

February 2002

Quad CMOS Op Amp / Comparator

## DESCRIPTION

The HI-8573, HI-8574 and HI-8575 devices are designed using low power CMOS technology. The operating current is externally programmable with a resistor to give the optimum tradeoff between power dissipation and slew rate. The operational amplifiers are internally compensated.

All three versions offer a high degree of versatility and are well suited for both line-powered and battery-powered systems. Features include a typical offset voltage of  $\pm 5$  mV, high input impedance and low current drain. Either single or dual power supply operation may be used up to 15V DC. The comparators are CMOS and TTL compatible. The three devices are direct replacements for the Motorola/ON-Semiconductor MC14573, MC14574 and MC14575 respectively.

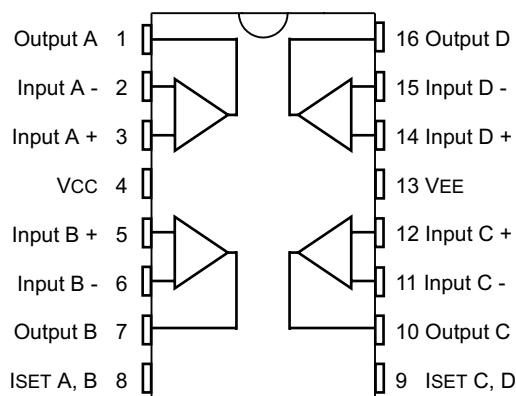
## APPLICATIONS

- Oscillators
- Function generators
- Active filters
- Logic level converters
- Voltage reference
- Zero crossing detectors
- Instrumentation

## FEATURES

- Single or dual power supply. +3 to 15Vdc or  $\pm 1.5$  to  $\pm 7.5$ Vdc
- Wide input voltage range
- Common mode range 0 to  $V_{CC}-2V$  single supply
- Adjustable current / slew rate
- Typical offset  $\pm 5$  mV
- Internally compensated op amps
- High input impedance
- CMOS and TTL compatible comparators
- Direct replacements for Motorola / On Semiconductor MC14573, MC14574 and MC14575

## PIN CONFIGURATION

**16 Pin Plastic DIP package**

## PIN DESCRIPTIONS

PIN	SYMBOL	FUNCTION	DESCRIPTION		
			HI-8573	HI-8574	HI-8575
1	Output A	Analog output	Amplifier A	Comparator A	Amplifier A
2	Input A-	Analog input	Amplifier A	Comparator A	Amplifier A
3	Input A+	Analog input	Amplifier A	Comparator A	Amplifier A
4	VCC	Power	Positive supply voltage		
5	Input B+	Analog input	Amplifier B	Comparator B	Amplifier B
6	Input B-	Analog input	Amplifier B	Comparator B	Amplifier B
7	Output B	Analog output	Amplifier B	Comparator B	Amplifier B
8	ISET A, B	Analog input	Bias control for A and B		
9	ISET C, D	Analog input	Bias control for C and D		
10	Output C	Analog output	Amplifier C	Comparator C	Comparator C
11	Input C-	Analog input	Amplifier C	Comparator C	Comparator C
12	Input C+	Analog input	Amplifier C	Comparator C	Comparator C
13	VEE	Power	Negative supply voltage		
14	Input D+	Analog input	Amplifier D	Comparator D	Comparator D
15	Input D-	Analog input	Amplifier D	Comparator D	Comparator D
16	Output D	Analog output	Amplifier D	Comparator D	Comparator D

## PROGRAMMING CURRENT

The programming current ISET is fixed by an external resistor RSET connected between VEE and either one or both of the ISET pins (8 and 9). When two external programming resistors are used, the set currents for each op amp pair or comparator are given by:

$$ISET (\mu A) = (VCC - VEE - 1.0) / RSET (M\Omega)$$

Pins 8 and 9 may be tied together for use with a single programming resistor. The set currents for each op amp or comparator pair are then given by:

$$ISET (\mu A) = (VCC - VEE - 1.0) / 2 RSET (M\Omega)$$

If a pair of op amps or comparators are not used, the ISET pin for that pair may be tied to VCC for minimum power consumption.

