

## MAX40002–MAX40005 Evaluation Kits

Evaluates: MAX40002–MAX40005  
MAX40012–MAX40015

### General Description

The MAX40002–MAX40005 evaluation kits (EV kits) are fully assembled and tested PC boards that evaluate the MAX40002ANS02–MAX40005ANS02 single comparators. The MAX40002ANS02–MAX40005ANS02 operate from a  $V_{CC}$  supply between 1.7V to 5.5V, come with an internal reference voltage of 0.2V, and have a wide 0.1V to 5.5V input voltage (IN) range. These EV kits demonstrate the MAX40002ANS02–MAX40005ANS02 in an ultra-small, 0.76mm x 0.76mm, 4-bump wafer-level package (WLP) with 0.35mm bump spacing.

These EV kits are configured to evaluate all devices in the MAX40002–MAX40005/MAX40012–MAX40015 family that have a 4-bump wafer-level package (WLP). To evaluate other WLP devices in this MAX40002–MAX40005/MAX40012–MAX40015 family other than what is pre-installed, replace the U1 IC with the desired part (see [Ordering Information](#) for details).

### Features

- 0.1V to 5.5V Input Voltage Range
- 1.7V to 5.5V External Reference Range (MAX40002ANS–MAX40005ANS)
- 1.7V to 5.5V  $V_{CC}$  Range with Internal Reference (MAX40002ANS\_\_–MAX40005ANS\_\_)
  - 0.2V, 0.5V, 0.9V, and 1.222V Internal Reference Options Available
- Evaluates 4-Bump WLP Package
- Fully Assembled and Tested

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

### Quick Start

#### Required Equipment

Before beginning, the following equipment is needed:

- Three +5V DC power supplies ( $V_{CC}$ /REF, IN, and  $V_{PU}$ )
- One digital multimeter (DMM)

#### Procedure

The MAX40002–MAX40005 EV kits are fully assembled and tested. Follow these steps to verify board operation. **Do not turn on the power supply until all connections are completed.**

- 1) Connect the positive terminal of a DC power supply to the  $V_{CC}$  pad and the ground terminal to the GND pad.
- 2) Connect the positive terminal of a DC power supply to the  $V_{PU}$  pad and the ground terminal to the GND pad (MAX40002/MAX40003/MAX40012/MAX40013 only).
- 3) Connect the positive terminal of a DC power supply to the IN pad and the ground terminal to the GND pad.
- 4) Turn on the  $V_{CC}$  power supply and set it to the desired level.
- 5) Turn on the  $V_{PU}$  power supply and set it to the desired level (MAX40002/MAX40003/MAX40012/MAX40013 only).
- 6) Turn on the IN power supply and set it to the desired level.
- 7) Monitor the output using a DMM at the OUT pad, and study its response to varying voltage at IN (see [Table 1](#) for more information).

**Table 1. How Devices Behave Under Various Input Voltage Conditions**

| PART   | V <sub>REF</sub> | INPUT POLARITY                         | INPUT VOLTAGE CONDITIONS               | ACTION AT OUTPUT |
|--|------------------|--|--|------------------|
| MAX40002,<br>MAX40004<br>MAX40012,<br>MAX40014 | External         | Noninverting                           | V <sub>IN</sub> > V <sub>REF</sub>     | Output goes high |
|  |                  |  | V <sub>IN</sub> < V <sub>REF</sub>     | Output goes low  |
| Inverting                                      |                  | V <sub>IN</sub> > V <sub>REF</sub>     | Output goes low                        |                  |
|  |                  | V <sub>IN</sub> < V <sub>REF</sub>     | Output goes high                       |                  |
| MAX40003,<br>MAX40005<br>MAX40013,<br>MAX40015 | Internal         | Noninverting                           | V <sub>IN</sub> > V <sub>REF_INT</sub> | Output goes high |
|  |                  |  | V <sub>IN</sub> < V <sub>REF_INT</sub> | Output goes low  |
| Inverting                                      |                  | V <sub>IN</sub> > V <sub>REF_INT</sub> | Output goes low                        |                  |
|  |                  | V <sub>IN</sub> < V <sub>REF_INT</sub> | Output goes high                       |                  |

### Detailed Description of Hardware

The MAX40002–MAX40005 EV kits are fully assembled and tested PC boards that evaluate the 4-bump WLP MAX40002ANS02–MAX40005ANS02 comparators.

