

LM392

Low Power Operational Amplifier and Comparator

The LM392 contains two functions: an op amp and a comparator. Both devices can operate on single-supply power and both have a common-mode range down to ground. Operation from split power supplies is also possible. Low power-supply current is independent of the supply voltage level. The output of the comparator interfaces directly with either TTL or CMOS logic. Low quiescent current makes the LM392 ideal for portable equipment.

Features

- Wide Power-Supply Range: 3 V to 32 V
- Low Input Offset Voltage: 2 mV
- Low Quiescent Current: 600 μ A
- Input CMV Range includes GND
- Op Amp is Unity Gain Stable
- These Devices are Pb-Free and are RoHS Compliant

Typical Applications

- Level Detectors
- Voltage Controlled Oscillators
- Transducer Amplifiers

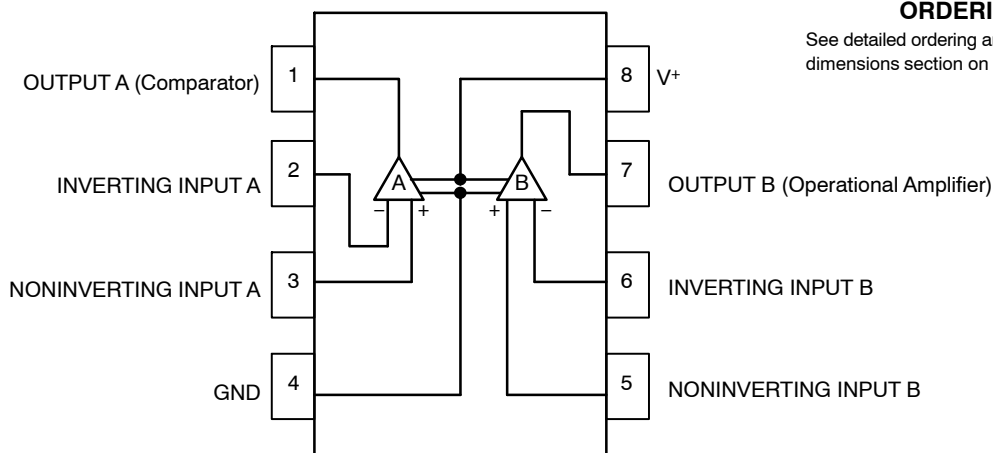


Figure 1. Logic Diagram and Pinout



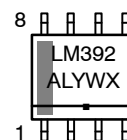
ON Semiconductor®

<http://onsemi.com>



SOIC-8 NB
CASE 751

MARKING DIAGRAM



XXXXX = Specific Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
W = Work Week
▪ = Pb-Free Package

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

LM392

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|---------------|----------------|-----------------------------|
| Supply Voltage | V_S | 32 or ± 16 | V |
| Differential Input Voltage | V_{IDR} | 32 | V |
| Input Voltage | V_I | 0.3 to 32 | V |
| Output Short – Circuit to Ground | t_{SO} | Continuous | |
| Thermal Impedance | θ_{JA} | 160 | $^{\circ}\text{C}/\text{W}$ |
| Storage Temperature Range | T_{stg} | -65 to 150 | $^{\circ}\text{C}$ |
| Lead Temperature (Soldering, 10 Seconds) | | 260 | $^{\circ}\text{C}$ |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

LM392

ELECTRICAL CHARACTERISTICS (Both Amplifiers) ($V^+ = 5\text{ V}$, $T_A = 25^\circ\text{C}$ unless otherwise stated)

