



# THE DATASHEET OF 74LVC32AT14-13

## Description

The 74LVC32A provides four independent 2-input OR gates. The device is designed for operation with a power supply range of 1.65V to 3.6V. The inputs are tolerant to 5.5V allowing this device to be used in a mixed-voltage environment. The device is fully specified for partial power down applications using  $I_{OFF}$ . The  $I_{OFF}$  circuitry disables the output preventing damaging current backflow when the device is powered down.

The gates perform the positive Boolean function:

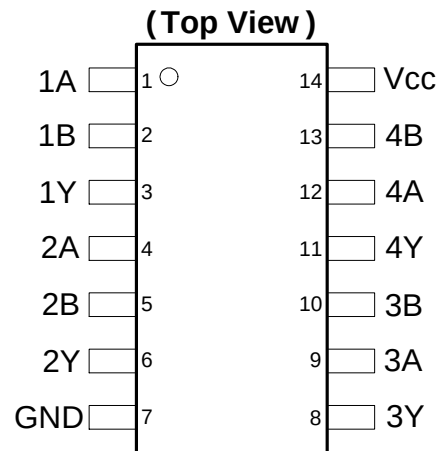
$$Y = A + B \text{ or } Y = \overline{\overline{A} \cdot \overline{B}}$$

## Features

- Supply Voltage Range from 1.65V to 3.6V
- Sinks 24mA at  $V_{CC} = 3.3V$
- CMOS low power consumption
- $I_{OFF}$  Supports Partial-Power-Down Mode Operation
- Inputs or outputs accept up to 5.5V
- Inputs can be driven by 3.3V or 5.5V allowing for voltage translation applications.
- ESD Protection Exceeds JESD 22
  - 200-V Machine Model (A115)
  - 2000-V Human Body Model (A114)
- Latch-Up Exceeds 250mA per JESD 78, Class I
- Range of Package Options SO-14 and TSSOP-14
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](https://www.diodes.com/quality/product-definitions/) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

## Pin Assignments



**SO-14 / TSSOP-14**

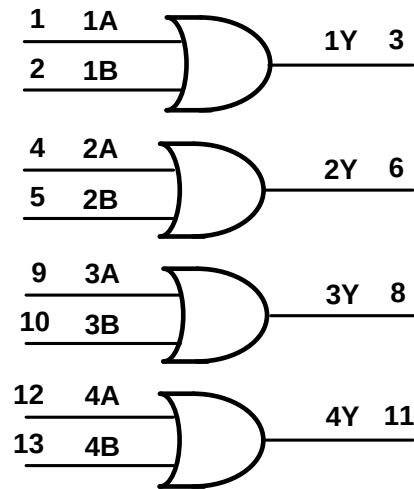
## Applications

- Voltage level shifting
- General-purpose logic
- Power down signal isolation
- Wide array of products such as:
  - PCs, networking, notebooks, ultrabooks, netbooks, PDAs
  - Computer peripherals, hard drives, CD/DVD ROM
  - TV, DVD, DVR, set top boxes

## Pin Descriptions

| Pin Number | Pin Name        | Description    |
|------------|-----------------|----------------|
| 1          | 1A              | Data Input     |
| 2          | 1B              | Data Input     |
| 3          | 1Y              | Data Output    |
| 4          | 2A              | Data Input     |
| 5          | 2B              | Data Input     |
| 6          | 2Y              | Data Output    |
| 7          | GND             | Ground         |
| 8          | 3Y              | Data Output    |
| 9          | 3A              | Data Input     |
| 10         | 3B              | Data Input     |
| 11         | 4Y              | Data Output    |
| 12         | 4A              | Data Input     |
| 13         | 4B              | Data Input     |
| 14         | V <sub>CC</sub> | Supply Voltage |

## Logic Diagram



## Function Table

| Inputs |   | Output |
|--------|---|--------|
| A      | B | Y      |
| L      | L | L      |
| L      | H | H      |
| H      | L | H      |
| H      | H | H      |

