

MAX9017A Evaluation Kit

Evaluates: MAX9017A, MAX9017B,
MAX9018, MAX9019, and MAX9020
(Open-Drain)

General Description

The MAX9017A evaluation kit (EV kit) is a fully assembled and tested circuit board that contains all the components necessary to evaluate both MAX9017 and MAX9019 ICs. The MAX9017AEVKIT printed circuit board (PCB) comes installed with MAX9017AEKA/V+ in 8-SOT23 package.

The device is a low-power, dual comparator with internal 1.24V voltage reference. The EV kit operates from a single 1.8V to 5.5V DC power supply or from $\pm 0.9V$ to $\pm 2.75V$ split supply.

Features

- +1.8V to +5.5V Supply Voltage Range Across V_{DD} and V_{SS}
- Dual-Channel Comparator with Built-in 1.24V Voltage Reference
- Proven PCB Layout
- Fully Assembled and Tested

Ordering Information appears at end of data sheet.

Quick Start

Required Equipment

Before beginning, the following equipment is needed:

- MAX9017A EV kit
- 1.8V to 5.5V, 100mA DC power supply
- Precision voltage calibrator
- Two digital multimeters

Procedure

Follow the steps to verify board operation.

Caution: Do not turn on power supplies until all connections are completed and turn on V_{CC} , V_{SS} supplies before turning on power supplies on the input pins.

- 1) Verify that shunts on J1, J2 are open and shunts on J3 is installed.
- 2) Set a DC power supply to 3.3V with a multi meter in series to check supply current. Connect the positive terminal of the power supply to the positive terminal of multi meter for current and connect negative terminal of multi meter to V_{CC} test point and the ground terminal of power supply to the GND test point.
- 3) Set precision voltage calibrator to 2.5V. Connect the positive terminal of the calibrator to the INA+ test point and the ground terminal to the GND test point.
- 4) Now short a wire between the INA+ test point and INB+ test point. Also, short a wire between the REF/INA- to INB- test points.
- 5) Enable DC power supply on V_{CC} first and then turn on voltage calibrator on INA+ test point.
- 6) Verify if the supply current measurement reading on V_{CC} pin is on the order of $\sim 1.2\mu A$.
- 7) Verify that OUTA and OUTB are at logic-high (3.3V).
- 8) Decrease the voltage set on INA+ test point to 1V on voltage calibrator and that in turn decreases voltage on INB+ test point as there is a short in between INA+, INB+, as discussed in step 4. Now verify that OUTA and OUTB are now at logic-low (0V).

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Detailed Description of Hardware

The MAX9017A EV kit by default comes with MAX9017A IC, which is dual comparator with internal voltage reference and push-pull output in 8-SOT23 package. The EV kit operates from a single 1.8V to 5.5V DC power supply. The EV kit is meant to work with split supplies as well where the voltage between V_{DD} and V_{SS} is $\pm 0.9V$ to $\pm 2.75V$.

Default Application Circuit

The EV kit comes preconfigured using a single supply configuration on generic dual comparator configuration.

These EV kits allow users to add external hysteresis in addition to the 4mV internal hysteresis through the addition of appropriate resistors on the R1 and R3 pads provided on the EV board for CHA. The amount of hysteresis added is given by the equation below, based on R1, R3 values:

$$\text{HYSTERESIS} = \frac{R3}{R1} \times V_{CC}$$

Similarly, Hysteresis to CHB is added by appropriately choosing R4, R5 resistors.

Other Application Circuit

This EV kit can be used in window-detector applications, while the MAX9018 is being evaluated on this kit.

A window detector application is useful in cases when a battery voltage needs to be monitored and thrown in an

interrupt on the comparator output when the battery voltage is out of the predetermined range set by user.

For example, in a single-cell Li-Ion battery, 3.6V is a nominal voltage range, with 2.9V being typical end-of-line discharge state and 4.2V being the maximum charge voltage. It is useful to track whether a Li-Ion battery voltage is within 2.9V to 4.2V range during operation. When the battery voltage falls out of this voltage range, a comparator in this application circuit will raise an interrupt on the output to alert the user.

Since the MAX9018 has an open-drain output structure, we can wire AND by shorting both of the outputs together and use a pullup resistor to supply voltage.

