

General Description

The MAX22444–MAX22446 evaluation kits (EV kits) provide a proven design to evaluate the MAX22444–MAX22446, reinforced, four-channel, galvanic digital isolators. Two types of evaluation boards are available to support different channel direction configurations, different ENA polarities and different output default settings of the MAX22444–MAX22446 family. The MAX22445FWEVKIT# is fully assembled and tested, and comes populated with the MAX22445FAWE+ (Figure 1). The MAX2244XWEVKIT# is a generic board which has U1 unpopulated allowing the user to select a device from the MAX22444–MAX22446 family (Figure 2). Both evaluation boards support the wide-body 16-pin SOIC package type. See Table 1 for EV kit options.

The EV kits should be powered from two independent isolated power supplies with nominal output voltage in range from 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 MAX2244XWEVKIT# comes with U1 unpopulated and supports the following digital isolators: MAX22444BAWE+, MAX22444CAWE+, MAX22444EAWWE+, MAX22444FAWE+, MAX22444MAWE+, MAX22444NAWE+, MAX22445BAWE+, MAX22445CAWE+, MAX22445EAWWE+, MAX22445FAWE+, MAX22445MAWE+, MAX22445NAWE+, MAX22445RAWE+, MAX22445SAWE+, MAX22445UAWWE+, MAX22445VAWE+, MAX22446BAWE+, MAX22446CAWE+, MAX22446EAWWE+, MAX22446FAWE+, MAX22446MAWE+, MAX22446NAWE+.

Note: When ordering the MAX2244XW EV kit, the engineer should request a sample of the desired MAX22444–MAX22446 isolator IC that can be soldered to the PCB.

Features

- Broad Range of Data Transfer Rates (from DC to 200Mbps)
- Four Unidirectional Channels with 3 Different Channel Direction Configurations
- SMA Connectors for Easy Connection to External Equipment
- Wide Power Supply Voltage Range from 1.71V to 5.5V
- Guaranteed Up to 5kV_{RMS} Isolation for 60s
- -40°C to +125°C Temperature Range
- Proven PCB Layout

Ordering Information appears at end of data sheet.

Table 1. EV Kit Options

EVKIT PART #	TARGET DEVICE	PACKAGE TYPE	COMMENT
MAX22445FWEVKIT#	MAX22445FAWE+	16-SOIC Wide-Body	200Mbps IC Populated
MAX2244XWEVKIT#	Not Populated	16-SOIC Wide-Body	Request Samples of Target Device from Maxim