## Absolute Maximum Ratings (Note 4) (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Symbol                              | Description                                                           | Rating                       | Unit |
|-------------------------------------|-----------------------------------------------------------------------|------------------------------|------|
| ESD HBM                             | Human Body Model ESD Protection                                       | 2                            | kV   |
| ESD MM                              | Machine Model ESD Protection                                          | 200                          | V    |
| V <sub>CC</sub>                     | Supply Voltage Range                                                  | -0.5 to 6.5                  | V    |
| V <sub>I</sub>                      | Input Voltage Range                                                   | -0.5 to 6.5                  | V    |
| V <sub>O</sub>                      | Voltage applied to output in high impedance or I <sub>OFF</sub> state | -0.5 to 6.5                  | V    |
| V <sub>O</sub>                      | Voltage applied to output in high or low state                        | -0.3 to V <sub>CC</sub> +0.5 | V    |
| I <sub>IK</sub>                     | Input Clamp Current V <sub>I</sub> < 0                                | -50                          | mA   |
| I <sub>OK</sub>                     | Output Clamp Current V <sub>O</sub> < 0                               | -50                          | mA   |
| I <sub>O</sub>                      | Continuous output current                                             | ±50                          | mA   |
| I <sub>CC1</sub> , I <sub>GND</sub> | Continuous current through V <sub>CC</sub> or GND                     | ±100                         | mA   |
| T <sub>J</sub>                      | Operating Junction Temperature                                        | -40 to +150                  | °C   |
| T <sub>STG</sub>                    | Storage Temperature                                                   | -65 to +150                  | °C   |
| P <sub>TOT</sub>                    | Total Power Dissipation                                               | 500                          | mW   |

Note: 4. Stresses beyond the absolute maximum may result in immediate failure or reduced reliability. These are stress values and device operation should be within recommend values.

## Recommended Operating Conditions (Note 5) (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Symbol          | Parameter                          | Conditions                            | Min  | Max             | Unit |
|-----------------|------------------------------------|---------------------------------------|------|-----------------|------|
| V <sub>CC</sub> | Supply Voltage                     | —                                     | 1.65 | 3.6             | V    |
| V <sub>I</sub>  | Input Voltage                      | —                                     | 0    | 5.5             | V    |
| V <sub>O</sub>  | Output Voltage                     | Active Mode                           | 0    | V <sub>CC</sub> | V    |
|                 |                                    | V <sub>CC</sub> = 0V; Power Down Mode | 0    | 5.5             | —    |
| Δt/ΔV           | Input transition rise or fall rate | V <sub>CC</sub> = 1.65V to 2.7V       | —    | 20              | ns/V |
|                 |                                    | V <sub>CC</sub> = 2.7V to 3.6V        | —    | 10              |      |
| T <sub>A</sub>  | Operating free-air temperature     | —                                     | -40  | +125            | °C   |

Note: 5. Unused inputs should be held at V<sub>CC</sub> or Ground.

