

## General Description

The MAX20029 EV kit is a fully assembled and tested PCB that demonstrates the capabilities of the MAX20029 power-management IC (PMIC), which comprises four low-voltage step-down converters. The IC operates at a 3V to 5.5V input supply voltage, regulates to a 1V to 4V voltage range, and delivers up to 1.5A of current at each of its outputs. The converters are high-frequency switchers, operating at 2.2MHz. The high switching frequency allows for reduced component values and sizes, including a single ceramic output capacitor on each rail. All channels have independent undervoltage/overvoltage comparators at both input and output, current limiting, and fault-flag outputs. The EV kit ships fully assembled and tested, ready for immediate evaluation of the IC.

## Benefits and Features

- 3.0V to 5.5V Input Voltage Range
- 1.0V to 4.0V Output Voltages Range
  - Resistive Dividers Used to Set Appropriate Output Voltage
- High Switching Frequency of 2.2MHz
  - Two Channels Operate 180° Out-of-Phase
- Individual Enable and Reset Connections Available
- Loop Measurements Ready on All Channels
- Overtemperature and Short-Circuit Protection
- Proven PCB Layout
- Fully Assembled and Tested

## Quick Start

### Required Equipment

- MAX20029 EV kit
- 5V, 3A power supply
- Appropriate resistive loads (depending on selected output voltage and current capability), or electronic loads for each of the outputs
- Voltmeter

### Procedure

The EV kit is fully assembled and tested. Follow the steps below to verify board operation:

- 1) Connect a 5V power supply to VSUP (J1) and PGND (J2). Activate the supply.
- 2) Verify that PG1–PG4 are at logic-low levels (J14, J24, J34, and J44).
- 3) Populate jumpers (J13, J23, J33, and J43) to activate all/selected outputs.
- 4) Measure the voltages on the enabled outputs.
- 5) Connect appropriate loads to all/selected outputs
- 6) Verify that the output voltages remain within specification.
- 7) Verify that PG1–PG4 are at logic-high levels.

*[Ordering Information](#) appears at end of data sheet.*

## Detailed Description of Hardware

### EV Kit Interface

The large connectors, VSUP (J1) and PGND (J2), are the main input supply points. Connect a 5V power supply across these pins. Outputs OUTS1–OUTS4 have large connectors for the output and GND nodes (labeled VOUT1–VOUT4, respectively). Each channel has independent enable and power-good test points. Installing jumpers at the dual headers marked EN1–EN4 activates the respective channel; the power-good signal for that channel can be accessed through the PG1–PG4 pins. Additional GND test points (J4–J7) are provided for ease of measurement.

### Evaluating IC Capabilities

The IC installed on the board is a MAX20029ATIA/V+. It has its four outputs set through resistor-dividers on the board at  $V_{OUT1} = 1.2V$ ,  $V_{OUT2} = 1.5V$ ,  $V_{OUT3} = 1.8V$ , and  $V_{OUT4} = 3.3V$ , with 1.5A current limit on them all.

To test a version of the chip with internally fixed output voltages, as well as the MAX20029C, the user can remove the appropriate resistors (R12, R22, R32, R42), and replace the existing resistors (R11, R21, R31, and R41) with  $0\Omega$  values to create a direct feedback connection from the VOUT\_ nodes to the OUTS\_ pins. Alternatively, the MAX20029CEVKIT# can be used if output voltages for all channels are internally fixed.

An external square wave can be applied to the SYNC pin (J3) to cause the IC to switch at a different frequency. Maxim suggests using a 50% duty cycle for the square wave. The supported switching frequency ( $f_{SW}$ ) range is from 1.7MHz up to 2.5MHz.

Three-pin headers J10, J20, J30, and J40 are provided for ease-of-loop measurements (for each of the regulators).

