Signetics

NE/SE529
Voltage Comparator

Product Specification

Linear Products

DESCRIPTION

The NE/SE529 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

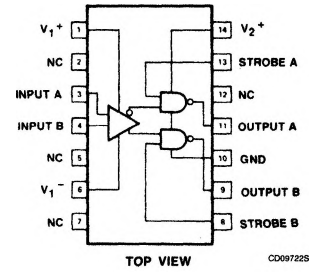
- **10ns propagation delay**
- **Complementary output gates**
- **TTL or ECL compatible outputs**
- **Wide common-mode and differential voltage range**
- **Typical gain 5000**

APPLICATIONS

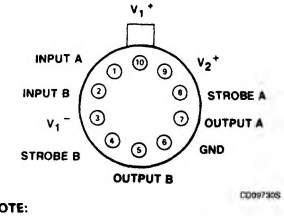
- **A/D conversion**
- **ECL-to-TTL interface**
- **TTL-to-ECL interface**
- **Memory sensing**
- **Optical data coupling**
- **MIL-STD-883A, B, C available**

PIN CONFIGURATIONS

D, F, N Packages



H Package*

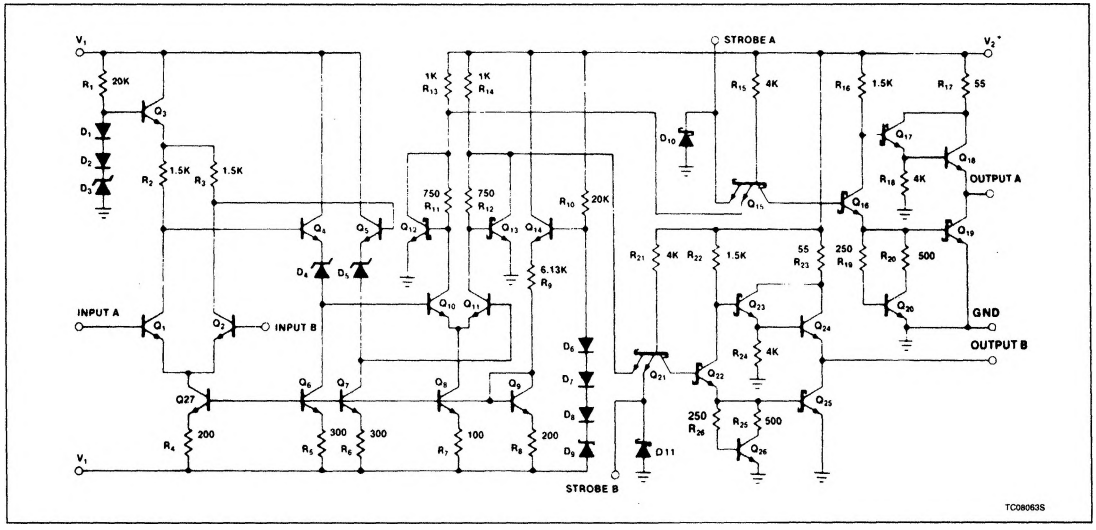


NOTE:
*Metal cans (H) not recommended for new designs.

ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE
14-Pin Plastic DIP	0 to +70°C	NE529N
14-Pin Cerdip	0 to +70°C	NE529F
14-Pin Cerdip	−55°C to +125°C	SE529F
14-Pin SO	0 to +70°C	NE529D
10-Lead Metal Can	0 to +70°C	NE529H
10-Lead Metal Can	−55°C to +125°C	SE529H

EQUIVALENT SCHEMATIC



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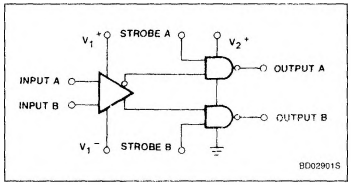
ABSOLUTE MAXIMUM RATINGS

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	±5	V
V_{CM}	Input common mode voltage	±6	V
P_D	Maximum power dissipation[1] T_A = 25°C (still-air)		
	F package	1190	mW
	N package	1420	mW
	D package	1040	mW
T_A	Operating temperature range		
	NE529	0 to +70	°C
	SE529	−55 to +125	°C
T_{STG}	Storage temperature range	−65 to +150	°C
T_{SOLD}	Lead soldering temperature (10 sec max)	+300	°C

NOTE:
1. Derate above 25°C at the following rates:
   F package at 9.5mW/°C.
   N package at 11.5mW/°C.
   D package at 8.3mW/°C.