### V<sub>CC</sub>/REF Supply Selection

The V<sub>CC</sub>/REF pad on the EV kit is used to either supply a 1.7V to 5.5V V<sub>CC</sub> voltage (internal reference devices) or a 1.7V to 5.5V external reference voltage to the IC. Refer to the MAX40002–MAX40005 and MAX40012–MAX40015 data sheets for more information.

### V<sub>PU</sub> Pad

The V<sub>PU</sub> pad on the EV kit is used to connect a pullup supply voltage up to 5.5V for the open-drain output devices (MAX40002/MAX40003/MAX40012/MAX40013) for proper operation. Remove R1 and eliminate V<sub>PU</sub> if evaluating the push-pull output devices (MAX40004/MAX40005/MAX40014/MAX40015).

### Ordering Information

| PART*          | U1 IC (INSTALLED) | V <sub>REF</sub> (V) | TYPE   | SWAP U1 IC TO EVALUATE |
|----------------|-------------------|----------------------|--------|------------------------|
| MAX40002EVKIT# | MAX40002ANS02+    | 0.2                  | EV Kit | MAX40012               |
| MAX40003EVKIT# | MAX40003ANS02+    | 0.2                  | EV Kit | MAX40013               |
| MAX40004EVKIT# | MAX40004ANS02+    | 0.2                  | EV Kit | MAX40014               |
| MAX40005EVKIT# | MAX40005ANS02+    | 0.2                  | EV Kit | MAX40015               |

#Denotes RoHS-compliant

**MAX40002–MAX40005 EV Kit Bill of Materials\***

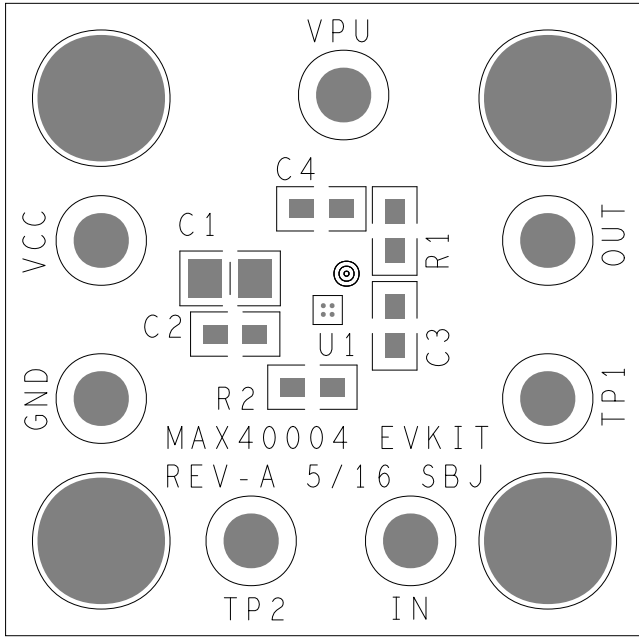
| ITEM  | REF_DES           | DNI/<br>DNP | QTY | MFG PART #                         | MFCTR              | VALUE        | DESCRIPTION  |
|-------|-------------------|-------------|-----|------------------------------------|--------------------|--------------|--|
| 1     | C1                | -           | 1   | GRM21BR71A475KA73; LMK212B7475KG-T | MURATA/TAIYO YUDEN | 4.7UF        | CAPACITOR; SMT (0805); CERAMIC CHIP; 4.7UF; 10V; TOL=10%; MODEL=GRM SERIES; TG=-55 DEGC TO +125 DEGC; TC=X7R           |
| 2     | C2, C4            | -           | 2   | 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     | GND, TP1, TP2     | -           | 3   | 5006                               | KEYSTONE           | N/A          | TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.35IN; BOARD HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; |
| 4     | IN, OUT, VCC, VPU | -           | 4   | 5005                               | KEYSTONE           | N/A          | TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.35IN; BOARD HOLE=0.063IN; RED; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;   |
| 5     | U1                | -           | 1   | MAX40004ANS+                       | MAXIM              | MAX40004ANS+ | EVKIT PART-IC; COMP; 600NA; 4-BUMP ULTRA-TINY COMPARATOR; PACKAGE OUTLINE: 21-100103; PACKAGE CODE: N40C0+1; WLP4      |
| 6     | C3                | DNP         | 0   | 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             |
| 7     | R1, R2            | DNP         | 0   | ERA-3ARB104                        | PANASONIC          | 100K         | RESISTOR; 0603; 100K OHM; 0.1%; 10PPM; 0.1W; THIN FILM   |
| 8     | PCB               | -           | 1   | MAX40004                           | MAXIM              | PCB          | PCB Board:MAX40004 EVALUATION KIT  |
| TOTAL |                   |             | 12  |                                    |                    |              |  |

