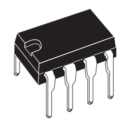
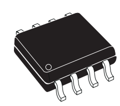
LF151
LF251 - LF351

WIDE BANDWIDTH
SINGLE J-FET OPERATIONAL AMPLIFIER

- INTERNALLY ADJUSTABLE INPUT OFFSET VOLTAGE
- 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

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.

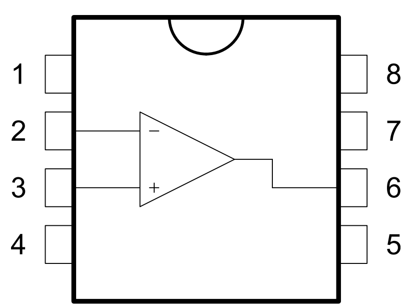
The devices feature high slew rates, low input bias and offset currents, and low offset voltage temperature coefficient.

ORDER CODE

Part Number	Temperature Range	Package	
		N	D
LF351	0°C, +70°C	•	•
LF251	-40°C, +105°C	•	•
LF151	-55°C, +125°C	•	•

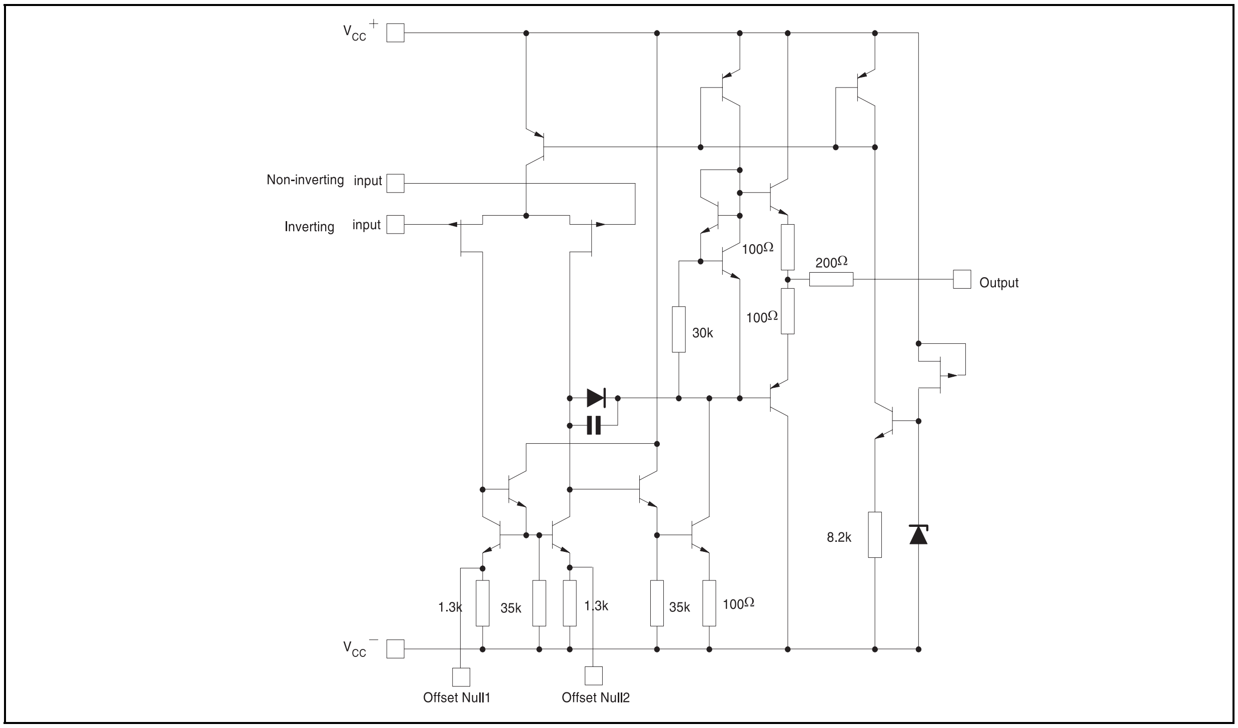
N = Dual in Line Package (DIP)
D = Small Outline Package (SO) - also available in Tape & Reel (DT)

PIN CONNECTIONS (top view)

