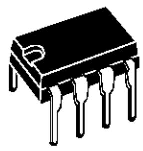
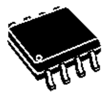
TL081
TL081A - TL081B

GENERAL PURPOSE
SINGLE J-FET 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/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.

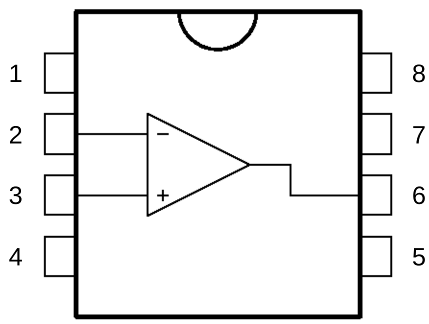
The devices feature high slew rates, low input bias and offset currents, and low offset voltage temperature coefficient.

ORDER CODES

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

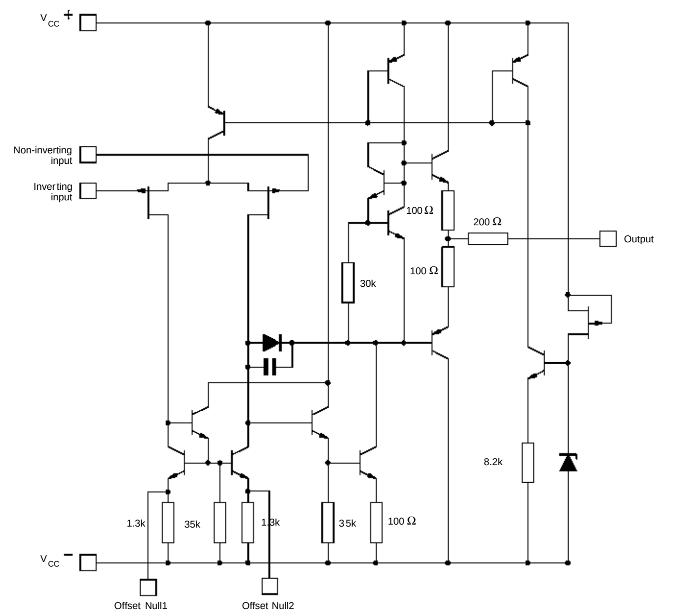
081-01.TBL

PIN CONNECTIONS (top view)



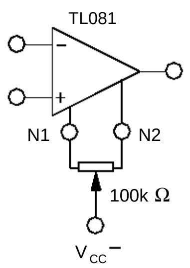
1 - Offset Null 1
2 - Inverting input
3 - Non-inverting input
4 - V_{CC}^{-}
5 - Offset Null 2
6 - Output
7 - V_{CC}^{+}
8 - N.C.

SCHEMATIC DIAGRAM



081-03.EPS

INPUT OFFSET VOLTAGE NULL CIRCUITS



081-04.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	TL081C,AC,BC TL081I,AI,BI TL081M,AM,BM	0 to 70 –40 to 105 –55 to 125	°C
T_{stg}	Storage Temperature Range		–65 to 150	°C

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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.

