

# 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.

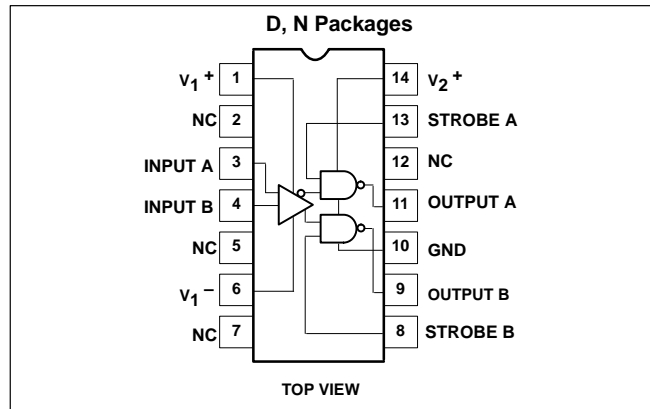
## FEATURES

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

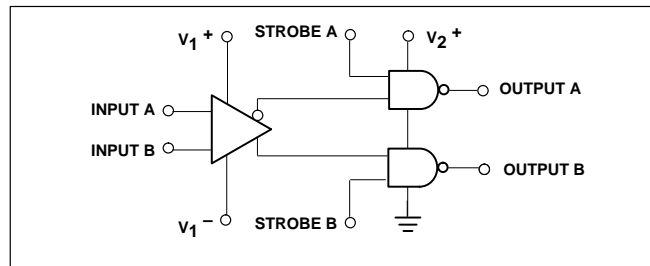
## APPLICATIONS

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

## PIN CONFIGURATIONS

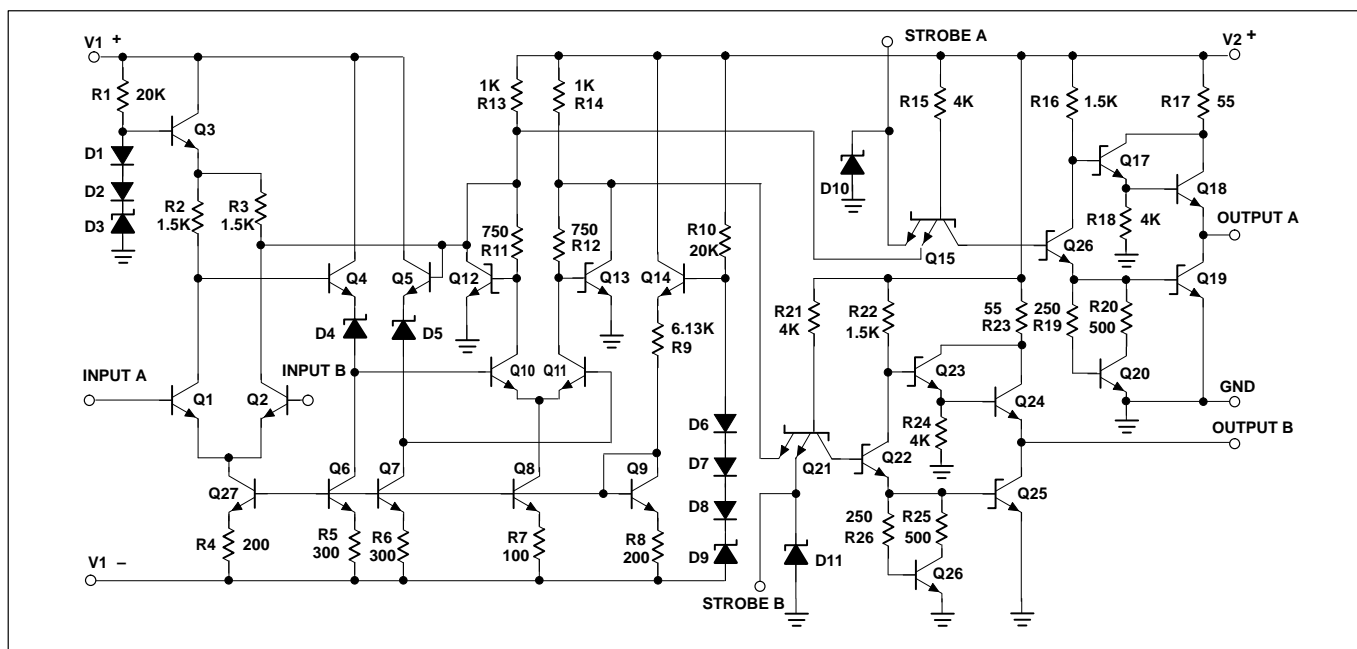


## BLOCK DIAGRAM



## 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 <sub>1+</sub>	Positive supply voltage	+15	V
V <sub>1-</sub>	Negative supply voltage	-15	V
V <sub>2+</sub>	Gate supply voltage	+7	V
V <sub>OUT</sub>	Output voltage	+7	V
V <sub>IN</sub>	Differential input voltage	±5	V
V <sub>CM</sub>	Input common mode voltage	±6	V
P <sub>D</sub>	Maximum power dissipation <sup>1</sup> T <sub>A</sub> =25°C (still-air)		
	N package	1420	mW
	D package	1040	mW
T <sub>A</sub>	Operating temperature range	0 to +70	°C
T <sub>STG</sub>	Storage temperature range	-65 to +150	°C
T <sub>SOLD</sub>	Lead soldering temperature (10 sec max)	+300	°C

**NOTES:**

- Derate above 25°C at the following rates:  
N package at 11.5mW/°C  
D package at 8.3mW/°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		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	$\mu A$ $\mu A$ $\mu A$ V V
$I_{SC}$	Short-circuit output current	$V_{2+}=5.25V$ , $V_{OUT}=0V$	-18		-70	$\mu A$
<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	$\mu A$ $\mu A$ $\mu A$

