

## Evaluates: MAX22420, MAX22421, MAX22820, MAX22821

## MAX22420/MAX22421 Evaluation Kit

### General Description

The MAX22420/MAX22421 evaluation kits (EV kits) provide a proven design to evaluate the MAX22420/1 and MAX22820/1, a family of reinforced, ultra-low-power, two-channel digital isolators in an 8-pin NSOIC or 8-pin WSOIC package, respectively. Two types of evaluation boards are available to support all variants in the family in both 1/1 and 2/0 configurations. The MAX22421BSEVKIT# is fully assembled and tested, and it comes populated with the MAX22421BASA+ (Figure 1). The MAX2242XSEVKIT# is a generic board that has U1 unpopulated, allowing the user to select a device from the MAX22420/MAX22421 family (Figure 2). Both the evaluation boards support the 8-pin NSOIC package type only. See Table 1 EV kit options.

The MAX22820/MAX22821 is functionally equivalent to the MAX22420/MAX22421 but in an 8-pin WSOIC package. The EV kits can be used to evaluate the functionality and electrical performance of the MAX22820/MAX22821.

The EV kits should be powered from two independent isolated power supplies with nominal output voltage in the range of 1.71V to 5.5V. For evaluating the electrical parameters of the device without any isolation between the two sides, a single power supply can also be used.

The MAX2242XSEVKIT# comes with U1 unpopulated and supports the following digital isolators: MAX22420BASA+, MAX22420CASA+, MAX22420EASA+, MAX22420FASA+, MAX22421BASA+, MAX22421CASA+, MAX22421EASA+, and MAX22421FASA+.

**Note:** When ordering the MAX2242XS EV kit, the engineer should request a sample of the desired MAX22420/1 isolator IC that can be soldered to the PCB.

### Features

- Ultra-Low-Power Operation
- Data Transfer Rates up to 10Mbps
- MAX22420 with 2:0 Channel Configuration  
MAX22421 with 1:1 Channel Configuration
- SMA Connectors for Easy Connection to External Equipment
- Wide Power Supply Voltage Range from 1.71V to 5.5V
- Guaranteed up to 3kV<sub>RMS</sub> Isolation for the 60s
- -40°C to +125°C Temperature Range
- Proven PCB Layout

