

## MAX22440/1/2 Evaluation Kits

## Evaluate: MAX22440/1/2, MAX22840/1/2, MAX22880/1/2

### General Description

The MAX22440-MAX22442 evaluation kits (EV kits) provide a proven design to evaluate the MAX22440-MAX22442, MAX22840-MAX22842, and MAX22880-MAX22882, a family of reinforced, ultra-low-power, four-channel digital isolators in a 16-pin QSOP, 16-pin WSOIC, or 20-pin SSOP package, respectively. Two types of evaluation boards are available to support all variants in the family in 4/0, 3/1, or 2/2 channel configurations. The MAX22441CEEVKIT# is fully assembled and tested, and it comes populated with the MAX22441CAEE+ (Figure 1). The MAX2244XEVKIT# is a generic board that has U1 unpopulated, allowing the user to select a device from the MAX22440-MAX22442 family (Figure 2). Both evaluation boards only support the 16-pin QSOP package type. See Table 1 for EV kit options.

The MAX22840-MAX22842 and MAX22880-MAX22882 are functionally equivalent to the MAX22440-MAX22442, but in a 16-pin WSOIC and 20-pin SSOP package, respectively. The EV kits can be used to evaluate the functionality and electrical performance of the MAX22840-MAX22842 and the MAX22880-MAX22882.

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 MAX2244XEVKIT# comes with U1 unpopulated and supports the following digital isolators: MAX22440CAEE+, MAX22440FAEE+, MAX22441CAEE+, MAX22441FAEE+, MAX22442CAEE+, and MAX22442FAEE+.

*Note: When ordering the MAX2244XE EV kit, the engineer should request a sample of the desired MAX22440-MAX22442 isolator IC that can be soldered to the PCB.*

### Features

- Ultra-Low-Power Operation
- Data Transfer Rates up to 10Mbps
- MAX22440 with 4:0 Channel Configuration
- MAX22441 with 3:1 Channel Configuration
- MAX22442 with 2:2 Channel Configuration
- SMA Connectors for External Equipment Connection
- Wide Power Supply Voltage Range from 1.71V to 5.5V
- Guaranteed up to 3kV<sub>RMS</sub> Isolation for 60 seconds
- -40°C to +125°C Temperature Range
- Proven PCB Layout

