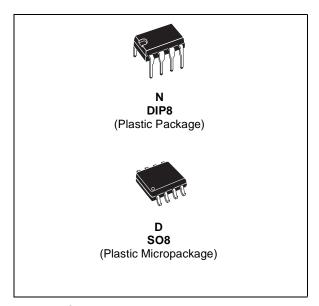


WIDE BANDWIDTH SINGLE J-FET OPERATIONAL AMPLIFIER

- 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)



DESCRIPTION

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

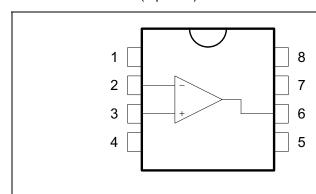
The devices feature high slew rates, low input bias and offset currents, and low offset voltage temperature coefficient.

ORDER CODE

Part Number	Temperature Range	Package	
	Temperature Kange	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)

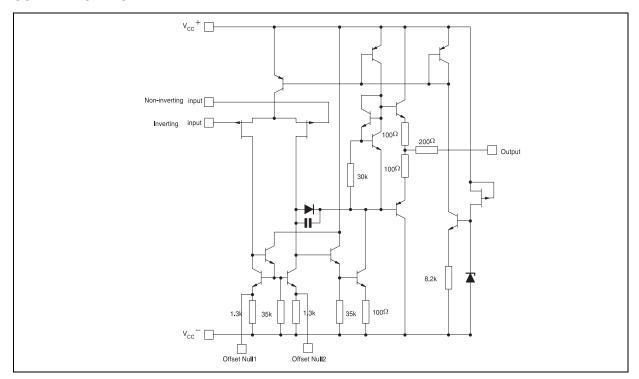
PIN CONNECTIONS (top view)



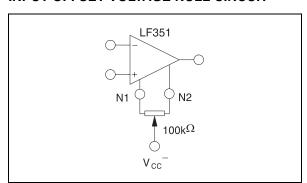
- 1 Offset null 1
- 2 Inverting input
- 3 Non-inverting input
- 4 V_{CC}
- 5 Offset null 2
- 6 Output
- 7 V_{CC}+
- 8 N.C.

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SCHEMATIC DIAGRAM



INPUT OFFSET VOLTAGE NULL CIRCUIT



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	LF151	LF251	LF351	Unit
V _{CC}	Supply voltage - note 1)	±18			
V _i	Input Voltage - note ²⁾	±15			
V _{id}	Differential Input Voltage - note 3)	±30			
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	

