

# NE521

## High-Speed Dual-Differential Comparator/Sense Amp

### Features

- TTL-Compatible Strobes and Outputs
- Large Common-Mode Input Voltage Range
- Operates from Standard Supply Voltages

### Applications

- MOS Memory Sense Amp
- A-to-D Conversion
- High-Speed Line Receiver

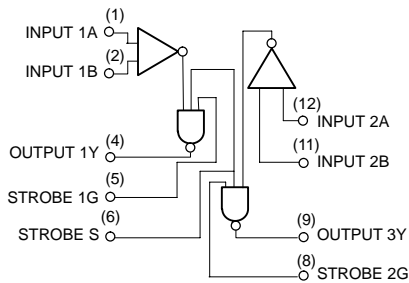


Figure 1. Block Diagram

### LOGIC FUNCTION TABLE

$V_{ID} (A^+, B)$	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

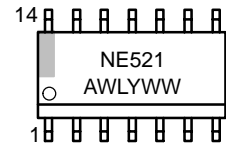
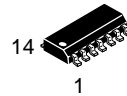


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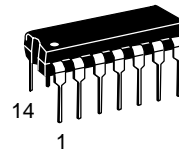
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### MARKING DIAGRAMS

SOIC-14  
D SUFFIX  
CASE 751A



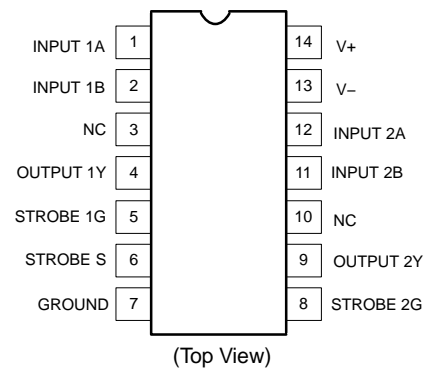
PDIP-14  
N SUFFIX  
CASE 646



A = Assembly Location  
WL = Wafer Lot  
YY, Y = Year  
WW = Work Week

### PIN CONNECTIONS

D, N Packages



(Top View)

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

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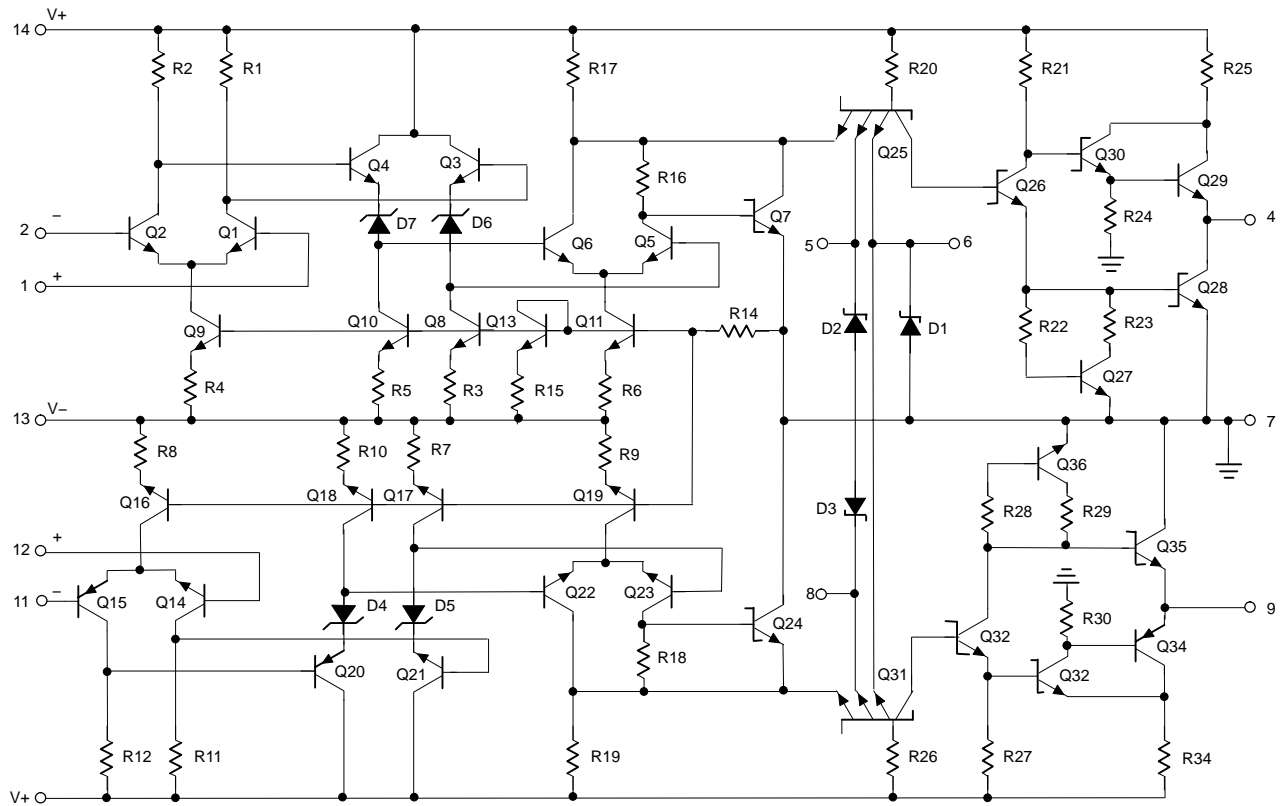