**NOTES:**

1. See logic function table.

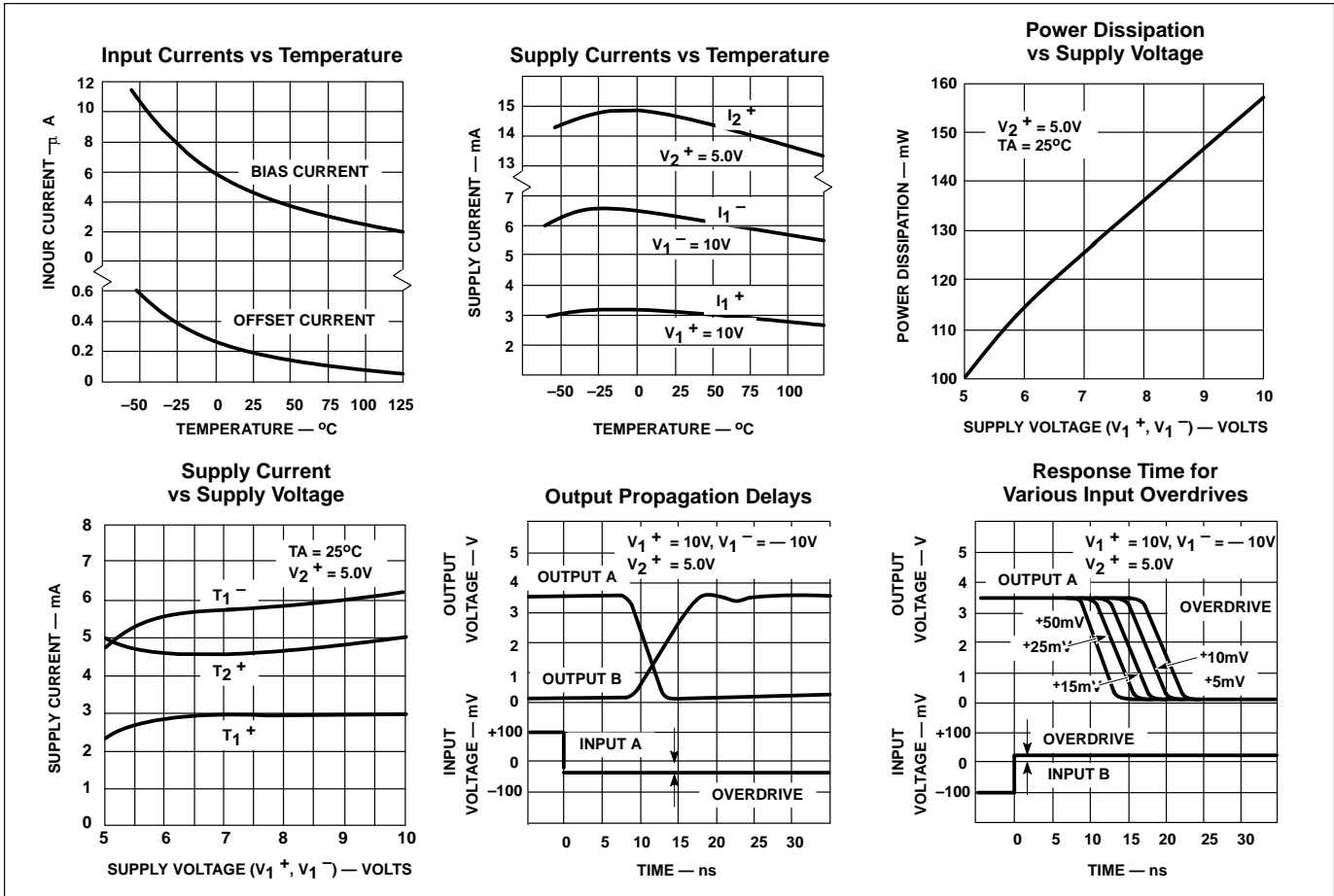
**AC ELECTRICAL CHARACTERISTICS** $T_A=25^\circ C$  (See AC test circuit).