## Ordering Information

PART	TYPE
MAX20029EVKIT#	EV Kit
MAX20029CEVKIT#	EV Kit

# Denotes RoHS compliant.

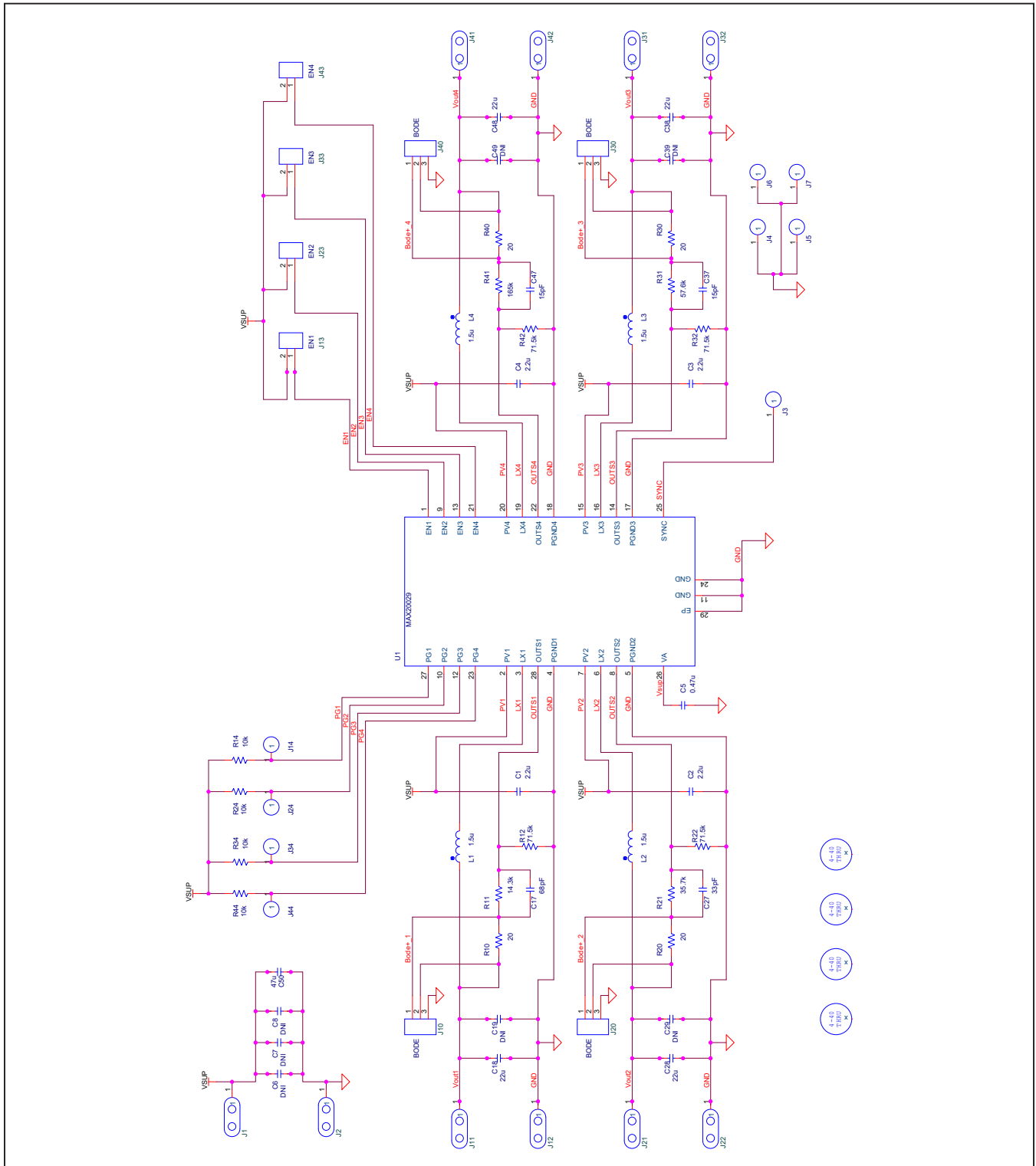
## MAX20029 EV Kit Bill of Materials

REFERENCE DESIGNATOR	QTY	DESCRIPTION	MFG. PART NUMBER
C1, C2, C3, C4	4	Capacitor, 2.2 $\mu$ F, 25V, ceramic, X7R, 0805	Murata GRM21BR71E225KA73
C5	1	Capacitor, 0.47 $\mu$ F, 16V, ceramic, X7R, 0603	Murata GCM188R71C474KA55D
C6, C7	2	Capacitor, 22 $\mu$ F, 10V, ceramic, X7R, 1210	Murata GCM32ER71A226ME12L
C8, C19, C29, C39, C49	—	Open, not populated	—
C17*	1	Capacitor, 68pF, 50V, ceramic, C0G/NP0, 0402	Murata GCM1555C1H680JA16D
C18, C28, C39, C49	4	Capacitor, 22 $\mu$ F, 10V, ceramic, X7T, 0805	Murata GRM21BD71A226ME44
C27*	1	Capacitor, 33pF, 50V, ceramic, C0G/NP0, 0402	Murata GCM1555C1H330JA16D
C37*	1	Capacitor, 15pF, 50V, ceramic, C0G/NP0, 0402	Murata GCM1555C1H150JA16D
