



# MAX3420E Evaluation Kit-2

**Evaluates: MAX3420E**

## General Description

The MAX3420E evaluation kit-2 (EV kit-2) provides a proven design to evaluate the MAX3420E USB peripheral controller with SPI™ interface. The EV kit-2 board is jumper-connected to an Atmel® ATtiny2313 microcontroller by default, but can also be connected to any SPI master. The MAX3420E EV kit-2 adds USB functionality to any microcontroller, microprocessor, DSP, CPLD, FPGA, or ASIC with an SPI master interface or five GPIO lines can connect to the MAX3420E EV kit-2.

The EV kit-2 board comes with the MAX3420EECJ+ installed.

## Component Suppliers

SUPPLIER	PHONE	WEBSITE
Murata	770-436-1300	www.murata.com
TDK	847-803-6100	www.component.tdk.com

**Note:** Indicate that you are using the MAX3420E when contacting these component suppliers.

## Features

- ◆ Complies with USB 2.0 (Full Speed)
- ◆ Custom USB Drivers Not Required
- ◆ USB Powered
- ◆ USB Power LED Indicator
- ◆ USB Cable Included
- ◆ On-Board ATtiny2313 Microcontroller
- ◆ Four GPI Port-Connected Pushbuttons
- ◆ Four GPO Port LED Indicators
- ◆ 20-Pin Signal Header to Connect the MAX3420E to Any Microcontroller
- ◆ Proven PCB Layout
- ◆ Fully Assembled and Tested

## Ordering Information

PART NUMBER	TYPE	PC INTERFACE
MAX3420EEVKIT-2+	EV kit	USB

+Denotes a lead-free and RoHS-compliant EV kit.

## Component List

DESIGNATION	QTY	DESCRIPTION
C1, C7	2	2.2μF ±20%, 6.3V X5R ceramic capacitors (0603) TDK C1608X5R0J225K or C1608X5R0J225M
C2, C3, C6, C8	4	1μF ±20%, 6.3V X5R ceramic capacitors (0603) TDK C1608X5R0J105K or C1608X5R0J105M
C4, C5	2	18pF ±5%, 50V COG ceramic capacitors (0402) Murata GRM1555C1H180J TDK C1005COG1H180J
D1–D4	4	Green LEDs (0603) Stanley Electric BG1111C-TR Panasonic LNJ314G8TRA or LNJ308G84RA
D5	1	Red LED (0603) Panasonic LNJ208R8ARA
H1	1	Dual-row, 20-pin (2 x 10) header
H2	1	Single-row, 8-pin header
H3	1	Dual-row, 6-pin (2 x 3) header

DESIGNATION	QTY	DESCRIPTION
JU1–JU5, JU10, JU11	7	3-pin headers
JU6–JU9	4	2-pin headers
P1	1	USB type B right-angle receptacle Assmann AU-Y1007-R
R1, R2	2	33.2Ω ±1% resistors (0603) (use lead-free parts only)
R3, R6–R9	5	150Ω ±5% resistors (0603) (use lead-free parts only)
R4, R5	2	10kΩ ±5% resistors (0603) (use lead-free parts only)
SW1–SW4	4	Pushbutton switches Panasonic EQV-PHP03T
TP1, TP2, TP3	3	Mini test points (black) Keystone Electronics 5001
U1	1	MAX3420EECJ+ USB peripheral controller (32-pin, 7mm x 7mm x 1.4mm, TQFP)

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## Component List (continued)

DESIGNATION	QTY	DESCRIPTION
U2	1	MAX6349TLUT+ (SOT23-6) Topmark AAJQ
U3	1	20MHz 8-bit RISC microcontroller Atmel ATtiny2313-20SU (20-pin SOIC)

DESIGNATION	QTY	DESCRIPTION
Y1	1	12MHz crystal; 18pF load (HCM49 SMD case) Citizen HCM49-12.000MABJ-UT
—	11	Shunts
—	4	Rubber bumps
—	1	MAX3420EEVKIT-2+ PCB

### Quick Start

#### Recommended Equipment

- MAX3420 EV kit-2 (USB cable included)
- A user-supplied Windows® 2000/XP PC with spare USB port

**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 2000/XP operating system.

#### Procedure

The MAX3420E EV kit-2 is fully assembled and tested. Follow the steps below to verify board operation.

