

# HIGH SPEED DUAL DIFFERENTIAL COMPARATOR/SENSE AMP

SE/NE521

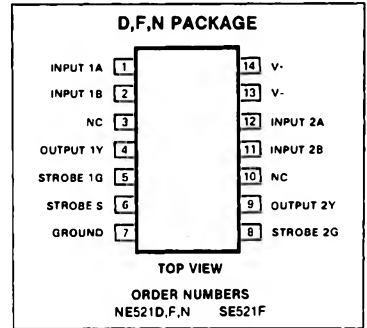
## FEATURES

- 12ns maximum guaranteed propagation delay
- 20 $\mu$ A maximum input bias current
- TTL compatible strobes and outputs
- Large common mode input voltage range
- Operates from standard supply voltages
- Military qualifications pending

## APPLICATIONS

- MOS memory sense amp
- A-to-D conversion
- High speed line receiver

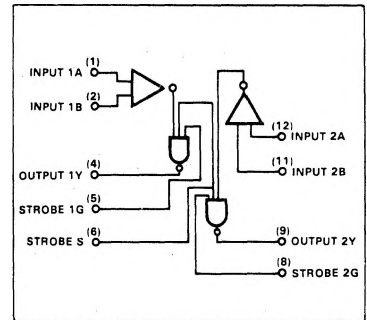
## PIN CONFIGURATION



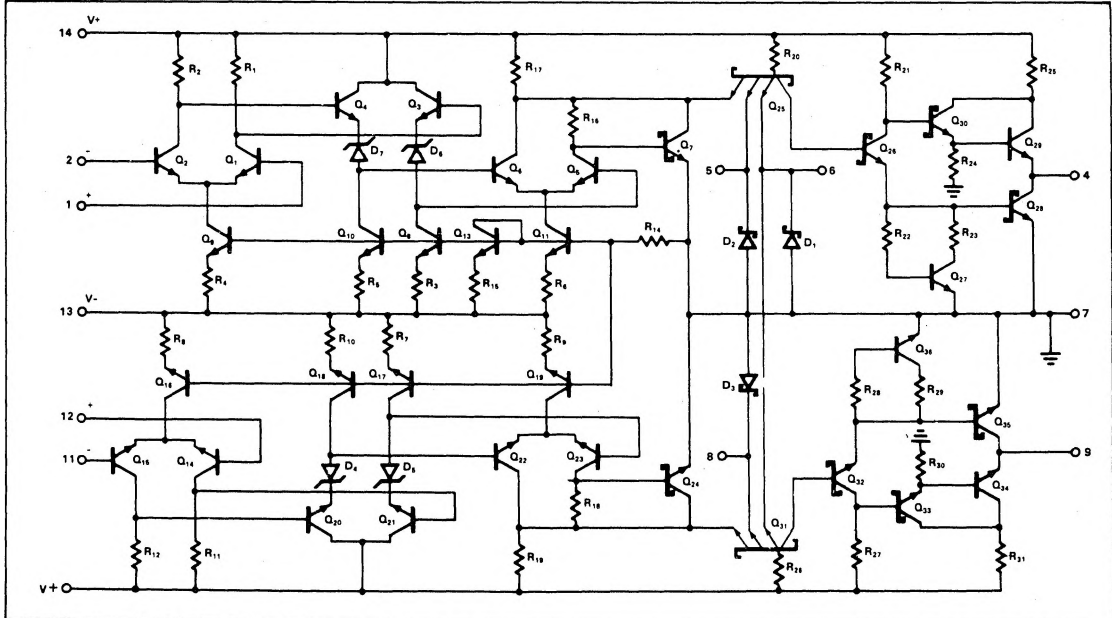
## ABSOLUTE MAXIMUM RATINGS

PARAMETER	RATING	UNIT
V+	Supply voltage	V
V-	Positive	+7
	Negative	-7
V <sub>IDR</sub>	Differential input voltage	$\pm 6$
V <sub>IN</sub>	Input voltage	V
	Common mode	$\pm 5$
	Strobe/gate	+5.25
P <sub>D</sub>	Power dissipation	600
T <sub>A</sub>	Operating temperature range	mW
	NE521	0 to 70
	SE521	-55 to +125
T <sub>stg</sub>	Storage temperature range	$^{\circ}$ C
	Lead temperature	-65 to +150
	(solder, 60 sec)	+300

