19-5765; Rev 1; 2/11

MAXQ610 Evaluation Kit

Evaluates: MAXQ610

General Description

The MAXQ610 evaluation kit (EV kit) provides a proven platform for conveniently evaluating the capabilities of the MAXQ610 low-power, 16-bit, RISC microcontroller targeted for battery-powered applications. The EV kit includes the MAXQ610 EV kit board, which contains infrared (IR) transmit and receive devices, two RS-232 serial channels, four 8-pin headers providing access to the processor's I/O port pins, a 5V power-supply input, and a bank of eight pushbutton switches for user input. The EV kit includes software, USB-to-JTAG interface board, 10-pin JTAG interface cable, and a standard A-to-mini-B USB cable for connecting to a personal computer. The EV kit provides a complete, functional system ideal for developing and debugging applications as well as evaluating the overall capabilities of the MAXQ610 RISC processor.

EV Kit Contents

- MAXQ610 EV Kit Board
- USB-to-JTAG Board
- MAXQ610 EV Kit CD
  - Includes Evaluation Installation of IAR Embedded Workbench for the MAXQ
  - Includes MAXQ610 Data Sheet, MAXQ Family User's Guide and its MAXQ610 Supplement, Application Notes, and Example Programs Including Source Code
- A-to-mini-B USB Cable

Features

- **Easily Load and Debug Code Using Supplied JTAG Board**
- **JTAG Interface Provides In-Application Debugging Features**
  - **Step-by-Step Execution Tracing**
  - **Breakpointing by Code Address, Data Memory Address, or Register Access**
  - **Data Memory or Register Content View and Edit**
- **On-Board 3.3V Voltage Regulator (Single 5V Input)**
- **Eight User Input Pushbutton Switches**
- **Included Level-Shifted RS-232 Interface for Serial Ports 0 and 1**
- **Prototyping Area**
- **Included Board Schematics Provide a Convenient Reference Design**

Ordering Information

PART	TEMP RANGE	SIZE
MAXQ610-KIT#	Room	4.75in x 5.0in

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

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C2, C5, C8, C11	5	0.1µF, 16V X7R ceramic capacitors (0603) ECJ-1VB1C104K
C3, C4	2	Open
C6, C7, C9, C12, C19	5	1.0µF, 16V X7R ceramic capacitors (0805) C0805C105K4RACTU
C10	1	0.47µF, 16V X7R ceramic capacitor (0603) GRM188R71C474KA88D
C13	1	4.7µF, 10V X7R ceramic capacitor (0805) LMK212B7475KG-T
C14, C15	2	2.2µF, 16V X7R ceramic capacitors (0805) GRM21BR71C225KA12L
C16	1	10,000pF, 16V X7R ceramic capacitor (0603) ECJ-1VB1C103K
C20	1	1.0µF, 16V X7R ceramic capacitor (0805) C0805C105K4RACTU
D1	1	High-power AlGaAS IR (870nm) T-1 3/4 (5mm) LED HSDL-4261
D2	1	PIN photodiode 60° ASDL-5270-D22

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Component List (continued)