It should be noted that increasing ISET for comparators will decrease propagation delay for that comparator.

For operational amplifiers, the maximum obtainable output voltage (VOH) for a given load resistor connected to VEE is given by:

$$V_{OH} = (4 \times 10^{-3} ISET) R_L - 0.05V$$

$$\text{if } (4 \times 10^{-3} ISET) R_L < VCC$$

where, RL is in KΩ, ISET is in μA

Typical op amp slew rates are given by:

$$SR \cong 0.05 ISET (V/\mu s).$$

where, ISET is in μA

**ABSOLUTE MAXIMUM RATINGS**

Supply voltage (Vcc)	-0.5 V to +18 V
Input voltage. All inputs	-0.5 V to Vcc+0.5 V
DC input current, per pin	±10 mA
Programming current range	2.0 mA
Storage temperature range	-60 to +150 °C
Solder Temperature (Leads)	275°C for 10 sec
Solder Temperature (Body)	220°C

**RECOMMENDED OPERATING CONDITIONS**

Supply Voltage VCC-VEE .....	+3.0 to +15 V
Temperature Range Industrial Screening.....	-40°C to +85°C

*NOTE: Stresses above absolute maximum ratings or outside recommended operating conditions may cause permanent damage to the device. These are stress ratings only. Operation at the limits is not recommended.*

**ELECTRICAL CHARACTERISTICS - OPERATIONAL AMPLIFIER**

VEE = 0 V, TA = 25°C (unless otherwise specified).

PARAMETER	SYMBOL	VCC	MIN	TYP	MAX	UNITS
Input common mode voltage range (ISET = 200 μA)	VICR	5	0		3	Vdc
		10	0		8	
		15	0		13	
Output voltage range (ISET = 50 μA) (RL = 100 KΩ connected to VEE)	VOR	5	1.05		4	Vdc
		10	1.05		9	
		15	1.05		14	
Input offset voltage	VIO	10		±5	±25	mVdc
Average temperature coefficient of VIO	ΔVIO/ΔT			20		μV/°C
Input bias current	IIB	10			1	nA
Input offset current	IIO	10			200	pA
Open loop voltage gain (ISET = 50 μA)	AVOL	10		90		dB
Power supply rejection ratio	PSRR	10		70		dB
Common mode rejection ratio	CMRR	10		80		dB
Channel separation		10		-100		dB
Slew rate	SR	10		2.5		V/μs
Phase margin	ΦM	10		45		Degrees
Supply current, per pair (RSET = 1 MΩ)	ICC	5		50		μA
		10		100		
		15		150		
Supply current, per pair (RSET = 100 KΩ)	ICC	5		0.5		mA
		10		1.2		
		15		1.8		
Gain x Bandwidth product	GBP	10		1.4		MHz

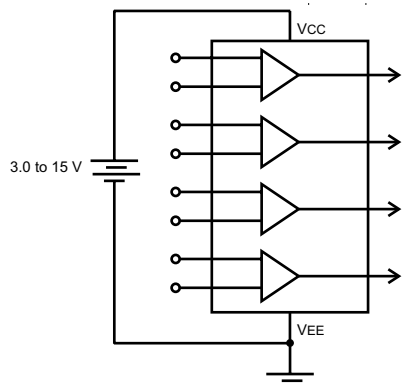
## ELECTRICAL CHARACTERISTICS - COMPARATOR

VEE = 0V, TA = 25°C (unless otherwise specified).

