

# High-Speed Dual-Differential Comparator/Sense Amp

## NE521

### Features

- TTL-Compatible Strokes 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

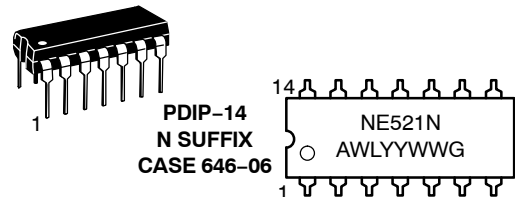
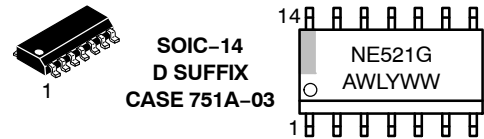
| Rating                                  | Symbol          | Value       | Unit               |
|-----------------------------------------|-----------------|-------------|--------------------|
| Supply Voltage                          |                 |             | V                  |
| Positive                                | $V_+$           | +7.0        |                    |
| Negative                                | $V_-$           | -7.0        |                    |
| Differential Input Voltage              | $V_{IDR}$       | $\pm 6.0$   | V                  |
| Input Voltage                           | $V_{IN}$        |             | V                  |
| Common Mode                             |                 | $\pm 5.0$   |                    |
| Stroke/Gate                             |                 | +5.25       |                    |
| Maximum Power Dissipation (Note 1)      | $P_D$           |             | mW                 |
| $T_A = 25^\circ\text{C}$ (Still-Air)    |                 |             |                    |
| N Package                               |                 | 1420        |                    |
| D Package                               |                 | 1040        |                    |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ |             | $^\circ\text{C/W}$ |
| N Package                               |                 | 100         |                    |
| D Package                               |                 | 145         |                    |
| Operating Temperature Range             | $T_A$           | 0 to 70     | $^\circ\text{C}$   |
| Storage Temperature Range               | $T_{stg}$       | -65 to +150 | $^\circ\text{C}$   |
| Operating Junction Temperature          | $T_J$           | 150         | $^\circ\text{C}$   |
| Lead Soldering Temperature (10 sec max) | $T_{sld}$       | +230        | $^\circ\text{C}$   |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Derate above  $25^\circ\text{C}$  at the following rates:

- N package at 10 mW/ $^\circ\text{C}$
- D package at 6.9 mW/ $^\circ\text{C}$ .

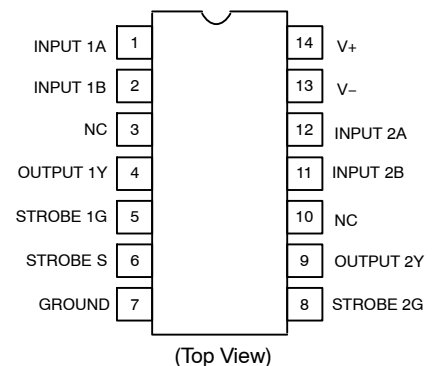
### MARKING DIAGRAMS



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.

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 5.

