

# LT1028, LT1028A ULTRALOW-NOISE, HIGH-SPEED PRECISION OPERATIONAL AMPLIFIERS

D3239, MAY 1988 - REVISED MARCH 1989

- **Very Low Input Noise Voltage:**  
1.1 nV/√Hz Max, 0.85 nV/√Hz Typ at 1 kHz  
for LT1028AM, LT1028AC
- **Low Peak-To-Peak Input Noise Voltage . . .**  
35 nV Typ at  $f = 0.1$  Hz to 10 Hz
- **Noise Voltage and Current 100% Tested**
- **Gain-Bandwidth Product . . . 50 MHz Min**
- **Slew Rate . . . 11 V/μs Min**
- **Input Offset Voltage . . . 40 μV Max at 25°C**  
for LT1028AM, LT1028AC
- **Offset Voltage Temperature Coefficient . . .**  
0.8 μV/°C Max for LT1028AM, LT1028AC
- **Applications:**
  - Low-Noise Frequency Synthesizers
  - High-Quality Audio
  - Infrared Detectors
  - Accelerometer and Gyro Amplifiers
  - 350-Ω Bridge Signal Conditioning
  - Magnetic Search Coil Amplifiers
  - Hydrophone Amplifiers

## description

The LT1028 features excellent noise performance combined with high-speed specifications, distortion-free output, and true precision parameters. Although the LT1028 input stage operates at collector currents of nearly 1 mA to achieve low voltage noise, the input bias current is only 25 or 30 nA at 25°C. The noise voltage of the LT1028 is less than the noise of a 50-Ω resistor. Therefore, even in very-low-source-impedance transducer or audio amplifier applications, the device's contribution to total system noise will be negligible.

The LT1028AM and LT1028M are characterized for operation over the full military temperature range of -55°C to 125°C. The LT1028AC and LT1028C are characterized for operation from 0°C to 70°C.

### AVAILABLE OPTIONS

T <sub>A</sub>	V <sub>IO</sub> max AT 25°C	PACKAGE			
		SMALL OUTLINE (DW)	CERAMIC DIP (JG)	METAL CAN (L)	PLASTIC DIP (P)
0°C to 70°C	40 μV	—	LT1028ACJG	LT1028ACL	LT1028ACP
	80 μV	LT1028ACDW	LT1028CJG	LT1028CL	LT1028CP
-55°C to 125°C	40 μV	—	LT1028AMJG	LT1028AML	—
	80 μV	—	LT1028MJG	LT1028ML	—

PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

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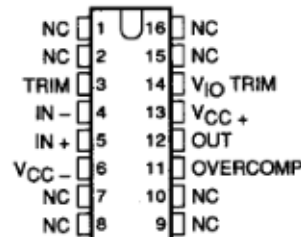
**TEXAS  
INSTRUMENTS**

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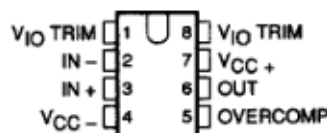
Operational Amplifiers