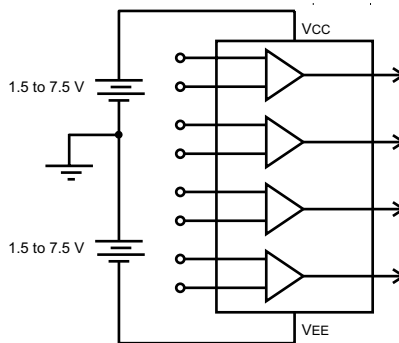
PARAMETER	SYMBOL	VCC	MIN	TYP	MAX	UNITS
Input common mode voltage range (ISET = 200 $\mu$ A)	VICR	5 10 15	0 0 0		3 8 13	V
Output low voltage "0" level	VOL	5 10 15		0 0 0	0.05 0.05 0.05	V
Output high voltage "1" level	VOH	5 10 15	4.95 9.95 14.95	5 10 15		V
Output source current (VOH = 2.5 V) (VOH = 4.6 V) (VOH = 9.5 V) (VOH = 13.5 V)	IOH	5 5 10 15	-0.24 -0.51 -1.3 -3.4	-0.42 -0.88 -2.25 -8.8		mAdc
Output sink current (VOL = 0.4 V) (VOL = 0.5 V) (VOL = 1.5 V)	IOL	5 10 15	1.25 3.25 8.5	2.25 5.6 20		mAdc
Input offset voltage (ISET = 50 $\mu$ A)	VIO	10		$\pm$ 5	$\pm$ 25	mVdc
Average temperature coefficient of VIO	$\Delta$ VIO/ $\Delta$ T			20		$\mu$ V/ $^{\circ}$ C
Input bias current	IIB	10			1	nA
Input offset current	IIO	10			200	pA
Open loop voltage gain (ISET = 50 $\mu$ A)	AVOL	10		96		dB
Power supply rejection ratio	PSRR	10		70		dB
Common mode rejection ratio	CMRR	10		80		dB
Channel separation		10		-100		dB
Output rise and fall time (CL = 50 pF)	tTLH tTHL	10		100		ns
Propagation delay time, 5 mV overdrive (ISET = 50 $\mu$ A, CL = 50 pF)	tD	10		1000		ns
Supply current, per pair (RSET = 1 M $\Omega$ )	ICC	5 10 15		50 100 150		$\mu$ A
Supply current, per pair (RSET = 100 K $\Omega$ )	ICC	5 10 15		0.45 1.0 1.5		mA

