



## LM1414 Dual Differential Voltage Comparator

### General Description

The 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.

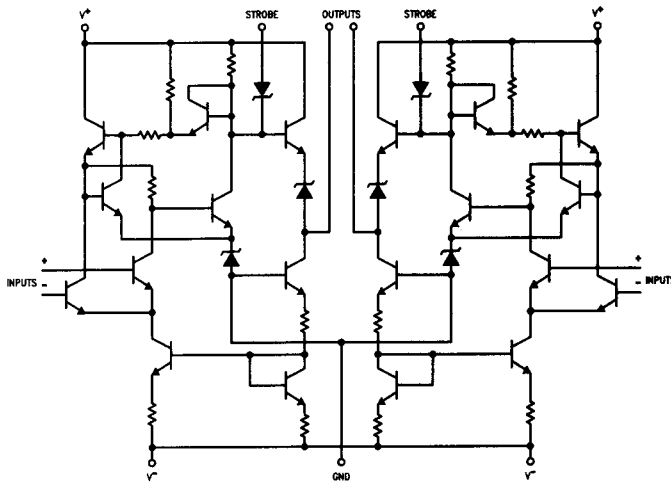
The LM1414 is useful as a variable threshold Schmitt trigger, a pulse height discriminator, a voltage comparator in high-speed A/D converters, a memory sense amplifier or a high noise immunity line receiver. The output of the comparator is compatible with all integrated logic forms. The LM1414 meets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

The LM1414 is specified for operation over the 0°C to +70°C temperature range.

### Features

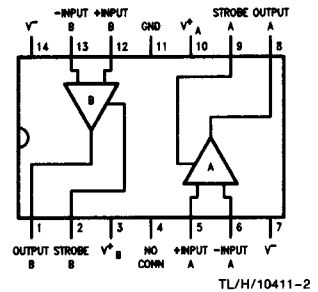
- Two totally separate comparators per package
- Independent strobe capability
- High speed 30 ns typ
- Low input offset voltage and current
- High output sink current over temperature
- Output compatible with TTL/DTL logic
- Molded or ceramic dual-in-line package

### Schematic and Connection Diagrams



TL/H/10411-1

### Dual-In-Line Package



TL/H/10411-2

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

**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 $T_A = T_H$			6.5 6.5	mV mV
Input Bias Current				40	$\mu\text{A}$
Temperature Coefficient of Input Offset Voltage			5.0		$\mu\text{V}/^\circ\text{C}$
Input Offset Current	$V_{CM} = 0\text{V}$ , $V_{OUT} = 1.8\text{V}$ , $T_A = T_L$ $V_{CM} = 0\text{V}$ , $V_{OUT} = 1.0\text{V}$ , $T_A = T_H$			7.5 7.5	$\mu\text{A}$ $\mu\text{A}$
Voltage Gain		800			
Output Sink Current	$V_{IN} \leq -9.0\text{ mV}$ , $V_{OUT} \geq 0\text{V}$	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:** LM1414 molded package: The maximum junction temperature is  $+125^\circ\text{C}$ , for operating at elevated temperatures, devices must be derated linearly at  $10\text{ mW}/^\circ\text{C}$ .

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

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