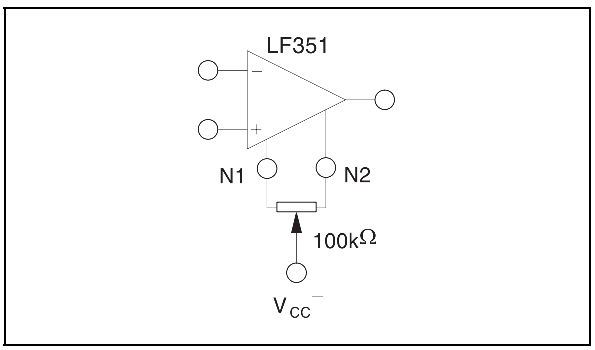


1 - Offset null 1
2 - Inverting input
3 - Non-inverting input
4 - V_{CC}^{-}
5 - Offset null 2
6 - Output
7 - V_{CC}^{+}
8 - N.C.

SCHEMATIC DIAGRAM



INPUT OFFSET VOLTAGE NULL CIRCUIT



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	LF151	LF251	LF351	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

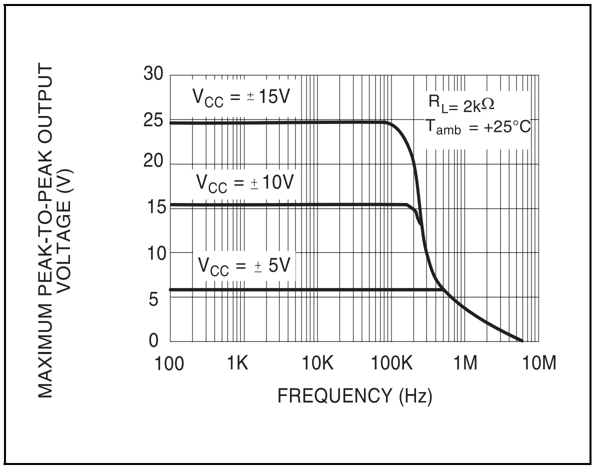
V_{CC} = ±15V, T_{amb} = +25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{io}	Input Offset Voltage (R_s = 10kΩ) T_{amb} = +25°C $T_{min} \le T_{amb} \le T_{max}$		3	10 13	mV
DV_{io}	Input Offset Voltage Drift		10		μV/°C
I_{io}	Input Offset Current- note 1) T_{amb} = +25°C $T_{min} \le T_{amb} \le T_{max}$		5	100 4	pA nA
I_{ib}	Input Bias Current -note 1 T_{amb} = +25°C $T_{min} \le T_{amb} \le T_{max}$		20	200 20	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		V/mV
SVR	Supply Voltage Rejection Ratio (R_S = 10kΩ) T_{amb} = +25°C $T_{min} \le T_{amb} \le T_{max}$	80 80	86		dB
I_{CC}	Supply Current, no load T_{amb} = +25°C $T_{min} \le T_{amb} \le T_{max}$		1.4	3.4 3.4	mA
V_{icm}	Input Common Mode Voltage Range	±11	+15 -12		V
CMR	Common Mode Rejection Ratio (R_S = 10kΩ) T_{amb} = +25°C $T_{min} \le T_{amb} \le T_{max}$	70 70	86		dB
I_{OS}	Output Short-circuit Current T_{amb} = +25°C $T_{min} \le T_{amb} \le T_{max}$	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		V
SR	Slew Rate V_i = 10V, R_L = 2kΩ, C_L = 100pF, T_{amb} = +25°C, unity gain	12	16		V/μs
t_r	Rise Time V_i = 20mV, R_L = 2kΩ, C_L = 100pF, T_{amb} = +25°C, unity gain		0.1		μs
K_{ov}	Overshoot V_i = 20mV, R_L = 2kΩ, C_L = 100pF, T_{amb} = +25°C, unity gain		10		%
GBP	Gain Bandwidth Product f = 100kHz, T_{amb} = +25°C,V_{in} = 10mV, R_L = 2kΩ, C_L = 100pF	2.5	4		MHz
R_i	Input Resistance		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		
e_n	Equivalent Input Noise Voltage R_S = 100Ω, f = 1KHz		15		$\frac{nV}{\sqrt{Hz}}$
∅m	Phase Margin		45		Degrees

