19-2058; Rev 0; 5/01

MAXIM

MAX1420 Evaluation Kit

General Description

The MAX1420 evaluation kit (EV kit) is a fully assembled and tested circuit board that contains all the components necessary to evaluate the performance of the MAX1420, MAX1421, or MAX1422, 12-bit, +3.3V, analog-to-digital converters (ADCs). The MAX1420/MAX1421/MAX1422 ADCs accept 2Vp-p differential analog inputs. The offset binary digital output produced by the ADC can be easily sampled with a user-provided high-speed logic analyzer or data-acquisition system. The EV kit comes with the 60Msps part (MAX1420) installed. Order a free sample of the MAX1421CCM or MAX1422CCM to evaluate the 40Msps or 20Msps parts.

Features

- ♦ **Up to 60Msps Sampling Rate**
- ♦ **Low Voltage, Low Power Operation**
- ♦ **Clock-Shaping Circuitry**
- ♦ **Easy Data Capture Configuration**
- ♦ **Fully Assembled and Tested**

Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX1420EVKIT	0°C to +70°C	48 TQFP

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C3, C39, C52	4	1.0µF, 16V, X7R, 1206 ceramic capacitors Taiyo Yuden EMK316BJ105KF Murata GRM42-6X7R105K016 TDK C3216X7R1C105M
C2, C4, C38	3	10µF, 6.3V, X5R, 1206 ceramic capacitors Taiyo Yuden JMK316BJ106KL Murata GRM42-6X5R106K6.3 TDK C3216X5R0J106K
C5, C7, C10, C14, C16, C18, C19, C29, C31, C33, C46, C50	12	0.1µF, 16V, X7R, 0603 ceramic capacitors Taiyo Yuden EMK107BJ104KA Murata GRM39X7R104K016 TDK C1608X7R1C104K
C6, C8, C9, C11, C13, C15, C17, C20, C22, C24, C26, C28, C30, C32, C34, C42, C51, C53	18	1000pF, 50V, X7R, 0402 ceramic capacitors
C12, C21, C23, C25, C27, C41, C47, C48, C56	9	0.22µF, 10V, X7R, 0603 ceramic capacitors Taiyo Yuden LMK107BJ224KA Murata GRM39X7R224K010
C35, C43, C44, C45	4	22pF, 50V, COG, 0402 ceramic capacitors
C36, C37, C55, C57, C59, C60	0	Not installed
C40	1	0.01µF, 50V, X7R, 0603 ceramic capacitor
C49	1	2200pF, 50V, X7R, 0603 ceramic capacitor
C54, C58	2	1.0µF, 10V, X7R, 0805 ceramic capacitors Taiyo Yuden LMK212BJ105KG Murata GRM40X7R105K010 TDK C2012X7R1A105K
J1	1	2 × 13-pin header
J2, J3	2	SMA connectors, vertical PC-mount
JU1, JU2	2	3-pin headers
JU3	0	Not installed
L1, L2, L3	3	Ferrite chip beads, 1206 Fair-Rite Products Corp. 2512069007Y0
R1, R2	2	10Ω ±5%, 1206 resistors
R3, R4, R5, R18, R23, R28–R40	18	49.9Ω ±1%, 0603 resistors
R6–R17	12	100Ω ±1%, 0603 resistors

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.

Component List (continued)

DESIGNATION	QTY	DESCRIPTION
R19, R20, R24, R25	4	10kΩ ±5%, 0805 resistors
R21, R22, R26, R27	4	24.9Ω ±1%, 0805 resistors
R41	1	820Ω ±1%, 0805 resistor
R42	1	620Ω ±1%, 0805 resistor
R43	0	Resistor not installed (short PC trace)
T1, T2	2	RF transformers Mini-Circuits T1-1T-KK81 Coilcraft WB2010-1-SM
U1	1	MAX1420CCM, 48-pin TQFP
U2	1	16-bit buffer/driver three-state output, 48-pin TSSOP IDT 74ALVC16244APA Texas Instruments SN74ALVCH16244ADGGR

