



17µA Max, Dual/Quad, Single-Supply, Precision Op Amps

General Description

The MAX478 and MAX479 are dual and quad micro-power, precision op amps available in 8-pin and 14-pin DIP and small-outline packages, respectively. Both devices feature an extremely low, 17µA max supply current per op amp, 70µV max offset voltage, 2.2µV/°C max offset voltage drift (0.5µV/°C typ), and 250pA max input offset current.

The MAX478 and MAX479 operate from a single supply. The input voltage range includes ground, and the output swings to within a few millivolts of ground, which eliminates pull-down resistors and saves power.

Both devices are optimized for single 3V and 5V supply operation, with guaranteed specifications at each supply voltage. Specifications for ±15V operation are also provided.

Applications

Battery- or Solar-Powered Systems:

Portable Instrumentation
Remote Sensor Amplifier
Satellite Circuitry

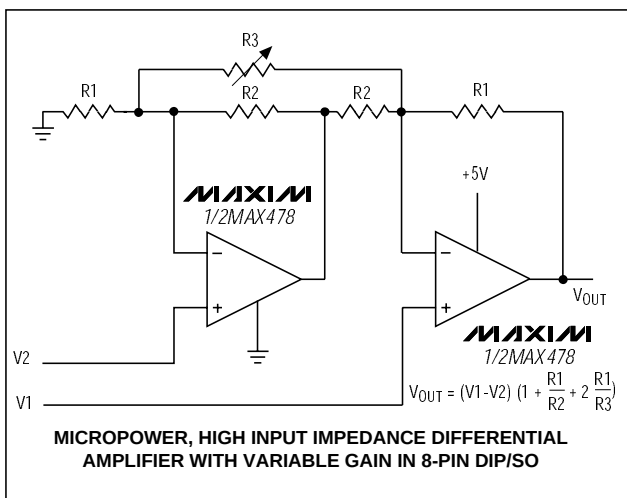
Micropower Sample-and-Hold

Thermocouple Amplifier

Micropower Filters

Single Lithium Cell Powered Systems

Typical Operating Circuit



Features

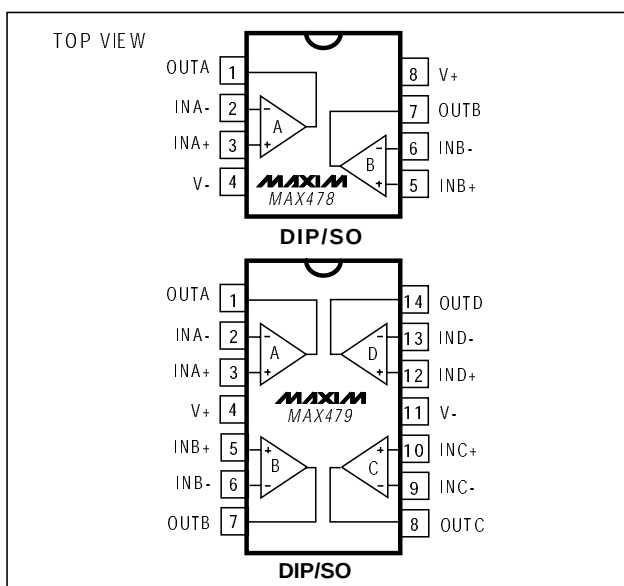
- ♦ 17µA Max Supply Current (MAX478A/MAX479A)
- ♦ 70µV Max Offset Voltage (MAX478A)
- ♦ Single-Supply Operation:
Input Voltage Range Includes Ground
Output Swings to Ground While Sinking Current
No Pull-Down Resistors Required
- ♦ Dual Op Amp in 8-Pin DIP/SO Package (MAX478)
Quad Op Amp in 14-Pin DIP/SO Package (MAX479)
- ♦ 250pA Max Input Offset Current (MAX478A/MAX479A)
- ♦ 0.5µV/°C Offset-Voltage Drift
- ♦ Output Sources and Sinks 5mA Load Current

