

# High-speed dual-differential comparator/sense amp

# NE/SE521

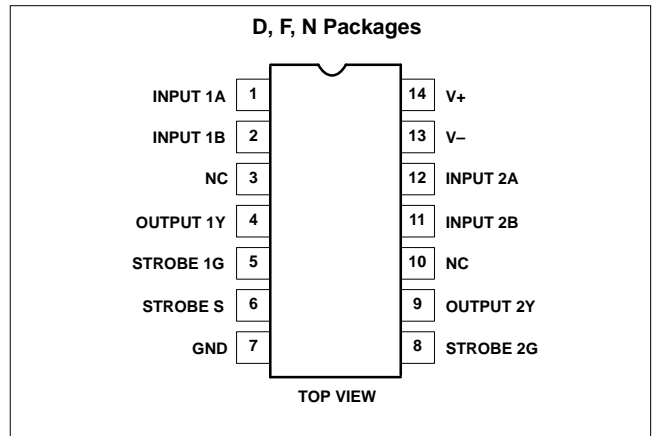
## FEATURES

- 12ns maximum guaranteed propagation delay
- 20µA 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

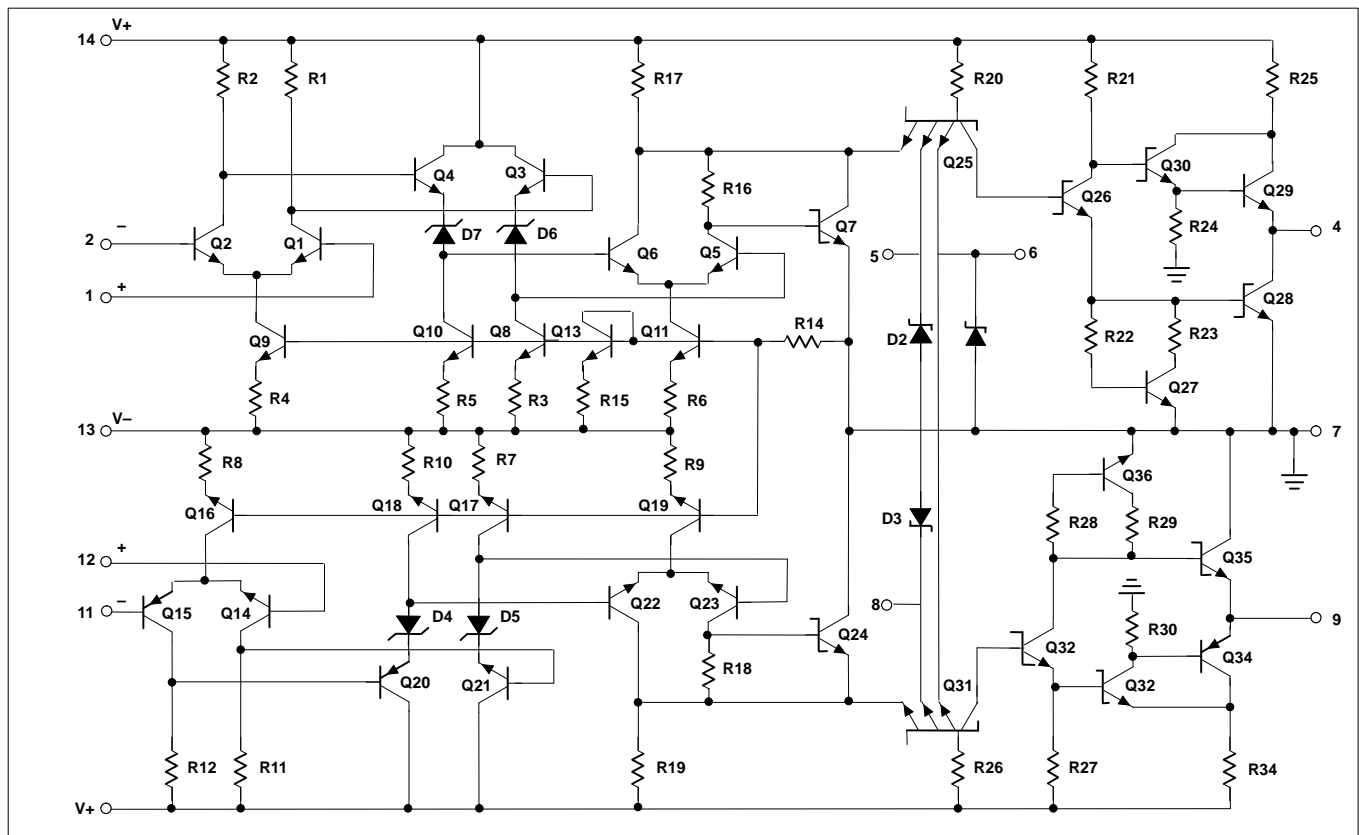
## PIN CONFIGURATION



## ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE	DWG #
14-Pin Plastic Dual In-Line Package (DIP)	0 to +70°C	NE521N	0405B
14-Pin SO Package	0 to +70°C	NE521D	0175D
14-Pin Ceramic Dual In-Line Package (CERDIP)	0 to +70°C	NE521F	0581B
14-Pin Ceramic Dual In-Line Package (CERDIP)	-55°C to +125°C	SE521F	0581B

## EQUIVALENT SCHEMATIC



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## LOGIC FUNCTIONS

$V_{ID}$ A <sup>+</sup> , B <sup>-</sup>	STROBE S	STROBE G	OUTPUT (Y)
$V_{ID} \leq -V_{OS}$	H	H	L
$-V_{OS} < V_{ID} < V_{OS}$	H	H	Undefined
$V_{ID} \geq V_{OS}$	H	H	H
X	L	X	H
X	X	L	H

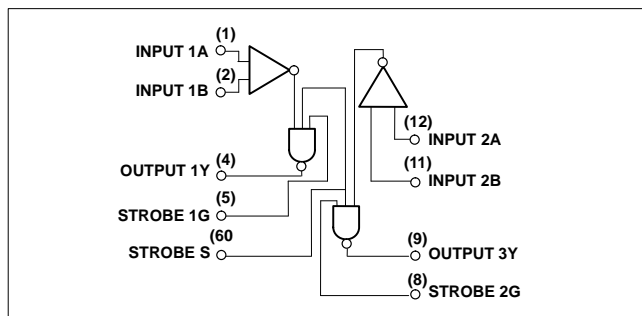
## ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
V+	Supply voltage		
	Positive	+7	V
V-	Negative	-7	V
$V_{IDR}$	Differential input voltage	±6	V
$V_{IN}$	Input voltage		
	Common mode	±5	V
	Strobe/gate	+5.25	V
$P_D$	Maximum power dissipation <sup>1</sup> $T_A = 25^\circ\text{C}$ (still-air)		
	F package	1190	mW
	N package	1420	mW
	D package	1040	mW
$T_A$	Operating temperature range		
	NE521	0 to 70	°C
	SE521	-55 to +125	°C
$T_{STG}$	Storage temperature range	-65 to +150	°C
$T_{SOLD}$	Lead soldering temperature (10 sec. max)	+300	°C

### NOTES:

- Derate above 25°C at the following rates:  
 F package at 9.5mW/°C  
 N package at 11.4mW/°C  
 D package at 8.3mW/°C

