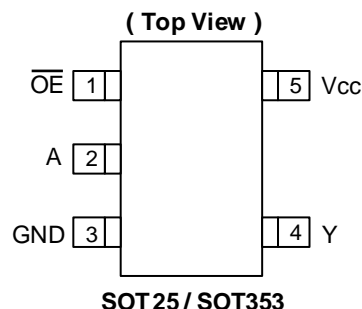


## Description

The 74LVC1G125Q is an automotive-compliant single, non-inverting buffer/bus driver with a 3-state output. The output enters a high-impedance state when a HIGH level is applied to the output enable ( $\overline{OE}$ ) pin. The device is designed for operation with a power supply range of 1.65V to 5.5V. 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.

## Pin Assignments



## Features

- Grade 1 Ambient Temperature Operation: -40°C to +125°C
- Wide Supply Voltage Range from 1.65V to 5.5V
- $\pm 24$ mA Output Drive at 3.3V
- CMOS Low Power Consumption
- $I_{OFF}$  Supports Partial Power-Down Mode Operation
- Inputs Accept up to 5.5V Regardless of  $V_{CC}$  Level
- ESD Protection Tested per AEC-Q100
- Exceeds 2000V Human Body Model (AEC-Q100-002)
- Exceeds 1000V Charged Device Model (AEC-Q100-011)
- Latch-Up Exceeds 100mA (AEC-Q100-004)
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The 74LVC1G125Q is suitable for automotive applications requiring specific change control; this part is AEC-Q100 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

## Applications

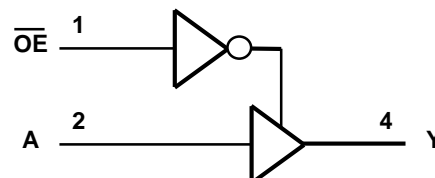
- Voltage Level Shifting
- General Purpose Logic
- Power Down Signal Isolation
- Wide Array of Products such as:
  - Automotive Applications within Grade 1 Temperature Range
  - Industrial Computing/Controls/Automation
  - High Reliability Networking/Communications
  - Industrial/Agricultural Equipment

- 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 Descriptions

| Pin Name        | Description              |
|-----------------|--------------------------|
| $\overline{OE}$ | Output Enable Active LOW |
| A               | Data Input               |
| GND             | Ground                   |
| Y               | Data Output              |
| V <sub>CC</sub> | Supply Voltage           |

## Logic Diagram



## Function Table

| Inputs          |   | Output |
|-----------------|---|--------|
| $\overline{OE}$ | A | Y      |
| L               | H | H      |
| L               | L | L      |
| H               | X | Z      |

## Absolute Maximum Ratings (Notes 4 & 5)

| Symbol                            | Description   | Rating                        | Unit |
|-----------------------------------|---|-------------------------------|------|
| ESD HBM                           | Human Body Model ESD Protection                                       | 2                             | kV   |
| ESD CDM                           | Charged Device Model ESD Protection                                   | 1                             | kV   |
| 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                        | -0.5 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  | -50                           | mA   |
| I <sub>O</sub>                    | Continuous Output Current   | ±50                           | mA   |
| I <sub>CC</sub> , I <sub>GN</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   |

- Notes:
- Stresses beyond the absolute maximum can result in immediate failure or reduced reliability. These are stress values and device operation should be within recommend values.
  - Forcing the maximum allowed voltage could cause a condition exceeding the maximum current or conversely forcing the maximum current could cause a condition exceeding the maximum voltage. The ratings of both current and voltage must be maintained within the controlled range.

