μPC254

Instrumentation Operational Amplifier

GENERAL DESCRIPTION

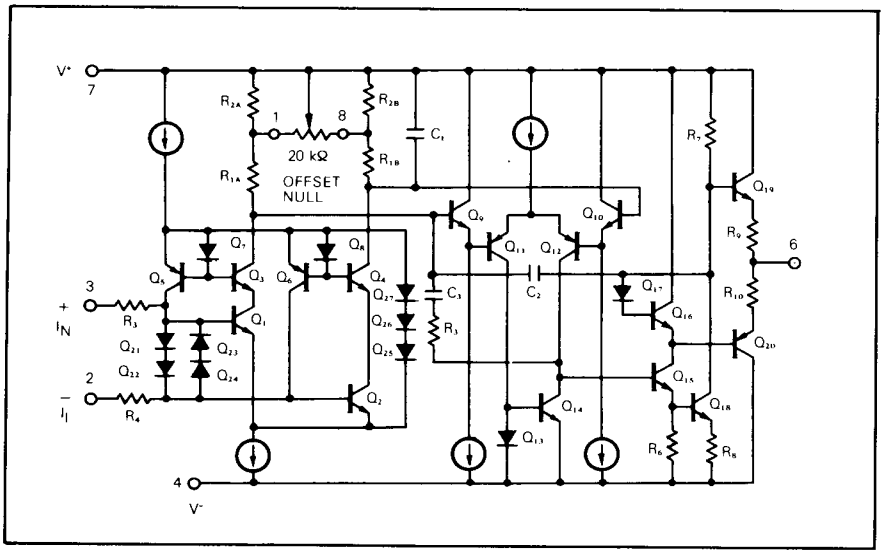
The μPC254 of Monolithic Instrumentation Operational Amplifier exhibits excellent performance in low signal level applications with the flexibility and ease of application of a fully protected, internally compensated op amp. Main features are low offset voltage, bias current and noise and high gain, input impedance, CMRR and SVRR.

The μPC254 is an optimum choise for a wide variety of applications including strain gauge, thermocouple bridges, high gain active filters, buffers, integrators, and sample and hold amplifiers.

FEATURES

- Low Input Offset Voltage Drift vs Temp . . . . . 0.4 μV/°C (Null) Typ.
- Low Input Offset Voltage Drift vs Time . . . . . 0.4μV/Month Typ.
- Low Input Offset Voltage . . . . . 0.3 mV Typ.
- Low Input Bias Current . . . . . ±1.8 nA Typ.
- High Gain
- Łow Noise
- High CMRR
- Internally Frequency Compensated.
- Easy Offset Nulling
- OP-05C Direct Replacement

EQUIVALENT CIRCUIT



ORDERING INFORMATION

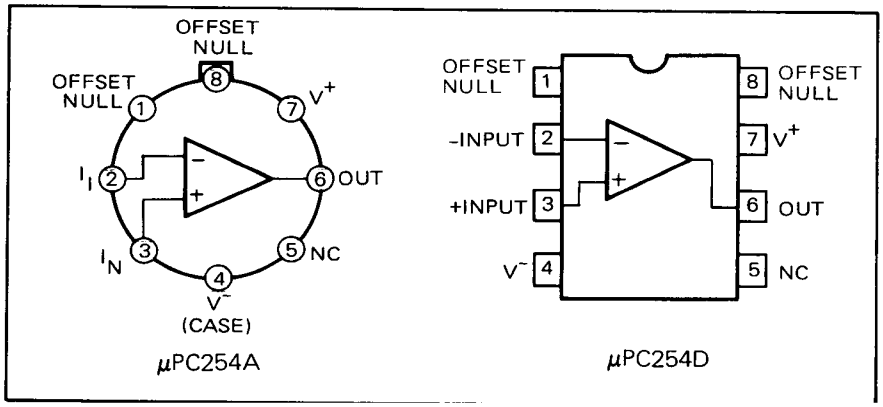
μPC254A

8 pin Metal Can Package

μPC254D

8 pin Ceramic DIP
(Dual In-Line Package)

