

#### **General Description**

The USBTO232 is an adapter board that converts a PC's USB port into a standard COM port. A COM port is also known as the standard serial port that uses Recommended Standard 232 (RS-232).

The USBTO232 is included with selected Maxim EV kits and EV systems that were originally designed for the PC COM port and later updated to also support the USB port. Data sheets for EV kits and EV systems that can use the USBTO232 have been updated to reflect compatibility and also provide ordering information. Use of the USBTO232 in applications other than those EV kits specified by Maxim is not supported.

**Important:** Before using the USBTO232, see the *Quick Start* section of this data sheet to correctly install the USB driver for the appropriate Windows<sup>®</sup> operating system.

#### \_Features

- USB Powered
- USB Driver for Windows 98SE/2000/XP Operating Systems
- USB and I/O Power LED Indicators
- Two GPIO LED Indicators
- USB Cable Included
- ♦ 8-Pin Signal Header
- Proven PCB Layout
- Fully Assembled and Tested

#### **\_Ordering Information**

PART	PC INTERFACE	OPERATING SYSTEMS SUPPORTED
USBTO232+	USB	Windows 98SE/2000/XP
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+ Denotes lead-free and RoHS compliance.

#### **Component List**

DESIGNATION	QTY	DESCRIPTION
P1	1	USB type B right-angle female receptacle connector Assmann AU-Y1007-R
P2	1	Short DB9 right-angle male receptacle connector (without cable-locking screws)
R1, R2	2	$270\Omega \pm 5\%$ resistors (0603) (use lead-free parts only)
U1	1	USB-to-UART converter FTDI FT232RL (28-pin SSOP)
U2	1	MAX213EEAI+ (28-pin SSOP)
	3	Shunts
	1	USBTO232+ PCB
_	1	USB high-speed A-to-B 6ft cable

#### **Component Supplier**

SUPPLIER	PHONE	WEBSITE
TDK	847-803-6100	www.component.tdk.com

**Note:** Indicate the Maxim EV kit that you are using when contacting this component supplier.

#### Windows is a registered trademark of Microsoft Corp.

DESIGNATION	QTY	DESCRIPTION
C1	1	0.01µF ±10%, 50V X7R ceramic capacitor (0603) TDK C1608X7R1H103K
C2, C3	2	47pF ±5%, 50V COG ceramic capacitors (0603) TDK C1608C0G1H470J
C4–C8, C11, C12	7	0.1µF ±10%, 16V X7R ceramic capacitors (0603) TDK C1608X7R1C104K
C9	1	4.7μF ±10%, 6.3V X5R ceramic capacitor (0603) TDK C1608X5R0J475K
C10	1	1µF ±10%, 6.3V X5R ceramic capacitor (0603) TDK C1608X5R0J105K
D1	1	Red LED (0603) Panasonic LNJ208R8ARA
D2	1	Green LED (0603) Stanley Electric BG1111C-TR Panasonic LNJ314G8TRA
FB1	1	40Ω @ 100MHz, 1.5A ferrite bead (0805) Steward MI0805K400R-10
H1	1	8-pin header
JU1, JU2, JU3	3	3-pin headers

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For pricing, delivery, and ordering information, please contact Maxim/Dallas Direct! at 1-888-629-4642, or visit Maxim's website at www.maxim-ic.com.

#### \_Quick Start

The following instructions are for installing USB drivers and the EV kit software. Once the USB drivers and EV kit software have been installed, refer to the *Quick Start* section of the appropriate EV kit data sheet for EV kitspecific instructions.

#### **Recommended Equipment**

- USBTO232 board (USB cable included)
- Maxim EV kit (or EV system) with a COM port PC connection
- Corresponding EV kit data sheet
- User-supplied PC with a 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 98SE/2000/XP operating system.

