

| REVISIONS | | | |
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| LTR | DESCRIPTION | DATE | APPROVED |
| | | | |

Prepared in accordance with ASME Y14.24

Vendor item drawing

| | | | | | | | | | | | | | | | | | | | | |
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| REV STATUS OF PAGES | REV | | | | | | | | | | | | | | | | | | |
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| PMIC N/A | PREPARED BY RICK OFFICER | DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990 | | | | | | | | | | | | | | | | | | |
| Original date of drawing YY-MM-DD 11-06-29 | CHECKED BY RAJESH PITHADIA | TITLE MICROCIRCUIT, LINEAR, DUAL, HIGH SPEED, SINGLE SUPPLY, VOLTAGE COMPARATOR, MONOLITHIC SILICON | | | | | | | | | | | | | | | | | | |
| | APPROVED BY CHARLES F. SAFFLE | | | | | | | | | | | | | | | | | | | |
| | SIZE A | CODE IDENT. NO. 16236 | DWG NO. V62/09638 | | | | | | | | | | | | | | | | | |
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1. SCOPE

1.1 Scope. This drawing documents the general requirements of a dual, high speed, single supply, voltage comparator microcircuit, with an operating temperature range of -55°C to +125°C.

1.2 Vendor Item Drawing Administrative Control Number. The manufacturers PIN is the item of identification. The vendor item drawing establishes an administrative control number for identifying the item on the engineering documentation:

| | | | | |
|---------------------------------------|---|---|---|--|
| <u>V62/09638</u> Drawing number | - | <u>01</u> Device type (See 1.2.1) | <u>X</u> Case outline (See 1.2.2) | <u>B</u> Lead finish (See 1.2.3) |
|---------------------------------------|---|---|---|--|

1.2.1 Device type(s).

| | | |
|--------------------|----------------|--|
| <u>Device type</u> | <u>Generic</u> | <u>Circuit function</u> |
| 01 | MAX942 | Dual, high speed, single supply voltage comparator |

1.2.2 Case outline(s). The case outline(s) are as specified herein.

| | | | |
|-----------------------|-----------------------|---------------------|----------------------|
| <u>Outline letter</u> | <u>Number of pins</u> | <u>JEDEC PUB 95</u> | <u>Package style</u> |
| X | 8 | MS-012-AA | Small outline |

1.2.3 Lead finishes. The lead finishes are as specified below or other lead finishes as provided by the device manufacture:

| | |
|--------------------------|----------------------|
| <u>Finish designator</u> | <u>Material</u> |
| A | Hot solder dip |
| B | Tin-lead plate |
| C | Gold plate |
| D | Palladium |
| E | Gold flash palladium |
| Z | Other |

| | | | |
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1.3 Absolute maximum ratings. 1/

Power supply voltage ranges:

| | |
|---|------------------------|
| Supply voltage +V to GND | +6.5 V |
| Differential input voltage | -0.3 V to (+V + 0.3 V) |
| Common mode input voltage | -0.3 V to (+V + 0.3 V) |
| Current into input pins | ±20 mA |
| Junction temperature range (T _J) | 150°C |
| Storage temperature range (T _{STG}) | -65°C to +150°C |
| Lead temperature (soldering, 10 seconds) | +300°C |
| Electrostatic discharge (ESD): | |
| Human body model (HBM) | 1,500 V |
| Moisture sensitivity level (MSL) | Level 1 |

1.4 Recommended operating conditions. 2/

| | |
|--|-----------------|
| Supply voltage range (+V) | 2.7 V to 5.5 V |
| Operating free-air temperature range (T _A) | -55°C to +125°C |

1.5 Thermal data table.

| Case outline letter | X | X | Units |
|--|--------------|----------------|-------|
| PC board | Single layer | Multi-layer 3/ | |
| Power dissipation (P _D), maximum at +70°C | 471 | 588 | mW |
| Power dissipation (P _D) derating above +70°C | 5.9 | 7.4 | mW/°C |
| Thermal resistance, junction to case (θ _{JC}) | 40 | 38 | °C/W |
| Thermal resistance, junction to ambient (θ _{JA}) | 170 | 136 | °C/W |

1/ Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

2/ Use of this product beyond the manufacturers design rules or stated parameters is done at the user’s risk. The manufacturer and/or distributor maintain no responsibility or liability for product used beyond the stated limits.