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 6		ns ns

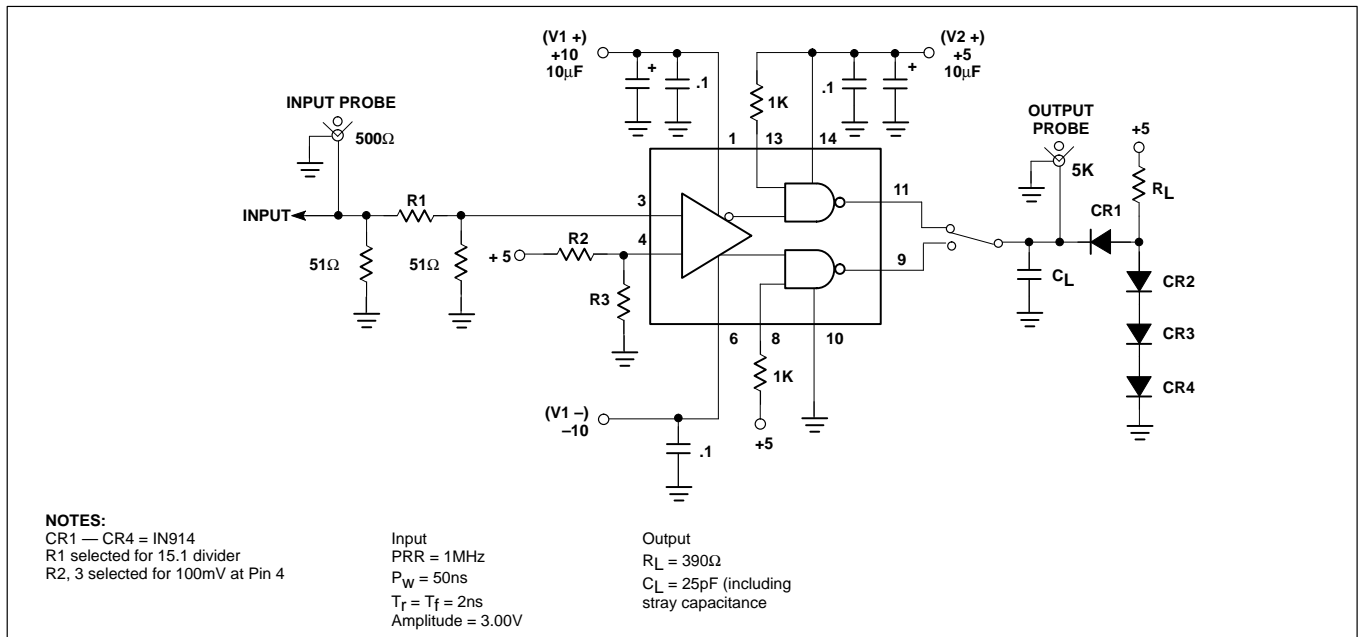
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## TYPICAL PERFORMANCE CHARACTERISTICS



