

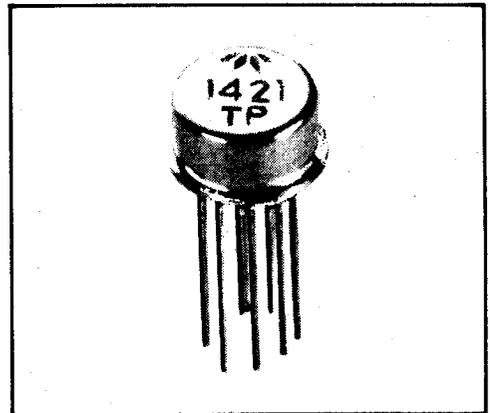
**1421  
1424  
1425  
1426**

# FET Input High Performance Monolithic Op Amps

The 1421, 1424, 1425 and 1426 comprise a group of general purpose, 741 pin-compatible FET op amps with specifications approaching low drift FET modules such as the 1020. For all but the 1424, typical low frequency input noise is very low. In addition to low cost, the 1421 is optimized for low drift with 10mA output. The 1425 and 1426 are optimized for low initial offset voltage, low  $I_{bias}$ , and low offset voltage drift.

These amplifiers are internally compensated for all closed loop gains, providing a smooth 6dB per octave roll off and the ability to drive 1000pF capacitive loads in all circuit configurations. Any of these amplifiers can be used to directly replace a 741 to achieve high input impedance, low bias current, low drift and low noise.

With guaranteed initial offset voltages between  $\pm 1mV$  and  $\pm 50mV$ , most applications will not require trim components. However, a 10k $\Omega$  pot (with standard 741 connection) can be used to trim the initial offset voltage to 0.



Part Number	Output Voltage (V)	Output Current (mA)	Typical Full Power Bandwidth (kHz)	Typical Slow Rate (V/ $\mu$ sec)	Maximum Initial Offset Voltage (mV)	Maximum Offset Drift ( $\mu$ V/ $^{\circ}$ C)	Maximum Initial Bias Current (pA)
1421	$\pm 10$	$\pm 10$	80	5	$\pm 15$	$\pm 50$	-50
1421-01					$\pm 15$	$\pm 50$	-15
1421-02					$\pm 15$	$\pm 25$	-10
1424	$\pm 10$	$\pm 5$	100	6	$\pm 50$	$\pm 75$	-50
1425	$\pm 10$	$\pm 5$	80	5	$\pm 2$	$\pm 50$	-10
1425-01					$\pm 1$	$\pm 25$	-5
1425-02					$\pm 1$	$\pm 10$	-5
1426	$\pm 10$	$\pm 5$	80	5	$\pm 2$	$\pm 50$	-25
1426-01					$\pm 1$	$\pm 25$	-10
1426-02					$\pm 1$	$\pm 10$	-25
1426-03					$\pm 1$	$\pm 5$	-25

Table 1. Performance Summary

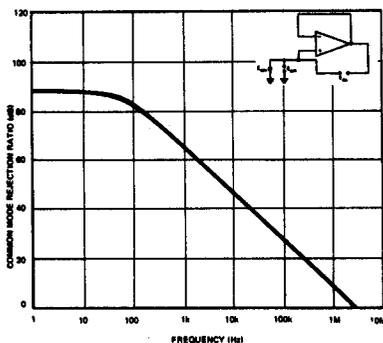


Figure 1. CMRR vs. Frequency

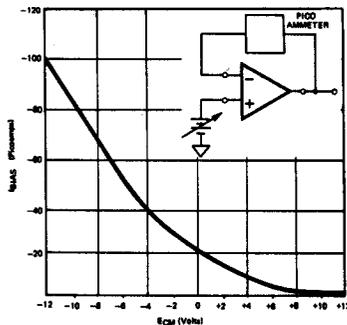


Figure 2. Bias Current vs. Common Mode Voltage

## FEATURES

- Low Cost
- Monolithic Construction
- 741 Pin Compatible
- Offset Voltages to  $\pm 1mV$  Max
- Bias Currents to 5pA Max
- Offset Drifts to  $\pm 5\mu$ V/ $^{\circ}$ C Max
- 1000pF Capacitive Loading