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) T_{amb} = 25°C TL081BC,BI,BM $T_{min.} \le T_{amb} \le T_{max.}$ TL081BC,BI,BM		3 1	6 3 7 5		3	10 13	mV
DV_{io}	Input Offset Voltage Drift		10			10		μV/°C
I_{io}	Input Offset Current * T_{amb} = 25°C $T_{min.} \le T_{amb} \le T_{max.}$		5	100 4		5	100 4	pA nA
I_{ib}	Input Bias Current * T_{amb} = 25°C $T_{min.} \le T_{amb} \le T_{max.}$		20	200 20		20	400 20	pA nA
A_{vd}	Large Signal Voltage Gain (R_L = 2kΩ, V_O = ±10V) T_{amb} = 25°C $T_{min.} \le T_{amb} \le T_{max.}$	50 25	200		25 15	200		V/mV
SVR	Supply Voltage Rejection Ratio (R_S = 50Ω) T_{amb} = 25°C $T_{min.} \le T_{amb} \le T_{max.}$	80 80	86		70 70	86		dB
I_{CC}	Supply Current, no Load T_{amb} = 25°C $T_{min.} \le T_{amb} \le T_{max.}$		1.4	2.5 2.5		1.4	2.5 2.5	mA
V_{icm}	Input Common Mode Voltage Range	±11	+15 -12		±11	+15 -12		V
CMR	Common Mode Rejection Ratio (R_S = 50Ω) T_{amb} = 25°C $T_{min.} \le T_{amb} \le T_{max.}$	80 80	86		70 70	86		dB
Ios	Output Short-circuit Current T_{amb} = 25°C $T_{min.} \le T_{amb} \le T_{max.}$	10 10	40	60 60	10 10	40	60 60	mA
$\pm V_{OPP}$	Output Voltage Swing T_{amb} = 25°C R_L = 2kΩ R_L = 10kΩ $T_{min.} \le T_{amb} \le T_{max.}$ R_L = 2kΩ R_L = 10kΩ	10 12 10 12	12 13.5		10 12 10 12	12 13.5		V
SR	Slew Rate (V_{in} = 10V, R_L = 2kΩ, C_L = 100pF, T_{amb} = 25°C, unity gain)	8	16		8	16		V/μs
t_r	Rise Time (V_{in} = 20mV, R_L = 2kΩ, C_L = 100pF, T_{amb} = 25°C, unity gain)		0.1			0.1		μs
K_{OV}	Overshoot (V_{in} = 20mV, R_L = 2kΩ, C_L = 100pF, T_{amb} = 25°C, unity gain)		10			10		%
GBP	Gain Bandwidth Product (f = 100kHz, T_{amb} = 25°C, V_{in} = 10mV, R_L = 2kΩ, C_L = 100pF)	2.5	4		2.5	4		MHz
R_i	Input Resistance		10^{12}			10^{12}		Ω
THD	Total Harmonic Distortion (f = 1kHz, A_V = 20dB, R_L = 2kΩ, C_L = 100pF, T_{amb} = 25°C, V_O = 2V_{PP})		0.01			0.01		%
e_n	Equivalent Input Noise Voltage (f = 1kHz, R_s = 100Ω)		15			15		$\frac{nV}{\sqrt{Hz}}$
Øm	Phase Margin		45			45		Degrees

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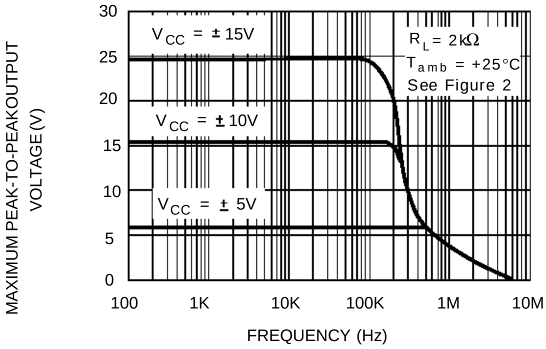
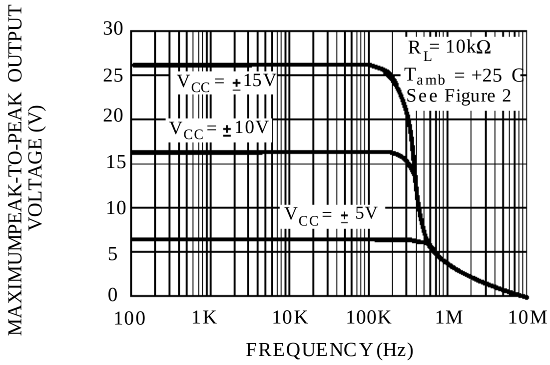
* The input bias currents are junction leakage currents which approximately double for every 10°C increase in the junction temperature.