# Electrical Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Symbol           | Parameter                  | Test Conditions                                                        | V <sub>CC</sub> | T <sub>A</sub> = -40°C to +85°C |                        | T <sub>A</sub> = -40°C to +125°C |                        | Unit |
|------------------|----------------------------|------------------------------------------------------------------------|-----------------|---------------------------------|------------------------|----------------------------------|------------------------|------|
|                  |                            |                                                                        |                 | Min                             | Max                    | Min                              | Max                    |      |
| V <sub>IH</sub>  | High-Level Input Voltage   | —                                                                      | 1.65V to 1.95V  | 0.65 X V <sub>CC</sub>          | —                      | 0.65 X V <sub>CC</sub>           | —                      | V    |
|                  |                            | —                                                                      | 2.3V to 2.7V    | 1.7                             | —                      | 1.6                              | —                      |      |
|                  |                            | —                                                                      | 2.7 V to 3.6V   | 2.0                             | —                      | 2.0                              | —                      |      |
| V <sub>IL</sub>  | Low-Level Input voltage    | —                                                                      | 1.65V to 1.95V  | —                               | 0.35 X V <sub>CC</sub> | —                                | 0.35 X V <sub>CC</sub> | V    |
|                  |                            | —                                                                      | 2.3V to 2.7V    | —                               | 0.7                    | —                                | 0.7                    |      |
|                  |                            | —                                                                      | 2.7V to 3.6V    | —                               | 0.8                    | —                                | 0.8                    |      |
| V <sub>OH</sub>  | High-Level Output Voltage  | I <sub>OH</sub> = -100μA                                               | 1.65V to 3.6V   | V <sub>CC</sub> - 0.2           | —                      | V <sub>CC</sub> - 0.3            | —                      | V    |
|                  |                            | I <sub>OH</sub> = -4mA                                                 | 1.65V           | 1.2                             | —                      | —                                | —                      |      |
|                  |                            | I <sub>OH</sub> = -8mA                                                 | 2.3V            | 1.9                             | —                      | —                                | —                      |      |
|                  |                            | I <sub>OH</sub> = -12mA                                                | 2.7V            | 2.2                             | —                      | 2.05                             | —                      |      |
|                  |                            |                                                                        | 3.0V            | 2.3                             | —                      | 2.1                              | —                      |      |
|                  |                            | I <sub>OH</sub> = -24mA                                                | 3.0V            | 2.2                             | —                      | 2.0                              | —                      |      |
| V <sub>OL</sub>  | Low-Level Output Voltage   | I <sub>OH</sub> = 100μA                                                | 1.65V to 3.6V   | —                               | 0.2                    | —                                | 0.3                    | V    |
|                  |                            | I <sub>OH</sub> = 4mA                                                  | 1.65V           | —                               | 0.45                   | —                                | 0.6                    |      |
|                  |                            | I <sub>OH</sub> = 8mA                                                  | 2.3V            | —                               | 0.70                   | —                                | 0.85                   |      |
|                  |                            | I <sub>OH</sub> = 12mA                                                 | 2.7V            | —                               | 0.40                   | —                                | 0.6                    |      |
|                  |                            |                                                                        | 3.0V            | —                               | 0.55                   | —                                | 0.6                    |      |
|                  |                            | I <sub>OH</sub> = -24mA                                                | 3.0V            | —                               | 0.55                   | —                                | 0.6                    |      |
| I <sub>I</sub>   | Input Current              | V <sub>I</sub> = GND to 5.5V                                           | 3.6V            | —                               | ± 5                    | —                                | ± 20                   | μA   |
| I <sub>OFF</sub> | Power Down Leakage Current | V <sub>I</sub> or V <sub>O</sub> = 0V to 3.6V                          | 0               | —                               | 10                     | —                                | 20                     | μA   |
| I <sub>CC</sub>  | Supply Current             | V <sub>I</sub> = GND or V <sub>CC</sub> I <sub>O</sub> = 0             | 3.6V            | —                               | 10                     | —                                | 40                     | μA   |
| ΔI <sub>CC</sub> | Additional Supply Current  | One input at V <sub>CC</sub> -0.6V<br>Other at V <sub>CC</sub> or Gnd. | 2.7V to 3.6V    | —                               | 500                    | —                                | 5000                   | μA   |