## Recommended Operating Conditions (Note 6)

| Symbol          | Parameter                          | Min   | Max                    | Unit                   |
|-----------------|------------------------------------|---|------------------------|------------------------|
| V <sub>CC</sub> | Operating Voltage                  | Operating                                   | 1.65                   | 5.5                    |
|                 |                                    | Data Retention Only                         | 1.5                    | —                      |
| V <sub>IH</sub> | High-Level Input Voltage           | V <sub>CC</sub> = 1.65V to 1.95V            | 0.65 × V <sub>CC</sub> | —                      |
|                 |                                    | V <sub>CC</sub> = 2.3V to 2.7V              | 1.7                    | —                      |
|                 |                                    | V <sub>CC</sub> = 3V to 3.6V                | 2                      | —                      |
|                 |                                    | V <sub>CC</sub> = 4.5V to 5.5V              | 0.7 × V <sub>CC</sub>  | —                      |
| V <sub>IL</sub> | Low-Level Input Voltage            | V <sub>CC</sub> = 1.65V to 1.95V            | —                      | 0.35 × V <sub>CC</sub> |
|                 |                                    | V <sub>CC</sub> = 2.3V to 2.7V              | —                      | 0.7                    |
|                 |                                    | V <sub>CC</sub> = 3V to 3.6V                | —                      | 0.8                    |
|                 |                                    | V <sub>CC</sub> = 4.5V to 5.5V              | —                      | 0.3 × V <sub>CC</sub>  |
| V <sub>I</sub>  | Input Voltage                      | 0   | 5.5                    | V                      |
| V <sub>O</sub>  | Output Voltage                     | 0   | V <sub>CC</sub>        | V                      |
| I <sub>OH</sub> | High-Level Output Current          | V <sub>CC</sub> = 1.65V                     | —                      | -4                     |
|                 |                                    | V <sub>CC</sub> = 2.3V                      | —                      | -8                     |
|                 |                                    | V <sub>CC</sub> = 2.7V                      | —                      | -12                    |
|                 |                                    | V <sub>CC</sub> = 3V                        | —                      | -16                    |
|                 |                                    | V <sub>CC</sub> = 4.5V                      | —                      | -24                    |
| I <sub>OL</sub> | Low-Level Output Current           | V <sub>CC</sub> = 1.65V                     | —                      | 4                      |
|                 |                                    | V <sub>CC</sub> = 2.3V                      | —                      | 8                      |
|                 |                                    | V <sub>CC</sub> = 2.7V                      | —                      | 12                     |
|                 |                                    | V <sub>CC</sub> = 3V                        | —                      | 16                     |
|                 |                                    | V <sub>CC</sub> = 4.5V                      | —                      | 24                     |
| Δt/ΔV           | Input Transition Rise or Fall Rate | V <sub>CC</sub> = 1.8V ± 0.15V, 2.5V ± 0.2V | —                      | 20                     |
|                 |                                    | V <sub>CC</sub> = 3.3V ± 0.3V               | —                      | 10                     |
|                 |                                    | V <sub>CC</sub> = 5V ± 0.5V                 | —                      | 5                      |
| T <sub>A</sub>  | Operating Free-Air Temperature     | —   | -40                    | +125                   |

Note: 6. Unused inputs should be held at V<sub>CC</sub> or Ground.

**Electrical Characteristics** (All typical values are at  $V_{CC} = 3.3V$ ,  $T_A = +25^\circ C$ )

| Symbol          | Parameter                  | Test Conditions  | $V_{CC}$             | -40°C to +125°C |                |         | Unit    |
|-----------------|----------------------------|--|----------------------|-----------------|----------------|---------|---------|
|                 |                            |  |                      | Min             | Typ            | Max     |         |
| $V_{OH}$        | High Level Output Voltage  | $V_I = V_{IH}$ or $V_{IL}$                                   | $I_{OH} = -100\mu A$ | 1.65V to 5.5V   | $V_{CC} - 0.1$ | —       | V       |
|                 |                            |  | $I_{OH} = -4mA$      | 1.65V           | 0.95           | —       |         |
|                 |                            |  | $I_{OH} = -8mA$      | 2.3V            | 17             | —       |         |
|                 |                            |  | $I_{OH} = -12mA$     | 2.7V            | 1.9            | —       |         |
|                 |                            |  | $I_{OH} = -24mA$     | 3V              | 2.0            | —       |         |
|                 |                            |  | $I_{OH} = -32mA$     | 4.5V            | 3.4            | —       |         |
| $V_{OL}$        | Low Level Output Voltage   | $V_I = V_{IH}$ or $V_{IL}$                                   | $I_{OL} = 100\mu A$  | 1.65V to 5.5V   | —              | —       | V       |
|                 |                            |  | $I_{OL} = 4mA$       | 1.65V           | —              | —       |         |
|                 |                            |  | $I_{OL} = 8mA$       | 2.3V            | —              | —       |         |
|                 |                            |  | $I_{OL} = 12mA$      | 2.7V            | —              | —       |         |
|                 |                            |  | $I_{OL} = 24mA$      | 3V              | —              | —       |         |
|                 |                            |  | $I_{OL} = 32mA$      | 4.5V            | —              | —       |         |
| $I_I$           | Input Current              | $V_I = 5.5V$ or GND  | 0 to 5.5V            | —               | $\pm 0.1$      | $\pm 1$ | $\mu A$ |
| $I_{OFF}$       | Power Down Leakage Current | $V_I$ or $V_O = 5.5V$  | 0V                   | —               | —              | $\pm 2$ | $\mu A$ |
| $I_{OZ}$        | Z-State Leakage Current    | $V_O =$ Ground to 5.5V                                       | 3.6V                 | —               | —              | $\pm 2$ | $\mu A$ |
| $I_{CC}$        | Supply Current             | $V_I = 5.5V$ or GND, $I_O = 0$                               | 5.5V                 | —               | 0.1            | 4       | $\mu A$ |
| $\Delta I_{CC}$ | Additional Supply Current  | One input at $V_{CC} - 0.6V$ Other inputs at $V_{CC}$ or GND | 3V to 5.5V           | —               | —              | 500     | $\mu A$ |
| $C_I$           | Input Capacitance          | $V_I = V_{CC}$ or GND  | 3.3V                 | —               | 3.5            | —       | pF      |

