General Description

The MAXQ1004 evaluation kit (EV kit) provides a proven platform for conveniently evaluating the capabilities of the MAXQ1004 1-Wire®/SPI™ authentication micro-controller. The EV kit includes the MAXQ1004 EV kit board, which contains an on-board USB-to-JTAG loader/debugger interface using the MAXQ610 microcontroller, off-board connectors for the 1-Wire and SPI communications interfaces, two GPIO-controlled pushbuttons and two LED indicators for application use, and headers providing access to all I/O pins on the MAXQ1004. With the included software and a USB cable connected to a Windows® PC, the EV kit provides a complete, functional system ideal for developing and debugging applications as well as evaluating the overall capabilities of the MAXQ1004 RISC microcontroller.

EV Kit Contents

♦ **MAXQ1004 EV Kit Board with 16-Pin TQFN MAXQ1004 Installed**

Additional Documentation/ Software

This EV kit must be used with the following documents:

- MAXQ1004 IC Data Sheet
- MAXQ1004 User's Guide
- MAXQ1004 EV Kit Data Sheet (this document)
- MAXQ1004-KIT Quick Start Guide

These documents are included in the MAXQ1004 EV kit software package, along with additional documentation and application notes. Download the latest version of the EV kit software package at **www.maximintegrated.com/ MAXQ1004-KIT**.

Ordering Information **appears at end of data sheet.**

1-Wire is a registered trademark of Maxim Integrated Products, Inc.

SPI is a trademark of Motorola, Inc.

Windows is a registered trademark of Microsoft Corp.

Features

♦ **Easily Loads and Debugs Code Using On-Board USB-to-JTAG Interface**

♦ **JTAG Interface Provides In-Application Debugging Features**
  ◇ **Step-by-Step Execution Tracing**
  ◇ **Up to Four Simultaneous Hardware Breakpoints by Code Address**
  ◇ **Data Memory or Register Content View and Edit**

♦ **On-Board 3.3V (Powered by USB) and 2.5V (Powered by 1-Wire Bus) Voltage Supplies**

♦ **Two GPIO-Connected Pushbuttons for Application Use**

♦ **Two GPIO-Connected LEDs for Application Use**

♦ **1-Wire and SPI Connectors for Off-Board Use**

Component List

DESIGNATION	QTY	DESCRIPTION
CN1	1	USB Mini-B connector TE Connectivity 1734035-2
C1	1	10nF, 50V ceramic capacitor (0603)
C2	1	4.7µF, 10V ceramic capacitor (0805)
C3, C4, C8, C9, C10, C11, C13	7	100nF, 16V ceramic capacitors (0603)
C5	1	10µF, 10V ceramic capacitors (0805)
C6, C7, C12	3	1.0µF, 10V ceramic capacitors (0603)
DN1	1	Dual fast-switching diode, 200mW 75V Diodes Inc. MMBD4448DW-7-F
DS1, DS2	2	Surface-mount, 660nm red LEDs (1206) Lumex SML-LX1206SRC-TR
D1	1	5.6V Zener diode, 200mW ON Semiconductor MM5Z5V6ST1G
JH1, JH2, JH4, JH5, P3, P4	6	2x1 header pins, 0.100in spaced Sullins PEC02SAAN
JH3	1	1x3 header pins, 0.100in spaced Sullins PEC03SAAN
J1	1	Right-angle PCB mount RJ11 jack Molex 95009-2447
P1, P2	2	2x5 header pins, 0.100in spaced Sullins PEC05DAAN

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim Integrated's website at www.maximintegrated.com.

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Component List (continued)

DE		
P5	1	1x6 header pins, 0.100in spaced Sullins PEC06SAAN
Q1	1	SOT23 n-channel MOSFET Fairchild FDV301N
R1	1	10Ω ±1%, 1/10W SMD resistor (0603)
R2, R3, R12, R13	4	475kΩ ±1%, 1/10W SMD resistors (0603)
R4, R8	2	10kΩ ±1%, 1/10W SMD resistors (0603)
R5, R6, R7, R9, R10, R11	6	182Ω ±1%, 1/10W SMD resistors (0603)
SW1, SW2, SW3	3	SPST normally-open pushbutton switches Omron B3FS-1000P

DE		
TP1–TP5	5	Test points
U1	1	USB-to-serial translation IC FTDI FT232RL 28-SSOP
U2	1	2.5V LDO regulator Maxim MAX1726EUK25+T (5 SOT23)
U3	1	1-Wire and SPI authentication microcontroller Maxim MAXQ1004-B01+ (16 TQFN-EP*)
U4	1	16-bit microcontroller (used for JTAG interface) Maxim MAXQ610B-0000+ (40 TQFN-EP*)
—	1	PCB: MAXQ1004 Evaluation Kit

