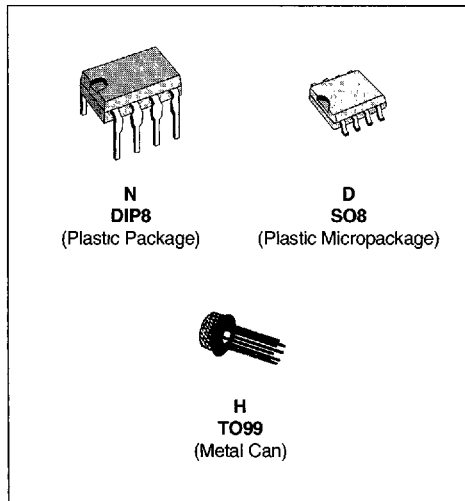


**GENERAL PURPOSE  
SINGLE JFET OPERATIONAL AMPLIFIERS**

- LOW POWER CONSUMPTION
- WIDE COMMON-MODE (UP TO  $V_{CC}^+$ ) AND DIFFERENTIAL VOLTAGE RANGE
- LOW INPUT BIAS AND OFFSET CURRENT
- OUTPUT SHORT-CIRCUIT PROTECTION
- HIGH INPUT IMPEDANCE J-FET INPUT STAGE
- INTERNAL FREQUENCY COMPENSATION
- LATCH UP FREE OPERATION
- HIGH SLEW RATE :  $16V/\mu s$  (typ)



**DESCRIPTION**

These circuits are high speed J-FET input single operational amplifiers incorporating well matched, high voltage J-FET and bipolar transistors in a monolithic integrated circuit.

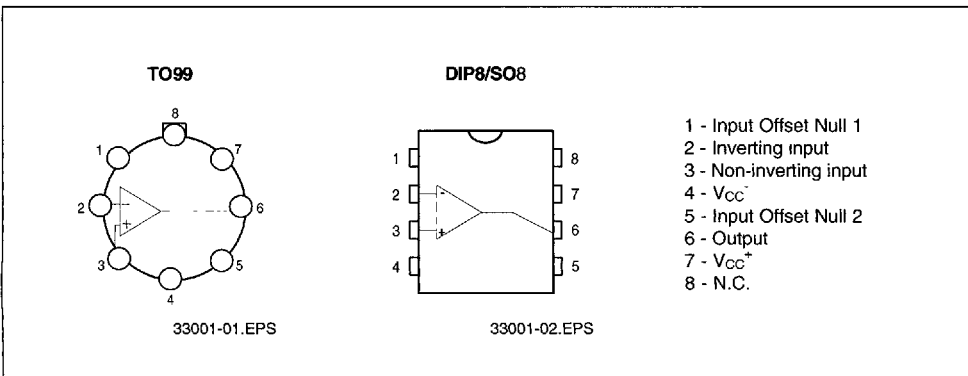
The devices feature high slew rates, low input bias and offset current, and low offset voltage temperature coefficient.

**ORDER CODES**

Part Number	Temperature	Package		
		H	N	D
MC34001/A/B	0°C, +70°C	•	•	•
MC33001/A/B	-40°C, +105°C	•	•	•
MC35001/A/B	-55°C, +125°C	•	•	•

