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MAX1284 Evaluation Kit/Evaluation System

Evaluate: MAX1284

General Description

The MAX1284 evaluation system (EV system) is a complete data-acquisition system consisting of a MAX1284 evaluation kit (EV kit), Maxim 68HC16MODULE-DIP microcontroller (μC) module, and USBT0232. The MAX1284 is a high-speed, 12-bit data acquisition system. Windows® 98/2000/XP-compatible software provides a handy user interface to exercise the MAX1284's features.

Order the complete EV system (MAX1284EVC16) for comprehensive evaluation of the MAX1284 using a PC. You can order the EV kit (MAX1284EVKIT) if the 68HC16MODULE-DIP module has already been purchased with a previous Maxim EV system, or for custom use in other μC-based systems.

Windows is a registered trademark of Microsoft Corp.

Component Lists

MAX1284 EV System

PART	QTY	DESCRIPTION
MAX1284EVKIT	1	MAX1284 EV kit
68HC16MODULE-DIP	1	68HC16 μC module
USBT0232+	1	USB-to-COM port adapter board

+Denotes lead-free and RoHS-compliant.

MAX1284 EV Kit

DESIGNATION	QTY	DESCRIPTION
C1	1	0.01μF ceramic capacitor
C2, C3	2	0.1μF ceramic capacitors
C4	1	4.7μF tantalum capacitor
C5	1	10μF, 10V tantalum capacitor
J1	1	2x20 right-angle socket
JU1	1	2-pin header
JU2	1	3-pin header
R1	1	1kΩ ±5% resistor
TP1	1	6-pin header
U1	1	MAX1284BCSA (8-pin SO)
—	1	PCB: MAX1284 Evaluation Kit

MAX1284 EV Kit Files

FILE	DESCRIPTION
INSTALL.EXE	Installs the EV kit files on your computer
MAX1284.EXE	Application program
KIT1284.C16	Software loaded into 68HC16 μC

Features

♦ **Proven PCB Layout**
♦ **Convenient On-Board Test Points**
♦ **Data-Logging Software**
♦ **Fully Assembled and Tested**
♦ **EV Kit Software Supports Windows 98/2000/XP with RS-232/COM Port**
♦ **EV Kit Software Supports Windows 2000/XP with USB Port**

Ordering Information

PART	TEMP. RANGE	INTERFACE TYPE
MAX1284EVKIT	0°C to +70°C	User supplied
MAX1284EVC16	0°C to +70°C	Windows software

Note: The MAX1284 software is designed for use with the complete MAX1284EVC16 EV system (includes 68HC16MODULE-DIP module, USBT0232, together with MAX1284EVKIT). If the MAX1284 evaluation software will not be used, the MAX1284EVKIT board can be purchased by itself, without the μC.

Quick Start

Recommended Equipment (USB Port/PC Connection Option)

Before beginning, the following equipment is needed:

- MAX1284 EV system:
  MAX1284 EV kit
  68HC16MODULE-DIP
  USBTO232 (USB cable included)

- A small DC power supply, such as a 12VDC, 0.25A plug-in transformer or a 9V battery

- A user-supplied Windows 2000/XP computer with an available USB port to connect to the USBTO232 board

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.

Connections and Setup

The MAX1284 EV kit is fully assembled and tested. Follow the steps below to verify board operation. **Caution: Do not turn on the power until all connections are completed.**

1) Visit the Maxim website (www.maxim-ic.com) to download the latest version of the USBTO232 User Guide. Follow the steps in the USBTO232 User Guide *Quick Start* section and return to step 2 of this *Quick Start* section when finished.

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2) Carefully connect the boards by aligning the 40-pin header of the MAX1284 EV kit with the 40-pin connector of the 68HC16MODULE-DIP module, both boards component side up. Gently press them together. The two boards should be flush against one another.

3) Ensure that jumper JU1 is open and jumper JU2 is in the 1-2 position.

4) Connect a +7VDC to +20VDC power source to the µC module at the terminal block located next to the on/off switch, along the top-edge of the µC module. Observe the polarity marked on the board.

5) Connect the USBTO232 board to the 68HC16MODULE-DIP module if you have not done so already.

6) The MAX1284 EV kit software should have already been downloaded and installed in the USBTO232 Quick Start.

7) Start the MAX1284 program by opening its icon in the **Start | Programs** menu.

8) Turn on the power supply and slide SW1 to the ON position on the 68HC16MODULE-DIP module. Press the **OK** button to automatically connect and download the file KIT1284.C16 to the module.

9) Apply an input signal between AIN and GND. Observe the readout on the screen.