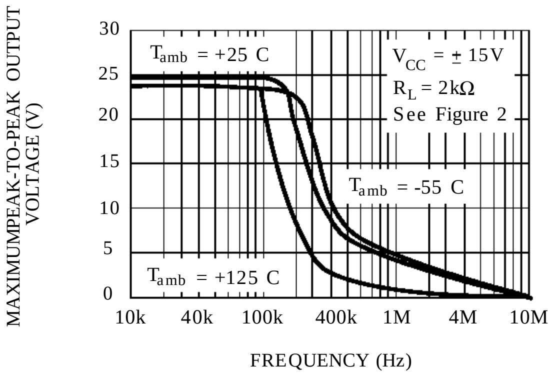
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREQUENCY



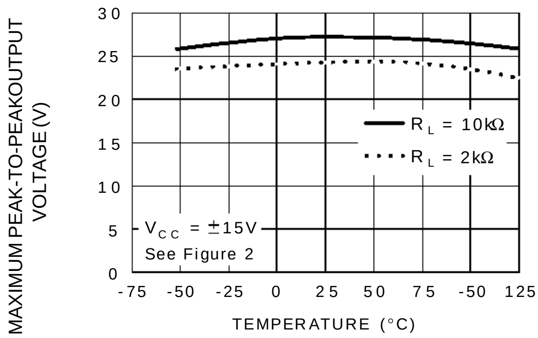
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREQUENCY



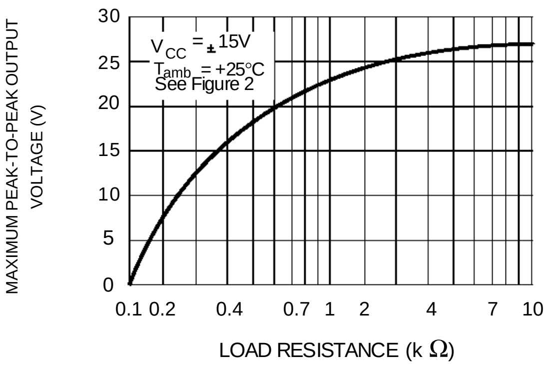
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREQUENCY



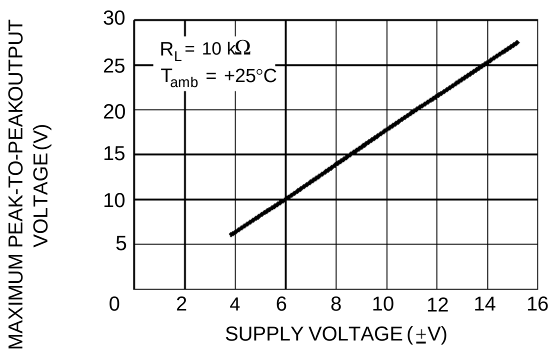
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREE AIR TEMP.



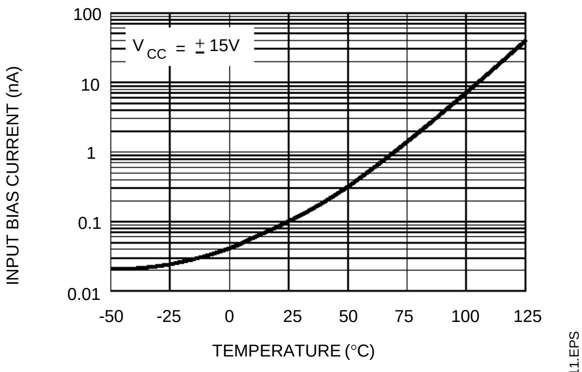
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS LOAD RESISTANCE



MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS SUPPLY VOLTAGE

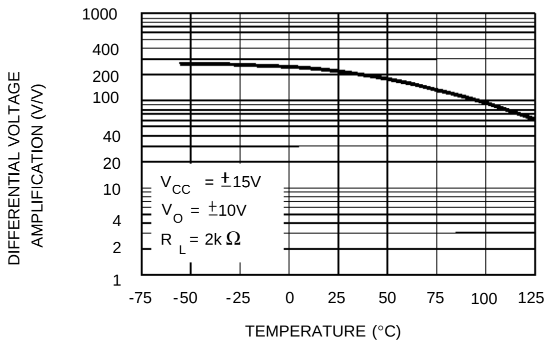


INPUT BIAS CURRENT VERSUS FREE AIR TEMPERATURE



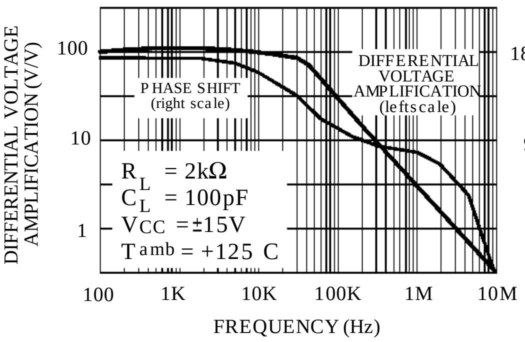
081-11.EPS

LARGE SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION VERSUS FREE AIR TEMPERATURE



