

## Voltage comparator

NE529

### DESCRIPTION

The NE529 is a high-speed analog voltage comparator which, for the first time, mates state-of-the-art Schottky diode technology with the conventional linear process. This allows simultaneous fabrication of high-speed TTL gates with a precision linear amplifier on a single monolithic chip.

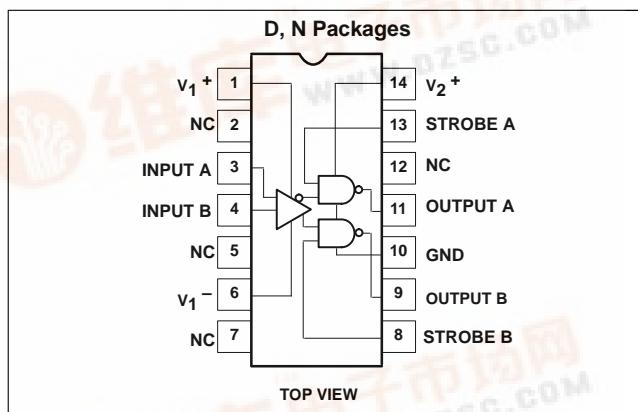
### FEATURES

- 10ns propagation delay
- Complementary output gates
- TTL or ECL compatible outputs
- Wide common-mode and differential voltage range
- Typical gain 5000

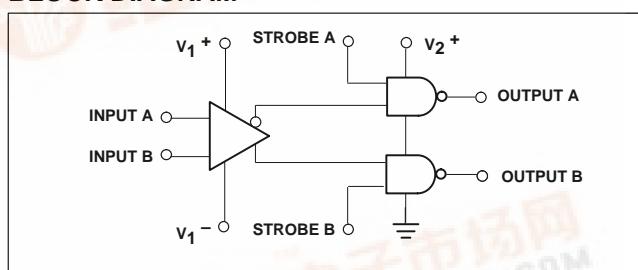
### APPLICATIONS

- A/D conversion
- ECL-to-TTL interface
- TTL-to-ECL interface
- Memory sensing
- Optical data coupling

### PIN CONFIGURATIONS

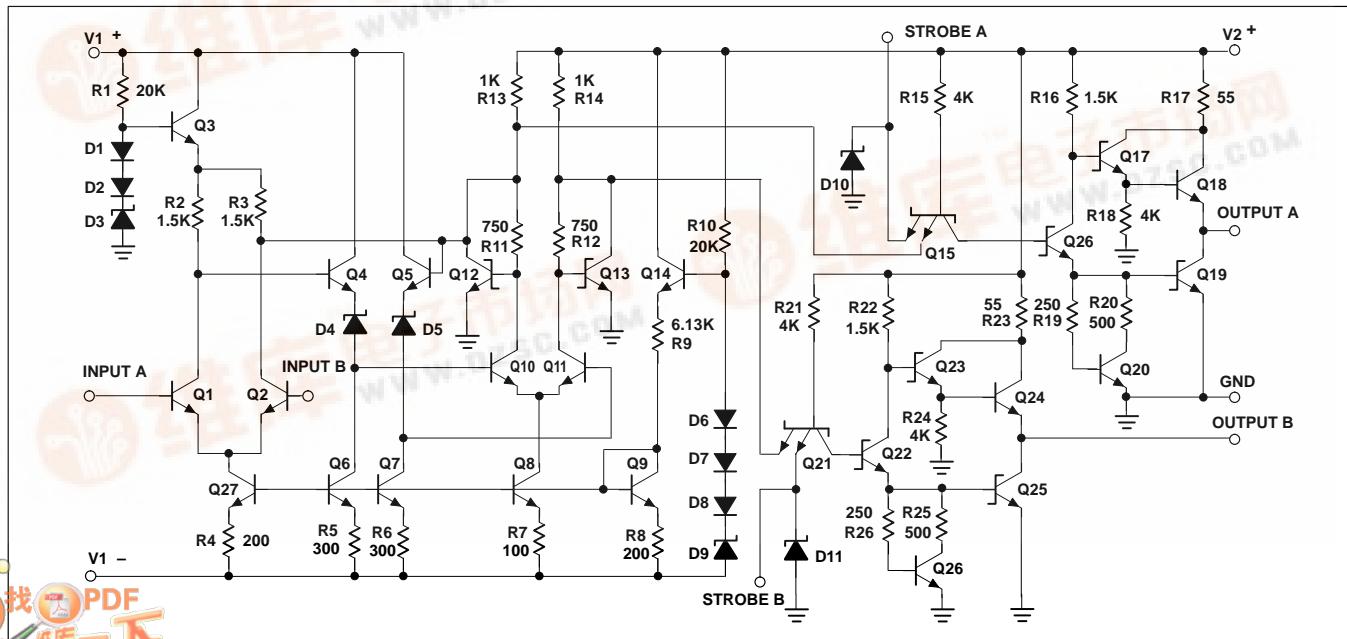


### BLOCK DIAGRAM



### ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE	DWG #
14-Pin Plastic Dual In-Line Package (DIP)	0 to +70°C	NE529N	0405B
14-Pin Small Outline (SO) Package	0 to +70°C	NE529D	0175D