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          |

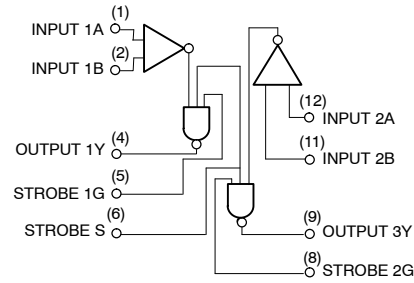


Figure 1. Block Diagram

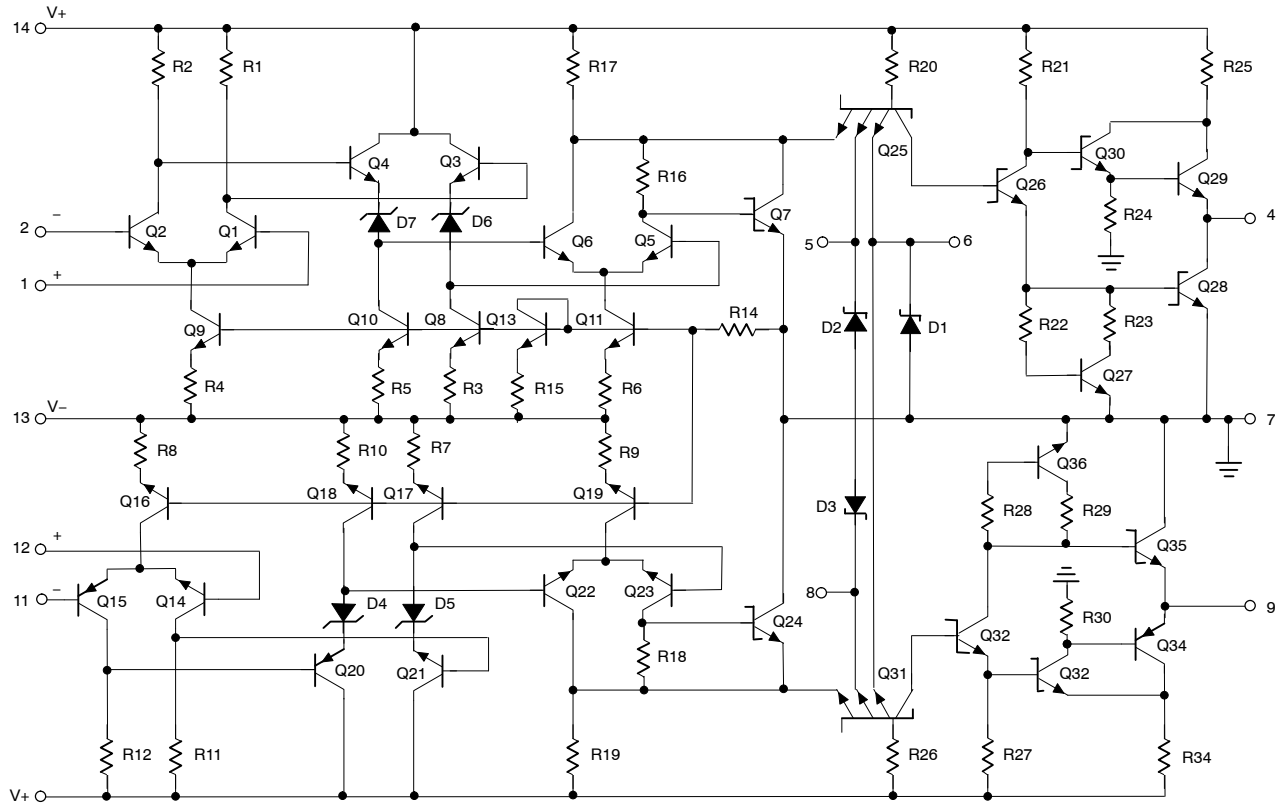


Figure 2. Equivalent Schematic

# NE521

## 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<br>At $25^\circ\text{C}$<br>Overtemperature Range | $V_+ = +4.75\text{ V}$ ; $V_- = -4.75\text{ V}$                                                                                                                                                 | $V_{OS}$                 | –<br>–        | 6.0<br>–    | 7.5<br>10     | mV            |
| Input Bias Current<br>At $25^\circ\text{C}$<br>Overtemperature Range   | $V_+ = +5.25\text{ V}$ ; $V_- = -5.25\text{ V}$                                                                                                                                                 | $I_{BIAS}$               | –<br>–        | 7.5<br>–    | 20<br>40      | $\mu\text{A}$ |
| Input Offset Current<br>At $25^\circ\text{C}$<br>Overtemperature Range | $V_+ = +5.25\text{ V}$ ; $V_- = -5.25\text{ V}$                                                                                                                                                 | $I_{OS}$                 | –<br>–        | 1.0<br>–    | 5.0<br>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<br>High                                                  | $V_+ = +5.25\text{ V}$ ; $V_- = -5.25\text{ V}$<br>$V_{IH} = 2.7\text{ V}$<br>1G or 2G Strobe<br>Common Strobe S                                                                                | $I_{IH}$                 | –<br>–        | –<br>–      | 50<br>100     | $\mu\text{A}$ |
| Input Current<br>Low                                                   | $V_{IL} = 0.5\text{ V}$<br>1G or 2G Strobe<br>Common Strobe S                                                                                                                                   | $I_{IL}$                 | –<br>–        | –<br>–      | –2.0<br>–4.0  | mA            |