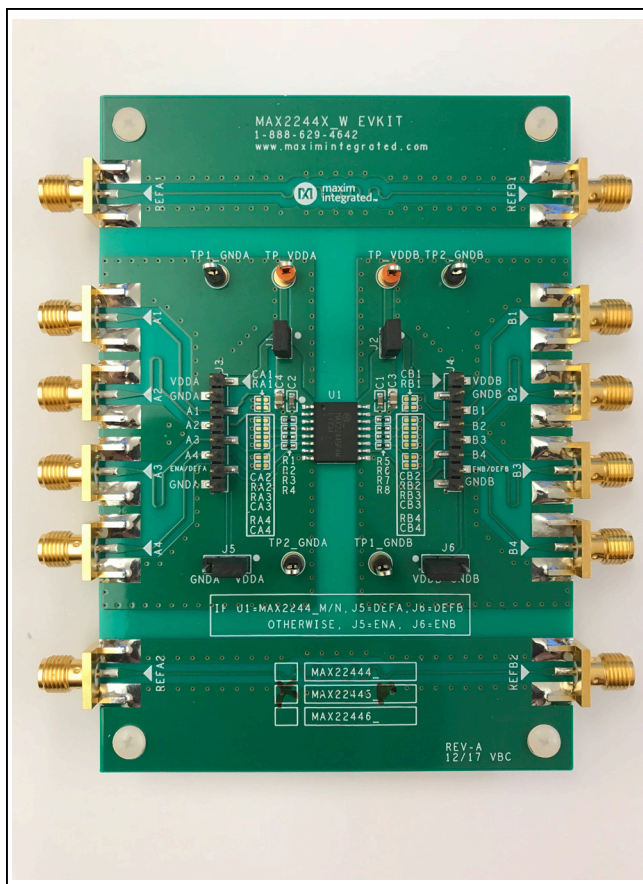


Figure 1. MAX22445FW EV KIT

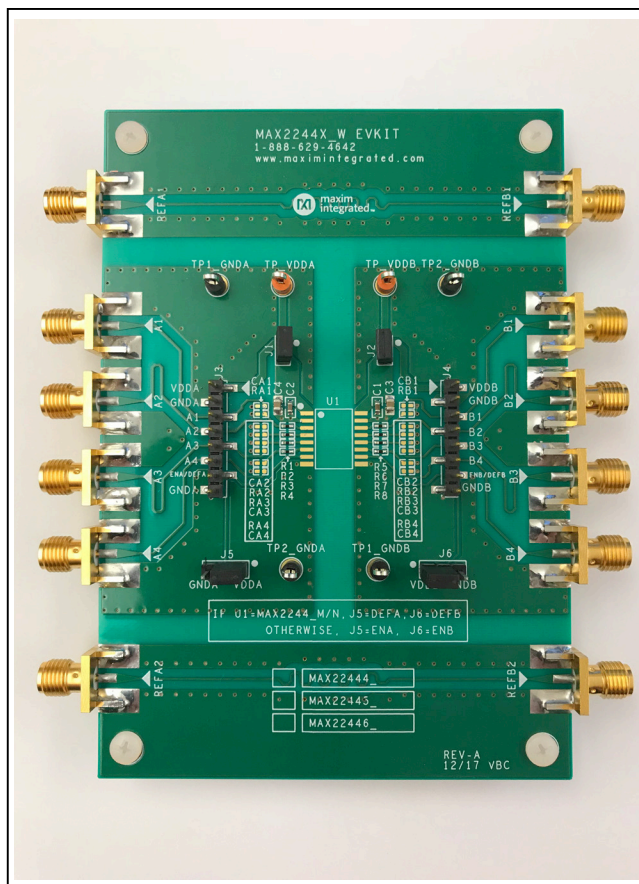


Figure 2. MAX2244XW EV KIT

Quick Start

Required Equipment

- MAX22445FW or MAX2244XW EV kit
- MAX22444–MAX22446 device, if EV kit is not populated
- Two DC power supplies with output range of 1.71V to 5.5V
- Signal/function generator
- Oscilloscope

Procedure

The MAX22445FW EV kit is fully assembled and ready for evaluation. The MAX2244XW EV kit has everything except the DUT (U1) installed. The user can install the desired version of the MAX22444–MAX22446 family of reinforced, four-channel, unidirectional digital isolators. Once installed, follow the steps below to verify board functionality:

- 1) Verify jumper settings. See [Table 2](#) for all shunt positions.
 - J1 and J2 are closed.
 - J5 is either in 1-2 position if U1 pin 7 has active-high ENA polarity, or in 2-3 position if U1 pin 7 has active-low ENA polarity.
 - Jumper J6 is in 1-2 position.
- 2) Connect one DC power supply between the EV kit's TP_VDDA and TP1_GNDA test points; connect the other DC power supply between TP_VDDB and TP1_GNDB test points.
- 3) Set both DC power supply outputs between 1.71V and 5.5V, and then enable the power supply output.

Note: It is also possible to power the EV kits 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 MAX22445FW EV kit, SMA connectors A1, A2, A3, and B4 are inputs, and SMA connectors B1, B2, B3, and A4 are outputs. Refer to [Table 3](#) for the SMA connector I/O configurations and jumper J3-J6 configurations when a different MAX22444–MAX22446 device is installed as U1 on the MAX2244XW EV kit.

Table 2. MAX2244XW EV Kits Board Connectors and Shunt Positions

CONNECTOR	SHUNT POSITION	DESCRIPTION
SIDE A		
J3	1	Test point or input header for V _{DDA}
	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 side A enable or default control; same as J5 pin 2
	8	Test point or input header for GNDA
A1 (SMA)	n/a	I/O on side A
A2 (SMA)	n/a	I/O on side A
A3 (SMA)	n/a	I/O on side A
A4 (SMA)	n/a	I/O on side A
J1	Open	Use current meter to measure current of side A
	1-2*	Connect power supply to V _{DDA}
J5	1-2*	Connect side A enable pin ENA or $\overline{\text{ENA}}$, or default control pin DEFA to V _{DDA} . If U1 is installed with MAX2244_B/C/E/F, outputs are enabled when ENA is connected to V _{DDA} . If U1 is installed with MAX22445R/S/U/V, outputs are high-impedance when $\overline{\text{ENA}}$ is connected to V _{DDA} . If U1 is installed with MAX2244_M/N, output default is set to high when DEFA is connected to V _{DDA} . Default setting on MAX22445FWEVKIT#
	2-3	Connect side A enable pin ENA or $\overline{\text{ENA}}$, or default control pin DEFA to GNDA; If U1 is installed with MAX2244_B/C/E/F, outputs are high-impedance when ENA is connected to GNDA. If U1 is installed with MAX22445R/S/U/V, outputs are enabled when $\overline{\text{ENA}}$ is connected to GNDA. If U1 is installed with MAX2244_M/N, output default is set to low when DEFA is connected to GNDA

Table 2. MAX2244XW EV Kits Board Connectors and Shunt Positions (continued)

