

# MAXIM

## MAX1282 Evaluation System

### General Description

The MAX1282 evaluation system (EV system) is a complete four-channel data-acquisition system consisting of a MAX1282 evaluation kit (EV kit) and a Maxim 68HC16MODULE-DIP microcontroller ( $\mu$ C) module. The MAX1282 is a high-speed, 12-bit data-acquisition system. Windows<sup>®</sup> 95/98 software provides a handy user interface to exercise the MAX1282's features.

Order the complete EV system (MAX1282EVC16) for comprehensive evaluation of the MAX1282 using a PC. Order the EV kit (MAX1282EVKIT) if the 68HC16MODULE-DIP module has already been purchased with a previous Maxim EV system, or for custom use in other  $\mu$ C-based systems.

### MAX1282EVC16 System

| PART             | QTY | DESCRIPTION           |
|------------------|-----|-----------------------|
| MAX1282EVKIT     | 1   | MAX1282 EV kit        |
| 68HC16MODULE-DIP | 1   | 68HC16 $\mu$ C module |

### MAX1282EVKIT Component List

| DESIGNATION | QTY | DESCRIPTION                         |
|-------------|-----|-------------------------------------|
| C1–C4, C10  | 5   | 0.01 $\mu$ F ceramic capacitors     |
| C9          | 1   | 4.7 $\mu$ F tantalum capacitor      |
| C11, C13    | 2   | 0.1 $\mu$ F ceramic capacitors      |
| C12, C14    | 2   | 10 $\mu$ F, 10V tantalum capacitors |
| J1          | 1   | 2x20 right-angle socket             |
| JU1         | 1   | 2-pin header                        |
| JU2         | 1   | 3-pin header                        |
| R1–R4       | 4   | 300 $\Omega$ $\pm$ 5% resistors     |
| R9, R10     | 2   | 10 $\Omega$ $\pm$ 1% resistors      |
| TP1         | 1   | 8-pin header                        |
| U1          | 1   | Maxim MAX1282BCUE (16-pin TSSOP)    |
| None        | 1   | PC board, MAX1282 EV kit            |
| None        | 1   | 3-1/2in software disk, MAX1282      |
| None        | 1   | MAX1282 EV kit data sheet           |
| None        | 1   | MAX1282 data sheet                  |

Windows 95/98 is a registered trademark of Microsoft Corp.

### Features

- ◆ Proven PC Board Layout
- ◆ Convenient On-Board Test Points
- ◆ Data-Logging Software
- ◆ Fully Assembled and Tested

### Ordering Information

| PART         | TEMP. RANGE  | INTERFACE        |
|--------------|--------------|------------------|
| MAX1282EVKIT | 0°C to +70°C | User supplied    |
| MAX1282EVC16 | 0°C to +70°C | Windows software |

**Note:** MAX1282 software is designed for use with the complete EV system, MAX1282EVC16 (includes 68HC16MODULE-DIP module and MAX1282EVKIT). If the MAX1282 evaluation software will not be used, the MAX1282EVKIT board can be purchased by itself, without the  $\mu$ C.

### MAX1282EVKIT Files

| FILE        | DESCRIPTION                                |
|-------------|--|
| INSTALL.EXE | Installs the EV kit files on your computer |
| MAX1282.EXE | Application program                        |
| KIT1282.C16 | Software loaded into 68HC16 $\mu$ C        |

### Recommended Equipment

- Maxim MAX1282EVC16 (contains MAX1282EVKIT board and 68HC16MODULE-DIP)
- A small DC power supply, such as a 12VDC 0.25A plug-in transformer or a 9V battery
- An IBM PC-compatible computer running Windows 95/98
- A spare serial communications port, preferably a 9-pin plug
- A serial cable to connect the computer's serial port to the 68HC16MODULE-DIP

### Quick Start

- 1) Carefully connect the boards by aligning the 40-pin header of the MAX1282 EV kit with the 40-pin connector of the 68HC16MODULE-DIP module. Gently press them together. The two boards should be flush against one another.

