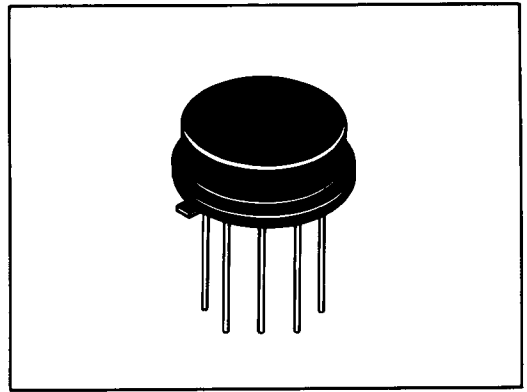


# TP0032

## High Speed FET Input Operational Amplifier



The TP0032 is a high slew rate, FET input, fully differential operational amplifier. This device features a 70dB minimum open loop gain, a wide 80MHz bandwidth, high input impedance ( $10^{11}\Omega$ ), and high output drive capabilities.

Although it can be used as a direct replacement for other LH0032 type op amps, the TP0032 features the following performance improvements:

1. Increased open loop gain improves linearity and eliminates output voltage droop.
2. Improved second stage biasing and decreased gain sensitivity to the transconductance of the JFET input yields faster and more consistent settling times.
3. The addition of bias compensation over temperature improves dynamic response vs. temperature.
4. Improved phase margin allows smaller compensation capacitance values to be used in low gain applications. This means that for new designs, the TP0032 will provide higher slew rates and faster settling times.

The standard TP0032 is fully specified over the  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  temperature range. The TP0032-83 is specified over the  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  temperature range and meets the high reliability of MIL-STD-883C, Class "B". This device may also be ordered screened to Class "S".

### FEATURES

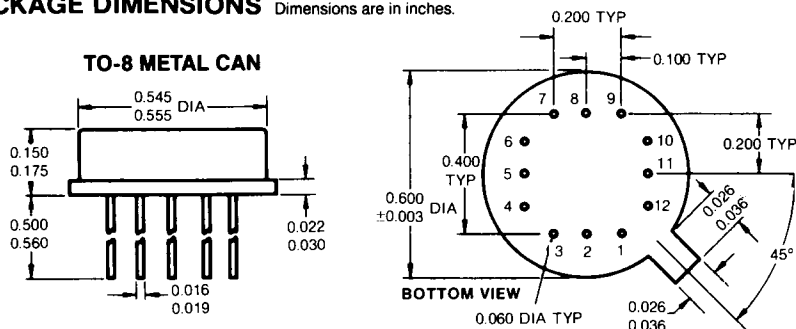
- Improved Second Source, Replaces All LH0032
- 100ns Settling to  $\pm 1\%$
- 650V/ $\mu\text{sec}$  Slew Rate
- 70dB Min Open Loop Gain
- $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  Operation

### APPLICATIONS

- High Speed ADC Comparators
- ADC and SHA Integrators
- High Speed Integrators
- Video Amplifiers

### PACKAGE DIMENSIONS

Dimensions are in inches.



### PIN DESIGNATION

1. N/C	7. N/C
2. OUTPUT COMP	8. N/C
3. BALANCE/COMP	9. N/C
4. BALANCE/COMP	10. $-V_{cc}$
5. INVERTING INPUT	11. OUTPUT
6. NON-INVERTING INPUT	12. $+V_{cc}$

**ABSOLUTE MAXIMUM RATINGS**

Supply Voltage ( $\pm V_{cc}$ )

$\pm 18V$

Input Voltage

$\pm V_{cc}$

Differential Input Voltage

$\pm 30V$

Operating Temperature Range: TP0032, TP0032-83 (4)