Figure 2. Equivalent Schematic

## MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Supply Voltage Positive Negative	V+ V-	+7.0 -7.0	V
Differential Input Voltage	V <sub>IDR</sub>	± 6.0	V
Input Voltage Common Mode Strobe/Gate	V <sub>IN</sub>	± 5.0 +5.25	V
Maximum Power Dissipation (Note 1) T <sub>A</sub> = 25°C (Still-Air) N Package D Package	P <sub>D</sub>	1420 1040	mW
Thermal Resistance, Junction-to-Ambient N Package D Package	R <sub>θJA</sub>	100 145	°C/W
Operating Temperature Range	T <sub>A</sub>	0 to 70	°C
Storage Temperature Range	T <sub>stg</sub>	-65 to +150	°C
Operating Junction Temperature	T <sub>J</sub>	150	°C
Lead Soldering Temperature (10 sec max)	T <sub>slid</sub>	+230	°C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

- Derate above 25°C at the following rates:  
N package at 10 mW/°C  
D package at 6.9 mW/°C.

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## DC ELECTRICAL CHARACTERISTICS (V+ = +5.0 V; V- = -5.0 V, TA = 0°C to +70°C, unless otherwise noted.)

Characteristic	Symbol	Test Conditions	Limits			Unit
			Min	Typ	Max	
Input Offset Voltage At 25°C Overtemperature Range	V <sub>OS</sub>	V+ = +4.75 V; V- = -4.75 V	- -	6.0 -	7.5 10	mV
Input Bias Current At 25°C Overtemperature Range	I <sub>BIAS</sub>	V+ = +5.25 V; V- = -5.25 V	- -	7.5 -	20 40	μA
Input Offset Current At 25°C Overtemperature Range	I <sub>OS</sub>	V+ = +5.25 V; V- = -5.25 V	- -	1.0 -	5.0 12	μA
Common-Mode Voltage Range	V <sub>CM</sub>	V+ = +4.75 V; V- = -4.75 V	-3.0	-	+3.0	V
Input Current High	I <sub>IH</sub>	V+ = +5.25 V; V- = -5.25 V V <sub>IH</sub> = 2.7 V 1G or 2G Strobe Common Strobe S	- -	- -	50 100	μA
Input Current Low	I <sub>IL</sub>	V <sub>IL</sub> = 0.5 V 1G or 2G Strobe Common Strobe S	- -	- -	-2.0 -4.0	mA
Output Voltage High	V <sub>OH</sub>	V <sub>I(S)</sub> = 2.0 V V+ = +4.75 V; V- = -4.75 V; I <sub>LOAD</sub> = -1.0 mA	2.7	3.4		V
Output Voltage Low	V <sub>OL</sub>	V+ = +5.25 V; V- = -5.25 V; I <sub>LOAD</sub> = 20 mA			0.5	
Supply Voltage Positive	V+	-	4.75	5.0	5.25	V
Supply Voltage Negative	V-	-	-4.75	-5.0	-5.25	
Supply Current Positive	I <sub>CC+</sub>	V+ = +5.25 V; V- = -5.25 V; TA = 25°C	-	27	35	mA
Supply Current Negative	I <sub>CC-</sub>		-	-15	-28	
Short-Circuit Output Current	I <sub>SC</sub>	-	-40	-	-100	mA

## AC ELECTRICAL CHARACTERISTICS (TA = 25°C; RL = 280 Ω; CL = 15 pF, V+ = 5.0 V; V- = 5.0 V, guaranteed by characterization)

Characteristic	Symbol	From Input	To Output	Limits			Unit
				Min	Typ	Max	
<b>Large-Signal Switching Speed</b>							
Propagation Delay							ns
Low to High (Note 2)	t <sub>PLH(D)</sub>	Amp	Output	-	9.6	12	
High to Low (Note 2)	t <sub>PHL(D)</sub>	Amp	Output	-	8.2	9.0	
Low to High (Note 3)	t <sub>PLH(S)</sub>	Strobe	Output	-	4.8	10	
High to Low (Note 3)	t <sub>PHL(S)</sub>	Strobe	Output	-	3.9	6.0	
Max. Operating Frequency	f <sub>MAX</sub>	-	-	40	55	-	MHz