CONNECTOR	SHUNT POSITION	DESCRIPTION
SIDE B		
J4	1	Test point or input header for V_{DDB}
	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 side B enable, or default control; same as J6 pin 2
	8	Test point or input header for GNDB
B1 (SMA)	n/a	I/O on side B
B2 (SMA)	n/a	I/O on side B
B3 (SMA)	n/a	I/O on side B
B4 (SMA)	n/a	I/O on side B
J2	Open	Use current meter to measure current of side B
	1-2*	Connect power supply to V_{DDB}
J6	1-2*	Connect side B enable pin ENB or default control pin DEFB to V_{DDB} ; If U1 is installed with MAX2244_B/C/E/F/R/S/U/V, outputs are enabled when ENB is connected to V_{DDB} . If U1 is installed with MAX2244_M/N, output default is set to high when DEFB is connected to V_{DDB} . Default setting on MAX22445FWEVKIT#
	2-3	Connect side B enable pin ENB or default control pin DEFB to GNDB; If U1 is installed with MAX2244_B/C/E/F/R/S/U/V, outputs are high-impedance when ENB is connected to GNDB. If U1 is installed with MAX2244_M/N, output default is set to low when DEFB is connected to GNDB

*Default configuration

Table 3. MAX2244XW EV Kits Connector Configurations

CONNECTOR	U1 DEVICE						
	MAX22444 B/C/E/F	MAX22444 M/N	MAX22445 B/C/E/F	MAX22445 M/N	MAX22445 R/S/U/V	MAX22446 B/C/E/F	MAX22446 M/N
SIDE A							
A1 (SMA)	IN1	IN1	IN1	IN1	IN1	IN1	IN1
A2 (SMA)	IN2	IN2	IN2	IN2	IN2	IN2	IN2
A3 (SMA)	IN3	IN3	IN3	IN3	IN3	OUT3	OUT3
A4 (SMA)	IN4	IN4	OUT4	OUT4	OUT4	OUT4	OUT4
J3 PIN 7, J5 PIN 2	ENA	DEFA	ENA	DEFA	$\overline{\text{ENA}}$	ENA	DEFA
SIDE B							
B1 (SMA)	OUT1	OUT1	OUT1	OUT1	OUT1	OUT1	OUT1
B2 (SMA)	OUT2	OUT2	OUT2	OUT2	OUT2	OUT2	OUT2
B3 (SMA)	OUT3	OUT3	OUT3	OUT3	OUT3	IN3	IN3
B4 (SMA)	OUT4	OUT4	IN4	IN4	IN4	IN4	IN4
J4 PIN 7, J6 PIN 2	ENB	DEFB	ENB	DEFB	ENB	ENB	DEFB

Detailed Description of Hardware

The MAX22444–MAX22446 EV kits allow the user to evaluate the features of the MAX22444–MAX22446 four-channel digital isolators.

External Power Supplies

Power to the MAX22445FW and MAX2244XW EV kits is derived from two external sources which can both be between +1.71V and +5.5V. Connect one source between the V_{DDA}

and GND A test points, and the other source between the V_{ddb} and GND B 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 MAX22444–MAX22446 level-shift 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](#).

