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

D, N Packages

Pin		Pin	
V_1^+	1	14	V_2^+
NC	2	13	STROBE A
INPUT A	3	12	NC
INPUT B	4	11	OUTPUT A
NC	5	10	GND
V_1^-	6	9	OUTPUT B
NC	7	8	STROBE B

TOP VIEW
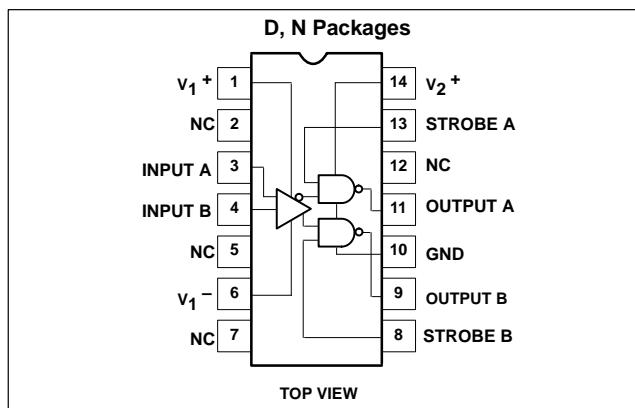
BLOCK DIAGRAM
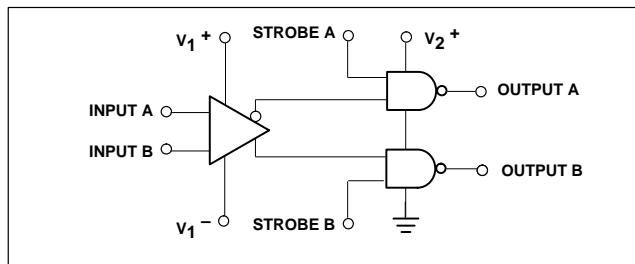
ORDERING INFORMATION

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
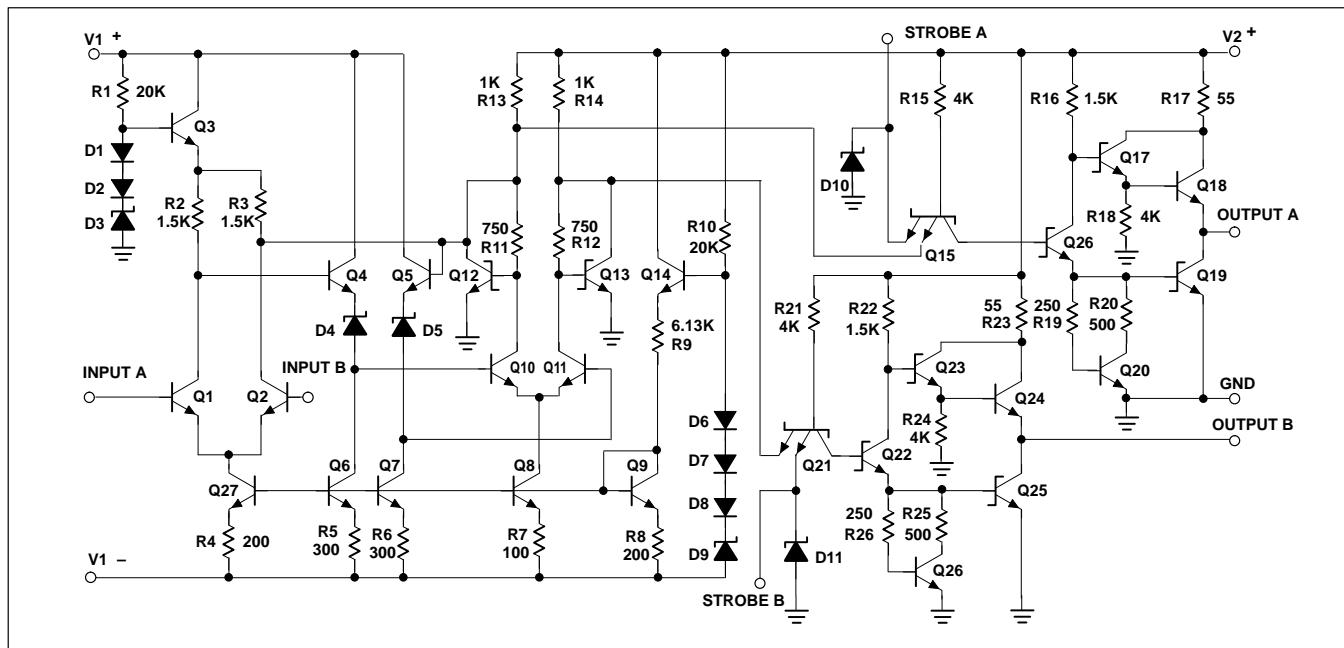
Voltage comparator