**Ordering Information** appears at end of data sheet.

### EV Kit Photos

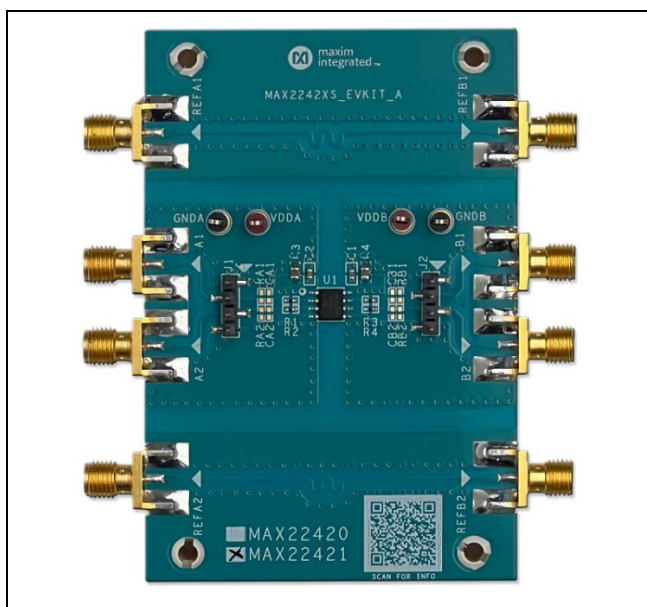


Figure 1. MAX22421BS EV kit

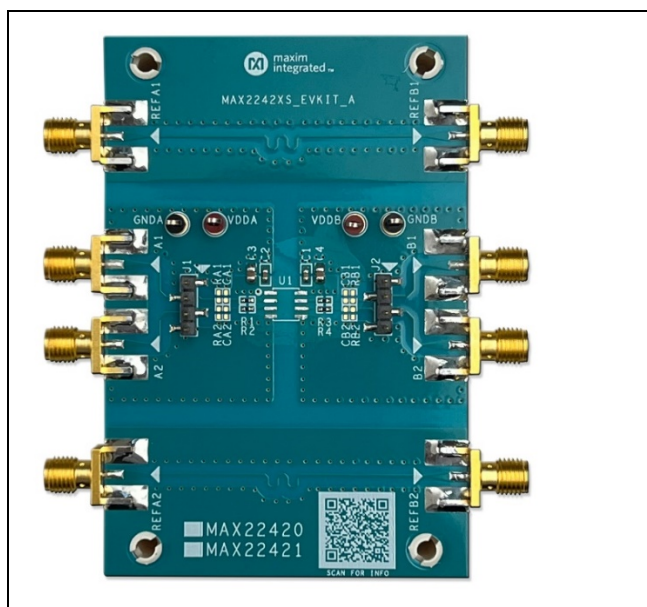


Figure 2. MAX2242XS EV kit

**Quick Start**

**Required Equipment**

- MAX22421BS or MAX2242XS EV kit
- MAX22420/MAX22421 device if U1 is not populated on the EV kit
- Two DC power supplies with an output range of 1.71V to 5.5V
- Signal/function generator
- Oscilloscope

**Procedure**

The MAX22421BS EV kit is fully assembled and ready for evaluation. The MAX2242XS EV kit has everything except the DUT (U1) installed. The user can install the desired version of the MAX22420/MAX22421 family of ultra-low-power reinforced digital isolators. Once installed, follow these steps to verify board functionality:

1. Connect one DC power supply between the EV kit's VDDA and GNDA test points; connect the other DC power supply between the VDDB and GNDB test points.
2. Set both DC power supply outputs between 1.71V and 5.5V, and then enable the power supply outputs.  
**Note:** *It is also possible to power the EV kit from a single power supply to test electrical parameters, but this invalidates the digital isolation of the IC.*
3. Connect the signal/function generator to an input SMA connector or test point of side A and observe the isolated signal on the corresponding side B output using an oscilloscope. On the MAX22421BS EV kit, SMA connectors A2 and B1 are inputs, and SMA connectors A1 and B2 are outputs. See [Table 2](#) for the SMA connector I/O configurations for different MAX22420/1 devices on the MAX2242XS EV kit.

**Table 1. EV Kit Options**

EVKIT PART #	TARGET DEVICE	PACKAGE TYPE	COMMENT
MAX22421BSEVKIT#	MAX22421BASA+	8-pin NSOIC	IC Populated
MAX2242XSEVKIT#	Not Populated	8-pin NSOIC	Request Samples of Target Device from Factory

**Table 2. MAX22421BS and MAX2242XS EV Kits Connector Configurations**

CONNECTOR	SHUNT POSITION	U1 DEVICE	
		MAX22420	MAX22421
<b>SIDE A</b>			
A1 (SMA)	—	IN1	OUT1
A2 (SMA)		IN2	IN2
REFA1 (SMA)		I/O on side A	
REFA2 (SMA)		I/O on side A	
J1	1	Test point or input header for V <sub>DDA</sub> .	
	2	Test point or input header for I/O; same as A1 SMA.	
	3	Test point or input header for I/O; same as A2 SMA.	
	4	Test point or input header for GNDA.	
<b>SIDE B</b>			
B1 (SMA)	—	OUT1	IN1
B2 (SMA)		OUT2	OUT2
REFB1 (SMA)		I/O on side B	

REFB2 (SMA)		I/O on side B
J2	1	Test point or input header for V <sub>DDB</sub> .
	2	Test point or input header for I/O; same as B1 SMA.
	3	Test point or input header for I/O; same as B2 SMA.
	4	Test point or input header for GNDB.

**Detailed Description of Hardware**

The MAX22420/MAX22421 EV kits allow the user to evaluate the features of the MAX22420/MAX22421 and MAX22820/MAX22821, a family of reinforced, ultra-low-power, two-channel, galvanic digital isolators.

**External Power Supplies**

The Power to the MAX22421BS and MAX2242XS EV kits is derived from two external sources which can both be between +1.71V and +5.5V. Connect one source between the V<sub>DDA</sub> and GNDA test points, and the other source between the V<sub>DDB</sub> and GNDB test points. Each supply can be set independently and can be present over the entire range from +1.71V to +5.5V, regardless of the level or presence of the other supply. The device level-shifts the data, transmitting them across the isolation barrier.