| Output Voltage<br>High<br><br>Low                                      | $V_{I(S)} = 2.0\text{ V}$<br>$V_+ = +4.75\text{ V}$ ; $V_- = -4.75\text{ V}$ ;<br>$I_{LOAD} = -1.0\text{ mA}$<br>$V_+ = +5.25\text{ V}$ ; $V_- = -5.25\text{ V}$ ;<br>$I_{LOAD} = 20\text{ mA}$ | $V_{OH}$<br><br>$V_{OL}$ | 2.7           | 3.4         | 0.5           | V             |
| Supply Voltage<br>Positive<br>Negative                                 | –                                                                                                                                                                                               | $V_+$<br>$V_-$           | 4.75<br>–4.75 | 5.0<br>–5.0 | 5.25<br>–5.25 | V             |
| Supply Current<br>Positive<br>Negative                                 | $V_+ = +5.25\text{ V}$ ; $V_- = -5.25\text{ V}$ ;<br>$T_A = 25^\circ\text{C}$                                                                                                                   | $I_{CC+}$<br>$I_{CC-}$   | –<br>–        | 27<br>–15   | 35<br>–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 |      |
| Large-Signal Switching Speed              |            |           |                     |        |     |     |      |
| Propagation Delay<br>Low to High (Note 2) | Amp        | Output    | t <sub>PLH(D)</sub> | –      | 9.6 | 12  | ns   |
| High to Low (Note 2)                      | Amp        | Output    | t <sub>PHL(D)</sub> | –      | 8.2 | 9.0 |      |
| Low to High (Note 3)                      | Strobe     | Output    | t <sub>PLH(S)</sub> | –      | 4.8 | 10  |      |
| High to Low (Note 3)                      | Strobe     | Output    | t <sub>PHL(S)</sub> | –      | 3.9 | 6.0 |      |
| Max. Operating Frequency                  | –          | –         | f <sub>MAX</sub>    | 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