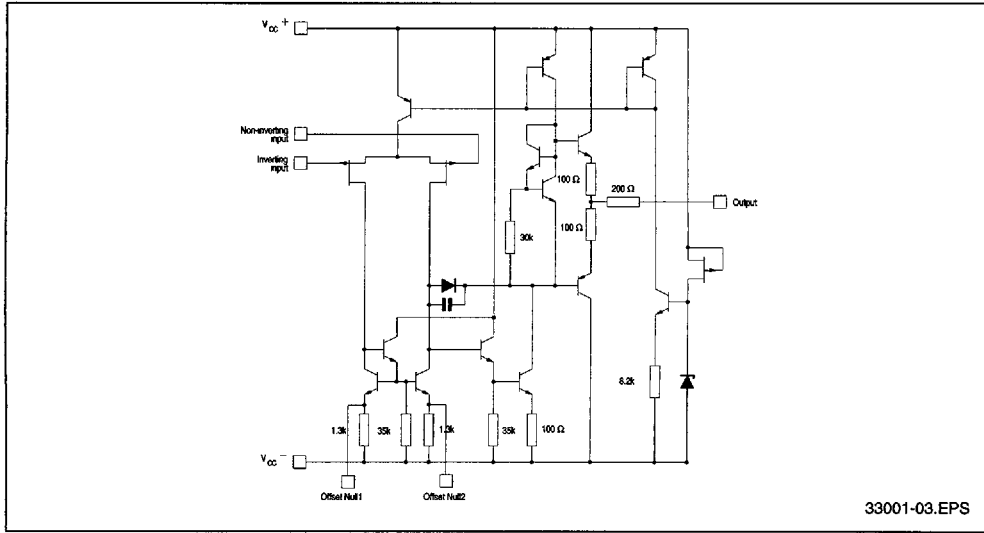
33001-01.TBL

**PIN CONNECTIONS (top views)**



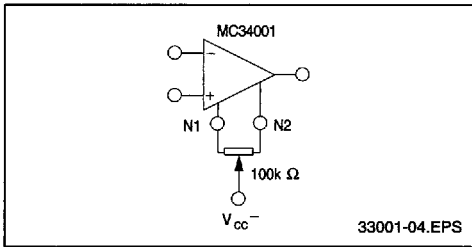
**MC33001/A/B - MC34001/A/B - MC35001/A/B**

**SCHEMATIC DIAGRAM**



33001-03.EPS

**INPUT OFFSET VOLTAGE NULL CIRCUITS**



33001-04.EPS

**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit	
$V_{CC}$	Supply Voltage - (note 1)	±18	V	
$V_I$	Input Voltage - (note 3)	±15	V	
$V_{id}$	Differential Input Voltage - (note 2)	±30	V	
$P_{tot}$	Power Dissipation	680	mW	
	Output Short-circuit Duration (note 4)	Infinite		
$T_{oper}$	Operating Free Air Temperature Range	MC34001, A, B MC33001, A, B MC35001, A, B	0 to 70 -40 to 105 -55 to 125	°C
$T_{stg}$	Storage Temperature Range		-65 to 150	°C

- Notes :**
1. All voltage values, except differential voltage, are with respect to the zero reference level (ground) of the supply voltages where the zero reference level is the midpoint between  $V_{CC}^+$  and  $V_{CC}^-$ .
  2. Differential voltages are at the non-inverting input terminal with respect to the inverting input terminal.
  3. The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 volts, whichever is less.
  4. The output may be shorted to ground or to either supply. Temperature and /or supply voltages must be limited to ensure that the dissipation rating is not exceeded.

33001-07.TIP

**MC33001/A/B - MC34001/A/B - MC35001/A/B**

**ELECTRICAL CHARACTERISTICS**

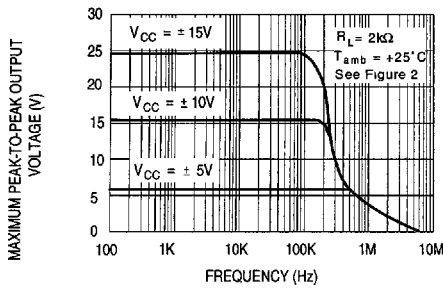
V<sub>CC</sub> = ±15V, T<sub>amb</sub> = 25°C (unless otherwise specified)

