



# LM1514/LM1414 Dual Differential Voltage Comparator

## General Description

The LM1514/LM1414 is a dual differential voltage comparator intended for applications requiring high accuracy and fast response times. The device is constructed on a single monolithic silicon chip.

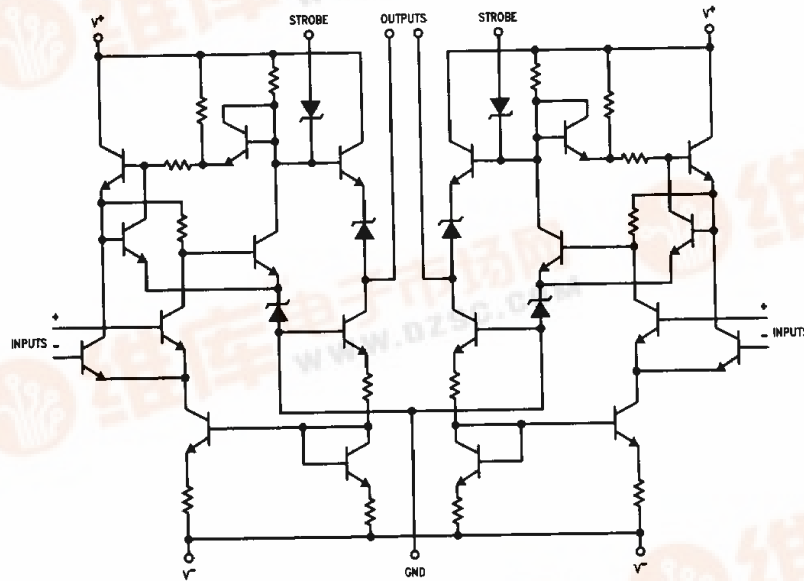
The LM1514/LM1414 is useful as a variable threshold Schmitt trigger, a pulse height discriminator, a voltage comparator in high-speed A/D converters, a memory sense amplifier or a high noise immunity line receiver. The output of the comparator is compatible with all integrated logic forms. The LM1514/LM1414 meet or exceed the specifications for the MC1514/MC1414 and are pin-for-pin replacements. The LM1514 is available in the ceramic dual-in-line package. The LM1414 is available in either the ceramic or molded dual-in-line package.

The LM1514 is specified for operation over the  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  military temperature range. The LM1414 is specified for operation over the  $0^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  temperature range.

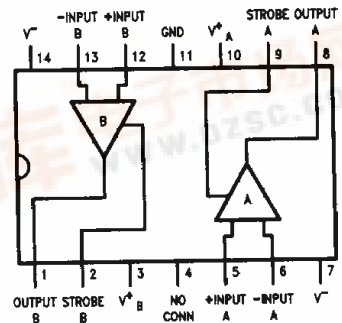
## Features

- Two totally separate comparators per package
- Independent strobe capability
- High speed 30 ns typ
- Low input offset voltage and current
- High output sink current over temperature
- Output compatible with TTL/DTL logic
- Molded or ceramic dual-in-line package

## Schematic and Connection Diagrams



### Dual-In-Line Package



Order Number LM1414J or LM1514J  
See NS Package Number J14A

Order Number LM1414N  
See NS Package Number N14A



### Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Positive Supply Voltage	+14.0V
Negative Supply Voltage	-7.0V
Peak Output Current	10 mA
Differential Input Voltage	±5.0V
Input Voltage	±7.0V

Power Dissipation (Note 2)	1000 mW
Operating Temperature Range	
LM1514	-55°C to +125°C
LM1414	0°C to +70°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 10 sec.)	300°C

### Electrical Characteristics for $T_A = 25^\circ\text{C}$ , $V^+ = +12\text{V}$ , $V^- = -6\text{V}$ , unless otherwise specified

Parameter	Conditions	LM1514			LM1414			Units
		Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage	$R_S \leq 200\Omega$ , $V_{CM} = 0\text{V}$ , $V_{OUT} = 1.4\text{V}$		0.6	2.0		1.0	5.0	mV
Input Offset Current	$V_{CM} = 0\text{V}$ , $V_{OUT} = 1.4\text{V}$		0.8	3.0		1.2	5.0	$\mu\text{A}$
Input Bias Current				20			25	$\mu\text{A}$
Voltage Gain		1250			1000			
Output Resistance			200			200		$\Omega$
Differential Input Voltage Range		±5.0			±5.0			V
Input Voltage Range	$V^- = -7.0\text{V}$	±5.0			±5.0			V
Common Mode Rejection Ratio	$R_S \leq 200\Omega$ , $V^- = -7.0\text{V}$	80	100		70	100		dB
Positive Output Voltage	$V_{IN} \geq 7.0\text{ mV}$ , $0 \leq I_{OUT} \leq -5.0\text{ mA}$	2.5	3.2	4.0	2.5	3.2	4.0	V
Negative Output Voltage	$V_{IN} \leq -7.0\text{ mV}$	-1.0	-0.5	0	-1.0	-0.5	0	V
Strobed Output Voltage	$V_{STROBE} \leq 0.3\text{V}$	-1.0	-0.5	0	-1.0	-0.5	0	V
Strobe "0" Current	$V_{STROBE} = 100\text{ mV}$		-1.2	-2.5		-1.2	-2.5	mA
Positive Supply Current	$V_{IN} \leq -7\text{ mV}$			18			18	mA
Negative Supply Current	$V_{IN} \leq -7\text{ mV}$			-14			-14	mA
Power Consumption			180	300		180	300	mW
Response Time	(Note 3)		30			30		ns

**LM1514/LM1414:** The following apply for  $T_L \leq T_A < T_H$  (Note 4) unless otherwise specified

Input Offset Voltage	$R_S \leq 200\Omega$ , $V_{OUT} = 1.8\text{V}$ for $T_A = T_L$ $V_{CM} = 0\text{V}$ , $V_{OUT} = 1.0\text{V}$ for $T_A = T_H$			3.0			6.5	mV
				3.0			6.5	mV
Input Bias Current				45			40	$\mu\text{A}$
Temperature Coefficient of Input Offset Voltage			3.0			5.0		$\mu\text{V}/^\circ\text{C}$
Input Offset Current	$V_{CM} = 0\text{V}$ , $V_{OUT} = 1.8\text{V}$ , $T_A = T_L$ $V_{CM} = 0\text{V}$ , $V_{OUT} = 1.0\text{V}$ , $T_A = T_H$			7.0			7.5	$\mu\text{A}$
				3.0			7.5	$\mu\text{A}$
Voltage Gain		1000				800		
Output Sink Current	$V_{IN} \leq -9.0\text{ mV}$ , $V_{OUT} \geq 0\text{V}$	2.8	4.0		1.6	2.5		mA

**Note 1:** Voltage values are with respect to network ground terminal. Positive current is defined as current into the referenced pin.

**Note 2:** LM1514 ceramic package: The maximum junction temperature is +150°C, for operating at elevated temperatures, devices must be derated linearly at 12.5 mW/°C. LM1414 ceramic package: The maximum junction temperature is +125°C for operating at elevated temperatures, devices must be derated linearly at 12.5 mW/°C. LM1414 molded package: The maximum junction temperature is +125°C, for operating at elevated temperatures, devices must be derated linearly at 10 mW/°C.

**Note 3:** The response time specified (see definitions) for a 100 mV input step with 5 mV overdrive.

**Note 4:** For LM1514,  $T_L = -55^\circ\text{C}$ ,  $T_H = +125^\circ\text{C}$ . For LM1414,  $T_L = 0^\circ\text{C}$ ,  $T_H = +70^\circ\text{C}$ .