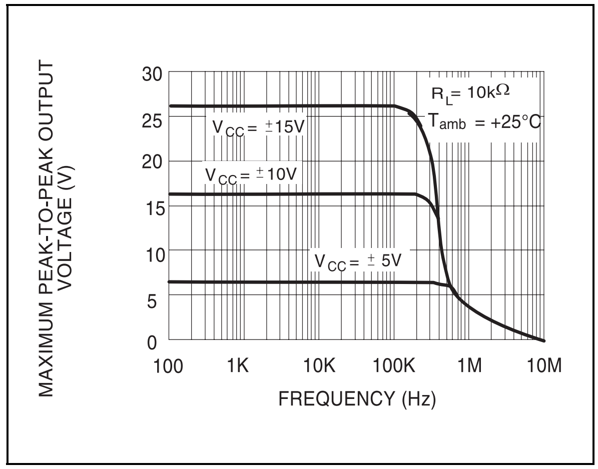
1. The input bias currents are junction leakage currents which approximately double for every 10°C increase in the junction temperature.

MAXIMUM PEAK-TO-PEAK OUTPUT

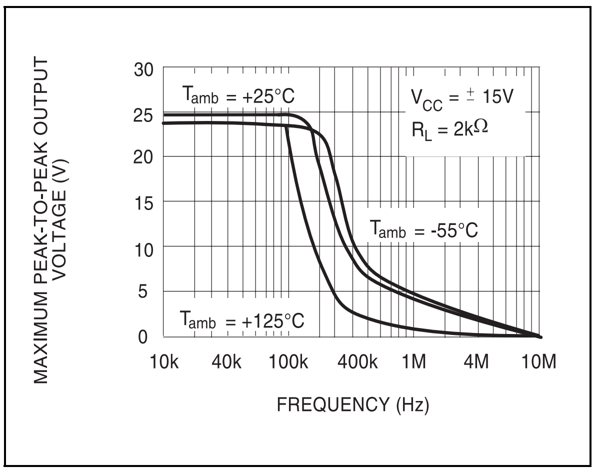
VOLTAGE versus FREQUENCY



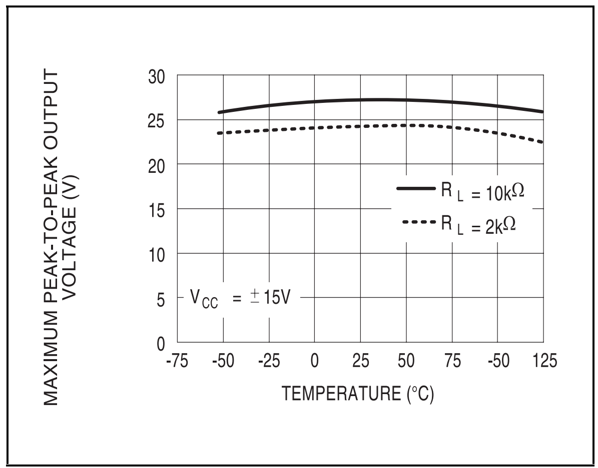
VOLTAGE versus FREQUENCY



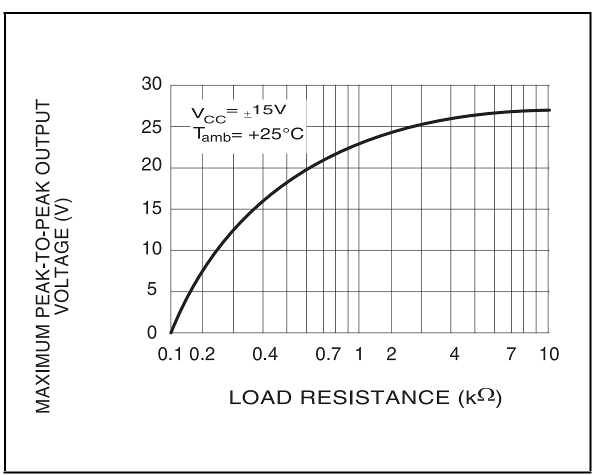
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE versus FREQUENCY