3/ Package thermal resistances were obtained using the method described in JEDEC specification JESD51-7, using a four-layer board. For detailed information on package thermal considerations, refer to www.maxim-ic.com/thermal-tutorial

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2. APPLICABLE DOCUMENTS

JEDEC PUB 95 – Registered and Standard Outlines for Semiconductor Devices
JESD51-7 - High Effective Thermal Conductivity Test Board for Leaded Surface Mount Packages

(Applications for copies should be addressed to the JEDEC Office, 3103 North 10th Street, Suite 240-S, Arlington, VA 22201-2107 or online at <http://www.jedec.org>)

3. REQUIREMENTS

3.1 Marking. Parts shall be permanently and legibly marked with the manufacturer's part number as shown in 6.3 herein and as follows:

- A. Manufacturer's name, CAGE code, or logo
- B. Pin 1 identifier
- C. ESDS identification (optional)

3.2 Unit container. The unit container shall be marked with the manufacturer's part number and with items A and C (if applicable) above.

3.3 Electrical characteristics. The maximum and recommended operating conditions and electrical performance characteristics are as specified in 1.3, 1.4, and table I herein.

3.4 Design, construction, and physical dimension. The design, construction, and physical dimensions are as specified herein.

3.5 Diagrams.

3.5.1 Case outline. The case outline shall be as shown in 1.2.2 and figure 1.

3.5.2 Terminal connections. The terminal connections shall be as shown in figure 2.

| | | | |
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TABLE I. Electrical performance characteristics. 1/

| Test | Symbol | Conditions +V = 2.7 V to 5.5 V unless otherwise specified | Temperature, T _A | Device type | Limits | | Unit |
|-------------------------------------|--------------------|---|--------------------------------|----------------|-------------|-------------|------|
| | | | | | Min | Max | |
| Positive supply voltage | +V | | -55°C to +125°C | 01 | 2.7 | 5.5 | V |
| Input voltage range | V _{CMR} | <u>2/</u> | -55°C to +125°C | 01 | -0.2 | +V + 0.2 | V |
| Input referred trip points | V _{TRIP} | V _{CM} = 0 V or V _{CM} = +V <u>3/</u> | +25°C | 01 | | 3 | mV |
| | | | -55°C to +125°C | | | 4 | |
| Input offset voltage | V _{OS} | V _{CM} = 0 V or V _{CM} = +V <u>4/</u> | +25°C | 01 | | 2 | mV |
| | | | -55°C to +125°C | | | 3 | |
| Input bias current | I _B | V _{IN} = V _{OS} , <u>5/</u> V _{CM} = 0 V or V _{CM} = +V | -55°C to +125°C | 01 | | 400 | nA |
| Input offset current | I _{OS} | V _{IN} = V _{OS} , V _{CM} = 0 or V _{CM} = +V | -55°C to +125°C | 01 | | 150 | nA |
| Input differential clamp voltage | V _{CLAMP} | Force 100 μA into +IN, -IN = GND, measure +V _{IN} - -V _{IN} , see figure 4 | +25°C | 01 | 2.2 typical | | V |
| Common mode rejection ratio | CMRR | <u>6/</u> | -55°C to +125°C | 01 | | 300 | μV/V |
| Power supply rejection ratio | PSRR | 2.7 V ≤ +V ≤ 5.5 V, V _{CM} = 0 V | -55°C to +125°C | 01 | | 300 | μV/V |
| Output high voltage | V _{OH} | I _{SOURCE} = 400 μA | -55°C to +125°C | 01 | +V - 0.4 | | V |
| | | I _{SOURCE} = 4 mA | | | +V - 0.4 | | |
| Output low voltage | V _{OL} | I _{SINK} = 400 μA | -55°C to +125°C | 01 | | 0.4 | V |
| | | I _{SINK} = 4 mA | | | | 0.4 | |
| Supply current per comparator | I _{CC} | +V = 3 V | -55°C to +125°C | 01 | | 500 | μA |
| | | +V = 5 V | | | | 600 | |
| Power dissipation per comparator | P _D | +V = 5.5 V | -55°C to +125°C | 01 | | 3.6 | mW |

See footnotes at end of table.

