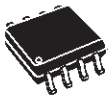
TL081
TL081A - TL081B

GENERAL PURPOSE J-FET SINGLE OPERATIONAL AMPLIFIERS

- 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/µs (typ)

N
DIP8
(Plastic Package)



D
SO8
(Plastic Micropackage)

DESCRIPTION

The TL081, TL081A and TL081B are high speed J–FET input single operational amplifiers incorporating well matched, high voltage J–FET and bipolar transistors in a monolithic integrated circuit.

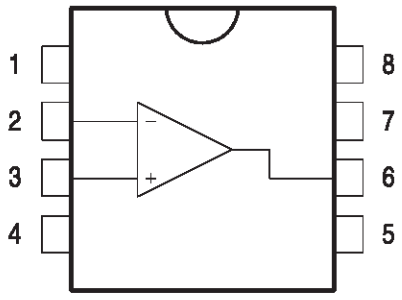
The devices feature high slew rates, low input bias and offset currents, and low offset voltage temperature coefficient.

ORDER CODE

Part Number	Temperature Range	Package	
		N	D
TL081M/AM/BM	-55°C, +125°C	•	•
TL081I/AI/BI	-40°C, +105°C	•	•
TL081C/AC/BC	0°C, +70°C	•	•
Example : TL081CD, TL081IN			

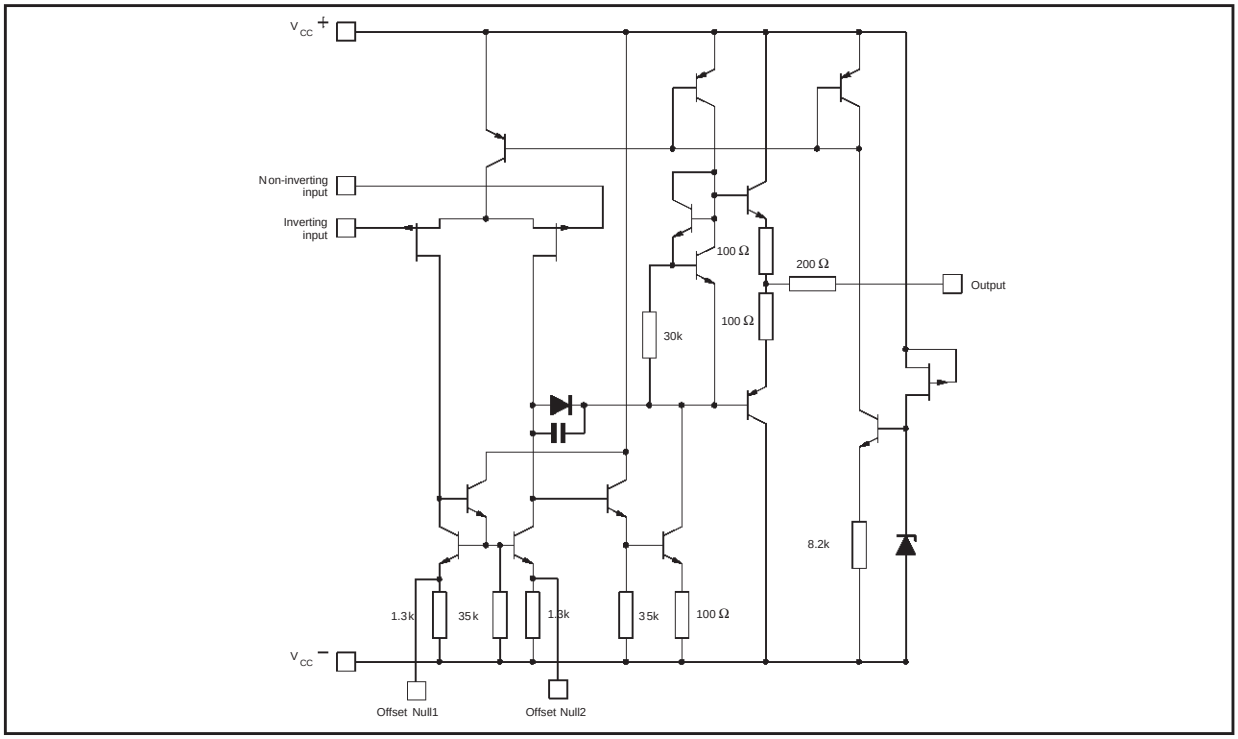
N = Dual in Line Package (DIP)
D = Small Outline Package (SO) - also available in Tape & Reel (DT)

PIN CONNECTIONS (top view)

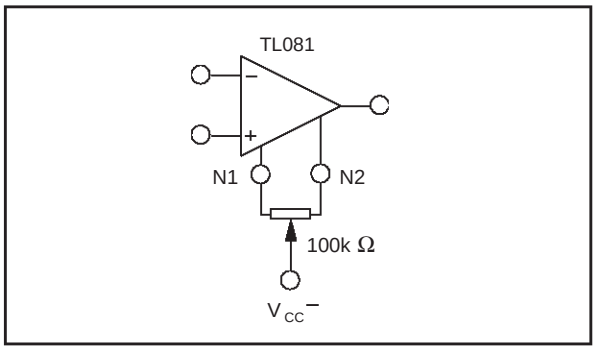


1 - Offset null 1
2 - Inverting input
3 - Non-inverting input
4 - V_{CC}^-
5 - Offset null 2
6 - Output
7 - V_{CC}^+
8 - N.C.