\*Specified for the MAX40004. For other variants, change U1 to the desired device. All other components are the same.

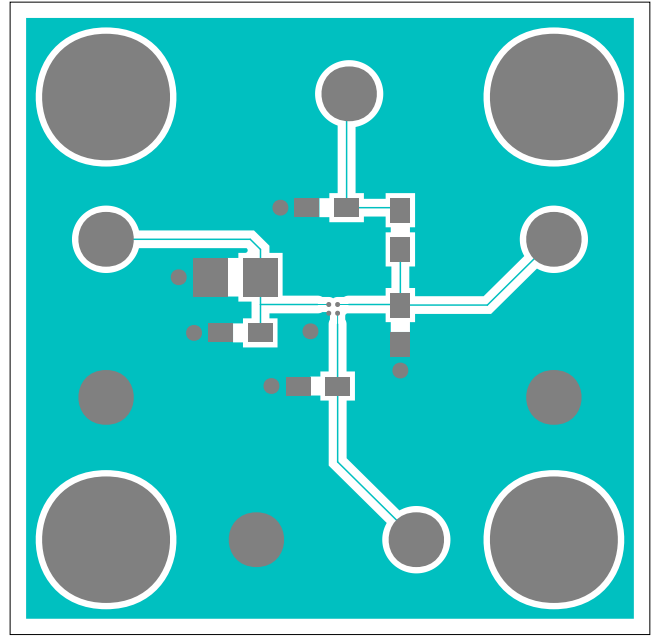
MAX40002–MAX40005  
Evaluation Kits

Evaluates: MAX40002–MAX40005  
MAX40012–MAX40015

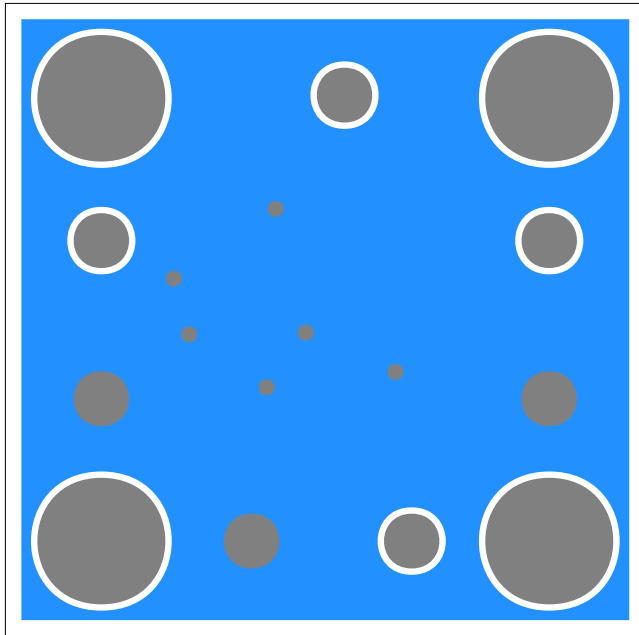
MAX40002–MAX40005 EV Kit PCB Layout Diagrams\*