C47*	1	Capacitor, 15pF, 50V, ceramic, C0G/NP0, 0402	Murata GCM1555C1H150JA16D
C50	1	Capacitor, 220 $\mu$ F Tant Poly, 6.3V, 2917	Panasonic 6TPF220M5L
L1, L2, L3, L4	4	Inductor, 1.5 $\mu$ H, thin film, 2.5mm x 2.0mm	TDK TFM252012ALMA1R5MTAA
R10, R20, R30, R40	4	Resistor, 20 Ohms, 1%, 0402	RC0402FR-0720RL or similar
R11*	1	Resistor, 14.3 kOhm, 1%, 0402	ERJ-2RKF1432X or similar
R12, R22, R32, R42*	4	Resistor, 71.5 kOhm, 1%, 0402	ERJ-2RKF7152X or similar
R14, R24, R34, R44	4	Resistor, 10 kOhm, 1%, 0402	RC0402FR-0710KL or similar
R21*	1	Resistor, 35.7 kOhm, 1%, 0402	ERJ-2RKF3572X or similar
R31*	1	Resistor, 57.6 kOhm, 1%, 0402	ERJ-2RKF5762X or similar
R41*	1	Resistor, 165 kOhm, 1%, 0402	ERJ-2RKF1653X or similar
U1	1	MAX20029 PMIC, quad output, step-down, low voltage	MAX20029ATIAV+**
—	—	PCB: MAX20029 EV KIT	MAX20029EVKIT#