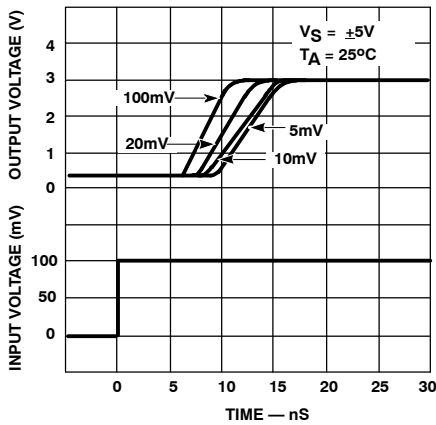


Figure 3. Response Time for Various Input Overdrives

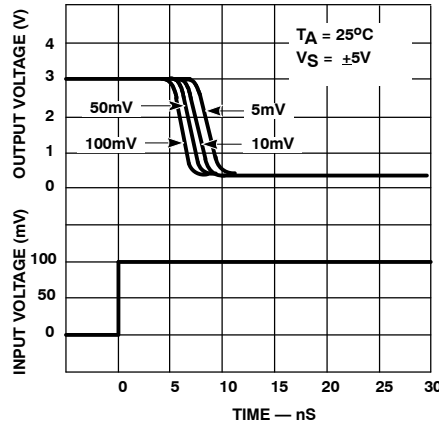


Figure 4. Response Time for Various Input Overdrives

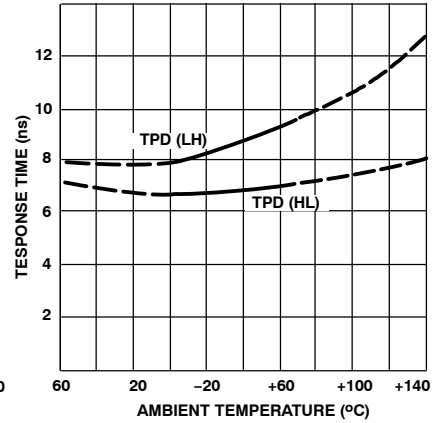


Figure 5. Response Time vs. Temperature

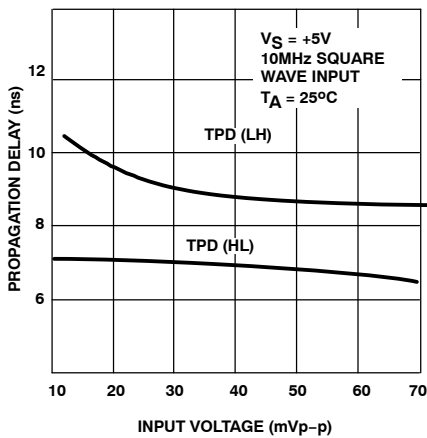


Figure 6. Propagation Delay for Various Input Voltages

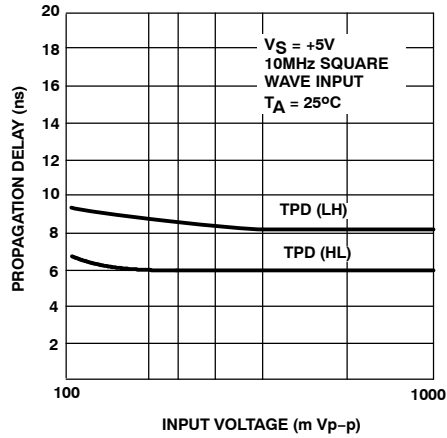


Figure 7. Propagation Delay for Various Input Voltages

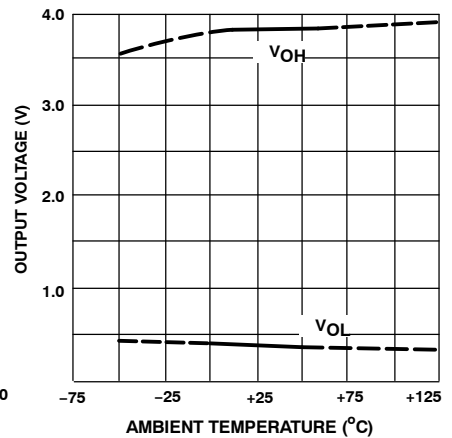


Figure 8. Output Voltage vs. Ambient Temperature

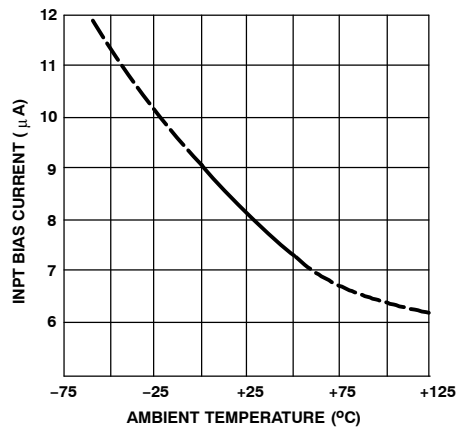


Figure 9. Input Bias Current vs. Ambient Temperature

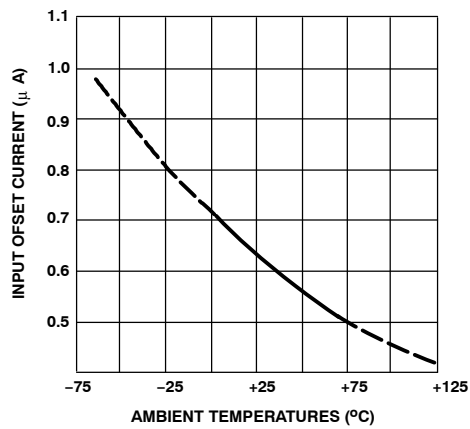


Figure 10. Input Offset Current vs. Ambient Temperature

## NE521

### ORDERING INFORMATION

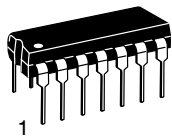
| Device    | Temperature Range | Package              | Shipping†        |
|-----------|-------------------|----------------------|------------------|
| NE521DR2G | 0 to +70°C        | SOIC-14<br>(Pb-Free) | 2500/Tape & Reel |

### DISCONTINUED (Note 4)

|          |            |                      |                  |
|----------|------------|----------------------|------------------|
| NE521D   | 0 to +70°C | SOIC-14              | 55 Units/Rail    |
| NE521DG  |            | SOIC-14<br>(Pb-Free) |                  |
| NE521DR2 |            | SOIC-14              | 2500/Tape & Reel |
| NE521N   | 0 to +70°C | PDIP-14              | 25 Units/Rail    |
| NE521NG  |            | PDIP-14<br>(Pb-Free) |                  |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