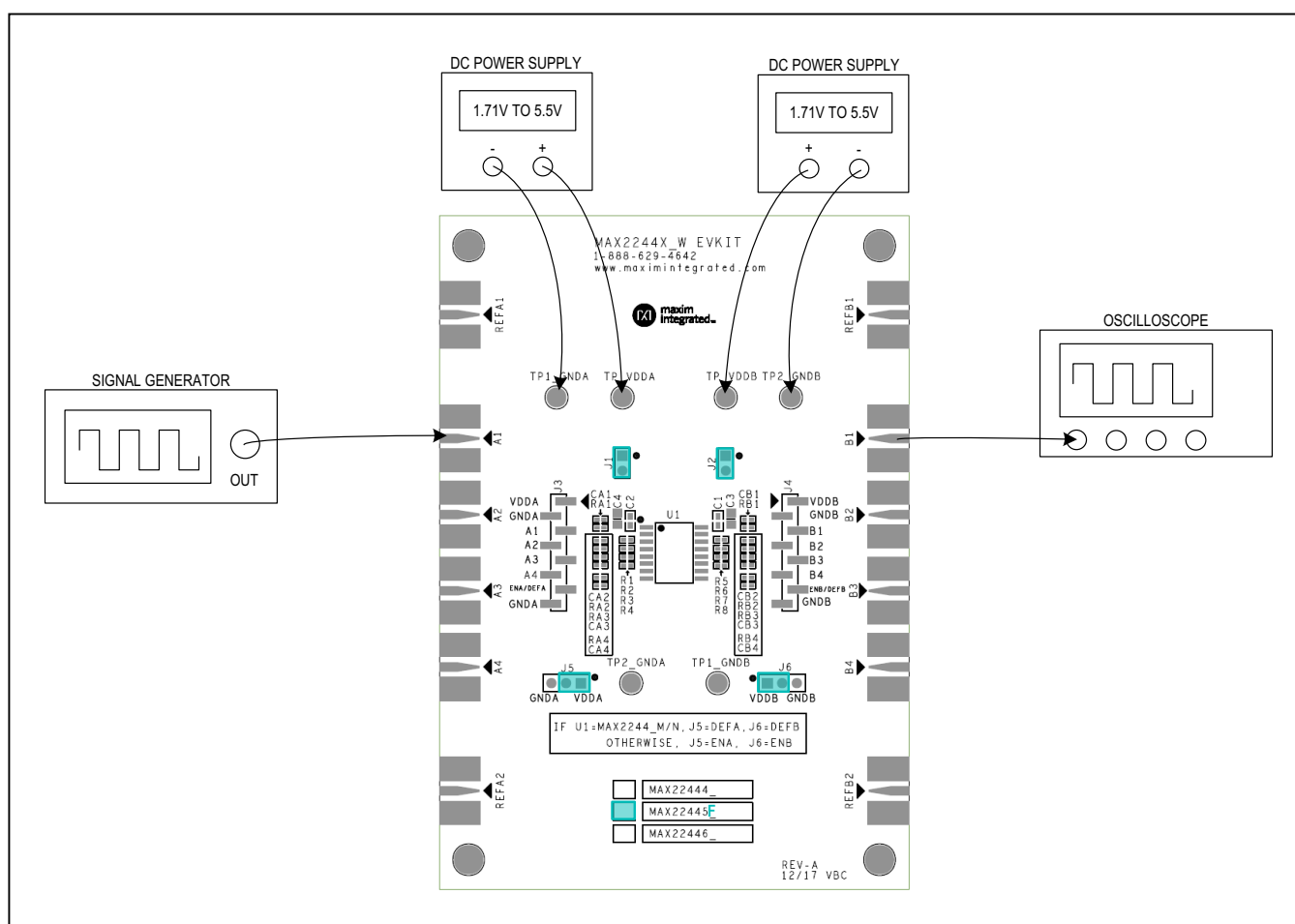


Figure 3. MAX2244XW EV Kit Typical Test Setup

Decoupling Capacitors

Each power supply is decoupled with a 1µF ceramic capacitor in parallel with a 0.1µF ceramic capacitor, which are placed close to the U1 V_{DDA} and V_{ddb} pin.

Shunt Positions

Jumpers J1 and J2 are installed between the external power supplies and U1 power supply pins to allow supply current measurement. Uninstall the J1 and J2 shunts and connect current meters on both side A and side B to measure the MAX22444–MAX22446 supply current.

Jumper J5 and J6 are provided to enable or disable the outputs of the MAX2244_B/C/E/F/R/S/U/V isolator channels, or configure the default level (high or low) of the MAX2244_M/N isolator outputs.

To enable devices with an active-high enable pin on side A (MAX2244_B/C/E/F), connect the J5 shunt to V_{DDA}. To enable devices with an active-low enable pin on side A (MAX22445R/S/U/V), connect the J5 shunt to GNDA. Side A outputs are high-impedance when disabled. Connect the J6 shunt to V_{ddb} to enable side B channels or connect to GNDB to disable side B channels (MAX2244_B/C/E/F/R/S/U/V). Side B outputs are high-impedance when disabled.

All channels on the MAX2244_M/N are always enabled. However, the output default level is configurable. To configure the default level of both side A and side B outputs to high, connect J5 to V_{DDA} and J6 to V_{ddb}. To configure the default level of the outputs to low, connect J5 to GNDA and J6 to GNDB. Ensure the logic state of J5 is the same as that for J6. Configure J5 and J6 before powering up the board and do not toggle J5 and J6 during normal operation. 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 four isolation channels have an impedance control of 50Ω. A 20Ω series resistor 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 oscilloscopes.

Output Load

Each output has an unpopulated 0603 SMT resistor (RA1–RA4, RB1–RB4) and an unpopulated 0603 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 the reference channel first to determine the delay introduced by the test setup. Measure the propagation delay (t_{PD_ISO}) again using one of the MAX22444–MAX22446 data channels. The calibrated isolator delay is t_{PD_ISO} - t_{PD_REF}.

U1 on the MAX2244XW EV Kit

U1 on the MAX2244XWEVKIT# is not installed. The user can install the desired version of the MAX22444–MAX22446 family of four-channel unidirectional digital isolators. The MAX22444–MAX22446 family offers three unidirectional channel configurations. The MAX22444 features all four channels transferring digital signals in one direction. SMA connectors A1–A4 on side A are input connectors and B1–B4 on side B are output connectors if the MAX22444 is installed as U1. The MAX22445 has three channels transmitting data in one direction and one channel transmitting in the opposite direction. SMA connectors A1–A3 and B4 are input connectors and B1–B3 and A4 are output connectors if the MAX22445 is installed as U1. The MAX22446 provides two channels in each direction. SMA connectors A1, A2, B3, and B4 are input connectors and B1, B2, A3 and A4 are output connectors if the MAX22446 is installed as U1. Refer to [Table 3](#) for SMA connector I/O configurations with different U1 selection.