- 1) Verify that all jumpers (JU1–JU11) are in the default 1-2 position.
- 2) Connect the included USB cable from the PC's USB port (Type A) to the USB connector (Type B) on the MAX3420E EV kit-2 board.
- 3) Verify that the red USB power LED (D5) lights up.
- 4) Verify that the green port 0 LED (D1) blinks.

- 5) **A Found New Hardware | Demo** window appears after plugging in the USB cable for the first time (Figure 1). Windows 2000 or higher is required.
- 6) Next, a **Found New Hardware | USB Human Interface Device** appears, as shown in Figure 2. The standard Windows USB HID driver is installed automatically.
- 7) Open WordPad by clicking on the WordPad icon located at **Start | Programs | Accessories | WordPad**. **Caution:** Make sure that WordPad or a similar editor (e.g., Notepad) is the active window before performing the next step (the demonstration program types text into whatever window is open).
- 8) Press the port 3 pushbutton switch (SW4) to start the HID keyboard emulator.
- 9) Verify that the HID keyboard emulator automatically writes text into the active WordPad editor.
- 10) Stop the HID keyboard emulator by pressing the port 3 pushbutton switch (SW4) again. The port 3 pushbutton starts and stops the emulator.

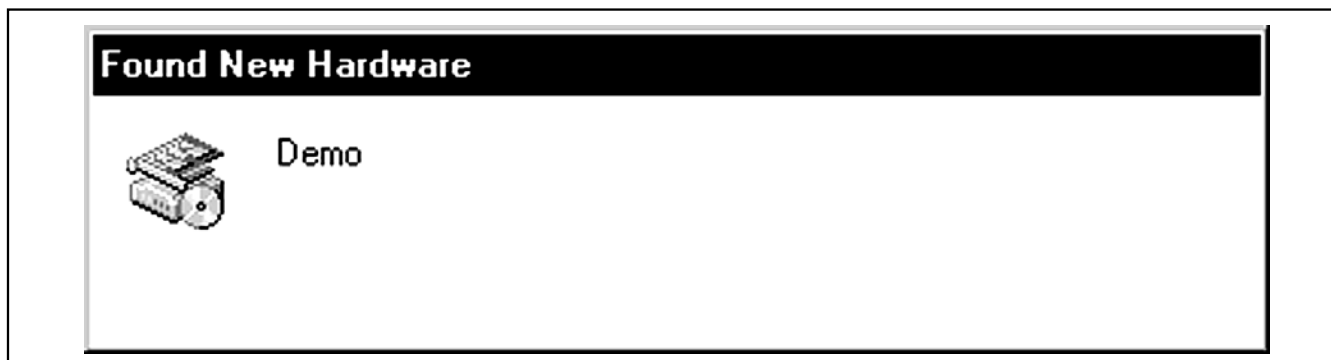


Figure 1. Found New Hardware | Demo Window

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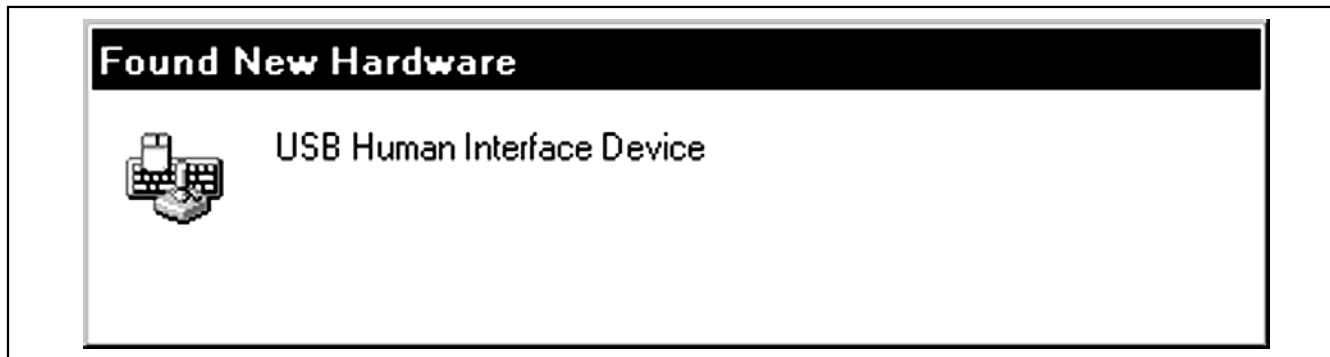