### EV Kit Photos

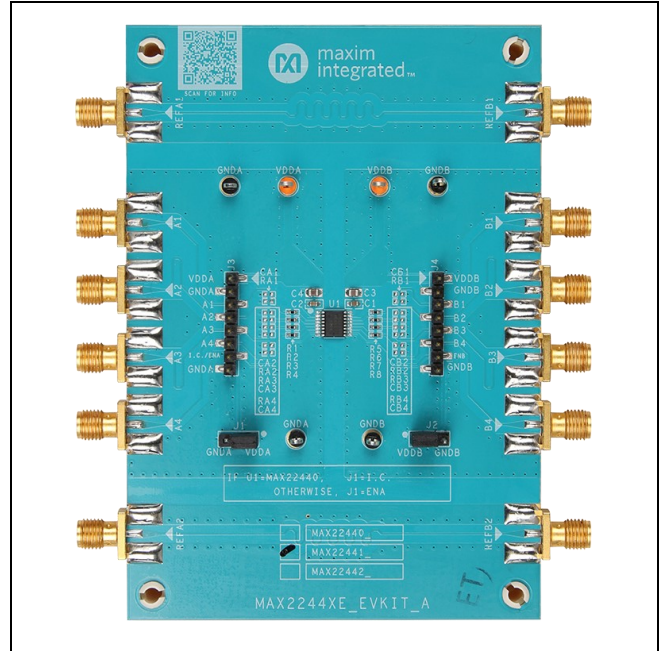


Figure 1. MAX22441CE EV Kit

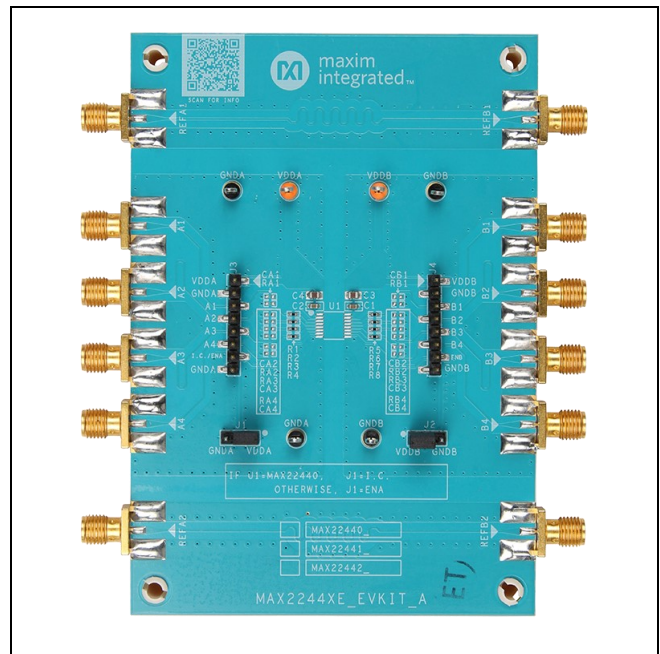


Figure 2. MAX2244XE EV Kit

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

## Quick Start

### Required Equipment

- MAX22441CE or MAX2244XE EV kit
- MAX22440-MAX22442 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
- Digital oscilloscope

### Procedure

The MAX22441CE EV kit is fully assembled and ready for evaluation. The MAX2244XE EV kit has everything except the DUT (U1) installed. The user can install the desired version of the MAX22440-MAX22442 family of ultra-low-power reinforced digital isolators. Once installed, follow these steps to verify board functionality:

1. Verify all jumpers are in their default position as shown in [Table 2](#).
2. Connect one DC power supply between the EV kit's VDDA and GNDA test points; connect the other DC power supply between the VDDDB and GNDB test points.
3. 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.*
4. 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 MAX22441CE EV kit, SMA connectors A1, A2, A3, and B4 are inputs, and SMA connectors B1, B2, B3, and A4 are outputs. See [Table 3](#) for the SMA connector I/O configurations for each MAX22440-MAX22442 device on the MAX2244XE EV kit.

**Table 1. EV Kit Options**

EV KIT PART #	TARGET DEVICE	PACKAGE TYPE	COMMENT
MAX22441CEEVKIT#	MAX22441CAEE+	16-pin QSOP	IC Installed
MAX2244XEEVKIT#	Not Populated	16-pin QSOP	Request Samples of Target Device from Factory

Table 2. EV Kit Shunt Positions

CONNECTOR	SHUNT POSITION	DESCRIPTION
<b>SIDE A</b>		
J1 (ENA)	1-2*	Connect side A enable pin ENA to V <sub>DDA</sub> . Side A outputs are enabled when ENA is connected to V <sub>DDA</sub> .
	2-3	Connect side A enable pin ENA to GNDA. Side A outputs are high-impedance when ENA is connected to GNDA.
	Open	Side A enable pin is not connected when U1 is installed with the MAX22440.
J3	1	Test point or input header for V <sub>DDA</sub> .
	2	Test point or input header for GNDA.
	3	Test point or input header for I/O; same as A1 SMA.
	4	Test point or input header for I/O; same as A2 SMA.
	5	Test point or input header for I/O; same as A3 SMA.
	6	Test point or input header for I/O; same as A4 SMA.
	7	Test point or input header for ENA.
	8	Test point or input header for GNDA.
<b>SIDE B</b>		
J2 (ENB)	1-2*	Connect side B enable pin ENB to V <sub>ddb</sub> . Side B outputs are enabled when ENB is connected to V <sub>ddb</sub> .
	2-3	Connect side B enable pin ENB to GNDB. Side B outputs are high-impedance when ENB is connected to GNDB.
J4	1	Test point or input header for V <sub>ddb</sub> .
	2	Test point or input header for GNDB.
	3	Test point or input header for I/O; same as B1 SMA.
	4	Test point or input header for I/O; same as B2 SMA.
	5	Test point or input header for I/O; same as B3 SMA.
	6	Test point or input header for I/O; same as B4 SMA.
	7	Test point or input header for ENB.
	8	Test point or input header for GNDB.