SCHEMATIC DIAGRAM



INPUT OFFSET VOLTAGE NULL CIRCUIT



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	TL081M, AM, BM	TL081I, AI, BI	TL081C, AC, BC	Unit
V_{CC}	Supply voltage - note 1)	±18			V
V_i	Input Voltage - note 2)	±15			V
V_{id}	Differential Input Voltage - note 3)	±30			V
P_{tot}	Power Dissipation	680			mW
	Output Short-circuit Duration - note 4)	Infinite			
T_{oper}	Operating Free-air Temperature Range	-55 to +125	-40 to +105	0 to +70	°C
T_{stg}	Storage Temperature Range	-65 to +150			°C

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. The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 volts, whichever is less.
3. Differential voltages are the non-inverting input terminal with respect to the inverting input terminal.
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

ELECTRICAL CHARACTERISTICS

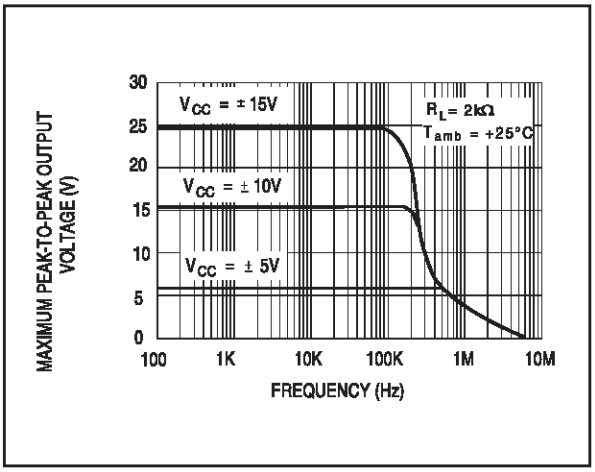
V_{CC} = ±15V, T_{amb} = +25°C (unless otherwise specified)

Symbol	Parameter		TL081I,M,AC,AI,AM, BC,BI,BM			TL081C			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{io}	Input Offset Voltage (R_S = 50Ω)								mV
	T_{amb} = +25°C	TL081		3	10		3	10	
		TL081A		3	6				
		TL081B		1	3				
	$T_{min} \le T_{amb} \le T_{max}$	TL081			13			13	
		TL081A			7				
		TL081B			5				
DV_{io}	Input Offset Voltage Drift			10			10		µV/°C
I_{io}	Input Offset Current - note 1)								
	T_{amb} = +25°C			5	100		5	100	pA
	$T_{min} \le T_{amb} \le T_{max}$				4			10	nA
I_{ib}	Input Bias Current -note 1								nA
	T_{amb} = +25°C			20	200		20	400	
	$T_{min} \le T_{amb} \le T_{max}$				20			20	
A_{vd}	Large Signal Voltage Gain (R_L = 2kΩ, V_o = ±10V)								V/mV
	T_{amb} = +25°C		50	200		25	200		
	$T_{min} \le T_{amb} \le T_{max}$		25			15			
SVR	Supply Voltage Rejection Ratio (R_S = 50Ω)								dB
	T_{amb} = +25°C		80	86		70	86		
	$T_{min} \le T_{amb} \le T_{max}$		80			70			
I_{CC}	Supply Current, no load								mA
	T_{amb} = +25°C			1.4	2.5		1.4	2.5	
	$T_{min} \le T_{amb} \le T_{max}$				2.5			2.5	
V_{icm}	Input Common Mode Voltage Range		±11	+15 -12		±11	+15 -12		V
CMR	Common Mode Rejection Ratio (R_S = 50Ω)								dB
	T_{amb} = +25°C		80	86		70	86		
	$T_{min} \le T_{amb} \le T_{max}$		80			70			
I_{os}	Output Short-circuit Current								mA
	T_{amb} = +25°C		10	40	60	10	40	60	
	$T_{min} \le T_{amb} \le T_{max}$		10		60	10		60	
$\pm V_{opp}$	Output Voltage Swing								V
	T_{amb} = +25°C	RL = 2kΩ	10	12		10	12		
		RL = 10kΩ	12	13.5		12	13.5		
	$T_{min} \le T_{amb} \le T_{max}$	RL = 2kΩ	10			10			
		RL = 10kΩ	12			12			
SR	Slew Rate (T_{amb} = +25°C)								V/µs
	V_{in} = 10V, R_L = 2kΩ, C_L = 100pF, unity gain		8	16		8	16		
t_r	Rise Time (T_{amb} = +25°C)								µs
	V_{in} = 20mV, R_L = 2kΩ, C_L = 100pF, unity gain			0.1			0.1		
K_{ov}	Overshoot (T_{amb} = +25°C)								%
	V_{in} = 20mV, R_L = 2kΩ, C_L = 100pF, unity gain			10			10		
GBP	Gain Bandwidth Product (T_{amb} = +25°C)								MHz
	V_{in} = 10mV, R_L = 2kΩ, C_L = 100pF, f= 100kHz		2.5	4		2.5	4		
R_i	Input Resistance			10^{12}			10^{12}		Ω