MAX40002–MAX40005 EV Kit—Top Silkscreen



MAX40002–MAX40005 EV Kit—Top



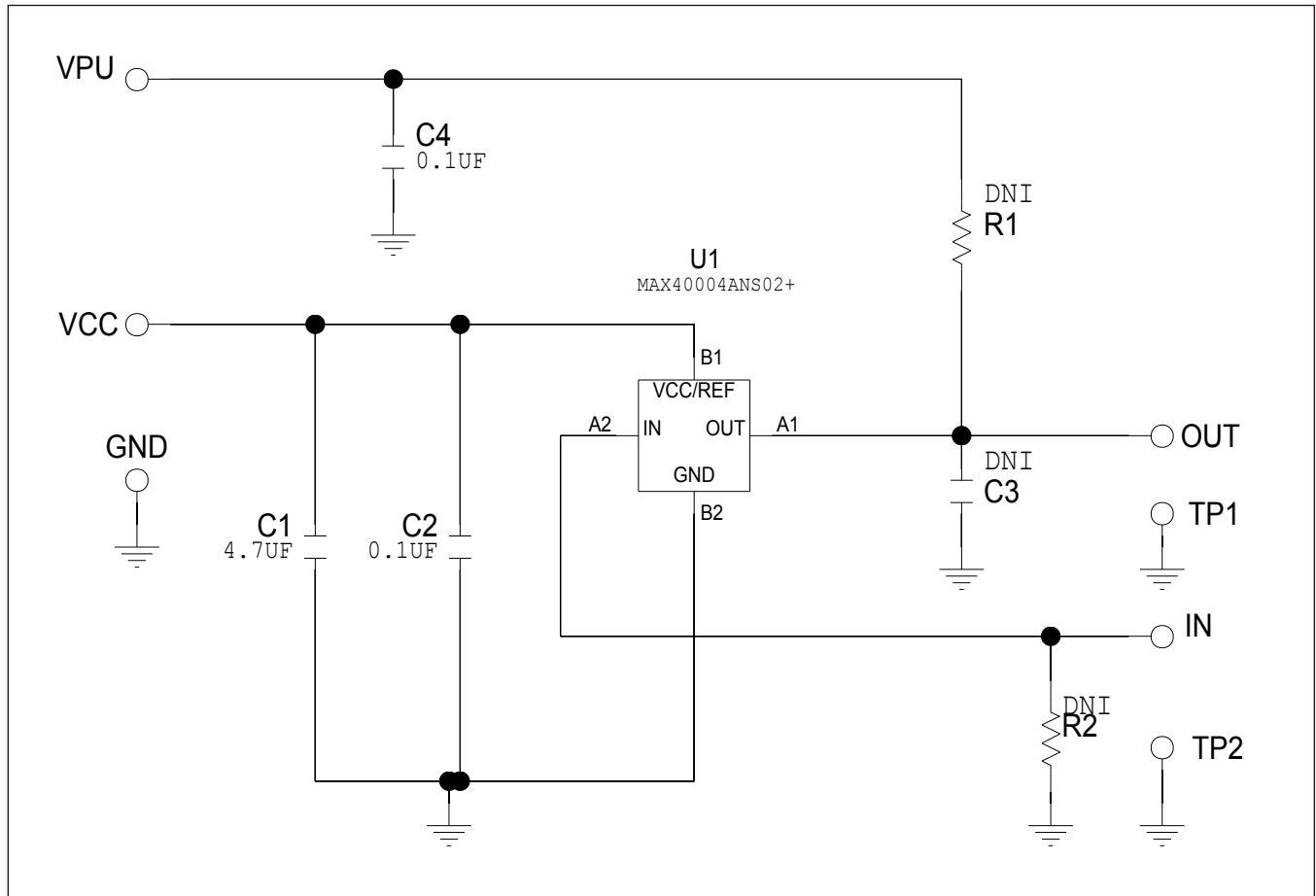
MAX40002–MAX40005 EV Kit—Bottom



MAX40002–MAX40005 EV Kit—Bottom Silkscreen

\*Specified for the MAX40004. For other variants, change U1 to the desired device. All other components are the same.

MAX40002–MAX40005 EV Kit Schematic\*



\*Specified for the MAX40004. For other variants, change U1 to the desired device. All other components are the same.

MAX40002–MAX40005  
Evaluation Kits

Evaluates: MAX40002–MAX40005  
MAX40012–MAX40015

## Revision History

| REVISION NUMBER | REVISION DATE | DESCRIPTION  | PAGES CHANGED |
|-----------------|---------------|--|---------------|
| 0               | 1/17          | Initial release                                    | —             |
| 1               | 2/20          | Added MAX40012–MAX40015 part numbers to data sheet | 1–6           |

For pricing, delivery, and ordering information, please visit Maxim Integrated's online storefront at <https://www.maximintegrated.com/en/storefront/storefront.html>.

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#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.