**Package Characteristics**

| Symbol        | Parameter                                 | Package | Test Conditions | Min | Typ | Max | Unit         |
|---------------|---|---------|-----------------|-----|-----|-----|--------------|
| $\theta_{JA}$ | Thermal Resistance<br>Junction-to-Ambient | SOT25   | Note 7          | —   | 184 | —   | $^\circ C/W$ |
|               |   | SOT353  |                 | —   | 385 | —   |              |
| $\theta_{JC}$ | Thermal Resistance<br>Junction-to-Case    | SOT25   | Note 7          | —   | 62  | —   | $^\circ C/W$ |
|               |   | SOT353  |                 | —   | 164 | —   |              |

Note: 7. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

## Switching Characteristics

Figure 1 Typical Values at  $T_A = +25^\circ\text{C}$  and nominal voltages 1.8V, 2.5V, 2.7V, 3.3V, and 5.0V.

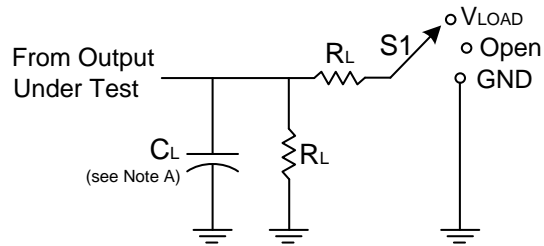
| Parameter | From Input             | To Output | $V_{CC}$                       | $T_A = -40^\circ\text{C to } +125^\circ\text{C}$ |     |      | Unit |
|-----------|------------------------|-----------|--------------------------------|--|-----|------|------|
|           |                        |           |                                | Min  | Typ | Max  |      |
| $t_{PD}$  | A                      | Y         | $1.8\text{V} \pm 0.15\text{V}$ | 1.0  | 3.3 | 10.5 | ns   |
|           |                        |           | $2.5\text{V} \pm 0.2\text{V}$  | 0.5  | 2.2 | 7.0  |      |
|           |                        |           | 2.7V                           | 0.5  | 2.5 | 7.0  |      |
|           |                        |           | $3.3\text{V} \pm 0.3\text{V}$  | 0.5  | 2.1 | 6.0  |      |
|           |                        |           | $5.0\text{V} \pm 0.5\text{V}$  | 0.5  | 1.7 | 5.5  |      |
| $t_{EN}$  | $\overline{\text{OE}}$ | Y         | $1.8\text{V} \pm 0.15\text{V}$ | 1.0  | 4.1 | 12.0 | ns   |
|           |                        |           | $2.5\text{V} \pm 0.2\text{V}$  | 0.5  | 2.8 | 8.5  |      |
|           |                        |           | 2.7V                           | 0.5  | 3.3 | 8.5  |      |
|           |                        |           | $3.3\text{V} \pm 0.3\text{V}$  | 0.5  | 2.4 | 7.0  |      |
|           |                        |           | $5.0\text{V} \pm 0.5\text{V}$  | 0.5  | 2.1 | 6.5  |      |
| $t_{DIS}$ | $\overline{\text{OE}}$ | Y         | $1.8\text{V} \pm 0.15\text{V}$ | 1.0  | 4.3 | 12.0 | ns   |
|           |                        |           | $2.5\text{V} \pm 0.2\text{V}$  | 0.5  | 2.7 | 6.5  |      |
|           |                        |           | 2.7V                           | 0.5  | 3.0 | 6.5  |      |
|           |                        |           | $3.3\text{V} \pm 0.3\text{V}$  | 0.5  | 3.1 | 6.5  |      |
|           |                        |           | $5.0\text{V} \pm 0.5\text{V}$  | 0.5  | 2.2 | 5.5  |      |