\*Default option.

Table 3. EV Kit Connector Configurations

CONNECTOR	U1 DEVICE		
	MAX22440	MAX22441	MAX22442
<b>SIDE A</b>			
A1 (SMA)	IN1	IN1	IN1
A2 (SMA)	IN2	IN2	IN2
A3 (SMA)	IN3	IN3	OUT3
A4 (SMA)	IN4	OUT4	OUT4
REFA1 (SMA)	I/O on Side A	I/O on Side A	I/O on Side A
REFA2 (SMA)	I/O on Side A	I/O on Side A	I/O on Side A
<b>SIDE B</b>			
B1 (SMA)	OUT1	OUT1	OUT1
B2 (SMA)	OUT2	OUT2	OUT2
B3 (SMA)	OUT3	OUT3	IN3
B4 (SMA)	OUT4	IN4	IN4
REFB1 (SMA)	I/O on Side B	I/O on Side B	I/O on Side B
REFB2 (SMA)	I/O on Side B	I/O on Side B	I/O on Side B

### Detailed Description of Hardware

The MAX22440-MAX22442 EV kits allow the user to evaluate the features of the MAX22440-MAX22442, MAX22840-MAX22842, and MAX22880-MAX22882, a family of reinforced, ultra-low-power, four-channel, galvanic digital isolators.

### External Power Supplies

The power to the EV kits is derived from two external sources which can both be between +1.71V and +5.5V. Connect one source between the VDDA and GNDA test points, and the other source between the VDDB 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.