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- 2) Ensure that JU1 is closed and JU2 is in the 1-2 position (Table 1).
- 3) Connect a 7VDC to 20VDC power source to the  $\mu$ C module at the terminal block located next to the on/off switch, along the top edge of the  $\mu$ C module. Observe the polarity marked on the board.
- 4) Connect a cable from the computer's serial port to the  $\mu$ C 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, DCD) to confirm that the correct port has been selected.
- 5) Install the MAX1282 EV kit software on your computer by running the INSTALL.EXE program on the floppy disk. The program files are copied and icons are created for them in the Windows Start menu.
- 6) Start the MAX1282 program by opening its icon in the Start menu.
- 7) The program will prompt you to connect the  $\mu$ C module and turn its power on. Slide SW1 to the ON position. Select the correct serial port, and press OK. The program will automatically download KIT1282.C16 to the module.
- 8) Apply input signal between CH0 and COM. Observe the readout on the screen.

## Detailed Description

### MAX1282 Stand-Alone EV Kit

The MAX1282EVKIT provides a proven PC board layout to evaluate the MAX1282. It must be interfaced to appropriate timing signals for proper operation. Connect +5V to VDD, and connect ground return to GND (Figure 1). Refer to the MAX1282 data sheet for timing requirements.

### MAX1282 EV System

The MAX1282EVC16 EV system operates from a user-supplied 7VDC to 20VDC power supply. Windows 95/98 software running on an IBM PC interfaces to the EV system board through the computer's serial communications port. See the *Quick Start* section for set-up 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 input signal statistics. A separate graph window shows the data chang-

ing in real time. The update rate is limited to about 10 samples per second, due to COM port bandwidth limitations.

### Controls

The control word is divided into several fields. To change the active control word, drop down the appropriate field's combo box and select the desired option. If the QSPI™ clock is set to STOP, then configuration data will not be sent until the READ button is pressed.

### Statistics

The Minimum and Maximum fields show the highest and lowest readings acquired. The Average field shows a running mean. 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 two 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 is graphed. Once displayed, the data can optionally be saved 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.

### Scanning All Channels Input Signal

To scan through all channels, select SCAN from the Input menu.

Table 1. Jumper Functions

| JUMPER | POSITION | FUNCTION                               |
|--------|----------|--|
| JU1    | Closed*  | COM tied to GND                        |
|        | Open     | COM must be connected to analog common |
| JU2    | 1-2*     | Operate                                |
|        | 2-3      | Shutdown                               |

\*Default configuration

QSPI is a trademark of Motorola, Inc.

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## **Evaluating Shutdown**

The evaluation software configures the 68HC16's QSPI submodule to continuously read data from the MAX1282 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 check-box. Next, choose the desired software power-down control word, and press the Read button to send the new configuration to the MAX1282. 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 MAX1282 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. Note: This new VREF value is used only by the evaluation software and does not physically change the reference voltage.

## **Detailed Hardware Description**

U1, the MAX1282, is a high-speed, multichannel, 12-bit data-acquisition system. Resistors R1–R4 and capacitors C1–C4 form single-pole, lowpass anti-aliasing filters with a nominal 3 $\mu$ s time constant and a corner frequency of approximately 50kHz. C9 and C10 bypass the ADC's voltage reference and reference buffer. When plugged into the 68HC16MODULE, the VDD circuit is powered by +5V. (See Figure 1 and refer to the MAX1282 data sheet.)

## **Troubleshooting**

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

Check the VDD supply voltage. Check the reference voltage using a digital voltmeter (DVM). Use an oscilloscope to verify that the conversion-start signal is being strobed. Verify that SHDN is being driven high.

**Problem: Measurements are erratic, unstable; poor accuracy.**

Check the reference voltage using a DVM. Use an oscilloscope to check for noise. When probing for noise, keep the oscilloscope ground return lead as short as possible, preferably less than 1/2in (10mm).