DESIGNATION	QTY	DESCRIPTION
D3	1	1A, 20V Schottky diode (DO-41 case) 1N5817-T
D4	1	1500W, 5.0V SMC TVS Zener Unidir 1SMC5.0AT3G
DS1–DS4	4	660nm super red LEDs (water clear lens) (1206) SML-LX1206SRC-TR
F1	1	0.500A, 125V fast PICO-SMD fuse 0459.500UR
J1, J2	2	Right-angle, 9-position connectors, female socket receptacle (gold) 5745781-3
J3	1	2.5mm power jack with tapered PC pins CIU Inc. PJ-102B
JH1–JH5	5	3-position 0.100in single-strip connectors Sullins PEC03SAAN
JH14–JH18, JH20–JH26	12	2-position 0.100in single-strip connectors Sullins PEC02SAAN
L1	1	15µH SMD power inductor P1812R-153K
P1, P2, P3, P4	4	8-position 0.100in single-strip connectors Sullins PEC08SAAN
P5	1	10-position 0.100in dual-strip connector Sullins PEC05DAAN
Q1	1	General-purpose small-signal npn transistor (40V, 200mA TO-92) 2N3904G
R1	1	82Ω ±5%, 1/4W SMD resistor (1206) CRCW120682R0JNEA
R2	1	3.32kΩ ±1%, 1/10W SMD resistor (0603) CRCW06033K32FKEA
R3	1	10kΩ ±1%, 1/10W SMD resistor (0603) CRCW060310K0FKEA
R4	1	1.0Ω ±1%, 1/10W SMD resistor (0603) CRCW06031R00FNEA
R5, R6	2	1.0MΩ ±1%, 1/10W SMD resistors (0603) CRCW06031M00FKEA
R13, R14, R15, R17	4	100Ω ±1%, 1/10W SMD resistors (0603) CRCW0603100RFKEA
SW1–SW9	9	SPST-NO pushbutton switches B3FS-1000P
TP1–TP14	14	Multipurpose white PC test points 5012
U1	1	1µA supply current, 1.8V to 4.25V-powered RS-232 transceiver with AutoShutdown™ (20 SSOP) Maxim MAX3218CAP+
U2	1	Low-dropout, 300mA linear regulator in SOT23 (5 SOT23) Maxim MAX8887EZK33+
U4	1	16-bit microcontroller with infrared module (40 TQFN) and socket Maxim MAXQ610B-0000+, PLASTRONICS_40QN50K16060 socket
Y1	1	12MHz ceramic resonator with capacitor ZTT-12.00MT
None	1	PCB: MAXQ610 EV Kit Circuit Board

AutoShutdown is a trademark of Maxim Integrated Products, Inc.