$-55^{\circ}C$  to  $+125^{\circ}C$

Storage Temperature Range

$-65^{\circ}C$  to  $+150^{\circ}C$

**SPECIFICATIONS ( $-55^{\circ}C \leq T_A \leq +125^{\circ}C$ ,  $\pm V_{cc} = \pm 15V$  unless otherwise indicated.)**

PARAMETER	MIN.	TYP.	MAX.	UNITS
<b>OPEN LOOP VOLTAGE GAIN</b> ( $R_L = 1k\Omega$ )				
Initial ( $T_A = +25^{\circ}C$ )	70	85	---	dB
$-55^{\circ}C$ to $+125^{\circ}C$	70	83	---	dB
<b>INPUT CHARACTERISTICS</b>				
Differential Input Impedance	---	$10^{11}/1.5$	---	$\Omega/pF$
Offset Voltage: Initial ( $T_c = +25^{\circ}C$ )	---	$\pm 2$	$\pm 5$	mV
$-55^{\circ}C$ to $+125^{\circ}C$	---	$\pm 4$	$\pm 10$	mV
Drift vs. Temperature	---	$\pm 25$	---	$\mu V/^{\circ}C$
Offset Current: Initial ( $T_c = +25^{\circ}C$ )	---	$\pm 5$	$\pm 25$	pA
$-55^{\circ}C$ to $+125^{\circ}C$	---	$\pm 12$	$\pm 25$	nA
Bias Current: Initial ( $T_c = +25^{\circ}C$ )	---	$\pm 10$	$\pm 100$	pA
$-55^{\circ}C$ to $+125^{\circ}C$	---	$\pm 5$	$\pm 50$	nA
Common Mode Voltage for DC Linear Operation	$\pm 10$	$\pm 12$	---	V
Power Supply Rejection Ratio ( $\Delta V_{cc} = \pm 10V$ )	50	70	---	dB
Common Mode Rejection Ratio ( $\Delta V_{in} = 10V$ )	50	70	---	dB
<b>OUTPUT CHARACTERISTICS</b>				
Voltage Swing ( $R_L = 1k\Omega$ )	$\pm 10$	$\pm 13.5$	---	V
Current (1)	$\pm 10$	$\pm 13.5$	---	mA
<b>FREQUENCY RESPONSE</b> (2)				
Unity-Gain Bandwidth (3)	---	80	---	MHz
Slew Rate ( $A_v = +1$ , $\Delta V_{in} = 20V$ )	350	650	---	$V/\mu sec$
Settling Time ( $A_v = -1$ )				
20V Step to within $\pm 1\%$	---	100	---	nsec
20V Step to within $\pm 0.1\%$	---	300	---	nsec
Small Signal Rise Time ( $A_v = +1$ , $\Delta V_{in} = 1V$ )	---	8	20	nsec
Small Signal Delay Time ( $A_v = +1$ , $\Delta V_{in} = 1V$ )	---	10	25	nsec
<b>POWER REQUIREMENTS</b>				
Quiescent Current ( $T_A = +25^{\circ}C$ )	---	$\pm 17$	$\pm 20$	mA

**NOTES**

1. The TP0032 is not output short circuit protected and neither are other vendors' 0032s.
2. Frequency Response specifications apply for  $T_A = +25^{\circ}C$ .
3. See Bode plot.
4. The TP0032-83 is screened to the high reliability requirements of MIL-STD-883C, Class "B". This device may be ordered screened to Class "S".

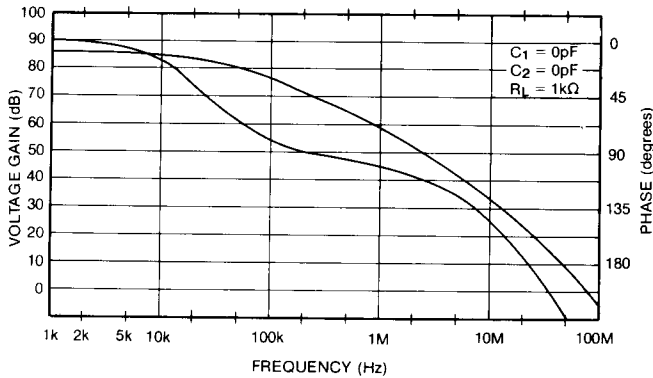


Figure 1. Bode Plot (Uncompensated)

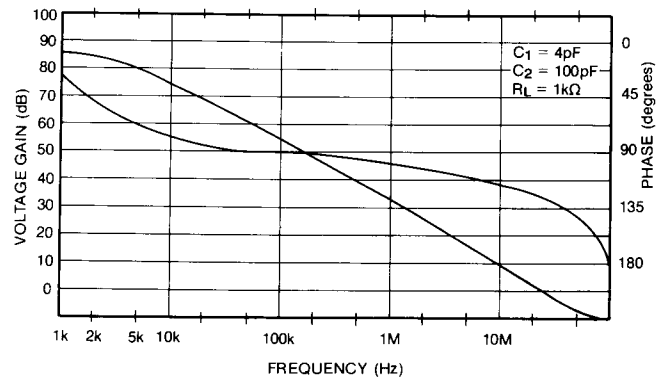


Figure 2. Bode Plot (Unity Gain Compensation)