- Procedure
   Visit the Maxim website (www.maxim-ic.com/evkitsoftware) to download the latest version of the EV kit software that supports USB. Save the EV kit software to a temporary folder and uncompress the file, if it is a .zip file.
- Install the EV kit software on your computer by running the INSTALL.EXE program inside the temporary folder. The program files are copied to <u>C:\Program Files\MAXxxxxx</u> and icons are created in the Windows <u>Start I Programs</u> menu.
- Uncompress the USB driver file copied into <u>C:\Program Files\MAXxxxx</u> after the software is installed. If you are using Windows 98SE, uncompress the <u>USB Driver 98 ME V1.09.zip</u> file. If you are using Windows 2000/XP, uncompress the <u>USB Driver XP 2K V2.00.zip</u> file. Uncompress the contents of the .zip file into <u>C:\Program</u> <u>Files\MAXxxxxx</u>.
- 4) Verify that the following USBTO232 jumpers are in the default positions:
  - JU1: (1-2)
  - JU2: (2-3)
  - JU3: (2-3)
- 5) Connect the included USB cable from the PC's USB port (Type A) to the Type B USB connector on the USBTO232 board.
- Verify that the red VCC power LED (D1) lights up. Also verify that the green VCCIO power LED (D2) lights up.

7) Go to the appropriate USB *Driver Installation* section in this data sheet for the version of Windows you are using and return to step 8 when finished. For example, if you are using Windows XP, go to the *Windows XP USB Driver Installation* section.

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Windows 2000: Page 11

Windows 98SE: Page 25

- Connect the USBTO232 board to the EV kit (or EV system) by connecting the male DB9 connector on the USBTO232 board to the female DB9 connector on the EV kit.
- 9) Refer to the *Quick Start* section of the appropriate EV kit data sheet for further EV kit-specific instructions.

#### \_Detailed Description of Hardware

The USBTO232 is an adapter board that converts a PC's USB port into a standard COM port. The USBTO232 board has three configurable jumpers: JU1, JU2, and JU3. Jumper JU1 is the I/O supply selection (see Table 1), jumper JU2 is the USB power-supply indicator (see Table 2), and jumper JU3 is the 3.3V power-supply indicator (see Table 3).

#### Table 1. I/O Supply Selection (VCCIO)

JUMPER	SHUNT POSITION	DESCRIPTION
JU1	1-2*	VCCIO = VCC = 5V
301	2-3	VCCIO = VCC30 = 3.3V

\*Default position.

# Table 2. USB Power-Supply Indicator (VCC–D1)

# JUMPER SHUNT POSITION DESCRIPTION 1-2 General-purpose LED connected to CBUS0

JU2	1-2	connected to CBUS0
JU2		Indicates USB power present when red LED (D1) is lit

\*Default position.

# Table 3. 3.3V Power-Supply Indicator (VCC30–D2)

JUMPER	SHUNT POSITION	DESCRIPTION
	1-2	General-purpose LED connected to CBUS1
JU3	2-3*	Indicates regulated 3.3V power present when green LED (D2) is lit

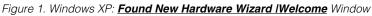
\*Default position.



#### Windows XP USB Driver Installation

 Once the USBTO232 board is connected to the PC for the first time in Windows XP, a <u>Found New</u> <u>Hardware Wizard I Welcome</u> window appears, as shown in Figure 1. Choose the <u>No, not this time</u> selection and press the <u>Next</u> button to get started. If you do not see a window that is similar to the one described above after 30 seconds, remove the USB cable from the USBTO232 board and reconnect it. Administrator privileges are required to install the USB device driver on Windows 2000/XP.

# Found New Hardware Wizard Welcome to the Found New Hardware Wizard Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission). Read our privacy policy Can Windows connect to Windows Update to search for software? O Yes, this time only O Yes, now and every time I connect a device. O No, not this time Click Next to continue. < <u>B</u>ack Next > Cancel



 A Found New Hardware Wizard | FTDI FT8U2XX Device window (Figure 2) appears next. This window asks What do you want the wizard to do?. Choose the Install from a list or specific location (Advanced) option and press the Next button.

#### Found New Hardware Wizard

This wizard helps you install software for:
FTDI FT8U2XX Device
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
O Install the software automatically (Recommended)
<ul> <li>Install from a list or specific location (Advanced)</li> </ul>
Click Next to continue.
< <u>B</u> ack <u>N</u> ext > Cancel



3) At the Found New Hardware Wizard I Search Options window (Figure 3), choose the Search for the best driver in these locations option and check the Include this location in the search checkbox. Press the Browse button and navigate to the path: C:\Program Files\MAXxxxxx (where xxxxx represents the Maxim IC part number on the EV kit being evaluated). Press the  $\underline{\text{Mext}}$  button when finished.