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

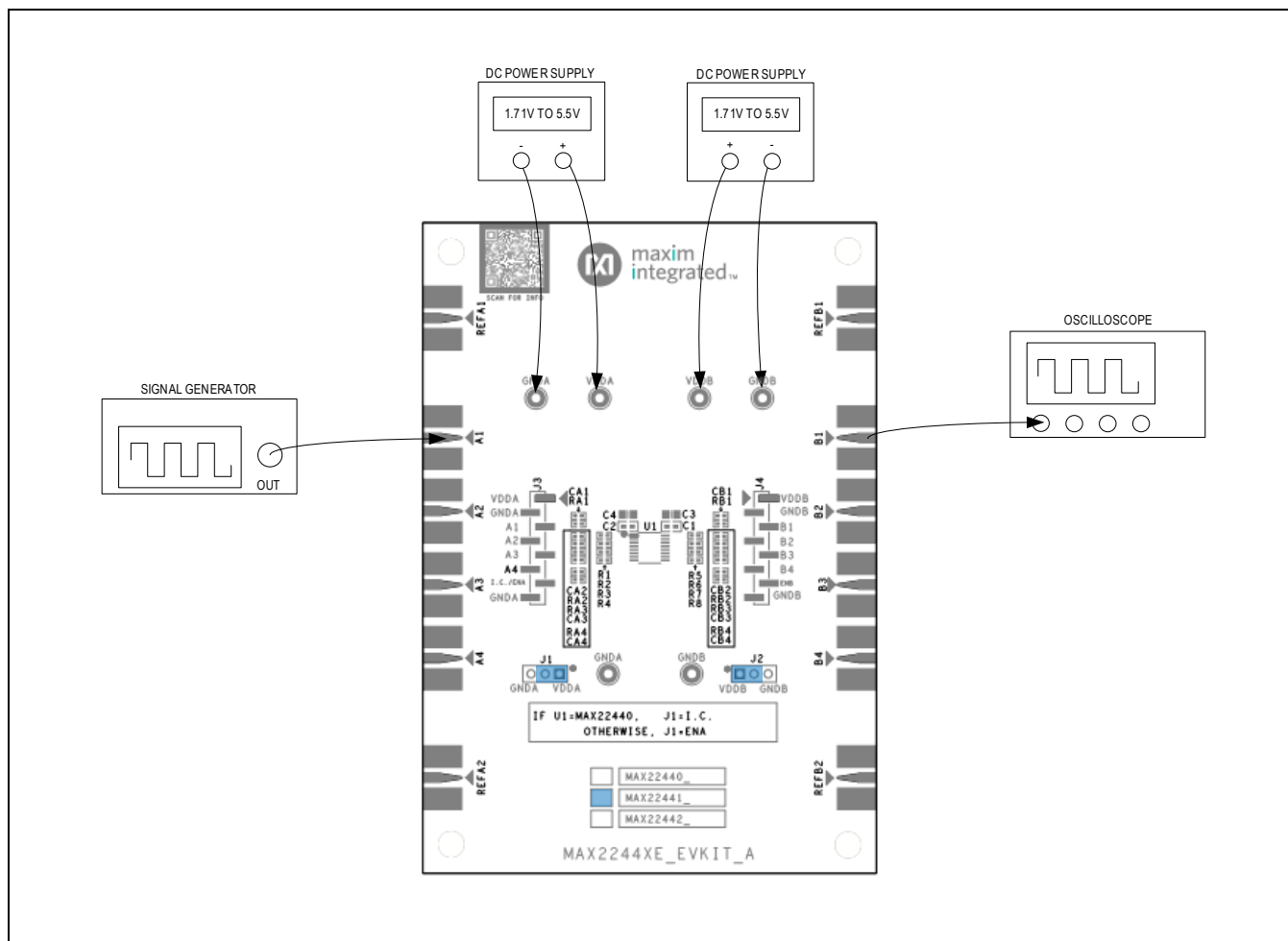


Figure 3. MAX22441CE EV Kit Typical Test Setup

### Decoupling Capacitors

A power supply on each side is decoupled with a 1μF ceramic capacitor in parallel with a 0.1μF ceramic capacitor, which are placed close to the U1 V<sub>D</sub>DA and V<sub>D</sub>DB pins.

### Shunt Positions

Jumpers J1 (ENA) and J2 (ENB) are provided to enable or disable the outputs of the MAX22440-MAX22442 isolation channels. Connect the J1 shunt to  $V_{DDA}$  to enable side A outputs or connect to GNDA to disable them. Side A outputs are high-impedance when disabled. Connect the J2 shunt to  $V_{ddb}$  to enable side B outputs or connect to GNDB to disable them. Side B outputs are high-impedance when disabled. Leave J1 open if U1 is installed with the MAX22440. See [Table 2](#) for all shunt positions and [Table 3](#) for connector configurations.

### I/O Traces Impedance Control

The input and output traces of all channels have an impedance control of 50Ω. A 20Ω series resistor (R1-R8) is added to all input and output channels; along with the internal series resistance, it can provide 50Ω impedance matching with external equipment such as function generators or digital oscilloscopes.

### Output Load

Each output has an unpopulated 0402 SMT resistor (RA1-RA4, RB1-RB4) and an unpopulated 0402 SMT capacitor (CA1-CA4, CB1-CB4) 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 ( $t_{PD\_REF}$ ) using either of the two reference channels first to determine the delay introduced by the test setup. Measure the propagation delay ( $t_{PD\_ISO}$ ) again using one of the MAX22440-MAX22442 data channels. The calibrated isolator delay is  $t_{PD\_ISO} - t_{PD\_REF}$ .

