

## Dual/Quad Precision Chopper Stabilized Operational Amplifiers With Internal Capacitors

### FEATURES

- Dual/Quad Low Cost Precision Op Amp
- No External Components Required
- Maximum Offset Voltage  $5\mu\text{V}$
- Maximum Offset Voltage Drift  $0.05\mu\text{V}/^\circ\text{C}$
- Low Noise  $1.5\mu\text{V}_{\text{p-p}}$  (0.1Hz to 10Hz)
- Minimum Voltage Gain, 120dB
- Minimum PSRR, 120dB
- Minimum CMRR, 114dB
- Low Supply Current 1mA/Op Amp
- Single Supply Operation 4.75V to 16V
- Input Common Mode Range Includes Ground
- Output Swings to Ground
- Typical Overload Recovery Time 3ms
- Pin Compatible with Industry Standard Dual and Quad Op Amps

### APPLICATIONS

- Thermocouple Amplifiers
- Electronic Scales
- Medical Instrumentation
- Strain Gauge Amplifiers
- High Resolution Data Acquisition
- DC Accurate R, C Active Filters

### DESCRIPTION

The LTC1051/LTC1053 is a high performance, low cost dual/quad chopper stabilized operational amplifier. The unique achievement of the LTC1051/LTC1053 is that it integrates on chip the sample-and-hold capacitors usually required externally by other chopper amplifiers. Further, the LTC1051/LTC1053 offers better combined overall DC and AC performance than is available from other chopper stabilized amplifiers with or without internal sample/hold capacitors

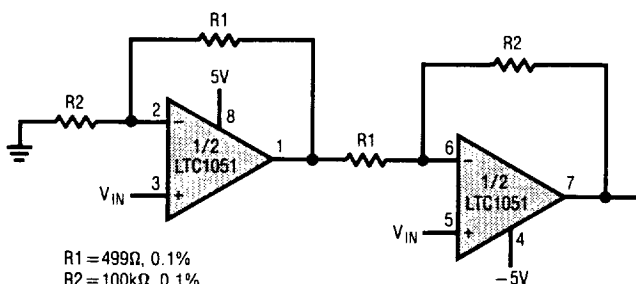
The LTC1051/LTC1053 has an offset voltage of  $0.5\mu\text{V}$ , drift of  $0.01\mu\text{V}/^\circ\text{C}$ , DC to 10Hz, input noise voltage typically  $1.5\mu\text{V}_{\text{p-p}}$  and typical voltage gain of 140dB. The slew rate of  $4\text{V}/\mu\text{s}$  and gain bandwidth product of 2.5MHz are achieved with only 1mA of supply current per op amp.

Overload recovery times from positive and negative saturation conditions are 1.5ms and 3ms respectively, about a 100 or more times improvement over chopper amplifiers using external capacitors.

The LTC1051 is available in standard plastic and ceramic dual in line packages as well as a 16-pin SOL package. The LTC1053 is available in a standard 14-pin plastic package and an 18-pin SOIC. The LTC1051/LTC1053 is a plug in replacement for most standard dual/quad op amps with improved performance.

### TYPICAL APPLICATION

#### High Performance Low Cost Instrumentation Amplifier



$R1 = 499\Omega$ , 0.1%  
 $R2 = 100\text{k}\Omega$ , 0.1%  
 GAIN = 201  
 MEASURED CMRR - 120dB AT DC  
 MEASURED INPUT  $V_{\text{OS}}$   $3\mu\text{V}$   
 MEASURED INPUT NOISE  $2\mu\text{V}_{\text{p-p}}$  (DC - 10Hz)

#### LTC1051 Noise Spectrum