Symbol	Parameter	MC35001A,B MC33001A,B MC34001A,B			MC35001 MC33001 MC34001			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V <sub>io</sub>	Input Offset Voltage (R <sub>S</sub> ≤ 10kΩ) T <sub>amb</sub> = 25°C MC35001B, MC34001B, MC33001B MC35001A, MC34001A, MC33001A T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub> MC35001B, MC34001B, MC33001B MC35001A, MC34001A, MC33001A		3 0.4	5 2		3 13	10	mV
DV <sub>io</sub>	Input Offset Voltage Drift		10			10		μV/°C
I <sub>io</sub>	Input Offset Current * T <sub>amb</sub> = 25°C T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub>		5	100 4		5 100 4		pA nA
I <sub>ib</sub>	Input Bias Current * T <sub>amb</sub> = 25°C T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub>		20	200 20		20 200 20		pA nA
A <sub>vd</sub>	Large Signal Voltage Gain (R <sub>L</sub> = 2kΩ, V <sub>O</sub> = ±10V) T <sub>amb</sub> = 25°C T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub>	50 25	200		25 15	200		V/mV
SVR	Supply Voltage Rejection Ratio (R <sub>S</sub> ≤ 10kΩ) T <sub>amb</sub> = 25°C T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub>	80 80	86		70 70	86		dB
I <sub>cc</sub>	Supply Current, no Load T <sub>amb</sub> = 25°C T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub>		1.4	2.5 2.8		1.4 2.5 2.8		mA
V <sub>icm</sub>	Input Common Mode Voltage Range	±11	+15 -12		±11	+15 -12		V
CMR	Common Mode Rejection Ratio (R <sub>S</sub> ≤ 10kΩ) T <sub>amb</sub> = 25°C T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub>	80 80	86		70 70	86		dB
I <sub>os</sub>	Output Short-circuit Current T <sub>amb</sub> = 25°C T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub>	10 10	40	60 60	10 10	40 60 60		mA
±V <sub>OPP</sub>	Output Voltage Swing T <sub>amb</sub> = 25°C T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub>		10 12 10 12	12 13.5		10 12 10 12	12 13.5	V
SR	Slew Rate (V <sub>in</sub> = 10V, R <sub>L</sub> = 2kΩ, C <sub>L</sub> = 100pF, T <sub>amb</sub> = 25°C, unity gain)	12	16		12	16		V/μs
t <sub>r</sub>	Rise Time (V <sub>in</sub> = 20mV, R <sub>L</sub> = 2kΩ, C <sub>L</sub> = 100pF, T <sub>amb</sub> = 25°C, unity gain)		0.1			0.1		μs
K <sub>OV</sub>	Overshoot (V <sub>in</sub> = 20mV, R <sub>L</sub> = 2kΩ, C <sub>L</sub> = 100pF, T <sub>amb</sub> = 25°C, unity gain)		10			10		%
GBP	Gain Bandwidth Product (f = 100kHz, T <sub>amb</sub> = 25°C, V <sub>in</sub> = 10mV, R <sub>L</sub> = 2kΩ, C <sub>L</sub> = 100pF)	2.5	4		2.5	4		MHz
R <sub>i</sub>	Input Resistance		10 <sup>12</sup>			10 <sup>12</sup>		Ω
THD	Total Harmonic Distortion (f = 1kHz, A <sub>V</sub> = 20dB, R <sub>L</sub> = 2kΩ, C <sub>L</sub> = 100pF, T <sub>amb</sub> = 25°C, V <sub>O</sub> = 2V <sub>PP</sub> )		0.01			0.01		%
e <sub>n</sub>	Equivalent Input Noise Voltage (f = 1kHz, R <sub>S</sub> = 100Ω)		15			15		nV √Hz
∅ <sub>m</sub>	Phase Margin		45			45		Degrees

\* The input bias currents are junction leakage currents which approximately double for every 10°C increase in the junction temperature

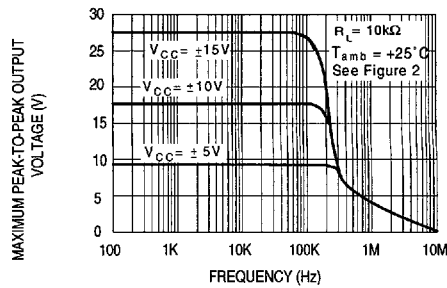
33001-03.TBL

**MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREQUENCY**



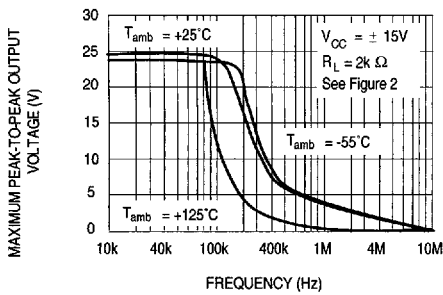
33001-05.EPS

**MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREQUENCY**



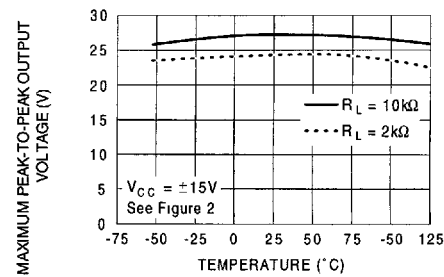
33001-06.EPS

**MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREQUENCY**



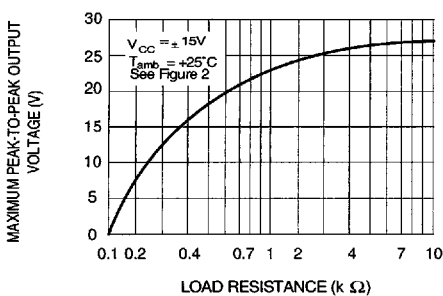
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**MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREE AIR TEMP.**