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

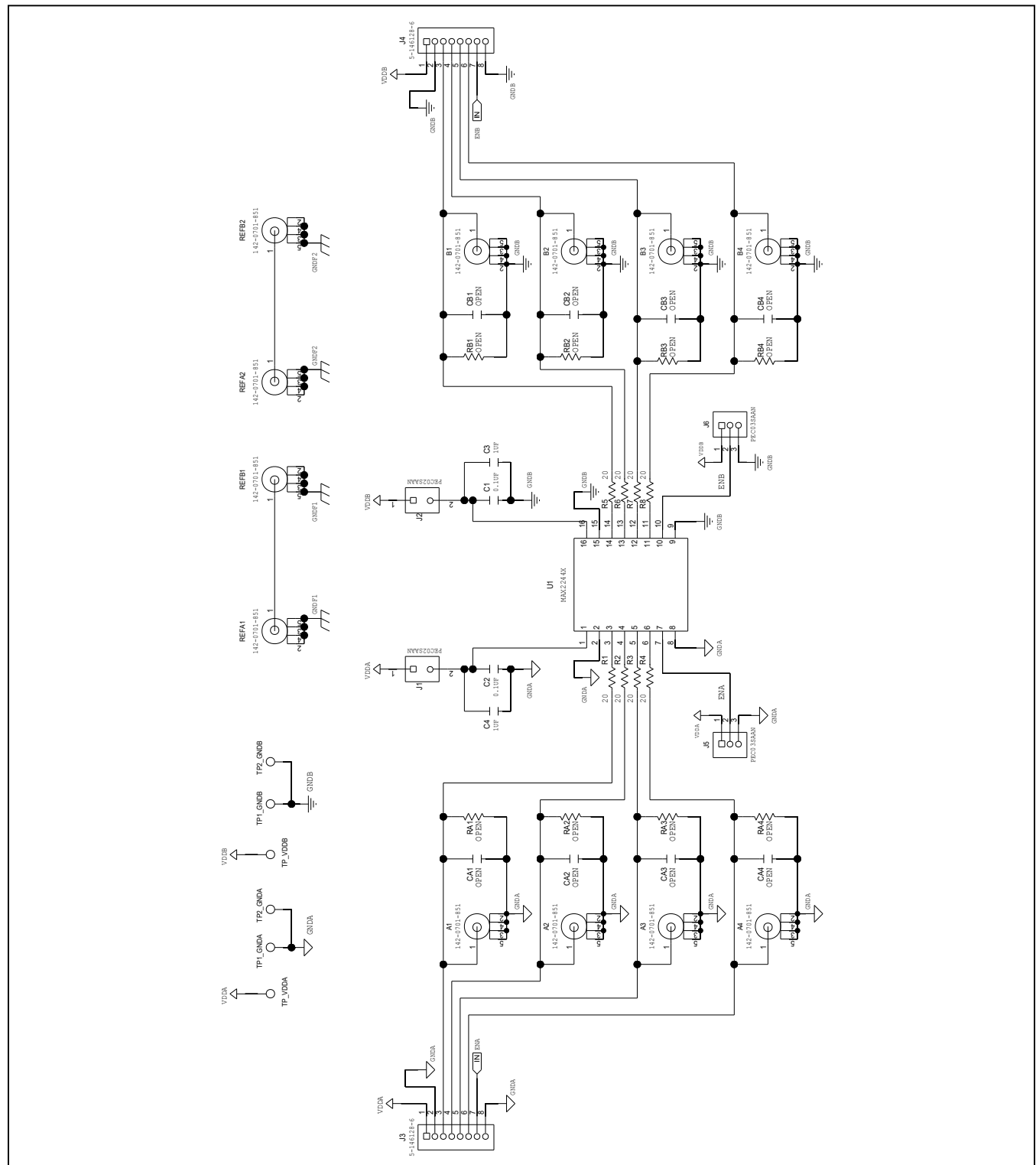
PART	TYPE
MAX22445FWEVKIT#	EV Kit with installed MAX22445FAWE+
MAX2244XWEVKIT#	EV Kit for wide-body SOIC package

#Denotes RoHS compliant.