+Denotes a lead(Pb)-free/RoHS-compliant package.
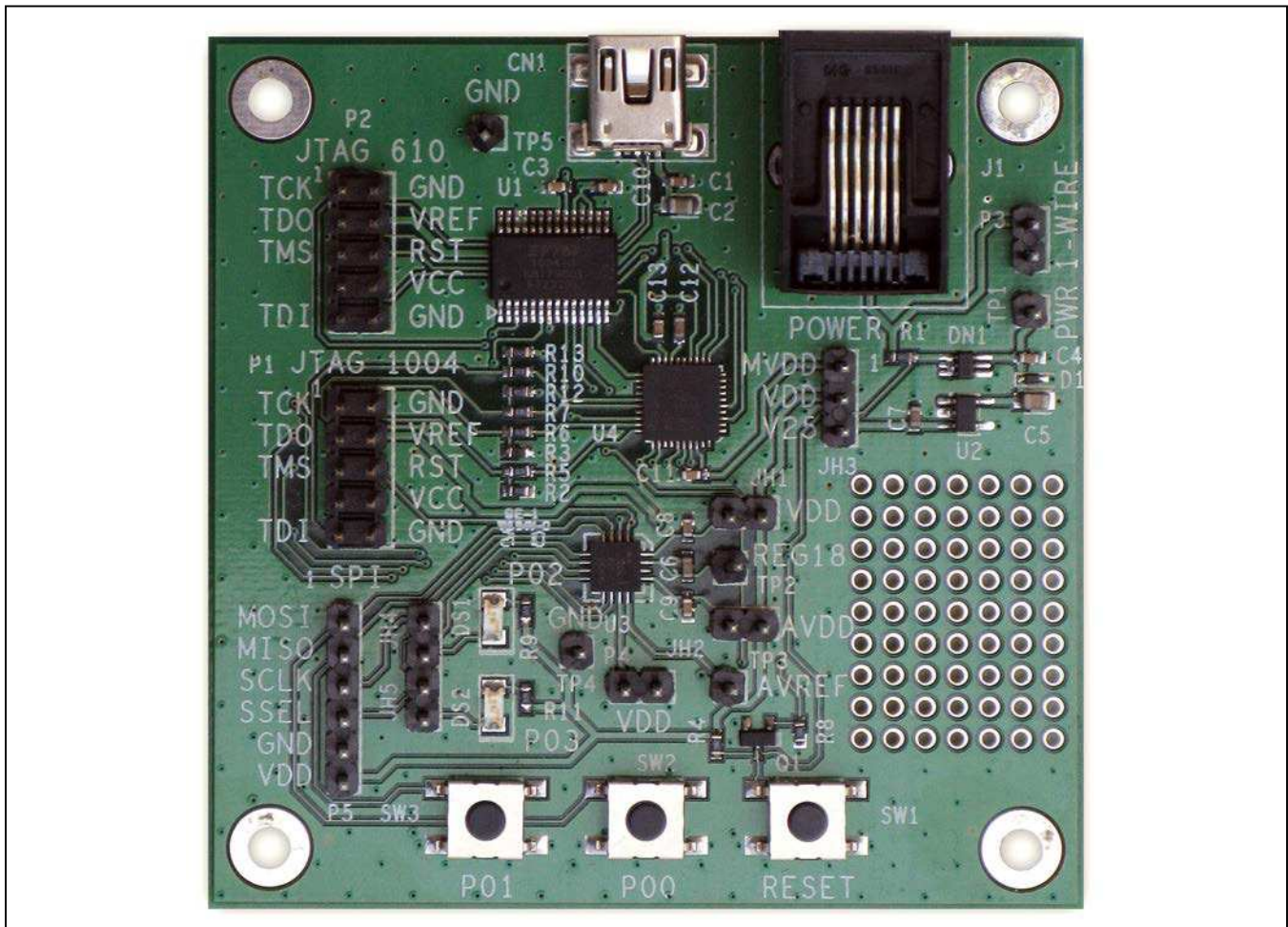*T = Tape and reel.*
*EP = Exposed pad.