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TABLE I. Electrical performance characteristics – Continued. 1/

| Test | Symbol | Conditions +V = 2.7 V to 5.5 V unless otherwise specified | Temperature, T _A | Device type | Limits | | Unit |
|--------------------------------|--|---|--------------------------------|----------------|------------|-----|------|
| | | | | | Min | Max | |
| Propagation delay | +t _{PD} , -t _{PD} | | -55°C to +125°C | 01 | | 200 | ns |
| Differential propagation delay | dt _{PD} | <u>7/</u> | +25°C | 01 | 10 typical | | ns |
| Propagation delay skew | | <u>8/</u> | +25°C | 01 | 10 typical | | ns |

- 1/ Testing and other quality control techniques are used to the extent deemed necessary to assure product performance over the specified temperature range. Product may not necessarily be tested across the full temperature range and all parameters may not necessarily be tested. In the absence of specific parametric testing, product performance is assured by characterization and/or design.
- 2/ Inferred from the CMRR test. Note also that either or both inputs can be driven to the absolute maximum limit (0.3 V beyond either supply rail) without damage or false output inversion.
- 3/ The input referred trip points are the extremities of the differential input voltage required to make the comparator output change state. The difference between the upper and lower trip points is equal to the width of the input referred hysteresis zone. See figure 3.
- 4/ V_{OS} is defined as the center of the input-referred hysteresis zone. See figure 3.
- 5/ The polarity of I_B reverses direction as V_{CM} approaches either supply rail. See the typical operating characteristics in the manufacturer's datasheet for more information.
- 6/ Specified over the full common mode range (V_{CMR}).
- 7/ Specified between any two channels in the device.
- 8/ Specified as the difference between +t_{PD} and -t_{PD} for any one comparator.