## 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

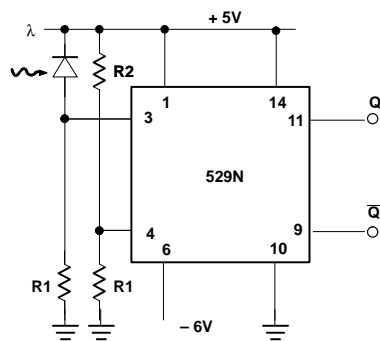
range should be limited to values of 2V less than the supply voltages ( $V_+$  and  $V_-$ ) up to a maximum of  $\pm 5V$  as supply voltages are increased.

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

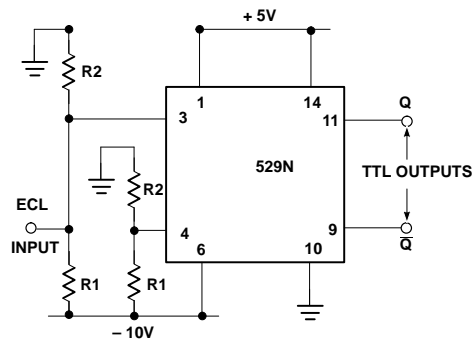
## LOGIC FUNCTION

$V_{ID}$ (A <sup>+</sup> , B <sup>-</sup> )	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

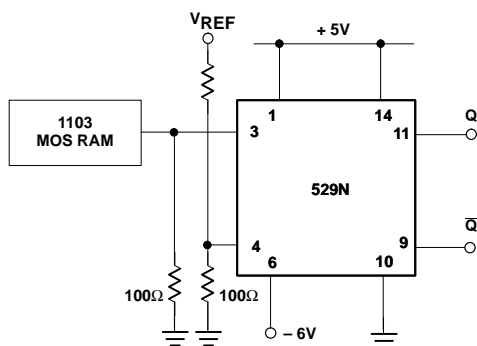
## TYPICAL APPLICATIONS



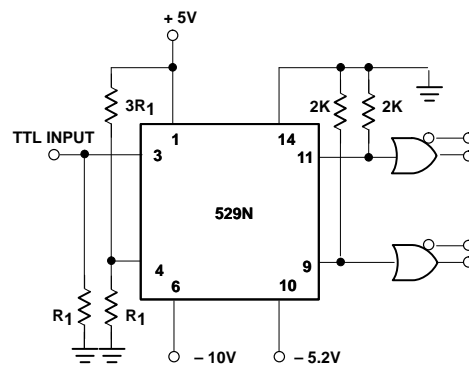
Photodiode Detector



ECL-to-TTL Interface



MOS Memory Sense AMP



TTL-to-ECL Interface