Ordering Information

PART	TEMP. RANGE	PIN-PACKAGE
MAX478ACPA	0°C to +70°C	8 Plastic DIP
MAX478CPA	0°C to +70°C	8 Plastic DIP
MAX478CSA	0°C to +70°C	8 SO
MAX478C/D	0°C to +70°C	Dice*
MAX478EPA	-40°C to +85°C	8 Plastic DIP
MAX478ESA	-40°C to +85°C	8 SO
MAX479ACPD	0°C to +70°C	14 Plastic DIP
MAX479CPD	0°C to +70°C	14 Plastic DIP
MAX479CSD	0°C to +70°C	14 SO
MAX479EPD	-40°C to +85°C	14 Plastic DIP
MAX479ESD	-40°C to +85°C	14 SO

* Dice are specified at $T_A = +25^\circ\text{C}$, DC parameters only.

Pin Configurations



Maxim Integrated Products 1

For free samples & the latest literature: <http://www.maxim-ic.com>, or phone 1-800-998-8800.
For small orders, phone 1-800-835-8769.

MAX478/MAX479

17 μ A Max, Dual/Quad, Single-Supply, Precision Op Amps

ABSOLUTE MAXIMUM RATINGS

Supply Voltage	±22V
Differential Input Voltage	±30V
Input Voltage	Equal to Positive Supply Voltage 5V Below Negative Supply Voltage
Output Short-Circuit Duration	Continuous
Continuous Power Dissipation (T _A = +70°C):	
8-Pin Plastic DIP (derate 9.09mW/°C above +70°C)	727mW
14-Pin Plastic DIP (derate 10.00mW/°C above +70°C) ..	800mW
14-Pin Wide SO (derate 9.52mW/°C above +70°C) ...	762mW

Operating Temperature Ranges:

MAX47 ACP /C 0°C to +70°C

MAX47_E -40°C to +85°C

Storage Temperature Range -65°C to +150°C

Lead Temperature (soldering, 10sec).....+300°C

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS: 5V

($V_S = 5V, 0V, V_{CM} = 0.1V, V_O = 1.4V, T_A = +25^\circ C$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MAX478AC MAX479AC			MAX478C/E MAX479C/E			UNITS
			MIN	TYP	MAX	MIN	TYP	MAX	
Input Offset Voltage	V _{OS}	MAX478ACP/CP/EP	30	70		40	120	μV	
		MAX479ACP/CP/EP	35	100		40	150		
		MAX478CS/ES				80	180		
		MAX479CS/ES				90	250		
Long-Term Input Offset-Voltage Stability	$\frac{\Delta V_{OS}}{\Delta \text{Time}}$		0.5			0.6			μV/Mo.
Input Offset Current	I _{OS}		0.05	0.25		0.05	0.35	nA	
Input Bias Current	I _B		3	5		3	6	nA	
Input Noise Voltage	e _n	0.1Hz to 10Hz (Note 1)	0.9	2.0		0.9		μV _{p-p}	
Input Noise Voltage Density		f _O = 10Hz (Note 1)	50	75		50		nV/√Hz	
		f _O = 1000Hz (Note 1)	49	65		49			
Input Noise Current	i _n	0.1Hz to 10Hz (Note 1)	1.5	2.5		1.5		pA _{p-p}	
Input Noise Current Density		f _O = 10Hz (Note 1)	0.03	0.07		0.03		pA/√Hz	
		f _O = 1000Hz	0.01			0.01			
Input Resistance	R _{IN}	Differential mode (Note 1)	0.8	2.0		0.6	2.0	GΩ	
		Common mode	12			12			
Input Voltage Range	V _{IN(CM)}	Upper limit	3.5	3.9		3.5	3.9	V	
		Lower limit	0	-0.3		0	-0.3		
Common-Mode Rejection Ratio	CMRR	V _{CM} = 0V to 3.5V	93	103		90	102	dB	
Power-Supply Rejection Ratio	PSRR	V _S = 2.2V to 12V	94	104		92	104	dB	
Large-Signal Voltage Gain	A _{VOL}	V _O = 0.03V to 4V, no load (Note 1)	140	700		110	700	V/mV	
		V _O = 0.03V to 3.5V, R _L = 50kΩ	80	200		70	200		