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

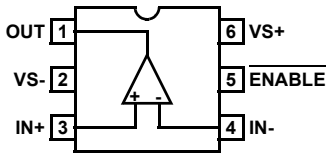
- 65µA max supply current
- 1mV max offset voltage
- 500pA input bias current
- 0.4µV/°C offset voltage drift
- 1MHz gain-bandwidth product
- 0.15V/µs slew rate
- Single supply operation
  - Input voltage range includes ground
  - Output swings to ground while sinking current
  - No pull-down resistors 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°C)

Supply Voltage 5.5V
Differential Input Current 5mA
Input Voltage . . . . . -0.5V to V_S + 0.5V
Output Short-Circuit Duration . . . . . Indefinite
Ambient Operating Temperature Range . . . . . -40°C to +85°C
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°C unless otherwise specified.

PARAMETER	DESCRIPTION	CONDITIONS	MIN	TYP	MAX	UNIT
V_{OS}	Input Offset Voltage			0.4	1	mV
$\frac{\Delta V_{OS}}{\Delta Time}$	Long Term Input Offset Voltage Stability			TBD		µV/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 = 1KHz		25		nV/√Hz
i_N	Input Noise Current Density	f_O = 1KHz		0.1		pA/√Hz
R_{IN}	Input Resistance			2		MΩ
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 = 100kΩ	200	500		V/mV
		V_O = 0.03V to 3.5V, R_L = 1kΩ		25		V/mV
V_{OUT}	Maximum Output Voltage Swing	Output low, R_L = 100kΩ		3	6	mV
		Output low, R_L = 1kΩ		130	200	mV
		Output high, R_L = 100kΩ	4.944	4.97		V
		Output high, R_L = 1kΩ	4.8	4.88		V
SR	Slew Rate		0.09	0.13	0.16	V/µs
GBW	Gain Bandwidth Product	A_V = 1		700		kHz
$I_{S,ON}$	Supply Current, Enabled	@ voltage < 2.0V	40	55	75	µA
$I_{S,OFF}$	Supply Current, Disabled			3	10	µA
I_O+	Short Circuit Output Current	R_L = 10Ω	18	31		mA
I_O-	Short Circuit Output Current	R_L = 10Ω	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	µA
I_{ENL}	Enable Pin Input Current	V_{EN} = 0V	-0.5	0	+0.5	µA

Typical Performance Curves

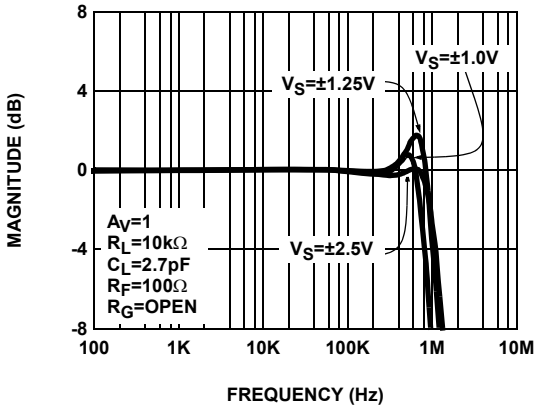


FIGURE 1. FREQUENCY RESPONSE vs SUPPLY VOLTAGE

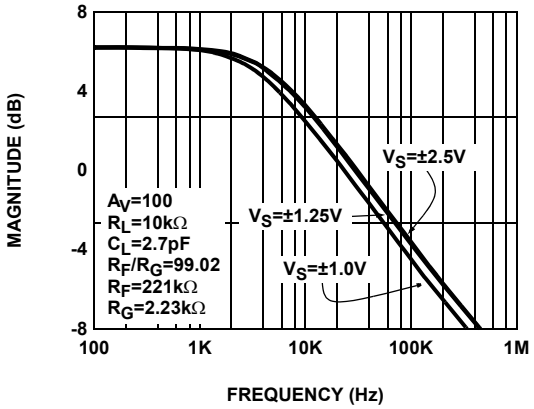


FIGURE 2. FREQUENCY RESPONSE vs SUPPLY VOLTAGE

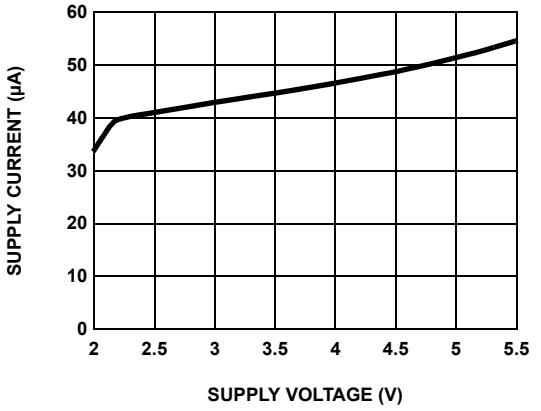


FIGURE 3. SUPPLY CURRENT vs SUPPLY VOLTAGE

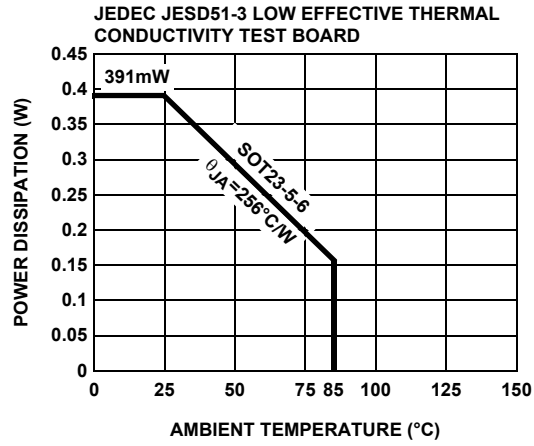


FIGURE 4. PACKAGE POWER DISSIPATION vs AMBIENT TEMPERATURE

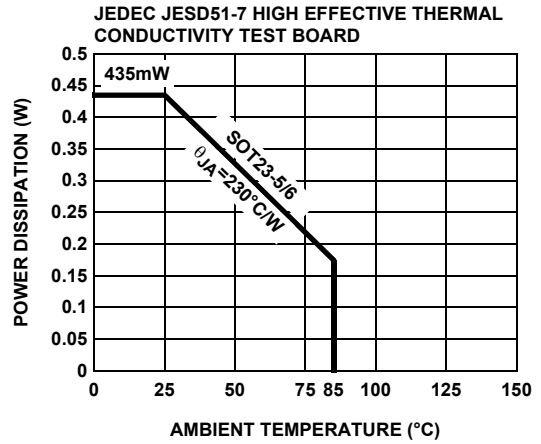


FIGURE 5. PACKAGE POWER DISSIPATION vs AMBIENT TEMPERATURE