Two SMA connectors on each side of the board allow easy connections to signal generator(s) and an oscilloscope. A typical test setup is shown in [Figure 3](#).

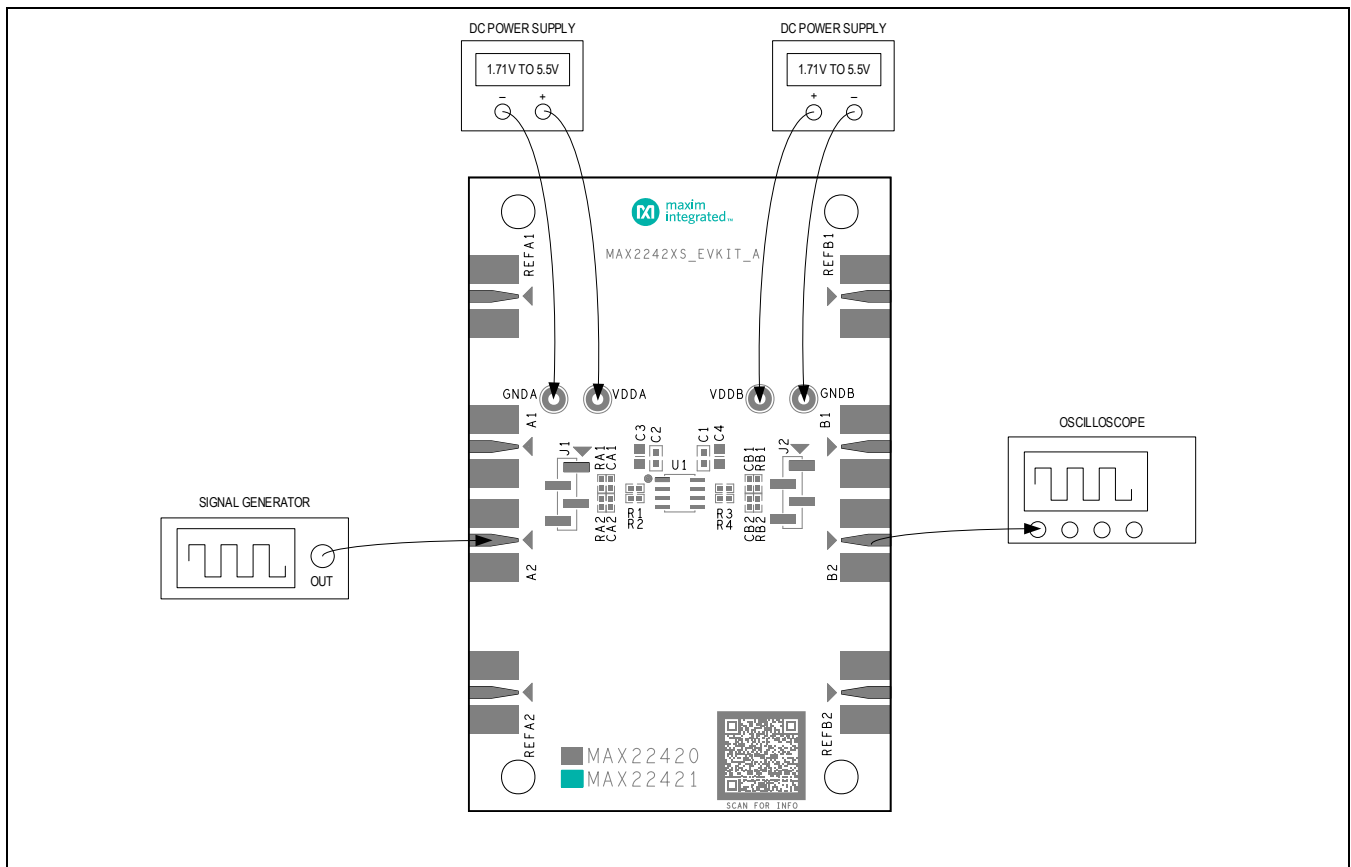


Figure 3. MAX22421BS EV kit typical test setup

### Decoupling Capacitors

Each power supply is decoupled with a 1 $\mu$ F ceramic capacitor in parallel with a 0.1 $\mu$ F ceramic capacitor, which is placed close to the U1 V<sub>DDA</sub> and V<sub>DDB</sub> pins.

