

Description

The AZ2185 series is low dropout positive voltage regulators with a maximum dropout of 1.5V at 3A of load current.

The device features low quiescent current, low adjustable current and improved load transient performance. This device built in band-gap reference circuit, on-chip thermal shutdown and current limit function.

The AZ2185 is available in adjustable version. The adjustable version can set the output voltage with two external resistors.

The AZ2185 series is available in standard packages of TO252 (Standard).

Features

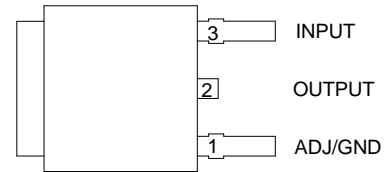
- Low Dropout Voltage: Typical 1.3V at 3A
- Current Limiting and Thermal Protection
- Output Current: 3A
- Current Limit: 4.5A
- Operating Junction Temperature: -40 to +125°C
- Line Regulation: 0.015%/V (Typ)
- Load Regulation: 0.1%/A (Typ)
- Adjust Pin Current: 6µA (Typ)
- Minimum Load Current: 0.3mA (Typ)
- Compatible with Low ESR Ceramic Capacitor
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Applications

- High Efficiency Linear Regulators
- Battery Charger
- Digital Video/Camcorder
- Post Regulation for Switching Supplies
- Microprocessor Supply
- Mother Board Power Supplies
- DVD-video Player
- Telecom Equipment
- Set Top Boxes and Web Boxes Modules' Supply

Features

(Top View)



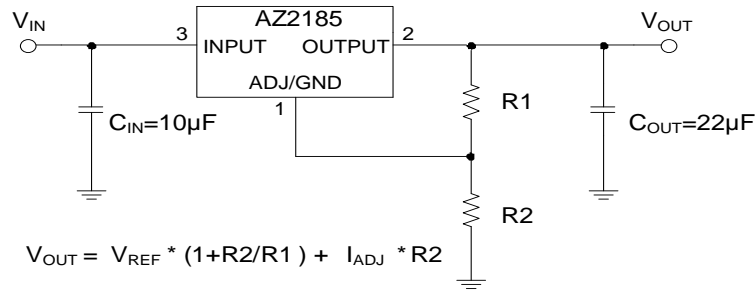
TO252 (Standard)

Applications

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- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html 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.

Typical Applications Circuit (Note 4)

