

ICL8069

Data Sheet

January 2004

FN3172.3

Low Voltage Reference

The ICL8069 is a 1.2V temperature-compensated voltage reference. It uses the band-gap principle to achieve excellent stability and low noise at reverse currents down to 50μ A. Applications include analog-to-digital converters, digital-to-analog converters, threshold detectors, and voltage regulators. Its low power consumption makes it especially suitable for battery operated equipment.

Ordering Information

| PART NUMBER | MAXIMUM TEMPCO | TEMP. RANGE (^o C) | PACKAGE | PKG. DWG. # |
|----------------|------------------------|-------------------------------------|------------------------|----------------|
| ICL8069CCZR | 0.005%/ ⁰ C | 0 to 70 | SIP Package (TO-92) | Z3.05 |
| ICL8069DCZR | 0.01%/ ⁰ C | 0 to 70 | SIP Package (TO-92) | Z3.05 |
| ICL8069CCBA | 0.005%/ ^o C | 0 to 70 | 8 Ld SOIC | M8.15 |

Features

- Low Bias Current (Min)50μA
- Low Dynamic Impedance
- Low Reverse Voltage
- Low Cost

Pinouts





CAUTION: These devices are sensitive to electrostatic discharge; follow proper IC Handling Procedures. 1-888-INTERSIL or 321-724-7143 | Intersil (and design) is a registered trademark of Intersil Americas Inc. Copyright © Intersil Americas Inc. 2004. All Rights Reserved All other trademarks mentioned are the property of their respective owners.

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Functional Block Diagrams

SIMPLE REFERENCE (1.2V OR LESS)



BUFFERED 10V REFERENCE USING A SINGLE SUPPLY



DOUBLE REGULATED 100mV REFERENCE FOR ICL7107 ONE-CHIP DPM CIRCUIT



Absolute Maximum Ratings

| Reverse VoltageSee Note | ÷ 3 |
|-------------------------|-----|
| Forward Current | nΑ |
| Reverse Current | hΑ |

Operating Conditions

| Temperature Ranges | | |
|--------------------|---------------------|-------------------|
| ICL8069C | 0 ⁰ C to | 70 ⁰ C |

Thermal Information

| Thermal Resistance (Typical, Note 1) | θ_{JA} (^o C/W) | θ _{JC} (^o C/W) | | | | |
|--|-----------------------------------|--------------------------------------|--|--|--|--|
| SOIC Package | 170 | N/A | | | | |
| SIP (TO-92) Package | 200 | N/A | | | | |
| Power Dissipation Limited by MAX Forward/Reverse Current | | | | | | |
| Maximum Junction Temperature (SOIC Package) | | | | | | |
| Maximum Storage Temperature Range . | 65 | ^o C to 150 ^o C | | | | |
| Maximum Lead Temperature (Soldering 1 | 0s) | 300 ⁰ C | | | | |
| (SOIC - Lead Tips Only) | | | | | | |

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

NOTE:

1. θ_{JA} is measured with the component mounted on an evaluation PC board in free air.

Electrical Specifications $T_A = 25^{\circ}C$ Unless Otherwise Specified

| PARAMETER | TEST CONDITIONS | MIN | ТҮР | MAX | UNITS |
|---|---|-------|------|-------|-------------------|
| Reverse Breakdown Voltage | I _R = 500μA | 1.20 | 1.23 | 1.25 | V |
| Reverse Breakdown Voltage Change | $50\mu A \le I_R \le 5mA$ | - | 15 | 20 | mV |
| Reverse Dynamic Impedance | I _R = 50μA | - | 1 | 2 | Ω |
| | I _R = 500μA | - | 1 | 2 | Ω |
| Forward Voltage Drop | I _F = 500μA | - | 0.7 | 1 | V |
| RMS Noise Voltage | $10Hz \le F \le 10kHz$, $I_R = 500\mu A$ | - | 5 | - | μV |
| Long Term Stability | I _R = 4.75mA, T _A = 25 ^o C | - | 1 | - | ppm/kHR |
| Breakdown Voltage Temperature Coefficient ICL8069C | $I_R = 500 \mu A$, $T_A = Operating$ Temperature Range | - | - | 0.005 | %/ ⁰ C |
| ICL8069D | | - | - | 0.01 | %/ ^o C |
| Reverse Current Range | 1.18V to 1.27V | 0.050 | - | 5 | mA |

NOTES:

2. If circuit strays in excess of 200pF are anticipated, a 4.7µF shunt capacitor will ensure stability under all operating conditions.