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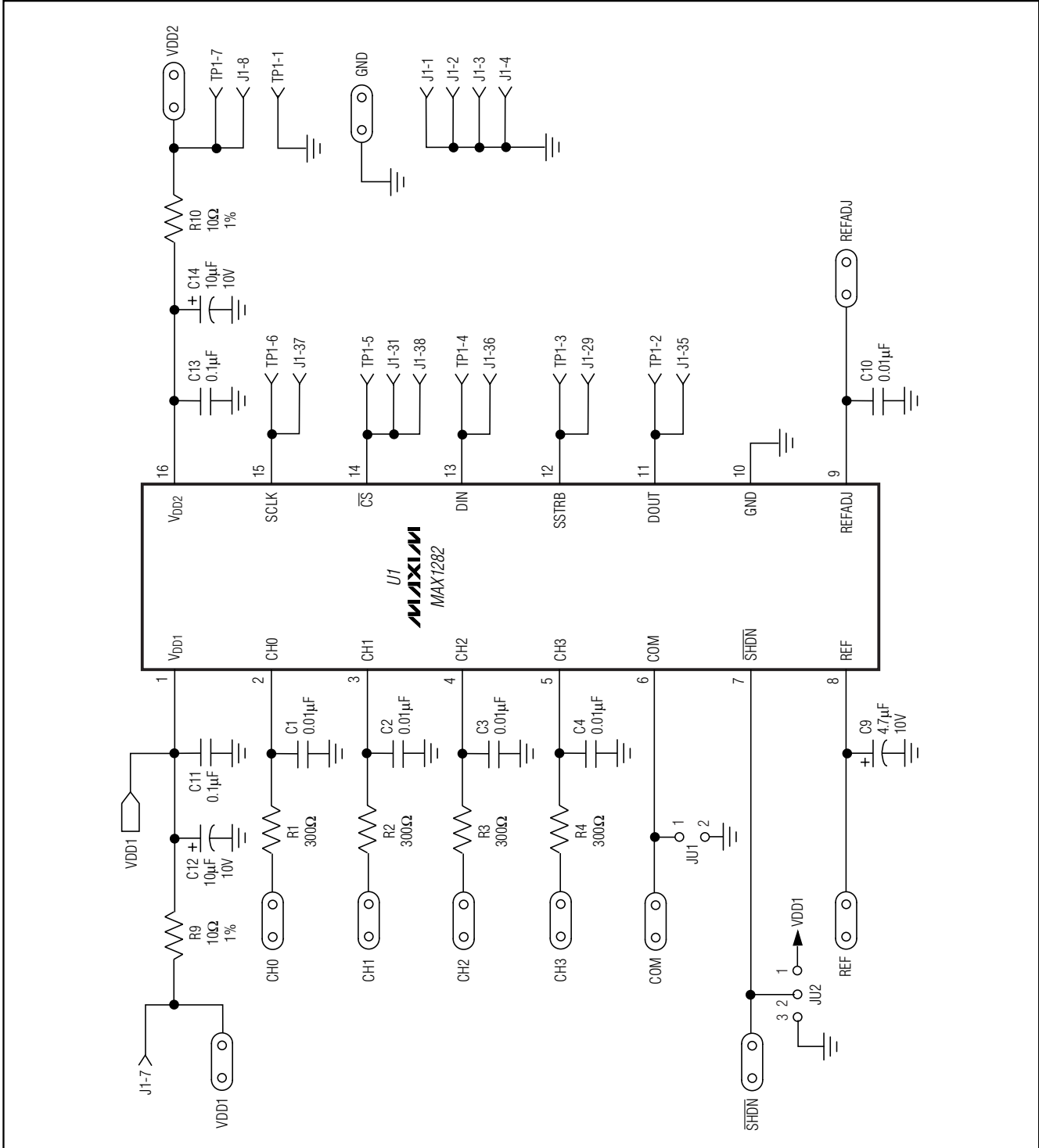