NE529

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	±5	V
V_{CM}	Input common mode voltage	±6	V
P_D	Maximum power dissipation[1] T_A=25°C (still-air)		
	N package	1420	mW
	D package	1040	mW
T_A	Operating temperature range	0 to +70	°C
T_{STG}	Storage temperature range	-65 to +150	°C
T_{SOLD}	Lead soldering temperature		
	(10 sec max)	+300	°C

NOTES:
1. Derate above 25°C at the following rates:
      N package at 11.5mW/°C
      D package at 8.3mW/°C

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NE529

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	
Input characteristics						
V_{OS}	Input offset voltage @ 25°C				6	mV
	Over temperature range				10	
I_{BIAS}	Input bias current @ 25°C			5	20	µA
	Over temperature range	$V_{IN}=0V$			50	
I_{OS}	Input offset current @ 25°C			2	5	µA
	Over temperature range	$V_{IN}=0V$			15	µA
V_{CM}	Common-mode voltage range		-5	0		V
Gate characteristics						
V_{OUT}	Output voltage					
	"1" state	$V_2+=4.75V$, $I_{SOURCE}=-1mA$	2.7	3.3		V
	"0" state	$V_2+=4.75V$, $I_{SINK}=10mA$			0.5	V
	Strobe inputs					
	"0" Input current[1]	$V_2+=5.25V$, $V_{STROBE}=0.5V$			-2	mA
	"1" Input current @ 25°C[1]	$V_2+=5.25V$, $V_{STROBE}=2.7V$			100	µA
	Over temperature range	$V_2+=5.25V$, $V_{STROBE}=2.7V$			200	µA
	"0" input voltage	$V_2+=4.75V$			0.8	V
	"1" input voltage	$V_2+=4.75V$	2.0			V
I_{SC}	Short-circuit output current	$V_2+=5.25V$, $V_{OUT}=0V$	-18		-70	mA
Power supply requirements						
	Supply voltage					
V_1+			5		10	V
V_1-			-6		-10	V
V_2+			4.75	5	5.25	V
	Supply current	$V_1+=10V$, $V_1-=-10V$				
		$V_2+=5.25V$				
I_1+		Over temp.			5	mA
I_1-		Over temp.			10	mA
I_2+		Over temp.			20	mA

NOTES:
1. See logic function table.

AC ELECTRICAL CHARACTERISTICS

$T_A=25°C$ (See AC test circuit).

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			Min	Typ	Max	
t_R	Transient response	$V_{IN}=\pm100mV$ step				
	Propagation delay time					
t_{PLH}	Low-to-high			12	22	ns
t_{PHL}	High-to-low			10	20	ns
	Delay between output A and B			2	5	ns
	Strobe delay time					
t_{ON}	turn-on time			6		ns
t_{OFF}	turn-off time			6		ns