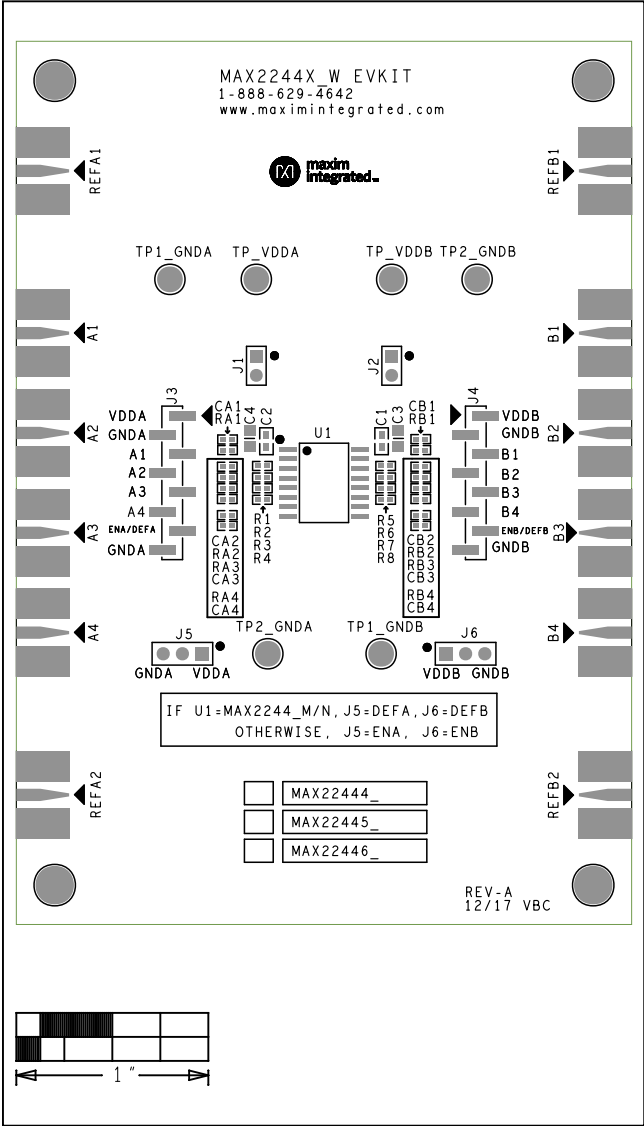
MAX22444–MAX22446 EV Kit Bill of Materials

ITEM	REF_DES		QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
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	MURATA;MURATA;TDK	0.1µF	CAPACITOR; SMT (0603); CERAMIC CHIP; 0.1µF; 50V; TOL = 10%; TG = -55°C TO +125°C; TC = X7R; AUTO	
3	C3, C4		2	GRM21BR71H105KA12; CL21B105KBFNNNE; C2012X7R1H105K085AC; UMK212B7105KG	MURATA;SAMSUNG ELECTRONICS;TDK;TAIYO YUDEN	1µF	CAPACITOR; SMT (0805); CERAMIC CHIP; 1µF; 50V; TOL = 10%; TG=-55°C TO +125°C; TC = X7R	
4	J1, J2		2	PEC02SAAN	SULLINS	PEC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS	
5	J3, J4		2	5-146128-6	TE CONNECTIVITY	5-146128-6	CONNECTOR; MALE; SMT; BREAKAWAY; STRAIGHT; 8PINS	
6	J5, J6		2	PEC03SAAN	SULLINS	PEC03SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS	
7	R1-R8		8	CRCW040220R0FK	VISHAY DALE	20	RESISTOR; 0402; 20 OHM; 1%; 100PPM; 0.063W; THICK FILM	
8	SU1-SU4		4	STC02SYAN	SULLINS ELECTRONICS CORP.	STC02SYAN	TEST POINT; JUMPER; STR; TOTAL LENGTH = 0.256IN; BLACK; INSULATION = PBT CONTACT = PHOSPHOR BRONZE; COPPER PLATED TIN OVERALL	
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	MAX2244X	MAXIM	MAX2244X	EVKIT PART-IC; MAX2244X SERIES; PACKAGE DRAWING NUMBER: 21-0042; PACKAGE LAND PATTERN: 90-0107; PACKAGE CODE: W16MS+12; WSOIC16	
12	PCB		1	MAX2244XW	MAXIM	PCB	PCB:MAX2244XW	
13	MTH1-MTH4	DNI	4	1902B	GENERIC PART	N/A	STANDOFF; FEMALE-THREADED; HEX;4- 40IN; 3/8IN; NYLON	
14	MTH1-MTH4	DNI	4	P440.375	GENERIC PART	N/A	MACHINE SCREW; SLOTTED; PAN;4-40IN; 3/8IN; NYLON	
15	RA1-RA4, RB1- RB4	DNP	0	N/A	N/A	OPEN	PACKAGE OUTLINE 0402 RESISTOR	
16	CA1-CA4, CB1- CB4	DNP	0	N/A	N/A	OPEN	PACKAGE OUTLINE 0402 NON-POLAR CAPACITOR	
TOTAL			50					