Component Suppliers

SUPPLIER	PHONE	FAX
Coilcraft	847-639-6400	847-639-1469
Fair-Rite Products	888-324-7748	888-337-7483
IDT	800-345-7015	408-492-8674
Mini-Circuits	718-934-4500	718-934-7092
Murata	814-237-1431	814-238-0490
Taiyo Yuden	408-573-4150	408-573-4159
TDK	847-803-6100	847-803-6296
Texas Instruments	972-644-5580	214-480-7800

Part Selection Table

PART	SPEED (Msps)
MAX1420CCM	60
MAX1421CCM	40
MAX1422CCM	20

Quick Start

- DC power supplies
  Digital (+3.3V, 100mA)
  Analog (+3.3V, 100mA)
- Function generator with low-phase noise and low-jitter for clock input (e.g., HP 8662A or equivalent)
- Function generator for analog signal input (e.g., HP 8662A or equivalent)
- Logic analyzer or data-acquisition system (e.g., HP 1663EP, HP 16500C or equivalent)
- Bandpass filter selected for the input frequency of interest (e.g., TTE Q56 series or equivalent)

The MAX1420 EV kit is fully assembled and tested. Follow the steps below to verify board operation.
Do not turn on the power supply until all connections are completed.

1) Verify that the shunts are installed in the following positions:
   JU1 (2-3)
   JU2 (2-3)
2) Connect the clock function generator to the CLKIN SMA connector.
3) Connect the output of the analog signal function generator to the input of the bandpass filter.
4) Connect the output of the filter to the analog input SMA connector (VIN) of the MAX1420 EV kit.
5) Connect the logic analyzer to the square pin header (J1), where D11 is the MSB and D0 is the LSB.
6) Connect a +3.3V power supply to AVDD and VS+. Connect the ground terminal of this supply to AGND.
7) Connect a +3.3V power supply to DVDD1. Connect the ground terminal of this supply to DGND.
8) Turn on both power supplies.
9) Enable the function generators. Set the clock function generator to $2V_{p-p}$ and frequency ≤ 60MHz. Set the analog signal function generator to $2V_{p-p}$ and the desired frequency. The function generators should be phase locked to ensure optimum performance.
10) Set the logic analyzer to capture data on the rising edge of the clock.
11) Collect and evaluate the data using the logic analyzer.

Detailed Description

The MAX1420 EV kit is a fully assembled and tested circuit board that contains all the components necessary to evaluate the performance of the MAX1420, MAX1421, or MAX1422, 12-bit ADC at a maximum clock frequency of 60MHz. The EV kit is designed using a four-layer architecture, to optimize the performance of the MAX1420. Separate, nonoverlapping, analog and digital power planes minimize noise coupling between analog and digital signals.

For simple operation, the EV kit is specified to have +3.3V power supplies applied to analog and digital power planes. However, the digital supply can be operated down to +2.7V without compromising the board's performance. The logic analyzer's threshold should be adjusted accordingly.

Access to the digital outputs and the capture clock is provided through connector J1. The 26-pin connector interfaces directly to a user-provided logic analyzer or data-acquisition system.

Power Supplies

The MAX1420 EV kit requires separate analog and digital power supplies for best performance. A +3.3V power supply is used to power the analog portion (AVDD) of the MAX1420/MAX1421/MAX1422. A second separate +3.3V power supply is used to power the digital portion (DVDD1) of the MAX1420 and the buffer/driver, but it will work with a supply as low as +2.7V and as high as +3.6V. Enhanced dynamic performance can be achieved when the digital supply voltage is lower than the analog supply voltage.

Input Signal

The MAX1420 EV kit requires a single-ended analog input signal. This single-ended signal is converted to a differential signal by transformer T1. This differential signal is applied to the input pins (INP and INN) of the MAX1420. Both input pins receive half of the input signal swing applied at the SMA connector VIN centered at (VS+/2).