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NE529

TYPICAL PERFORMANCE CHARACTERISTICS

Input Currents vs Temperature

Supply Currents vs Temperature

Power Dissipation vs Supply Voltage

Supply Current vs Supply Voltage

Output Propagation Delays

Response Time for Various Input Overdrives
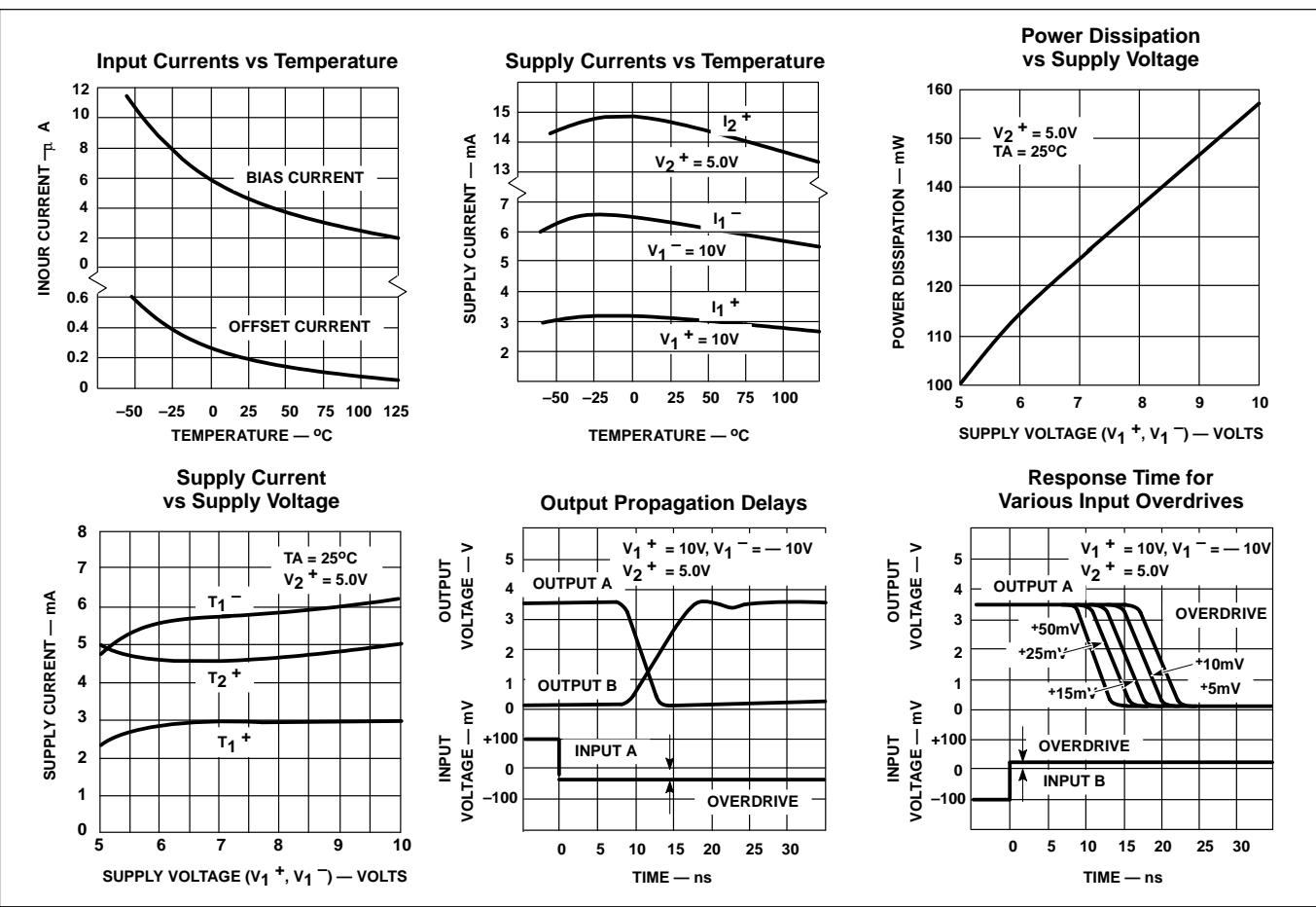
RESPONSE TIME TEST CIRCUIT

NOTES:
CR1 — CR4 = IN914
R1 selected for 15.1 divider
R2, 3 selected for 100mV at Pin 4