Recommended Equipment (RS-232-to-COM Port/PC Connection Option)
Before beginning, the following equipment is needed:

• MAX1284 EV system:
  MAX1284 EV kit
  68HC16MODULE-DIP

• A small DC power supply, such as a 12VDC, 0.25A plug-in transformer or a 9V battery

• A user-supplied Windows 98/2000/XP computer with an available serial communications port, preferably a 9-pin plug

• A serial cable to connect the computer's serial port to the 68HC16MODULE-DIP

Connections and Setup
The MAX1284 EV kit is fully assembled and tested. Follow the steps below to verify board operation. **Caution: Do not turn on the power until all connections are completed.**

1) Visit the Maxim website (www.maxim-ic.com/evkit-software) to download the latest version of the EV kit software. Save the EV kit software to a temporary folder and uncompress the file (if it is a .zip file).

2) Install the MAX1284 EV kit software on your computer by running the INSTALL.EXE program. The program files are copied and icons are created for them in the Windows **Start | Programs** menu.

3) Carefully connect the boards by aligning the 40-pin header of the MAX1284 EV kit with the 40-pin connector of the 68HC16MODULE-DIP module, both boards component side up. Gently press them together. The two boards should be flush against one another.

4) Ensure that jumper JU1 is open and jumper JU2 is in the 1-2 position.

5) Connect a +7VDC to +20VDC power source to the µC module at the terminal block located next to the on/off switch, along the top-edge of the µC module. Observe the polarity marked on the board.

6) Connect a cable from the computer's serial port to the µC module. If using a 9-pin serial port, use a straight-through, 9-pin female-to-male cable. If the only available serial port uses a 25-pin connector, a standard 25-pin-to-9-pin adapter will be required. The EV kit software checks the modem status lines (CTS, DSR, and DCD) to confirm that the correct port has been selected.

7) Start the MAX1284 program by opening its icon in the **Start | Programs** menu.

8) Turn on the power supply and slide SW1 to the ON position. Select the correct serial port and press **OK**. The program will automatically download KIT1284.C16 to the module.

9) Apply an input signal between AIN and GND. Observe the readout on the screen.

Table 1. Jumper JU1 Functions

JUMPER	POSITION	FUNCTION
JU1	Closed	$\overline{SHDN}$ driven by µC; JU2 must be open
	Open*	$\overline{SHDN}$ set by JU2
JU2	1-2*	Operate
	2-3	Shutdown

*Default position.

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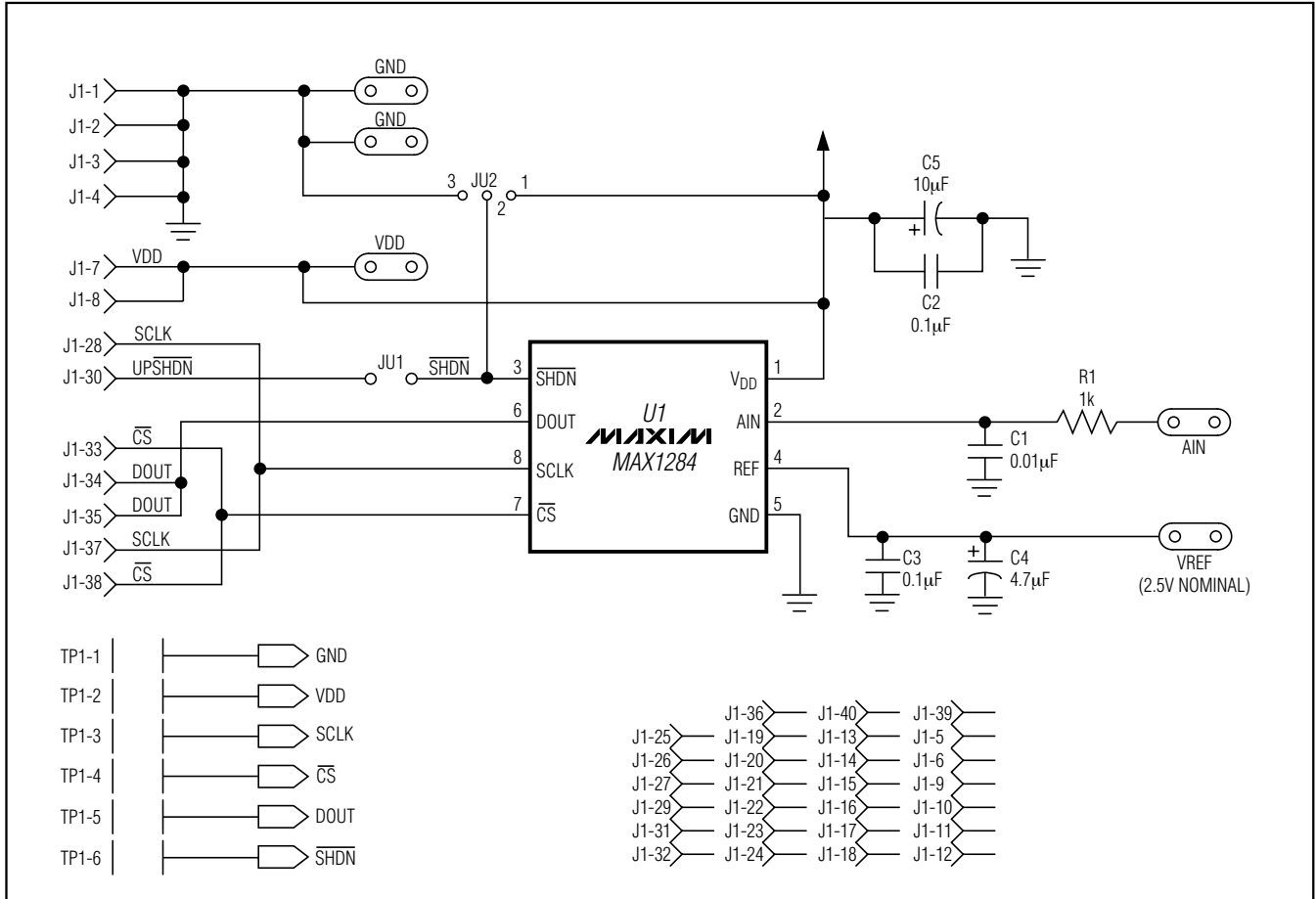# MAX1284 Evaluation Kit/Evaluation System