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

TYPICAL PERFORMANCE CHARACTERISTICS

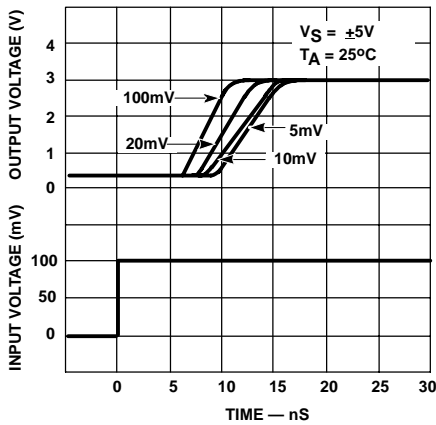


Figure 3. Response Time for Various Input Overdrives

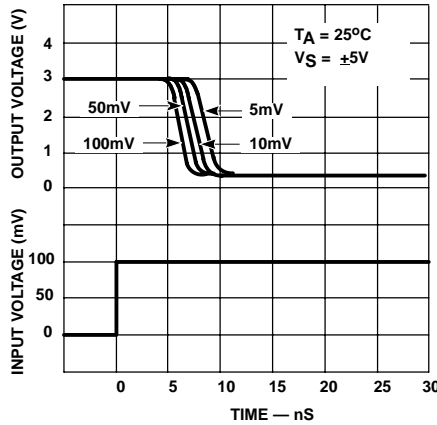


Figure 4. Response Time for Various Input Overdrives

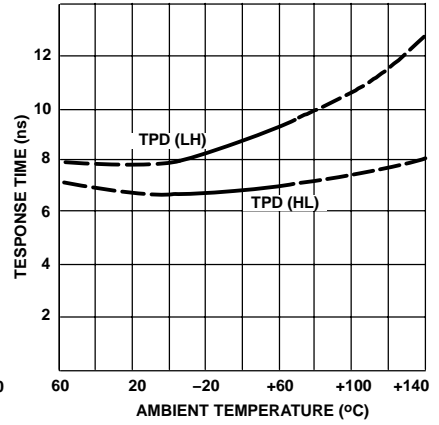


Figure 5. Response Time vs. Temperature

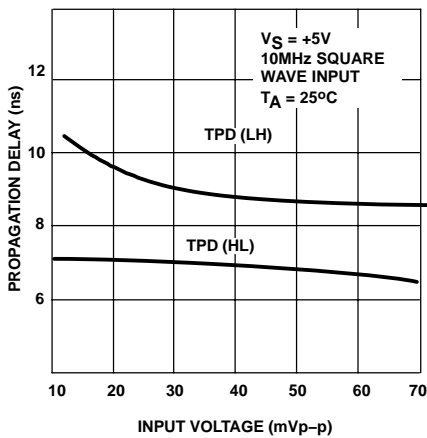


Figure 6. Propagation Delay for Various Input Voltages

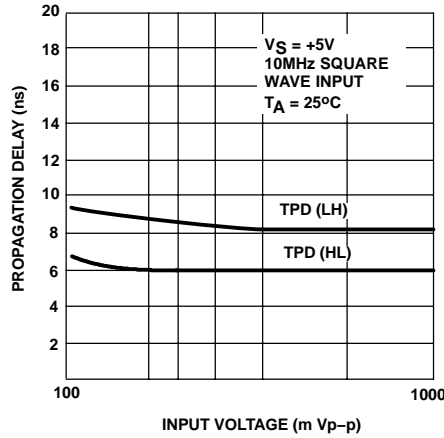


Figure 7. Propagation Delay for Various Input Voltages

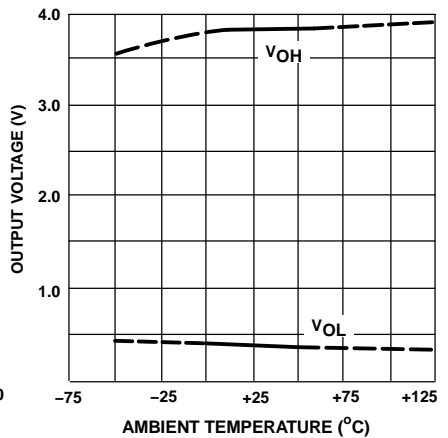


Figure 8. Output Voltage vs. Ambient Temperature

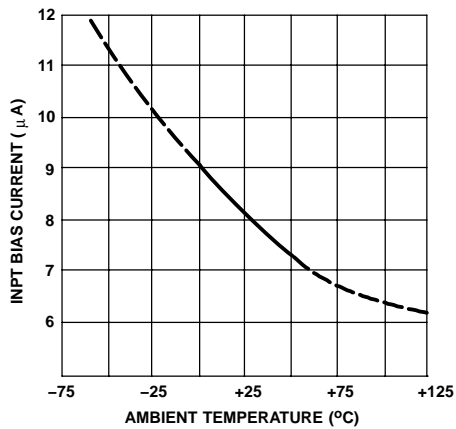


Figure 9. Input Bias Current vs. Ambient Temperature

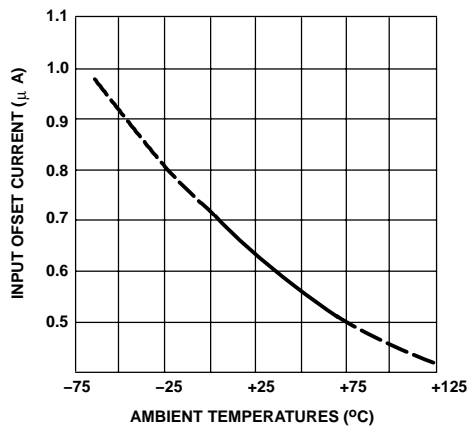


Figure 10. Input Offset Current vs. Ambient Temperature

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## ORDERING INFORMATION

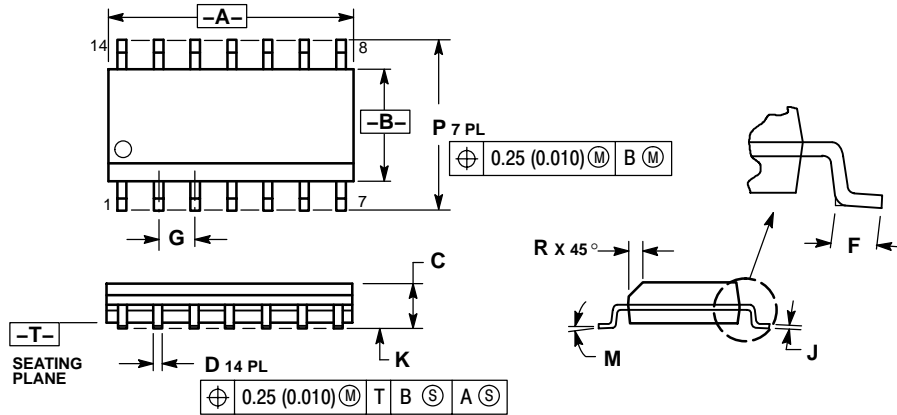
Device	Description	Temperature Range	Shipping†