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**ABSOLUTE MAXIMUM RATINGS**

SYMBOL	PARAMETER	RATING	UNIT
$V_{1+}$	Positive supply voltage	+15	V
$V_{1-}$	Negative supply voltage	-15	V
$V_{2+}$	Gate supply voltage	+7	V
$V_{OUT}$	Output voltage	+7	V
$V_{IN}$	Differential input voltage	$\pm 5$	V
$V_{CM}$	Input common mode voltage	$\pm 6$	V
$P_D$	Maximum power dissipation <sup>1</sup> $T_A=25^\circ\text{C}$ (still-air)		
	N package	1420	mW
	D package	1040	mW
$T_A$	Operating temperature range	0 to $+70$	$^\circ\text{C}$
$T_{STG}$	Storage temperature range	-65 to $+150$	$^\circ\text{C}$
$T_{SOLD}$	Lead soldering temperature (10 sec max)	+300	$^\circ\text{C}$

**NOTES:**

1. Derate above  $25^\circ\text{C}$  at the following rates:

    N package at  $11.5\text{mW}/^\circ\text{C}$

    D package at  $8.3\text{mW}/^\circ\text{C}$

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**DC ELECTRICAL CHARACTERISTICS** $V_1+=+10V$ ,  $V_2+=+5.0V$ ,  $V_1=-10V$ , unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	NE529			UNIT
			Min	Typ	Max	
<b>Input characteristics</b>						
$V_{OS}$	Input offset voltage @ 25°C Over temperature range				6 10	mV
$I_{BIAS}$	Input bias current @ 25°C Over temperature range	$V_{IN}=0V$		5	20 50	$\mu A$
$I_{os}$	Input offset current @ 25°C Over temperature range	$V_{IN}=0V$		2	5 15	$\mu A$
$V_{CM}$	Common-mode voltage range		-5	0		V
<b>Gate characteristics</b>						
$V_{OUT}$	Output voltage "1" state "0" state	$V_2+=4.75V$ , $I_{SOURCE}=-1mA$ $V_2+=4.75V$ , $I_{SINK}=10mA$	2.7	3.3	0.5	V V
	Strobe inputs "0" Input current <sup>1</sup> "1" Input current @ 25°C <sup>1</sup> Over temperature range "0" input voltage "1" input voltage	$V_2+=5.25V$ , $V_{STROBE}=0.5V$ $V_2+=5.25V$ , $V_{STROBE}=2.7V$ $V_2+=5.25V$ , $V_{STROBE}=2.7V$ $V_2+=4.75V$ $V_2+=4.75V$			-2 100 200 0.8 V V	$\mu A$ $\mu A$ $\mu A$ V V
$I_{SC}$	Short-circuit output current	$V_2+=5.25V$ , $V_{OUT}=0V$	-18		-70	mA
<b>Power supply requirements</b>						
$V_{1+}$ $V_{1-}$ $V_{2+}$	Supply voltage		5 -6 4.75		10 -10 5.25	V V V
$I_{1+}$ $I_{1-}$ $I_{2+}$	Supply current	$V_1+=10V$ , $V_1=-10V$ $V_2+=5.25V$ Over temp. Over temp. Over temp.			5 10 20	mA mA mA

**NOTES:**

- See logic function table.

