

# 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
- Pb-Free Packages are Available

### Applications

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

### 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)	P <sub>D</sub>	N Package D Package	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	

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Derate above 25°C at the following rates:

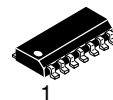
- N package at 10 mW/°C
- D package at 6.9 mW/°C.



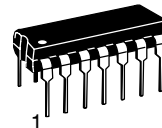
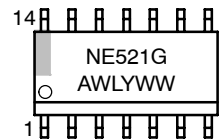
ON Semiconductor®

<http://onsemi.com>

### MARKING DIAGRAMS



SOIC-14  
D SUFFIX  
CASE 751A



PDIP-14  
N SUFFIX  
CASE 646



A = Assembly Location  
WL = Wafer Lot  
Y, YY = Year  
WW = Work Week  
G = Pb-Free Package

### PIN CONNECTIONS

#### D, N Packages



### ORDERING INFORMATION

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

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## 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



Figure 1. Block Diagram

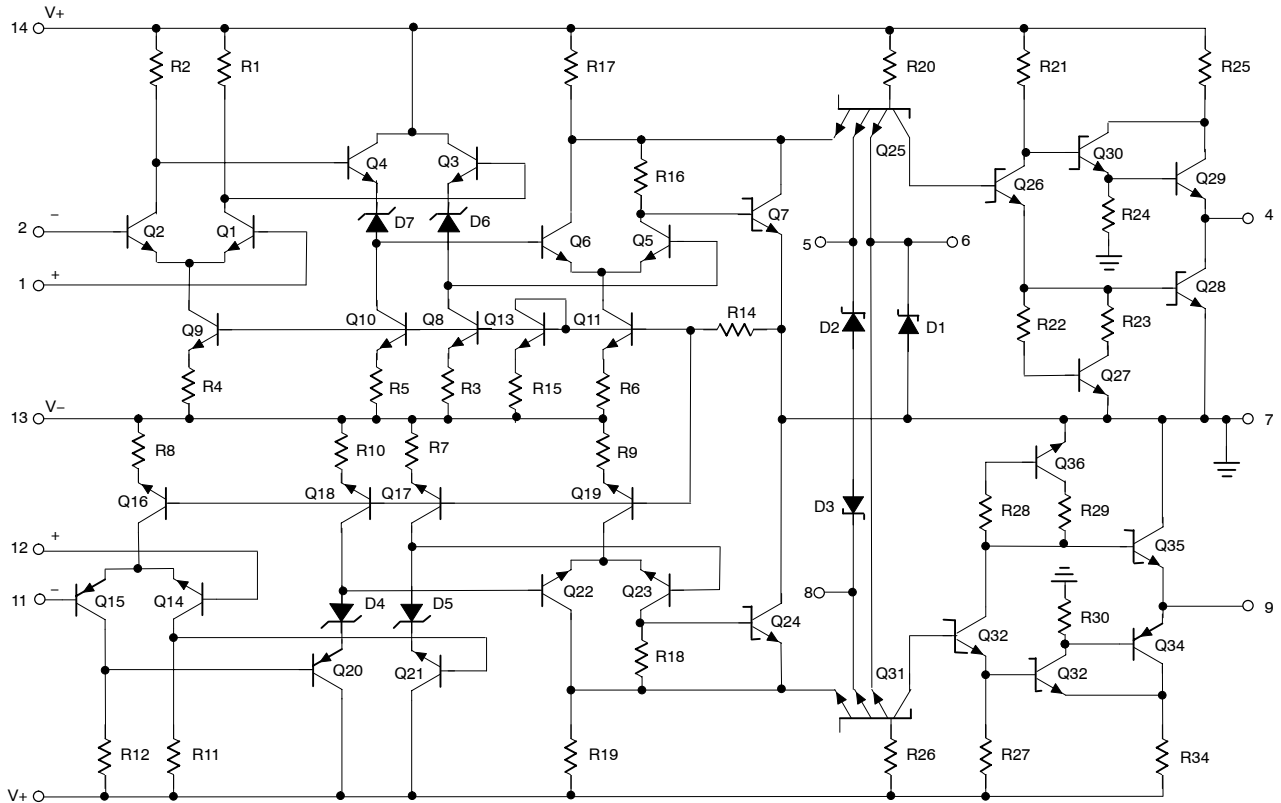


Figure 2. Equivalent Schematic

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## DC ELECTRICAL CHARACTERISTICS ( $V_+ = +5.0\text{ V}$ ; $V_- = -5.0\text{ V}$ , $T_A = 0^\circ\text{C}$ to $+70^\circ\text{C}$ , unless otherwise noted.)