Figure 1. MAX1284 EV Kit Schematic Diagram

Detailed Description

MAX1284 Stand-Alone EV Kit

The MAX1284 EV kit provides a proven PCB layout to evaluate the MAX1284. It must be interfaced to appropriate timing signals for proper operation. Connect +5V to VDD, and connect the ground return to GND (Figure 1). Refer to the MAX1284 data sheet for timing requirements.

MAX1284 EV System

The MAX1284 EV system operates from a user-supplied +7VDC to +20VDC power supply. Windows 98/2000/XP-compatible software running on a PC interfaces to the EV system board through the computer's serial communications port. See the *Quick Start* section for setup and operating instructions.

Description of Software

The evaluation software's main window controls the serial-clock speed and sample rate. It displays the voltage and output code as well as some statistics of the input signal. A separate graph window shows the data changing in real time. The update rate is limited to about 10 samples per second, due to COM port bandwidth limitations.

Statistics

The **Minimum** and **Maximum** fields show the highest and lowest readings acquired. The **Average** field shows a running mean based on the equation $a_i = (k)(x_i) + (1 - k)(a_{i-1})$. The **Clear** button resets the statistics. To remove offset errors, first apply 0V to the active input channel, clear statistics, acquire some samples, and then check **Tare**. This average offset voltage will now be subtracted from all subsequent measurements.

Sampling

Choose the desired sampling rate (QSPI™ Clock), sampling size (**Sample!** menu item), and press **Begin Sampling!** (in Sample! pop-up window). Sample size is restricted to a power of 2 to permit FFT processing once the data is saved to a file. After the samples have been collected, the data is automatically uploaded to the host and graphed. Once displayed, the data can be saved optionally to a file.

Saving Graphs to Disk

Data in the real-time graph and in sampled data graphs may be saved to a file. Only the raw output codes are saved, but voltages may be inferred, based on the reference voltage and the maximum code value.

Evaluating Shutdown

The evaluation software configures the 68HC16's QSPI submodule to continuously read data from the MAX1284 into the 68HC16. The sample rate is controlled by the QSPI clock. To evaluate power-saving modes, these automatic updates must be stopped. First, set the QSPI clock control to **STOP**. This reconfigures the 68HC16's QSPI submodule to stop driving the serial clock. Second, in the evaluation software's main window, uncheck the **Read Every...msec** checkbox. If evaluating the hardware shutdown, move jumper JU2 to the 2-3 position.

Reference Voltage

The evaluation software assumes a 2.5V reference voltage, unless otherwise specified. Refer to the MAX1284 data sheet for more information. To override this value, type the new reference voltage into the **Vref** edit box and press the **Set Vref** button.

Detailed Hardware Description

The MAX1284 (U1) is a high-speed, 12-bit data-acquisition system. Resistor R1 (1kΩ) and capacitor C1 (0.01µF) form a single-pole, low-pass anti-aliasing filter with a nominal 10µs time constant and a corner frequency of approximately 16kHz. C3 and C4 bypass the analog-to-digital converter's (ADC's) voltage reference. When plugged into the 68HC16MODULE, the V_{DD} circuit is powered by +5V (Figure 1; refer to the MAX1284 IC data sheet).

