Signetics

NE/SE527
Voltage Comparator

Product Specification

Linear Products

DESCRIPTION

The NE/SE527 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. The NE/SE527 is similar in design to the Signetics NE/SE529 voltage comparator except that it incorporates an "Emitter-Follower" input stage for extremely low input currents. This opens the door to a whole new range of applications for analog voltage comparators.

FEATURES

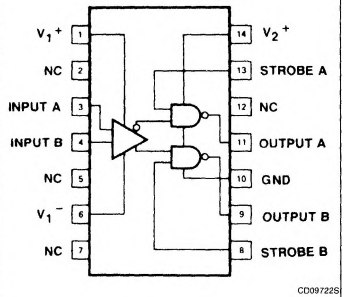
- **15ns propagation delay**
- **Complementary output gates**
- **TTL or ECL compatible outputs**
- **Wide common-mode and differential voltage range**
- **MIL-STD-883A, B, C available**
- **Typical gain of 5000**

APPLICATIONS

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

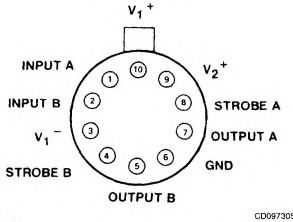
PIN CONFIGURATIONS

D, F, N Packages



CD09722S

H Package[1]



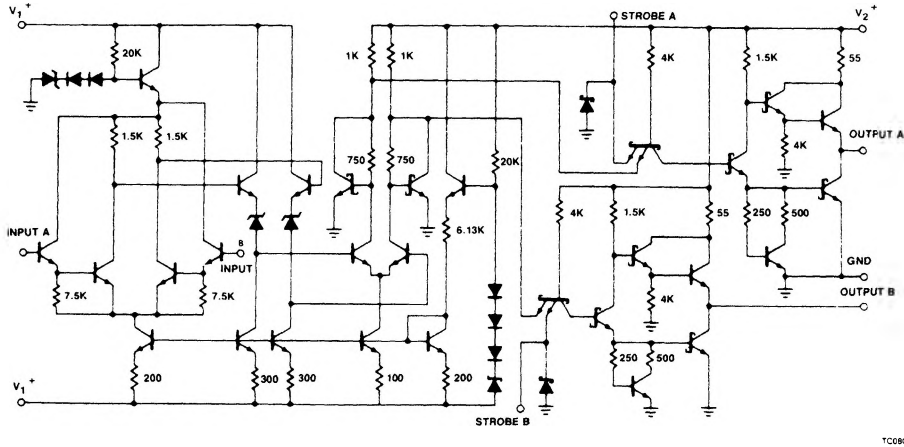
CD09730S

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

ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE
14-Pin Plastic DIP	0 to +70°C	NE527N
14-Pin Cerdip	0 to +70°C	NE527F
14-Pin SO	0 to +70°C	NE527D
14-Pin Cerdip	−55°C to +125°C	SE527F
10-Lead metal can	0 to +70°C	NE527H
10-Lead metal can	−55°C to +125°C	SE527H

EQUIVALENT SCHEMATIC



TC08004S

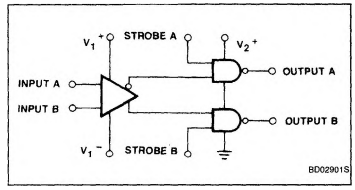
Voltage Comparator | NE/SE527

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	Max power dissipation[1] 25°C ambient (still air) F package N package D package	 1190 1420 1040	 mW mW mW
T_A	Operating temperature range NE527 SE527	 0 to +70 −55 to +125	 °C °C
T_{STG}	Storage temperature range	−65 to +150	°C
T_{SOLD}	Lead soldering temperature (10sec max)	+300	°C

NOTE:
1. Derate above 25°C, at the following rates:
   F package 9.5mW/°C
   N package 11.4mW/°C
   D package 8.3mW/°C

BLOCK DIAGRAM



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

SYMBOL	PARAMETER	TEST CONDITIONS	SE527			NE527			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				2			2	μA
	over temperature range				4			4	μA
I_{OS}	Input offset current @ 25°C				0.5			0.75	μA
	over temperature range	$V_{IN} = 0V$			1			1	μA
	common-mode voltage range				±5			±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

NOTE:
1. See Logic Function Table.

AC ELECTRICAL CHARACTERISTICS $T_A = 25°C$, unless otherwise specified. (See AC test circuit)

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			Min	Typ	Max	
	Transient response propagation delay time					
t_{PLH}	Low-to-High	$V_{IN} = \pm 100mV$ step		16	26	ns
t_{PHL}	High-to-Low			14	24	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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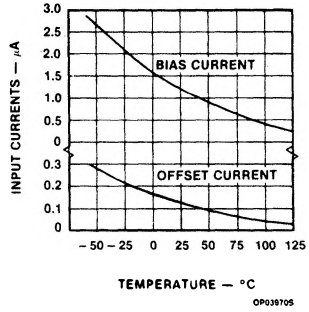
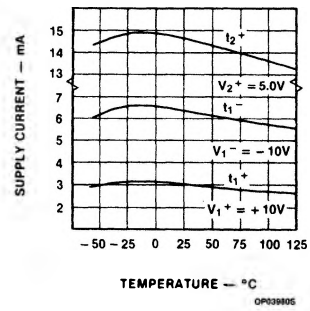
TYPICAL PERFORMANCE CHARACTERISTICS

