National Semiconductor

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.

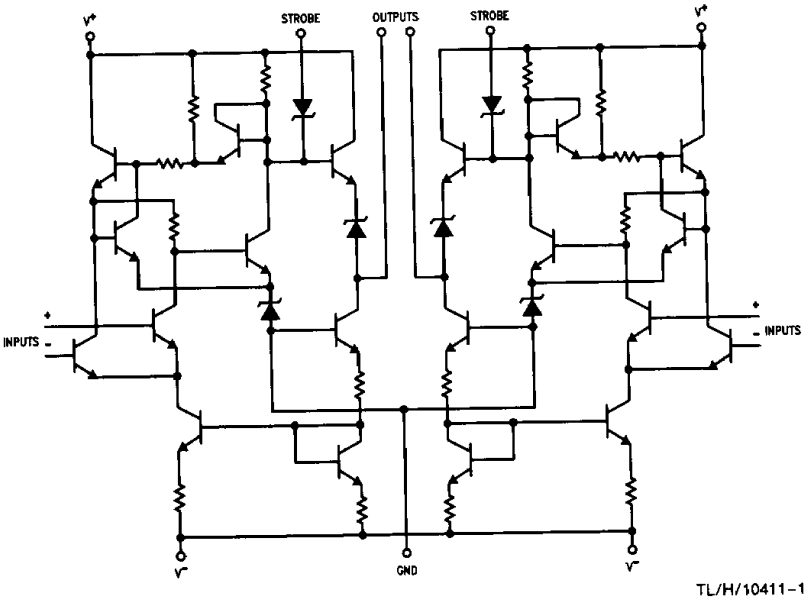
The LM1514/LM1414 is useful as a variable threshold Schmitt trigger, a pulse height discriminator, a voltage comparator in high-speed A/D converters, a memory sense amplifier or a high noise immunity line receiver. The output of the comparator is compatible with all integrated logic forms. The LM1514/LM1414 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°C to +125°C military temperature range. 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



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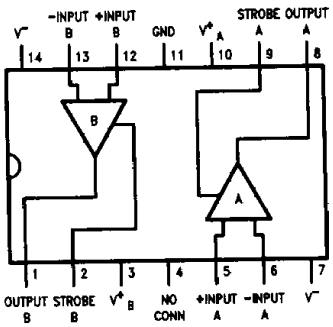
Dual-In-Line Package



TL/H/10411-2

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 $T_A = 25°C$, $V^+ = +12V$, $V^- = -6V$, unless otherwise specified

Parameter	Conditions	LM1514			LM1414			Units
		Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage	$R_S \le 200\Omega$, $V_{CM} = 0V$, $V_{OUT} = 1.4V$		0.6	2.0		1.0	5.0	mV
Input Offset Current	$V_{CM} = 0V$, $V_{OUT} = 1.4V$		0.8	3.0		1.2	5.0	μA
Input Bias Current				20			25	μA
Voltage Gain		1250			1000			
Output Resistance			200			200		Ω
Differential Input Voltage Range		±5.0			±5.0			V
Input Voltage Range	$V^- = -7.0V$	±5.0			±5.0			V
Common Mode Rejection Ratio	$R_S \le 200\Omega$, $V^- = -7.0V$	80	100		70	100		dB
Positive Output Voltage	$V_{IN} \ge 7.0$ mV, $0 \le I_{OUT} \le -5.0$ mA	2.5	3.2	4.0	2.5	3.2	4.0	V
Negative Output Voltage	$V_{IN} \le -7.0$ mV	−1.0	−0.5	0	−1.0	−0.5	0	V
Strobed Output Voltage	$V_{STROBE} \le 0.3V$	−1.0	−0.5	0	−1.0	−0.5	0	V
Strobe "0" Current	$V_{STROBE} = 100$ mV		−1.2	−2.5		−1.2	−2.5	mA
Positive Supply Current	$V_{IN} \le -7$ mV			18			18	mA
Negative Supply Current	$V_{IN} \le -7$ mV			−14			−14	mA
Power Consumption			180	300		180	300	mW
Response Time	(Note 3)		30			30		ns
LM1514/LM1414: The following apply for $T_L \le T_A < T_H$ (Note 4) unless otherwise specified								
Input Offset Voltage	$R_S \le 200\Omega$, $V_{OUT} = 1.8V$ for $T_A = T_L$ $V_{CM} = 0V$, $V_{OUT} = 1.0V$ for $T_A = T_H$			3.0 3.0			6.5 6.5	mV mV
Input Bias Current				45			40	μA
Temperature Coefficient of Input Offset Voltage			3.0			5.0		μV/°C
Input Offset Current	$V_{CM} = 0V$, $V_{OUT} = 1.8V$, $T_A = T_L$ $V_{CM} = 0V$, $V_{OUT} = 1.0V$, $T_A = T_H$			7.0 3.0			7.5 7.5	μA μA
Voltage Gain		1000			800			
Output Sink Current	$V_{IN} \le -9.0$ mV, $V_{OUT} \ge 0V$	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, $T_L = -55°C$, $T_H = +125°C$. For LM1414, $T_L = 0°C$, $T_H = +70°C$.