Characteristic	Test Conditions	Symbol	Limits			Unit
			Min	Typ	Max	
Input Offset Voltage At $25^\circ\text{C}$ Overtemperature Range	$V_+ = +4.75\text{ V}$ ; $V_- = -4.75\text{ V}$	$V_{OS}$	– –	6.0 –	7.5 10	mV
Input Bias Current At $25^\circ\text{C}$ Overtemperature Range	$V_+ = +5.25\text{ V}$ ; $V_- = -5.25\text{ V}$	$I_{BIAS}$	– –	7.5 –	20 40	$\mu\text{A}$
Input Offset Current At $25^\circ\text{C}$ Overtemperature Range	$V_+ = +5.25\text{ V}$ ; $V_- = -5.25\text{ V}$	$I_{OS}$	– –	1.0 –	5.0 12	$\mu\text{A}$
Common-Mode Voltage Range	$V_+ = +4.75\text{ V}$ ; $V_- = -4.75\text{ V}$	$V_{CM}$	–3.0	–	+3.0	V
Input Current High	$V_+ = +5.25\text{ V}$ ; $V_- = -5.25\text{ V}$ $V_{IH} = 2.7\text{ V}$ 1G or 2G Strobe Common Strobe S	$I_{IH}$	– –	– –	50 100	$\mu\text{A}$
Input Current Low	$V_{IL} = 0.5\text{ V}$ 1G or 2G Strobe Common Strobe S	$I_{IL}$	– –	– –	–2.0 –4.0	mA
Output Voltage High	$V_{I(S)} = 2.0\text{ V}$ $V_+ = +4.75\text{ V}$ ; $V_- = -4.75\text{ V}$ ; $I_{LOAD} = -1.0\text{ mA}$	$V_{OH}$	2.7	3.4		V
Output Voltage Low	$V_+ = +5.25\text{ V}$ ; $V_- = -5.25\text{ V}$ ; $I_{LOAD} = 20\text{ mA}$	$V_{OL}$			0.5	V
Supply Voltage Positive	–	$V_+$	4.75	5.0	5.25	V
Supply Voltage Negative	–	$V_-$	–4.75	–5.0	–5.25	V
Supply Current Positive	$V_+ = +5.25\text{ V}$ ; $V_- = -5.25\text{ V}$ ; $T_A = 25^\circ\text{C}$	$I_{CC+}$	–	27	35	mA
Supply Current Negative		$I_{CC-}$	–	–15	–28	mA
Short-Circuit Output Current	–	$I_{SC}$	–40	–	–100	mA

## AC ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ ; $R_L = 280\ \Omega$ ; $C_L = 15\text{ pF}$ , $V_+ = 5.0\text{ V}$ ; $V_- = 5.0\text{ V}$ , guaranteed by characterization)

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

2. Response time measured from 0 V point of  $\pm 100\text{ mV}_{P-P}$  10 MHz square wave to the 1.5 V point of the output.