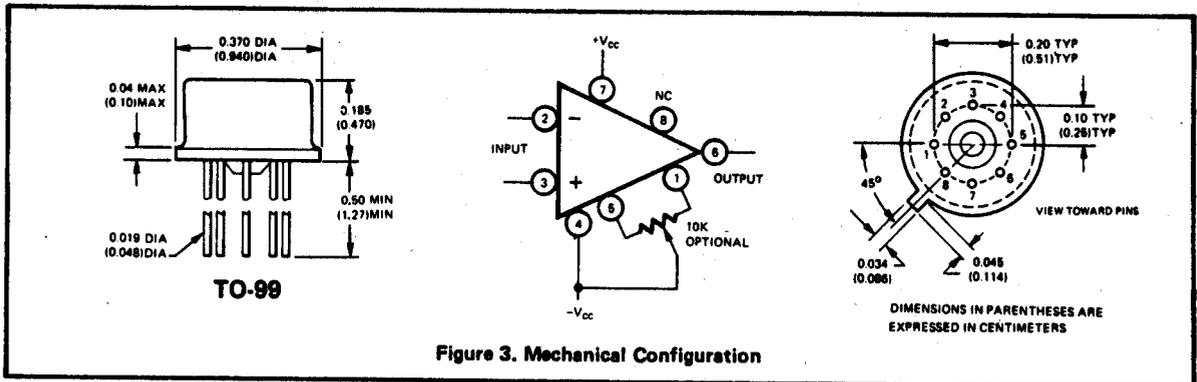
## APPLICATIONS

- High Impedance Transducer Amplifiers
- Current to Voltage Converters
- Photo Transducers
- Log Amps
- Integrators

