

Quadruple Operational Amplifiers

Check for

 Samples: [LM124](#), [LM124A](#), [LM224](#), [LM224A](#), [LM324](#), [LM324A](#), [LM2902](#), [LM2902V](#), [LM224K](#), [LM224KA](#), [LM324K](#), [LM324KA](#), [LM2902K](#), [LM2902KV](#), [LM2902KAV](#)

FEATURES

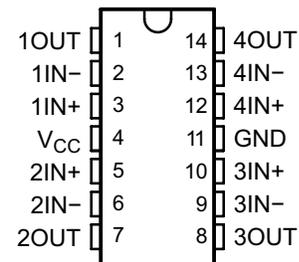
- **2-kV ESD Protection for:**
 - LM224K, LM224KA
 - LM324K, LM324KA
 - LM2902K, LM2902KV, LM2902KAV
- **Wide Supply Ranges**
 - **Single Supply:** 3 V to 32 V (26 V for LM2902)
 - **Dual Supplies:** ± 1.5 V to ± 16 V (± 13 V for LM2902)
- **Low Supply-Current Drain Independent of Supply Voltage: 0.8 mA Typ**
- **Common-Mode Input Voltage Range Includes Ground, Allowing Direct Sensing Near Ground**
- **Low Input Bias and Offset Parameters**
 - **Input Offset Voltage:** 3 mV Typ
A Versions: 2 mV Typ
 - **Input Offset Current:** 2 nA Typ
 - **Input Bias Current:** 20 nA Typ
A Versions: 15 nA Typ
- **Differential Input Voltage Range Equal to Maximum-Rated Supply Voltage: 32 V (26 V for LM2902)**
- **Open-Loop Differential Voltage Amplification: 100 V/mV Typ**
- **Internal Frequency Compensation**
- **On Products Compliant to MIL-PRF-38535, All Parameters Are Tested Unless Otherwise Noted. On All Other Products, Production Processing Does Not Necessarily Include Testing of All Parameters.**

DESCRIPTION

These devices consist of four independent high-gain frequency-compensated operational amplifiers that are designed specifically to operate from a single supply over a wide range of voltages. Operation from split supplies also is possible if the difference between the two supplies is 3 V to 32 V (3 V to 26 V for the LM2902 device), and V_{CC} is at least 1.5 V more positive than the input common-mode voltage. The low supply-current drain is independent of the magnitude of the supply voltage.

Applications include transducer amplifiers, dc amplification blocks, and all the conventional operational-amplifier circuits that now can be more easily implemented in single-supply-voltage systems. For example, the LM124 device can be operated directly from the standard 5-V supply that is used in digital systems and provides the required interface electronics, without requiring additional ± 15 -V supplies.

LM124 . . . D, J, OR W PACKAGE
 LM124A . . . J OR W PACKAGE
 LM224, LM224A, LM224K, LM224KA . . . D OR N PACKAGE
 LM324, LM324K . . . D, N, NS, OR PW PACKAGE
 LM324A . . . D, DB, N, NS, OR PW PACKAGE
 LM324KA . . . D, N, NS, OR PW PACKAGE
 LM2902 . . . D, N, NS, OR PW PACKAGE
 LM2902K . . . D, DB, N, NS, OR PW PACKAGE
 LM2902KV, LM2902KAV . . . D OR PW PACKAGE
 (TOP VIEW)

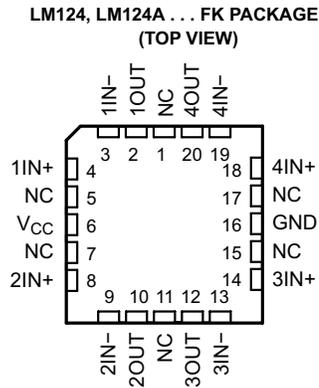


Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

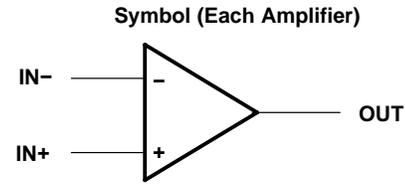


This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

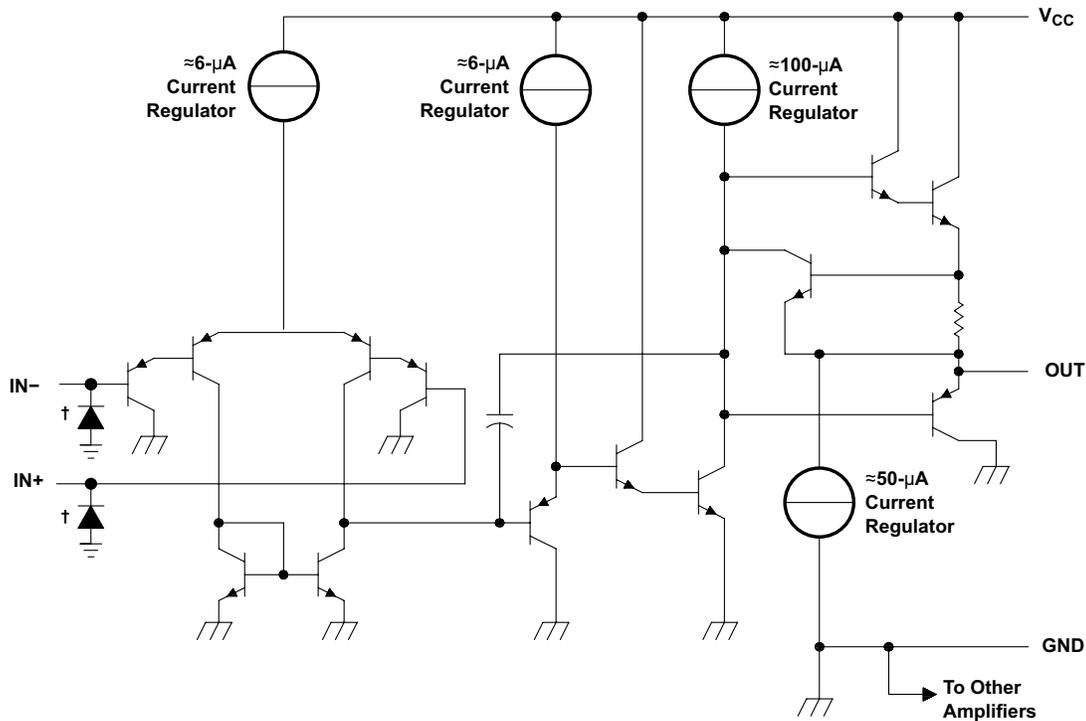
ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.



NC – No internal connection



Schematic (Each Amplifier)



COMPONENT COUNT (total device)	
Epi-FET	1
Transistors	95
Diodes	4
Resistors	11
Capacitors	4

† ESD protection cells - available on LM324K and LM324KA only