# 0.5W Zener Diode – 1N6309 to 1N6349

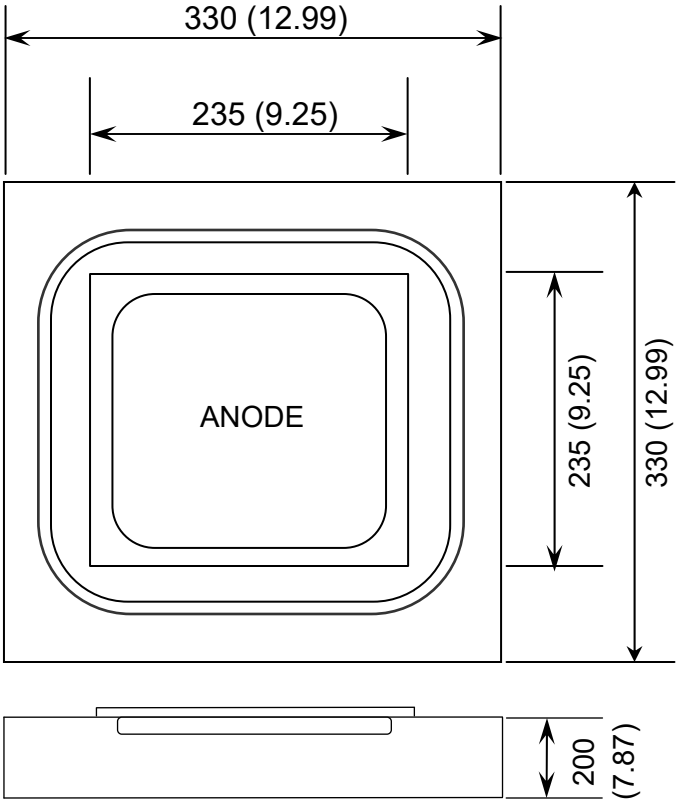
**Rev 1.1**
**10/05/24**

**Silicon Planar Zener diode in bare die form – 5% tolerance**

## Features:

- Sharp Reverse Characteristics
- Low Reverse Current Levels
- High Reliability Gold Back Metal
- High Reliability tested grades.

## Die Dimensions in µm (mils)




CHIP BACKSIDE IS CATHODE

## Ordering Information

The following part suffixes apply:

- No suffix - Commercial grade die
- "**H**"– Hi-rel grade die + MIL-STD-38534 Class H LAT
- "**K**" – Hi-rel grade die + MIL-STD-38534 Class K LAT.

LAT = Lot acceptance Test.

For information on Hi-Rel LAT flows please see below.

www.siliconsupplies.com\bare-die-lot-qualification

## Supply Formats:

- Default – Die in Waffle Pack (400 per tray capacity)
- Sawn Wafer on Tape – By specific request
- Unsawn Wafer – By specific request
- With additional electrical selection – By specific request

## Mechanical Specification

| | | |
|---|---|---|
| Die Size (Unsawn) | 330 x 330<br>12.99 x 12.99 | µm<br>mils |
| Anode Pad Size | 235 x 235<br>9.25 x 9.25 | µm<br>mils |
| Die Thickness | 200<br>7.87 | µm<br>mils |
| Top Metal Composition | Al | |
| Back Metal Composition | AuAs | |

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## Absolute Maximum Ratings[1] $T_A$ = 25°C unless otherwise stated

| PARAMETER | SYMBOL | VALUE | UNIT |
|---|---|---|---|
| Power Dissipation[2] | $P_{TOT}$ | 500 | mW |
| Junction Temperature | $T_J$ | 175 | °C |
| Storage Temperature Range | $T_S$ | -65 to +175 | °C |
| Forward Voltage @ $I_F$ = 200mA | $V_F$ | 1.1 | V |