Troubleshooting

Problem: No output measurement. System seems to report zero voltage or fails to make a measurement.

1) Check the V_{DD} supply voltage.

2) Check the reference voltage using a DVM.

3) Use an oscilloscope to verify that the conversion-start signal is being strobed. Verify that $\overline{SHDN}$ is being driven high.

Problem: Measurements are erratic, unstable; poor accuracy.

1) Check the reference voltage using a DVM.

2) Use an oscilloscope to check for noise.

3) When probing for noise, keep the oscilloscope ground return lead as short as possible, preferably less than 1/2in (10mm).

QSPI is a trademark of Motorola, Inc.

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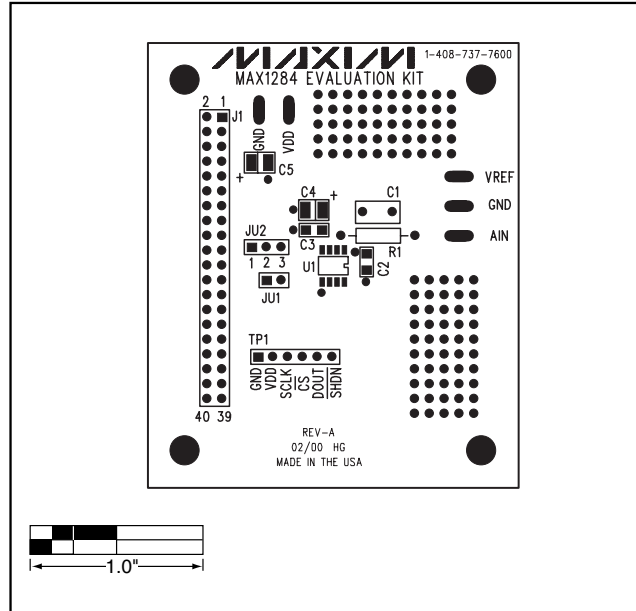*Figure 2. MAX1284 EV Kit Component Placement Guide—Component Side*
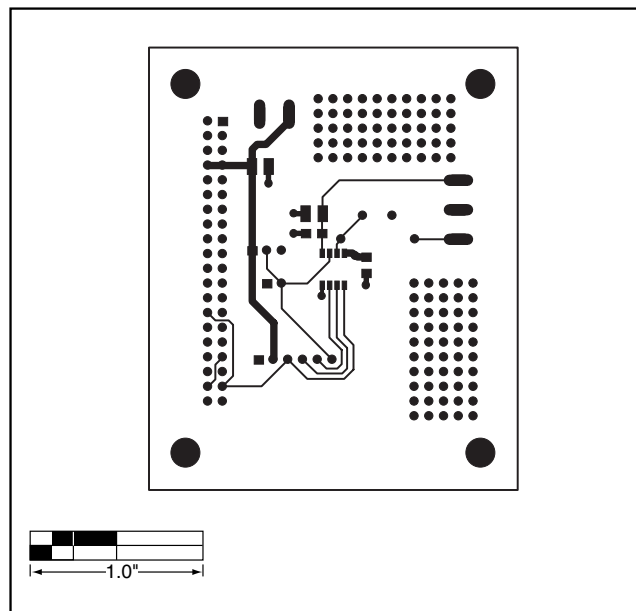
Figure 3. MAX1284 EV Kit PCB Layout—Component Side

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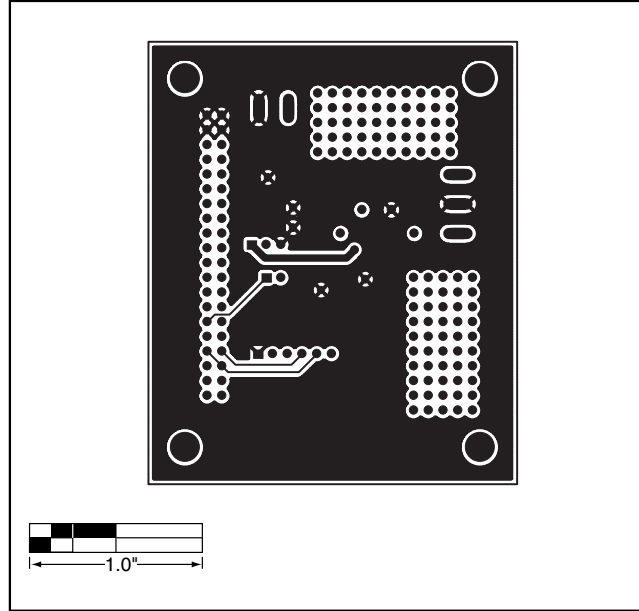

Figure 4. MAX1284 EV Kit PCB Layout—Solder Side

_____**Revision History**

Pages changed at Rev 1: Title change—all pages, 1–6