## Switching Characteristics

| Symbol             | Parameter                                                            | Test Conditions | V <sub>CC</sub> | T <sub>A</sub> = +25°C |      |     | -40°C to +85°C |     | -40°C to +125°C |      | Unit |
|--------------------|----------------------------------------------------------------------|-----------------|-----------------|------------------------|------|-----|----------------|-----|-----------------|------|------|
|                    |                                                                      |                 |                 | Min                    | Typ. | Max | Min            | Max | Min             | Max  |      |
| t <sub>PD</sub>    | Propagation Delay A <sub>N</sub> or B <sub>N</sub> to Y <sub>N</sub> | Figure 2        | 1.65V to 1.95V  | 1.0                    | 4.2  | 8.2 | 1.0            | 8.7 | 1.0             | 10.2 | ns   |
|                    |                                                                      |                 | 2.3V to 2.7V    | 1.0                    | 3.6  | 4.9 | 1.0            | 5.4 | 1.0             | 6.9  |      |
|                    |                                                                      |                 | 2.7V            | 1.0                    | 3.0  | 4.6 | 1.0            | 4.9 | 1.0             | 5.5  |      |
|                    |                                                                      |                 | 3.3V to 3.6V    | 1.0                    | 2.5  | 4.1 | 1.0            | 4.2 | 1.0             | 5.0  |      |
| t <sub>SK(0)</sub> | Output Skew Time                                                     | —               | 3.3V to 3.6V    | —                      | —    | —   | —              | 1.0 | —               | 1.5  | ns   |

## Operating Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Parameter       |                                        | Test Conditions                           | V <sub>CC</sub> = 1.8V | V <sub>CC</sub> = 2.5V | V <sub>CC</sub> = 3.3V | Unit |
|-----------------|----------------------------------------|-------------------------------------------|------------------------|------------------------|------------------------|------|
|                 |                                        |                                           | Typ                    | Typ                    | Typ                    |      |
| C <sub>pd</sub> | Power dissipation capacitance per gate | f = 10 MHz                                | 7.4                    | 10.5                   | 12.4                   | pF   |
| C <sub>i</sub>  | Input Capacitance                      | V <sub>i</sub> = V <sub>CC</sub> – or GND | 4                      | 4                      | 4                      | pF   |

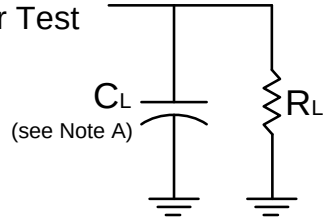
## Package Characteristics

| Symbol          | Parameter                              | Test Conditions | V <sub>CC</sub> | Min | Typ | Max | Unit |
|-----------------|----------------------------------------|-----------------|-----------------|-----|-----|-----|------|
| θ <sub>JA</sub> | Thermal Resistance Junction-to-Ambient | SO-14           | (Note 6)        | —   | TBD | —   | °C/W |
|                 |                                        | TSSOP-14        |                 | —   | 159 | —   |      |
| θ <sub>JC</sub> | Thermal Resistance Junction-to-Case    | SO-14           | (Note 6)        | —   | TBD | —   | °C/W |
|                 |                                        | TSSOP-14        |                 | —   | 25  | —   |      |

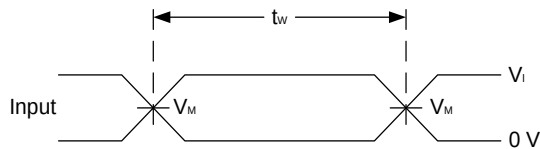
Note: 6. Test condition for SO-14 and TSSOP-14: Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

## Parameter Measurement Information

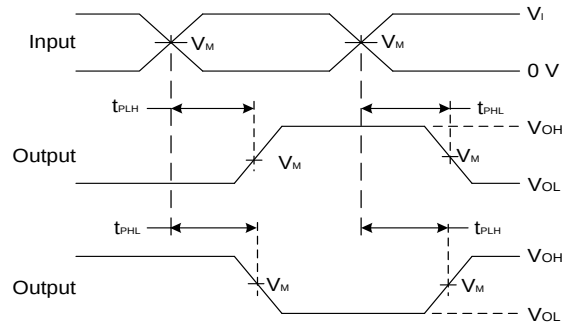
From Output  
Under Test



| $V_{CC}$         | Inputs   |              | $V_M$      | $C_L$ | $R_L$        |
|------------------|----------|--------------|------------|-------|--------------|
|                  | $V_I$    | $t_r/t_f$    |            |       |              |
| $1.8V \pm 0.15V$ | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | 30pF  | 1K $\Omega$  |
| $2.5V \pm 0.2V$  | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | 30pF  | 500 $\Omega$ |
| 2.7V             | 2.7V     | $\leq 2.5ns$ | 1.5V       | 50pF  | 500 $\Omega$ |
| $3.3V \pm 0.3V$  | 2.7V     | $\leq 2.5ns$ | 1.5V       | 50pF  | 500 $\Omega$ |