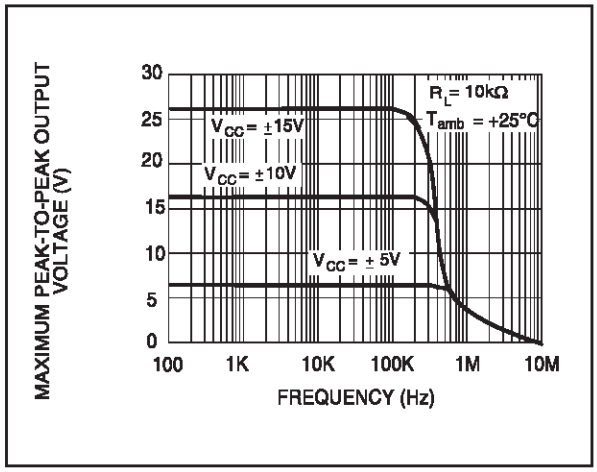
Symbol	Parameter	TL081I,M,AC,AI,AM, BC,BI,BM			TL081C			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
THD	Total Harmonic Distortion (T_{amb} = +25°C), f= 1kHz, R_L = 2kΩ,C_L = 100pF, A_v = 20dB, V_o = $2V_{pp}$		0.01			0.01		%
e_n	Equivalent Input Noise Voltage R_S = 100Ω, f = 1KHz		15			15		$\frac{nV}{\sqrt{Hz}}$
∅m	Phase Margin		45			45		degrees

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

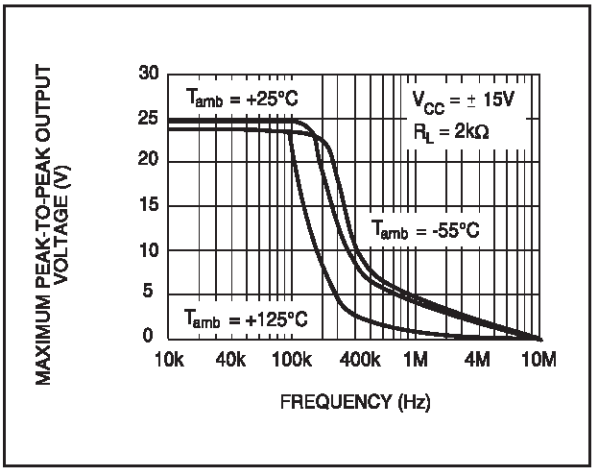
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE versus FREQUENCY



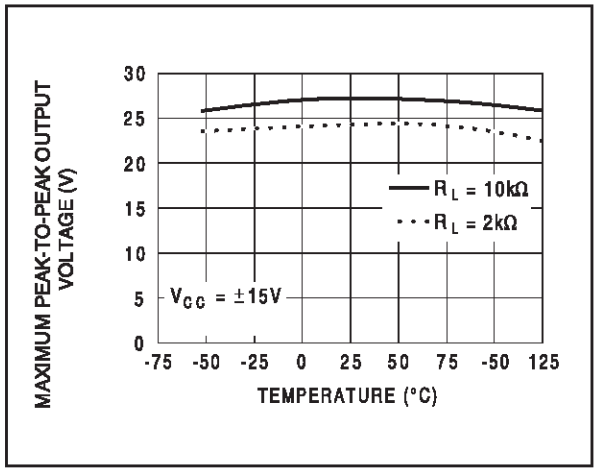
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE versus FREQUENCY



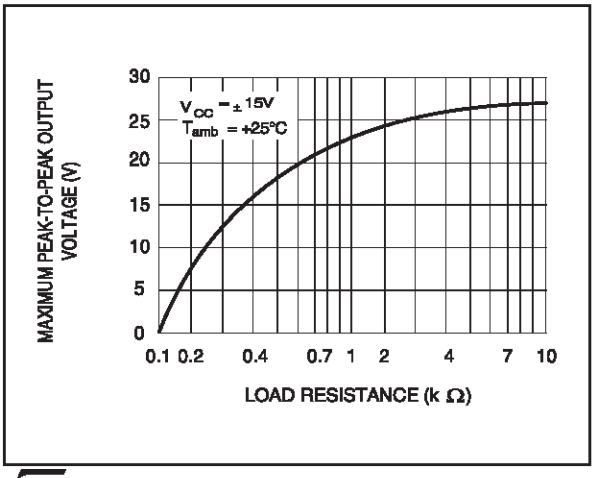
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE versus FREQUENCY