3. Response time measured from 1.5 V point of input to 1.5 V point of the output.

TYPICAL PERFORMANCE CHARACTERISTICS

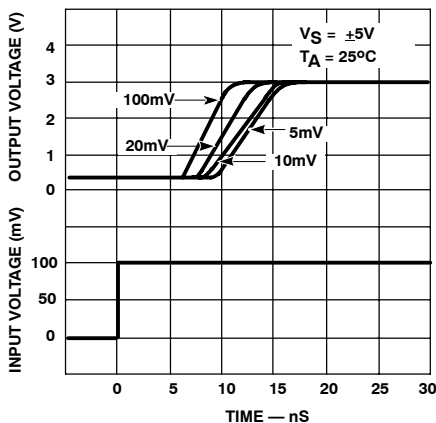


Figure 3. Response Time for Various Input Overdrives

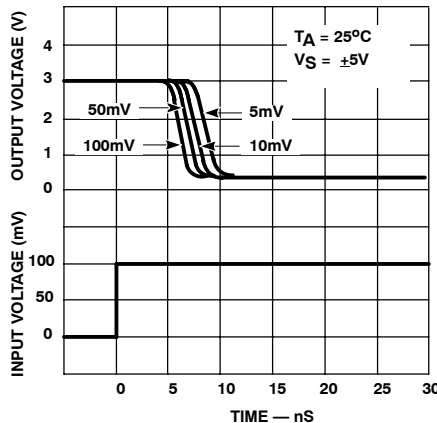


Figure 4. Response Time for Various Input Overdrives

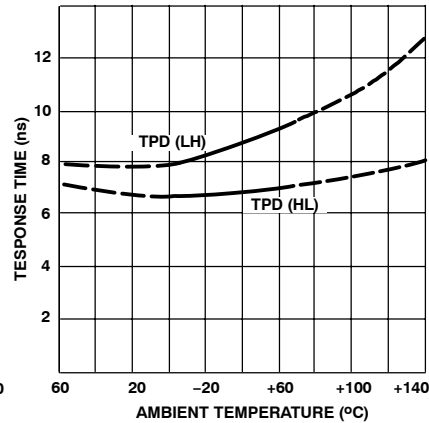


Figure 5. Response Time vs. Temperature

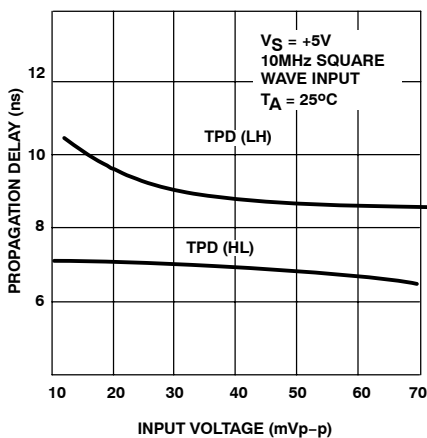


Figure 6. Propagation Delay for Various Input Voltages

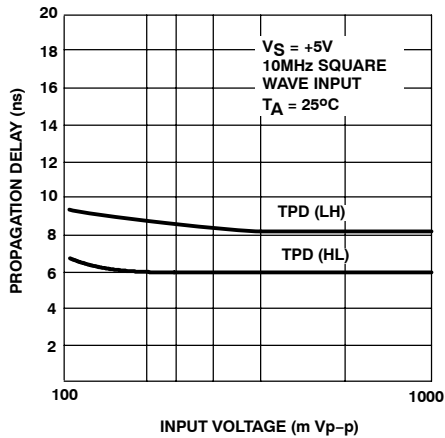


Figure 7. Propagation Delay for Various Input Voltages

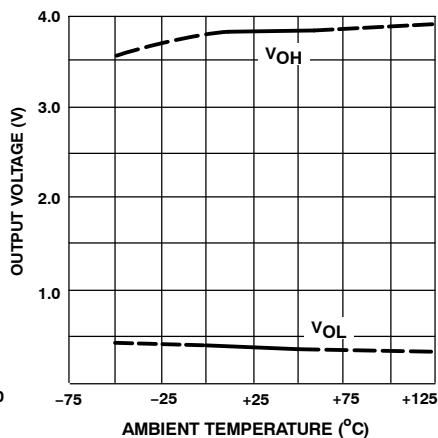


Figure 8. Output Voltage vs. Ambient Temperature

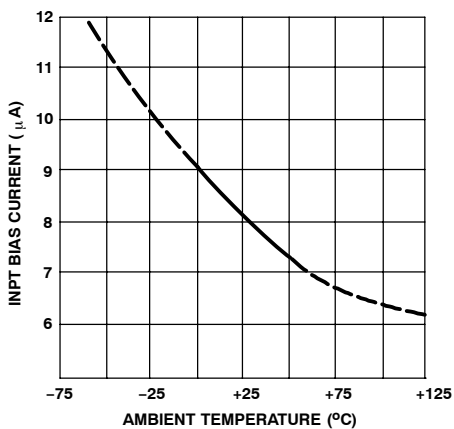


Figure 9. Input Bias Current vs. Ambient Temperature

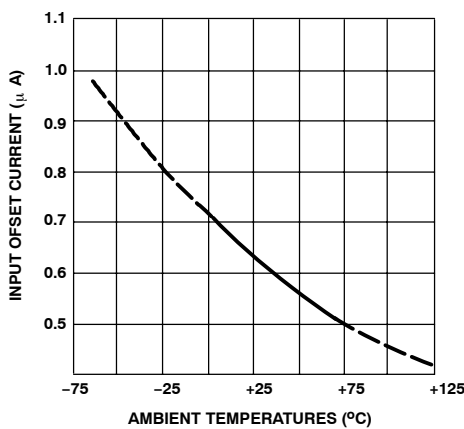


Figure 10. Input Offset Current vs. Ambient Temperature

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## ORDERING INFORMATION