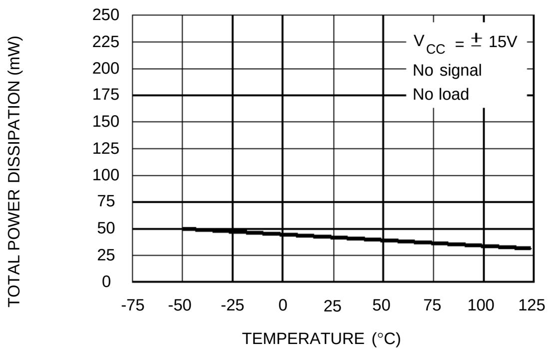
081-12.EPS

LARGE SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION AND PHASE SHIFT VERSUS FREQUENCY



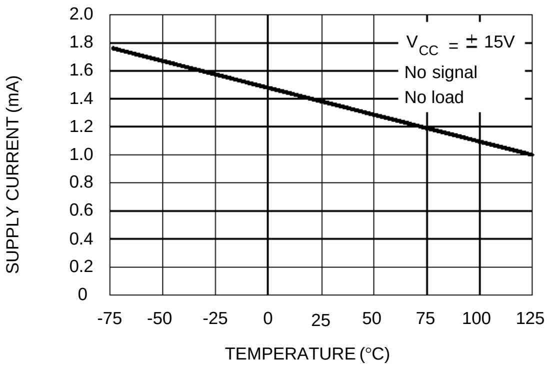
081-13.EPS

TOTAL POWER DISSIPATION VERSUS FREE AIR TEMPERATURE



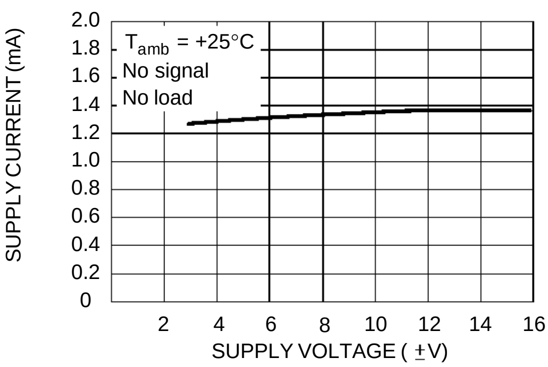
081-14.EPS

SUPPLY CURRENT PER AMPLIFIER VERSUS FREE AIR TEMPERATURE