### U1 on the MAX2244XE EV Kit

U1 on the MAX2244XEEVKIT# is not installed. The user can install the desired version of MAX22440, MAX22441, or MAX22442. The MAX22440 features all four channels transferring digital signals in one direction; if installed as U1, the SMA connectors A1-A4 on side A are input connectors and B1-B4 on side B are output connectors. The MAX22441 has three channel transmitting data in one direction and the other channel transmitting in the opposite direction; if installed as U1, SMA connectors A1-A3 and B4 are input connectors and B1-B3 and A4 are output connectors. The MAX22442 has two channels transmitting data in one direction and the other two channels transmitting in the opposite direction; if installed as U1, SMA connectors A1-A2 and B3-B4 are input connectors and B1-B2 and A3-A4 are output connectors. See [Table 3](#) 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 dot on the silkscreen.

### Ordering Information

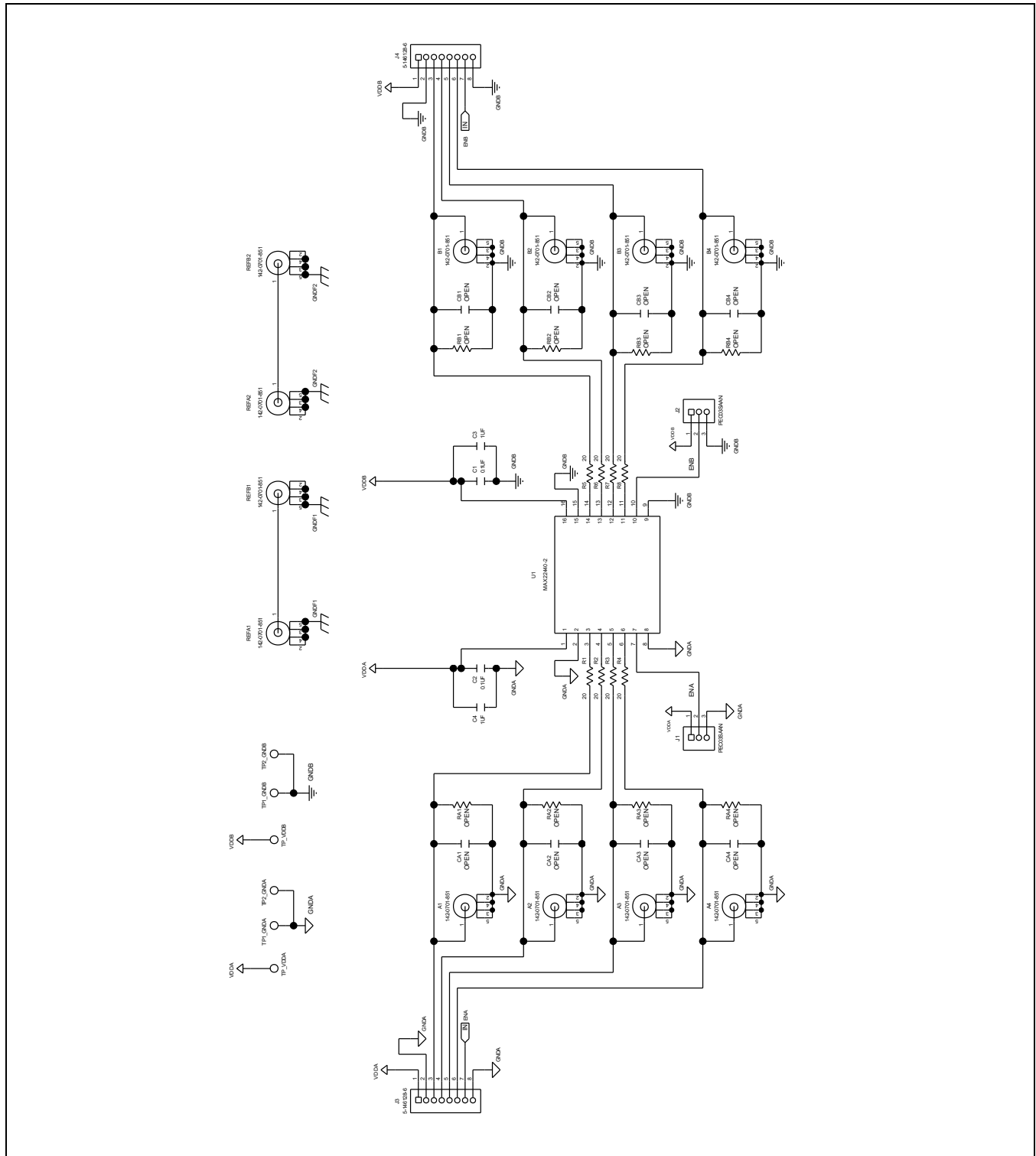
PART	TYPE
MAX22441CEEVKIT#	EV Kit installed with MAX22441CAEE+
MAX2244XEEVKIT#	EV Kit for 16-pin QSOP package