## Electrical Characteristics $T_A$ = 25°C unless otherwise stated

| DEVICE | ZENER VOLTAGE RANGE | | | TEST CURRENT | | REVERSE LEAKAGE CURRENT | | DYNAMIC RESISTANCE | | MAX CURRENT | ZENER REG[3] | NOISE DENSITY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $V_Z$ @ $I_{ZT1}$ | | | $I_{ZT1}$ | $I_{ZT2}$ | $I_R$ @ $V_R$ | | $Z_Z$ @ $I_{ZT1}$ | $Z_{ZK}$ @ $I_{ZT2}$ | $I_{ZM}$ | $V_{Z(reg)}$ $\Delta V_Z$ | $N_D$ @ 250µA |
| | V | | | mA | | µA | V | Ω | | mA | V | µV/√Hz |
| | Min. | Nom. | Max. | | | Max. | | Max. | | Max. | Typ. | Typ. |
| 1N6309 | 2.28 | 2.4 | 2.52 | 20 | 0.25 | 100 | 1.0 | 30 | 1200 | 177 | 1.0 | 1.0 |
| 1N6310 | 2.57 | 2.7 | 2.84 | 20 | 0.25 | 60 | 1.0 | 30 | 1300 | 157 | 1.0 | 1.0 |
| 1N6311 | 2.85 | 3 | 3.15 | 20 | 0.25 | 30 | 1.0 | 29 | 1400 | 141 | 1.0 | 1.0 |
| 1N6312 | 3.14 | 3.3 | 3.47 | 20 | 0.25 | 5.0 | 1.0 | 24 | 1400 | 128 | 1.0 | 1.0 |
| 1N6313 | 3.42 | 3.6 | 3.78 | 20 | 0.25 | 3.0 | 1.0 | 22 | 1400 | 109 | 1.0 | 1.0 |
| 1N6314 | 3.71 | 3.9 | 4.10 | 20 | 0.25 | 2.0 | 1.0 | 20 | 1700 | 118 | 1.0 | 1.0 |
| 1N6315 | 4.09 | 4.3 | 4.52 | 20 | 0.25 | 2.0 | 1.0 | 18 | 1400 | 99 | 0.9 | 1.0 |
| 1N6316 | 4.47 | 4.7 | 4.94 | 20 | 0.25 | 5.0 | 1.5 | 16 | 1500 | 90 | 0.5 | 1.0 |
| 1N6317 | 4.85 | 5.1 | 5.36 | 20 | 0.25 | 5.0 | 2.0 | 14 | 1300 | 83 | 0.4 | 1.0 |
| 1N6318 | 5.32 | 5.6 | 5.88 | 20 | 0.25 | 5.0 | 2.5 | 8 | 1200 | 76 | 0.4 | 2.0 |
| 1N6319 | 5.89 | 6.2 | 6.51 | 20 | 0.25 | 5.0 | 3.5 | 3 | 800 | 68 | 0.3 | 5.0 |
| 1N6320 | 6.46 | 6.8 | 7.14 | 20 | 0.25 | 2.0 | 4.0 | 3 | 400 | 63 | 0.35 | 5.0 |
| 1N6321 | 7.13 | 7.5 | 7.88 | 20 | 0.25 | 2.0 | 5.0 | 4 | 400 | 57 | 0.4 | 5.0 |
| 1N6322 | 7.79 | 8.2 | 8.61 | 20 | 0.25 | 1.0 | 6.0 | 5 | 400 | 52 | 0.4 | 20 |
| 1N6323 | 8.65 | 9.1 | 9.56 | 20 | 0.25 | 1.0 | 7.0 | 6 | 500 | 47 | 0.5 | 40 |
| 1N6324 | 9.5 | 10 | 10.5 | 20 | 0.25 | 1.0 | 8.0 | 6 | 500 | 43 | 0.5 | 80 |
| 1N6325 | 10.45 | 11 | 11.55 | 20 | 0.25 | 1.0 | 8.5 | 7 | 550 | 39 | 0.5 | 100 |
| 1N6326 | 11.4 | 12 | 12.6 | 20 | 0.25 | 1.0 | 9.0 | 7 | 550 | 35 | 0.55 | 100 |
| 1N6327 | 12.35 | 13 | 13.65 | 9.5 | 0.25 | 0.05 | 9.9 | 8 | 550 | 33 | 0.55 | 100 |
| 1N6328 | 14.25 | 15 | 15.75 | 8.5 | 0.25 | 0.05 | 11 | 10 | 600 | 28 | 0.70 | 100 |
| 1N6329 | 15.2 | 16 | 16.8 | 7.8 | 0.25 | 0.05 | 12 | 12 | 600 | 27 | 0.75 | 100 |
| 1N6330 | 17.1 | 18 | 18.9 | 7.0 | 0.25 | 0.05 | 14 | 14 | 600 | 24 | 0.85 | 100 |
| 1N6331 | 19 | 20 | 21 | 6.2 | 0.25 | 0.05 | 15 | 18 | 500 | 21 | 0.95 | 100 |