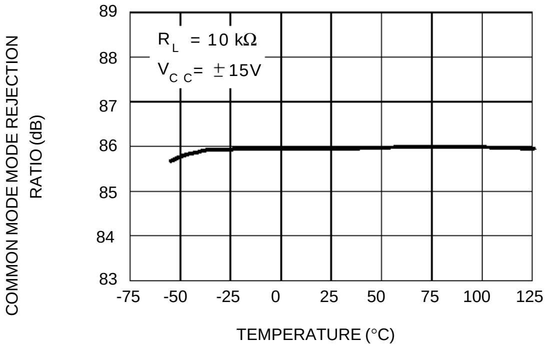
081-15.EPS

SUPPLY CURRENT PER AMPLIFIER VERSUS SUPPLY VOLTAGE



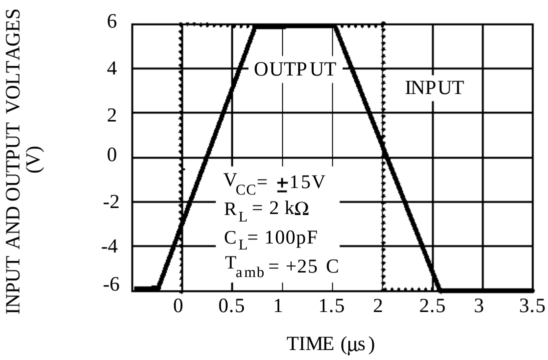
081-16.EPS

COMMON MODE REJECTION RATIO VERSUS FREE AIR TEMPERATURE



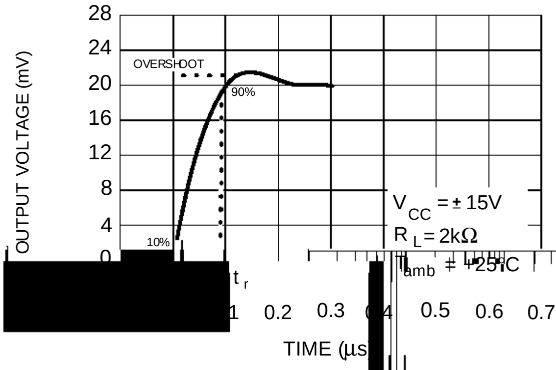
081-17.EPS

VOLTAGE FOLLOWER LARGE SIGNAL PULSE RESPONSE



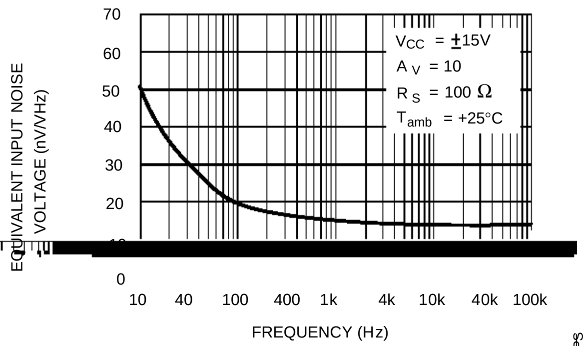
081-18.EPS