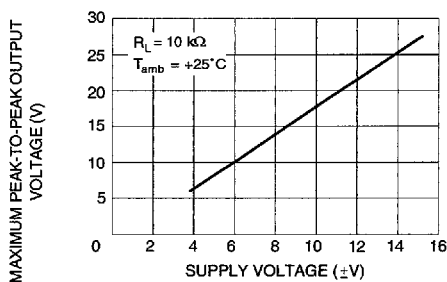
33001-08.EPS

**MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS LOAD RESISTANCE**



33001-09.EPS

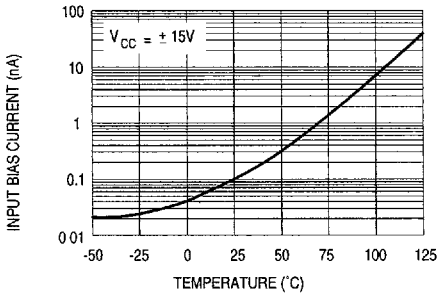
**MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS SUPPLY VOLTAGE**



33001-10.EPS

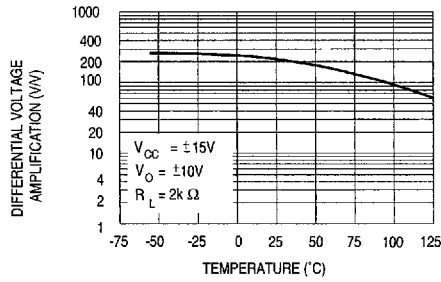
MC33001/A/B - MC34001/A/B - MC35001/A/B

INPUT BIAS CURRENT VERSUS FREE AIR TEMPERATURE



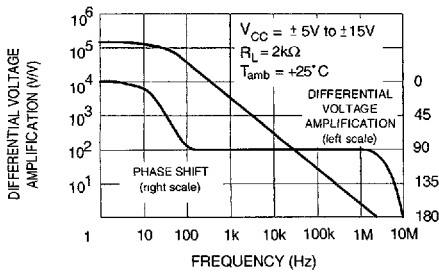
33001-11.EPS

LARGE SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION VERSUS FREE AIR TEMPERATURE



