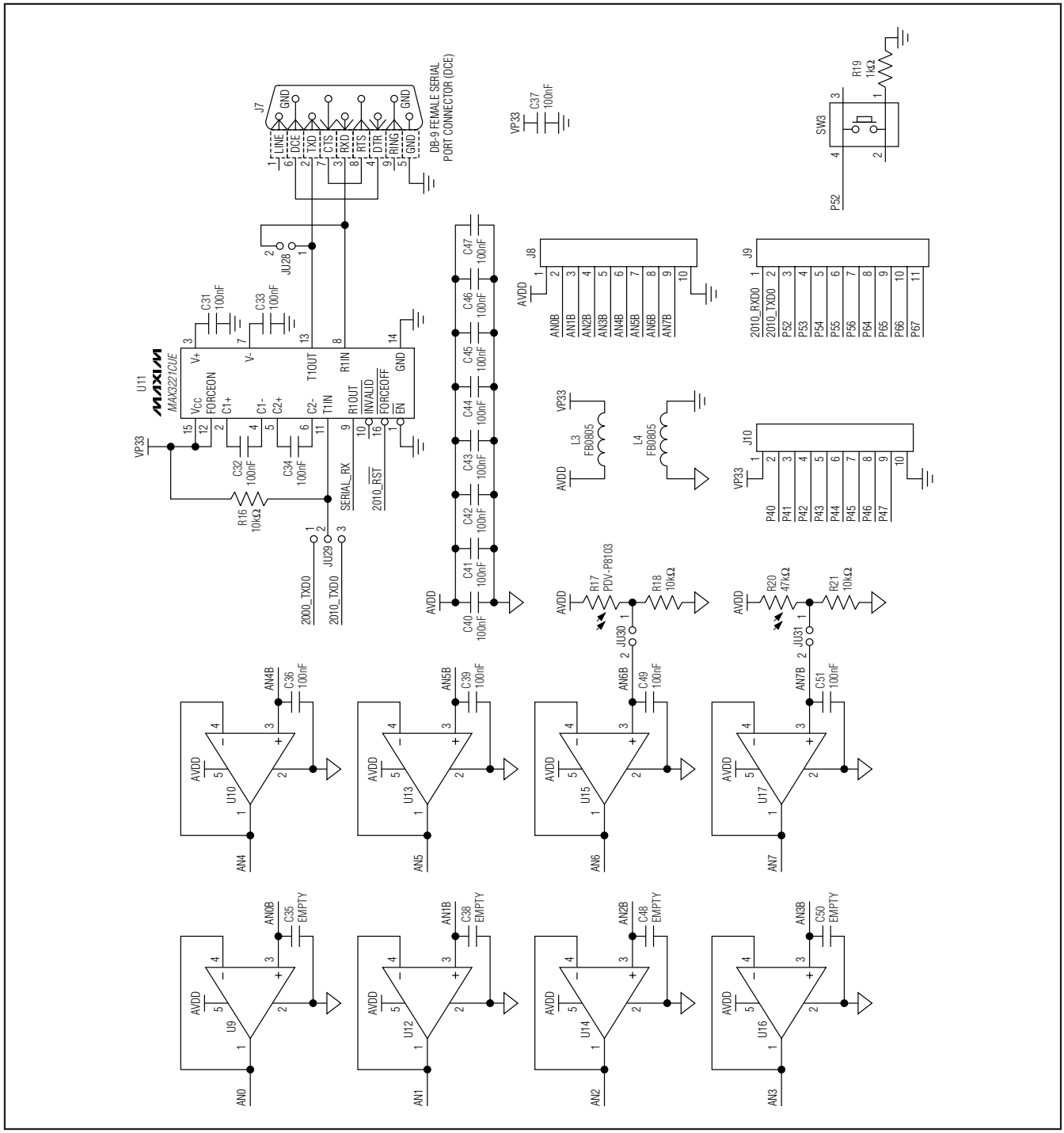

Figure 6. MAXQ2010 EV Kit Schematic—Serial/ADC (3 of 3)

Revision History

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