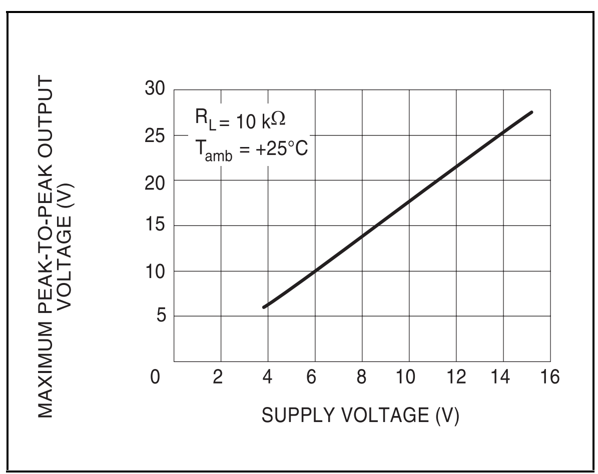
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE versus FREE AIR TEMP.



MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE versus LOAD RESISTANCE



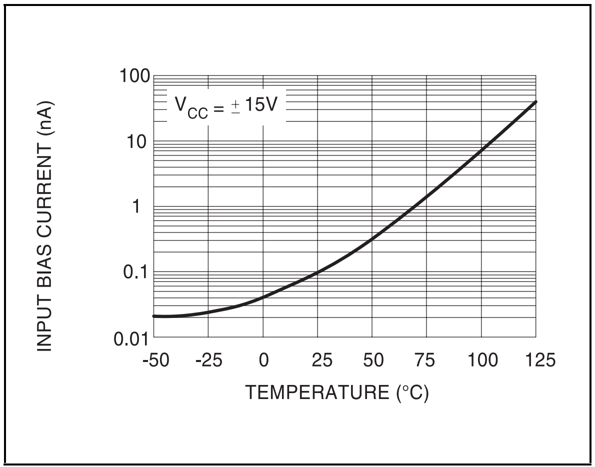
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE versus SUPLY VOLTAGE



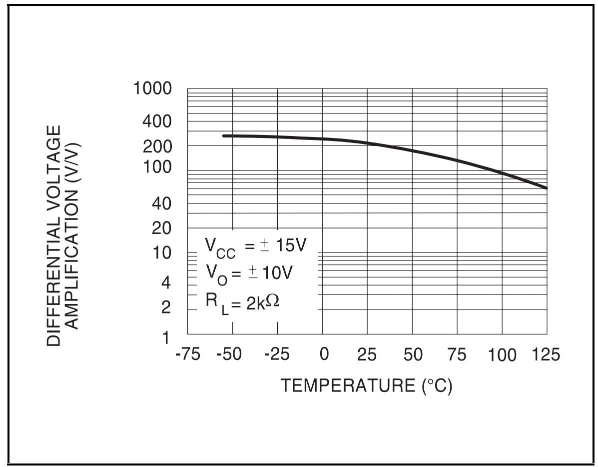
MAXIMUM PEAK-TO-PEAK OUTPUT

INPUT BIAS CURRENT versus FREE AIR

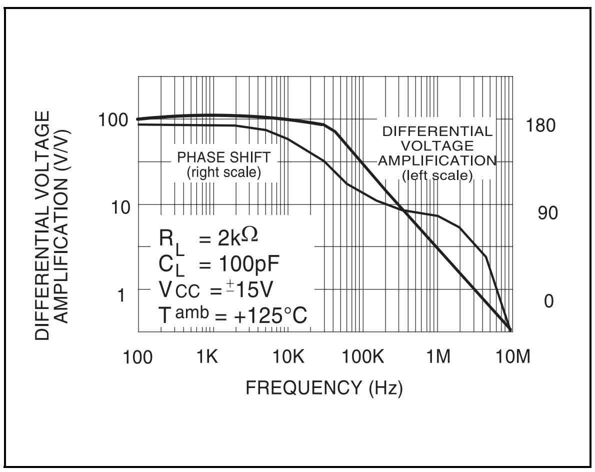
TEMPERATURE



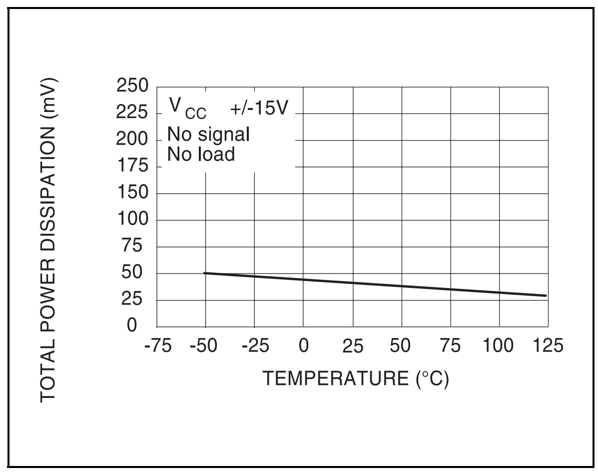
AMPLIFICATION versus FREE AIR TEMP.