Figure 2. Found New Hardware / USB Human Interface Device Window

## **Detailed Description of Hardware**

Tables 1 and 2 describe the function of each pushbutton and LED during the HID keyboard emulator demo. Tables 3 through 6 explain the functionality of each jumper on the MAX3420E EV kit-2.

Tables 7 through 9 give the pin descriptions for headers H1, H2, and H3. H2 is a header consisting of SPI test points. H3 is a header designed to be connected to

one of two Atmel tools. The JTAGICE-2 can connect to this header to load and debug ATtiny2313 code using the AVR Studio® software, available on the Atmel website. Additionally, an AVRISP-2 can be connected to program any hex file into the ATtiny2313. Refer to the Atmel documentation for further details.

The example firmware code for the HID keyboard emulator may be downloaded at [www.maxim-ic.com/evkitsoftware](http://www.maxim-ic.com/evkitsoftware). Double click the MAX3420E EVKIT Firmware link.

**Table 1. Pushbutton Descriptions for HID Keyboard Emulator Demo**

PORT	PUSHBUTTON	DESCRIPTION
0	SW1	Not used
1	SW2	Not used
2	SW3	Not used
3	SW4	Starts and stops sending characters as keyboard

**Table 2. LED Descriptions for HID Keyboard Emulator Demo**

PORT	LED	DESCRIPTION
0	D1	Blinks to show program is running
1	D2	MAX3420E detected a USB bus reset
2	D3	SUSPEND (PC stopped USB activity)
3	D4	SEND light (toggles when the pushbutton on GPO port 3 (SW4) is pressed)

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**Table 3. SPI Bus Selection (JU1–JU5)**

JUMPER	SHUNT POSITION	DESCRIPTION
JU1	1-2*	INT line connected to the ATtiny2313 INT line
	2-3	INT line connected to H1-2
JU2	1-2*	$\overline{SS}$ line connected to the ATtiny2313 $\overline{SS}$ line
	2-3	$\overline{SS}$ line connected to H1-6
JU3	1-2*	MOSI line connected to the ATtiny2313 MOSI line
	2-3	MOSI line connected to H1-4
JU4	1-2*	MISO line connected to the ATtiny2313 MISO line
	2-3	MISO line connected to H1-3
JU5	1-2*	SCLK line connected to the ATtiny2313 SCLK line
	2-3	SCLK line connected to H1-5

\*Default position.

**Table 4. GPO 0–3 LED Connection (JU6–JU9)**

JUMPER	SHUNT POSITION	DESCRIPTION
JU6	1-2*	GPO port 3 LED (D4) connected
	Open	GPO port 3 LED (D4) disconnected
JU7	1-2*	GPO port 2 LED (D3) connected
	Open	GPO port 2 LED (D3) disconnected
JU8	1-2*	GPO port 1 LED (D2) connected
	Open	GPO port 1 LED (D2) disconnected
JU9	1-2*	GPO port 0 LED (D1) connected
	Open	GPO port 0 LED (D1) disconnected

\*Default position.

**Table 5.  $V_L$  Logic-Supply Selection ( $V_L$ )**

JUMPER	SHUNT POSITION	DESCRIPTION
JU10	1-2*	Logic-supply voltage ( $V_L = 3.3V$ )
	2-3	Do not use
	Open	Apply $V_L$ supply on H1-9

\*Default position.

**Table 6. Power-Supply Source Selection**

JUMPER	SHUNT POSITION	DESCRIPTION
JU11	1-2*	EV kit-2 board powered by USB
	2-3	Do not use
	Open	Apply 5V supply on JU11-2 and GND on JU11-3

\*Default position.