To configure the EV kit in the window detector application, install jumper J2 and the appropriate resistors on the R3, R2, and R6 pads. Resistors R3, R2, and R6 pads are available for setting the overvoltage and undervoltage-threshold levels. In this single-cell, Li-Ion application, by appropriately choosing these resistors, OUTA provides an active-low, undervoltage indication ($\leq 2.9V$), while OUTB provides an active-low, overvoltage indication ($\geq 4.2V$). ANDing the two open-drain outputs provides an active-high, power-good signal when battery voltage is within the 2.9V to 4.2V range. For the detailed design procedure involved in calculating R3, R2, and R6, refer to the MAX9017 IC data sheet.

Table 1. Default Jumper Settings

| JUMPER | SHUNT POSITION | DESCRIPTION |
|--------|----------------|--|
| J1 | Installed | Positive feedback for external hysteresis |
| | Not Installed* | No feedback is connected |
| J2 | Installed | Inbuilt voltage reference connected to INB+ |
| | Not Installed* | Inbuilt voltage reference is not used for driving INB+ |
| J3 | Installed* | Single-supply operation |
| | Not Installed | Split-supply operation enabled |

*Default position.

Component Suppliers

| SUPPLIER | WEBSITE |
|---------------------------------------|---|
| Murata Electronics North America Inc. | http://www.murata.com/en-us |

Note: Indicate that you are using the MAX40088EVKIT when contacting these component suppliers.

Ordering Information

| PART | TYPE |
|----------------|--------|
| MAX9017AEVKIT# | EV Kit |

#RoHS compliant.

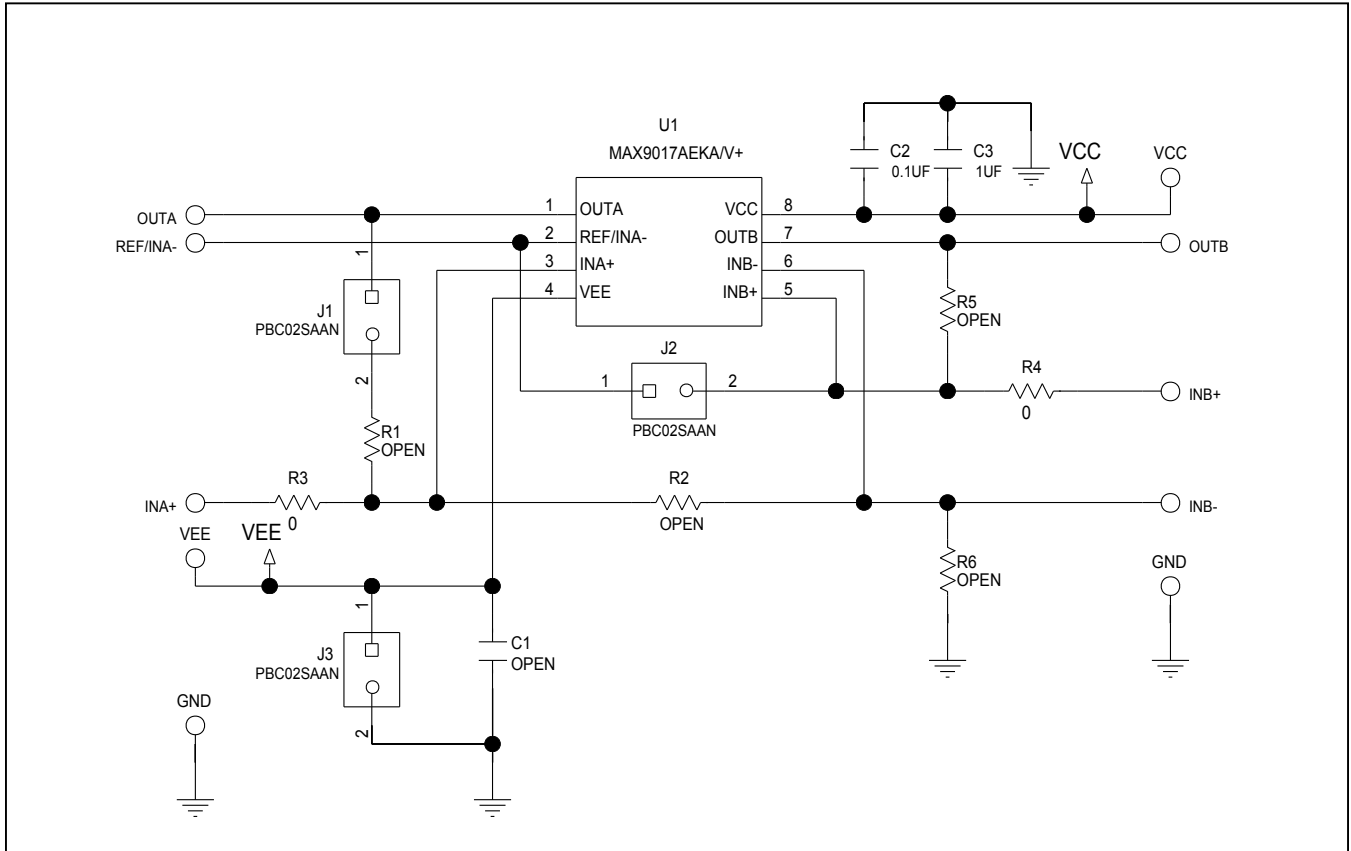
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MAX9017A EV Kit Bill of Materials