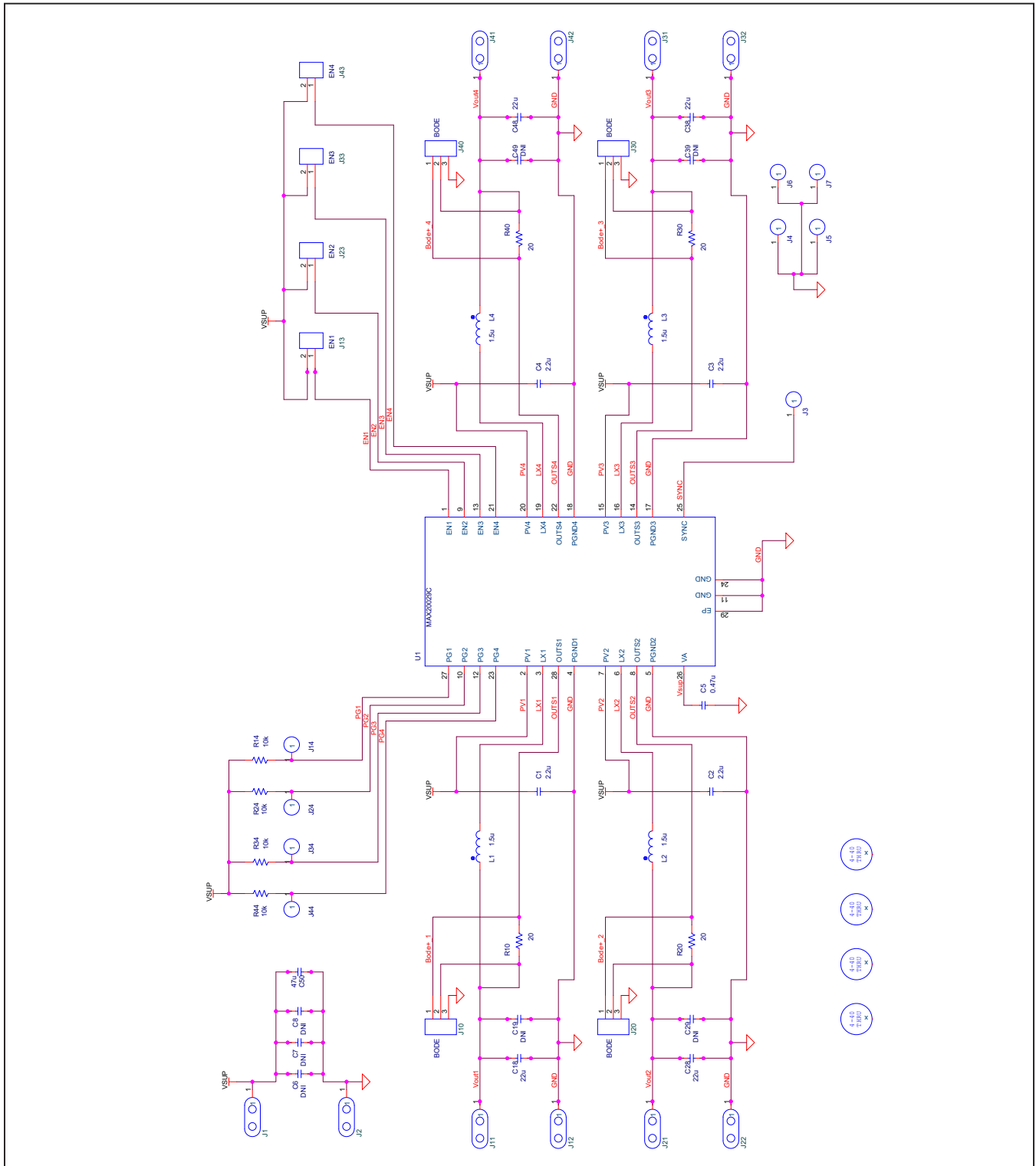
\* Component not used in MAX20029CEVKIT#