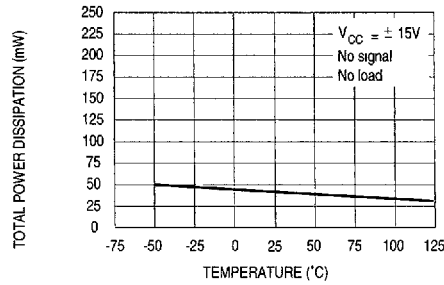
33001-12.EPS

LARGE SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION AND PHASE SHIFT VERSUS FREQUENCY



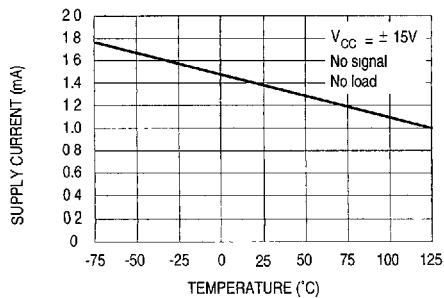
33001-13.EPS

TOTAL POWER DISSIPATION VERSUS FREE AIR TEMPERATURE



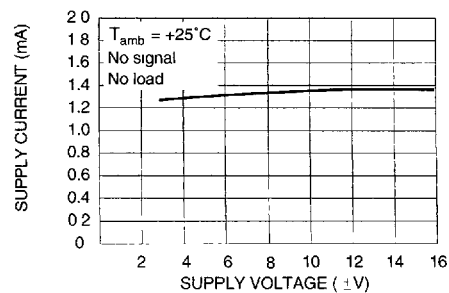
33001-14.EPS

SUPPLY CURRENT PER AMPLIFIER VERSUS FREE AIR TEMPERATURE



33001-15.EPS

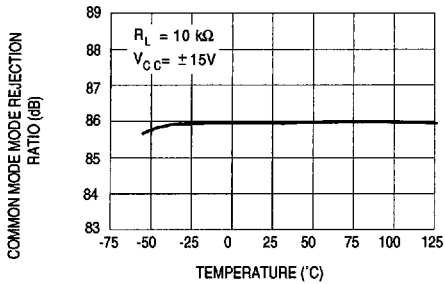
SUPPLY CURRENT PER AMPLIFIER VERSUS SUPPLY VOLTAGE



33001-16.EPS

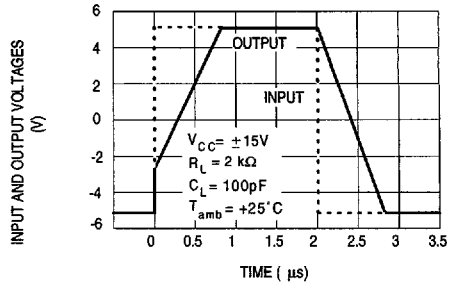
MC33001/A/B - MC34001/A/B - MC35001/A/B

**COMMON MODE REJECTION RATIO VERSUS FREE AIR TEMPERATURE**



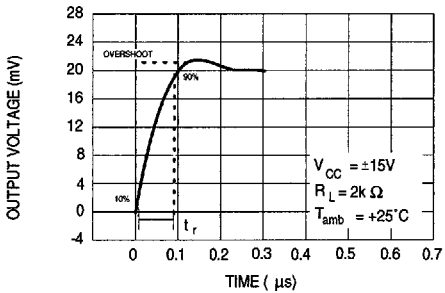
33001-17.EPS

**VOLTAGE FOLLOWER LARGE SIGNAL PULSE RESPONSE**



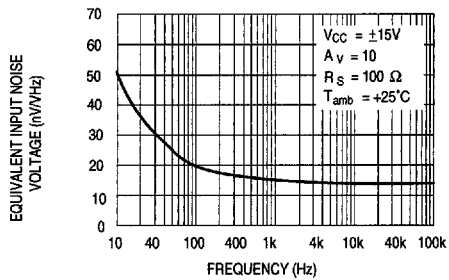
33001-18.EPS

**OUTPUT VOLTAGE VERSUS ELAPSED TIME**



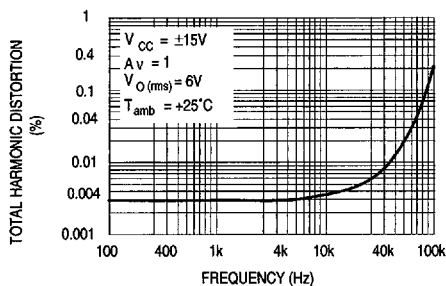
33001-19.EPS

**EQUIVALENT INPUT NOISE VOLTAGE VERSUS FREQUENCY**



33001-20.EPS

**TOTAL HARMONIC DISTORTION VERSUS FREQUENCY**



33001-21.EPS

PARAMETER MEASUREMENT INFORMATION

Figure 1 : Voltage Follower

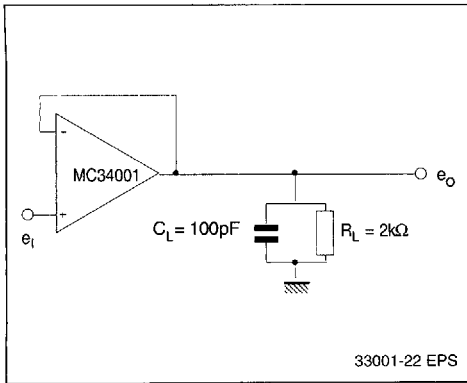
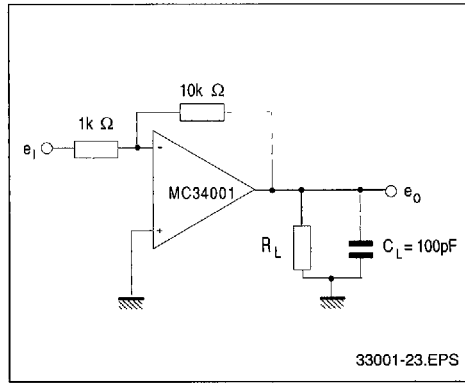
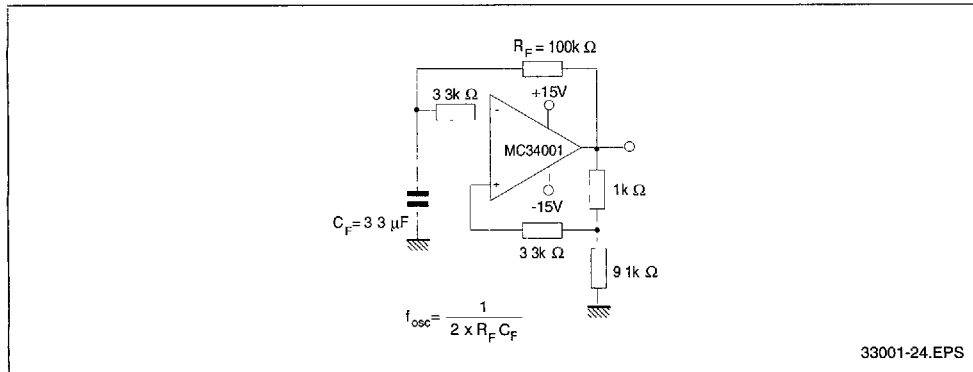


Figure 2 : Gain-of-10 Inverting Amplifier



TYPICAL APPLICATIONS

(0.5Hz) SQUARE WAVE OSCILLATOR



HIGH Q NOTCH FILTER