3. In normal use, the reverse voltage cannot exceed the reference voltage. However when plugging units into a powered-up test fixture, an instantaneous voltage equal to the compliance of the test circuit will be seen. This should not exceed 20V.

Typical Performance Curves



REVERSE CURRENT





FIGURE 3. REVERSE VOLTAGE AS A FUNCTION OF TEMPERATURE

Single-In-Line Plastic Packages (SIP)



NOTES:

- 1. Package body dimensions do not include any mold flash or protrusions.
- 2. Package outline dimensions do not include burrs.
- 3. Controlling dimension: INCH.

Z3.05 (JEDEC STYLE TO-92 MODIFIED) 3 LEAD PLASTIC SINGLE-IN-LINE PACKAGE

| | INCHES | | MILLIN | | |
|--------|----------------|----------------|----------------|----------------|-------|
| SYMBOL | MIN | MAX | MIN | MAX | NOTES |
| А | 0.170 | 0.195 | 4.32 | 4.95 | 1 |
| b | 0.014 | 0.020 | 0.36 | 0.51 | 2 |
| E | 0.130 | 0.155 | 3.30 | 3.94 | 1 |
| е | 0.045 | 0.055 | 1.14 | 1.40 | - |
| e1 | 0.095 | 0.105 | 2.41 | 2.67 | - |
| L | 0.500 | 0.610 | 12.70 | 15.49 | - |
| R | 0.085 | 0.095 | 2.16 | 2.41 | - |
| S1 | 0.045 | 0.060 | 1.14 | 1.52 | - |
| W | 0.016 | 0.022 | 0.41 | 0.56 | 2 |
| D | 0.175 | 0.195 | 4.45 | 4.95 | 1 |
| α | 4 ⁰ | 6 ⁰ | 4 ⁰ | 6 ⁰ | - |

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Small Outline Plastic Packages (SOIC)



NOTES:

- 1. Symbols are defined in the "MO Series Symbol List" in Section 2.2 of Publication Number 95.
- 2. Dimensioning and tolerancing per ANSI Y14.5M-1982.
- Dimension "D" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion and gate burrs shall not exceed 0.15mm (0.006 inch) per side.
- Dimension "E" does not include interlead flash or protrusions. Interlead flash and protrusions shall not exceed 0.25mm (0.010 inch) per side.
- 5. The chamfer on the body is optional. If it is not present, a visual index feature must be located within the crosshatched area.
- 6. "L" is the length of terminal for soldering to a substrate.
- 7. "N" is the number of terminal positions.
- 8. Terminal numbers are shown for reference only.
- 9. The lead width "B", as measured 0.36mm (0.014 inch) or greater above the seating plane, shall not exceed a maximum value of 0.61mm (0.024 inch).
- 10. Controlling dimension: MILLIMETER. Converted inch dimensions are not necessarily exact.

M8.15 (JEDEC MS-012-AA ISSUE C) 8 LEAD NARROW BODY SMALL OUTLINE PLASTIC PACKAGE

| | INCHES | | MILLIMETERS | | |
|--------|----------------|----------------|----------------|----------------|-------|
| SYMBOL | MIN | MAX | MIN | MAX | NOTES |
| A | 0.0532 | 0.0688 | 1.35 | 1.75 | - |
| A1 | 0.0040 | 0.0098 | 0.10 | 0.25 | - |
| В | 0.013 | 0.020 | 0.33 | 0.51 | 9 |
| С | 0.0075 | 0.0098 | 0.19 | 0.25 | - |
| D | 0.1890 | 0.1968 | 4.80 | 5.00 | 3 |
| E | 0.1497 | 0.1574 | 3.80 | 4.00 | 4 |
| е | 0.050 BSC | | 1.27 BSC | | - |
| Н | 0.2284 | 0.2440 | 5.80 | 6.20 | - |
| h | 0.0099 | 0.0196 | 0.25 | 0.50 | 5 |
| L | 0.016 | 0.050 | 0.40 | 1.27 | 6 |
| N | 8 | | | 8 | 7 |
| α | 0 ⁰ | 8 ⁰ | 0 ⁰ | 8 ⁰ | - |

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