

General Description

The LTA77 is a 44-V micro-power alternative to the industry-standard OP77/OP07 precision amplifiers. The LTA77 offer outstanding dc precision and ac performance, including 25 μV ultralow offset, below $0.3 \mu\text{V}/^\circ\text{C}$ drift over temperature, $0.5 \mu\text{V}_{\text{p-p}}$ input voltage noise and 0.9 MHz bandwidth. External offset trimming is not required in the majority of circuits.

A PSRR of $3 \mu\text{V}/\text{V}$ (110 dB) and CMRR of $1.0 \mu\text{V}/\text{V}$ (120 dB) maximum virtually eliminate errors caused by power supply drifts and common-mode signals. This combination of outstanding characteristics makes the LTA77 ideally suited for high resolution instrumentation and other tight error budget systems.

The robust design of the LTA77 provides ease-of-use to the circuit designer: integrated RF/EMI rejection filter, no phase reversal in overdrive conditions, and high electro-static discharge (ESD) protection. The LTA77 is optimized for operation at voltages from $+6 \text{ V}$ ($\pm 3 \text{ V}$) to $+44 \text{ V}$ ($\pm 22 \text{ V}$) over the extended temperature range of -40°C to $+125^\circ\text{C}$.

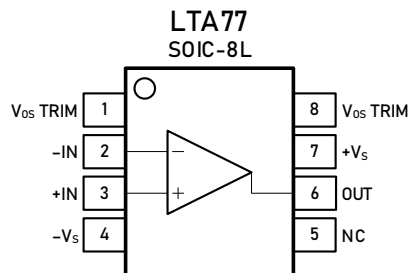
Features and Benefits

- Offset Voltage: 60 μV Maximum
- Offset Voltage Drift: $0.6 \mu\text{V}/^\circ\text{C}$ Maximum
- 0.1 to 10 Hz Noise: $0.5 \mu\text{V}_{\text{p-p}}$
- High Common-Mode Rejection: $0.1 \mu\text{V}/\text{V}$ (140 dB)
- Wide Supply: $\pm 3 \text{ V}$ to $\pm 22 \text{ V}$, 6 V to 44 V
- Wide Bandwidth: 0.9 MHz
- High Slew Rate: $0.5 \text{ V}/\mu\text{s}$
- Low Quiescent Current: 0.22 mA per Amplifier
- EMI/RFI Filtered Inputs

Applications

- Replaces OP07/OP77/OP97/OP177 with Improved Performance
- High-Side and Low-Side Current Sensing
- Multiplexed Data-Acquisition Systems
- Test and Measurement Equipment
- High-Resolution ADC Driver Amplifiers
- SAR ADC Reference Buffers
- Programmable Logic Controllers
- High Precision Comparator

Pin Configuration (Top View)



Pin Description

Symbol	Description
-IN	Inverting input of the amplifier. The voltage range is from V_{S-} to V_{S+} .
+IN	Non-inverting input of the amplifier. This pin has the same voltage range as -IN.
OUT	Amplifier output.
V_{OS} TRIM	External input offset voltage adjustment
$+V_S$	Positive power supply. The voltage is from 6 V to 44 V. Split supplies are possible as long as the voltage between V_{S+} and V_{S-} is from 6 V to 44 V.
$-V_S$	Negative power supply. It is normally tied to ground. It can also be tied to a voltage other than ground as long as the voltage between V_{S+} and V_{S-} is from 6 V to 44 V.
NC	No connection.

Ordering Information ⁽¹⁾

Type Number	Package Name	Package Quantity	Eco Class ⁽²⁾	Marking Code
LTA77XS8/R8	SOIC-8L	Tape and Reel, 4 000	Green (RoHS & no Sb/Br)	ZT-77

(1) Please contact to your Linearin representative for the latest availability information and product content details.

(2) Eco Class - The planned eco-friendly classification: Pb-Free (RoHS) or Green (RoHS & Halogen Free).

Limiting Value - In accordance with the Absolute Maximum Rating System (IEC 60134).

Parameter	Absolute Maximum Rating
Supply Voltage, V_{S+} to V_{S-}	44 V
Signal Input Terminals: Voltage, Current	V_{S-} to V_{S+} , ± 10 mA
Output Short-Circuit	Continuous
Storage Temperature Range, T_{stg}	-65 °C to $+150$ °C
Junction Temperature, T_J	150 °C
Lead Temperature Range (Soldering 10 sec)	260 °C

ESD Rating

Parameter	Item	Value	Unit
Electrostatic Discharge Voltage	Human body model (HBM), per MIL-STD-883J / Method 3015.9 ⁽¹⁾	2 000	V
	Charged device model (CDM), per ESDA/JEDEC JS-002-2014 ⁽²⁾	2 000	

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process. Manufacturing with less than 500-V HBM is possible if necessary precautions are taken.

(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process. Manufacturing with less than 250-V CDM is possible if necessary precautions are taken.