Figure 1. MAX1282 EV Kit Schematic

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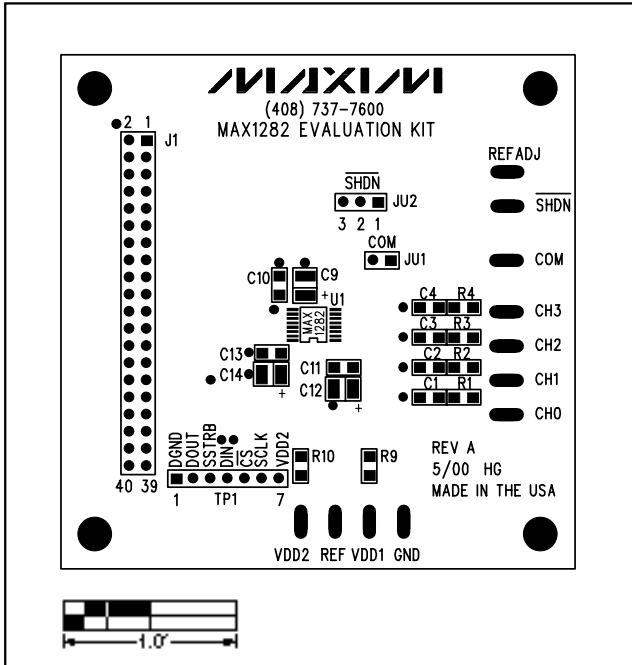


Figure 2. MAX1282 EV Kit Component Placement Guide—Component Side

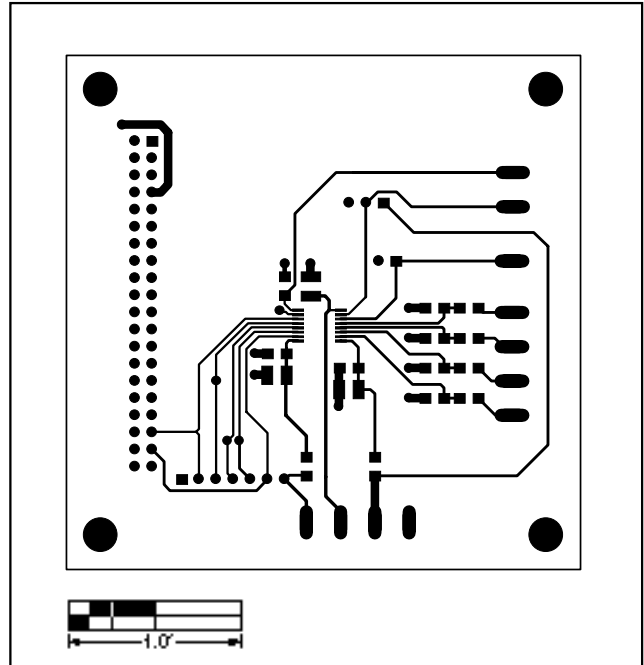


Figure 3. MAX1282 EV Kit PC Board Layout—Component Side

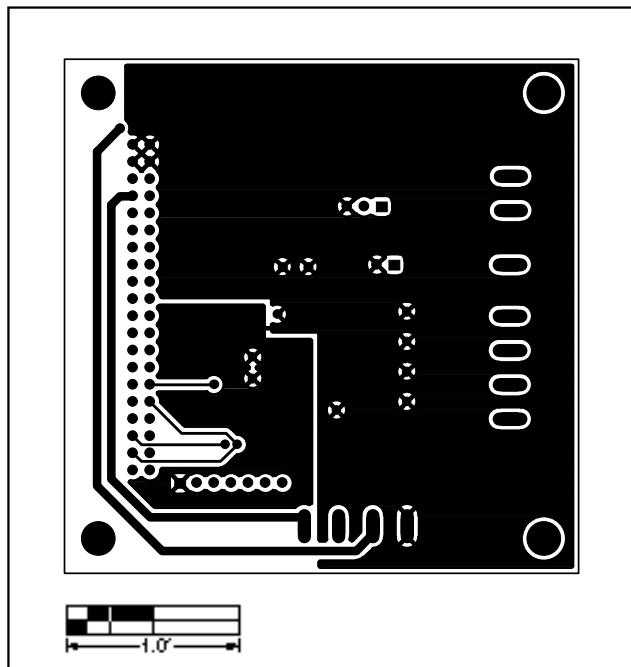


Figure 4. MAX1282 EV Kit PC Board Layout—Solder Side

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## NOTES

*Maxim cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim product. No circuit patent licenses are implied. Maxim reserves the right to change the circuitry and specifications without notice at any time.*

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