### I/O Traces Impedance Control

The input and output traces of both isolation channels have an impedance control of 50 $\Omega$ . A 20 $\Omega$  series resistor is added to both input and output channels; along with the internal series resistance, it can provide 50 $\Omega$  impedance matching with external equipment such as function generators or oscilloscopes.

### Output Load

Each output has an unpopulated 0402 SMT resistor (RA1, RA2, RB1, RB2) and an unpopulated 0402 SMT capacitor (CA1, CA2, CB1, CB2) to GND\_ to allow different loads based on customer requirements.

### Calibration Channels

Two reference channels (REFA1–REFB1, REFA2–REFB2) are implemented on the EV kits to help calibrate the test setup for timing measurements such as propagation delay. Measure the propagation delay (t<sub>PD\_REF</sub>) using the reference channel first to determine the delay introduced by the test setup. Measure the propagation delay (t<sub>PD\_ISO</sub>) again using one of the MAX22420/1 data channels. The calibrated isolator delay is t<sub>PD\_ISO</sub> - t<sub>PD\_REF</sub>.

### U1 on the MAX2242XS EV Kit

U1 on the MAX2242XSEVKIT# is not installed. The user can install the desired version of MAX22420 or MAX22421. The MAX22420 features both channels transferring digital signals in one direction. SMA connectors A1 and A2 on side A are input connectors, B1 and B2 on side B are output connectors if the MAX22420 is installed as U1. The MAX22421 has one channel transmitting data in one direction and the other channel transmitting in the opposite direction. SMA connectors A2 and B1 are input connectors, A1 and B2 are output connectors if the MAX22421 is installed as U1. See [Table 2](#) for SMA connector I/O configurations with different U1 selections.

When installing U1, make sure pin 1 of the device is mounted onto pin 1 of U1 on the PCB. Pin 1 is located at the upper left corner of U1, denoted by a white dot on the silkscreen.

## Ordering Information

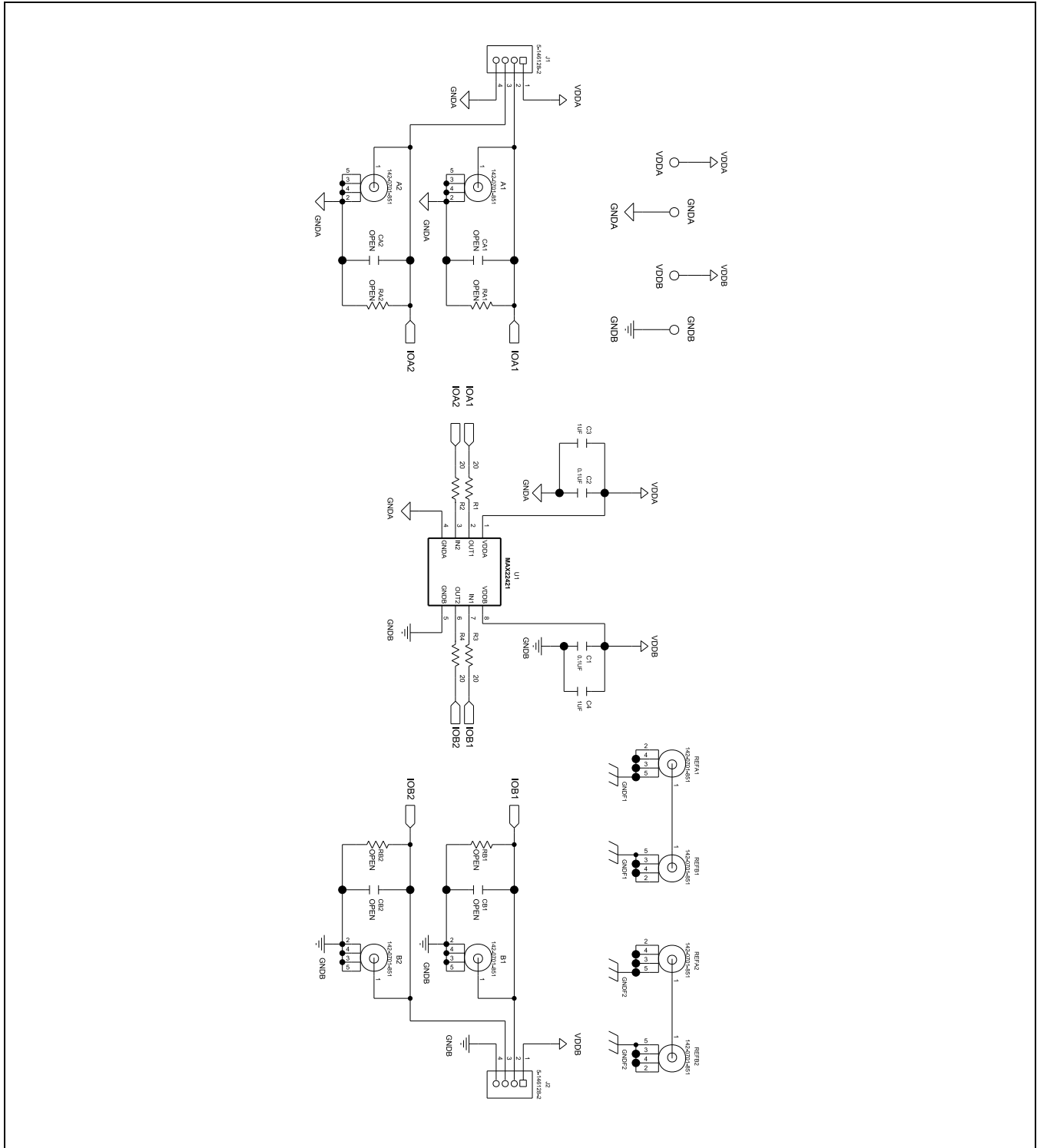
PART	TYPE
MAX22421BSEVKIT#	EV kit Installed with MAX22421BASA+
MAX2242XSEVKIT#	EV Kit for 8-pin NSOIC Package