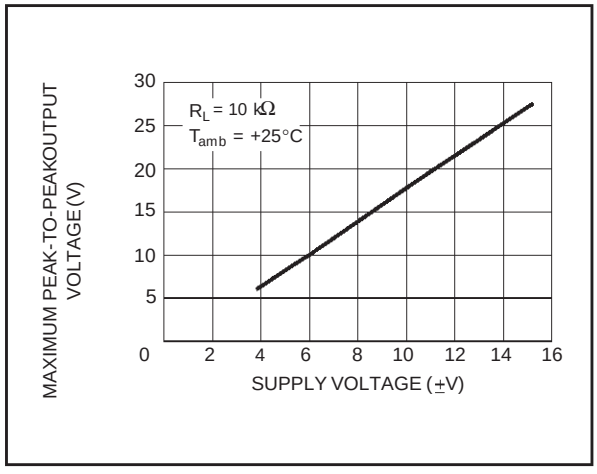
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE versus FREE AIR TEMP.



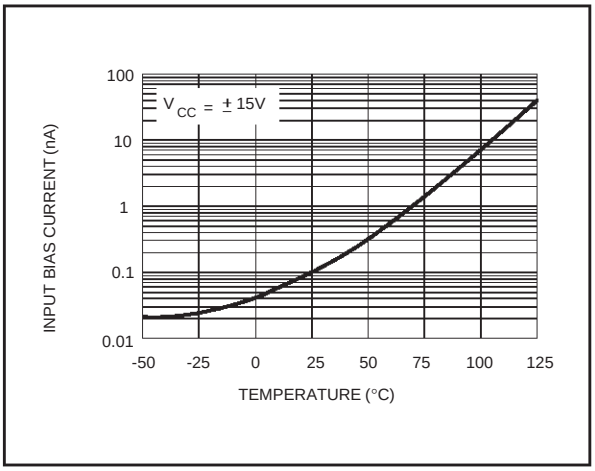
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE versus LOAD RESISTANCE



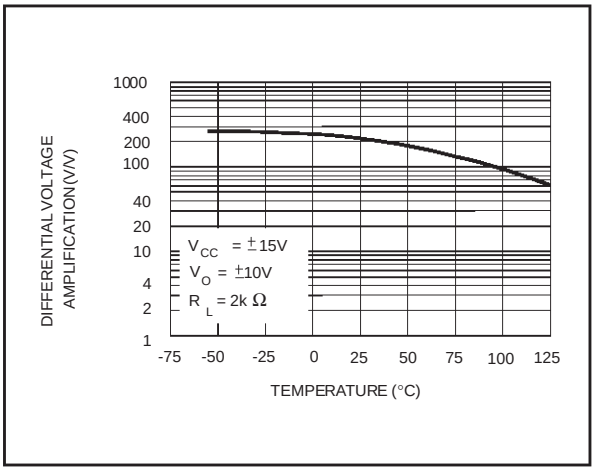
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE versus SUPPLY VOLTAGE



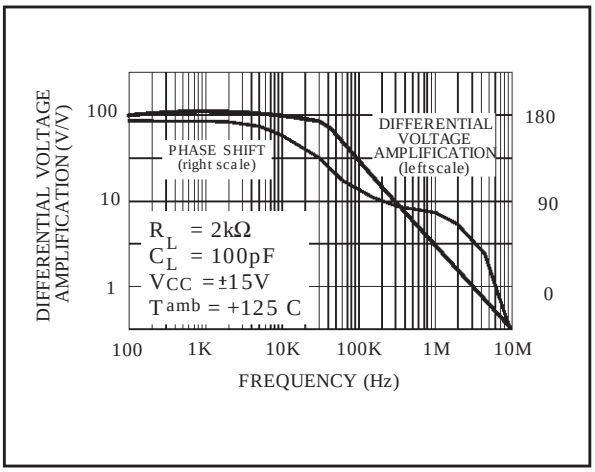
INPUT BIAS CURRENT versus FREE AIR TEMPERATURE



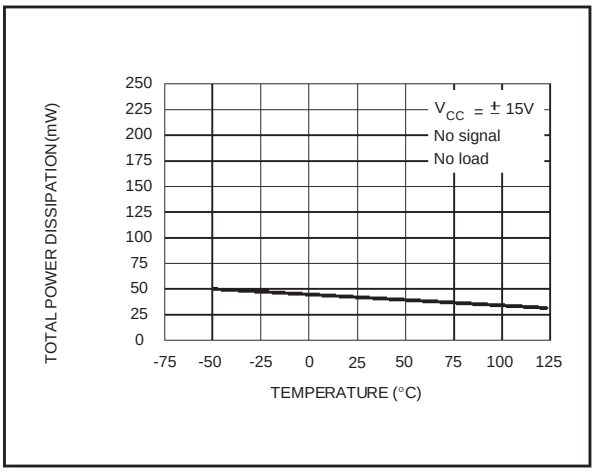
LARGE SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION versus FREE AIR TEMP.