## BLOCK DIAGRAM



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**DC ELECTRICAL CHARACTERISTICS (SE521)**V<sub>+</sub>=+5V, V<sub>-</sub>=-5V, T<sub>A</sub>=-55°C to +125°C, unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			Min	Typ	Max	
V <sub>OS</sub>	Input offset voltage At 25°C Over temperature range	V <sub>+</sub> =+4.5V, V <sub>-</sub> =-4.5V		6	7.5 15	mV
I <sub>BIAS</sub>	Input bias current At 25°C Over temperature range	V <sub>+</sub> =+5.5V, V <sub>-</sub> =-5.5V		7.5	20 40	μA
I <sub>OS</sub>	Input offset current At 25°C Over temperature range	V <sub>+</sub> =+5.5V, V <sub>-</sub> =-5.5V		1.0	5 12	μA
V <sub>CM</sub>	Common-mode voltage range	V <sub>+</sub> =+4.5V, V <sub>-</sub> =-4.5V	-3		+3	V
V <sub>IL</sub>	Low level input voltage At 25°C Over temperature				0.8 0.7	V
V <sub>IH</sub>	High level input voltage		2.0			V
I <sub>IH</sub>	Input current High	V <sub>+</sub> =+5.5V, V <sub>-</sub> =-5.5V V <sub>IH</sub> =2.7V 1G or 2G strobe Common strobe S			50 100	μA μA
I <sub>IL</sub>	Input Current Low	V <sub>IL</sub> =0.5V 1G or 2G strobe Common strobe S			-2.0 -4.0	mA mA
V <sub>OH</sub>	Output voltage High	V <sub>I(S)</sub> =2.0V V <sub>+</sub> =+4.5V, V <sub>-</sub> =-4.5V, I <sub>LOAD</sub> =-1mA	2.5	3.4		V
V <sub>OL</sub>	Output voltage Low	V <sub>+</sub> =+4.5V, V <sub>-</sub> =-4.5V, I <sub>LOAD</sub> =10mA T <sub>A</sub> =25°C, I <sub>LOAD</sub> =20mA			0.5 0.5	V
V <sub>+</sub> V <sub>-</sub>	Supply voltage Positive Negative		4.5 -4.5	5.0 -5.0	5.5 -5.5	V
I <sub>CC+</sub> I <sub>CC-</sub>	Supply current Positive Negative	V <sub>+</sub> =5.5V, V <sub>-</sub> =-5.5V, T <sub>A</sub> =25°C		27 -15	35 -28	mA
I <sub>sc</sub>	Short-circuit output current		-35		-115	mA