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Table 7. Header H1 Pin Description

PIN	NAME	DESCRIPTION
1	GPX	GPX line
2	CONINT	Interrupt (INT) Line (Note 1)
3	CONMISO	Master In Slave Out (MISO) Line (Note 2)
4	CONMOSI	Master Out Slave In (MOSI) Line (Note 3)
5	CONSCLK	Serial Clock (SCLK) Line (Note 4)
6	CON $\overline{SS}$	Active-Low Slave Select ( $\overline{SS}$ ) Line (Note 5)
7	GPO3	General-Purpose Output 3 (Note 6)
8	$\overline{RES}$	Active-Low Reset Line
9	VL	Logic-Voltage-Supply Line
10	GPO2	General-Purpose Output 2 (Note 6)
11	GND	Ground
12	GND	Ground
13	GPO0	General-Purpose Output 0 (Note 6)
14	GPO1	General-Purpose Output 1 (Note 6)
15	GPI2	General-Purpose Input 2 (Note 7)
16	GPI3	General-Purpose Input 3 (Note 7)
17	GPI0	General-Purpose Input 0 (Note 7)
18	GPI1	General-Purpose Input 1 (Note 7)
19	3.3V	3.3V EV Kit-2 Board Supply
20	GND	Ground

**Note 1:** If jumper JU1 is in the 2-3 position.

**Note 2:** If jumper JU4 is in the 2-3 position.

**Note 3:** If jumper JU3 is in the 2-3 position.

**Note 4:** If jumper JU5 is in the 2-3 position.

**Note 5:** If jumper JU2 is in the 2-3 position.

**Note 6:** Also connected to an LED through a current-limiting resistor if the respective jumper is in place.

**Note 7:** General-purpose inputs are internally pulled up to VL, so external pullups are not required.

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**Table 8. Header H2 Pin Description (SPI Test Points)**

PIN	NAME	DESCRIPTION
1	—	—
2	GPX	GPX line
3	MOSI	Master Out Slave In (MOSI) Line
4	MISO	Master In Slave Out (MISO) Line
5	$\overline{SS}$	Active-Low Slave Select ( $\overline{SS}$ ) Line
6	SCLK	Serial-Clock (SCLK) Line
7	INT	Interrupt (INT) Line
8	GND	Ground

**Table 9. Header H3 Pin Description (ISP Connector)**

PIN	NAME	DESCRIPTION
1	ATMISO	ATtiny2313 Master In Slave Out (MISO) Line
2	3.3V	3.3V EV Kit-2 Board Supply
3	ATSCLK	ATtiny2313 Serial-Clock (SCLK) Line
4	ATMOSI	ATtiny2313 Master Out Slave In (MOSI) Line
5	DRES	Debug Reset Line
6	GND	Ground

**Note:** When using the Atmel AVRISP-2 to download hex files for ATtiny2313 programming, remove jumpers JU2–JU5 to avoid any signal interference with the MAX3420E.



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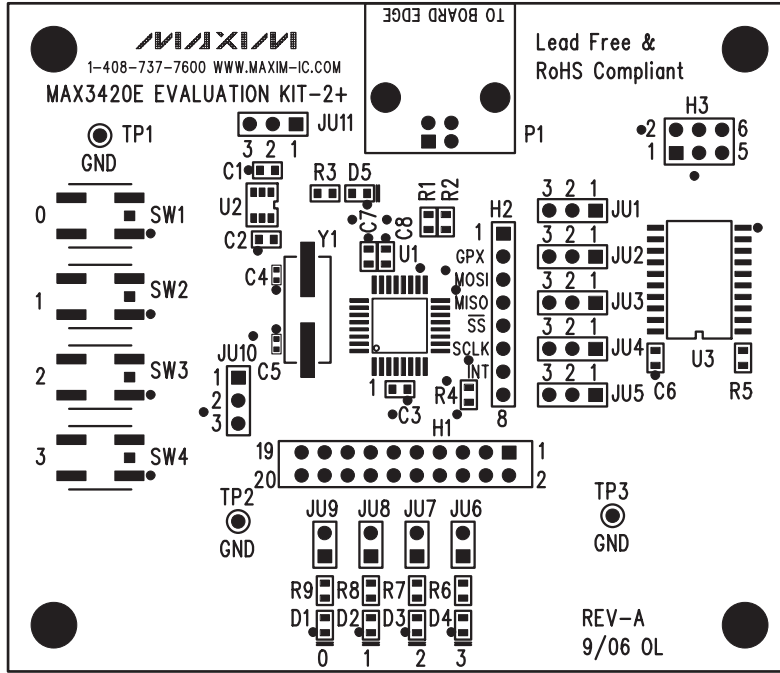