Found New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM)
Include this location in the search:
C:\Program Files\MAXxxxxx  Browse Browse
O Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< <u>B</u> ack <u>N</u> ext > Cancel

Figure 3. Windows XP: Found New Hardware Wizard | Search Options Window

4) The <u>Found New Hardware Wizard I Complete</u> window appears (Figure 4). Press the <u>Finish</u> button.

Found New Hardware Wizard		
	Completing the Found New Hardware Wizard The wizard has finished installing the software for:	
	USB Serial Converter	
	Click Finish to close the wizard.	

Figure 4. Windows XP: Found New Hardware Wizard I Complete Window

 A <u>Found New Hardware Wizard I Welcome</u> window appears again (Figure 5). Choose the <u>No, not</u> <u>this time</u> selection and press the <u>Next</u> button.

# Found New Hardware Wizard Welcome to the Found New Hardware Wizard Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission). Read our privacy policy Can Windows connect to Windows Update to search for software? O Yes, this time only O Yes, now and every time I connect a device O No, not this time Click Next to continue. Cancel < <u>B</u>ack <u>N</u>ext >



6) The next window is the Found New Hardware Wizard I USB Serial Port window (Figure 6). This window asks What do you want the wizard to do?. Choose the Install from a list or specific location (Advanced) option and press the Next button.

round New Hardware Wizard	
	This wizard helps you install software for:
	USB Serial Port
	If your hardware came with an installation CD or floppy disk, insert it now.
	What do you want the wizard to do?
	<ul> <li>Install the software automatically (Recommended)</li> <li>Install from a list or specific location (Advanced)</li> </ul>
	Click Next to continue.
	< <u>B</u> ack <u>N</u> ext > Cancel





7) At the Found New Hardware Wizard I Search Options window (Figure 7), choose the Search for the best driver in these locations option and check the Include this location in the search checkbox. Press the Browse button and navigate to the path: C:\Program Files\MAXxxxxx. Press the Next button when finished.

Found New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM)
Include this location in the search:
C:\Program Files\MAXxxxxx  Browse Browse
O Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< <u>B</u> ack <u>N</u> ext > Cancel

Figure 7. Windows XP: Found New Hardware Wizard | Search Options Window

- The next window is the <u>Found New Hardware</u> <u>Wizard I Complete</u> window (Figure 8). Press the <u>Finish</u> button.
- 9) When finished, return to step 8 of the USBTO232 *Quick Start* section.

Found New Hardware Wizard		
	Completing the Found New Hardware Wizard	
	The wizard has finished installing the software for:	
	USB Serial Port	
	Click Finish to close the wizard.	
	< <u>B</u> ack Finish Cancel	



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#### Windows 2000 USB Driver Installation

 Once the USBTO232 board is connected to the PC for the first time in Windows 2000, a <u>Found New</u> <u>Hardware</u> window appears, as shown in Figure 9.

# Found New Hardware



FT232R USB UART

Figure 9. Windows 2000: Found New Hardware Window

2) A **Found New Hardware Wizard I Welcome** window then appears (Figure 10). Press the **Next** button.

Found New Hardware Wizard		
	Welcome to the Found New Hardware Wizard	
	This wizard helps you install a device driver for a hardware device.	
	To continue, click Next. < <u>Back</u> Cancel	
	< <u>B</u> ack <u>Next</u> > Cancel	

Figure 10. Windows 2000: Found New Hardware Wizard | Welcome Window



 At the Found New Hardware Wizard I Install <u>Hardware Device Drivers</u> window (Figure 11), choose <u>Search for a suitable driver for my device</u> (recommended) and press the <u>Next</u> button when finished.