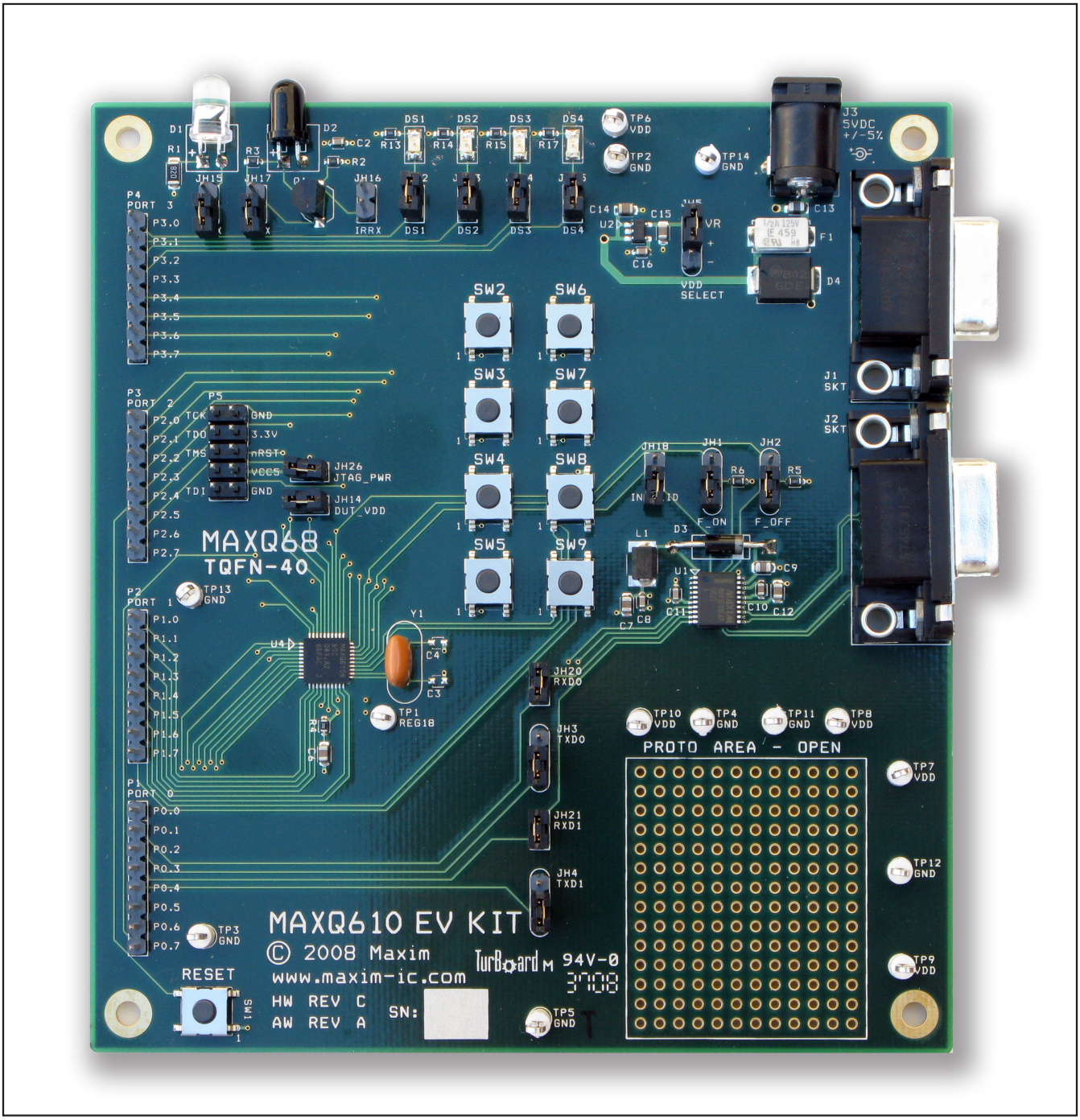

Figure 1. MAXQ610 EV Kit Board

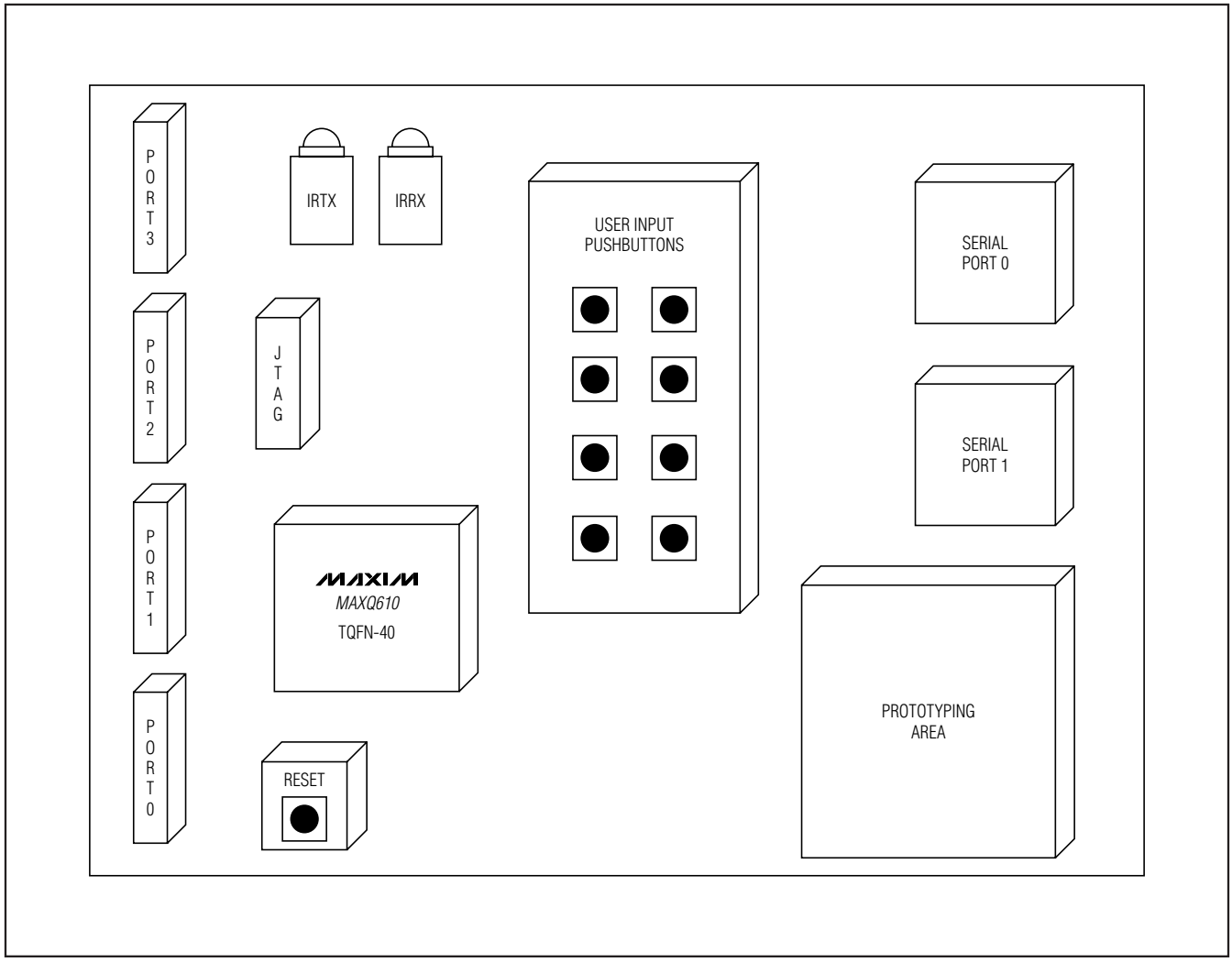

Figure 2. MAXQ610 EV Kit Board Functional Layout

Detailed Description

This EV kit must be used in conjunction with the following documents:

- MAXQ Family User's Guide
- MAXQ Family User's Guide: MAXQ610 Supplement
- MAXQ610 Data Sheet
- MAXQ610 EV Kit Data Sheet (this document)

These documents are available on the CD provided with the MAXQ610 EV kit, and are also available on the Maxim website at **www.maxim-ic.com/MAXQ610-KIT**.

For a step-by-step guide to using your MAXQ610 EV kit for the first time, refer to Application Note 4314: *Getting Started with the MAXQ610 Evaluation Kit and IAR's Embedded Workbench*, included on the EV kit CD. This application note covers jumper settings, cable connections, software configuration, and the steps necessary to quickly begin developing and executing programs using this EV kit.

The MAXQ610 EV kit board is fully defined in the schematic (Figure 3). A short description of the major sections and functions of the board follows.

Power Supply

The MAXQ610 EV kit board can be powered directly using an external DC power supply applied to connector J3. A regulated 5V (±5%), 300mA, center positive, 2.5mm power supply is required. The EV kit board includes a regulator to supply 3.3V power to its circuitry.

The serial-to-JTAG board can also be used to provide 5.0V power to the EV kit board (connector P5 pin 8). This capability is enabled by installing jumper JH26 on the EV kit board and jumper JH3 on the serial-to-JTAG board and applying power to J2 of the JTAG board. In this configuration, an external power source should not be applied to connector J3.

Infrared (IR) Interface