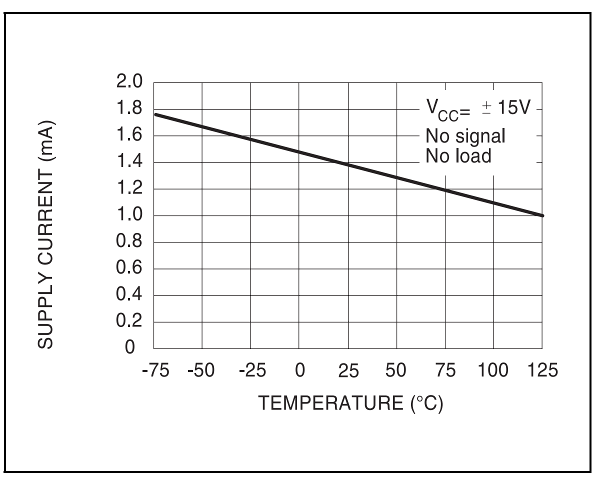
LARGE SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION AND PHASE SHIFT versus FREQUENCY



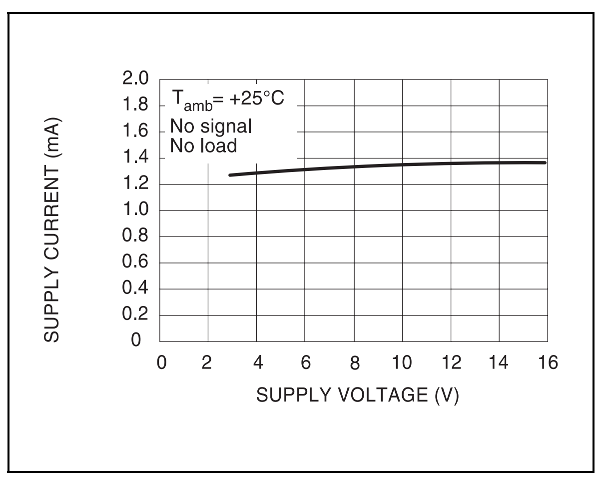
TOTAL POWER DISSIPATION versus FREE AIR TEMPERATURE



SUPPLY CURRENT PER AMPLIFIER versus FREE AIR TEMPERATURE



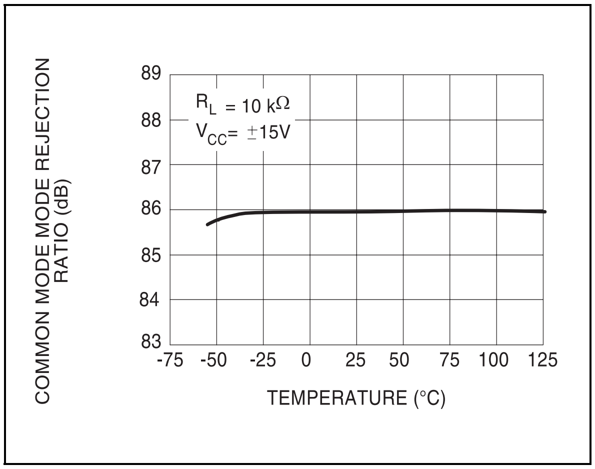
SUPPLY CURRENT PER AMPLIFIER versus SUPPLY VOLTAGE