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**Rev 1.1**
**10/05/24**

## Electrical Characteristics $T_A$ = 25°C unless otherwise stated

| DEVICE | ZENER VOLTAGE RANGE | | | TEST CURRENT | | REVERSE LEAKAGE CURRENT | | DYNAMIC RESISTANCE | | MAX CURRENT | ZENER REG[3] | NOISE DENSITY[4] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $V_Z$ @ $I_{ZT1}$ | | | $I_{ZT1}$ | $I_{ZT2}$ | $I_R$ @ $V_R$ | | $Z_Z$ @ $I_{ZT1}$ | $Z_{ZK}$ @ $I_{ZT2}$ | $I_{ZM}$ | $V_{Z(reg)}$ $\Delta V_Z$ | $N_D$ @ 250µA |
| | V | | | mA | | µA | V | Ω | | mA | V | µV/√Hz |
| | Min. | Nom. | Max. | | | Max. | | Max. | | Max. | Typ. | Typ. |
| 1N6332 | 20.90 | 22 | 23.10 | 5.6 | 0.25 | 0.05 | 17 | 20 | 500 | 19 | 1.05 | 100 |
| 1N6333 | 22.80 | 24 | 25.20 | 5.2 | 0.25 | 0.05 | 18 | 24 | 500 | 18 | 1.15 | 100 |
| 1N6334 | 25.65 | 27 | 28.35 | 4.6 | 0.25 | 0.05 | 21 | 27 | 500 | 16 | 1.30 | 100 |
| 1N6335 | 28.5 | 30 | 31.50 | 4.2 | 0.25 | 0.05 | 23 | 32 | 500 | 14 | 1.45 | 100 |
| 1N6336 | 31.35 | 33 | 34.65 | 3.8 | 0.25 | 0.05 | 25 | 40 | 600 | 13 | 1.60 | 100 |
| 1N6337 | 34.20 | 36 | 37.80 | 3.4 | 0.25 | 0.05 | 27 | 50 | 600 | 12 | 1.75 | 100 |
| 1N6338 | 37.05 | 39 | 40.95 | 3.2 | 0.25 | 0.05 | 30 | 55 | 700 | 11 | 1.90 | 100 |
| 1N6339 | 40.85 | 43 | 45.15 | 3.0 | 0.25 | 0.05 | 33 | 65 | 800 | 9.9 | 2.10 | 80 |
| 1N6340 | 44.65 | 47 | 49.35 | 2.7 | 0.25 | 0.05 | 36 | 75 | 900 | 9.0 | 2.25 | 80 |
| 1N6341 | 48.45 | 51 | 53.55 | 2.5 | 0.25 | 0.05 | 39 | 85 | 1000 | 8.3 | 2.50 | 80 |
| 1N6342 | 53.20 | 56 | 58.80 | 2.2 | 0.25 | 0.05 | 43 | 100 | 1200 | 7.6 | 2.70 | 80 |
| 1N6343 | 58.90 | 62 | 65.10 | 2.0 | 0.25 | 0.05 | 47 | 125 | 1300 | 6.8 | 2.90 | 80 |
| 1N6344 | 64.60 | 68 | 71.40 | 1.8 | 0.25 | 0.05 | 52 | 155 | 1500 | 6.3 | 3.20 | 80 |
| 1N6345 | 71.25 | 75 | 78.75 | 1.7 | 0.25 | 0.05 | 56 | 180 | 1600 | 5.7 | 3.40 | 80 |
| 1N6346 | 77.90 | 82 | 86.10 | 1.5 | 0.25 | 0.05 | 62 | 220 | 1800 | 5.2 | 3.80 | 80 |
| 1N6347 | 86.45 | 91 | 95.55 | 1.4 | 0.25 | 0.05 | 69 | 270 | 2100 | 4.7 | 4.20 | 80 |
| 1N6348 | 95.00 | 100 | 105.0 | 1.3 | 0.25 | 0.05 | 76 | 340 | 2400 | 4.3 | 4.40 | 80 |
| 1N6349 | 104.5 | 110 | 115.5 | 1.1 | 0.25 | 0.05 | 84 | 500 | 2800 | 3.9 | 4.80 | 80 |

**1.** Operation above the absolute maximum rating may cause device failure. Operation at the absolute maximum ratings, for extended periods, may reduce device reliability. **2.** Assembled in DO-35 package. Performance in die form subject to assembly heat sinking and die attach methods.
**3.** $V_{Z(reg)}$ = $V_Z$ @ 50% of $I_{ZM}$ minus $V_Z$ @ 10% of $I_{ZM}$ **4.** 1-3 kHz

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