#Denotes RoHS-compliant.

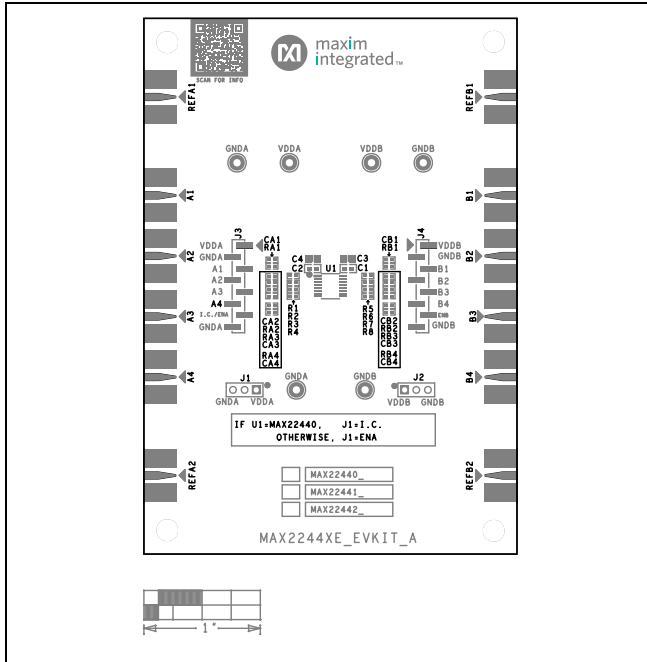
MAX22440-MAX22442 EV Kit Bill of Materials