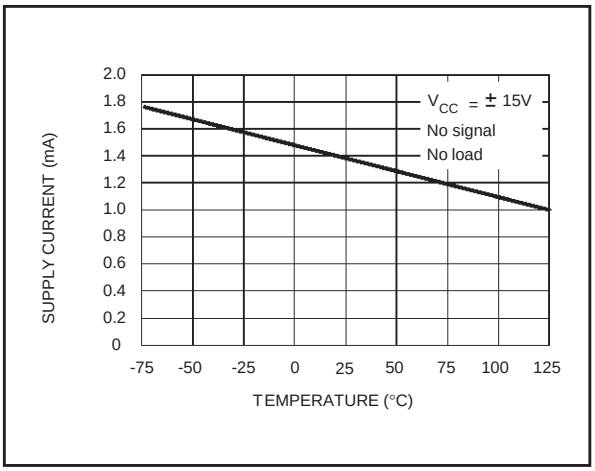
LARGE SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION AND PHASE SHIFT versus FREQUENCY



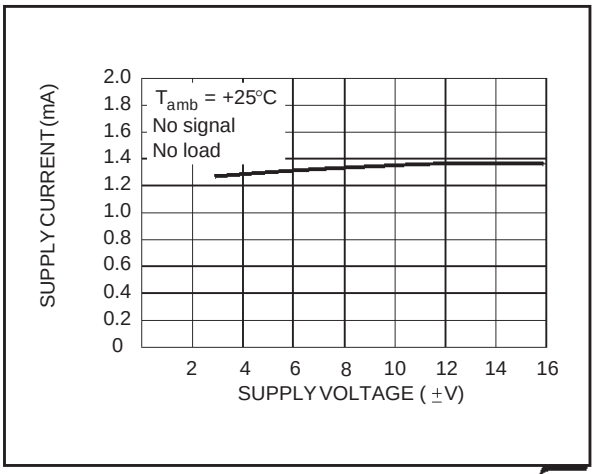
TOTAL POWER DISSIPATION versus FREE AIR TEMPERATURE



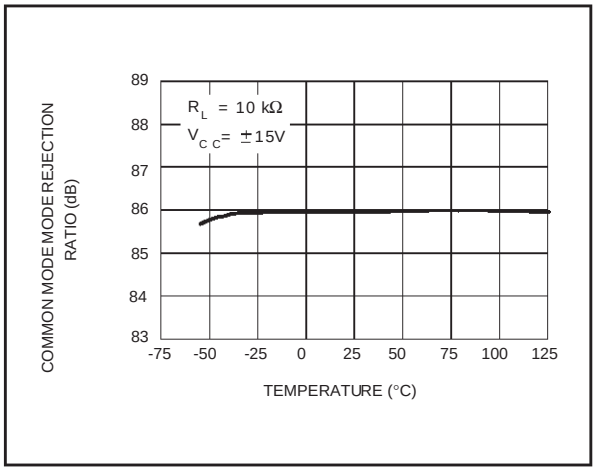
SUPPLY CURRENT PER AMPLIFIER versus FREE AIR TEMPERATURE



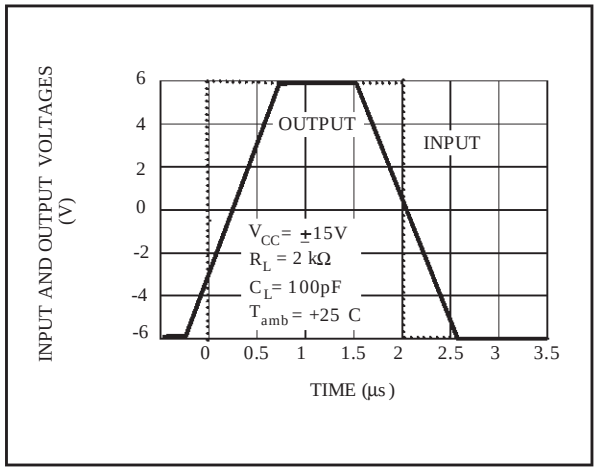
SUPPLY CURRENT PER AMPLIFIER versus SUPPLY VOLTAGE