#Denotes RoHS-compliance.

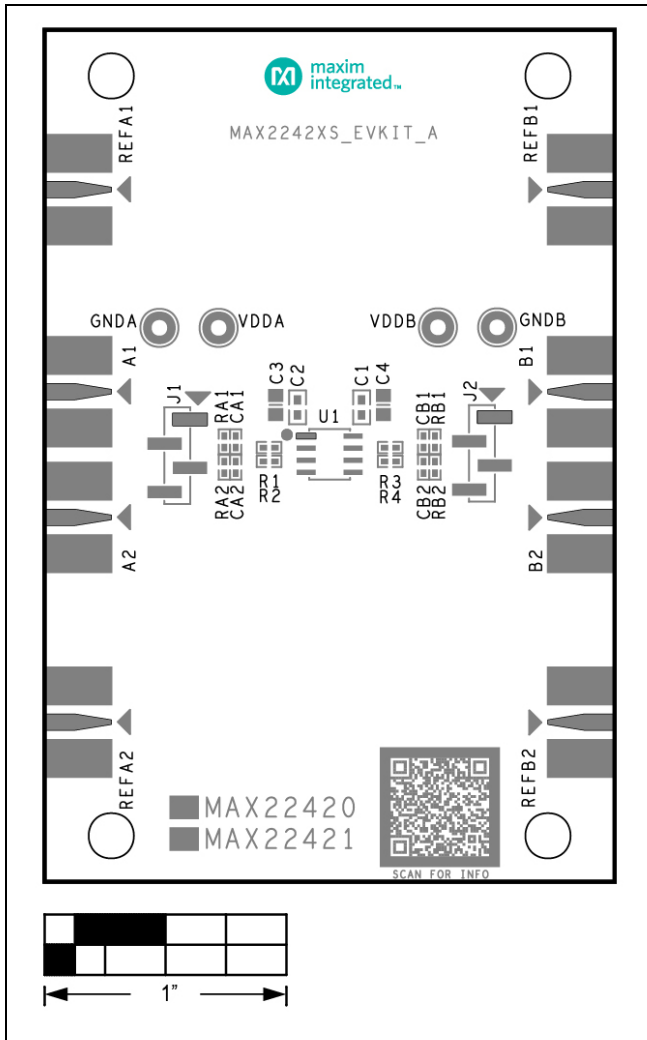
**MAX22420/MAX22421 EV Kit Bill of Materials**