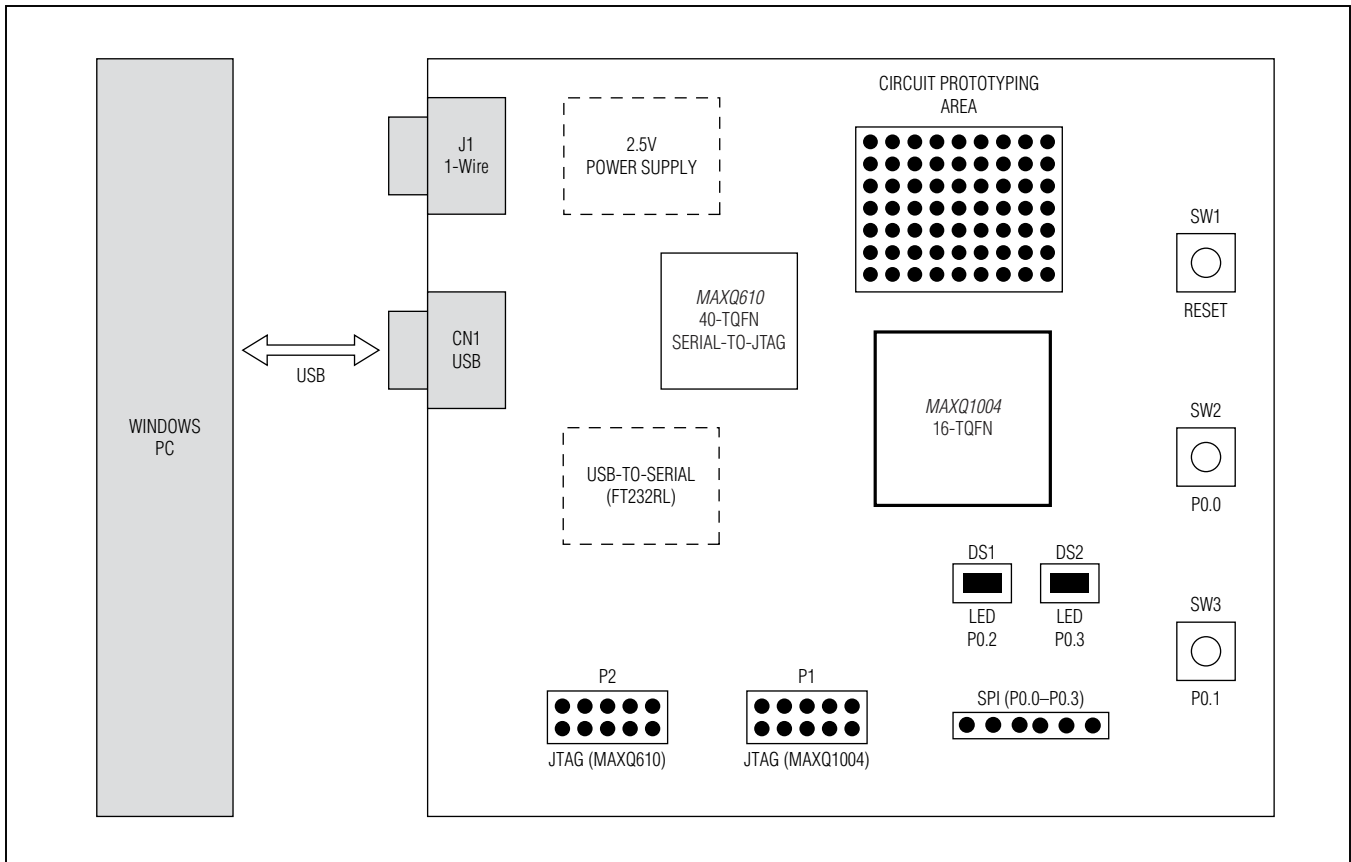*Figure 1. MAXQ1004 EV Kit Board*

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Figure 2. MAXQ1004 EV Kit Board Functional Layout

Detailed Description of Hardware

Power Supply

The EV board should normally be powered by connecting a standard USB interface cable (A-to-mini-B) from connector CN1 on the EV board to a PC. This allows the board to draw power directly over the +5V supply on the USB port. The built-in +3.3V linear regulator on the FT232RL IC (U1) is normally used to generate the V_{DD} power rail used by the MAXQ1004 and the MAXQ610.

If the MAXQ1004 kit is "free-running," that is, the user is running an application that has been previously loaded on the MAXQ1004, and does not need to use the loader or debugger, it is not necessary to connect the USB cable. In this configuration, the EV kit can be powered by connecting a regulated DC bench supply to pin JH3.2

(MAXQ1004 VDD/AVDD). Refer to the MAXQ1004 IC data sheet for allowable power-supply range values.

GPIO Pushbuttons and Indicator LEDs

The two pushbuttons on the bottom side of the EV kit (SW2 and SW3) are connected to the MAXQ1004 GPIO pins P0.1 (SW3) and P0.0 (SW2). If the pushbutton is pressed, it pulls the attached port pin low. The label indicating which port pin is connected to the switch is found on the board below the switch.