**SPECIFICATIONS @ +25°C, V<sub>CC</sub> = ±15 V, Rated Load, unless otherwise specified**

	1421		1424		1425		1426	
	Typical	Guaranteed	Typical	Guaranteed	Typical	Guaranteed	Typical	Guaranteed
<b>OUTPUT RANGE</b>								
Voltage (Peak)	±13 V	±10 V	±12 V	±10 V	±12 V	±10 V	±12 V	±10 V
Current	±13 mA	±10 mA	±10 mA	±5 mA	±10 mA	±5 mA	±10 mA	±5 mA
<b>VOLTAGE GAIN (dc, Open Loop)</b>								
Rated Load	104 dB	94 dB	92 dB	86 dB	104 dB	94 dB	104 dB	94 dB
<b>FREQUENCY RESPONSE (Inverting)</b>								
Small Signal (Unity Gain, Open Loop)	2 MHz	---	1 MHz	---	2 MHz	---	2 MHz	---
Max Peak to Peak Out (triangle wave)	80 kHz	50 kHz	100 kHz	---	80 kHz	50 kHz	80 kHz	50 kHz
Slew Rate	5 V/μsec	3 V/μsec	6 V/μsec	---	5 V/μsec	3 V/μsec	5 V/μsec	3 V/μsec
Max Capacitive Load without Instability	1,000 pF	---						
Settling Time (0.01% Final Value for 10 V Step)	3 μsec	---						
<b>INPUT VOLTAGE RANGE</b>								
Common Mode (dc Linear Operation)	±13 V	±12 V	±12 V	±10 V	±13 V	±12 V	±13 V	±12 V
Common Mode Fault	±V <sub>CC</sub>	±15 V						
Differential (between inputs)	+V <sub>CC</sub> (-V <sub>CC</sub> )	±30 V	+V <sub>CC</sub> (-V <sub>CC</sub> )	±30 V	+V <sub>CC</sub> (-V <sub>CC</sub> )	±30 V	+V <sub>CC</sub> (-V <sub>CC</sub> )	±30 V
Common Mode Rejection Ratio	---	72 dB	80 dB	72 dB	---	72 dB	---	72 dB
<b>INPUT OFFSET VOLTAGE</b>								
Initial (without external trim)	±3 mV	±15 mV	---	±50 mV	---	±2 mV	---	±2 mV
(01 Version)	±3 mV	±15 mV	---	---	---	±1 mV	---	±1 mV
(02 Version)	±3 mV	±15 mV	---	---	---	±1 mV	---	±1 mV
(03 Version)	---	---	---	---	---	---	---	±1 mV
Zero Adjustment (optional)	10 kΩ pot	---						
Vs. Temperature (avg. -25 to +85°C)	±10 μV/°C	±50 μV/°C	---	---	---	±50 μV/°C	---	±50 μV/°C
(01 Version)	±10 μV/°C	±50 μV/°C	---	---	---	±25 μV/°C	---	±25 μV/°C
(02 Version)	±10 μV/°C	±25 μV/°C	---	---	---	±10 μV/°C	---	±10 μV/°C
(03 Version)	---	---	---	---	---	---	---	±5 μV/°C
Vs. Temperature (avg. 0 to +70°C)	---	---	±30 μV/°C	±75 μV/°C	---	---	---	---
Vs. Power Supply	100 μV/V	---	---	---	100 μV/V	---	100 μV/V	---
<b>INPUT BIAS CURRENT</b>								
Initial (doubles every 10°C)	-15 pA	-50 pA	-10 pA	-50 pA	-5 pA	-10 pA	-15 pA	-25 pA
(01 Version)	-10 pA	-15 pA	---	---	---	-5 pA	-5 pA	-10 pA
(02 Version)	-5 pA	-10 pA	---	---	---	-5 pA	-10 pA	-25 pA
(03 Version)	---	---	---	---	---	-10 pA	-10 pA	-25 pA
<b>INPUT IMPEDANCE @ dc</b>								
Differential	10 <sup>12</sup> Ω    3 pF	---	10 <sup>12</sup> Ω    2 pF	---	10 <sup>12</sup> Ω    3 pF	---	10 <sup>12</sup> Ω    3 pF	---
Common Mode (either input to common)	10 <sup>12</sup> Ω    3 pF	---	10 <sup>12</sup> Ω    2 pF	---	10 <sup>12</sup> Ω    3 pF	---	10 <sup>12</sup> Ω    3 pF	---
<b>NOISE (Referred to Input)</b>								
Flicker (0.016 to 1.6 Hz)								
Voltage (peak-to-peak)	±4 μV	---	±15 μV	---	±3 μV	---	±4 μV	---
Current (peak-to-peak)	0.5 pA	---	0.3 pA	---	0.3 pA	---	0.5 pA	---
Midband (1.6 to 180 Hz)								
Voltage (rms)	2 μV	---						
Current (rms)	0.5 pA	---	0.3 pA	---	0.3 pA	---	0.5 pA	---
Broadband (180 to 16 kHz)								
Voltage (rms)	3 μV	---						
Current (rms)	0.2 pA	---	0.1 pA	---	0.1 pA	---	0.2 pA	---
<b>POWER REQUIREMENTS</b>								
Voltage Range	±12 to ±18 V	---						
Current: Quiescent	2.8 mA	3.5 mA	---	±6.0 mA	2.8 mA	±3.5 mA	2.8 mA	3.5 mA
<b>TEMPERATURE RANGE</b>								
Operating (Rated)	---	-25 to +85°C	---	0 to +70°C	---	-25 to +85°C	---	-25 to +85°C
Operating (Derated)	---	-40 to +85°C	---	---	---	---	---	---
Storage	---	-55 to +125°C	---	-55 to +150°C	---	-55 to +125°C	---	-55 to +125°C

The input circuits of these units are protected to ±V<sub>CC</sub>. Output circuits are short-circuit protected to ground.



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