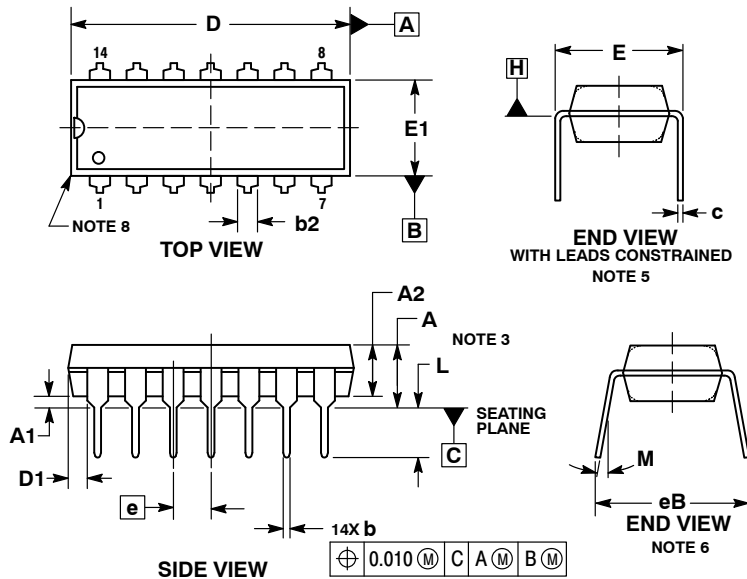
4. **DISCONTINUED:** These devices are not recommended for new design. Please contact your **onsemi** representative for information. The most current information on these devices may be available on [www.onsemi.com](http://www.onsemi.com).



SCALE 1:1

**PDIP-14**  
**CASE 646-06**  
**ISSUE 5**

DATE 22 APR 2015



**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. DIMENSIONS A, A1 AND L ARE MEASURED WITH THE PACKAGE SEATED IN JEDEC SEATING PLANE GAUGE GS-3.
4. DIMENSIONS D, D1 AND E1 DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS. MOLD FLASH OR PROTRUSIONS ARE NOT TO EXCEED 0.10 INCH.
5. DIMENSION E IS MEASURED AT A POINT 0.015 BELOW DATUM PLANE H WITH THE LEADS CONSTRAINED PERPENDICULAR TO DATUM C.
6. DIMENSION eB IS MEASURED AT THE LEAD TIPS WITH THE LEADS UNCONSTRAINED.
7. DATUM PLANE H IS COINCIDENT WITH THE BOTTOM OF THE LEADS, WHERE THE LEADS EXIT THE BODY.
8. PACKAGE CONTOUR IS OPTIONAL (ROUNDED OR SQUARE CORNERS).

| DIM | INCHES             |       | MILLIMETERS |       |
|-----|--------------------|-------|-------------|-------|
|     | MIN                | MAX   | MIN         | MAX   |
| A   | ---                | 0.210 | ---         | 5.33  |
| A1  | 0.015              | ---   | 0.38        | ---   |
| A2  | 0.115              | 0.195 | 2.92        | 4.95  |
| b   | 0.014              | 0.022 | 0.35        | 0.56  |
| b2  | 0.060 TYP 1.52 TYP |       |             |       |
| C   | 0.008              | 0.014 | 0.20        | 0.36  |
| D   | 0.735              | 0.775 | 18.67       | 19.69 |
| D1  | 0.005              | ---   | 0.13        | ---   |
| E   | 0.300              | 0.325 | 7.62        | 8.26  |
| E1  | 0.240              | 0.280 | 6.10        | 7.11  |
| e   | 0.100 BSC          |       | 2.54 BSC    |       |
| eB  | ---                | 0.430 | ---         | 10.92 |
| L   | 0.115              | 0.150 | 2.92        | 3.81  |
| M   | ---                | 10°   | ---         | 10°   |

**GENERIC**  
**MARKING DIAGRAM\***



XXXXX = Specific Device Code  
A = Assembly Location  
WL = Wafer Lot  
YY = Year  
WW = Work Week  
G = Pb-Free Package