| ITEM | QTY | REF DES | VAR STATUS | MAXINV | MFG PART # | MANUFACTURER | VALUE | DESCRIPTION | COMMENTS |
|-------|-----|--|------------|---------------------|---|---|--------------|---|----------|
| 1 | 2 | A1, A2 | Pref | 02-TPMINI5001-00 | 5001 | KEYSTONE | N/A | TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; RECOMMENDED FOR BOARD THICKNESS=0.062IN; NOT FOR COLD TEST | |
| 2 | 1 | C2 | Pref | 20-000U1-P6B | C1608X7R1E104K080AA | TDK | 0.1UF | CAPACITOR; SMT (0603); CERAMIC CHIP; 0.1UF; 25V; TOL=10%; MODEL=C SERIES; TG=-55 DEGC TO +125 DEGC; TC=X7R | |
| 3 | 1 | C3 | Pref | 20-0001U-P6 | GRM188R71E105KA12D; CGA3E1X7R1E105K | MURATA | 1UF | CAPACITOR; SMT (0603); CERAMIC CHIP; 1UF; 25V; TOL=10%; MODEL=GRM SERIES; TG=-55 DEGC TO +125 DEGC; TC=X7R | |
| 4 | 6 | INA+, INB+, INB-, OUTA, OUTB, REF/INA- | Pref | 02-TPMINI5002-00 | 5002 | KEYSTONE | N/A | TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; WHITE; PHOSPHOR BRONZE WIRE SILVER; NOT FOR COLD TEST | |
| 5 | 3 | J1-J3 | Pref | 01-PBC02SAAN2P-21 | PBC02SAAN | SULLINS ELECTRONICS CORP. | PBC02SAAN | CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS; -65 DEGC TO +125 DEGC | |
| 6 | 2 | R3, R4 | Pref | 80-0000R-27A | RC1608J000CS; CR0603-J-000ELF; RC0603JR-070RL | SAMSUNG ELECTRONICS/ BOURNS/YAGEO PH | 0 | RESISTOR; 0603; 0 OHM; 5%; JUMPER; 0.10W; THICK FILM | |
| 7 | 3 | SU1-SU3 | Pref | 02-JMPFSTC02SYAN-00 | STC02SYAN | SULLINS ELECTRONICS CORP. | STC02SYAN | TEST POINT; JUMPER; STR; TOTAL LENGTH=0.256IN; BLACK; INSULATION=PB CONTACT=PHOSPHOR BRONZE; COPPER PLATED TIN OVERALL | |
| 8 | 1 | U1 | Pref | MAX9017AEKA/V+ | MAX9017AEKA/V+ | MAXIM | MAX9017AEKA+ | IC; COMP; DUAL; PRECISION; 1.8V; NANOPOWER COMPARTOR; WITH REFERENCE; SOT23-8 | |
| 9 | 2 | VCC, VEE | Pref | 02-TPMINI5000-00 | 5000 | KEYSTONE | N/A | TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; RED; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; RECOMMENDED FOR BOARD THICKNESS=0.062IN; NOT FOR COLD TEST | |
| 10 | 1 | | Pref | EPCB9017A | MAX9017A | MAXIM | PCB | PCB: MAX9017A | |
| TOTAL | 22 | | | | | | | | |