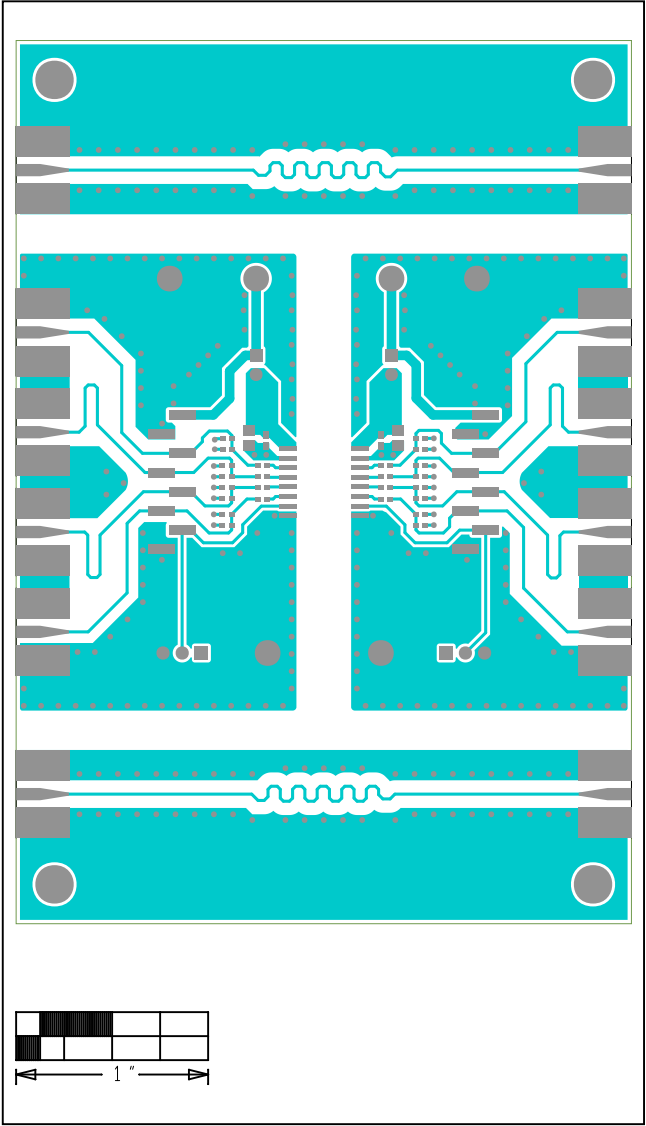
MAX22444–MAX22446 EV Kit Schematic



MAX22444–MAX22446 EV Kit PCB Layout Diagrams

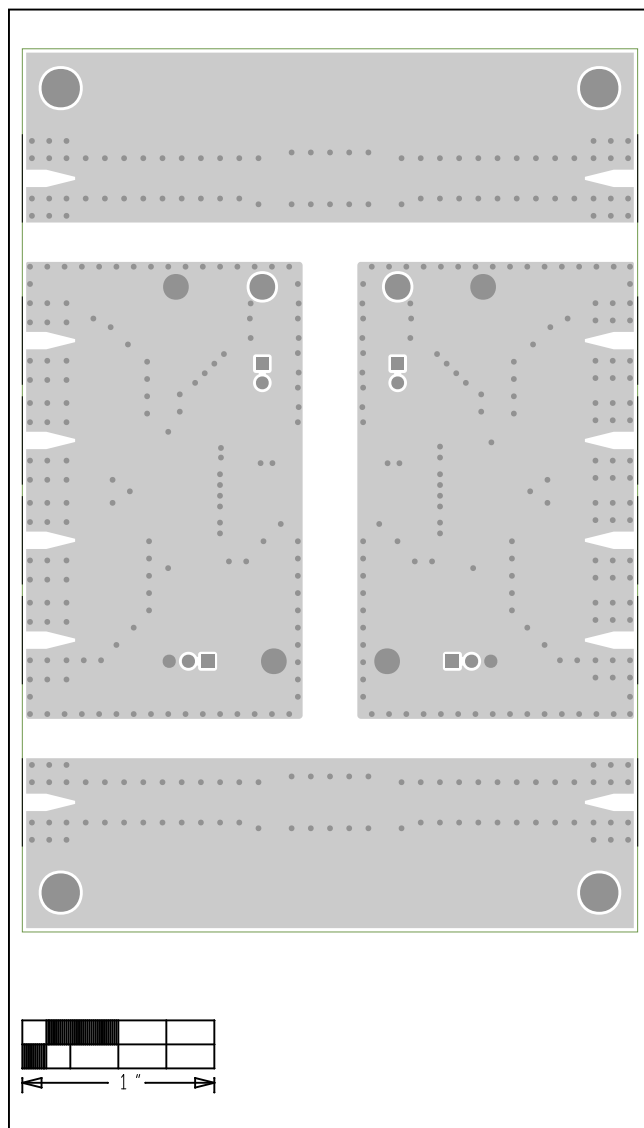


MAX22444–MAX22446 EV Kit—Top Silkscreen

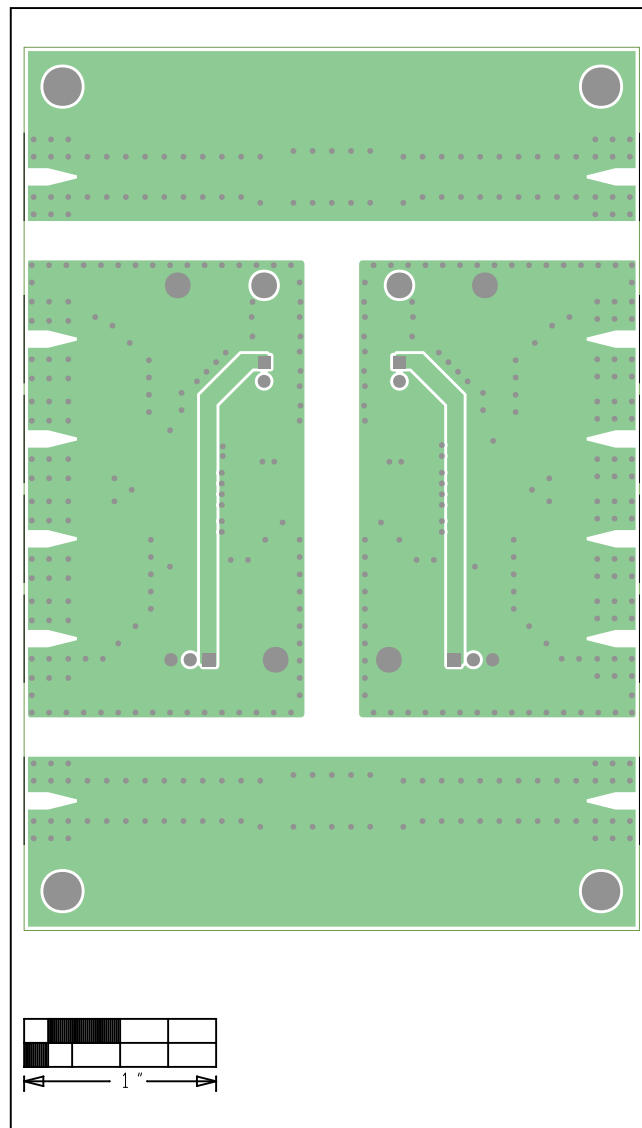


MAX22444–MAX22446 EV Kit—Top

MAX22444–MAX22446 EV Kit PCB Layout Diagrams (continued)