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

STYLES ON PAGE 2

|                         |                    |                                                                                                                                                                                     |
|-------------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DOCUMENT NUMBER:</b> | <b>98ASB42428B</b> | Electronic versions are uncontrolled except when accessed directly from the Document Repository.<br>Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| <b>DESCRIPTION:</b>     | <b>PDIP-14</b>     | <b>PAGE 1 OF 2</b>                                                                                                                                                                  |

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

PDIP-14  
CASE 646-06  
ISSUE S

DATE 22 APR 2015

|                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| STYLE 1:<br>PIN 1. COLLECTOR<br>2. BASE<br>3. EMITTER<br>4. NO<br>CONNECTION<br>5. EMITTER<br>6. BASE<br>7. COLLECTOR<br>8. COLLECTOR<br>9. BASE<br>10. EMITTER<br>11. NO<br>CONNECTION<br>12. EMITTER<br>13. BASE<br>14. COLLECTOR                                                                       | STYLE 2:<br>CANCELLED                                                                                                                                                                                                                                                                                            | STYLE 3:<br>CANCELLED                                                                                                                                                                                                                         | STYLE 4:<br>PIN 1. DRAIN<br>2. SOURCE<br>3. GATE<br>4. NO<br>CONNECTION<br>5. GATE<br>6. SOURCE<br>7. DRAIN<br>8. DRAIN<br>9. SOURCE<br>10. GATE<br>11. NO<br>CONNECTION<br>12. GATE<br>13. SOURCE<br>14. DRAIN                                                                                            |
| STYLE 5:<br>PIN 1. GATE<br>2. DRAIN<br>3. SOURCE<br>4. NO CONNECTION<br>5. SOURCE<br>6. DRAIN<br>7. GATE<br>8. GATE<br>9. DRAIN<br>10. SOURCE<br>11. NO CONNECTION<br>12. SOURCE<br>13. DRAIN<br>14. GATE                                                                                                 | STYLE 6:<br>PIN 1. COMMON CATHODE<br>2. ANODE/CATHODE<br>3. ANODE/CATHODE<br>4. NO CONNECTION<br>5. ANODE/CATHODE<br>6. NO CONNECTION<br>7. ANODE/CATHODE<br>8. ANODE/CATHODE<br>9. ANODE/CATHODE<br>10. NO CONNECTION<br>11. ANODE/CATHODE<br>12. ANODE/CATHODE<br>13. NO CONNECTION<br>14. COMMON ANODE        | STYLE 7:<br>PIN 1. NO CONNECTION<br>2. ANODE<br>3. ANODE<br>4. NO CONNECTION<br>5. ANODE<br>6. NO CONNECTION<br>7. ANODE<br>8. ANODE<br>9. ANODE<br>10. NO CONNECTION<br>11. ANODE<br>12. ANODE<br>13. NO CONNECTION<br>14. COMMON<br>CATHODE | STYLE 8:<br>PIN 1. NO CONNECTION<br>2. CATHODE<br>3. CATHODE<br>4. NO CONNECTION<br>5. CATHODE<br>6. NO CONNECTION<br>7. CATHODE<br>8. CATHODE<br>9. CATHODE<br>10. NO CONNECTION<br>11. CATHODE<br>12. CATHODE<br>13. NO CONNECTION<br>14. COMMON ANODE                                                   |
| STYLE 9:<br>PIN 1. COMMON CATHODE<br>2. ANODE/CATHODE<br>3. ANODE/CATHODE<br>4. NO CONNECTION<br>5. ANODE/CATHODE<br>6. ANODE/CATHODE<br>7. COMMON ANODE<br>8. COMMON ANODE<br>9. ANODE/CATHODE<br>10. ANODE/CATHODE<br>11. NO CONNECTION<br>12. ANODE/CATHODE<br>13. ANODE/CATHODE<br>14. COMMON CATHODE | STYLE 10:<br>PIN 1. COMMON<br>CATHODE<br>2. ANODE/CATHODE<br>3. ANODE/CATHODE<br>4. ANODE/CATHODE<br>5. ANODE/CATHODE<br>6. NO CONNECTION<br>7. COMMON ANODE<br>8. COMMON<br>CATHODE<br>9. ANODE/CATHODE<br>10. ANODE/CATHODE<br>11. ANODE/CATHODE<br>12. ANODE/CATHODE<br>13. NO CONNECTION<br>14. COMMON ANODE | STYLE 11:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. CATHODE<br>4. CATHODE<br>5. CATHODE<br>6. CATHODE<br>7. CATHODE<br>8. ANODE<br>9. ANODE<br>10. ANODE<br>11. ANODE<br>12. ANODE<br>13. ANODE<br>14. ANODE                                      | STYLE 12:<br>PIN 1. COMMON CATHODE<br>2. COMMON ANODE<br>3. ANODE/CATHODE<br>4. ANODE/CATHODE<br>5. ANODE/CATHODE<br>6. COMMON ANODE<br>7. COMMON CATHODE<br>8. ANODE/CATHODE<br>9. ANODE/CATHODE<br>10. ANODE/CATHODE<br>11. ANODE/CATHODE<br>12. ANODE/CATHODE<br>13. ANODE/CATHODE<br>14. ANODE/CATHODE |

