

## Micropower, Single Supply Op Amp

The EL8186 is a micropower operational amplifier optimized for single supply operation at 5V and can operate down to 2.4V.

Micropower performance of competing devices is achieved at the expense of seriously degrading precision, noise, speed, and output drive specifications. The EL8186 reduces supply current without sacrificing other parameters. Offset current, voltage and current noise, slew rate, and gain-bandwidth product are all two to ten times better than on previous micropower op amps.

The 1/f corner of the voltage noise spectrum is at 1kHz. This results in low frequency noise performance which can only be found on devices with an order of magnitude higher supply current.

The EL8186 can be operated from one lithium cell or two Ni-Cd batteries. The input range goes below ground. The all-NPN output stage swings to ground while sinking current - no pull-down resistors are needed.

## Ordering Information

PART NUMBER	PACKAGE	TAPE & REEL	PKG. DWG. #
EL8186IW-T7	6-Pin SOT-23	7" (3K pcs)	MDP0038
EL8186IW-T7A	6-Pin SOT-23	7" (250 pcs)	MDP0038

## Features

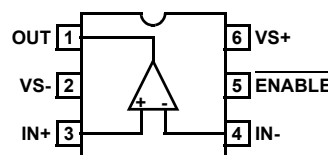
- 65µA max supply current
- 1mV max offset voltage
- 500pA input bias current
- 0.4µV/°C offset voltage drift
- 1MHz gain-bandwidth product
- 0.15V/µs slew rate
- Single supply operation
  - Input voltage range includes ground
  - Output swings to ground while sinking current
  - No pull-down resistors are needed
- Output sources and sinks 5mA load current
- Open loop gain of 150kV/V

## Applications

- Battery- or solar-powered systems
- 4mA to 25mA current loops
- Handheld consumer products
- Medical devices
- Photodiode pre amps

## Pinout

**EL8186**  
**(6-PIN SOT-23)**  
TOP VIEW



**Absolute Maximum Ratings** ( $T_A = 25^\circ\text{C}$ )

Supply Voltage	5.5V	Output Short-Circuit Duration	Indefinite
Differential Input Current	5mA	Ambient Operating Temperature Range	-40°C to +85°C
Input Voltage	-0.5V to $V_S + 0.5V$	Storage Temperature Range	-65°C to +150°C

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

IMPORTANT NOTE: All parameters having Min/Max specifications are guaranteed. Typical values are for information purposes only. Unless otherwise noted, all tests are at the specified temperature and are pulsed tests, therefore:  $T_J = T_C = T_A$

**Electrical Specifications**  $V_S = 5V$ ,  $0V$ ,  $V_{CM} = 0.1V$ ,  $V_O = 1.4V$ ,  $T_A = 25^\circ\text{C}$  unless otherwise specified.

PARAMETER	DESCRIPTION	CONDITIONS	MIN	TYP	MAX	UNIT
$V_{OS}$	Input Offset Voltage			0.4	1	mV
$\frac{\Delta V_{OS}}{\Delta \text{Time}}$	Long Term Input Offset Voltage Stability			TBD		$\mu\text{V/Mo}$
$I_{OS}$	Input Offset Current			0.4	2	nA
$I_B$	Input Bias Current			0.5	3	nA
$e_N$	Input Noise Voltage Density	$f_O = 1\text{KHz}$		25		$\text{nV}/\sqrt{\text{Hz}}$
$i_N$	Input Noise Current Density	$f_O = 1\text{KHz}$		0.1		$\text{pA}/\sqrt{\text{Hz}}$
$R_{IN}$	Input Resistance			2		$\text{M}\Omega$
CMIR	Input Voltage Range	Guaranteed by CMRR test	0		5	V
CMRR	Common Mode Rejection Ratio	$V_{CM} = 0V$ to $5V$	90	110		dB
PSRR	Power Supply Rejection Ratio	$V_S = 2.4V$ to $5V$	90	110		dB
$A_{VOL}$	Large Signal Voltage Gain	$V_O = 0.03V$ to $4V$ , $R_L = 100\text{k}\Omega$	200	500		$\text{V/mV}$
		$V_O = 0.03V$ to $3.5V$ , $R_L = 1\text{k}\Omega$		25		$\text{V/mV}$
$V_{OUT}$	Maximum Output Voltage Swing	Output low, $R_L = 100\text{k}\Omega$		3	6	mV
		Output low, $R_L = 1\text{k}\Omega$		130	200	mV
		Output high, $R_L = 100\text{k}\Omega$	4.944	4.97		V
		Output high, $R_L = 1\text{k}\Omega$	4.8	4.88		V
SR	Slew Rate		0.09	0.13	0.16	$\text{V}/\mu\text{s}$
GBW	Gain Bandwidth Product	$A_V = 1$		700		kHz
$I_{S,ON}$	Supply Current, Enabled	@ voltage < 2.0V	40	55	75	$\mu\text{A}$
$I_{S,OFF}$	Supply Current, Disabled			3	10	$\mu\text{A}$
$I_{O+}$	Short Circuit Output Current	$R_L = 10\Omega$	18	31		mA
$I_{O-}$	Short Circuit Output Current	$R_L = 10\Omega$	17	26		mA
$V_S$	Minimum Supply Voltage			2.2	2.4	V
$V_{INH}$	Enable Pin High Level				2	V
$V_{INL}$	Enable Pin Low Level		0.8			V
$I_{ENH}$	Enable Pin Input Current	$V_{EN} = 5V$	0.25	0.7	2	$\mu\text{A}$
$I_{ENL}$	Enable Pin Input Current	$V_{EN} = 0V$	-0.5	0	+0.5	$\mu\text{A}$