ITEM	REF_DES	DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
1	A1, A2, B1, B2, REFA1, REFA2, REFB1, REFB2	—	8	142-0701-851	JOHNSON COMPONENTS	142-0701-851	CONNECTOR; END LAUNCH JACK RECEPTACLE; BOARDMOUNT; STRAIGHT THROUGH; 2PINS;
2	C1, C2	—	2	CC0603KRX7R0BB104; GRM188R72A104KA35; HMK107B7104KA; 06031C104KAT2A; GRM188R72A104K	YAGEO; MURATA; TAIYO YUDEN; AVX; MURATA	0.1UF	CAP; SMT (0603); 0.1UF; 10%; 100V; X7R; CERAMIC
3	C3, C4	—	2	GRM21BR71H105KA12; CL21B105KBFNNN; C2012X7R1H105K085AC; UMK212B7105KG	MURATA; SAMSUNG ELECTRONICS; TDK; TAIYO YUDEN	1UF	CAP; SMT (0805); 1UF; 10%; 50V; X7R; CERAMIC
4	GND A, GND B	—	2	5011	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; RECOMMENDED FOR BOARD THICKNESS=0.062IN; NOT FOR COLD TEST
5	J1, J2	—	2	5-146128-2	TE CONNECTIVITY	5-146128-2	CONNECTOR; HEADER ASSEMBLY; BREAKAWAY MALE; SMT; STRAIGHT; 4PINS
6	MTH1-MTH4	—	4	9032	KEYSTONE	9032	MACHINE FABRICATED; ROUND- THRU HOLE SPACER; NO THREAD; M3.5; 5/8IN; NYLON
7	R1-R4	—	4	CRCW040220R0FK	VISHAY DALE	20	RES; SMT (0402); 20; 1%; +/-100PPM/DEGC; 0.0630W
8	U1	—	1	MAX22421BASA+	MAXIM	MAX22421BASA+	EVKIT PART - IC; MAX22421; ULTRA-LOW POWER 2CH REINFORCED DIGITAL ISOLATOR; PACKAGE LAND PATTERN: 90-0096; NSOIC8
9	VDDA, VDDB	—	2	5010	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; RED; PHOSPHOR BRONZE WIRE SIL; NOT FOR COLD TEST
10	PCB	—	1	MAX2242XS	MAXIM	PCB	PCB:MAX2242XS
11	CA1, CA2, CB1, CB2	DNP	4	N/A	N/A	OPEN	PACKAGE OUTLINE 0402 NON- POLAR CAPACITOR - EVKIT
12	RA1, RA2, RB1, RB2	DNP	4	N/A	N/A	OPEN	PACKAGE OUTLINE 0402 RESISTOR - EVKIT

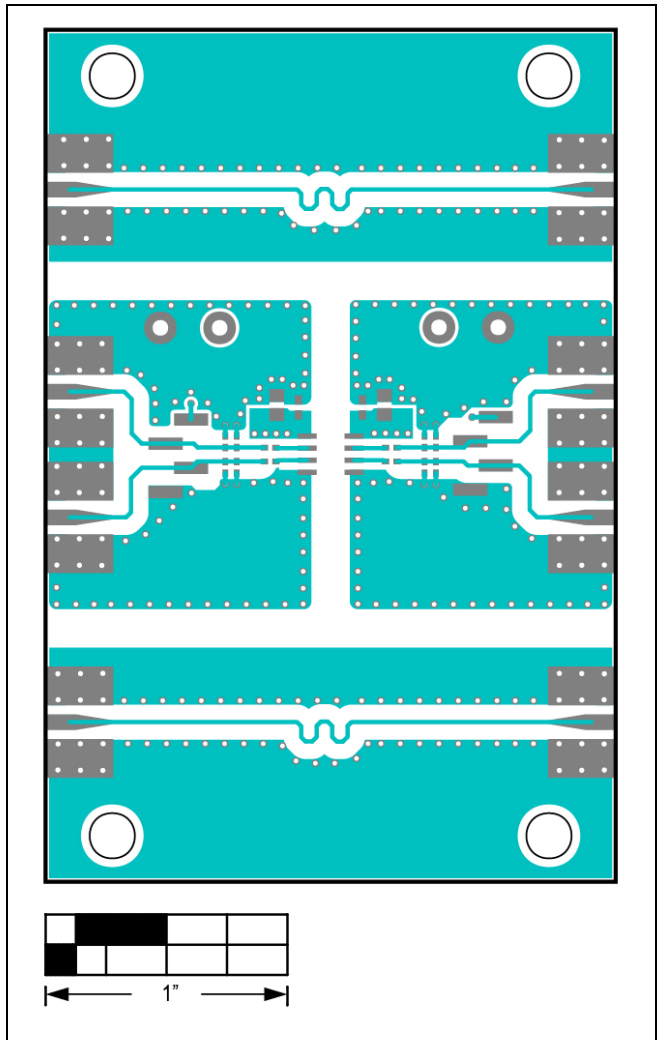
MAX22420/MAX22421 EV Kit Schematic Diagram