The MAXQ610 microcontroller provides a dedicated IR timer/counter module to simplify support for IR communication. The IR timer/counter implements two pins (IRTX and IRRX) for supporting IR transmit and receive, respectively. The IRTX output pin can be manipulated high or low using the IRTXOUT bit of the power control register (PWCN) when the IRTX function is not enabled. However, the IRTX pin has no corresponding port pin designation, so the standard port direction (PD), port output (PO), and port input (PI) control status bits are not present.

The MAXQ610 EV kit board includes circuitry for both receiving and transmitting IR signals. The IR source is diode D1. Its anode is connected to the board's VDD supply through an 82Ω resistor, and its cathode is connected to the MAXQ610's IRTX pin (pin 39) when jumper JH15 is installed. The IR receiving circuitry consists of silicon PIN photodiode D2 and an npn bipolar transistor with biasing resistors. The photodiode D2 is intended for IR applications in the 700nm to 1100nm range, and the transistor is configured as a common emitter amplifier for the diode. Its collector is connected to the processor's IRRX pin (when JH16 is installed), and the emitter is connected to the processor's P0.7 (TBB1, pin 10) pin when jumper JH17 is installed. This allows the processor's port pin to be used as an IR receiver-enable signal.

Jumper Functions

The MAXQ610 EV kit board contains a number of jumpers to configure its operation. Table 1 describes the jumpers and their function.

Serial Port Interface

The MAXQ610's serial ports are both connected to RS-232 level translators, and these RS-232 level signals are connected the DB-9 connectors (J1 and J2). A number of jumpers are used to connect various serial signals to the level translator and configure its operation. Table 1 describes these jumper functions.