## Typical Performance Curves

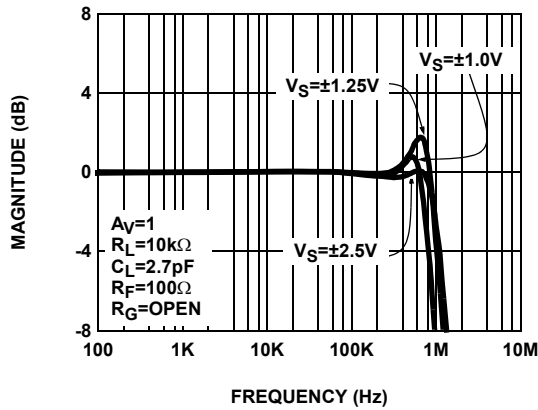


FIGURE 1. FREQUENCY RESPONSE vs SUPPLY VOLTAGE

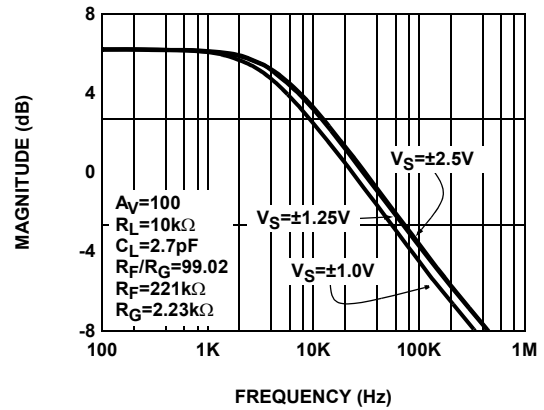


FIGURE 2. FREQUENCY RESPONSE vs SUPPLY VOLTAGE

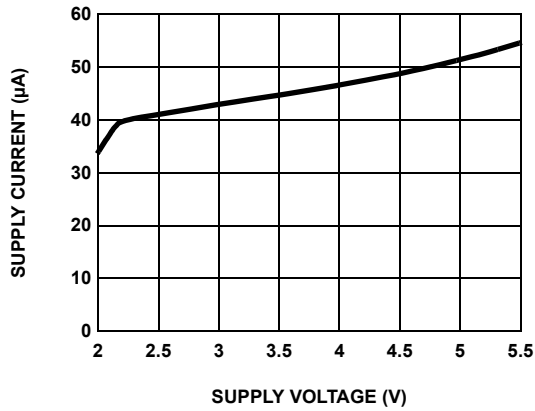


FIGURE 3. SUPPLY CURRENT vs SUPPLY VOLTAGE

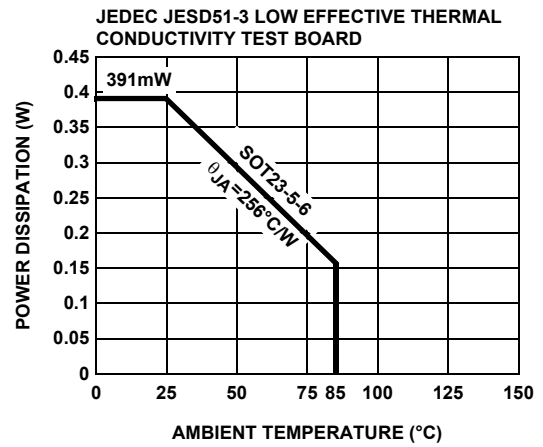


FIGURE 4. PACKAGE POWER DISSIPATION vs AMBIENT TEMPERATURE

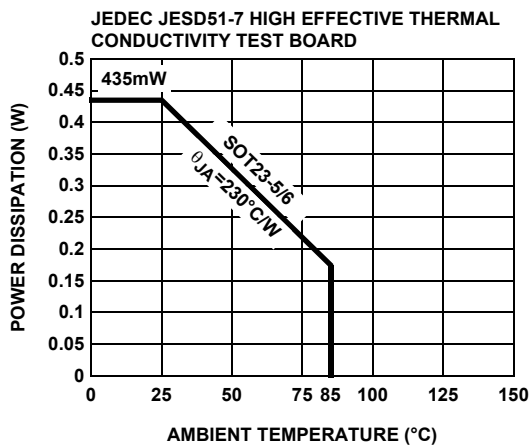


FIGURE 5. PACKAGE POWER DISSIPATION vs AMBIENT TEMPERATURE

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