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**DC ELECTRICAL CHARACTERISTICS**(NE521)V<sub>+</sub>=+5V, V<sub>-</sub>=-5V, T<sub>A</sub>=0 to 70°C, unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			Min	Typ	Max	
V <sub>OS</sub>	Input offset voltage At 25°C Over temperature range	V <sub>+</sub> =+4.75V, V <sub>-</sub> =-4.75V		6	7.5 10	mV
I <sub>BIAS</sub>	Input bias current At 25°C Over temperature range	V <sub>+</sub> =+5.25V, V <sub>-</sub> =-5.25V		7.5	20 40	μA
I <sub>OS</sub>	Input offset current At 25°C Over temperature range	V <sub>+</sub> =+5.25V, V <sub>-</sub> =-5.25V		1.0	5 12	μA
V <sub>CM</sub>	Common-mode voltage range	V <sub>+</sub> =+4.75V, V <sub>-</sub> =-4.75V	-3		+3	V
I <sub>IH</sub>	Input current High	V <sub>+</sub> =+5.25V, V <sub>-</sub> =-5.25V V <sub>IH</sub> =2.7V 1G or 2G strobe Common strobe S			50 100	μA μA
I <sub>IL</sub>	Input Current Low	V <sub>IL</sub> =0.5V 1G or 2G strobe Common strobe S			-2.0 -4.0	mA mA
V <sub>OH</sub> V <sub>OL</sub>	Output voltage High Low	V <sub>I(S)</sub> =2.0V V <sub>+</sub> =+4.75V, V <sub>-</sub> =-4.75V, I <sub>LOAD</sub> =-1mA V <sub>+</sub> =+5.25V, V <sub>-</sub> =-5.25V, I <sub>LOAD</sub> =20mA	2.7	3.4	0.5	V
V <sub>+</sub> V <sub>-</sub>	Supply voltage Positive Negative		4.75 -4.75	5.0 -5.0	5.25 -5.25	V
I <sub>CC+</sub> I <sub>CC-</sub>	Supply current Positive Negative	V <sub>+</sub> =5.25V, V <sub>-</sub> =-5.25V, T <sub>A</sub> =25°C		27 -15	35 -28	mA
I <sub>SC</sub>	Short-circuit output current		-40		-100	mA

**AC ELECTRICAL CHARACTERISTICS**T<sub>A</sub>=25°C, R<sub>L</sub>=280Ω C<sub>L</sub>=15pF V<sub>+</sub>=5V V<sub>-</sub>=-5V.

SYMBOL	PARAMETER	FROM INPUT	TO OUTPUT	LIMITS			UNIT
				Min	Typ	Max	
<b>Large-signal switching speed</b>							
t <sub>PLH(D)</sub>	Propagation delay Low to high <sup>1</sup>	Amp	Output		8	12	ns
t <sub>PHL(D)</sub>	High to low <sup>1</sup>	Amp	Output		6	9	
t <sub>PLH(S)</sub>	Low to high <sup>2</sup>	Strobe	Output		4.5	10	
t <sub>PHL(S)</sub>	High to low <sup>2</sup>	Strobe	Output		3.0	6	
f <sub>MAX</sub>	Max. operating frequency			40	55		MHz

**NOTES:**

- Response time measured from 0V point of ±100mV<sub>p-p</sub> 10MHz square wave to the 1.5V point of the output.
- Response time measured from 1.5V point of input to 1.5V point of the output.

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## TYPICAL PERFORMANCE CHARACTERISTICS