MAX1420 Enable and Power-Down

The MAX1420 EV kit features jumpers to enable and power-down the MAX1420 (JU1) or enable/disable its digital outputs (JU2). See Table 1 for jumper settings.

Voltage Reference

The MAX1420 requires a voltage reference to set the full-scale analog input range. The MAX1420 provides three modes of operation to set the reference voltage. In internal reference mode, the on-chip +2.048V bandgap reference is used. The pads CMLT, REFNT, REFPT, and REFIN must be left floating in this mode. In buffered external reference mode, a stable and accurate voltage must be applied at the REFIN pad to set the reference voltage. The pads CMLT, REFNT, and REFPT must be left floating in this mode. Connecting REFIN to AGND activates the unbuffered external reference mode. In this mode, the full-scale input range is determined by the voltage difference (V_{DIFF}) between the pads REFPT and REFNT. In this mode, CMLT must be biased between +1.568V to +1.733V. REFPT and REFNT should be biased to V_{CMLT} + (V_{DIFF}/2) and V_{CMLT} - (V_{DIFF}/2), respectively.

Output Buffer/Driver

The 74ALVC16244 buffers the MAX1420's digital outputs, and is able to drive capacitive loads without compromising the MAX1420's dynamic performance. The outputs of the buffer are connected to a 26-pin header (J1) located on the right side of the EV kit, where the user can connect a logic analyzer or data-acquisition system.

Clock

The MAX1420 EV kit requires a single-ended sinusoidal clock input signal. This single-ended signal is converted to a differential signal by transformer T2. The differential signal is then applied to the clock pins (CLK and $\overline{CLK}$) of the MAX1420. The clock frequency determines the sampling rate of the MAX1420. The frequency should be between 100kHz and 60MHz. The clock signal is also connected through the 74ALVC16244 to the 26-pin header J1, to be used by a logic analyzer or data-acquisition system.

Table 1. Jumper JU1 and JU2 Functions

JUMPER	SHUNT LOCATION	FUNCTION
JU1	1-2	MAX1420 in power-down mode
	2-3	MAX1420 operational
JU2	1-2	Digital outputs D0–D11 disabled (high impedance)
	2-3	Digital outputs D0–D11 enabled