|                  |             |                                                                                                                                                                                     |
|------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DOCUMENT NUMBER: | 98ASB42428B | Electronic versions are uncontrolled except when accessed directly from the Document Repository.<br>Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| DESCRIPTION:     | PDIP-14     | PAGE 2 OF 2                                                                                                                                                                         |

**onsemi** and **onsemi** are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. **onsemi** does not convey any license under its patent rights nor the rights of others.



SOIC-14 NB  
CASE 751A-03  
ISSUE L

DATE 03 FEB 2016

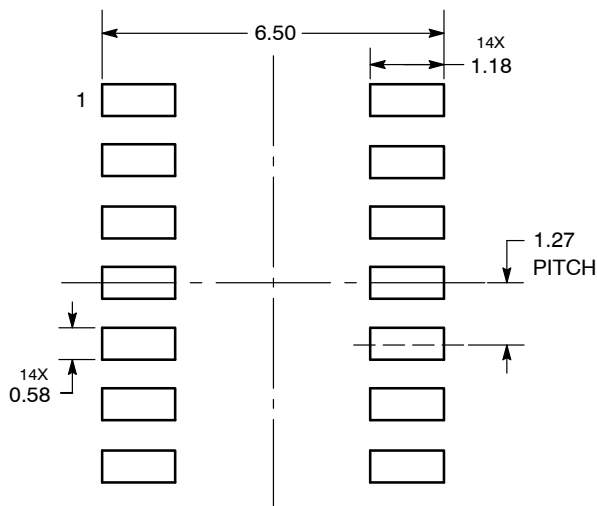


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF AT MAXIMUM MATERIAL CONDITION.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSIONS.
5. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.

| DIM | MILLIMETERS |      | INCHES    |       |
|-----|-------------|------|-----------|-------|
|     | MIN         | MAX  | MIN       | MAX   |
| A   | 1.35        | 1.75 | 0.054     | 0.068 |
| A1  | 0.10        | 0.25 | 0.004     | 0.010 |
| A3  | 0.19        | 0.25 | 0.008     | 0.010 |
| b   | 0.35        | 0.49 | 0.014     | 0.019 |
| D   | 8.55        | 8.75 | 0.337     | 0.344 |
| E   | 3.80        | 4.00 | 0.150     | 0.157 |
| e   | 1.27 BSC    |      | 0.050 BSC |       |
| H   | 5.80        | 6.20 | 0.228     | 0.244 |
| h   | 0.25        | 0.50 | 0.010     | 0.019 |
| L   | 0.40        | 1.25 | 0.016     | 0.049 |
| M   | 0°          | 7°   | 0°        | 7°    |

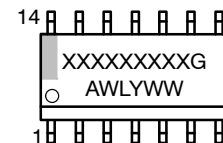
SOLDERING FOOTPRINT\*



DIMENSIONS: MILLIMETERS

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

GENERIC  
MARKING DIAGRAM\*



XXXXXX = Specific Device Code  
A = Assembly Location  
WL = Wafer Lot  
Y = Year  
WW = Work Week  
G = Pb-Free Package

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

STYLES ON PAGE 2

|                  |             |                                                                                                                                                                                     |
|------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DOCUMENT NUMBER: | 98ASB42565B | Electronic versions are uncontrolled except when accessed directly from the Document Repository.<br>Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| DESCRIPTION:     | SOIC-14 NB  | PAGE 1 OF 2                                                                                                                                                                         |

**onsemi** and **onsemi** are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. **onsemi** does not convey any license under its patent rights nor the rights of others.