ITEM	REF_DES	DNP	QTY	MFG PART#	MANUFACTURER	VALUE	DESCRIPTION
1	A1-A4, B1-B4, REFA1, REFA2, REFB1, REFB2	-	12	142-0701-851	JOHNSON COMPONENTS	142-0701-851	CONNECTOR; END LAUNCH JACK RECEPTACLE; BOARDMOUNT; STRAIGHT THROUGH; 2PINS;
2	C1, C2	-	2	GCJ188R71H104KA12;GCM188R71H104K;CGA3E2X7R1H104K080AA;CGA3E2X7R1H104K080AD;CL10B104KB8WPN	MURATA;MURATA;TDK;TDK;SAMSUNG	0.1UF	CAP; SMT (0603); 0.1UF; 10%; 50V; 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	J1, J2	-	2	PEC03SAAN	SULLINS	PEC03SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS
5	J3, J4	-	2	5-146128-6	TE CONNECTIVITY	5-146128-6	CONNECTOR; MALE; SMT; BREAKAWAY ; STRAIGHT; 8PINS
6	MTH1-MTH4	-	4	9032	KEYSTONE	9032	MACHINE FABRICATED; ROUND-THRU HOLE SPACER; NO THREAD; M3.5; 5/8IN; NYLON
7	R1-R8	-	8	CRCW040220R0FK	VISHAY DALE	20	RES; SMT (0402); 20; 1%; +/-100PPM/DEGC; 0.0630W
8	SU1, SU2	-	2	S1100-B;SX1100-B;STC02SYAN	KYCON;KYCON;SULLINS ELECTRONICS CORP.	SX1100-B	TEST POINT; JUMPER; STR; TOTAL LENGTH=0.24IN; BLACK; INSULATION=PBT;PHOSPHOR BRONZE CONTACT=GOLD PLATED
9	TP1_GNDA, TP1_GNDB, TP2_GNDA, TP2_GNDB	-	4	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;
10	TP_VDDA, TP_Vddb	-	2	5013	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; ORANGE; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
11	U1	-	1	MAX22440-2	MAXIM	MAX22440-2	EVKIT PART - IC; MAX2244X SERIES; PACKAGE DRAWING NUMBER: 21-0055; PACKAGE LAND PATTERN: 90-0167; PACKAGE CODE: N/A; QSOP16
12	PCB	-	1	MAX2244XE	MAXIM	PCB	PCB:MAX2244XE
13	RA1-RA4, RB1-RB4	DNP	0	N/A	N/A	OPEN	PACKAGE OUTLINE 0402 RESISTOR
14	CA1-CA4, CB1-CB4	DNP	0	N/A	N/A	OPEN	PACKAGE OUTLINE 0402 NON-POLAR CAPACITOR