MAX1420 Evaluation Kit

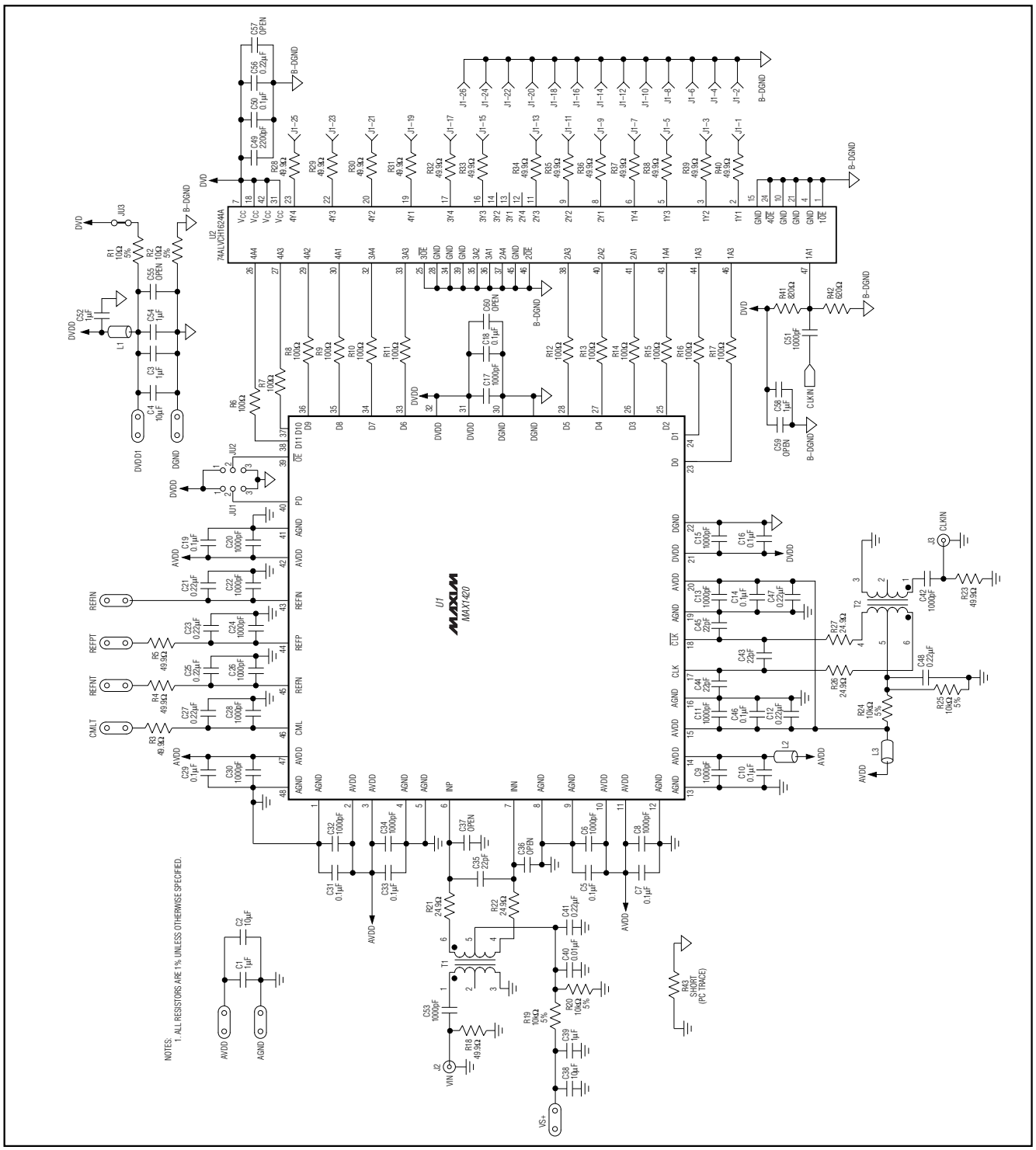


Figure 1. MAX1420 EV Kit Schematic

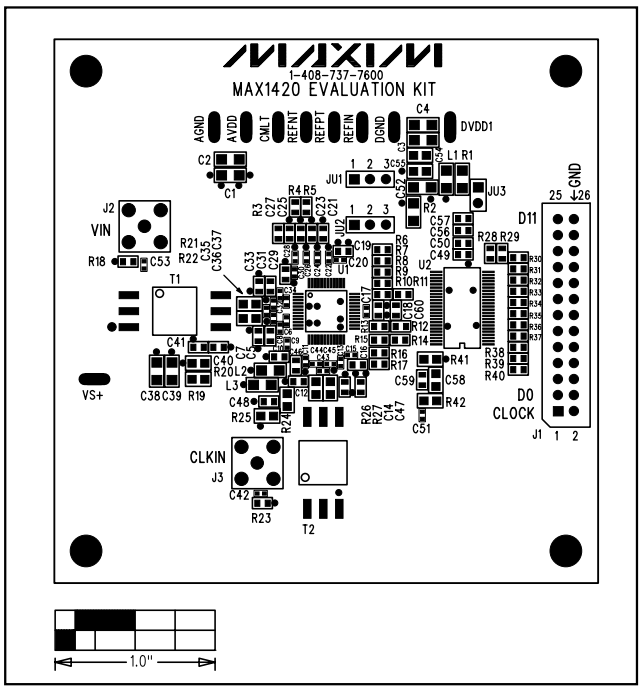


Figure 2. MAX1420 EV Kit Component Placement Guide—Component Side

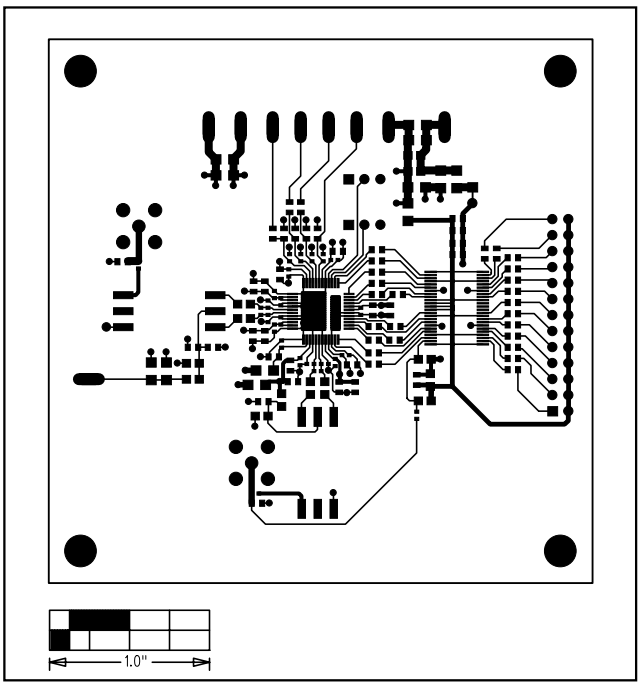


Figure 3. MAX1420 EV Kit PC Board Layout—Component Side