| Parameter | Conditions | T_A | LM392 | | | Unit | |
|---------------------------------|---|---|-------|---------------------|-------------|------|----|
| | | | Min | Typ | Max | | |
| Input Offset Voltage | At output switch point, $V_O = 1.4\text{ V}$, $R_S = 0\ \Omega$, $V^+ = 5\text{ V}$ to 30 V , $V_{CM} = 0$ to ($V^+ - 1.5\text{ V}$) | 25°C | | ± 2 | ± 5 | mV | |
| | | 0°C to 70°C | | | ± 7 | | |
| Input Bias Current | IN(+) or IN(-), $V_{CM} = 0\text{ V}$ | 25°C | | 50 | 205 | nA | |
| | IN(+) or IN(-) | 0°C to 70°C | | | 400 | | |
| Input Offset Current | IN(+) or IN(-) | 25°C | | ± 5 | ± 50 | nA | |
| | | 0°C to 70°C | | | ± 150 | | |
| Input Common-Mode Voltage Range | $V^+ = 30\text{ V}$ (Note 1) | 25°C | 0 | | $V^+ - 1.5$ | V | |
| | | 0°C to 70°C | 0 | | $V^+ - 2$ | | |
| Supply Current | No Load | 0°C to 70°C | | $V^+ = 30\text{ V}$ | 1 | 2 | mA |
| | | | | $V^+ = 5\text{ V}$ | 0.5 | 1 | |
| Amplifier-to-Amplifier Coupling | $f = 1\text{ kHz}$ to 20 kHz , Input Referred | 25°C | | -78 | | dB | |
| Differential Input Voltage | All $V_{IN} \geq V$ (or V^- , If Used) | 0°C to 70°C | | | 32 | V | |

ELECTRICAL CHARACTERISTICS ($V^+ = 5\text{ V}$, $T_A = 25^\circ\text{C}$ unless otherwise stated)

| Parameter | Conditions | T_A | LM392 | | | Unit |
|---|--|---|-------------|-----|-----|------------------------------|
| | | | Min | Typ | Max | |
| OP AMP ONLY | | | | | | |
| Large Signal Voltage Gain | $V^+ = 15\text{ V}$, V_O Swing = 1 V to 11 V , $R_L = 2\text{ k}\Omega$ | 25°C | 25 | 100 | | V/mV |
| Output Voltage Swing, High (V_{OH}) | $R_L = 2\text{ k}\Omega$ | 25°C | $V^+ - 1.7$ | | | V |
| Output Voltage Swing, Low (V_{OL}) | $R_L = 2\text{ k}\Omega$ | 25°C | | | 20 | mV |
| Common-Mode Rejection Ratio | $V_{CM} = 0$ to $V^+ - 1.5\text{ V}$ | 25°C | 65 | 70 | | dB |
| Power Supply Rejection Ratio | | 25°C | 65 | 100 | | dB |
| Output Current Source | $V_{IN(+)} = 1\text{ V}$, $V_{IN(-)} = 0\text{ V}$, $V^+ = 15\text{ V}$, $V_O = 2\text{ V}$ | 25°C | 20 | 40 | | mA |
| Output Current Sink | $V_{IN(-)} = 1\text{ V}$, $V_{IN(+)} = 0\text{ V}$, $V^+ = 15\text{ V}$, $V_O = 2\text{ V}$ | 25°C | 10 | 20 | | mA |
| | $V_{IN(-)} = 1\text{ V}$, $V_{IN(+)} = 0\text{ V}$, $V^+ = 15\text{ V}$, $V_O = 200\text{ mV}$ | 25°C | 12 | 50 | | μA |
| Input Offset Voltage Drift | $R_S = 0\ \Omega$ (0°C to 70°C) | 0°C to 70°C | | 7 | | $\mu\text{V}/^\circ\text{C}$ |
| Input Offset Current Drift | $R_S = 0\ \Omega$ (0°C to 70°C) | 0°C to 70°C | | 10 | | $\text{pA}/^\circ\text{C}$ |
| COMPARATOR ONLY | | | | | | |
| Voltage Gain | $R_L \geq 15\text{ k}\Omega$, $V^+ = 15\text{ V}$ | 25°C | 50 | 200 | | V/mV |
| Large Signal Response Time | $V_{IN} = \text{TTL Logic Swing}$, $V_{REF} = 1.4\text{ V}$, $V_{RL} = 5\text{ V}$, $R_L = 5.1\text{ k}\Omega$ | 25°C | | 200 | | ns |
| Response Time | $V_{RL} = 5\text{ V}$, $R_L = 5.1\text{ k}\Omega$ | 25°C | | 600 | | ns |
| Output Sink Current | $V_{IN(-)} = 1\text{ V}$, $V_{IN(+)} = 0\text{ V}$, $V_O \geq 1.5\text{ V}$ | 25°C | 6 | 16 | | mA |
| Saturation Voltage | $V_{IN(-)} \geq 1\text{ V}$, $V_{IN(+)} = 0$, $I_{SINK} \leq 4\text{ mA}$ | 25°C | | 250 | 400 | mV |
| | $V_{IN(-)} \geq 1\text{ V}$, $V_{IN(+)} = 0$, $I_{SINK} \leq 4\text{ mA}$ | 0°C to 70°C | | | 700 | mV |
| Output Leakage Current | $V_{IN(-)} = 0$, $V_{IN(+)} \geq 1\text{ V}$, $V_O = 5\text{ V}$ | 25°C | | 0.1 | | nA |
| | $V_{IN(-)} = 0$, $V_{IN(+)} \geq 1\text{ V}$, $V_O = 30\text{ V}$ | 25°C | | | 1.0 | μA |