- 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

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

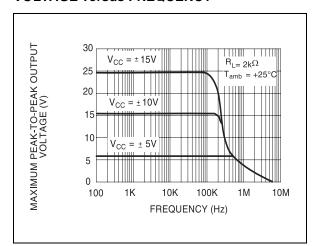
Symbol	Parameter	Min.	Тур.	Max.	Unit
	Input Offset Voltage ($R_s = 10k\Omega$)				mV
V_{io}	$T_{amb} = +25$ °C		3	10	
	$T_{min} \le T_{amb} \le T_{max}$			13	
DV _{io}	Input Offset Voltage Drift		10		μV/°C
	Input Offset Current- note 1)				
I _{io}	$T_{amb} = +25$ °C		5	100	pА
	$T_{min} \le T_{amb} \le T_{max}$			4	nA
	Input Bias Current -note 1				nA
I_{ib}	$T_{amb} = +25$ °C		20	200	
	$T_{min} \le T_{amb} \le T_{max}$			20	
	Large Signal Voltage Gain ($R_L = 2k\Omega$, $V_0 = \pm 10V$)				V/mV
A_{vd}	$T_{amb} = +25$ °C	50	200		
	$T_{min} \le T_{amb} \le T_{max}$	25			
	Supply Voltage Rejection Ratio ($R_S = 10k\Omega$)				dB
SVR	$T_{amb} = +25$ °C	80	86		
	$T_{min} \le T_{amb} \le T_{max}$	80			
	Supply Current, no load				m ^
I_{CC}	$T_{amb} = +25$ °C		1.4	3.4	mA
	$T_{min} \le T_{amb} \le T_{max}$			3.4	
V_{icm}	Input Common Mode Voltage Range	±11	+15		V
ICITI			-12		
01.15	Common Mode Rejection Ratio ($R_S = 10k\Omega$)				dB
CMR	$T_{amb} = +25^{\circ}C$	70 70	86		
	$T_{min} \le T_{amb} \le T_{max}$	70			
	Output Short-circuit Current T _{amb} = +25°C	40	40	00	mA
Ios		10 10	40	60 60	
	$T_{min} \le T_{amb} \le T_{max}$	10		00	
	Output Voltage Swing $T_{amb} = +25^{\circ}C$ $R_{L} = 2k\Omega$	4.0	4.0		V
+ \/	$R_{L} = 10k\Omega$	10 12	12 13.5		
$\pm V_{opp}$	$T_{min} \le T_{amb} \le T_{max}$ $R_L = 2k\Omega$	10	13.3		
	$R_{L} = 10k\Omega$	12			
	Slew Rate				V/μs
SR	$V_i = 10V$, $R_L = 2k\Omega$, $C_L = 100pF$, $T_{amb} = +25^{\circ}C$, unity gain	12	16		ν/μ3
	Rise Time				μs
t _r	$V_i = 20$ mV, $R_L = 2$ k Ω , $C_L = 100$ pF, $T_{amb} = +25$ °C, unity gain		0.1		μο
14	Overshoot				%
K _{ov}	$V_i = 20$ mV, $R_L = 2$ k Ω , $C_L = 100$ pF, $T_{amb} = +25$ °C, unity gain		10		70
000	Gain Bandwidth Product				MHz
GBP	$f = 100kHz, T_{amb} = +25^{\circ}C, V_{in} = 10mV, R_{L} = 2k\Omega, C_{L} = 100pF$	2.5	4		
R _i	Input Resistance		10 ¹²		Ω
	Total Harmonic Distortion ($f = 1kHz$, $A_v = 20dB$				
THD	$R_L = 2k\Omega$, $C_L = 100pF$, $T_{amb} = +25^{\circ}C$, $V_0 = 2V_{pp}$)		0.01		
				-	r\/
e_n	Equivalent Input Noise Voltage $R_S = 100\Omega$, $f = 1$ KHz		15		<u>nV</u> √Hz
	-		15		,
Øm	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.