If jumper JH4 is closed, the GPIO pin P0.2 can be used to drive LED DS1. If P0.2 is driven low, then LED DS1 lights; otherwise, it is dark.

If jumper JH5 is closed, the GPIO pin P0.3 can be used to drive LED DS2. If P0.3 is driven low, then LED DS2 lights; otherwise, it is dark.

MAXQ610 and the JTAG Loader/Debug Interface

The MAXQ610 microcontroller (U4) is preloaded with interface firmware that provides a link between the JTAG loader/debug interface on the MAXQ1004 and the serial port output from the FTDI USB-to-serial bridge IC. This firmware handles commands that are transmitted by application development and debugging software running on the PC, such as MTK, MAX-IDE, or IAR® Embedded Workbench environment.

Under normal circumstances, the firmware in the MAXQ610 should not be altered. If it is necessary to update or change the JTAG loader/debug firmware, the standard MAXQ JTAG loader tools (such as MTK) can be used to do so, using any of the available MAXQ JTAG interface boards and the P2 JTAG connector.

FTDI USB-to-Serial Bridge

The FTDI USB-to-serial interface IC (U1, FT232RL) provides an interface between a virtual COM port running on the PC and the MAXQ610 over a USB-to-serial link. Refer to the *MAXQ1004-KIT Quick Start Guide* for details on installing and configuring the FTDI drivers required for this interface to operate correctly. The FT232RL also provides the +3.3V regulated supply (used by all devices on the EV kit) and a direct 12MHz digital clock (used by the MAXQ610 only).

Reset Pushbutton

Pushbutton SW1 can be used to manually reset the MAXQ1004. Normally, this should only be done when the part is free-running, that is, when the loader/debug interface is not in use, or when the part is running with a breakpoint set in the debugger (not during step-by-step tracing mode). Triggering a manual reset when code is being loaded to the part or during active debugging mode can cause the development environment to lose communications with the part, which means that the project session may have to be restarted and the application reloaded in order to continue.

1-Wire Interface and Power Over 1-Wire

The EV kit can optionally be configured to operate using a "parasite power" supply mode, where all power to operate the MAXQ1004 is drawn from the 1-Wire signal line. Using this supply scheme, power is "captured" from the 1-Wire line during high signal periods using diode DN1, and energy is stored in capacitor C4. This supply voltage (which is at the 1-Wire line voltage) is regulated down to +2.5V by linear regulator U2.

To configure the MAXQ1004 to run using this power supply, set JH3 to pins 2+3 (VDD+V25). However, this only powers the MAXQ1004. The MAXQ610 (and the accompanying FTDI device) does not operate from this supply, which means that the application code must already be loaded into the MAXQ1004 (the MAXQ1004 must be free-running).

There are additional considerations when using this type of power supply. If a standard 1-Wire pullup is being used, the energy stored in the parasite power capacitor can only power the MAXQ1004 for a brief time. The length of time that the MAXQ1004 can run before exhausting the parasite power supply varies depending on the operating frequency and activity of the MAXQ1004, as well as the resistance of the pullup on the 1-Wire line.

For a more detailed discussion of this topic, refer to *Application Note 4255: How to Power the Extended Features of 1-Wire® Devices*.

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Jumper Function List

[Table 1](#) details the functions of the EV kit's configurable jumpers. Settings marked with "✓" indicate jumper placements that should be used for most normal operation (default settings).