MAX9017A EV Kit Schematic

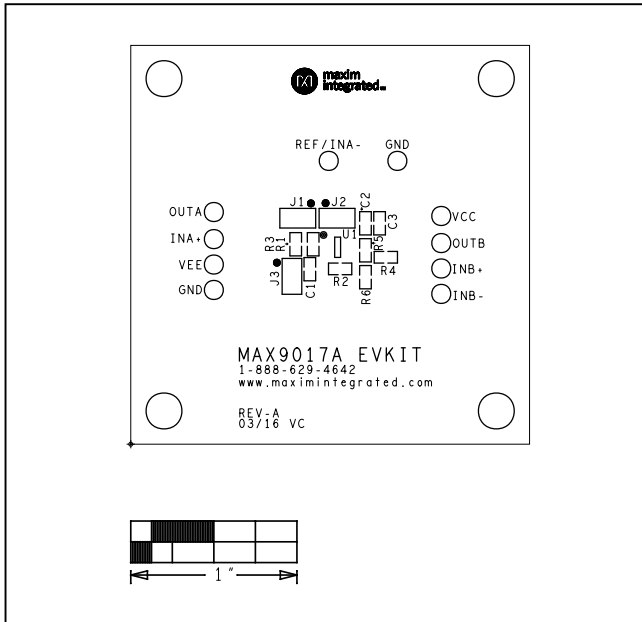


MAX9017A EV Kit Schematic

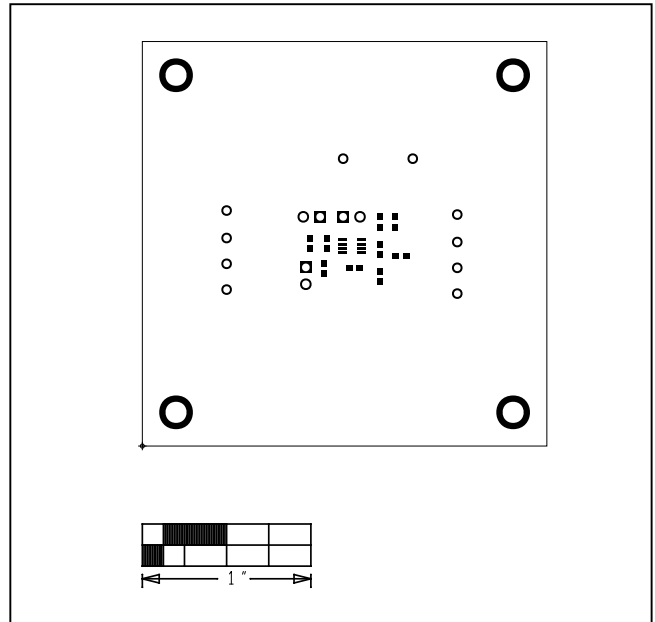
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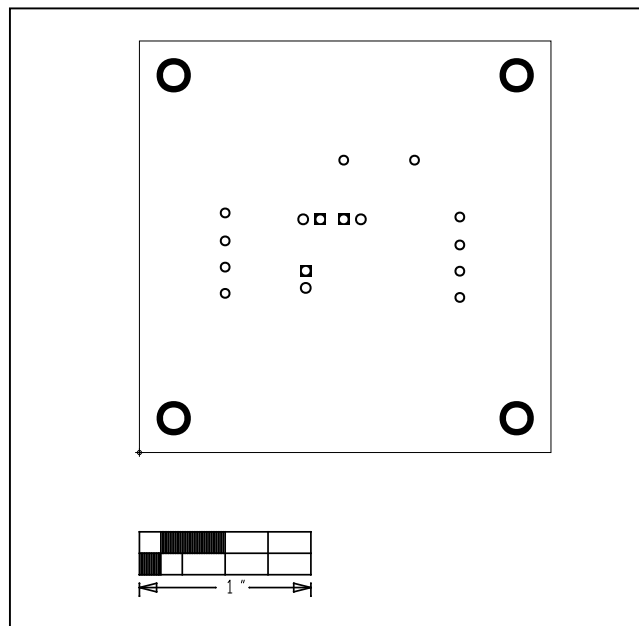
MAX9017A EV Kit PCB Layout Diagrams