CONNECTION DIAGRAM (Top View)



ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

PARAMETER		μPC254	UNIT
Voltage between V^+ and V^-		44	V
Power Dissipation*	A or D Package	500	mW
Differential Input Voltage		±30	V
Input Voltage (Note 1)		±22	V
Output Short Circuit Duration		Indefinite	s
Operating Temperature Range	A or D Package	−20 to +80	°C
Storage Temperature Range	A Package	−60 to +175	°C
	D Package	−55 to +150	

Note 1: For supply voltages less than ±22 V, the absolute maximum input voltage is equal to the supply voltage.

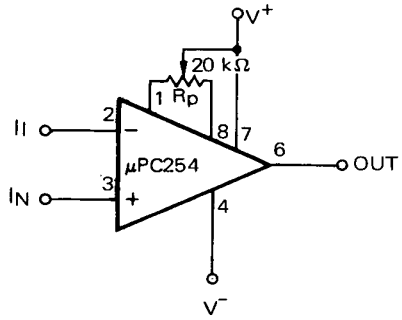
* See thermal information in chapter 11.

ELECTRICAL CHARACTERISTICS (Ta = 25°C, $V^{\pm}$ = ±15 V)

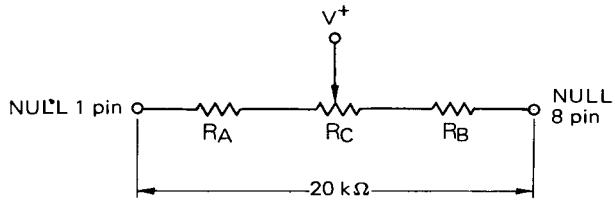
CHARACTERITIC	MIN.	TYP.	MAX.	UNIT	CONDITIONS
Input Offset Voltage		0.3	1.3	mV	$R_S \leqslant 100\ \Omega$
Average Input Offset Voltage Drift		1.2	4.5	μV/°C	$R_S \leqslant 100\ \Omega$, unnull (Note 2)
Average Input Offset Voltage Drift		0.4	1.5		$R_S \leqslant 100\ \Omega$, null, R_P=20 kΩ (Note 2)
Input Offset Current		1.8	6.0	nA	
Average Input Offset Current Drift		12	50	pA/°C	(Note 2)
Input Bias Current		±1.8	±7.0	nA	
Average Input Bias Current Drift		18	50	pA/°C	(Note 2)
Input Resistance — Dif Mode	8	33		MΩ	
Large Signal Voltage Gain	120	500		V/mV	$R_L \geqslant 2\ k\Omega$, Vo = ±10 V
Supply Current		3.2	5.0	mA	
		0.67	1.3		$V^{\pm}$ = ±3 V
Power Consumption		95	150	mW	
Maximum Output Voltage Swing	±12.0	±13.0		V	$R_L \geqslant 10\ k\Omega$
	±11.5	±12.8			$R_L \geqslant 2\ k\Omega$
	±1.45	±1.6			$V^{\pm}$ = ±3 V, $R_L \geqslant 2\ k\Omega$
Common Mode Rejection Ratio	100	120		dB	
Power Supply Rejection Ratio	90	104		dB	$V^{\pm}$ = ±3 V → ±18 V
Offset Adjustment Range		4		mV	R_P = 20 kΩ
Input Noise Voltage		0.5		μVp-p	R_S = 10 kΩ, f = 0.1 ~ 10 Hz (Note 2)
Input Noise Voltage Density		10.5	20.0	nV/√Hz	f_o = 10 Hz (Note 2)
		10.2	13.5		f_o = 100 Hz (Note 2)
		9.8	11.5		f_o = 1000 Hz (Note 2)
Input Noise Current Density		0.35	0.90	pA/√Hz	f_o = 10 Hz (Note 2)
		0.15	0.27		f_o = 100 Hz (Note 2)
		0.13	0.18		f_o = 1000 Hz (Note 2)
Long Term Input Offset Voltage Stability		0.4	2.0	μV/Mo	(Note 2)

Note 2: Parametor is not 100 % tested, 90 % of units meet this specification.