BLOCK DIAGRAM



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

SYMBOL	PARAMETER	TEST CONDITIONS	SE529			NE529			UNIT
			Min	Typ	Max	Min	Typ	Max	
Input characteristics									
V_{OS}	Input offset voltage @ 25°C				4			6	mV
	Over temperature range				6			10	mV
I_{BIAS}	Input bias current @ 25°C			5	12		5	20	μA
	Over temperature range	$V_{IN} = 0V$			36			50	μA
I_{OS}	Input offset current @ 25°C			2	3		2	5	μA
	Over temperature range	$V_{IN} = 0V$			9			15	μA
	Common-mode voltage range			0	±5		0	±5	V
Gate characteristics									
V_{OUT}	Output voltage								
	"1" state	$V_2+ = 4.75V$, $I_{SOURCE} = -1mA$	2.5	3.3		2.7	3.3		V
	"0" state	$V_2+ = 4.75V$, $I_{SINK} = 10mA$			0.5			0.5	V
	Strobe inputs								
	"0" Input current[1]	$V_2+ = 5.25V$, $V_{STROBE} = 0.5V$			-2			-2	mA
	"1" Input current @ 25°C[1]	$V_2+ = 5.25V$, $V_{STROBE} = 2.7V$			50			100	μA
	Over temperature range	$V_2+ = 5.25V$, $V_{STROBE} = 2.7V$			200			200	μA
	"0" input voltage	$V_2+ = 4.75V$			0.8			0.8	V
	"1" input voltage	$V_2+ = 4.75V$	2.0			2.0			V
I_{SC}	Short-circuit output current	$V_2+ = 5.25V$, $V_{OUT} = 0V$	-18		-70	-18		-70	mA
Power supply requirements									
	Supply voltage								
V_1+			5		10	5		10	V
V_1-			-6		-10	-6		-10	V
V_2+			4.5	5	5.5	4.75	5	5.25	V
	Supply current	$V_1+ = 10V$, $V_1- = -10V$, $V_2+ = 5.25V$							
I_1+		Over temp.			5			5	mA
I_1-		Over temp.			10			10	mA
I_2+		Over temp.			20			20	mA

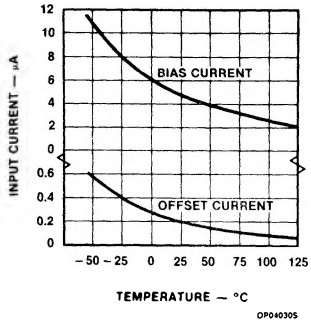
NOTES:
1. See logic function table.

AC ELECTRICAL CHARACTERISTICS $T_A = 25°C$ (See AC test circuit).

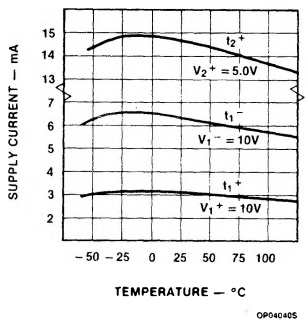
SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			Min	Typ	Max	
t_R	Transient response	$V_{IN} = \pm 100mV$ step				
	Propagation delay time					
t_{PLH}	Low-to-high			12	22	ns
t_{PHL}	High-to-low			10	20	ns
	Delay between output A and B			2	5	ns
	Strobe delay time					
t_{ON}	turn-on time			6		ns
t_{OFF}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