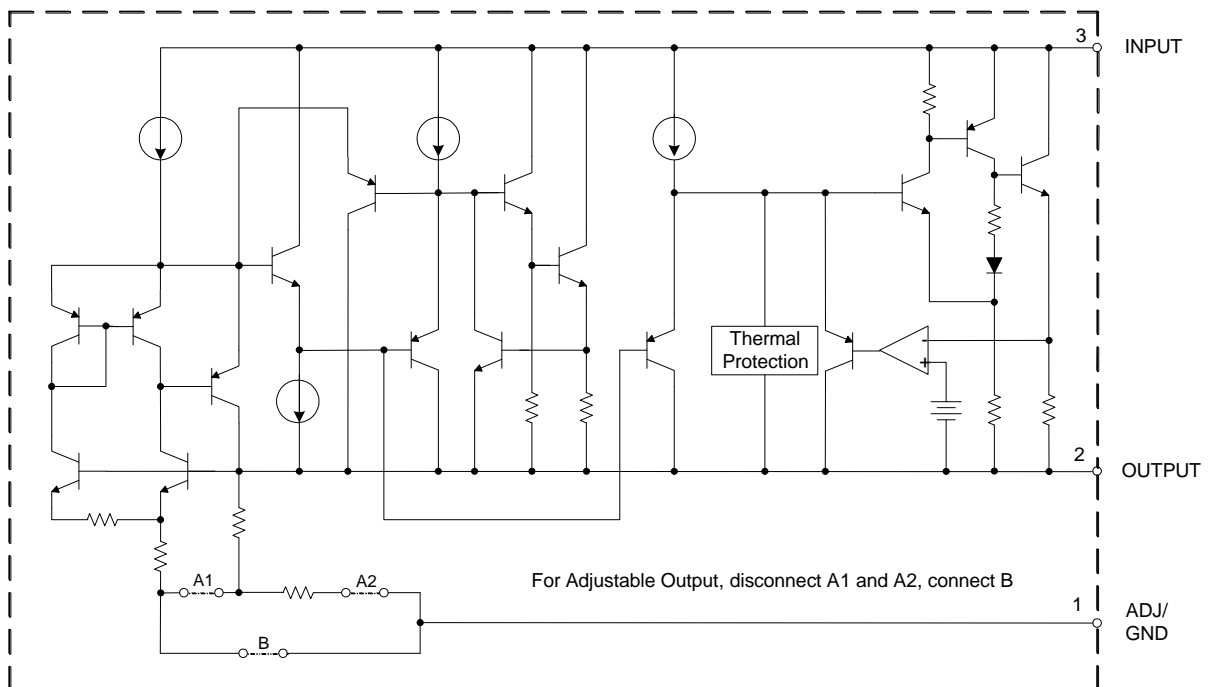


Note 4: The AZ2185 is compatible with low ESR ceramic capacitor.
The ESR of the output capacitors must be less than 0.4Ω.
A minimum of 10µF output capacitor is required.

Pin Descriptions

| Pin Number | Pin Name | Function |
|------------|----------|-------------------|
| 1 | ADJ/GND | Adjust pin/Ground |
| 2 | OUTPUT | Output voltage |
| 3 | INPUT | Input voltage |

Functional Block Diagram



Absolute Maximum Ratings (Note 5)

| Symbol | Parameter | Rating | Unit |
|---------------|--|-------------|------|
| V_{IN} | Input Voltage | 18 | V |
| T_J | Operating Junction Temperature | +150 | °C |
| T_{STG} | Storage Temperature Range | -65 to +150 | °C |
| T_{LEAD} | Lead Temperature (Soldering, 10sec) | +260 | °C |
| θ_{JA} | Thermal Resistance (Junction to Ambient) | 75 | °C/W |
| — | ESD (Human Body Model) | 5000 | V |
| — | ESD (Charge Device Model) | 2000 | V |

Note 5: Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” is not implied. Exposure to “Absolute Maximum Ratings” for extended periods may affect device reliability.

Recommended Operating Conditions

| Symbol | Parameter | Min | Max | Unit |
|----------|--------------------------------|-----|------|------|
| V_{IN} | Input Voltage | — | 12 | V |
| T_J | Operating Junction Temperature | -40 | +125 | °C |

Electrical Characteristics (Typicals and limits appearing in normal type apply for $T_J = +25^\circ\text{C}$. Limits appearing in **Boldface** type apply over the entire operating junction temperature range -40 to $+125^\circ\text{C}$.)

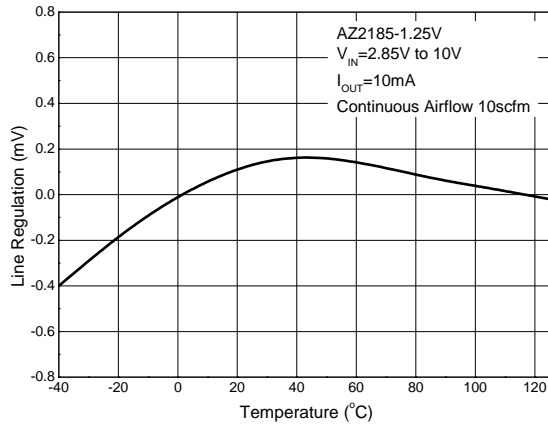
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------------|--|---|-----------------------|-----------------------|-----------------------|--------------------|
| V_{REF} | Reference Voltage | $I_{OUT} = 10\text{mA}$, $V_{IN}-V_{OUT} = 3\text{V}$, $T_J = +25^\circ\text{C}$, $10\text{mA} \leq I_{OUT} \leq 3\text{A}$, $1.5\text{V} \leq V_{IN}-V_{OUT} \leq 5\text{V}$ | 1.238 1.225 | 1.250 1.250 | 1.262 1.275 | V |
| V_{RLOAD} | Load Regulation | $10\text{mA} \leq I_{OUT} \leq 3\text{A}$, $V_{IN}-V_{OUT} = 3\text{V}$ | — | 0.1 0.2 | 0.4 0.5 | %/A |
| V_{RLINE} | Line Regulation | $I_{OUT} = 10\text{mA}$, $2.85\text{V} \leq V_{IN} \leq 10\text{V}$ | — | 0.015 0.035 | 0.2 0.2 | %/V |
| V_{DROP} | Dropout Voltage | $I_{OUT} = 3\text{A}$, ΔV_{REF} , $\Delta V_{OUT} = 1\%$ | — | 1.3 | 1.5 | V |
| I_{LIMIT} (Note 6) | Current Limit | $V_{IN}-V_{OUT} = 3\text{V}$ | 3.2 | 4.5 | 4.95 | A |
| I_{LOAD} | Minimum Load Current | $V_{IN} = 10\text{V}$ | — | 0.3 | 1 | mA |
| I_{ADJ} | Adjust Pin Current | $V_{IN} = 4.25\text{V}$, $I_{OUT} = 10\text{mA}$ | — | 6 | 10 | μA |
| ΔI_{ADJ} | Adjust Pin Current Change | $10\text{mA} \leq I_{OUT} \leq 3\text{A}$, $1.5\text{V} \leq V_{IN}-V_{OUT} \leq 6\text{V}$ | — | 0.3 | 2 | μA |
| PSRR | Ripple Rejection | $f_{RIPPLE} = 120\text{Hz}$, $C_{OUT} = 22\mu\text{F}$, $I_{OUT} = 3\text{A}$, $V_{IN}-V_{OUT} = 3\text{V}$ | — | 50 | — | dB |
| — | Long Term Stability | $T_A = +125^\circ\text{C}$, 1000Hrs | — | 0.5 | — | % |
| — | Temperature Stability | $I_{OUT} = 10\text{mA}$, $V_{IN}-V_{OUT} = 1.5\text{V}$ | — | 50 | — | PPM% |
| — | RMS Noise (% of V_{OUT}) | $T_A = +125^\circ\text{C}$, $10\text{Hz} \leq f \leq 10\text{kHz}$ | — | 0.003 | — | % |
| — | OTSD | — | — | +150 | — | $^\circ\text{C}$ |
| — | OTSD Hysteresis | — | — | +20 | — | $^\circ\text{C}$ |
| θ_{JC} | Thermal Resistance (Junction to Case) | — | — | 10 | — | $^\circ\text{C/W}$ |