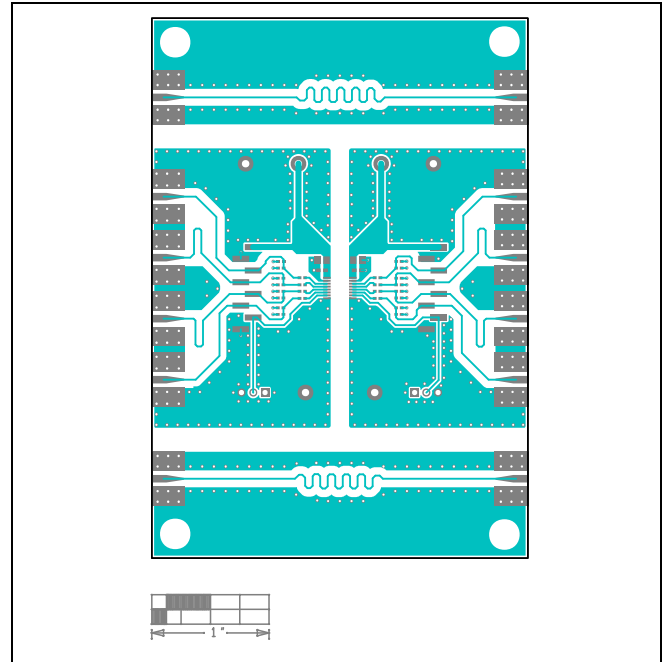
MAX22440-MAX22442 EV Kit Schematic



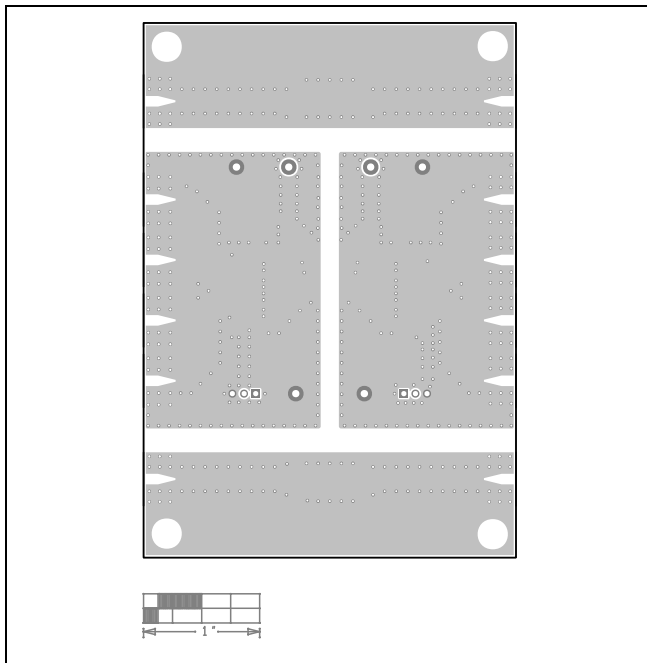
MAX2240-MAX22442 EV Kit PCB Layout



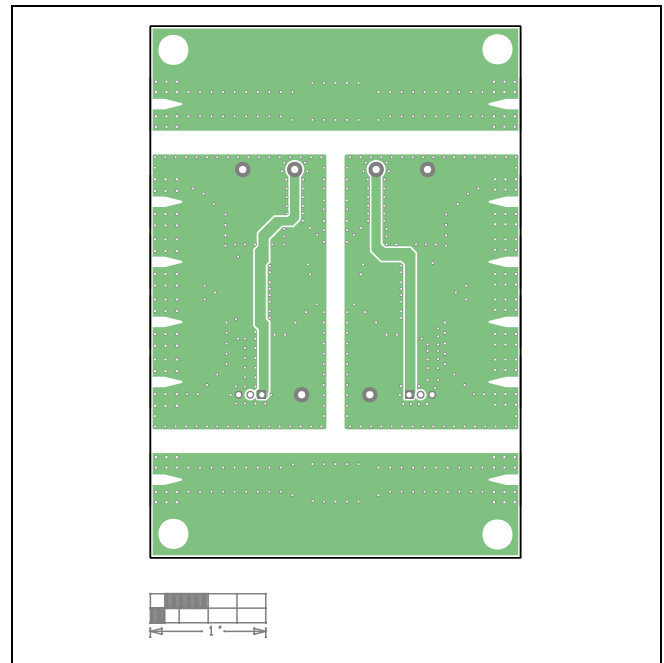
MAX2240-MAX22442 EV Kit PCB Layout—Top Silkscreen



MAX2240-MAX22442 EV Kit PCB Layout—Top Layer

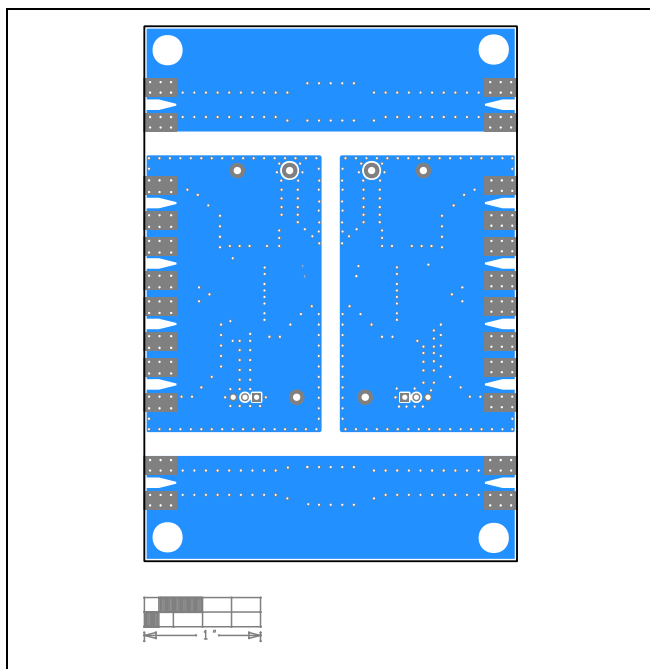


MAX2240-MAX22442 EV Kit PCB Layout—Layer 2



MAX2240-MAX22442 EV Kit PCB Layout—Layer 3





MAX22440-MAX22442 EV Kit PCB Layout—Bottom Layer

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	8/22	Initial release	—