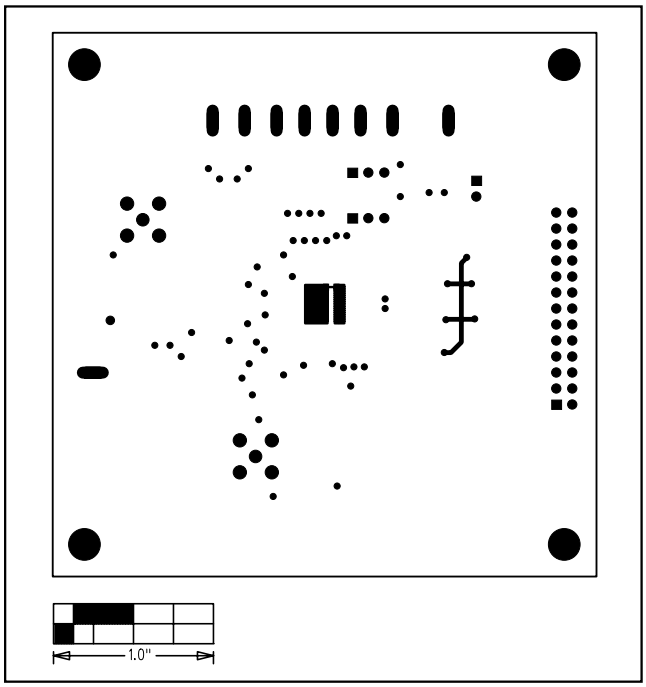


Figure 4. MAX1420 EV Kit PC Board Layout—Solder Side

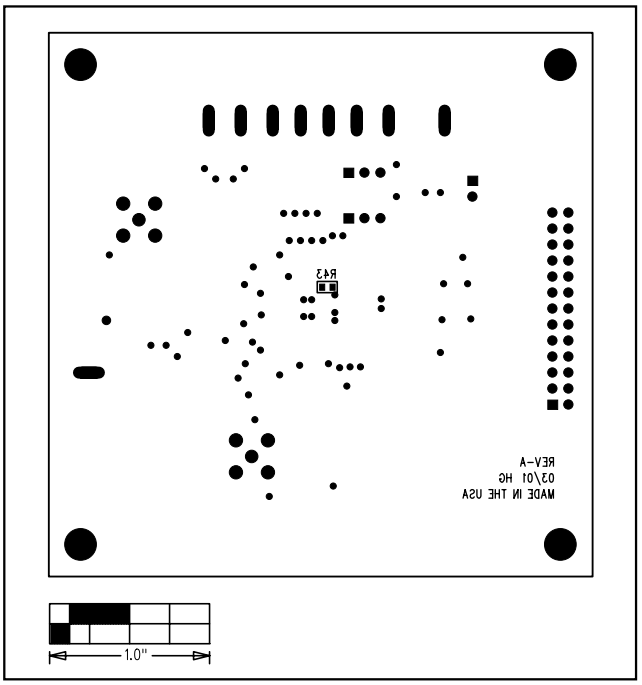


Figure 5. MAX1420 EV Kit Component Placement Guide—Solder Side

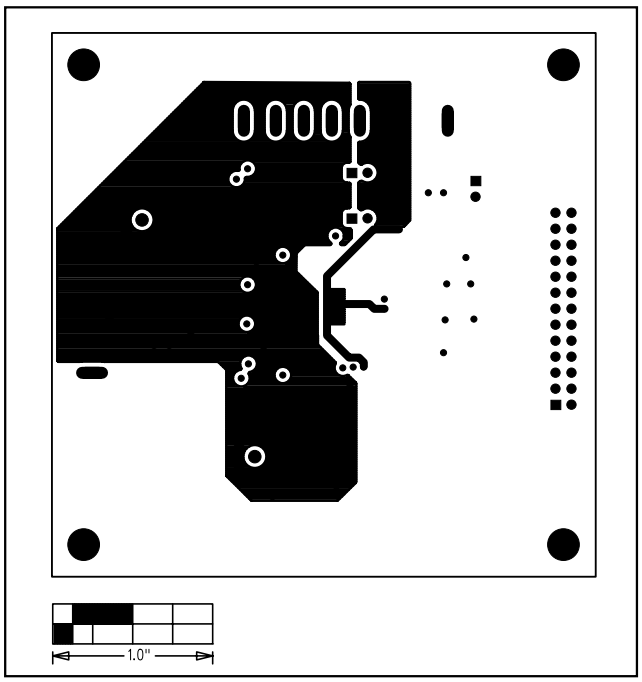


Figure 6. MAX1420 EV Kit PC Board Layout—Inner GND Layer