Install Hardware Device Drivers A device driver is a software program that enables a hardware device to work with an operating system.	
This wizard will complete the installation for this device:	
A device driver is a software program that makes a hardware device work. Windows needs driver files for your new device. To locate driver files and complete the installation click Next. What do you want the wizard to do?	
<ul> <li>Search for a suitable driver for my device (recommended)</li> <li>Display a list of the known drivers for this device so that I can choose a specific driver</li> </ul>	
< <u>B</u> ack <u>N</u> ext > Car	icel

Figure 11. Windows 2000: Found New Hardware Wizard | Install Hardware Device Drivers Window

 The <u>Found New Hardware Wizard | Locate Driver</u> <u>Files</u> window appears next (Figure 12). Check the <u>Specify a location</u> checkbox and press the <u>Next</u> button when finished.

#### Found New Hardware Wizard

#### Locate Driver Files

Where do you want Windows to search for driver files?



Search for driver files for the following hardware device:



FT232R USB UART

The wizard searches for suitable drivers in its driver database on your computer and in any of the following optional search locations that you specify.

To start the search, click Next. If you are searching on a floppy disk or CD-ROM drive, insert the floppy disk or CD before clicking Next.

Optional search locations:

Floppy <u>d</u>isk drives

- <u>CD-ROM</u> drives
- Specify a location

	licrosoft	Windows	Update
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< <u>B</u>ack

Cancel

Next >

Figure 12. Windows 2000: Found New Hardware Wizard | Locate Driver Files Window

5) The next window is the Found New Hardware Wizard I Path window (Figure 13). Press the Browse button and choose the path C:\Program Files\MAXxxxx Press the OK button when finished.

Found Ne	w Hardware Wizard	×
	Insert the manufacturer's installation disk into the drive selected, and then click OK.	OK Cancel
	<u>C</u> opy manufacturer's files from: C:\Program Files\MAXxxxx 🗨	Browse

Figure 13. Windows 2000: Found New Hardware Wizard | Path Window

# USBT0232

 The <u>Found New Hardware Wizard I Driver Files</u> <u>Search Results</u> window is shown in Figure 14. Press the <u>Next</u> button after the wizard finds the driver.

#### Found New Hardware Wizard

#### Driver Files Search Results The wizard has finished searching for driver files for your hardware device.



The wizard found a driver for the following device:



USBT0232

FT232R USB UART

Windows found a driver for this device. To install the driver Windows found, click Next.



c:\program files\maxxxxx\ftdibus.inf

<<u>B</u>ack <u>N</u>ext> Cancel

Figure 14. Windows 2000: Found New Hardware Wizard | Driver Files Search Results Window

7) At the **Found New Hardware Wizard I Complete** window (Figure 15), press the **Finish** button.



Figure 15. Windows 2000: Found New Hardware Wizard | Complete Window

8) A **Found New Hardware** window appears for the USB Serial Port, as shown in Figure 16.

# USBT0232

# Found New Hardware



USB Serial Port

Installing ...

Figure 16. Windows 2000: Found New Hardware Window

9) When the <u>Found New Hardware Wizard I</u> <u>Welcome</u> window appears (Figure 17), press the <u>Next</u> button.

# Found New Hardware Wizard Welcome to the Found New Hardware Wizard This wizard helps you install a device driver for a hardware device. To continue, click Next. < Rack</td> Next > Cancel

Figure 17. Windows 2000: Found New Hardware Wizard | Welcome Window

10) At the <u>Found New Hardware Wizard I Install</u> <u>Hardware Device Drivers</u> window (Figure 18), choose <u>Search for a suitable driver for my device</u> <u>(recommended)</u> and press the <u>Next</u> button when finished.

#### Found New Hardware Wizard

Install Hardware Device Drivers A device driver is a software program that enables a hardware device to work with an operating system.
This wizard will complete the installation for this device:
A device driver is a software program that makes a hardware device work. Windows needs driver files for your new device. To locate driver files and complete the installation click Next.
What do you want the wizard to do?
<ul> <li>Search for a suitable driver for my device (recommended)</li> </ul>
O <u>D</u> isplay a list of the known drivers for this device so that I can choose a specific driver
< <u>B</u> ack <u>N</u> ext > Cancel

Figure 18. Windows 2000: Found New Hardware Wizard | Install Hardware Device Drivers Window

11) The Found New Hardware Wizard I Locate Driver Files window (Figure 19) appears. Check the Specify a location checkbox and press the <u>Next</u> button when finished.