## Operating Characteristics

$T_A = +25^\circ\text{C}$

| Parameter |                               |                  | Test Conditions    | $V_{CC} = 1.8\text{V}$ | $V_{CC} = 2.5\text{V}$ | $V_{CC} = 3.3\text{V}$ | $V_{CC} = 5\text{V}$ | Unit |
|-----------|-------------------------------|------------------|--------------------|------------------------|------------------------|------------------------|----------------------|------|
|           |                               |                  |                    | Typ                    | Typ                    | Typ                    | Typ                  |      |
| $C_{PD}$  | Power Dissipation Capacitance | Outputs Enabled  | $f = 10\text{MHz}$ | 19                     | 19                     | 19                     | 21                   | pF   |
|           |                               | Outputs Disabled |                    | 2                      | 2                      | 3                      | 4                    |      |

## Parameter Measurement Information



| TEST              | S1         |
|-------------------|------------|
| $t_{PLH}/t_{PHL}$ | Open       |
| $t_{PLZ}/t_{PZL}$ | $V_{LOAD}$ |
| $t_{PHZ}/t_{PZH}$ | GND        |

| $V_{CC}$         | Inputs   |              | $V_M$      | $V_{LOAD}$        | $C_L$ | $R_L$        | $V_{\Delta}$ |
|------------------|----------|--------------|------------|-------------------|-------|--------------|--------------|
|                  | $V_I$    | $t_R/t_F$    |            |                   |       |              |              |
| $1.8V \pm 0.15V$ | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 30pF  | 1k $\Omega$  | 0.15V        |
| $2.5V \pm 0.2V$  | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 30pF  | 500 $\Omega$ | 0.15V        |
| 2.7V             | 2.7V     | $\leq 2.5ns$ | 1.5V       | 6V                | 50pF  | 500 $\Omega$ | 0.3V         |
| $3.3V \pm 0.3V$  | 3V       | $\leq 2.5ns$ | 1.5V       | 6V                | 50pF  | 500 $\Omega$ | 0.3V         |
| $5V \pm 0.5V$    | $V_{CC}$ | $\leq 2.5ns$ | $V_{CC}/2$ | $2 \times V_{CC}$ | 50pF  | 500 $\Omega$ | 0.3V         |

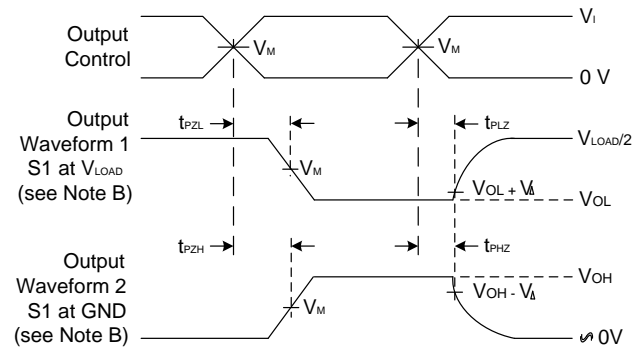
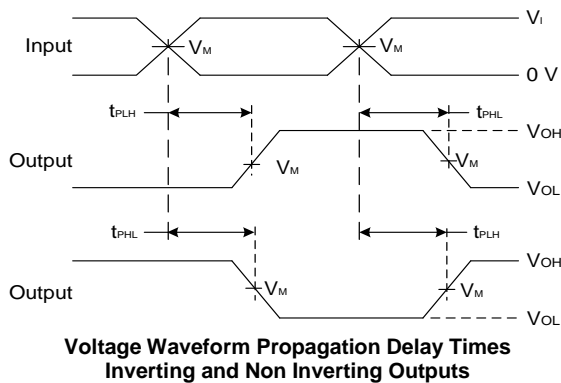
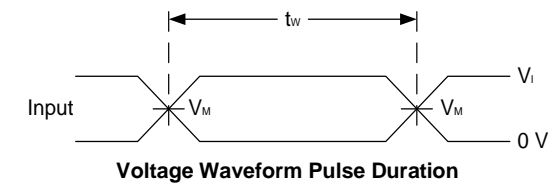
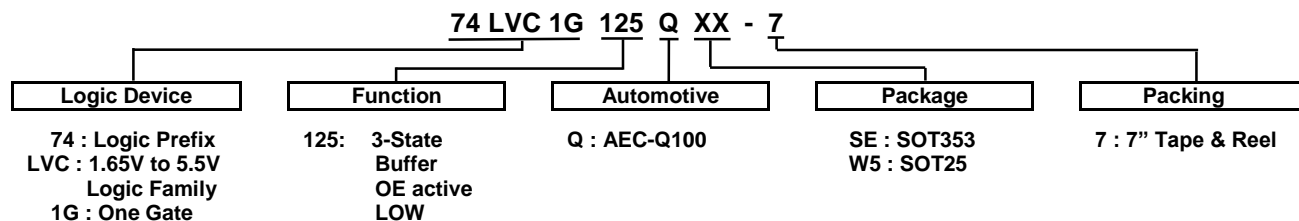