MAX9017A EV Kit—Top Silkscreen

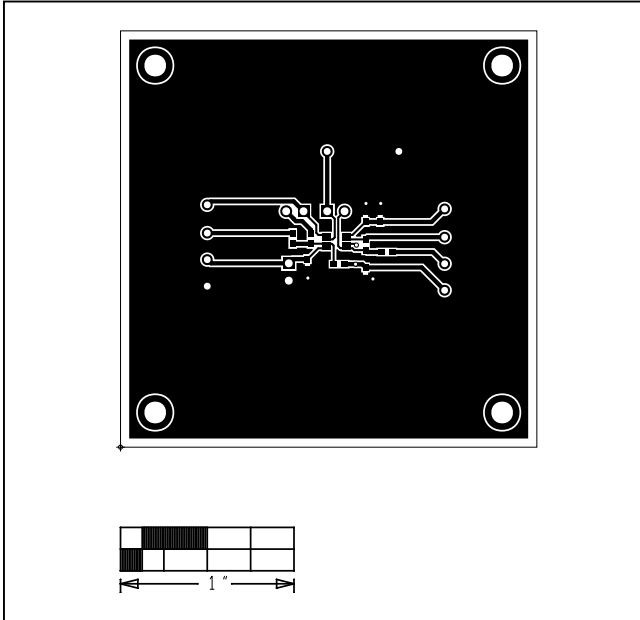


MAX9017A EV Kit—Top Mask

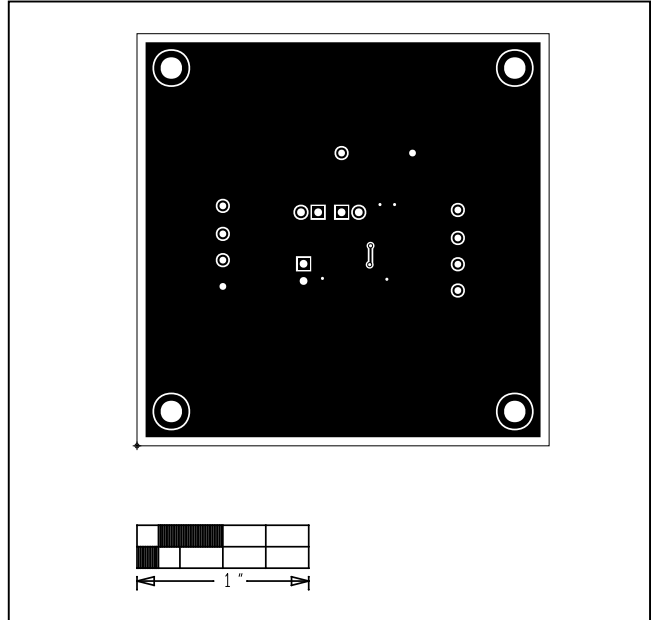


MAX9017A EV Kit—Bottom Mask

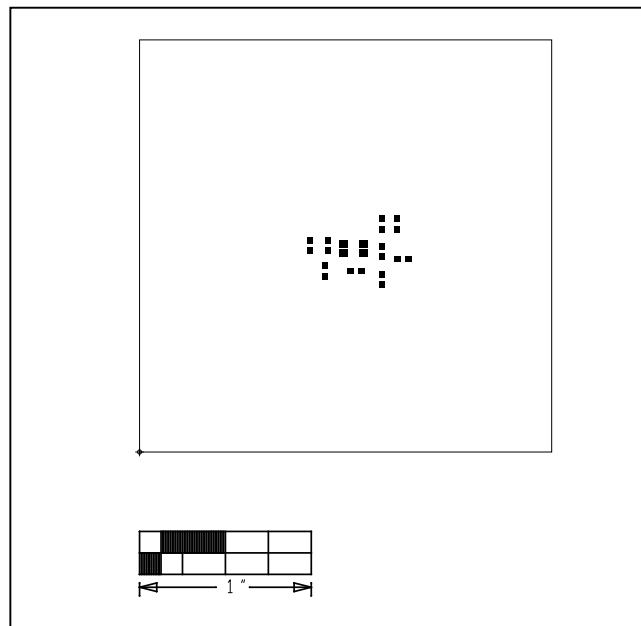
MAX9017A EV Kit PCB Layout Diagrams (continued)



MAX9017A EV Kit—Top



MAX9017A EV Kit—Bottom



MAX9017A EV Kit—Top Paste

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Revision History

| REVISION NUMBER | REVISION DATE | DESCRIPTION | PAGES CHANGED |
|-----------------|---------------|-----------------|---------------|
| 0 | 11/17 | Initial release | — |

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim Integrated's website at www.maximintegrated.com.

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