Table 1. Jumper Functions

NAME	DESCRIPTION
JH1	Connects pin 3 (FORCEON) of the RS-232 level translator U1 to: Pin 1 to 2: MAXQ610 port pin P3.5 (pin 28) Pin 2 to 3: The board's VDD
JH2	Connects pin 4 ($\overline{\text{FORCEOFF}}$) of the RS-232 level translator U1 to: Pin 1 to 2: MAXQ610 port pin P3.6 (pin 33) Pin 2 to 3: The board's VDD
JH3	Connects T1IN (pin 7) of the RS-232 level translator U1 to: Pin 1 to 2: The board's VDD Pin 2 to 3: MAXQ610 port pin P0.2 (TX0, pin 5)
JH4	Connects T2IN (pin 8) of the RS-232 level translator U1 to: Pin 1 to 2: The board's VDD Pin 2 to 3: MAXQ610 port pin P0.4 (TX1, pin 7)
JH5	Connects the board's VDD source to: Pin 1 to 2: U2's regulated 3.3V out (pin 5) Pin 2 to 3: GND
JH14	Connects the MAXQ610's VDD supply input (pin 38) to the board's VDD source.
JH15	Connects the board's D1 LED IR emitter to the MAXQ610's IRTX pin (pin 39).
JH16	Connects the board's D2 LED IR receiver amplified signal to the MAXQ610's IRRX pin (pin 40).
JH17	Connects the IR Rx enable to the MAXQ610's P0.7 pin (pin 10).
JH18	Connects pin 2 ($\overline{\text{INVALID}}$) of the RS-232 level translator U1 to the MAXQ610's port pin P3.4 (pin 27).
JH20	Connects R1OUT (pin 9) of the RS-232 level translator U1 to the MAXQ610's port pin P0.1 input (RX0, pin 3).
JH21	Connects R2OUT (pin 10) of the RS-232 level translator U1 to the MAXQ610's port pin P0.3 input (RX1, pin 6).
JH22	Connects the board's DS1 LED cathode to the MAXQ610's port pin P3.0 (pin 2).
JH23	Connects the board's DS2 LED cathode to the MAXQ610's port pin P3.1 (pin 4).
JH24	Connects the board's DS3 LED cathode to the MAXQ610's port pin P3.2 (pin 15).
JH25	Connects the board's DS4 LED cathode to the MAXQ610's port pin P3.3 (pin 16).
JH26	Connects the board's V50 source to the VCC5 pin of the JTAG connector (pin 8) allowing the JTAG board to source the 5V power.

User Input Pushbuttons

The MAXQ610 EV kit board provides eight momentary contact switches intended for user input. Each switch is connected to a separate port pin on the MAXQ610's port 1 (P1.7–P1.0) as illustrated in Table 2. The other side of each switch is connected to ground. Therefore, by using the weak pullup capability of the port pins, switch closure can be detected by reading a low on the normally high corresponding port pin.

Table 2. Switch Input Connections

PORT PIN	SWITCH
P1.0	SW2
P1.1	SW3
P1.2	SW4
P1.3	SW5
P1.4	SW6
P1.5	SW7
P1.6	SW8
P1.7	SW9

General-Purpose Diodes

The MAXQ610 EV kit board has four general-purpose LEDs labeled DS1, DS2, DS3, and DS4. Each anode is connected to the board's VDD through a 100Ω resistor, and each cathode is connected to a processor port 3 pin through a jumper as specified in Table 3. By setting the related port pin as an output, each LED can be illuminated by setting the port pin output register bit (PO3.x) to a logic 0.

Table 3. General-Purpose LED Connections

LED	JUMPER	PORT PIN
DS1	JH22	P3.0
DS2	JH23	P3.1
DS3	JH24	P3.2
DS4	JH25	P3.3

JTAG Interface

A USB-to-JTAG board (provided with the EV kit) is used to program and debug applications running on the MAXQ610 EV kit board. Connect the 10-pin ribbon cable from the JTAG board's J2 connector to connector P5 on the MAXQ610 EV kit board, being careful to note the polarity. Tools such as the Microcontroller Tool Kit (MTK) and IAR's Embedded Workbench have built-in support for loading applications through the JTAG interface and using all the MAXQ610 debug functionality (breakpoints, register and memory reading, etc.).