Figure 1. Load Circuit and Voltage Waveforms

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

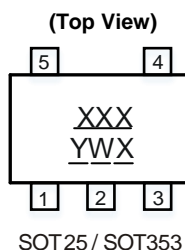
## Ordering Information (Note 8)



| Part Number     | Package Code | Package (Notes 9 & 10) | Package Size                                | 7" Tape and Reel |                    |
|-----------------|--------------|------------------------|---|------------------|--------------------|
|                 |              |                        |   | Quantity         | Part Number Suffix |
| 74LVC1G125QSE-7 | SE           | SOT353                 | 2.15mm × 2.1mm × 1.1mm<br>0.65mm lead pitch | 3000/Tape & Reel | -7                 |
| 74LVC1G125QW5-7 | W5           | SOT25                  | 3.0mm × 2.8mm × 1.2mm<br>0.95mm lead pitch  | 3000/Tape & Reel | -7                 |

Notes: 8. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.  
 9. Pad layout as shown in Diodes Incorporated's package outline PDFs, which can be found on our website at <http://www.diodes.com/package-outlines.html>.  
 10. The taping orientation is located on our website at <https://www.diodes.com/assets/Packaging-Support-Docs/ap02007.pdf>.

## Marking Information



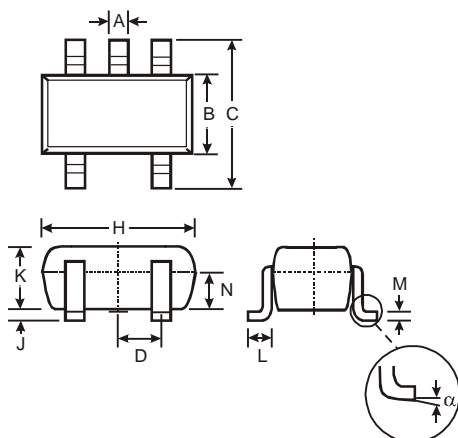
XXX : Identification Code  
 Y : Year 0~9  
 W : Week: A~Z 1~26 week  
       a~z 27~52 week  
       z represents week 52 and 53  
 X : A~Z : Internal Code

| Part Number     | Package | Identification Code |
|-----------------|---------|---------------------|
| 74LVC1G125QW5-7 | SOT25   | UYQ                 |
| 74LVC1G125QSE-7 | SOT353  | UYQ                 |