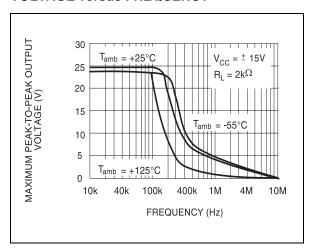
MAXIMUM PEAK-TO-PEAK OUTPUT



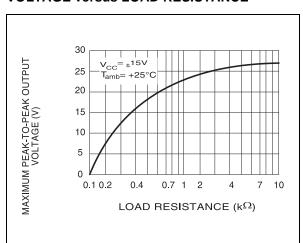
VOLTAGE versus FREQUENCY



MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE versus FREQUENCY

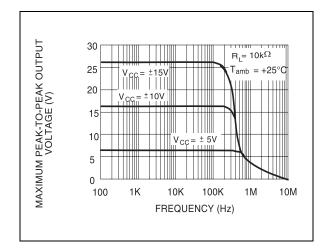


MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE versus LOAD RESISTANCE

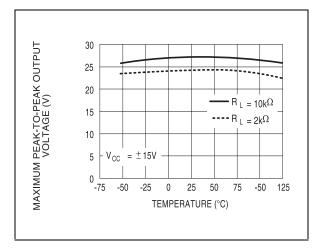


MAXIMUM PEAK-TO-PEAK OUTPUT

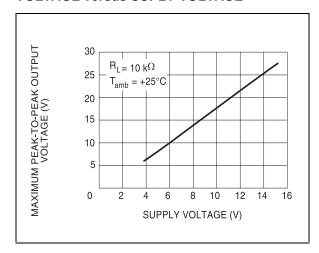
VOLTAGE versus FREQUENCY



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

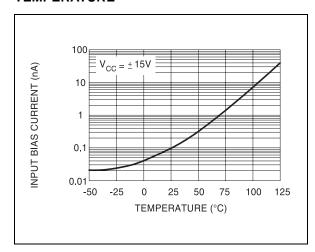


MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE versus SUPLY VOLTAGE

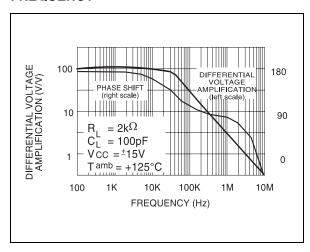


INPUT BIAS CURRENT versus FREE AIR

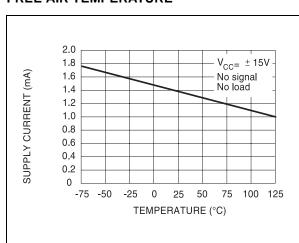
TEMPERATURE



LARGE SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION AND PHASE SHIFT versus FREQUENCY



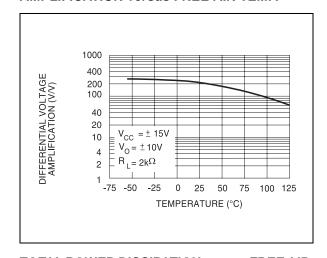
SUPPLY CURRENT PER AMPLIFIER versus FREE AIR TEMPERATURE



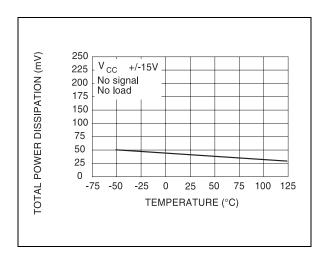
LARGE SIGNAL DIFFERENTIAL VOLTAGE

4

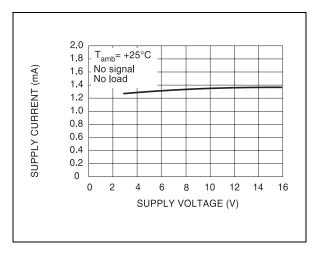
AMPLIFICATION versus FREE AIR TEMP.