Figure 4. MAX3420E EV Kit-2 Component Placement Guide—Component Side



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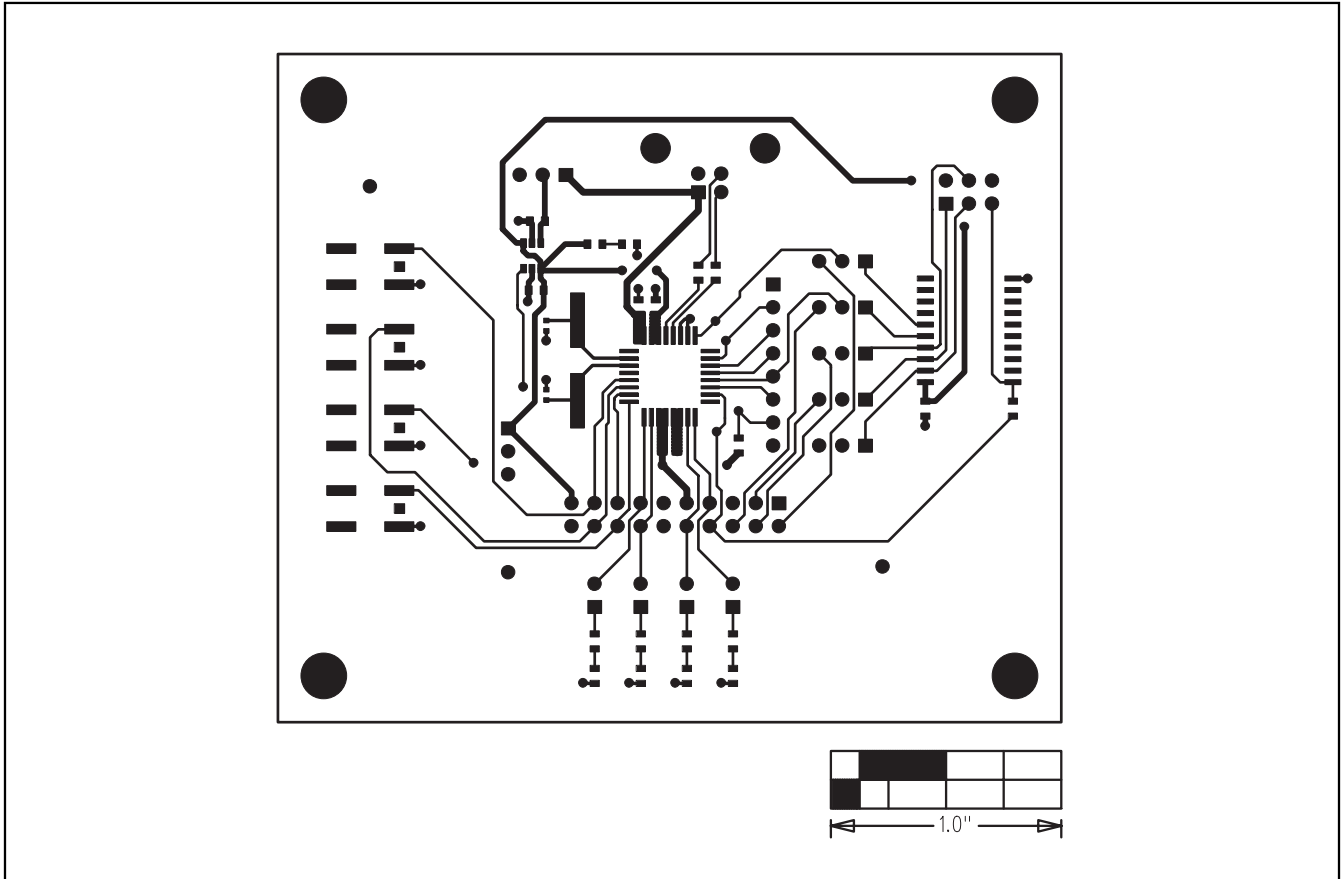