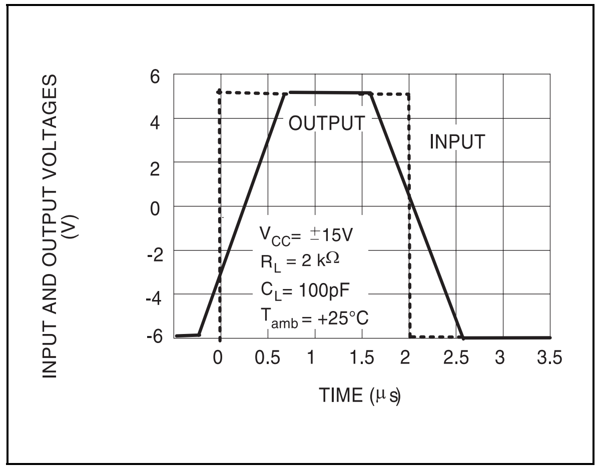
LARGE SIGNAL DIFFERENTIAL VOLTAGE

COMMON MODE REJECTION RATIO versus

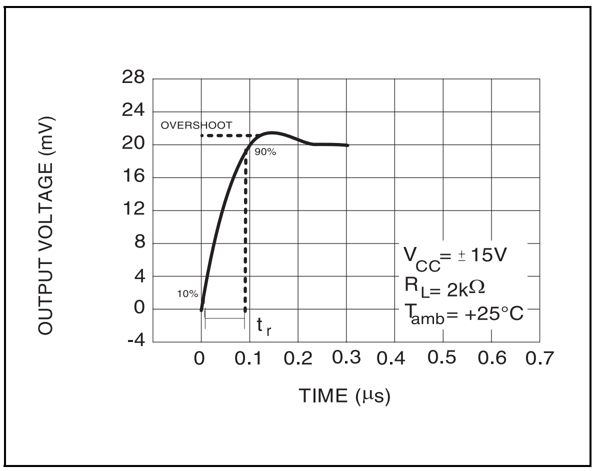
FREE AIR TEMPERATURE



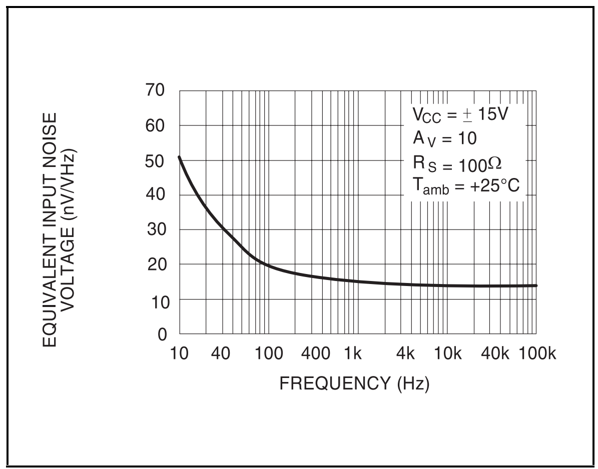
VOLTAGE FOLLOWER LARGE SIGNAL PULSE RESPONSE



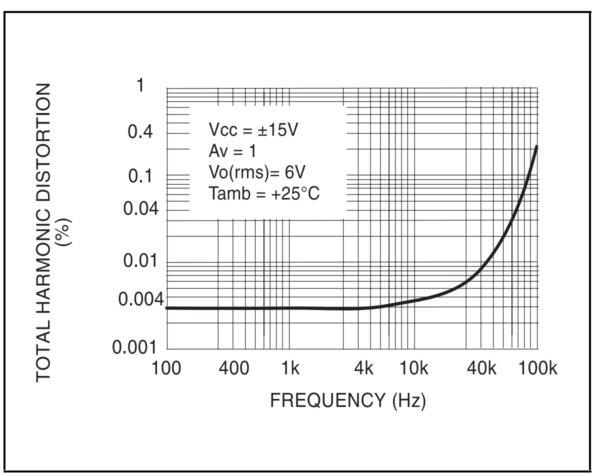