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Case X

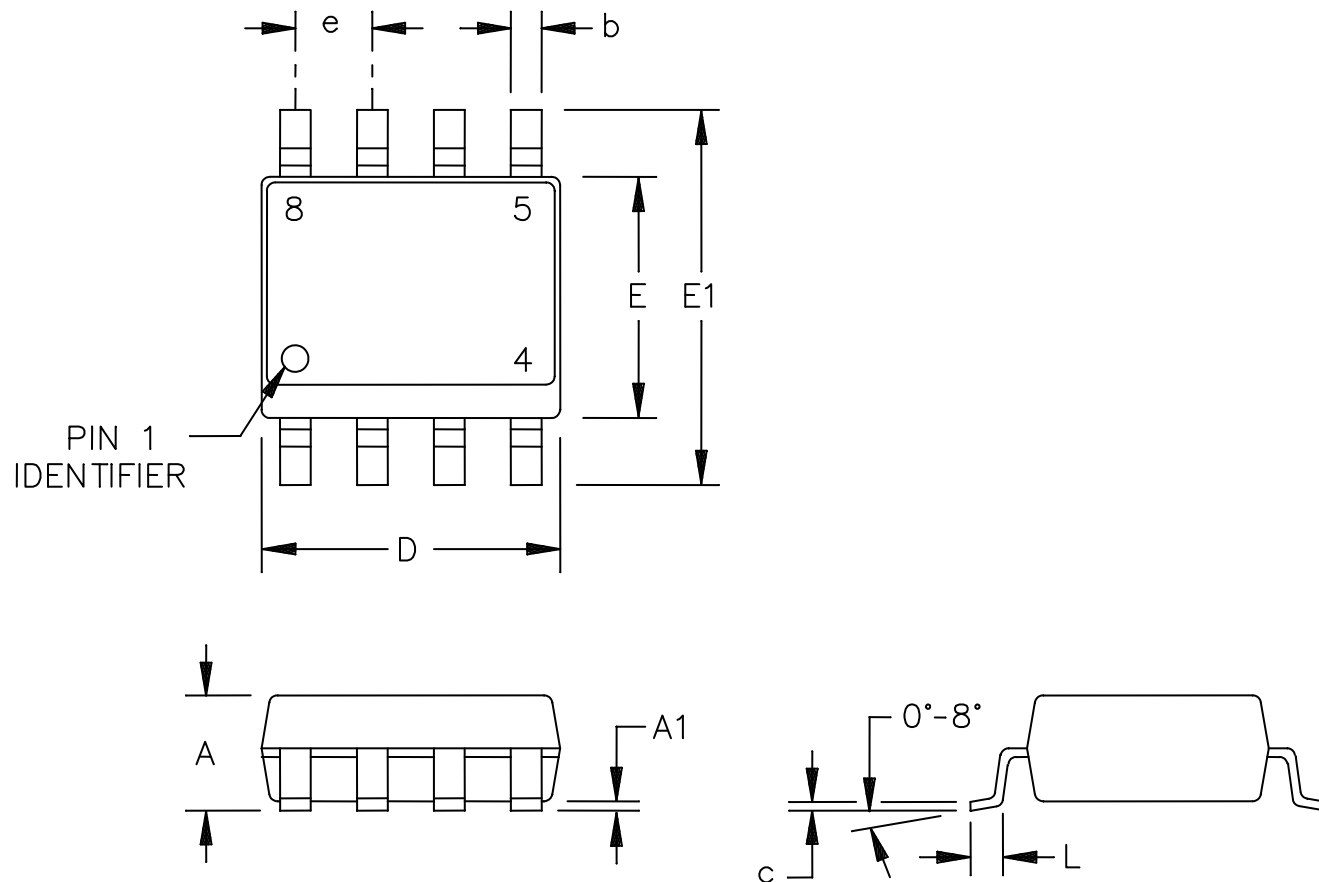


FIGURE 1. Case outline.

| | | | |
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Case X – continued.

| Symbol | Dimensions | | | |
|--------|------------|-------|-------------|------|
| | Inches | | Millimeters | |
| | Min | Max | Min | Max |
| A | 0.053 | 0.069 | 1.35 | 1.75 |
| A1 | 0.004 | 0.010 | 0.10 | 0.25 |
| b | 0.014 | 0.019 | 0.35 | 0.49 |
| c | 0.007 | 0.010 | 0.19 | 0.25 |
| D | 0.189 | 0.197 | 4.80 | 5.00 |
| e | 0.050 BSC | | 1.27 BSC | |
| E | 0.150 | 0.157 | 3.80 | 4.00 |
| E1 | 0.228 | 0.244 | 5.80 | 6.20 |
| L | 0.016 | 0.050 | 0.40 | 1.27 |
| n | 8 | | 8 | |

NOTES:

1. Controlling dimensions are millimeter, inch dimensions are given for reference only.
2. Dimensions D and E do not include mold flash.
3. Mold flash or protrusions do not exceed 0.15 mm (0.006 inch).
4. Leads to be coplanar within 0.10 mm (.004 inch).
5. Falls within reference to JEDEC MS-012-AA.

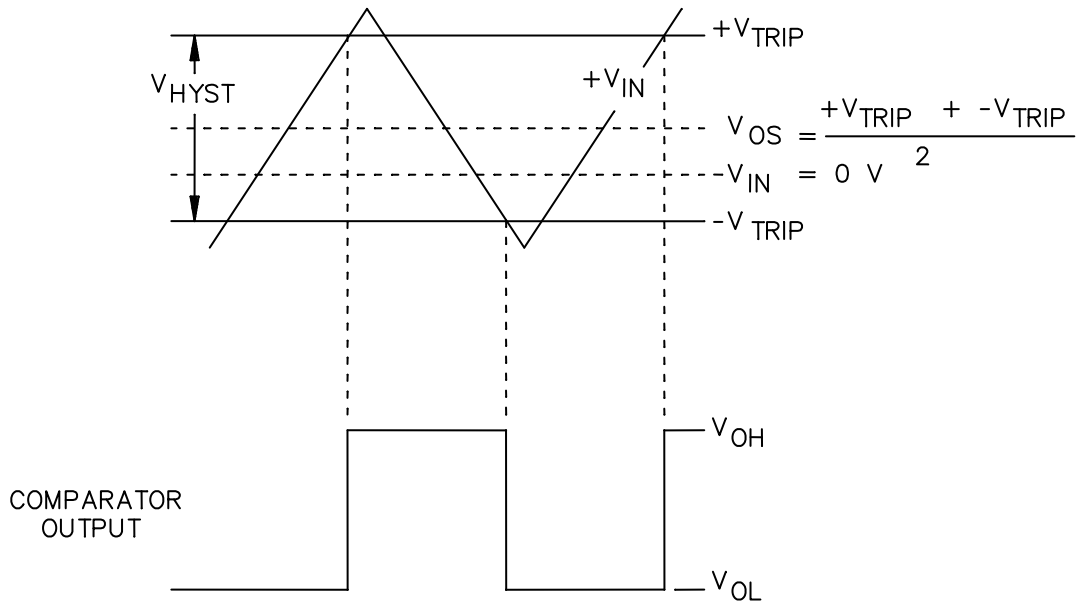
FIGURE 1. Case outline - Continued.