#### Found New Hardware Wizard

Locate Driver Files Where do you want Windows to search for driver files?
Search for driver files for the following hardware device:
USB Serial Port
The wizard searches for suitable drivers in its driver database on your computer and in any of the following optional search locations that you specify.
To start the search, click Next. If you are searching on a floppy disk or CD-ROM drive, insert the floppy disk or CD before clicking Next.
Optional search locations: Floppy <u>disk drives</u> <u>C</u> D-ROM drives
☑ Specify a location
Microsoft Windows Update
< <u>B</u> ack <u>N</u> ext > Cancel

Figure 19. Windows 2000: Found New Hardware Wizard | Locate Driver Files Window

USBT0232

12) At the Found New Hardware Wizard   Path win-
dow (Figure 20), press the <b><u>Browse</u></b> button and
choose the path C:\Program Files\MAXxxxx.
Press the <b>OK</b> button when finished.

Found Ne	ew Hardware Wizard	×
	Insert the manufacturer's installation disk into the drive selected, and then click OK.	OK Cancel
	<u>C</u> opy manufacturer's files from:	
	C:\Program Files\MAXxxxxx 🗨	Browse

Figure 20. Windows 2000: Found New Hardware Wizard | Path Window

13) The **Found New Hardware Wizard I Driver Files** <u>Search Results</u> window (Figure 21) appears. Press the <u>Next</u> button after the wizard finds the driver.

Found New Hardware Wizard		
Driver Files Search Results The wizard has finished searching for driver files for your hardware device.		
The wizard found a driver for the following device:		
USB Serial Port		
Windows found a driver for this device. To install the driver Windows found, click Next.		
c:\program files\maxxxxx\ftdiport.inf		
< <u>B</u> ack <u>N</u> ext> Cancel		

Figure 21. Windows 2000: Found New Hardware Wizard | Driver Files Search Results Window

- 14) The next window is the <u>Found New Hardware</u> <u>Wizard I Complete</u> window (Figure 22). Press the <u>Finish</u> button.
- 15) When finished, return to step 8 of the USBTO232 *Quick Start* section.

Found New Hardware Wizard		
	Completing the Found New Hardware Wizard         Image: Second Port         Image: Second Port         Windows has finished installing the software for this device.	
	To close this wizard, click Finish.	
	< <u>B</u> ack Finish Cancel	



#### Windows 98SE USB Driver Installation

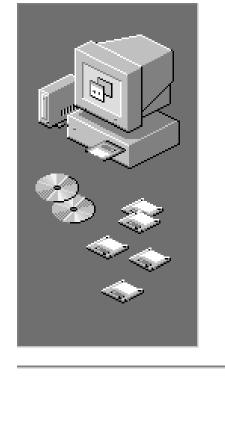
 Once the USBTO232 board is connected to the PC for the first time in Windows 98SE, an <u>Add New</u> <u>Hardware Wizard I Start</u> window appears, as shown in Figure 23. Press the <u>Next</u> button to get started.

Add New Hardware Wizard		
	This wizard searches for new drivers for:	
	FT232R USB UART	
	A device driver is a software program that makes a hardware device work.	
	< Back Next > Cancel	
	< <u>B</u> ack <u>Next</u> Cancel	

Figure 23. Windows 98SE: **<u>Add New Hardware Wizard | Start</u>** Window

 An <u>Add New Hardware Wizard I Options</u> window appears next (Figure 24). Choose the <u>Search for</u> <u>the best driver for your device (Recommended)</u> option and press the <u>Next</u> button when finished.

### Add New Hardware Wizard



What do you want Windows to do?

< Back

- Search for the best driver for your device. (Recommended).
- Display a list of all the drivers in a specific location, so you can select the driver you want.

Next >

Figure 24. Windows 98SE: Add New Hardware Wizard | Options Window

Cancel

3) At the <u>Add New Hardware Wizard I Specify</u> <u>Location</u> window (Figure 25), check the <u>Specify a</u> <u>location</u> checkbox and press the <u>Browse</u> button. Choose the path <u>C:\Program Files\MAXxxxxx\</u> <u>R10906</u> (where xxxxx represents the Maxim IC part number on the EV kit being evaluated). Press the Next button when finished.