## Package Outline Dimensions

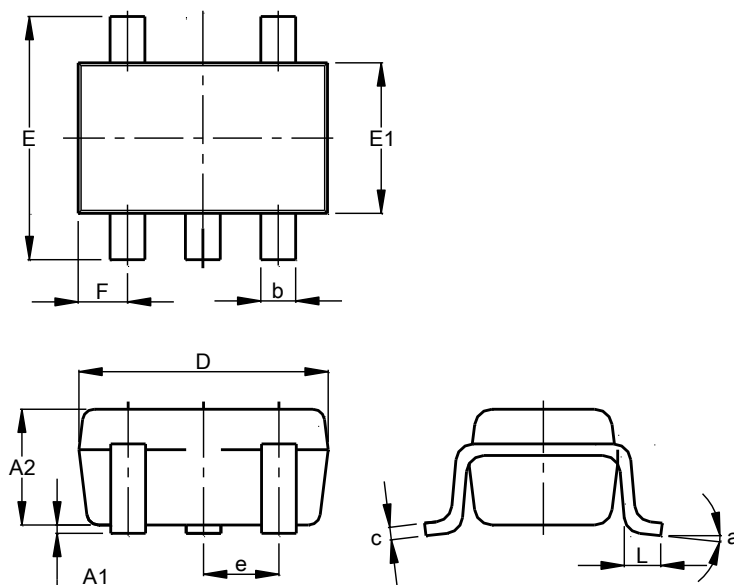
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

### (1) Package Type: SOT25



| SOT25                |       |      |      |
|----------------------|-------|------|------|
| Dim                  | Min   | Max  | Typ  |
| A                    | 0.35  | 0.50 | 0.38 |
| B                    | 1.50  | 1.70 | 1.60 |
| C                    | 2.70  | 3.00 | 2.80 |
| D                    | -     | -    | 0.95 |
| H                    | 2.90  | 3.10 | 3.00 |
| J                    | 0.013 | 0.10 | 0.05 |
| K                    | 1.00  | 1.30 | 1.10 |
| L                    | 0.35  | 0.55 | 0.40 |
| M                    | 0.10  | 0.20 | 0.15 |
| N                    | 0.70  | 0.80 | 0.75 |
| $\alpha$             | 0°    | 8°   | -    |
| All Dimensions in mm |       |      |      |

### (2) Package Type: SOT353



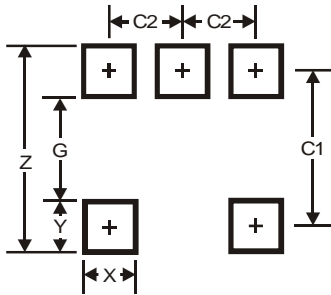
| SOT353               |           |      |       |
|----------------------|-----------|------|-------|
| Dim                  | Min       | Max  | Typ   |
| A1                   | 0.00      | 0.10 | 0.05  |
| A2                   | 0.90      | 1.00 | 0.95  |
| b                    | 0.10      | 0.30 | 0.25  |
| c                    | 0.10      | 0.22 | 0.11  |
| D                    | 1.80      | 2.20 | 2.15  |
| E                    | 2.00      | 2.20 | 2.10  |
| E1                   | 1.15      | 1.35 | 1.30  |
| e                    | 0.650 BSC |      |       |
| F                    | 0.40      | 0.45 | 0.425 |
| L                    | 0.25      | 0.40 | 0.30  |
| a                    | 0°        | 8°   | --    |
| All Dimensions in mm |           |      |       |



## Suggested Pad Layout

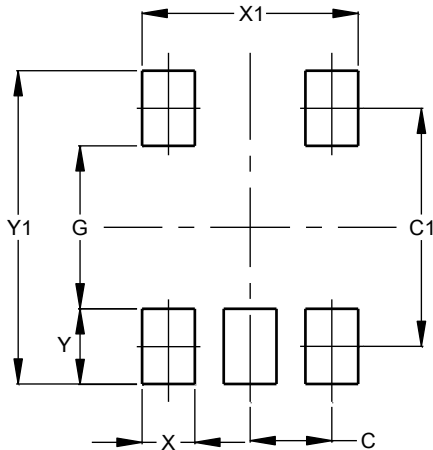
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

### (1) Package Type: SOT25



| Dimensions | Value |
|------------|-------|
| Z          | 3.20  |
| G          | 1.60  |
| X          | 0.55  |
| Y          | 0.80  |
| C1         | 2.40  |
| C2         | 0.95  |

### (2) Package Type: SOT353



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 0.650         |
| C1         | 1.900         |
| G          | 1.300         |
| X          | 0.420         |
| X1         | 1.720         |
| Y          | 0.600         |
| Y1         | 2.500         |

## Mechanical Data

### SOT25

- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 <sup>③</sup>
- Weight: 0.0158 grams (Approximate)

### SOT353

- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 <sup>③</sup>
- Weight: 0.0064 grams (Approximate)

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A. Life support devices or systems are devices or systems which:

1. are intended to implant into the body, or
2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

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