Table 1. Configurable Jumper Setting Functions

JUMPER	SETTING	EFFECT
JH1	Open	No supply is connected to the V_{DD} pin on the MAXQ1004. This setting should not normally be used.
	✓ Closed	The VDD on-board supply (normally +3.3V) is connected to the V_{DD} pin on the MAXQ1004.
JH2	Open	No supply is connected to the AVDD pin on the MAXQ1004. This setting should not normally be used.
	✓ Closed	The VDD on-board supply (normally +3.3V) is connected to the AVDD pin on the MAXQ1004.
JH3	Open	No power supply source is connected to the VDD on-board supply. If this setting is used, an appropriate DC bench supply should be connected to pin JH3.2 (VDD) and GND.
	✓ Closed (1+2, MVDD+VDD)	The VDD on-board supply is powered by the +3.3V regulated output from the FT232RL IC (which is also the MVDD supply used by the MAXQ610).
	Closed (2+3, VDD+V25)	This setting should not normally be used, unless the parasite power option is required. This setting leaves the MAXQ610 and the FT232RL unpowered.
JH4	Open	LED DS1 is disabled.
	✓ Closed	LED DS1 can be lit by driving GPIO pin P0.2 low.
JH5	Open	LED DS2 is disabled.
	✓ Closed	LED DS2 can be lit by driving GPIO pin P0.3 low
P3	N/A	**Not a configuration jumper.** Pin P3.1 provides access to the 1-Wire data line on the MAXQ1004.
P4	N/A	**Not a configuration jumper.** Pin P4.2 provides access to the AN0 pin (ADC input) on the MAXQ1004.
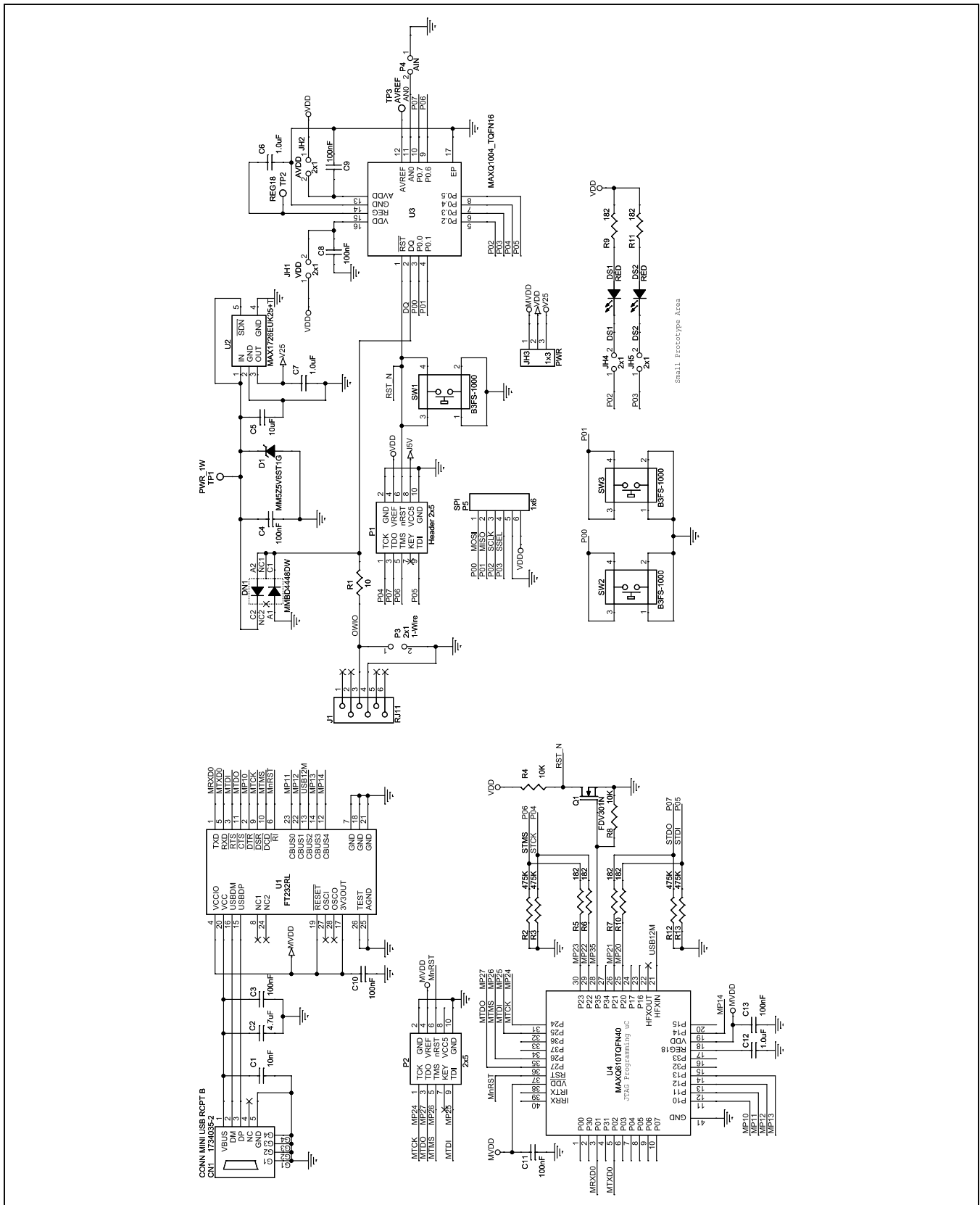
Figure 3. MAXQ1004 EV Kit Schematic

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Ordering Information

PART	TYPE
MAXQ1004-KIT#	EV Kit

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

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	6/11	Initial release	—

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