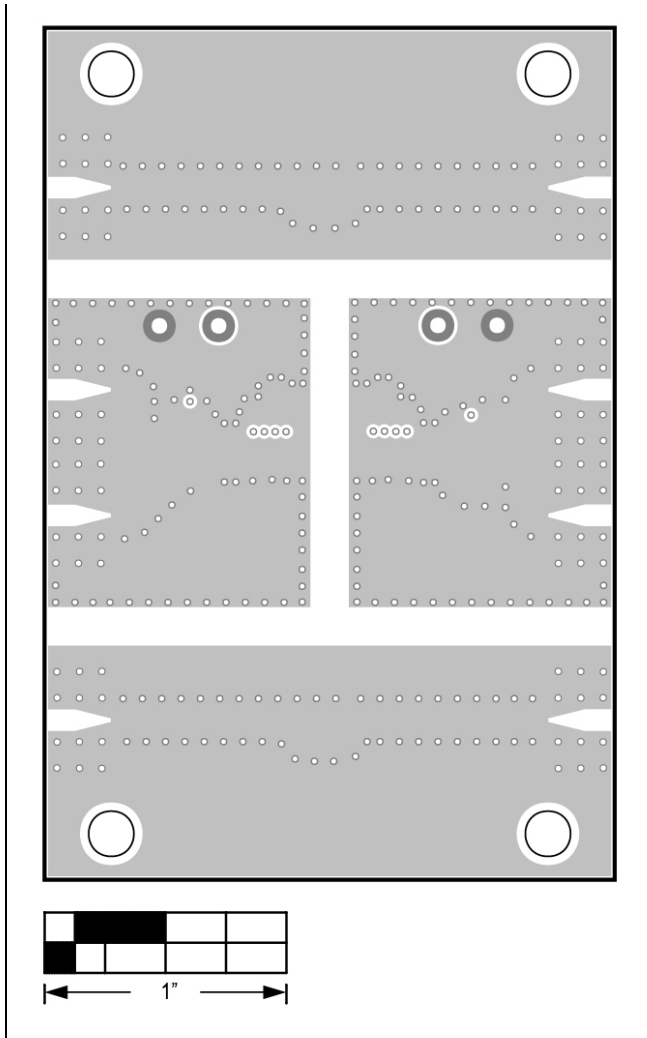
MAX22420/MAX22421 EV Kit PCB Layout Diagrams