| | | | |
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| Device type | 01 | |
|-----------------|-----------------|---|
| Case outline | X | |
| Terminal number | Terminal symbol | Description |
| 1 | OUTA | Comparator A output. |
| 2 | -INA | Comparator A inverting input. |
| 3 | +INA | Comparator A noninverting input. |
| 4 | GND | Ground. |
| 5 | +INB | Comparator B noninverting input. |
| 6 | -INB | Comparator B inverting input. |
| 7 | OUTB | Comparator B output. |
| 8 | +V | Positive supply (+V to GND must be ≤ 6.5 V). |

FIGURE 2. Terminal connections.

| | | | |
|---|------------------|--------------------------------|-----------------------------|
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(Noninverting input varied)

FIGURE 3. Input and output voltage waveform.

| | | | |
|--|--|--|---|
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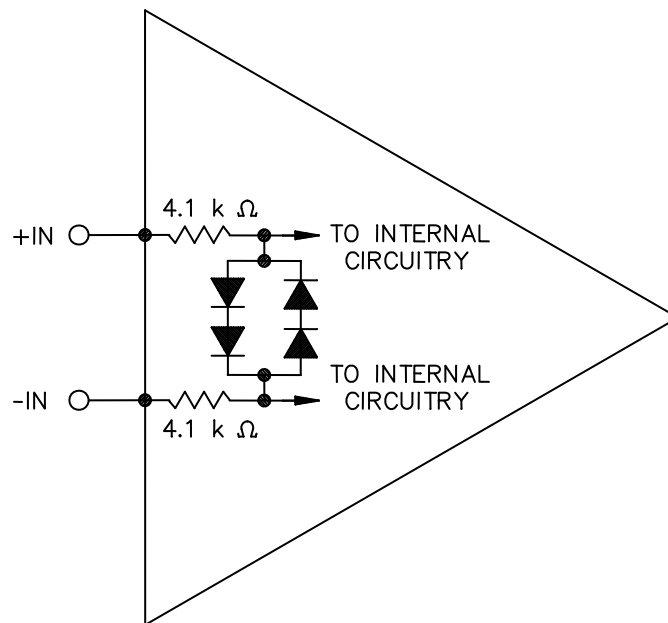


FIGURE 4. Input stage circuitry.

| | | | |
|---|-------------------|---------------------------------|-------------------------------------|
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4. VERIFICATION

4.1 Product assurance requirements. The manufacturer is responsible for performing all inspection and test requirements as indicated in their internal documentation. Such procedures should include proper handling of electrostatic sensitive devices, classification, packaging, and labeling of moisture sensitive devices, as applicable.

5. PREPARATION FOR DELIVERY

5.1 Packaging. Preservation, packaging, labeling, and marking shall be in accordance with the manufacturer's standard commercial practices for electrostatic discharge sensitive devices.

6. NOTES

6.1 ESDS. Devices are electrostatic discharge sensitive and are classified as ESDS class 1C minimum.

6.2 Configuration control. The data contained herein is based on the salient characteristics of the device manufacturer's data book. The device manufacturer reserves the right to make changes without notice. This drawing will be modified as changes are provided.

6.3 Suggested source(s) of supply. Identification of the suggested source(s) of supply herein is not to be construed as a guarantee of present or continued availability as a source of supply for the item.

| | | |
|---|-------------------------------|------------------------------|
| Vendor item drawing administrative control number <u>1/</u> | Device manufacturer CAGE code | Vendor part number <u>2/</u> |
| V62/09638-01XB | 1ES66 | MAX942MSA/PR |

1/ The vendor item drawing establishes an administrative control number for identifying the item on the engineering documentation.

2/ Add "-T" suffix for tape and reel.

CAGE code

1ES66

Source of supply

Maxim Integrated Products
120 San Gabriel Drive
Sunnyvale, CA 94086-5125

| | | | |
|---|------------------|--------------------------------|-----------------------------|
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