OUTPUT VOLTAGE VERSUS ELAPSED TIME



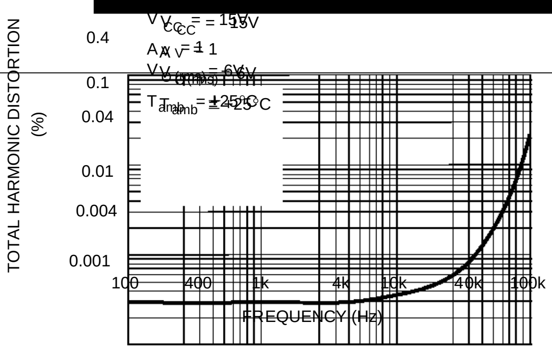
081-19.EPS

EQUIVALENT INPUT NOISE VOLTAGE VERSUS FREQUENCY



081-20.EPS

TOTAL HARMONIC DISTORTION VERSUS FREQUENCY



081-21.EPS

PARAMETER MEASUREMENT INFORMATION

Figure 1 : Voltage Follower

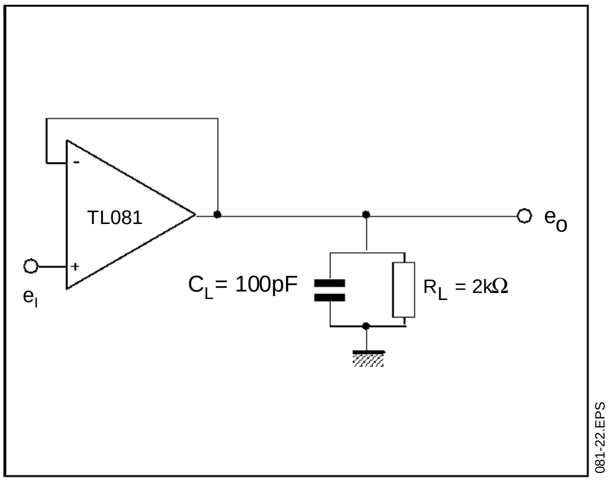
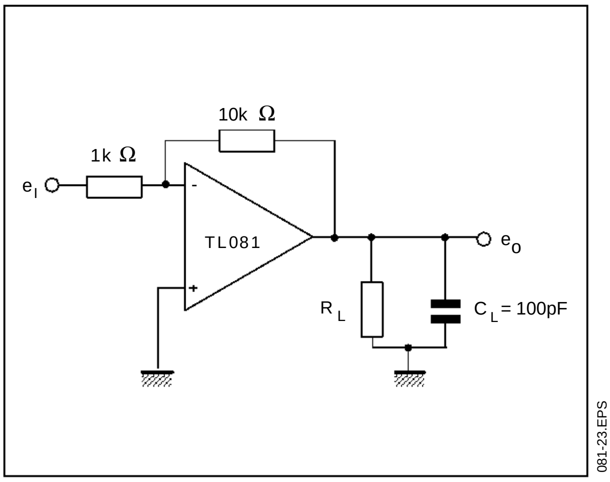
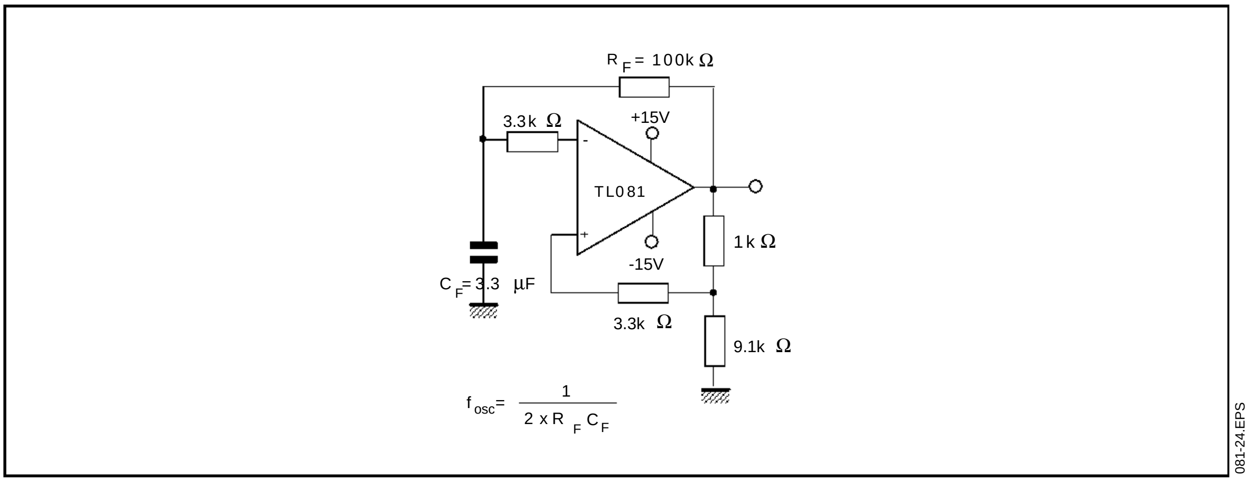