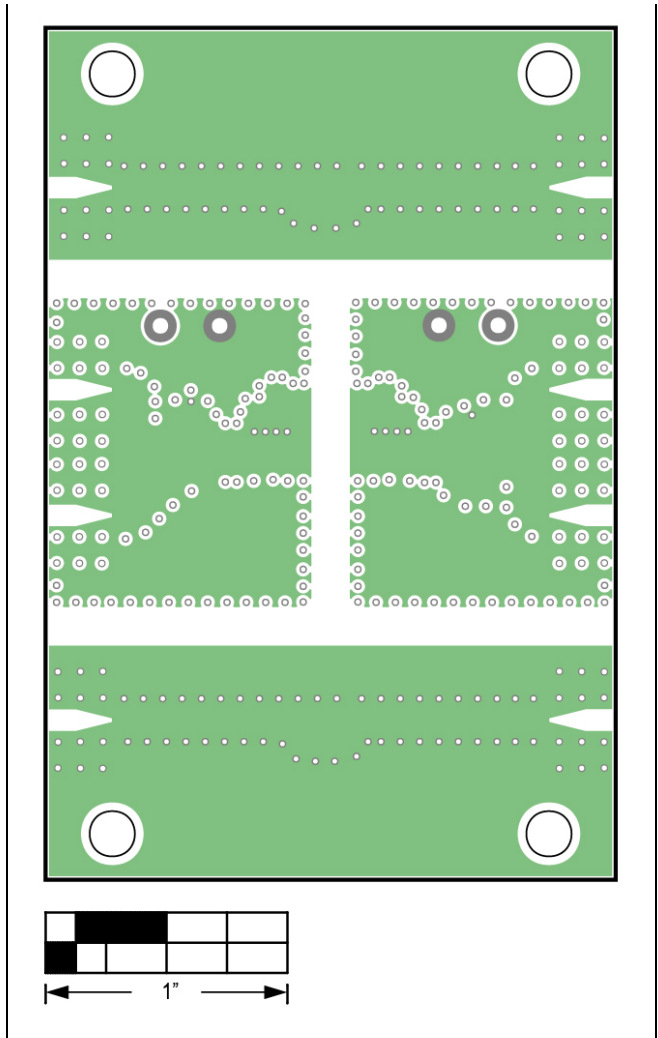
MAX22420/MAX22421 EV Kit PCB Layout—Top Silkscreen



MAX22420/MAX22421 EV Kit PCB Layout—Top Layer

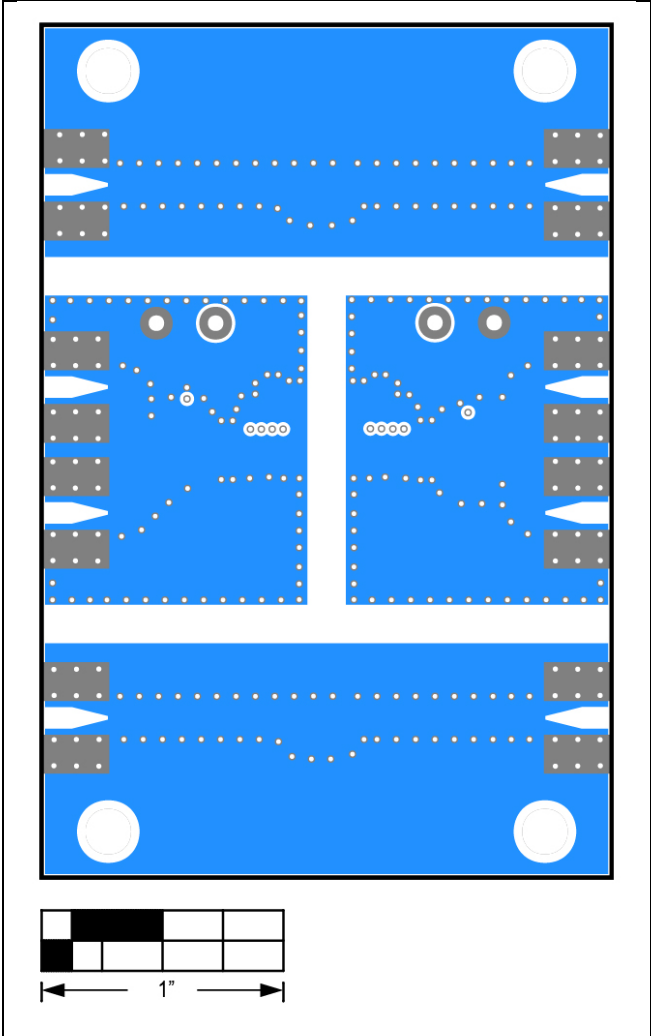


MAX22420/MAX22421 EV Kit PCB Layout—Layer 2 GND



MAX22420/MAX22421 EV Kit PCB Layout—Layer 3 PWR





MAX22420/MAX22421 EV Kit PCB Layout—Bottom Layer