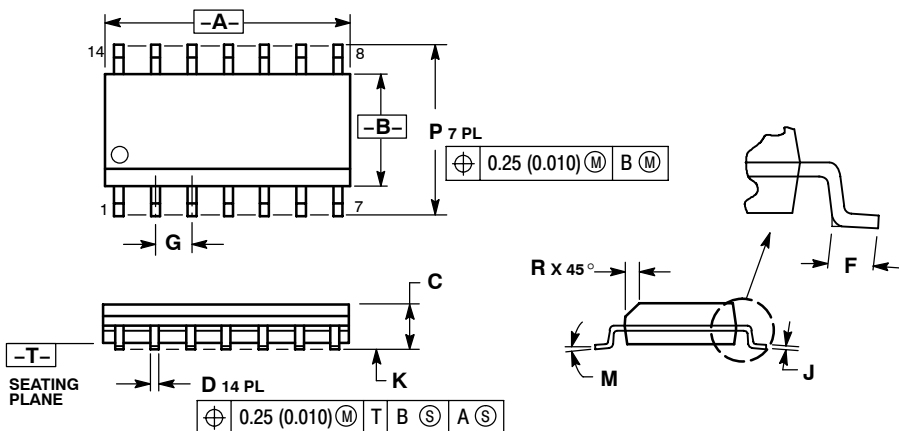
Device	Temperature Range	Package	Shipping†
NE521D	0 to +70°C	SOIC-14	55 Units/Rail
NE521DG		SOIC-14 (Pb-Free)	
NE521DR2		SOIC-14	2500/Tape & Reel
NE521DR2G		SOIC-14 (Pb-Free)	
NE521N		PDIP-14	25 Units/Rail
NE521NG		PDIP-14 (Pb-Free)	

†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

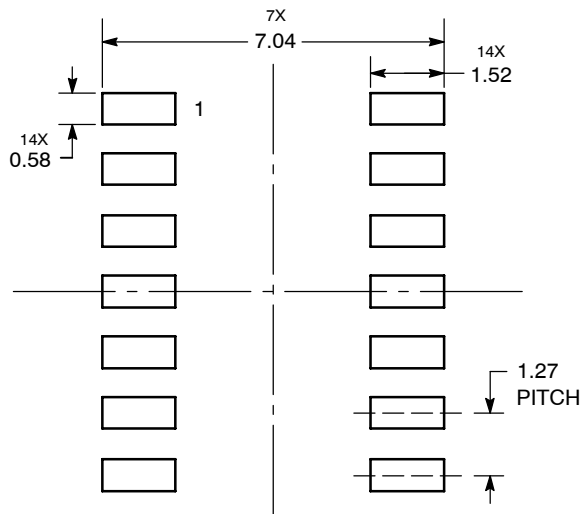
SOIC-14  
CASE 751A-03  
ISSUE H



- 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

### SOLDERING FOOTPRINT\*



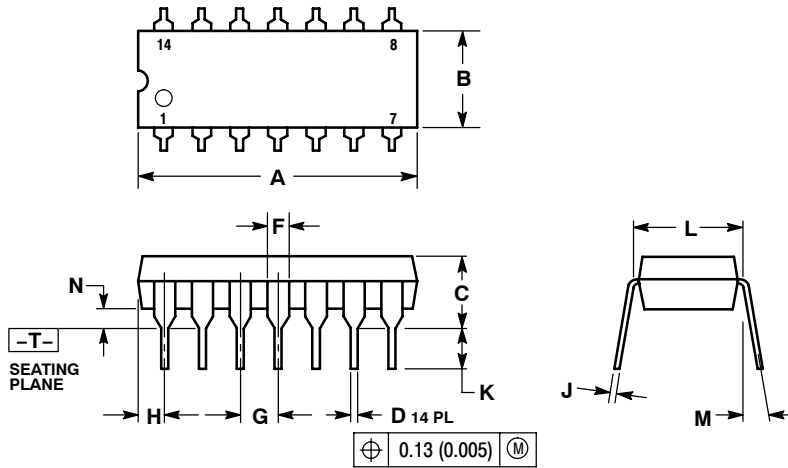
DIMENSIONS: MILLIMETERS

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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## PACKAGE DIMENSIONS

**PDIP-14**  
CASE 646-06  
ISSUE P



**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	19.56
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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