

JFET-INPUT OPERATIONAL AMPLIFIER

SLOS011C – MARCH 1987 – REVISED OCTOBER 1997

- Low Input Bias Current, 50 pA Typ
- Low Input Noise Current, 0.01 pA/√Hz Typ
- Low Supply Current, 2 mA Typ
- High Input impedance, $10^{12} \Omega$ Typ
- Low Total Harmonic Distortion
- Low 1/f Noise Corner, 50 Hz Typ
- Package Options Include Plastic Small-Outline (D) and Standard (P) DIPs

D OR P PACKAGE
(TOP VIEW)



NC – No internal connection

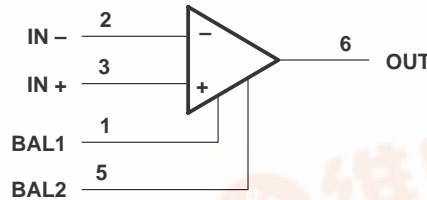
description

This device is a low-cost, high-speed, JFET-input operational amplifier with very low input offset voltage and a maximum input offset voltage drift. It requires low supply current, yet maintains a large gain-bandwidth product and a fast slew rate. In addition, the matched high-voltage JFET input provides very low input bias and offset currents.

The LF411 can be used in applications such as high-speed integrators, digital-to-analog converters, sample-and-hold circuits, and many other circuits.

The LF411C is characterized for operation from 0°C to 70°C. The LF411I is characterized for operation from -40°C to 85°C.

symbol



AVAILABLE OPTIONS

T _A	V _{IO} max AT 25°C	PACKAGE	
		SMALL OUTLINE (D)	PLASTIC DIP (P)
0°C to 70°C	2 mV	LF411CD	LF411CP
-40°C to 85°C	2 mV	LF411ID	LF411IP

The D packages are available taped and reeled. Add the suffix R to the device type (i.e., LF411CDR).

Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, V_{CC+}	18 V
Supply voltage, V_{CC-}	–18 V
Differential input voltage, V_{ID}	± 30 V
Input voltage, V_I (see Note 1)	± 15 V
Duration of output short circuit	Unlimited
Continuous total power dissipation	500 mW
Package thermal impedance, θ_{JA} (see Note 2): D package	197°C/W
P package	104°C/W
Storage temperature range, T_{stg}	–65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C

NOTES: 1. Unless otherwise specified, the absolute maximum negative input voltage is equal to the negative power supply voltage.
2. The package thermal impedance is calculated in accordance with JESD 51, except for through-hole packages, which use a trace length of zero.

recommended operating conditions

	C SUFFIX		I SUFFIX		UNIT
	MIN	MAX	MIN	MAX	
Supply voltage, V_{CC+}	3.5	18	3.5	18	V
Supply voltage, V_{CC-}	–3.5	–18	–3.5	–18	V
Operating free-air temperature, T_A	0	70	–40	–85	°C

electrical characteristics over operating free-air temperature range, $V_{CC\pm} = \pm 15$ V (unless otherwise specified)

PARAMETER		TEST CONDITIONS	T_A		MIN	TYP	MAX	UNIT
			LF411C	LF411I				
V_{IO}	Input offset voltage	$V_{IC} = 0$, $R_S = 10$ k Ω	25°C	25°C		0.8	2	mV
α_{VIO}	Average temperature coefficient of input offset voltage	$V_{IC} = 0$, $R_S = 10$ k Ω				10	20†	$\mu V/^\circ C$
I_{IO}	Input offset current‡	$V_{IC} = 0$	25°C	25°C		25	100	pA
			70°C	85°C			2	nA
I_{IB}	Input bias current‡	$V_{IC} = 0$	25°C	25°C		50	200	pA
			70°C	85°C			4	nA
V_{ICR}	Common-mode input voltage range				± 11	–11.5 to 14.5		V
V_{OM}	Maximum peak output-voltage swing	$R_L = 10$ k Ω			± 12	± 13.5		V
A_{VD}	Large-signal differential voltage	$V_O = \pm 10$ V, $R_L = 2$ k Ω	25°C	25°C	25	200		V/mV
			0°C to 70°C	–40°C to 85°C	15	200		
r_i	Input resistance	$T_J = 25^\circ C$				10 ¹²		Ω
CMR R	Common-mode rejection ratio	$R_S \leq 10$ k Ω			70	100		dB
k_{SVR}	Supply-voltage rejection ratio	See Note 3			70	100		dB
I_{CC}	Supply current					2	3.4	mA

† At least 90% of the devices meet this limit for α_{VIO} .

‡ Input bias currents of an FET-input operational amplifier are normal junction reverse currents, which are temperature sensitive. Pulse techniques must be used that will maintain the junction temperatures as close to the ambient temperature as possible.

NOTE 3: Supply-voltage rejection ratio is measured for both supply magnitudes increasing or decreasing simultaneously.

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operating characteristics, $V_{CC\pm} = \pm 15\text{ V}$, $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
SR	Slew rate		8	13		V/ μs
B ₁	Unity-gain bandwidth		2.7	3		MHz
V _n	Equivalent input noise voltage	f = 1 kHz, R _S = 20 Ω		18		nV/ $\sqrt{\text{Hz}}$
I _n	Equivalent input noise current	f = 1 kHz		0.01		pA/ $\sqrt{\text{Hz}}$

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