## BLOCK DIAGRAM



## EQUIVALENT SCHEMATIC



**DC ELECTRICAL CHARACTERISTICS**  $V_+ = +5V, V_- = -5V, T_A = -55$  to  $+125^\circ C$  unless otherwise specified

PARAMETER	TEST CONDITIONS	SE LIMITS			UNITS	
		Min	Typ	Max		
$V_{OS}$	Input offset voltage At 25°C Over temperature range	$V_+ = +4.5V, V_- = -4.5V$		6	7.5 15	mV
$I_{BIAS}$	Input bias current At 25°C Over temperature range	$V_+ = +5.5V, V_- = -5.5V$		7.5	20 40	$\mu A$
$I_{OS}$	Input offset current At 25°C Over temperature range	$V_+ = +5.5V, V_- = -5.5V$		1.0	5 12	$\mu A$
$V_{CM}$	Common mode voltage range	$V_+ = +4.5V, V_- = -4.5V$	$\pm 3$			V
$V_{IL}$	Low level input voltage At 25°C Over temperature				0.8 0.7	V
$V_{IH}$	High level input voltage		2.0			V
$I_{IH}$	Input current High	$V_+ = +5.5V, V_- = -5.5V$ $V_{IH} = 2.7V$ 1G or 2G strobe Common strobe S			50 100	$\mu A$ $\mu A$
$I_{IL}$	Low	$V_{IL} = 0.5V$ 1G or 2G strobe Common strobe S			-2.0 -4.0	mA mA
$V_{OH}$ $V_{OL}$	Output voltage High Low	$V_{I(S)} = 2.0V$ $V_+ = +4.5V, V_- = -4.5V, I_{LOAD} = -1mA$ $V_+ = +4.5V, V_- = -4.5V, I_{LOAD} = 10mA$ $T_A = 25^\circ C, I_{LOAD} = 20mA$	2.5	3.4	0.5 0.5	V
$V_+$ $V_-$	Supply voltage Positive Negative		4.5 -4.5	5.0 -5.0	5.5 -5.5	V
$I_{CC+}$ $I_{CC-}$	Supply current Positive Negative	$V_+ = 5.5V, V_- = -5.5V, T_A = 25^\circ C$		27 -15	35 -28	mA
$I_{SC}$	Short circuit output current		-35		-115	mA

**HIGH SPEED DUAL DIFFERENTIAL COMPARATOR/SENSE AMP**

**SE/NE521**

**DC ELECTRICAL CHARACTERISTICS** (Cont'd)  $V_+ = +5V, V_- = -5V, T_A = 0$  to  $70^\circ C$  unless otherwise specified

PARAMETER	TEST CONDITIONS	NE LIMITS			UNITS
		Min	Typ	Max	
$V_{OS}$	Input offset voltage At $25^\circ C$ Over temperature range	$V_+ = +4.75V, V_- = -4.75V$			mV
$I_{BIAS}$	Input bias current At $25^\circ C$ Over temperature range	$V_+ = +5.25V, V_- = -5.25V$			$\mu A$
$I_{OS}$	Input offset current At $25^\circ C$ Over temperature range	$V_+ = +5.25V, V_- = -5.25V$			$\mu A$
$V_{CM}$	Common mode voltage range	$V_+ = +4.75V, V_- = -4.75V$			V
$I_{IH}$	Input current High	$V_+ = +5.25V, V_- = -5.25V$ $V_{IH} = 2.7V$ 1G or 2G strobe Common strobe S			$\mu A$
$I_{IL}$	Low	$V_{IL} = 0.5V$ 1G or 2G strobe Common strobe S			$\mu A$
$V_{OH}$ $V_{OL}$	Output voltage High Low	$V_I(S) = 2.0V$ $V_+ = +4.75V, V_- = -4.75V, I_{LOAD} = -1mA$ $V_+ = +5.25V, V_- = -5.25V, I_{LOAD} = 20mA$			V
$V_+$ $V_-$	Supply voltage Positive Negative	4.75 -4.75	5.0 -5.0	5.25 -5.25	V
$I_{CC+}$ $I_{CC-}$	Supply current Positive Negative	$V_+ = 5.25V, V_- = -5.25V, T_A = 25^\circ C$			mA
$I_{SC}$	Short circuit output current	-40		-100	mA