MAXQ610 Evaluation Kit

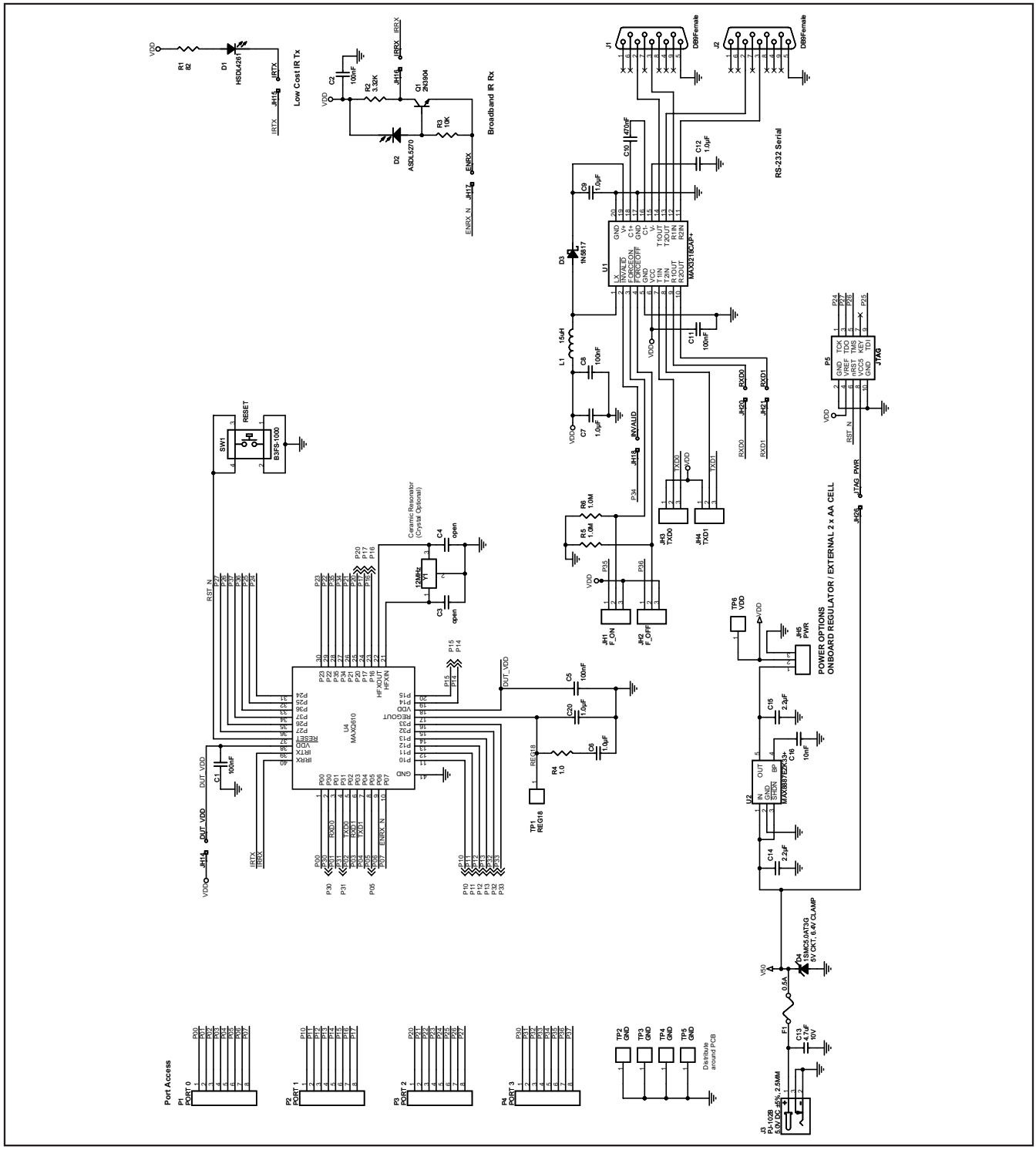

Figure 3a. MAXQ610 EV Kit Board Schematic—MAXQ, IR, RS-232 (Sheet 1 of 2)