Input
PRR = 1MHz
P_W = 50ns
$T_r = T_f$ = 2ns
Amplitude = 3.00V

Output
R_L = 390Ω
C_L = 25pF (including stray capacitance
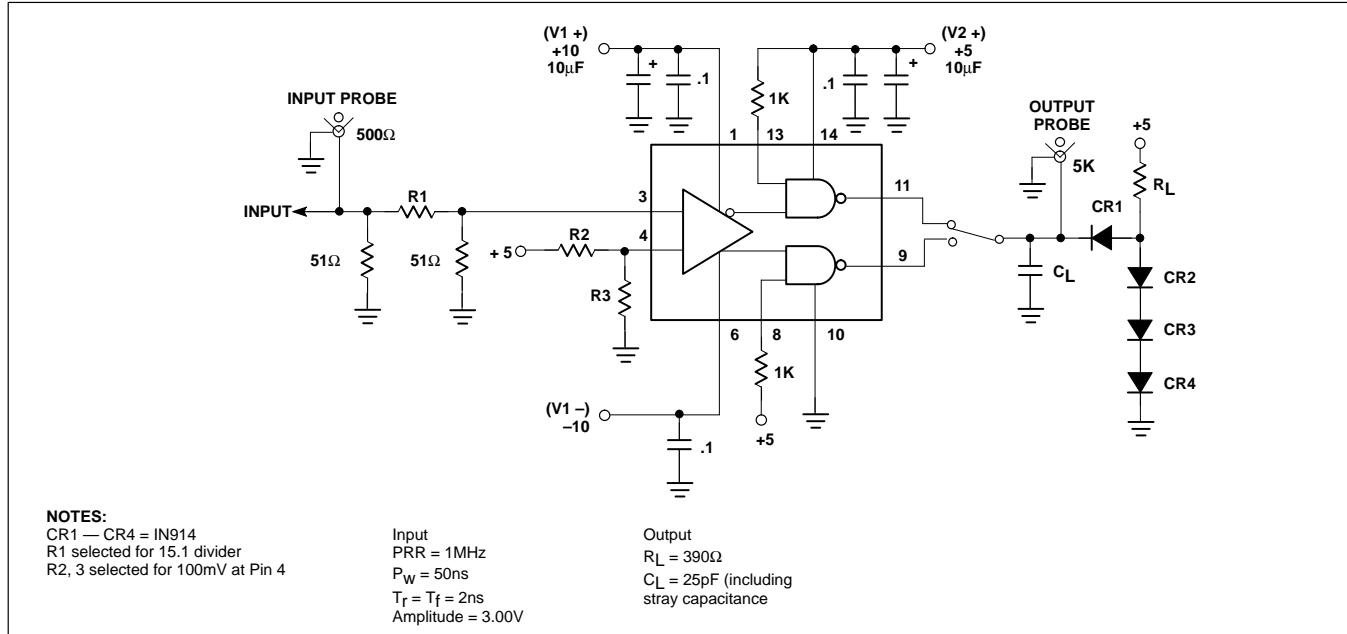
Voltage comparator

NE529

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 ±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
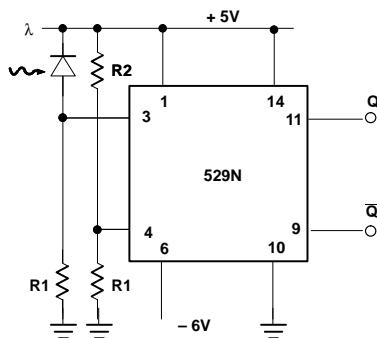
Photodiode Detector
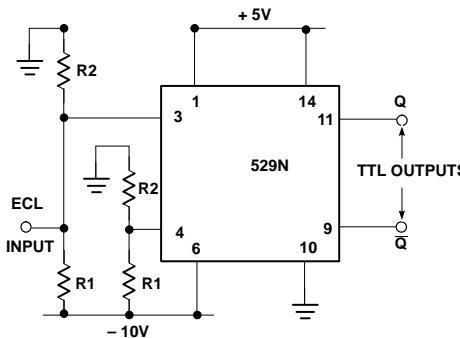
ECL-to-TTL Interface
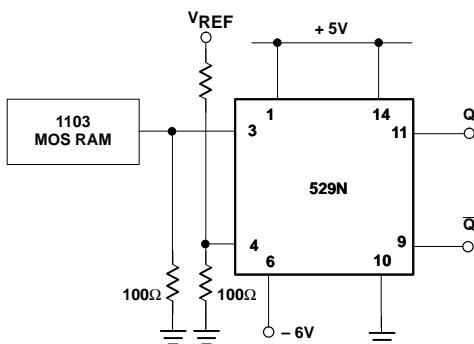
MOS Memory Sense AMP

TTL-to-ECL Interface