Add New Hardware Wizard	
	Windows will search for new drivers in its driver database on your hard drive, and in any of the following selected locations. Click Next to start the search.         □ Eloppy disk drives         □ CD-ROM drive         □ Microsoft Windows Update         ☑ Specify a location:         □ C\Program Files\MAXxxxxx\R10906         ☑ Browse
	< <u>B</u> ack Next > Cancel

Figure 25. Windows 98SE: Add New Hardware Wizard | Specify Location Window

 The <u>Add New Hardware Wizard I Search</u> window appears (Figure 26). Press the <u>Next</u> button once the driver has been located.

# Add New Hardware Wizard Windows driver file search for the device: USB Serial Converter Windows is now ready to install the best driver for this device. Click Back to select a different driver, or click Next to continue. Location of driver: C:\PROGRA~1\MAXXXXX\R10906\FTDIBL

Figure 26. Windows 98SE: Add New Hardware Wizard | Search Window

- 5) The next window is the <u>Add New Hardware Wizard</u> <u>I Complete</u> window (Figure 27). Press the <u>Finish</u> button to complete the driver installation.
- 6) When finished, return to step 8 of the USBTO232 *Quick Start* section.



Figure 27. Windows 98SE: Add New Hardware Wizard | Complete Window

**USBT0232** 

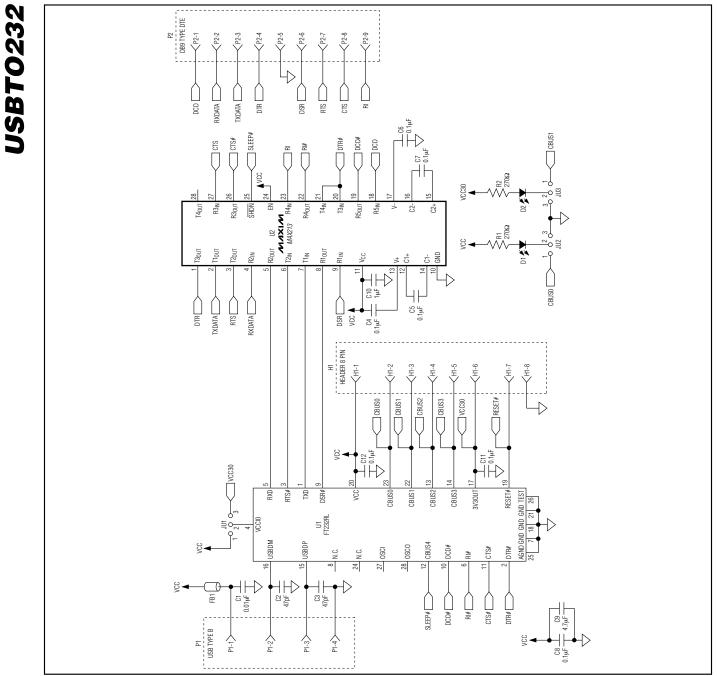


Figure 28. USBTO232 Schematic

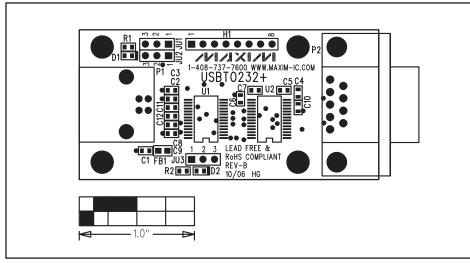


Figure 29. USBTO232 Component Placement Guide—Component Side

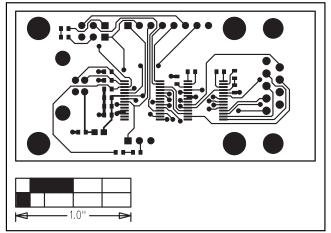


Figure 30. USBTO232 PCB Layout—Component Side

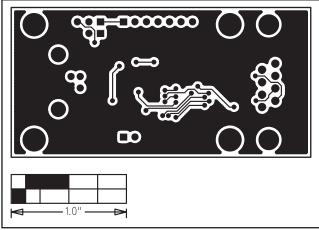


Figure 31. USBTO232 PCB Layout—Solder Side

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