OFFSET NULLING CIRCUIT

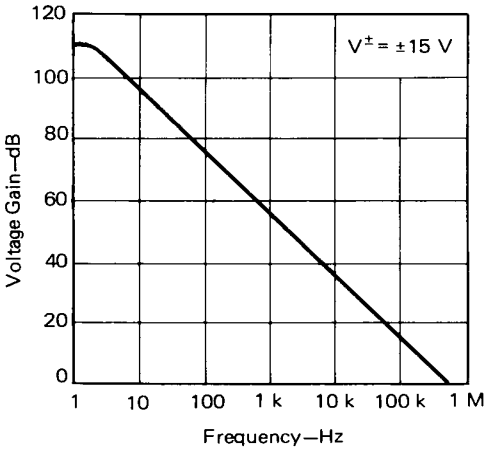


The μPC254 is designed to provide lowest drift performance when trimmed with a 20 kΩ potentiometer. When fine resolution of trimming is desired or where unwanted changes in potentiometer position with time and temperature could create unacceptable offsets, the sesitivity to offset vs potentiometer may be reduced by using the circurt shown below.

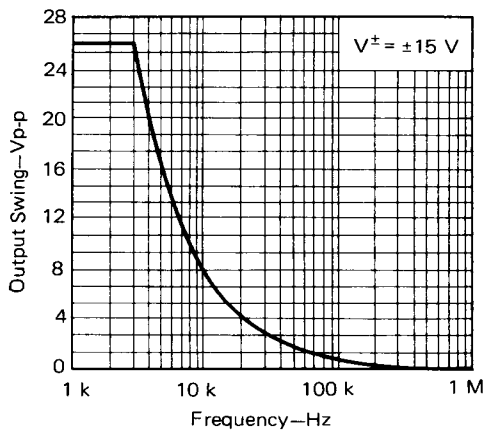


Fixed Resistor	R_A, R_B	5.1 kΩ
Potentiometer	Rc	10.0 kΩ
Null Range		±1.2 mV Typ.