- The input common-mode voltage or either input signal voltage should not be allowed to go negative by more than 0.3 V . The upper end of the common-mode voltage range is $V^+ - 1.5\text{ V}$, but either or both inputs can go to 32 V without damage.

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ORDERING INFORMATION

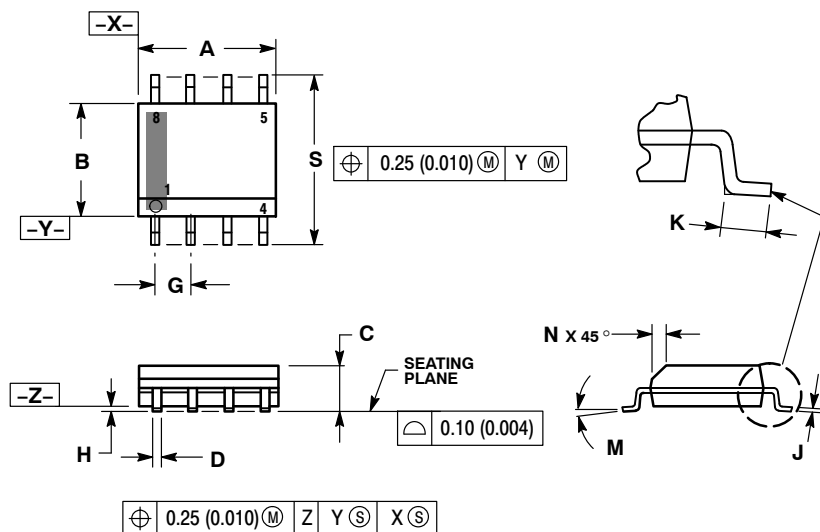
| Device | Operating Temperature Range | Package | Shipping [†] |
|-----------|-----------------------------|---------------------|-----------------------|
| LM392DR2G | 0°C to +70°C | SOIC-8 (Pb-Free) | 2500 / Tape & Reel |

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

LM392

PACKAGE DIMENSIONS

SOIC-8 NB CASE 751-07 ISSUE AJ

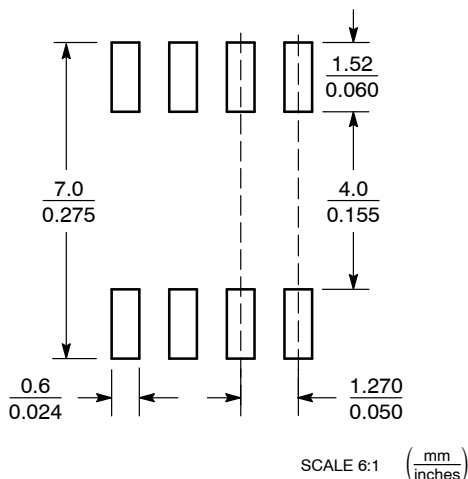


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 4.80 | 5.00 | 0.189 | 0.197 |
| B | 3.80 | 4.00 | 0.150 | 0.157 |
| C | 1.35 | 1.75 | 0.053 | 0.069 |
| D | 0.33 | 0.51 | 0.013 | 0.020 |
| G | 1.27 BSC | | 0.050 BSC | |
| H | 0.10 | 0.25 | 0.004 | 0.010 |
| J | 0.19 | 0.25 | 0.007 | 0.010 |
| K | 0.40 | 1.27 | 0.016 | 0.050 |
| M | 0° | 8° | 0° | 8° |
| N | 0.25 | 0.50 | 0.010 | 0.020 |
| S | 5.80 | 6.20 | 0.228 | 0.244 |

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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JONHON

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