OUTPUT VOLTAGE versus ELAPSED TIME



EQUIVALENT INPUT NOISE VOLTAGE versus FREQUENCY



TOTAL HARMONIC DISTORTION versus FREQUENCY



PARAMETER MEASUREMENT INFORMATION

Figure 1 : Voltage Follower

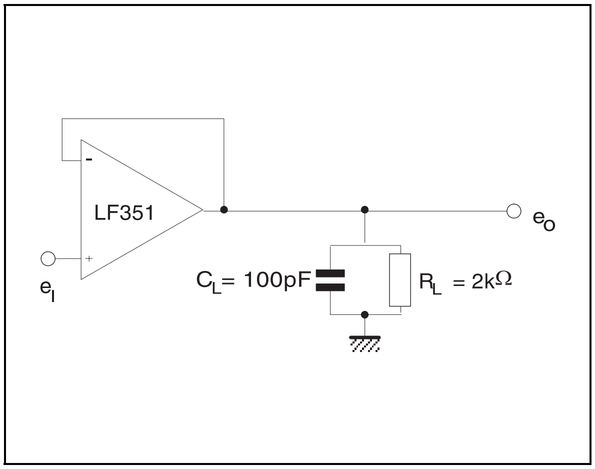
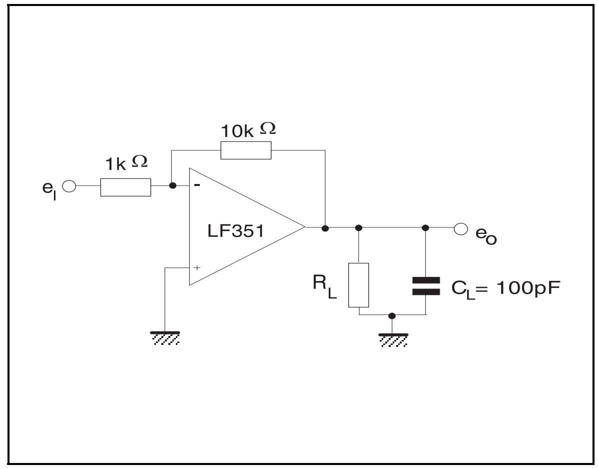
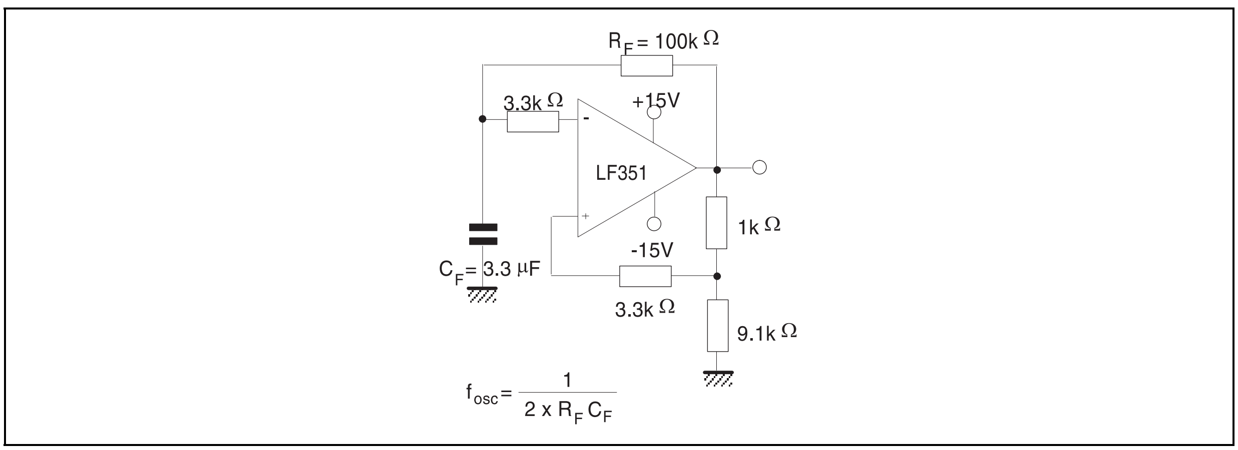