Figure 5. MAX3420E EV Kit-2 PCB Layout—Component Side

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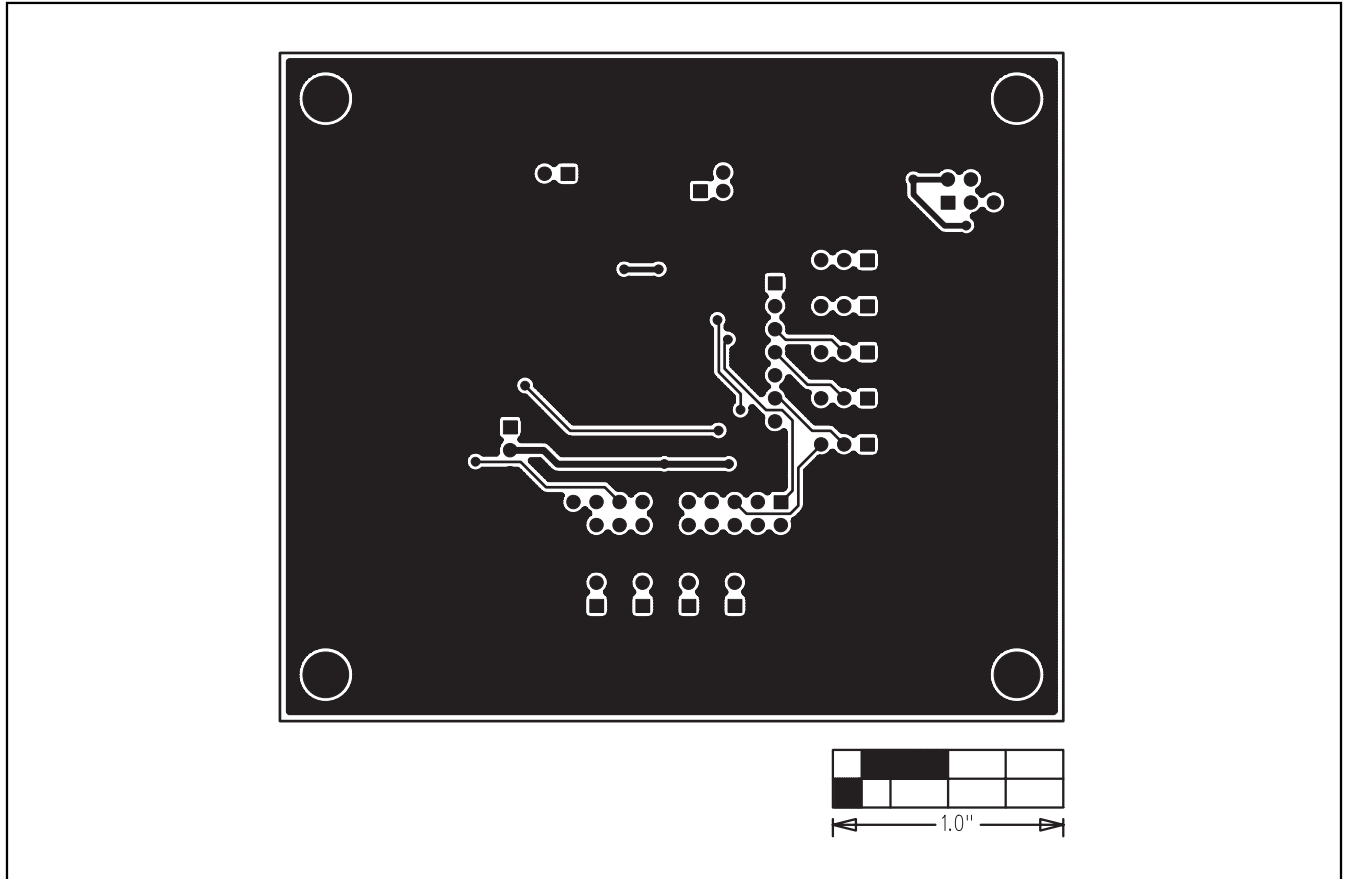


Figure 6. MAX3420E EV Kit-2 PCB Layout—Solder Side

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