**DW PACKAGE  
(TOP VIEW)**

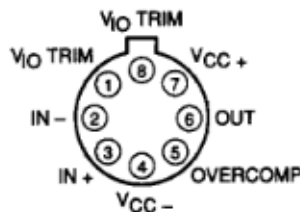


NC - No internal connection

**JG OR P PACKAGE  
(TOP VIEW)**



**L PACKAGE  
(TOP VIEW)**



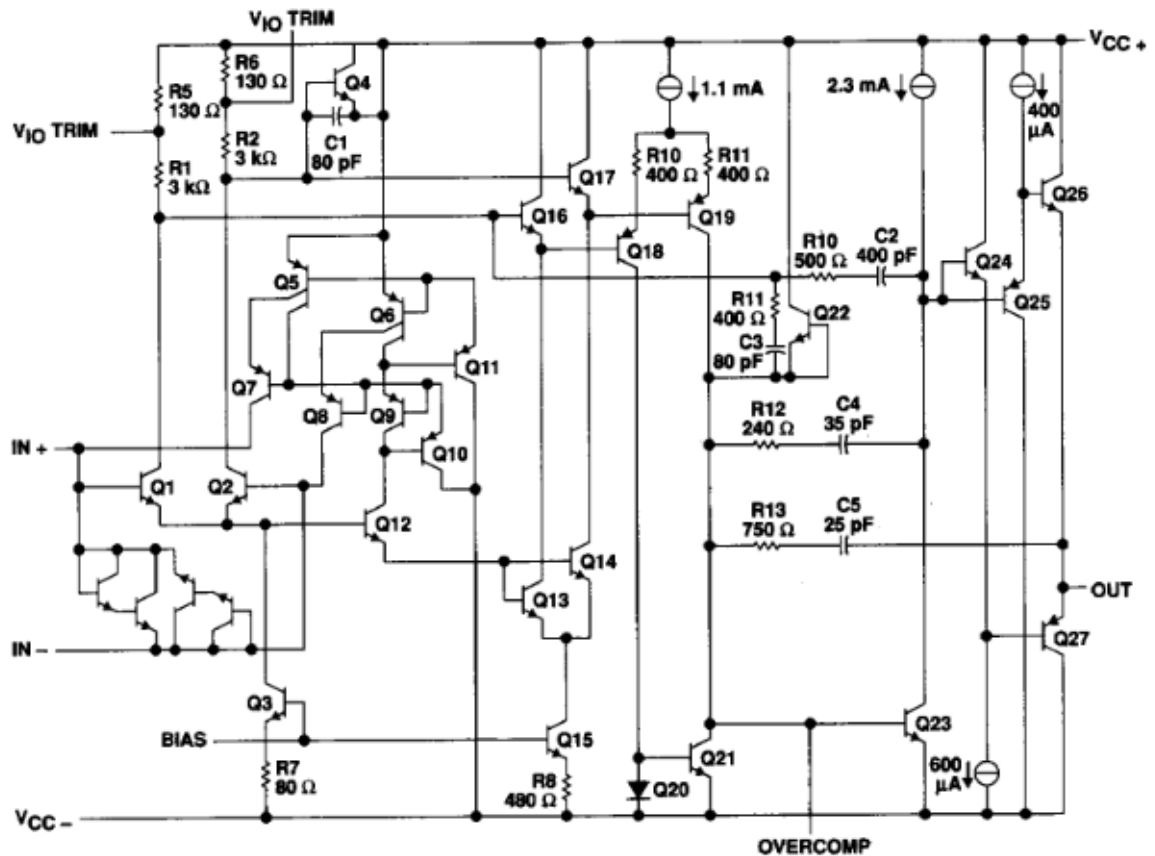
Pin 4 (L package) is in electrical contact with the case.

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schematic

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Operational Amplifiers



All component and current values shown are nominal.

### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, $V_{CC+}$ (see Note 1): LT1028AM, LT1028M	22 V
LT1028AC, LT1028C	16 V
Supply voltage, $V_{CC-}$ (see Note 1) LT1028AM, LT1028M	-22 V
LT1028AC, LT1028C	-16 V
Differential input current (see Note 2)	$\pm 25$ mA
Input voltage range, $V_I$ (any input, see Note 1)	$V_{CC} \pm$ unlimited
Duration of output short-circuit at (or below) 25°C (see Note 2)	unlimited
Operating free-air temperature, $T_A$ : LT1028AM, LT1028M	-55°C to 125°C
LT1028AC, LT1028C	0°C to 70°C
Storage temperature range	-65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds: D or P package	300°C
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds: JG or L package	260°C

NOTES: 1. All voltage values, except differential voltages, are with respect to the midpoint between  $V_{CC+}$  and  $V_{CC-}$ .  
2. The specified values for this parameter takes into account junction temperature increase due to supply and output currents.