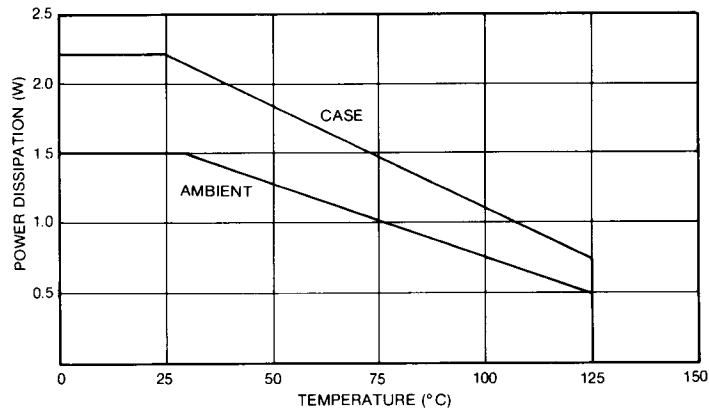


Figure 3. Maximum Power Dissipation

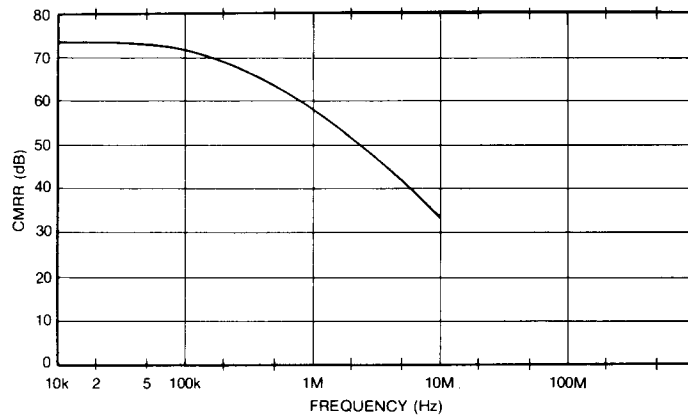


Figure 4. CMRR vs. Frequency

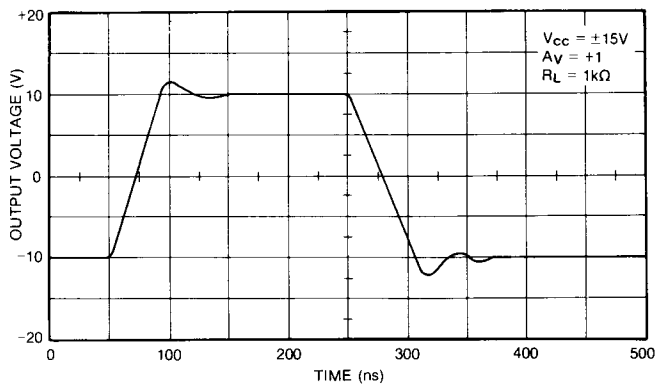


Figure 5. Large Signal Pulse Response

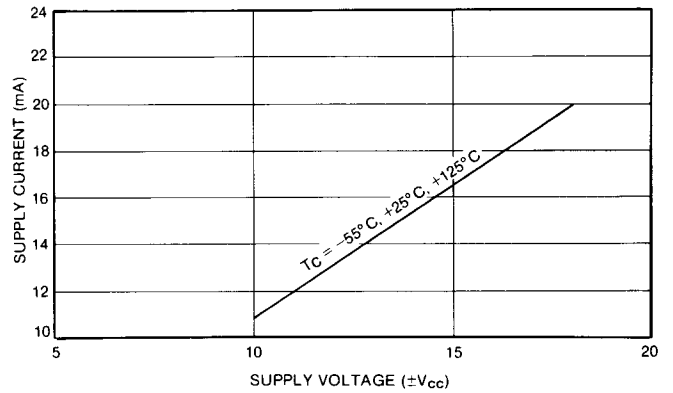


Figure 6. Supply Current vs. Supply Voltage