PRELIMINARY | Data Sheet | November 16, 2004 | FN7504.0

Micropower Single Supply Rail-to-Rail Input-Output Precision Op Amp

The EL8178 is a micropower precision operational amplifier optimized for single supply operation at 5V and can operate down to 2.4V.

The EL8178 draws minimal supply current while meeting excellent DC-accuracy noise and output drive specifications. Competing devices seriously degrade these parameters to achieve micropower supply current. 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 EL8178 can be operated from one lithium cell or two Ni-Cd batteries. The input range includes both positive and negative rail. The output swings to both rails.

Ordering Information

PART NUMBER	PACKAGE	TAPE & REEL	PKG. DWG. #
EL8178AIW-T7	6-Pin SOT-23	7” (3K pcs)	MDP0038
EL8178AIW-T7A	6-Pin SOT-23	7” (250 pcs)	MDP0038
EL8178BIW-T7	6-Pin SOT-23	7” (3K pcs)	MDP0038
EL8178BIW-T7A	6-Pin SOT-23	7” (250 pcs)	MDP0038
EL8278IY (Note)	10-Pin MSOP	-	MDP0043
EL8278IL (Note)	10-Pin DFN	-	MDP0047

NOTE: Contact factory for availability

Features

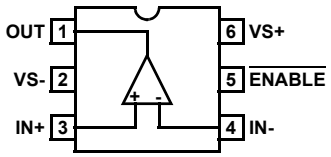
- 50µA supply current
- 100µV max offset voltage
- 1pA input bias current
- 400kHz gain-bandwidth product
- 0.13V/µs slew rate
- Single supply operation down to 2.4V
- Rail-to-rail input and output
- Output sources and sinks 26mA load current

Applications

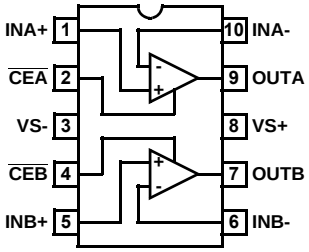
- Battery- or solar-powered systems
- 4mA to 25mA current loops
- Handheld consumer products
- Medical devices
- Thermocouple amplifiers
- Photodiode pre amps
- pH probe amplifiers

Pinouts

EL8178
(6-PIN SOT-23)
TOP VIEW



EL8278*
(10-PIN MSOP, DFN)
TOP VIEW



***COMING SOON**

Absolute Maximum Ratings (T_A = 25°C)

Supply Voltage 5.5V
Differential Input Voltage 0.5V
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	Grade A		50	100	µV
		Grade B		110	400	µV
$\frac{\Delta V_{OS}}{\Delta Time}$	Long Term Input Offset Voltage Stability			TBD		µV/Mo
$\frac{\Delta V_{OS}}{\Delta T}$	Input Offset Drift vs Temperature			1.5		µV/°C
I_B	Input Bias Current			1	50	pA
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
CMIR	Input Voltage Range	Guaranteed by CMRR test	0		5	V
CMRR	Input Voltage Range		0		5	V
CMRR	Common-Mode Rejection Ratio	V_{CM} = 0V to 5V	80	100		dB
PSRR	Power Supply Rejection Ratio	V_S = 3.3V to 5V	80	100		dB
A_{VOL}	Large Signal Voltage Gain	V_O = 0.5V to 4.5V, R_L = 100kΩ	100	400		V/mV
		V_O = 0.5V to 4.5V, R_L = 1kΩ		15		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	4.994	4.997		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	f_O = 100kHz		400		kHz
$I_{S,ON}$	Supply Current, Enabled		40	50	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