Electrical Characteristics

$V_S = \pm 15\text{ V}$, $T_A = +25\text{ }^\circ\text{C}$, $V_{CM} = V_S/2$, $V_O = V_S/2$, and $R_L = 10\text{ k}\Omega$ connected to $V_S/2$, unless otherwise noted. Boldface limits apply over the specified temperature range, $T_A = -40\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<i>OFFSET VOLTAGE</i>						
Input offset voltage	V_{OS}	LTA77		± 20	± 60	μV
Offset voltage drift	$V_{OS\text{ TC}}$	LTA77, $T_A = -40$ to $+125\text{ }^\circ\text{C}$			± 0.6	$\mu\text{V}/^\circ\text{C}$
Long-term stability ⁽¹⁾	$V_{OS\text{ TC}}$	LTA77		± 0.4		$\mu\text{V}/\text{Mo}$
Power supply rejection ratio	PSRR	LTA77, $V_S = \pm 3$ to $\pm 18\text{ V}$	0.7	5		$\mu\text{V}/\text{V}$
<i>INPUT BIAS CURRENT</i>						
Input bias current	I_B	LTA77			2.8	nA
Input offset current	I_{OS}			0.2		nA
<i>NOISE</i>						
Input voltage noise	V_n	$f = 0.1$ to 10 Hz		0.5		μV_{P-P}
Input current noise	I_n	$f = 0.1$ to 10 Hz		10		pA_{P-P}
<i>INPUT VOLTAGE</i>						
Common-mode voltage range	V_{CM}		± 13	± 14		V
Common-mode rejection ratio	CMRR	LTA77, $V_{CM} = \pm 13\text{ V}$	0.1	1.6		$\mu\text{V}/\text{V}$
<i>INPUT IMPEDANCE</i>						
Input capacitance	C_{IN}	Differential		2.0		pF
		Common mode		3.5		
<i>OPEN-LOOP GAIN</i>						
Open-loop voltage gain	A_{VOL}	LTA77, $R_L \geq 2\text{ k}\Omega$, $V_O = \pm 10\text{ V}$	2,000	6,000		V/mV
<i>FREQUENCY RESPONSE</i>						
Gain bandwidth product	GBW			0.9		MHz
Slew rate	SR	$G = +1$, $C_L = 100\text{ pF}$, $V_O = 1.5$ to 3.5 V		0.5		V/ μs
<i>OUTPUT</i>						
Output voltage swing	V_D	$R_L = 10\text{ k}\Omega$		± 14	± 14.9	V
		$R_L = 1\text{ k}\Omega$		± 13.5	± 14.5	
Short-circuit current	I_{SC}			± 22		mA
Offset adjustment range				± 1.5		mV

(1) Long-term input offset voltage stability refers to the averaged trend line of V_{OS} vs. time over extended periods after the first 30 days of operation.

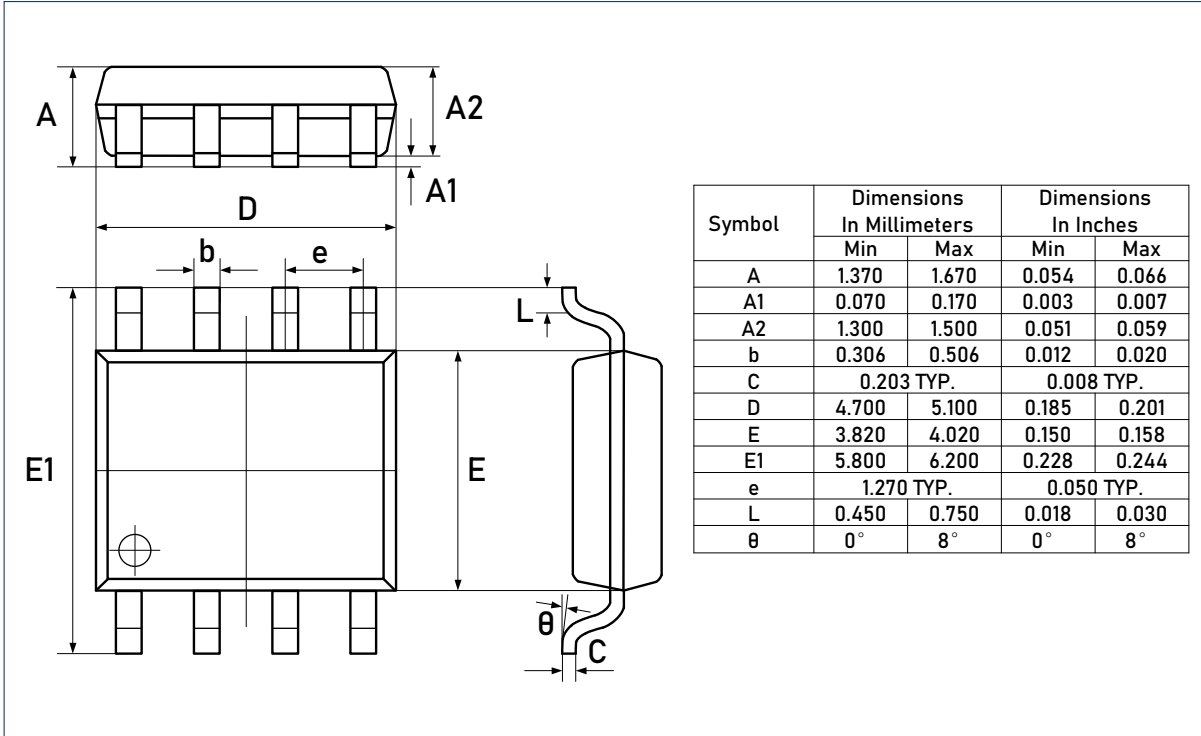
Electrical Characteristics (continued)