**NOTE:** Unused inputs should always be tied to either VCC or VEE

## POWER OPTIONS

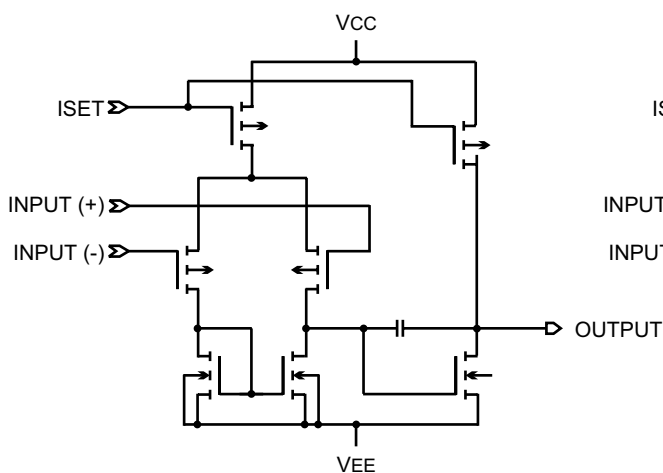


Single Supply

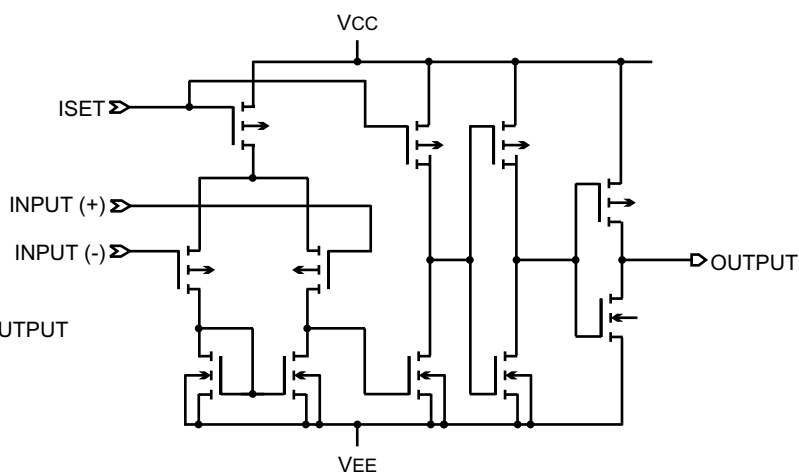


Split Supply

## CIRCUIT DIAGRAMS



Operational Amplifier



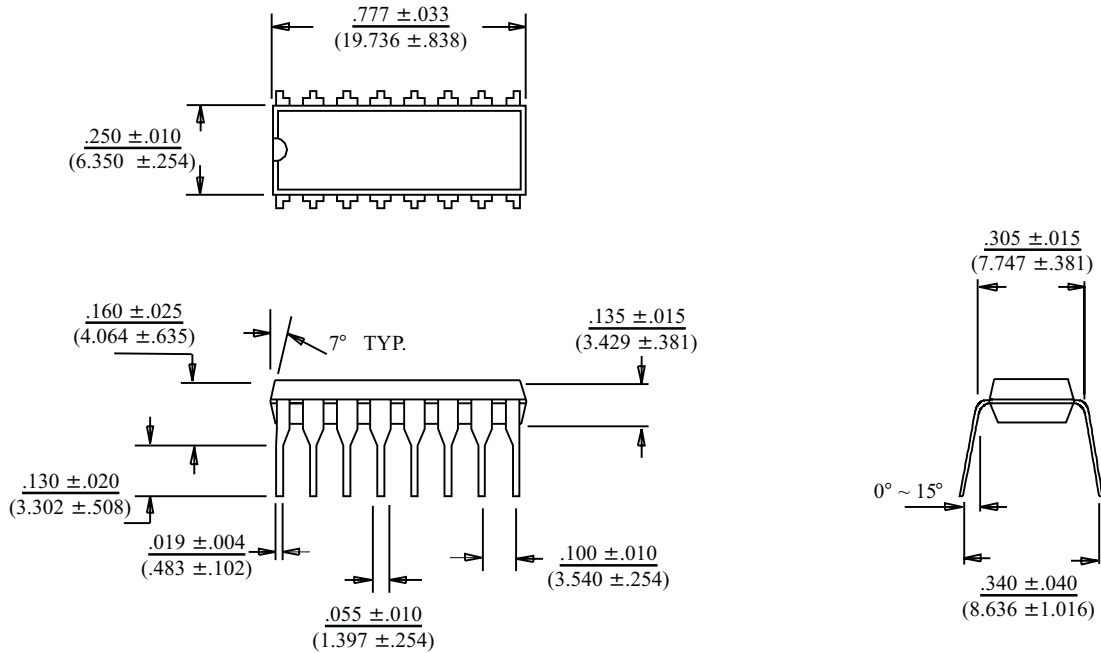
Comparator

## ORDERING INFORMATION

PART NUMBER	FUNCTION	PACKAGE DESCRIPTION	TEMPERATURE RANGE	PROCESS FLOW	BURN IN	LEAD FINISH
HI-8573PDI	QUAD OP AMP	16 PIN PLASTIC DIP	-40 °C TO +85 °C	I	NO	SOLDER
HI-8574PDI	QUAD COMPARATOR	16 PIN PLASTIC DIP	-40 °C TO +85 °C	I	NO	SOLDER
HI-8575PDI	DUAL OP AMP / DUAL COMPARATOR	16 PIN PLASTIC DIP	-40 °C TO +85 °C	I	NO	SOLDER
HI-8573PSI	QUAD OP AMP	16 PIN SOIC - NB	-40 °C TO +85 °C	I	NO	SOLDER
HI-8574PSI	QUAD COMPARATOR	16 PIN SOIC - NB	-40 °C TO +85 °C	I	NO	SOLDER
HI-8575PSI	DUAL OP AMP / DUAL COMPARATOR	16 PIN SOIC - NB	-40 °C TO +85 °C	I	NO	SOLDER

**16-PIN PLASTIC DIP**

Package Type: 16P



**16-PIN PLASTIC SMALL OUTLINE - NB**  
(Narrow Body)

Package Type: 16HN