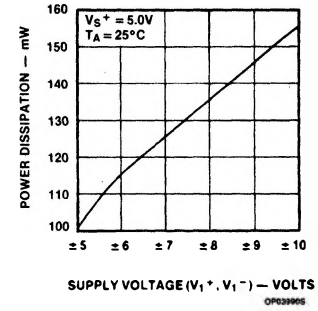
Input Currents vs Temperature



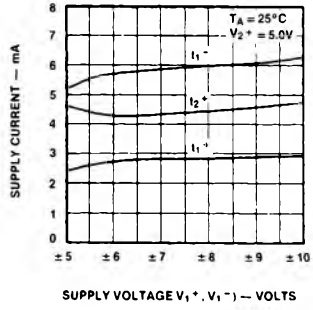
Supply Current vs Temperature



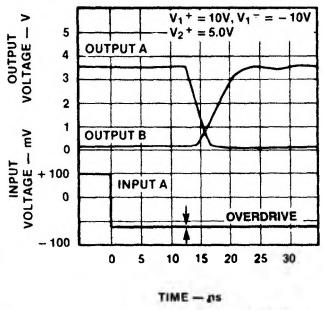
Power Dissipation vs Supply Voltage



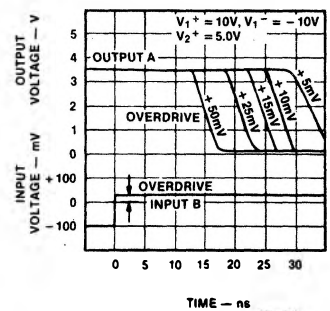
Supply Current vs Supply Voltage



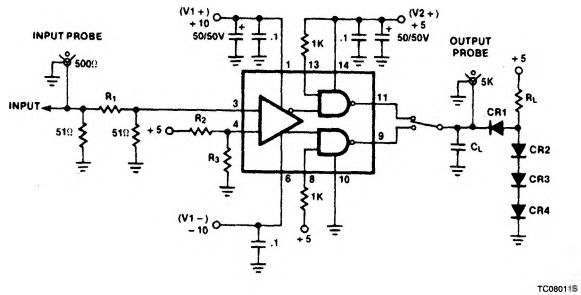
Output Propagation Delays



Response Time for Various Input Overdrives



RESPONSE TIME TEST CIRCUIT



NOTES:
CR1 – CR4 = 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)

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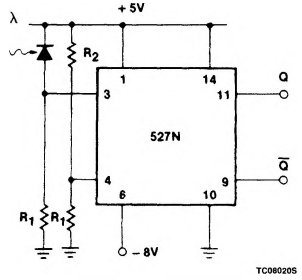
APPLICATIONS

One of the main features of the device is that supply voltages (V_1+, V_1−) need not be balanced, as in the following diagrams. For proper operation, however, negative supply (V_1−) 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_1+ and V_1−) 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.

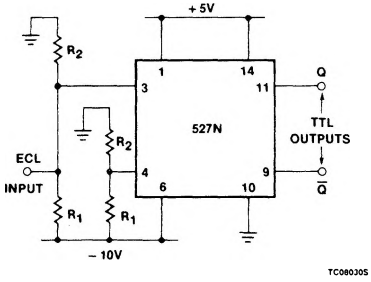
LOGIC FUNCTION

V_{ID} (A^+, B^-)	STROBE A	STROBE B	OUTPUT A	OUTPUT B	COMMENT
$V_{ID} \leq -V_{OS}$	H	X	L	H	Read I_{IHA}, I_{ILB}
$-V_{OS} < V_{ID} < V_{OS}$	H	H	Undefined	Undefined	
$V_{ID} \geq V_{OS}$	X	H	H	L	Read I_{ILA}, I_{IHB}
X	L	L	H	H	

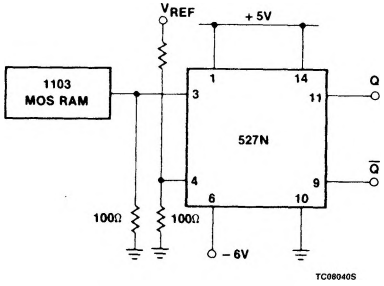
TYPICAL APPLICATIONS



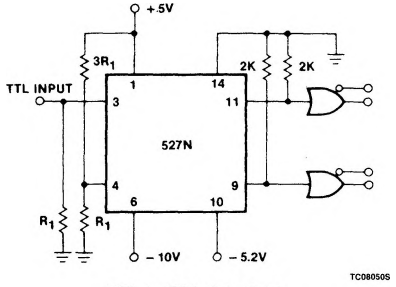
Photodiode Detector



ECL-to-TTL Interface



MOS Memory Sense AMP



TTL-to-ECL Interface