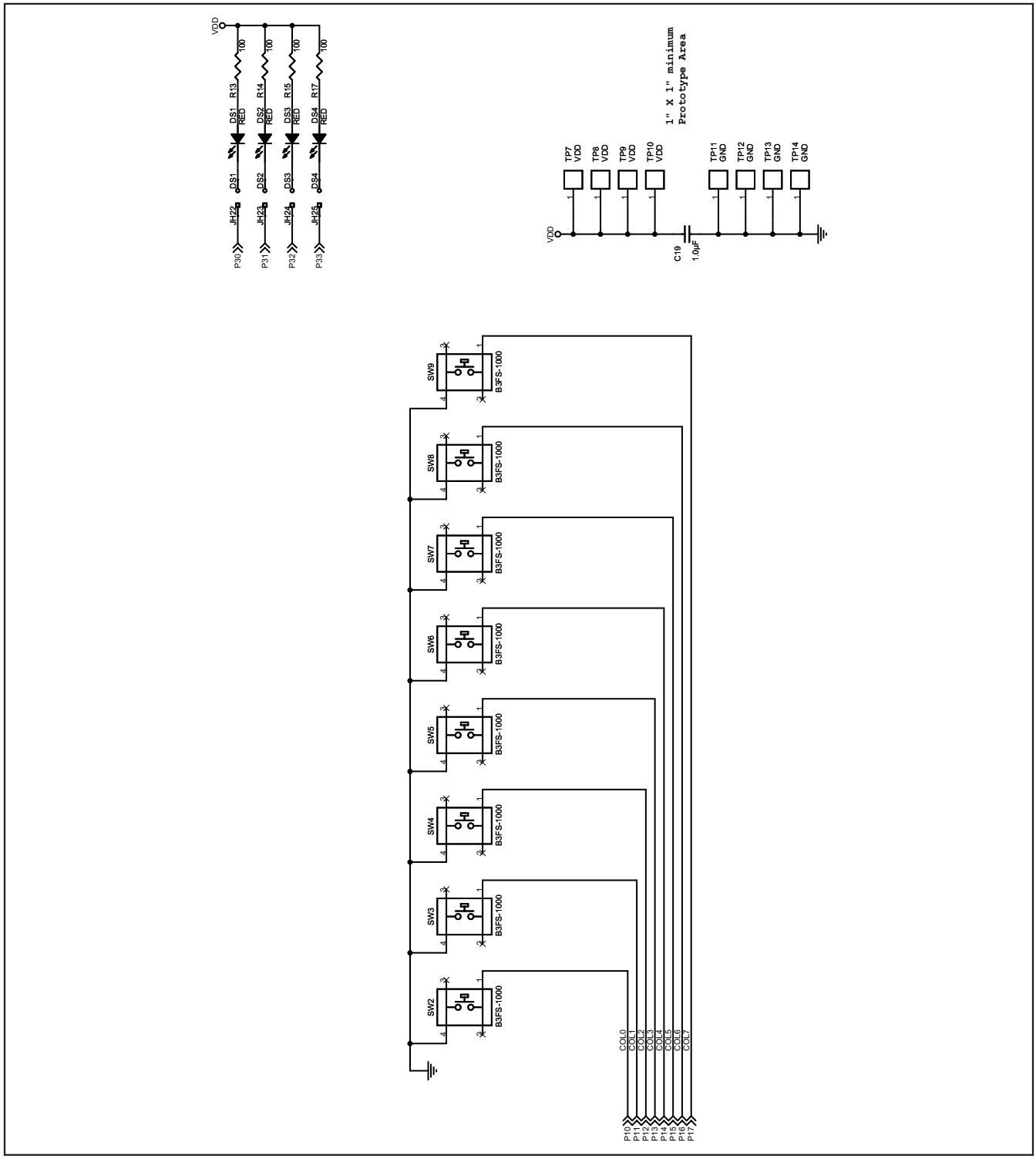

Figure 3b. MAXQ610 EV Kit Board Schematic—Pushbuttons (Sheet 2 of 2)

MAXQ610 Evaluation Kit

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	10/08	Initial release	—
1	2/11	Update *Features*, change “serial” to “USB”	1, 4, 7