\*\* MAX20029CEVKIT# is populated with MAX20029CATIAV+

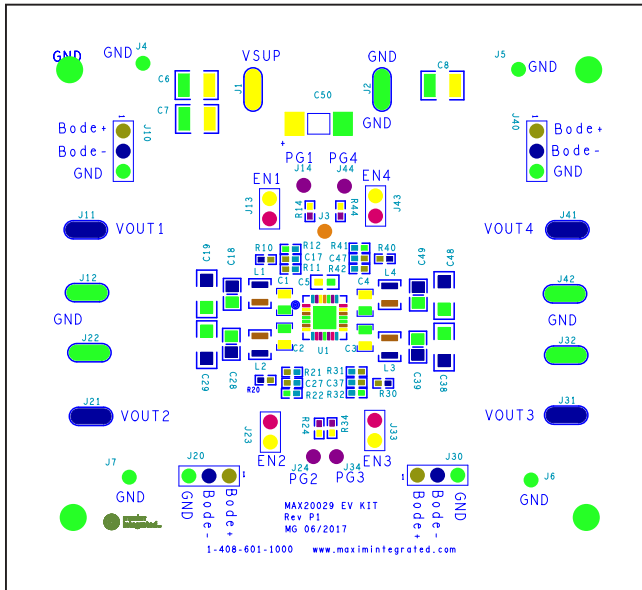
MAX20029 EV Kit Schematic



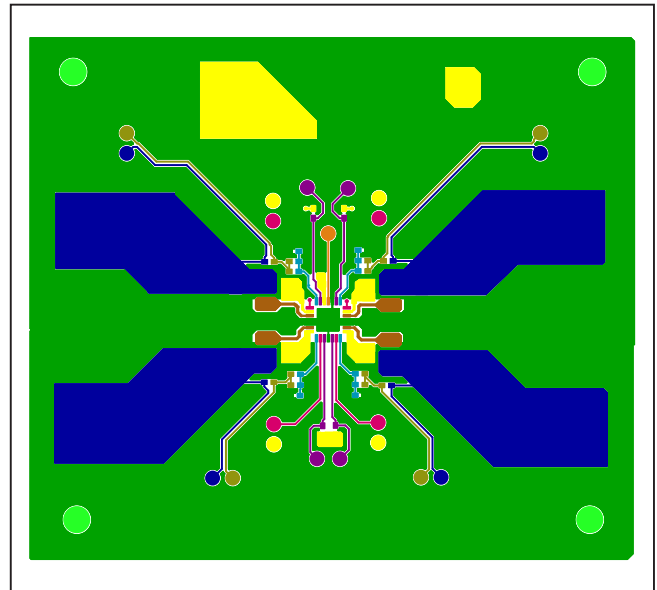
MAX20029C EV Kit Schematic



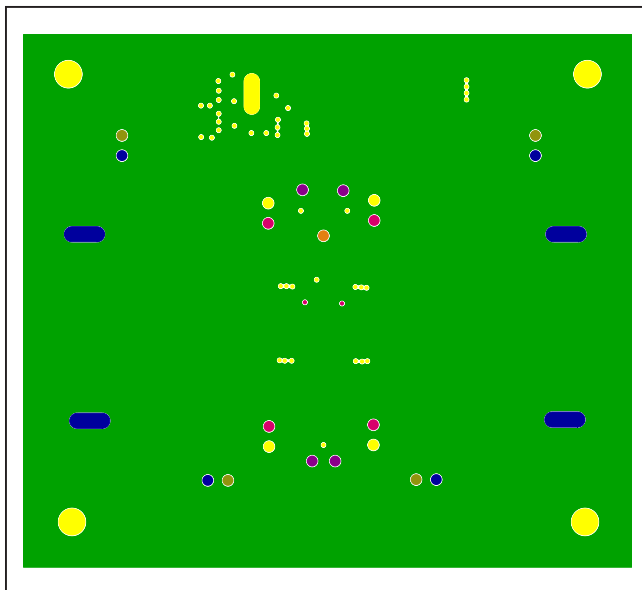
MAX20029 EV Kit PCB Layouts



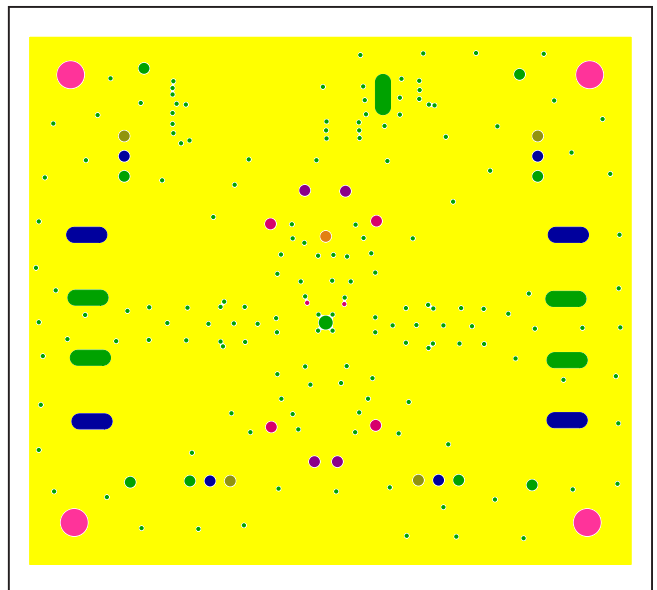
MAX20029 EV Kit Component Placement Guide—Top Assembly