**Voltage Waveform  
Pulse Duration**

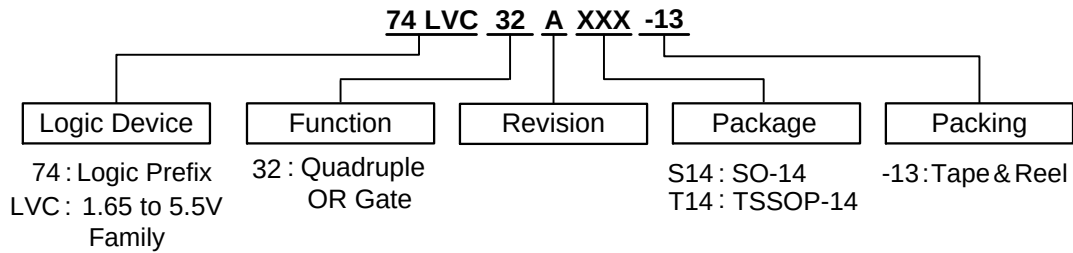


**Voltage Waveform  
Propagation Delay Times  
Inverting and Non Inverting Outputs**

**Figure 1. Load Circuit and Voltage Waveforms**

- Notes:
- A. Includes test lead and test apparatus capacitance.
  - B. All pulses are supplied at pulse repetition rate  $\leq 10$  MHz
  - C. Inputs are measured separately one transition per measurement
  - D.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{PD}$

## Ordering Information

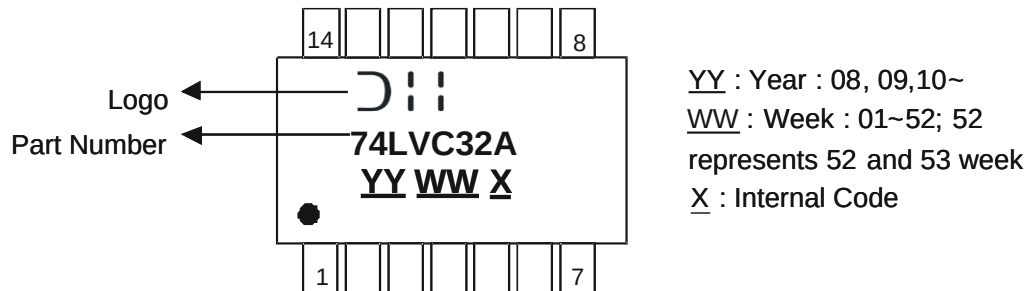


| Orderable Part Number | Package Code | Package (Note 7) | Packing  |                 |                    |
|-----------------------|--------------|------------------|----------|-----------------|--------------------|
|                       |              |                  | Quantity | Carrier         | Part Number Suffix |
| 74LVC32AS14-13        | S14          | SO-14            | 2,500    | 13" Tape & Reel | -13                |
| 74LVC32AT14-13        | T14          | TSSOP-14         | 2,500    | 13" Tape & Reel | -13                |

Note: 7. The taping orientation and tape details can be found at <http://www.diodes.com/datasheets/ap02007.pdf>