**AC ELECTRICAL CHARACTERISTICS**  $T_A = 25^\circ C, R_L = 280\ \Omega, C_L = 15pF, V_+ = +5V, V_- = -5V$

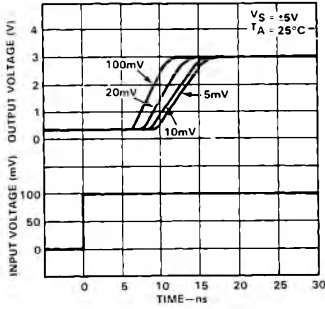
PARAMETER	FROM INPUT	TO OUTPUT	LIMITS			UNIT
			Min	Typ	Max	
<b>Large Signal Switching Speed</b> Propagation delay						ns
$t_{PLH}(D)$	Low to high <sup>1</sup>	Amp		8	12	
$t_{PHL}(D)$	High to low <sup>1</sup>	Amp		6	9	
$t_{PLH}(S)$	Low to high <sup>2</sup>	Strobe		4.5	10	
$t_{PHL}(S)$	High to low <sup>2</sup>	Strobe		3.0	6	
Maximum operating frequency			40	55		MHz

NOTES

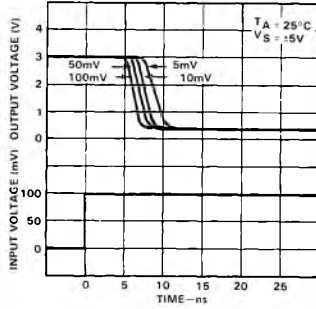
- 1 Response time measured from 0V point of  $\pm 100mV$  p-p 10MHz square wave to the 1.5V point of the output
- 2 Response time measured from 1.5V point of input to 1.5V point of the output

**TYPICAL PERFORMANCE CHARACTERISTICS**

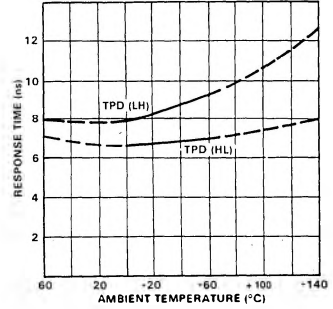
**RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES**



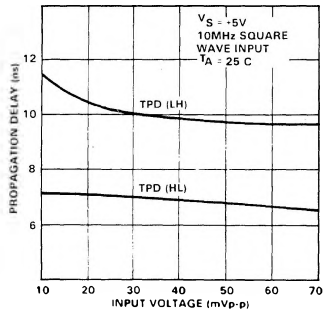
**RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES**



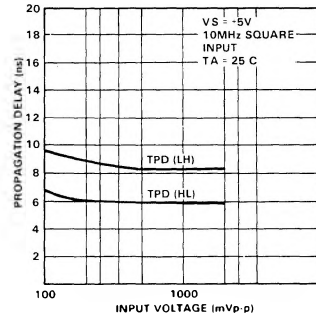
**RESPONSE TIME vs TEMPERATURE**



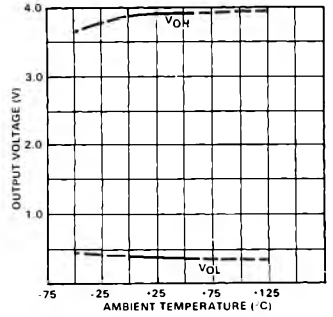
**PROPAGATION DELAY FOR VARIOUS INPUT VOLTAGE**



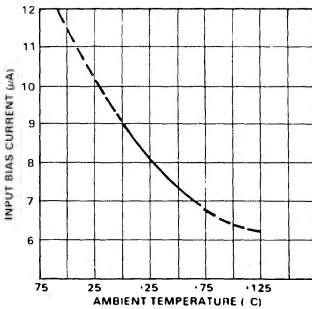
**PROPAGATION DELAY FOR VARIOUS INPUT VOLTAGES**



**OUTPUT VOLTAGE vs AMBIENT TEMPERATURE**



**INPUT BIAS CURRENT vs AMBIENT TEMPERATURE**



**INPUT OFFSET CURRENT vs AMBIENT TEMPERATURE**