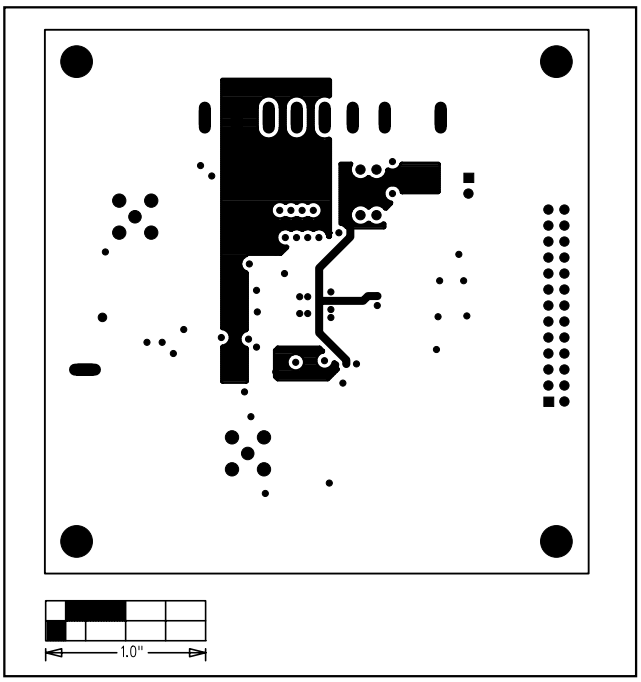


Figure 7. MAX1420 EV Kit PC Board Layout—Inner V_{CC} Layer

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.

© 2001 Maxim Integrated Products Printed USA MAXIM is a registered trademark of Maxim Integrated Products.