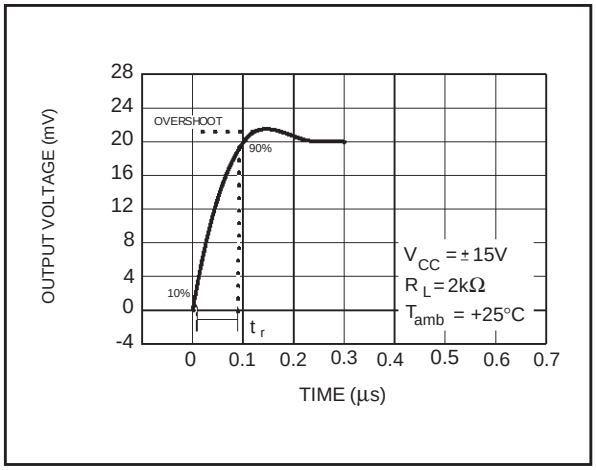
COMMON MODE REJECTION RATIO versus FREE AIR TEMPERATURE



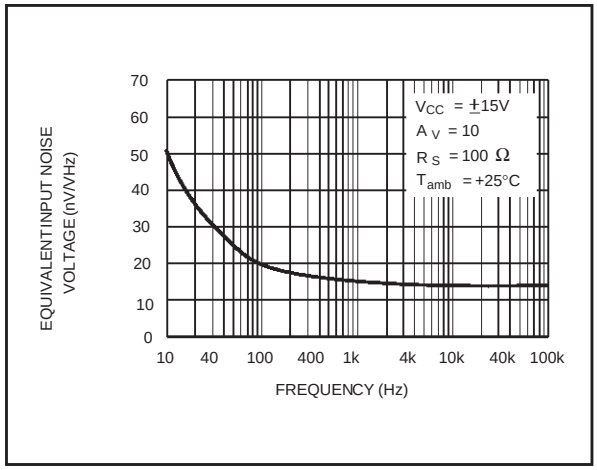
VOLTAGE FOLLOWER LARGE SIGNAL PULSE RESPONSE



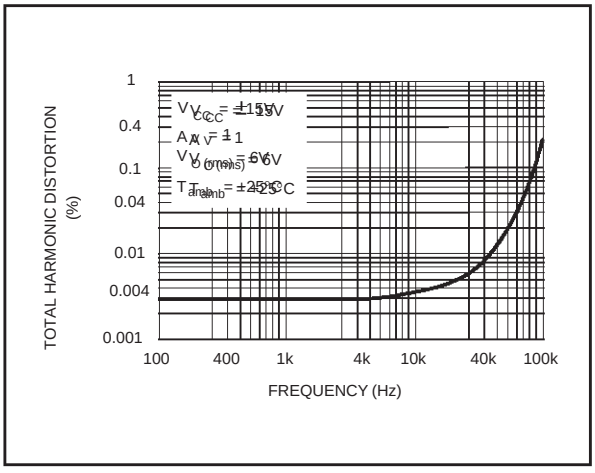
OUTPUT VOLTAGE versus ELAPSED TIME



EQUIVALENT INPUT NOISE VOLTAGE versus FREQUENCY



TOTAL HARMONIC DISTORTION versus FREQUENCY



PARAMETER MEASUREMENT INFORMATION

Figure 1 : Voltage Follower

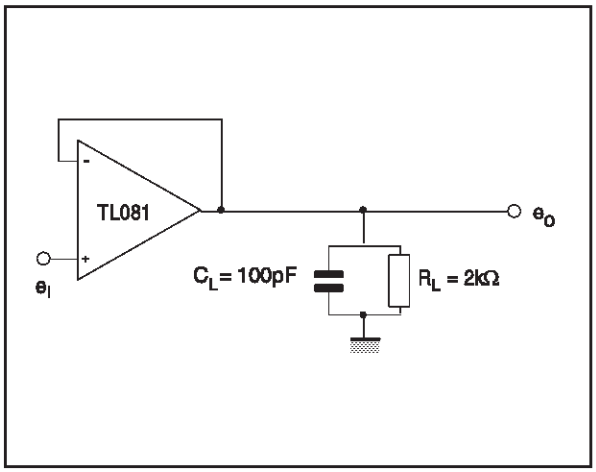
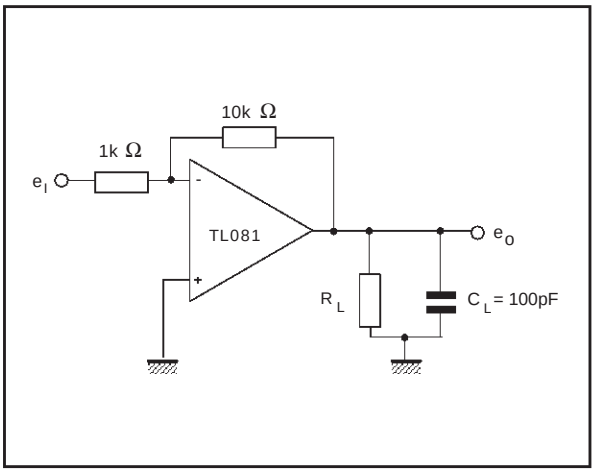
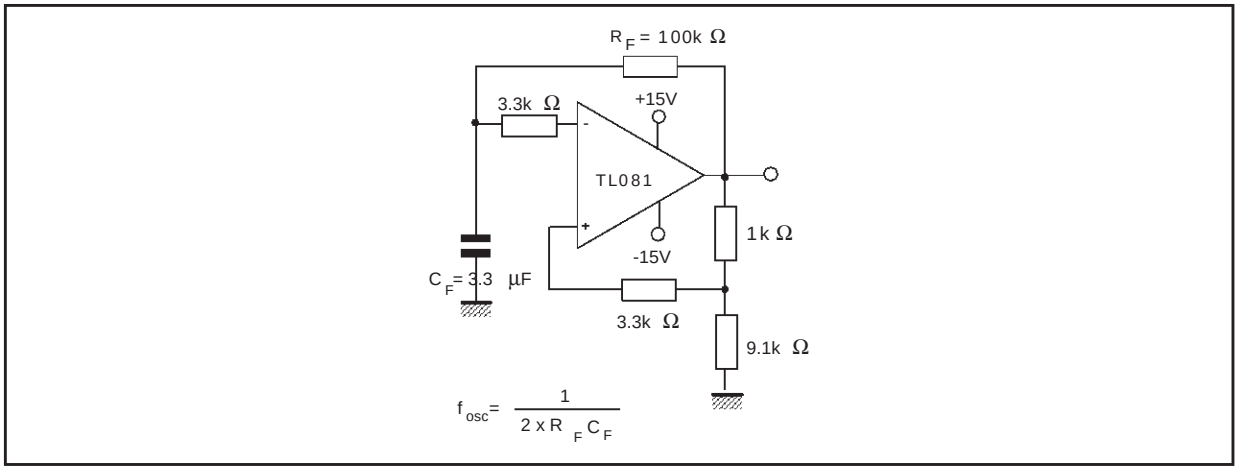