TOTAL POWER DISSIPATION versus FREE AIR TEMPERATURE

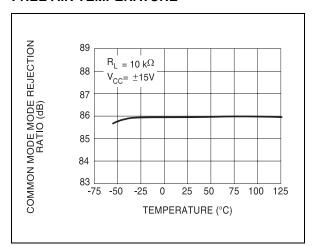


SUPPLY CURRENT PER AMPLIFIER versus SUPPLY VOLTAGE

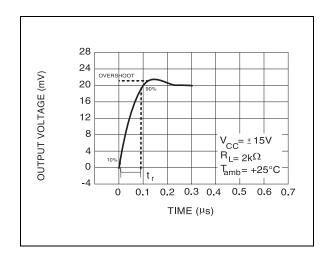


COMMON MODE REJECTION RATIO versus

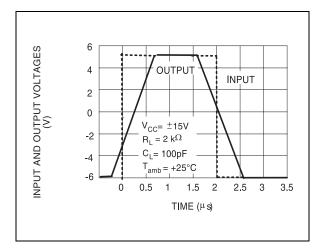
FREE AIR TEMPERATURE



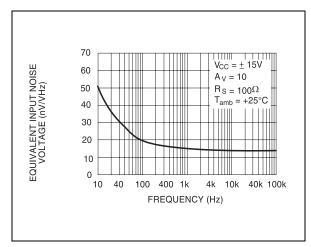
OUTPUT VOLTAGE versus ELAPSED TIME



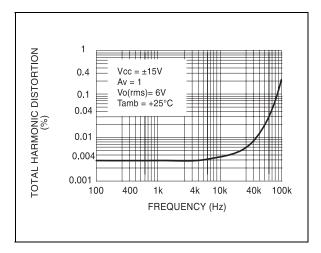
VOLTAGE FOLLOWER LARGE SIGNAL PULSE RESPONSE



EQUIVALENT INPUT NOISE VOLTAGE versus FREQUENCY



TOTAL HARMONIC DISTORTION versus FREQUENCY



PARAMETER MEASUREMENT INFORMATION

Figure 1 : Voltage Follower

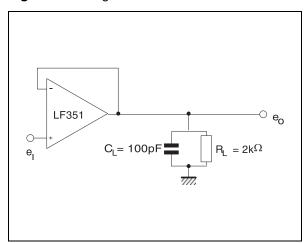
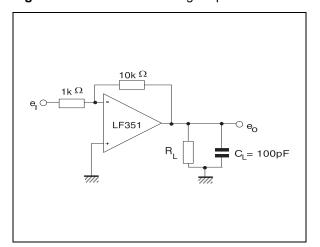
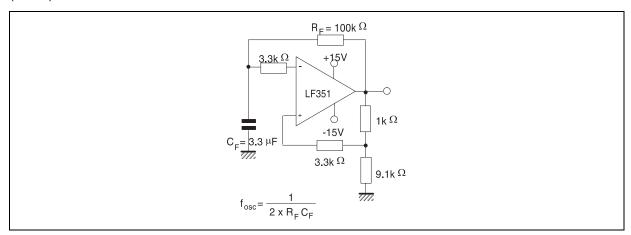


Figure 2 : Gain-of-10 inverting amplifier

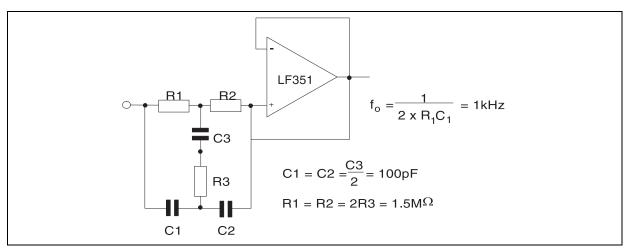


TYPICAL APPLICATION

(0.5Hz) SQUARE WAVE OSCILLATOR

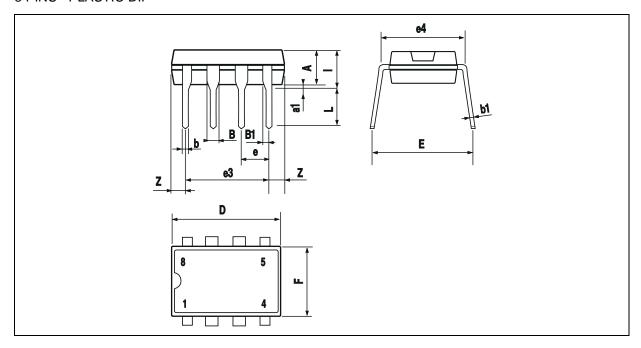


HIGH Q NOTCH FILTER



PACKAGE MECHANICAL DATA

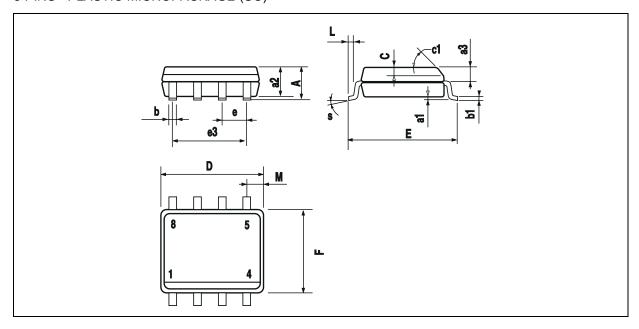
8 PINS - PLASTIC DIP



Dim.	Millimeters			Inches			
	Min.	Тур.	Max.	Min.	Тур.	Max.	
Α		3.32			0.131		
a1	0.51			0.020			
В	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	
е		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.	Тур.	Max.	Min.	Тур.	Max.	
А			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	
С	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	
е		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	
М			0.6			0.024	
S	8° (max.)						

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