## Marking Information

### (1) SO-14, TSSOP-14

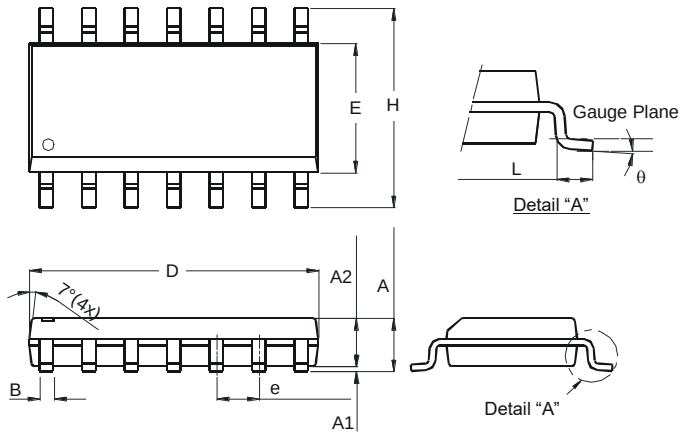


| Part Number | Package  |
|-------------|----------|
| 74LVC32A    | SO-14    |
| 74LVC32A    | TSSOP-14 |

## Package Outline Dimensions (All dimensions in mm.)

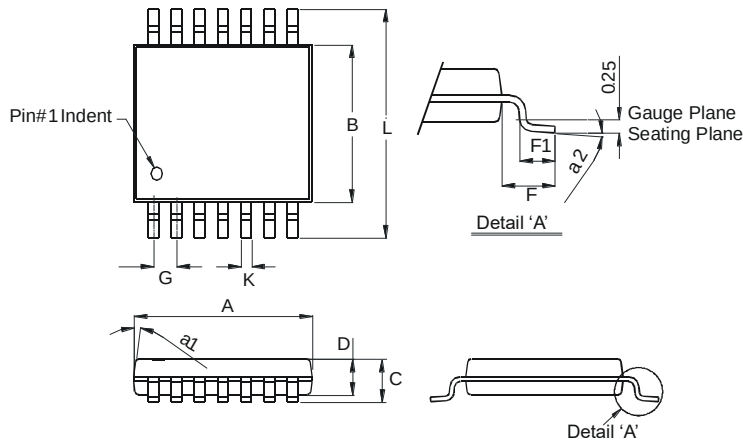
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

### SO-14



| SO-14                |          |      |
|----------------------|----------|------|
| Dim                  | Min      | Max  |
| A                    | 1.47     | 1.73 |
| A1                   | 0.10     | 0.25 |
| A2                   | 1.45 Typ |      |
| B                    | 0.33     | 0.51 |
| D                    | 8.53     | 8.74 |
| E                    | 3.80     | 3.99 |
| e                    | 1.27 Typ |      |
| H                    | 5.80     | 6.20 |
| L                    | 0.38     | 1.27 |
| θ                    | 0°       | 8°   |
| All Dimensions in mm |          |      |

### TSSOP-14

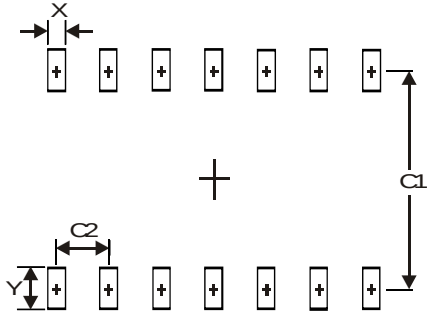


| TSSOP-14             |          |      |
|----------------------|----------|------|
| Dim                  | Min      | Max  |
| a1                   | 7° (4X)  |      |
| a2                   | 0°       | 8°   |
| A                    | 4.9      | 5.10 |
| B                    | 4.30     | 4.50 |
| C                    | -        | 1.2  |
| D                    | 0.8      | 1.05 |
| F                    | 1.00 Typ |      |
| F1                   | 0.45     | 0.75 |
| G                    | 0.65 Typ |      |
| K                    | 0.19     | 0.30 |
| L                    | 6.40 Typ |      |
| All Dimensions in mm |          |      |