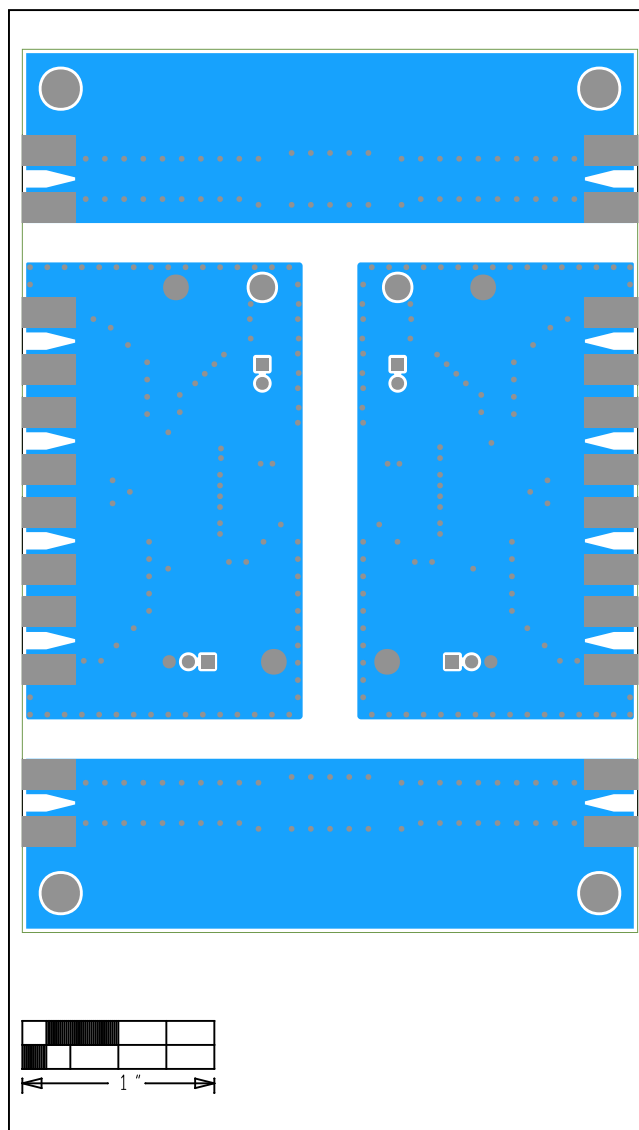


MAX22444–MAX22446 EV Kit—L2 GND



MAX22444–MAX22446 EV Kit—L3 PWR

MAX22444–MAX22446 EV Kit PCB Layout Diagrams (continued)



MAX22444–MAX22446 EV Kit—Bottom

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	3/18	Initial release	—

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