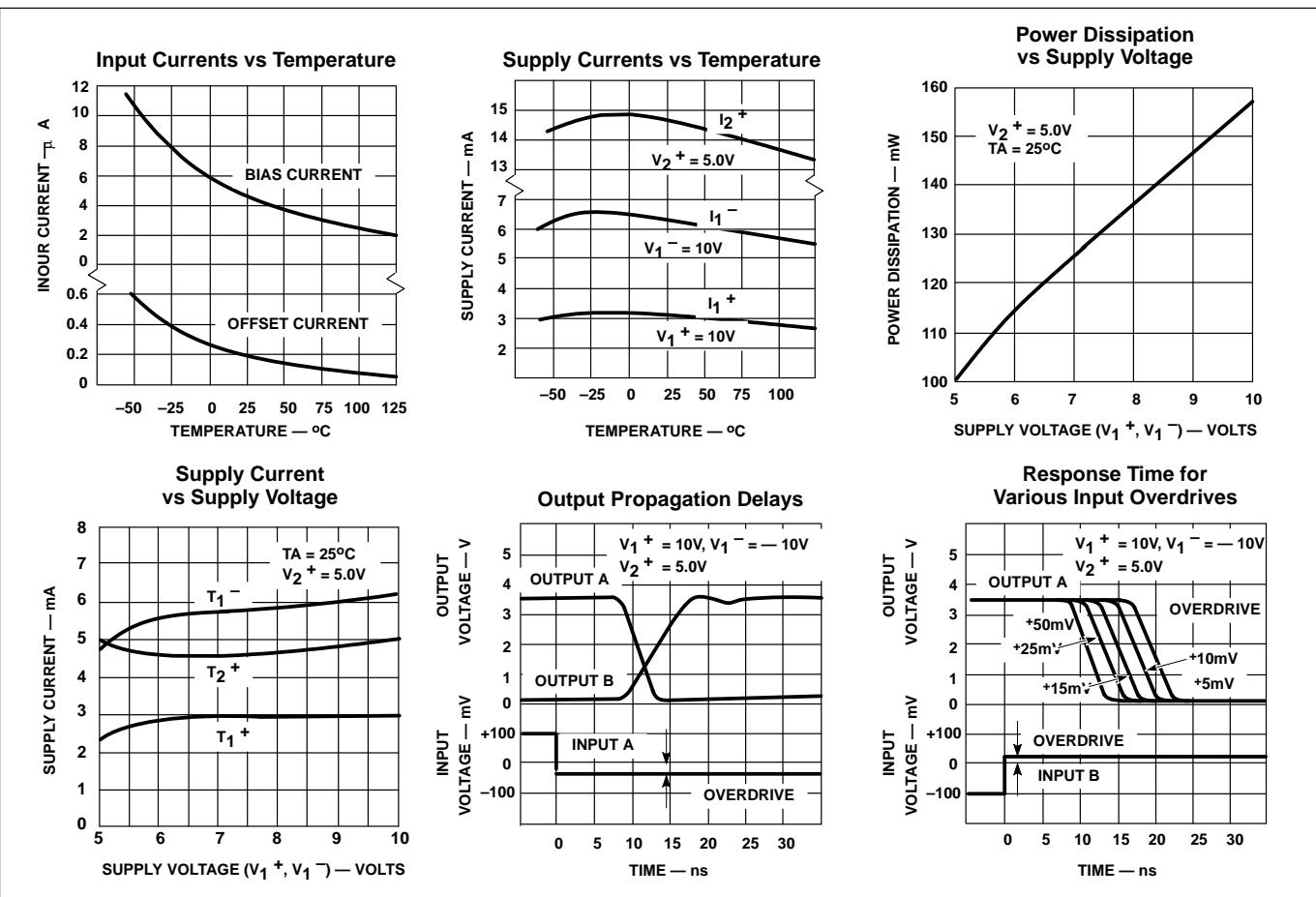
**AC ELECTRICAL CHARACTERISTICS** $T_A=25^\circ C$  (See AC test circuit).

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			Min	Typ	Max	
$t_R$	Transient response	$V_{IN}=\pm 100mV$ step				
$t_{PLH}$ $t_{PHL}$	Propagation delay time Low-to-high High-to-low			12 10	22 20	ns ns
	Delay between output A and B			2	5	ns
$t_{ON}$ $t_{OFF}$	Strobe delay time turn-on time turn-off time			6		ns ns