TYPICAL PERFORMANCE CHARACTERISTICS

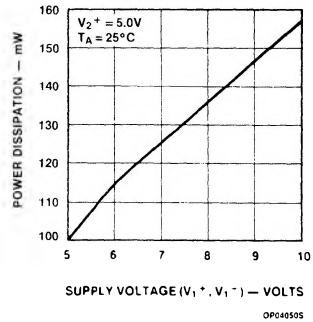
Input Currents vs Temperature



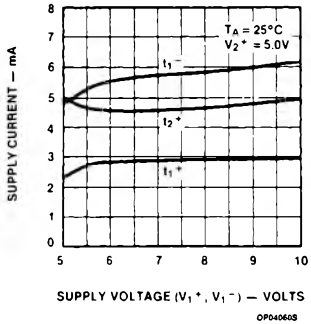
Supply Current vs Temperature



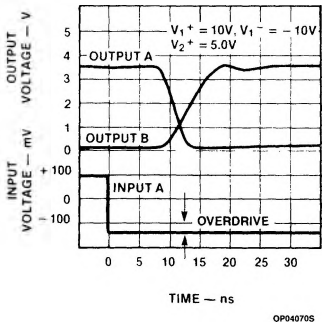
Power Dissipation vs Supply Voltage



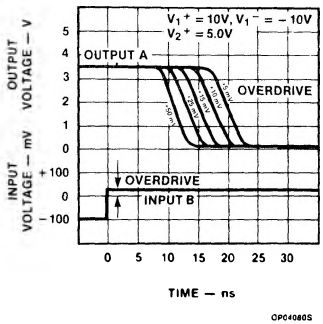
Supply Current vs Supply Voltage



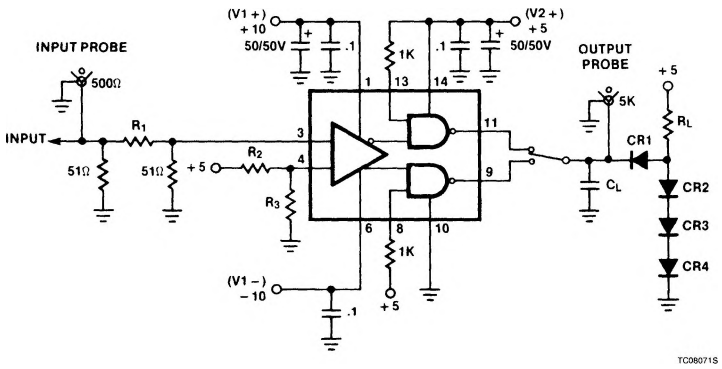
Output Propagation Delays



Response Time For Various Input Overdrives



RESPONSE TIME TEST CIRCUIT



NOTES:
CR1 – CR4 = 1N914
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)

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APPLICATIONS

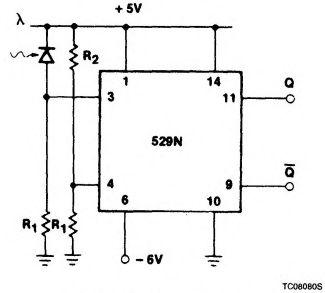
One of the main features of the device is that supply voltages (V+, V−) need not be balanced, as in the following diagrams. For proper operation, however, negative supply (V−) should always be at least 6V more than the ground terminal (pin 6). Input Common-Mode range should be limited to values of 2V less than the supply voltages (V+ and V−) up to a maximum of ± 6V 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.

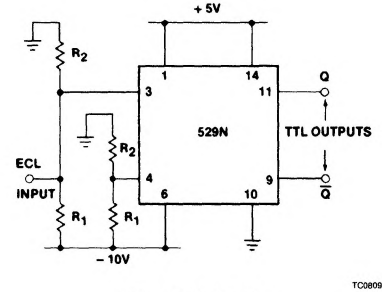
LOGIC FUNCTION

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

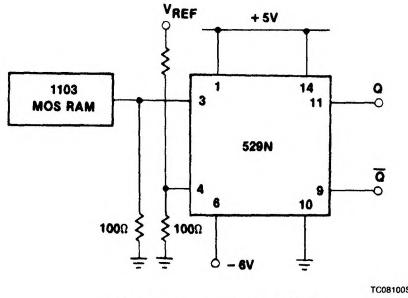
TYPICAL APPLICATIONS



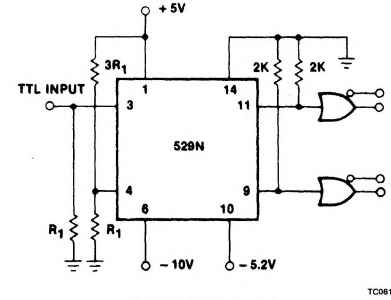
Photodiode Detector



ECL-to-TTL Interface



MOS Memory Sense AMP



TTL-to-ECL Interface