SOIC-14  
CASE 751A-03  
ISSUE L

DATE 03 FEB 2016

STYLE 1:  
PIN 1. COMMON CATHODE  
2. ANODE/CATHODE  
3. ANODE/CATHODE  
4. NO CONNECTION  
5. ANODE/CATHODE  
6. NO CONNECTION  
7. ANODE/CATHODE  
8. ANODE/CATHODE  
9. ANODE/CATHODE  
10. NO CONNECTION  
11. ANODE/CATHODE  
12. ANODE/CATHODE  
13. NO CONNECTION  
14. COMMON ANODE

STYLE 2:  
CANCELLED

STYLE 3:  
PIN 1. NO CONNECTION  
2. ANODE  
3. ANODE  
4. NO CONNECTION  
5. ANODE  
6. NO CONNECTION  
7. ANODE  
8. ANODE  
9. ANODE  
10. NO CONNECTION  
11. ANODE  
12. ANODE  
13. NO CONNECTION  
14. COMMON CATHODE

STYLE 4:  
PIN 1. NO CONNECTION  
2. CATHODE  
3. CATHODE  
4. NO CONNECTION  
5. CATHODE  
6. NO CONNECTION  
7. CATHODE  
8. CATHODE  
9. CATHODE  
10. NO CONNECTION  
11. CATHODE  
12. CATHODE  
13. NO CONNECTION  
14. COMMON ANODE

STYLE 5:  
PIN 1. COMMON CATHODE  
2. ANODE/CATHODE  
3. ANODE/CATHODE  
4. ANODE/CATHODE  
5. ANODE/CATHODE  
6. NO CONNECTION  
7. COMMON ANODE  
8. COMMON CATHODE  
9. ANODE/CATHODE  
10. ANODE/CATHODE  
11. ANODE/CATHODE  
12. ANODE/CATHODE  
13. NO CONNECTION  
14. COMMON ANODE

STYLE 6:  
PIN 1. CATHODE  
2. CATHODE  
3. CATHODE  
4. CATHODE  
5. CATHODE  
6. CATHODE  
7. CATHODE  
8. ANODE  
9. ANODE  
10. ANODE  
11. ANODE  
12. ANODE  
13. ANODE  
14. ANODE

STYLE 7:  
PIN 1. ANODE/CATHODE  
2. COMMON ANODE  
3. COMMON CATHODE  
4. ANODE/CATHODE  
5. ANODE/CATHODE  
6. ANODE/CATHODE  
7. ANODE/CATHODE  
8. ANODE/CATHODE  
9. ANODE/CATHODE  
10. ANODE/CATHODE  
11. COMMON CATHODE  
12. COMMON ANODE  
13. ANODE/CATHODE  
14. ANODE/CATHODE

STYLE 8:  
PIN 1. COMMON CATHODE  
2. ANODE/CATHODE  
3. ANODE/CATHODE  
4. NO CONNECTION  
5. ANODE/CATHODE  
6. ANODE/CATHODE  
7. COMMON ANODE  
8. COMMON ANODE  
9. ANODE/CATHODE  
10. ANODE/CATHODE  
11. NO CONNECTION  
12. ANODE/CATHODE  
13. ANODE/CATHODE  
14. COMMON CATHODE

|                  |             |                                                                                                                                                                                     |
|------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DOCUMENT NUMBER: | 98ASB42565B | Electronic versions are uncontrolled except when accessed directly from the Document Repository.<br>Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| DESCRIPTION:     | SOIC-14 NB  | PAGE 2 OF 2                                                                                                                                                                         |

**onsemi** and **onsemi** are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. **onsemi** does not convey any license under its patent rights nor the rights of others.

**onsemi**, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## ADDITIONAL INFORMATION

### TECHNICAL PUBLICATIONS:

Technical Library: [www.onsemi.com/design/resources/technical-documentation](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at  
[www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)