NE521D	14-Pin SO Package	0 to +70°C	55 Units/Rail
NE521DR2	14-Pin SO Package	0 to +70°C	2500 Tape & Reel
NE521N	14-Pin Plastic Dual In-Line Package	0 to +70°C	25 Units/Rail

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

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## PACKAGE DIMENSIONS

### SOIC-14 D SUFFIX CASE 751A-03 ISSUE G

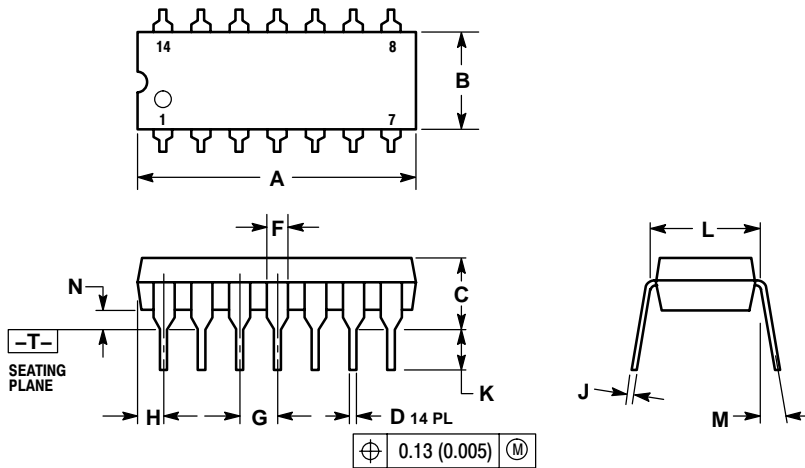


#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.55	8.75	0.337	0.344
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.228	0.244
R	0.25	0.50	0.010	0.019

### PDIP-14 N SUFFIX CASE 646-06 ISSUE M



#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.715	0.770	18.16	18.80
B	0.240	0.260	6.10	6.60
C	0.145	0.185	3.69	4.69
D	0.015	0.021	0.38	0.53
F	0.040	0.070	1.02	1.78
G	0.100 BSC		2.54 BSC	
H	0.052	0.095	1.32	2.41
J	0.008	0.015	0.20	0.38
K	0.115	0.135	2.92	3.43
L	0.290	0.310	7.37	7.87
M	---	10°	---	10°
N	0.015	0.039	0.38	1.01

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