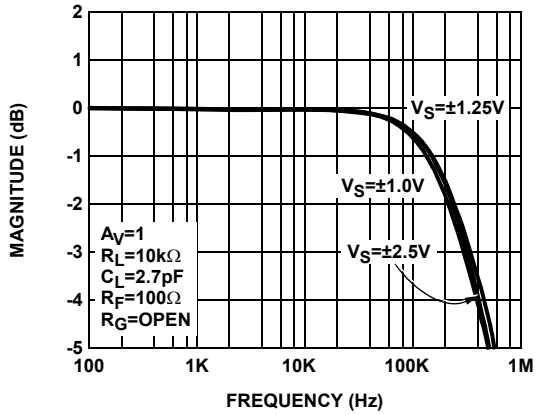


FIGURE 1. FREQUENCY RESPONSE vs SUPPLY VOLTAGE

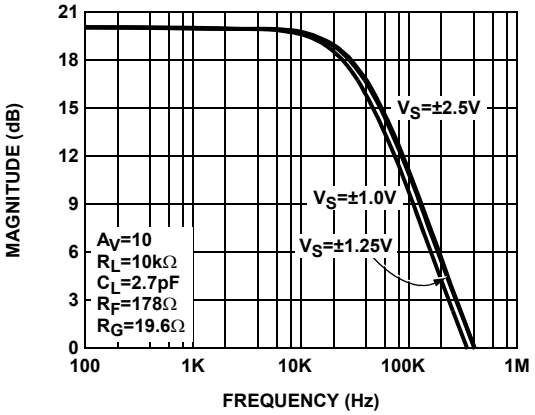


FIGURE 2. FREQUENCY RESPONSE vs SUPPLY VOLTAGE

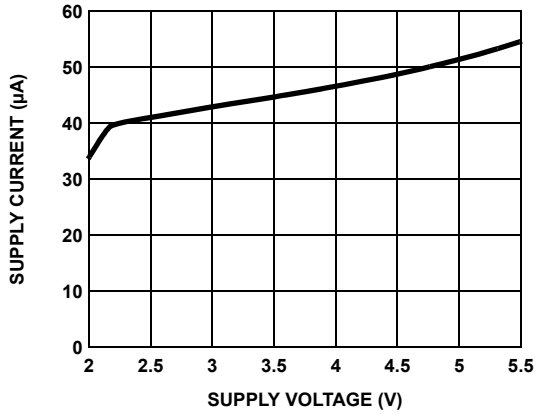


FIGURE 3. SUPPLY CURRENT vs SUPPLY VOLTAGE

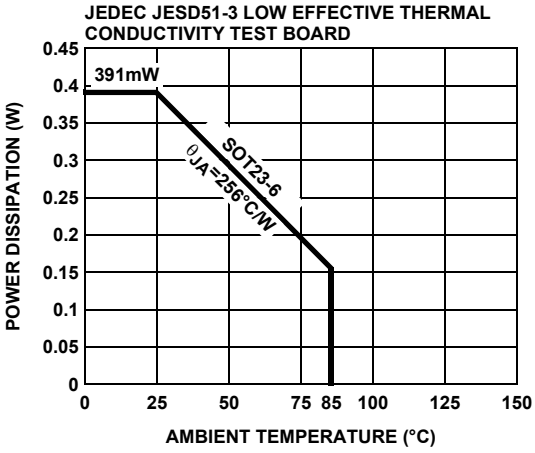


FIGURE 4. PACKAGE POWER DISSIPATION vs AMBIENT TEMPERATURE

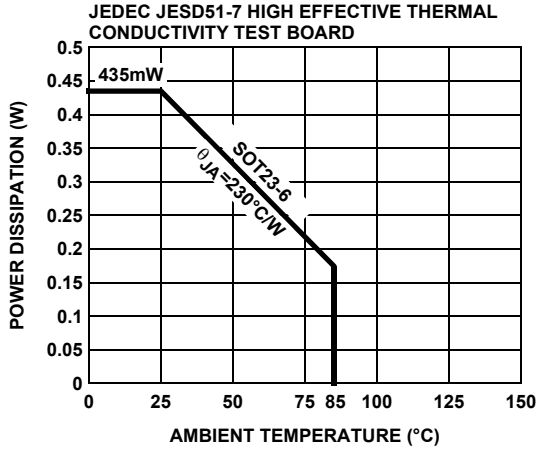


FIGURE 5. PACKAGE POWER DISSIPATION vs AMBIENT TEMPERATURE