$V_S = \pm 15\text{ V}$, $T_A = +25\text{ }^\circ\text{C}$, $V_{CM} = V_S/2$, $V_O = V_S/2$, and $R_L = 10\text{ k}\Omega$ connected to $V_S/2$, unless otherwise noted. Boldface limits apply over the specified temperature range, $T_A = -40\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$.

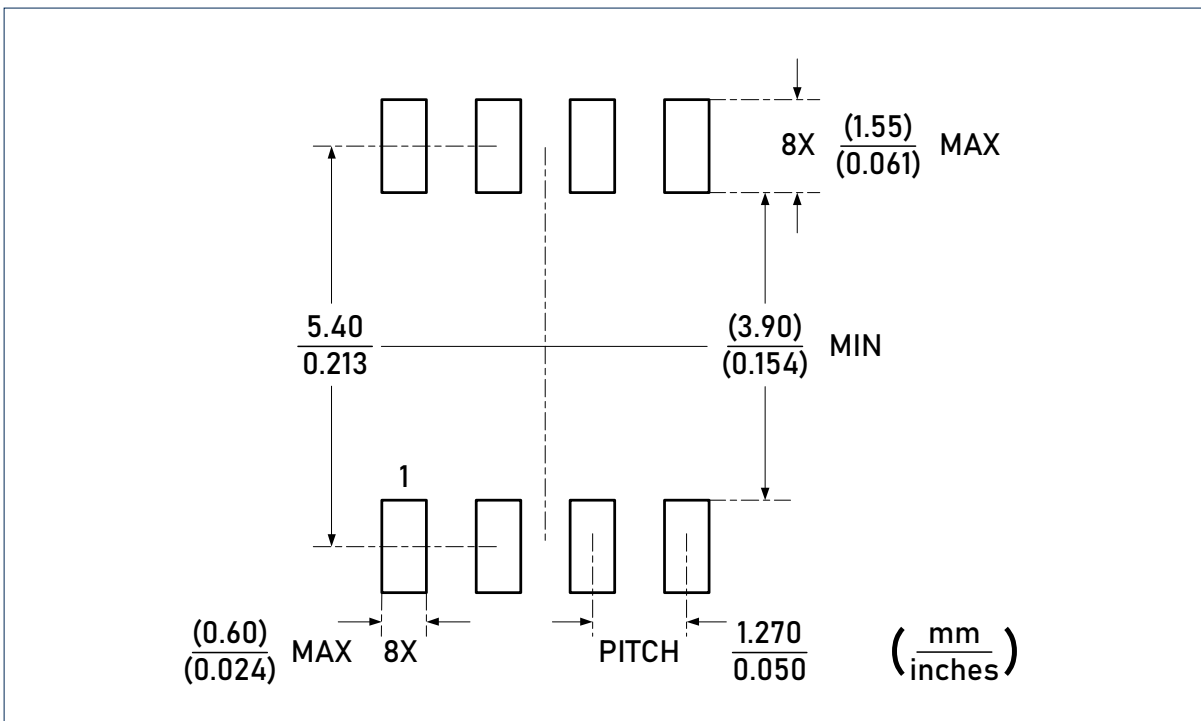
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<i>POWER SUPPLY</i>						
Operating supply voltage	V_S	$T_A = -40\text{ to }+125\text{ }^\circ\text{C}$	6		44	V
Quiescent current (per amplifier)	I_Q	$V_S = \pm 15\text{ V}$, no load		0.22	0.31	mA
		$V_S = \pm 3\text{ V}$, no load		0.21	0.3	
<i>THERMAL CHARACTERISTICS</i>						
Operating temperature range	T_A		-40		+125	$^\circ\text{C}$
Package Thermal Resistance	θ_{JA}	SOIC-8L		125		$^\circ\text{C/W}$

Package Outlines (continued)

DIMENSIONS, SOIC-8L



RECOMMENDED SOLDERING FOOTPRINT, SOIC-8L



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For additional product information, or full datasheet, please contact with the Linearin's Sales Department or Representatives.