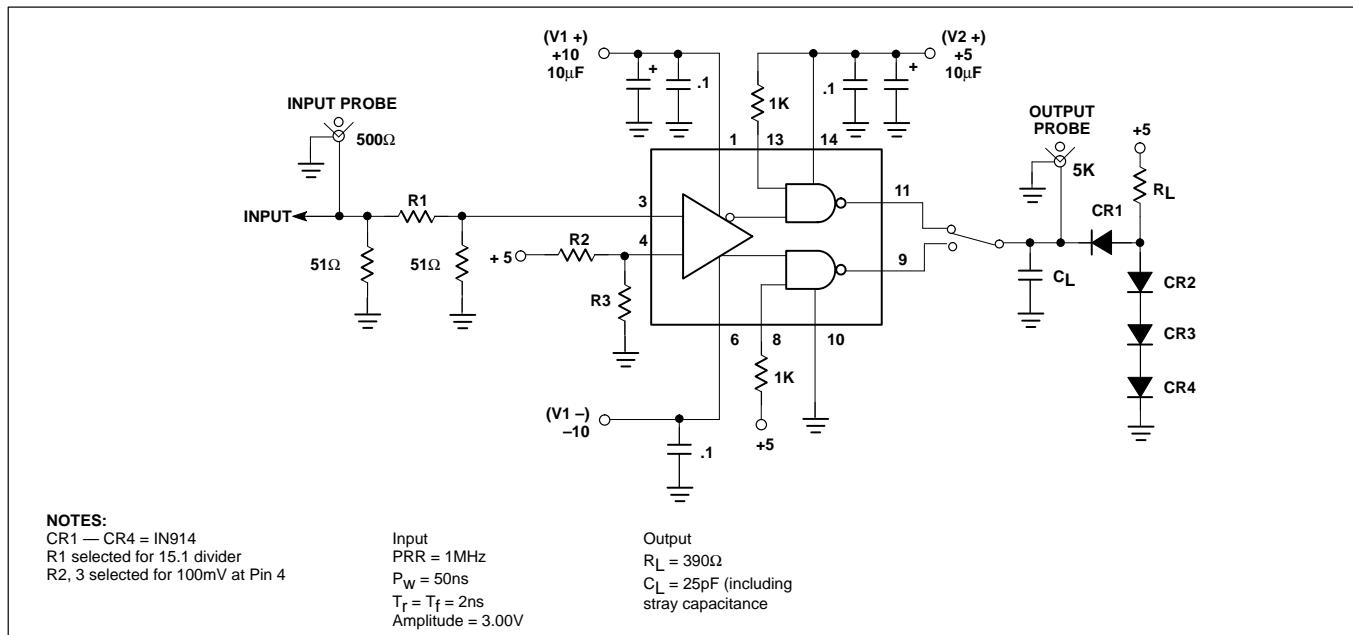
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## TYPICAL PERFORMANCE CHARACTERISTICS



## RESPONSE TIME TEST CIRCUIT



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### APPLICATIONS

One of the main features of the device is that supply voltages ( $V_+$ ,  $V_-$ ) need not be balanced, as in the following diagrams. For proper operation, however, negative supply ( $V_-$ ) should always be at least 6V more than the ground terminal (pin 6). Input Common-Mode

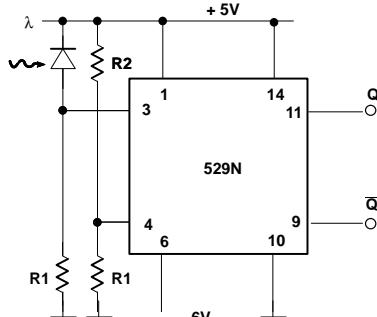
range should be limited to values of 2V less than the supply voltages ( $V_+$  and  $V_-$ ) up to a maximum of  $\pm 5V$  as supply voltages are increased.

It is also important to note that Output A is in phase with Input A and Output B is in phase with Input B.

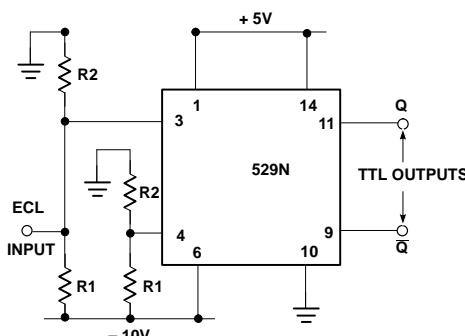
### LOGIC FUNCTION

$V_{ID}$ ( $A^+, B^-$ )	STROBE A	STROBE B	OUTPUT A	OUTPUT B
$V_{ID} \leq V_{OS}$	H	X	L	H
$-V_{OS} < V_{ID} < V_{OS}$	H	H	Undefined	Undefined
$V_{ID} \geq V_{OS}$	X	H	H	L
X	L	L	H	H

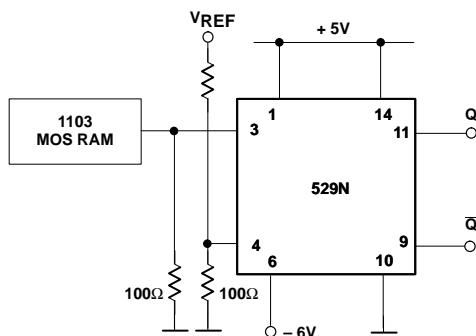
### TYPICAL APPLICATIONS



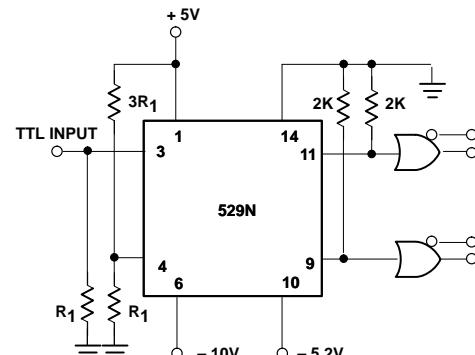
Photodiode Detector



ECL-to-TTL Interface



MOS Memory Sense AMP



TTL-to-ECL Interface