Figure 2 : Gain-of-10 Inverting Amplifier

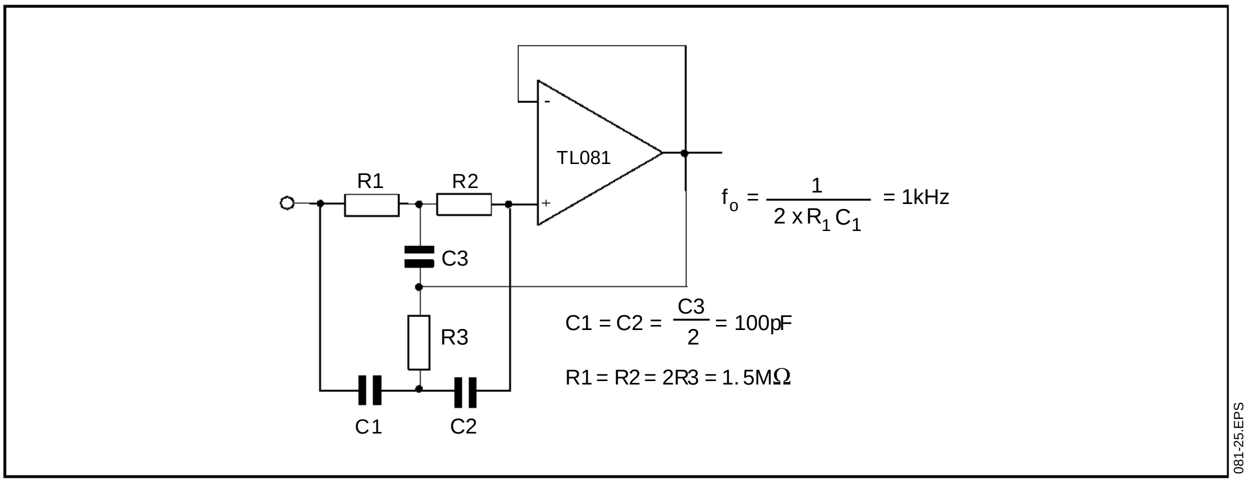


TYPICAL APPLICATIONS

(0.5Hz) SQUARE WAVE OSCILLATOR

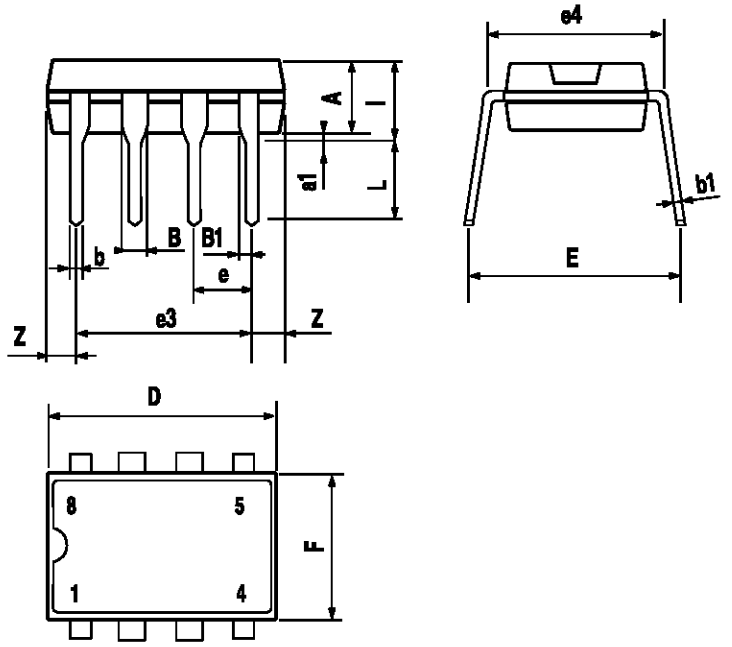


HIGH Q NOTCH FILTER



PACKAGE MECHANICAL DATA

8 PINS - PLASTIC DIP



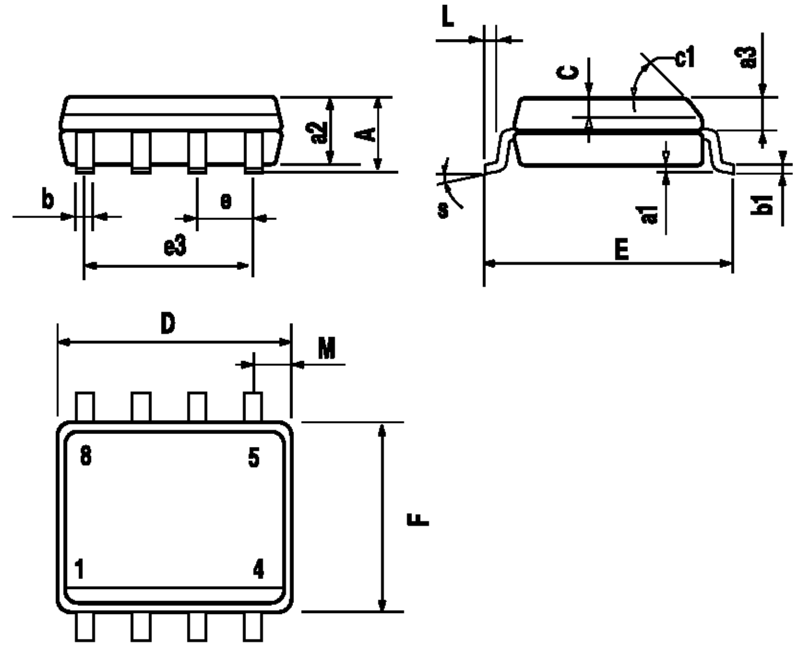
PM-DIP8.EPS

Dimensions	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

DIP8.TBL

PACKAGE MECHANICAL DATA

8 PINS - PLASTIC MICROPACKAGE (SO)



PM-SO8.EPS

Dimensions	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^{o} (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^{o} (max.)					

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