MAX20029 EV Kit PCB Layout—Top Layer

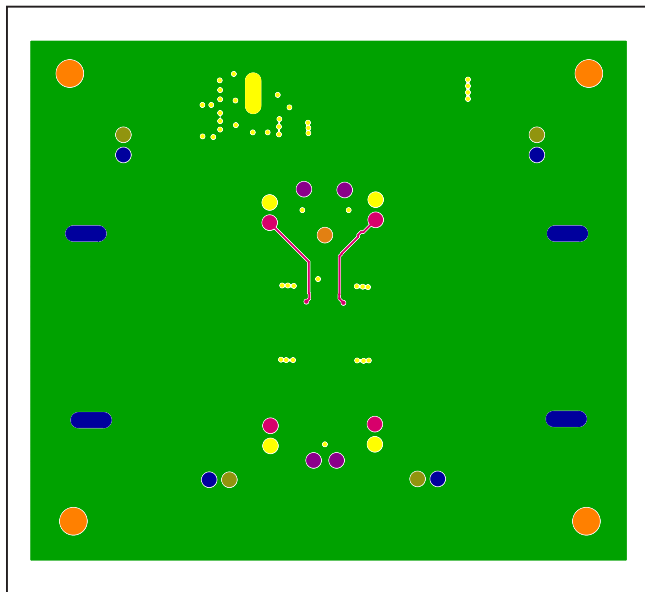


MAX20029 EV Kit PCB Layout—Inner Layer 1

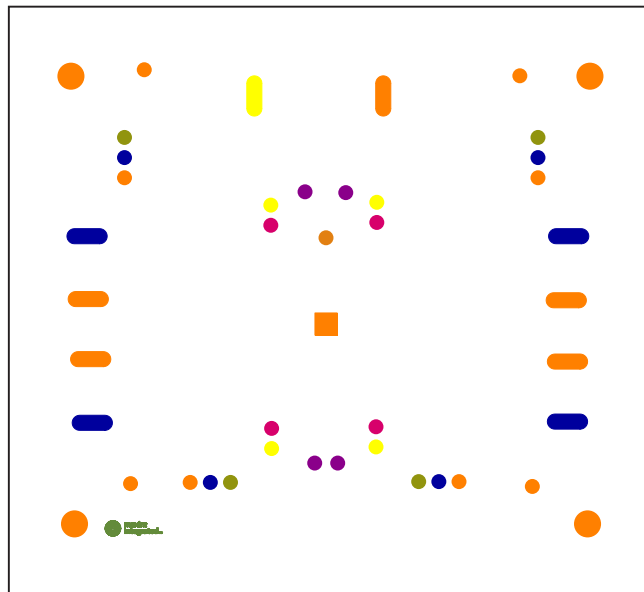


MAX20029 EV Kit PCB Layout—Inner Layer 2

### MAX20029 EV Kit PCB Layouts

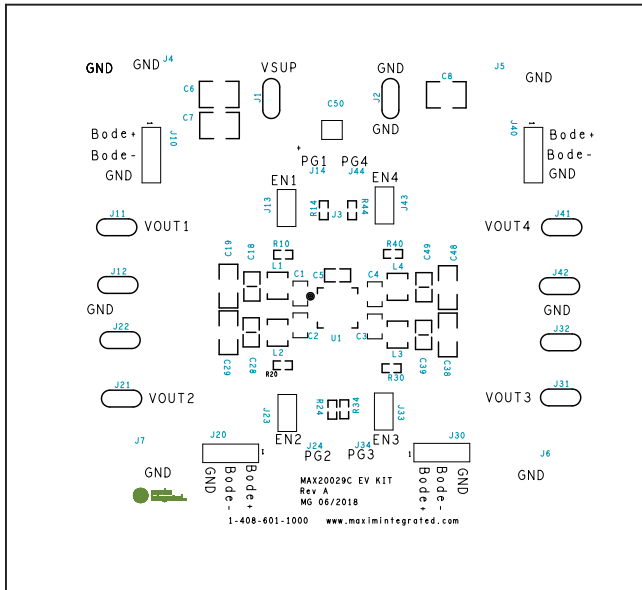


MAX20029 EV Kit PCB Layout—Bottom Layer

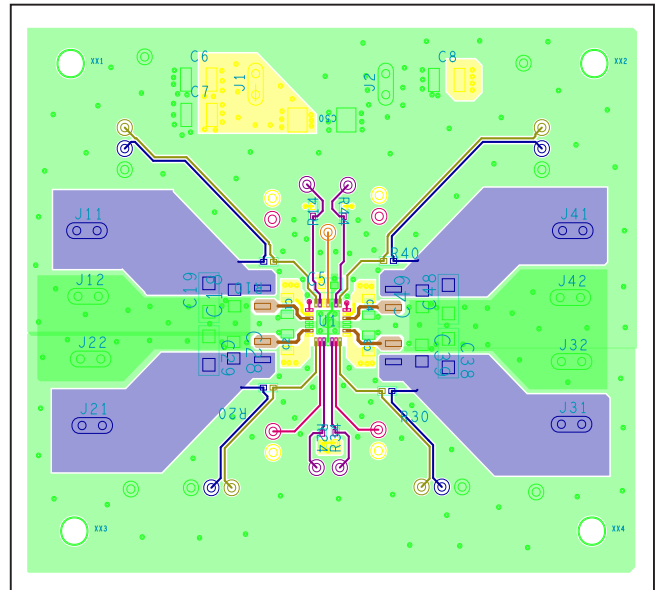


MAX20029 EV Kit Component Placement Guide—Bottom Assembly

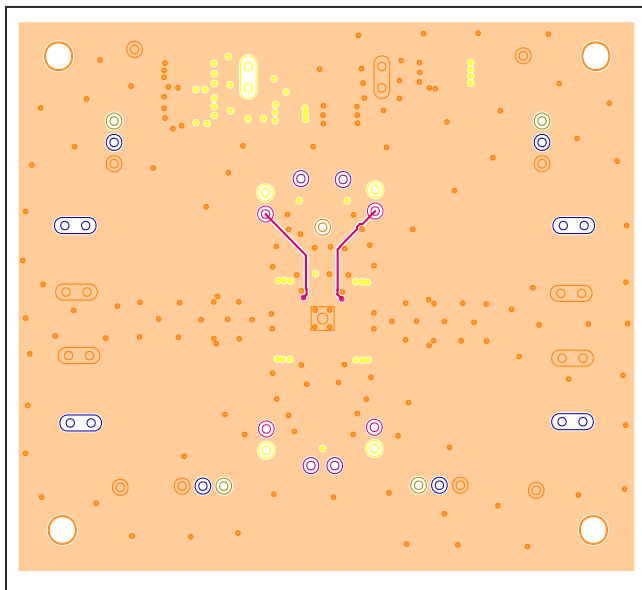
MAX20029C EV Kit PCB Layouts



MAX20029C EV Kit Component Placement Guide—Top Assembly



MAX20029C EV Kit PCB Layout—Top Layer



MAX20029C EV Kit PCB Layout—Bottom Layer



## Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	11/17	Initial release	—
1	4/19	Added MAX20029C to title, updated <a href="#">Detailed Description of Hardware, Ordering Information, MAX20029 EV Kit Bill of Materials</a> ; added <a href="#">MAX20029C EV Kit Schematic</a> and <a href="#">MAX20029C EV Kit PCB Layouts</a>	1–8

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