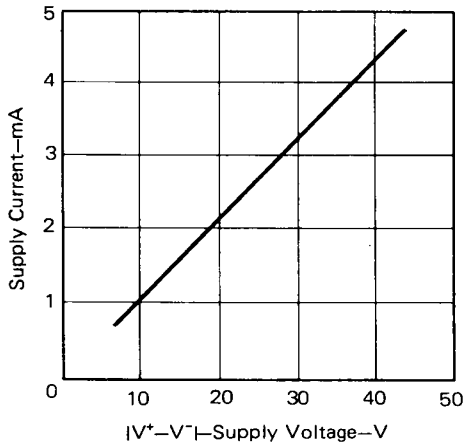
OPEN LOOP FREQUENCY RESPONSE



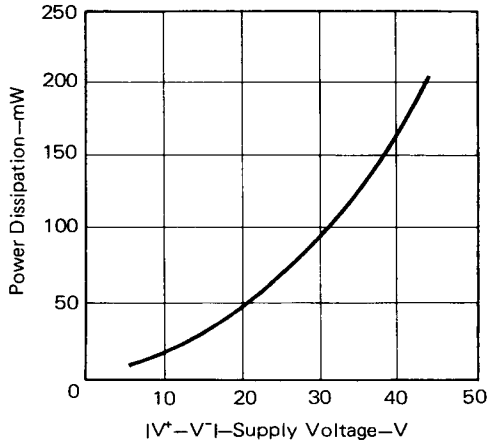
LARGE SIGNAL FREQUENCY RESPONSE



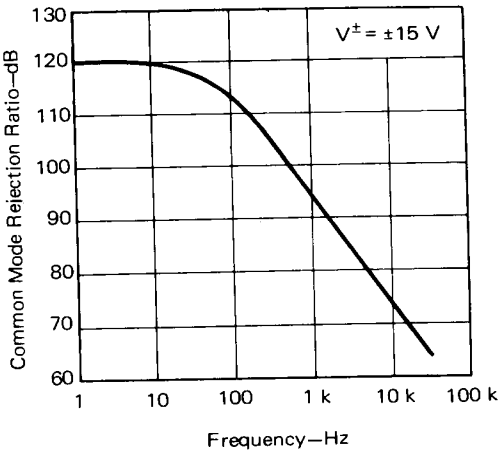
SUPPLY CURRENT



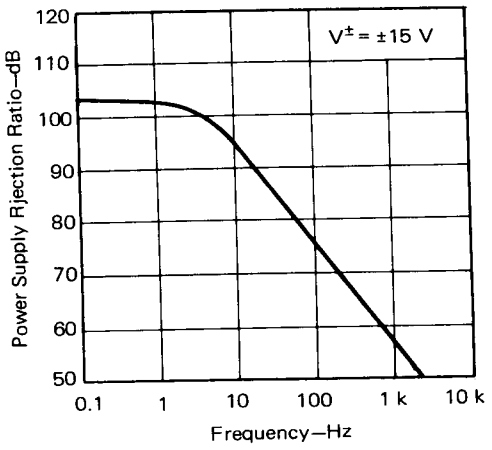
POWER DISSIPATION



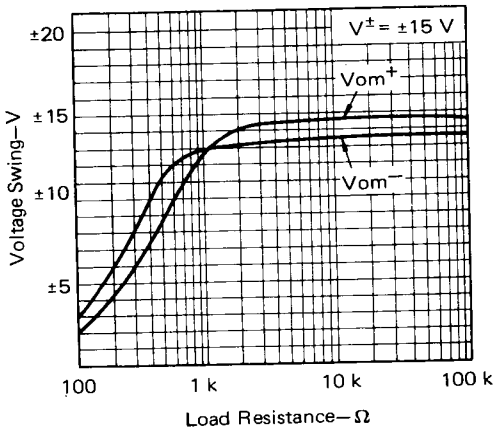
COMMON MODE REJECTION RATIO



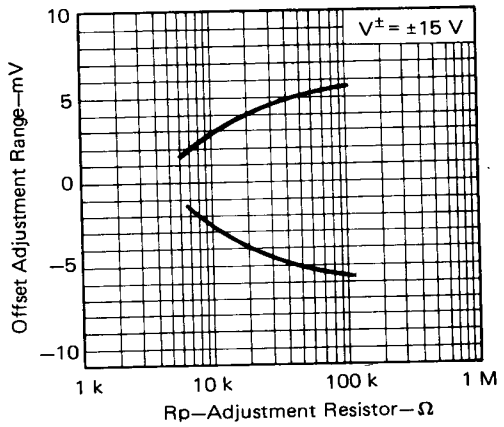
POWER SUPPLY REJECTION RATIO



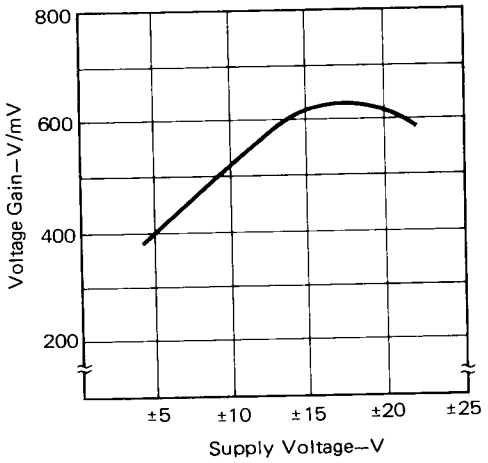
MAXIMUM OUTPUT VOLTAGE



OFFSET VOLTAGE ADJUSTMENT



VOLTAGE GAIN



VOLTAGE GAIN