## Suggested Pad Layout

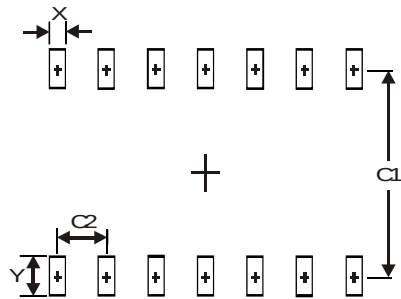
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SO-14



| Dimensions | Value (in mm) |
|------------|---------------|
| X          | 0.60          |
| Y          | 1.50          |
| C1         | 5.4           |
| C2         | 1.27          |

TSSOP-14



| Dimensions | Value (in mm) |
|------------|---------------|
| X          | 0.45          |
| Y          | 1.45          |
| C1         | 5.9           |
| C2         | 0.65          |

**IMPORTANT NOTICE**

1. DIODES INCORPORATED (Diodes) AND ITS SUBSIDIARIES MAKE NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO ANY INFORMATION CONTAINED IN THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).
2. The Information contained herein is for informational purpose only and is provided only to illustrate the operation of Diodes' products described herein and application examples. Diodes does not assume any liability arising out of the application or use of this document or any product described herein. This document is intended for skilled and technically trained engineering customers and users who design with Diodes' products. Diodes' products may be used to facilitate safety-related applications; however, in all instances customers and users are responsible for (a) selecting the appropriate Diodes products for their applications, (b) evaluating the suitability of Diodes' products for their intended applications, (c) ensuring their applications, which incorporate Diodes' products, comply the applicable legal and regulatory requirements as well as safety and functional-safety related standards, and (d) ensuring they design with appropriate safeguards (including testing, validation, quality control techniques, redundancy, malfunction prevention, and appropriate treatment for aging degradation) to minimize the risks associated with their applications.
3. Diodes assumes no liability for any application-related information, support, assistance or feedback that may be provided by Diodes from time to time. Any customer or user of this document or products described herein will assume all risks and liabilities associated with such use, and will hold Diodes and all companies whose products are represented herein or on Diodes' websites, harmless against all damages and liabilities.
4. Products described herein may be covered by one or more United States, international or foreign patents and pending patent applications. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks and trademark applications. Diodes does not convey any license under any of its intellectual property rights or the rights of any third parties (including third parties whose products and services may be described in this document or on Diodes' website) under this document.
5. Diodes' products are provided subject to Diodes' Standard Terms and Conditions of Sale (<https://www.diodes.com/about/company/terms-and-conditions/terms-and-conditions-of-sales/>) or other applicable terms. This document does not alter or expand the applicable warranties provided by Diodes. Diodes does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.
6. Diodes' products and technology may not be used for or incorporated into any products or systems whose manufacture, use or sale is prohibited under any applicable laws and regulations. Should customers or users use Diodes' products in contravention of any applicable laws or regulations, or for any unintended or unauthorized application, customers and users will (a) be solely responsible for any damages, losses or penalties arising in connection therewith or as a result thereof, and (b) indemnify and hold Diodes and its representatives and agents harmless against any and all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim relating to any noncompliance with the applicable laws and regulations, as well as any unintended or unauthorized application.
7. While efforts have been made to ensure the information contained in this document is accurate, complete and current, it may contain technical inaccuracies, omissions and typographical errors. Diodes does not warrant that information contained in this document is error-free and Diodes is under no obligation to update or otherwise correct this information. Notwithstanding the foregoing, Diodes reserves the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes.
8. Any unauthorized copying, modification, distribution, transmission, display or other use of this document (or any portion hereof) is prohibited. Diodes assumes no responsibility for any losses incurred by the customers or users or any third parties arising from any such unauthorized use.
9. This Notice may be periodically updated with the most recent version available at <https://www.diodes.com/about/company/terms-and-conditions/important-notice>

The Diodes logo is a registered trademark of Diodes Incorporated in the United States and other countries.  
All other trademarks are the property of their respective owners.  
© 2023 Diodes Incorporated. All Rights Reserved.

[www.diodes.com](https://www.diodes.com)

## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

 [View 74LVC32AT14-13](#) on WIN SOURCE

 [Diodes Incorporated](#) Information

## Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management