Figure 2 : Gain-of-10 Inverting Amplifier

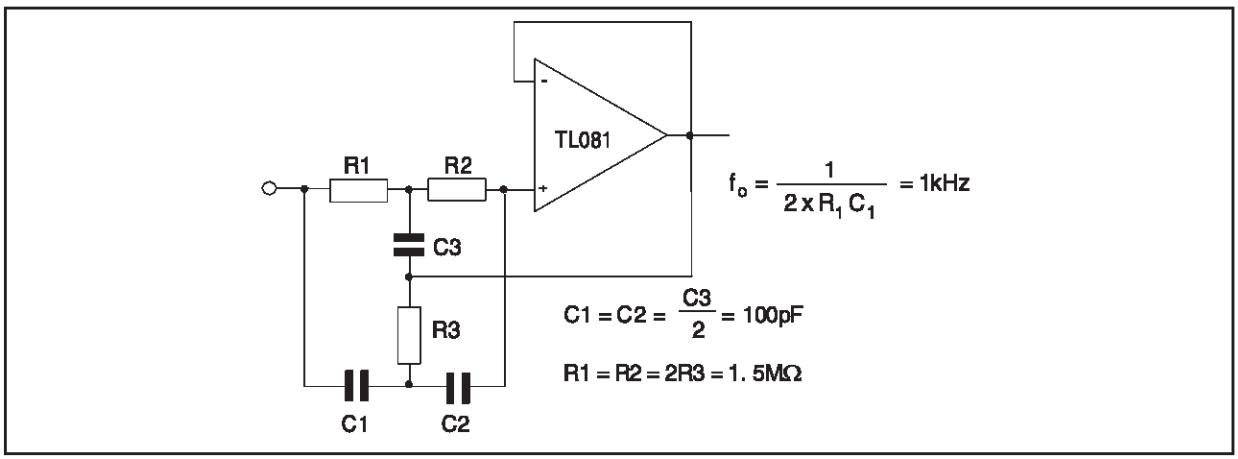


TYPICAL APPLICATIONS

(0.5Hz) SQUARE WAVE OSCILLATOR

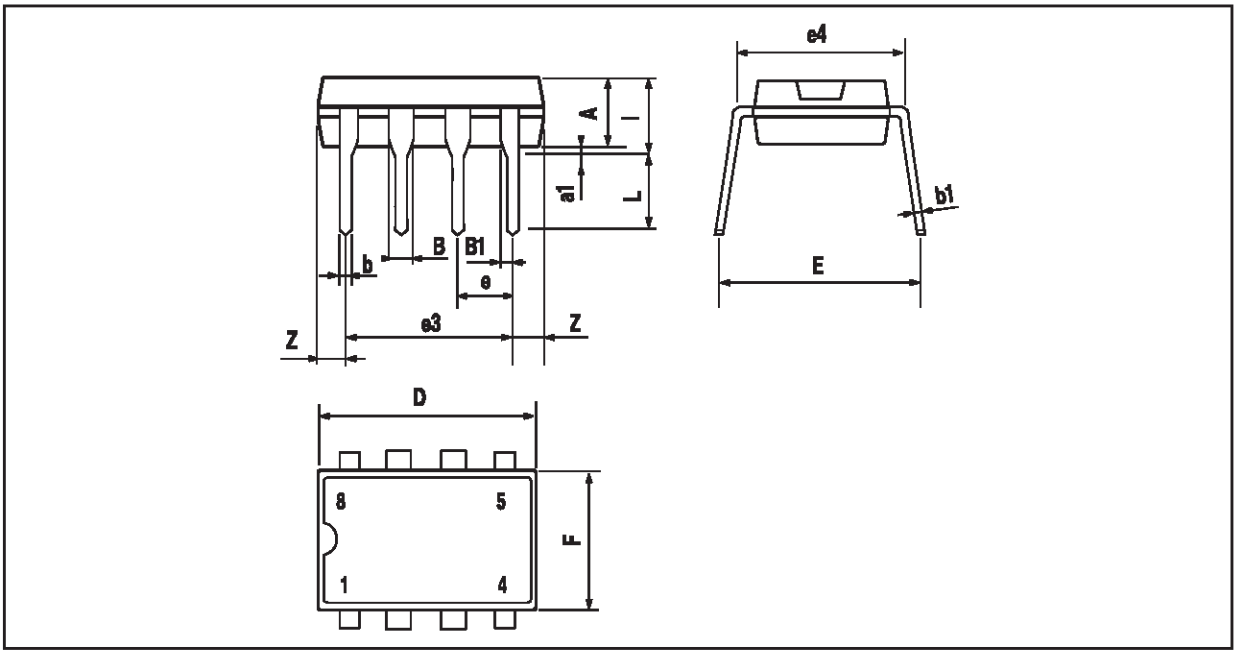


HIGH Q NOTCH FILTER



PACKAGE MECHANICAL DATA

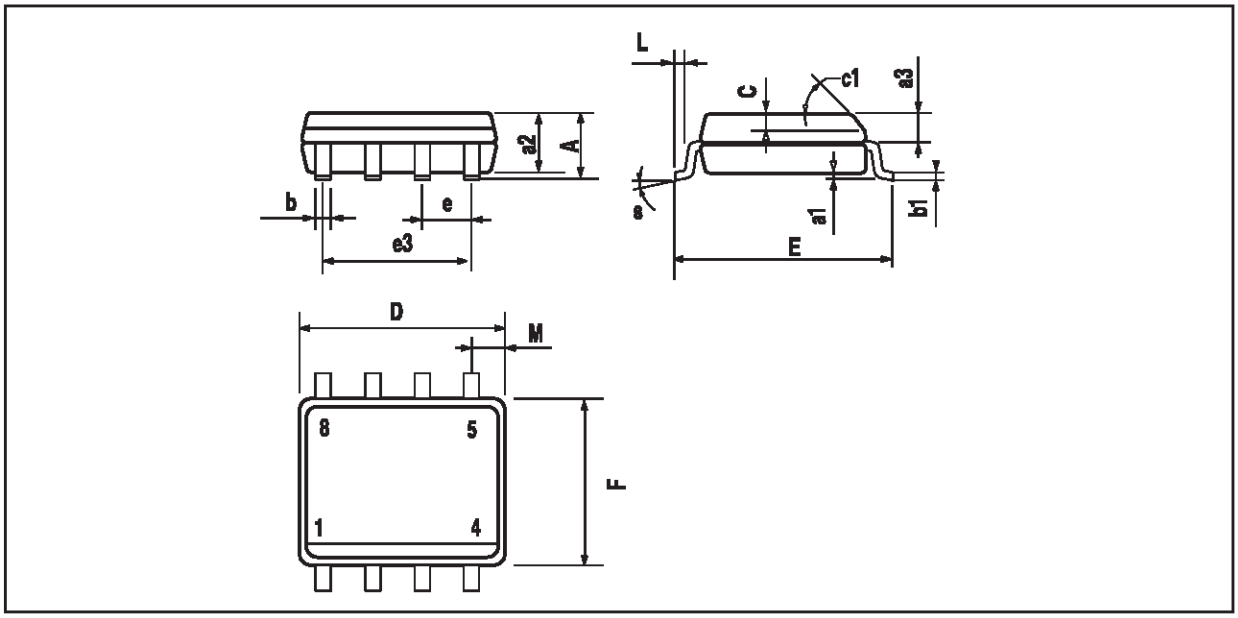
8 PINS - PLASTIC DIP



Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0260
i			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060

PACKAGE MECHANICAL DATA

8 PINS - PLASTIC MICROPACKAGE (SO)



Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
a3	0.65		0.85	0.026		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.020
c1	45° (typ.)					
D	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.150		0.157
L	0.4		1.27	0.016		0.050
M			0.6			0.024
S	8° (max.)					