Figure 2 : Gain-of-10 inverting amplifier

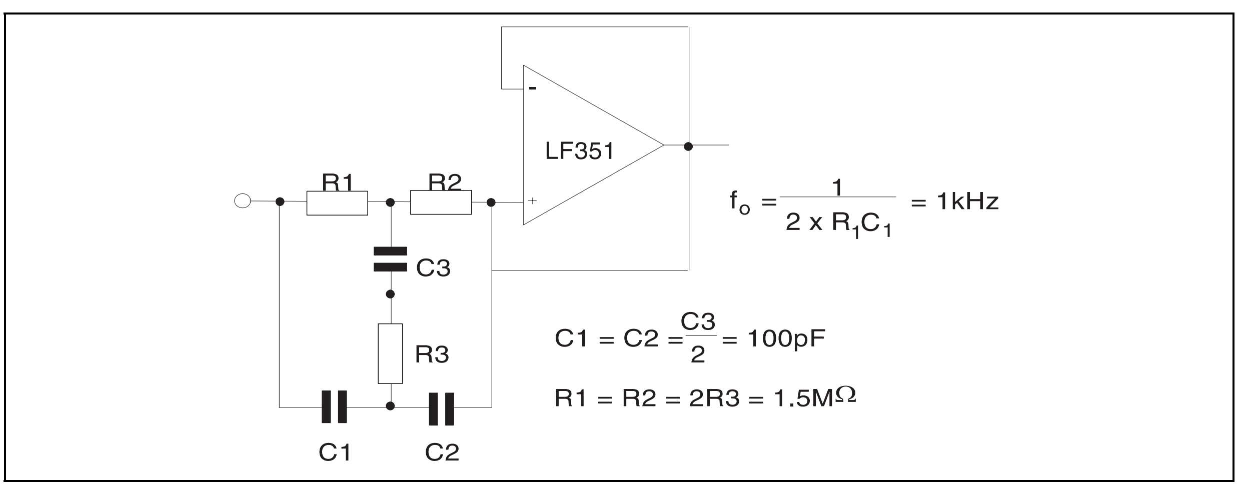


TYPICAL APPLICATION

(0.5Hz) SQUARE WAVE OSCILLATOR

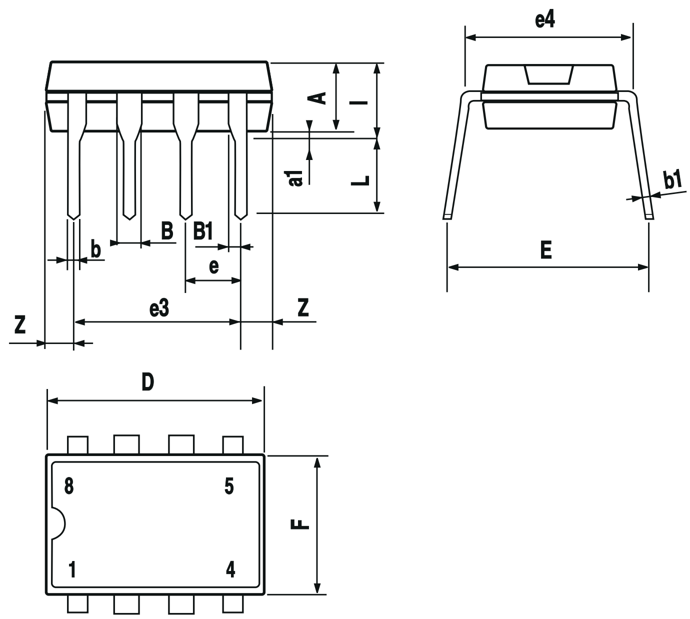


HIGH Q NOTCH FILTER



PACKAGE MECHANICAL DATA

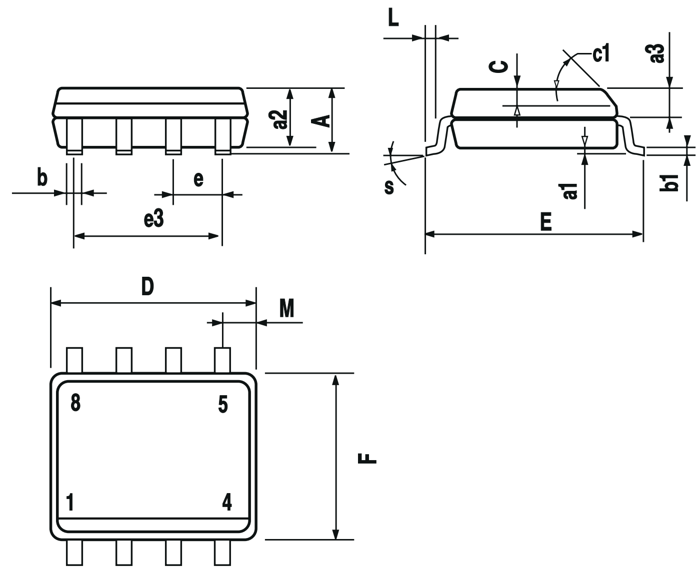
8 PINS - PLASTIC DIP



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.)					