Note 6: Make the V_{OUT} down to about 98% of the test values, I_{OUT} value is set to I_{LIMIT} at this time.

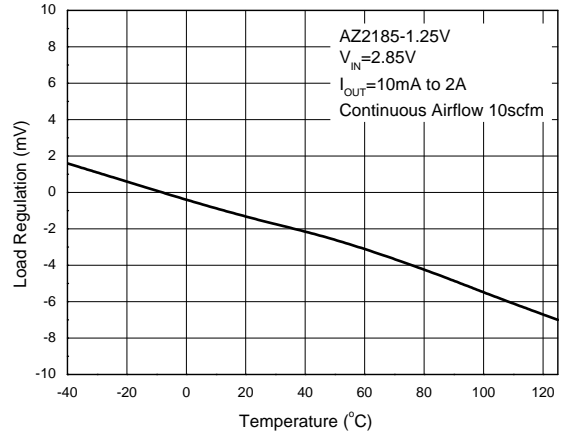
Performance Characteristics

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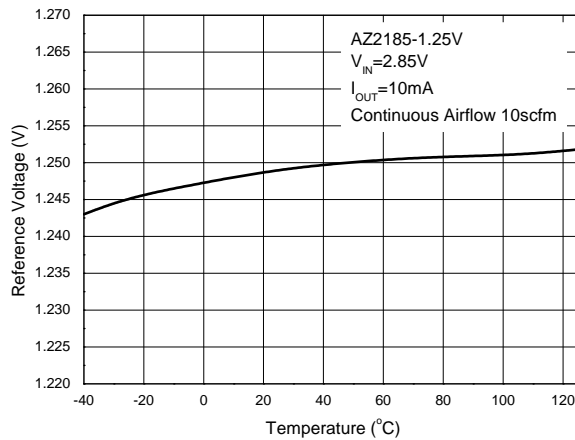
Line Regulation vs. Temperature



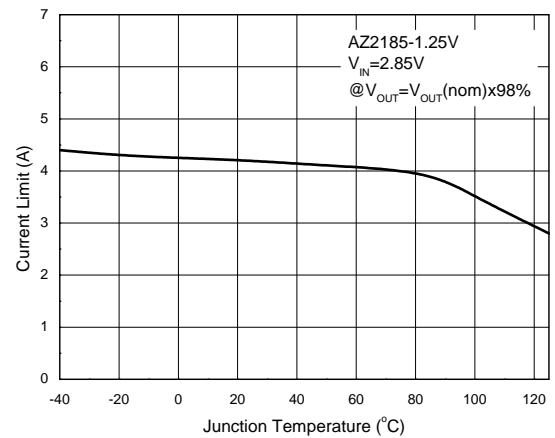
Load Regulation vs. Temperature



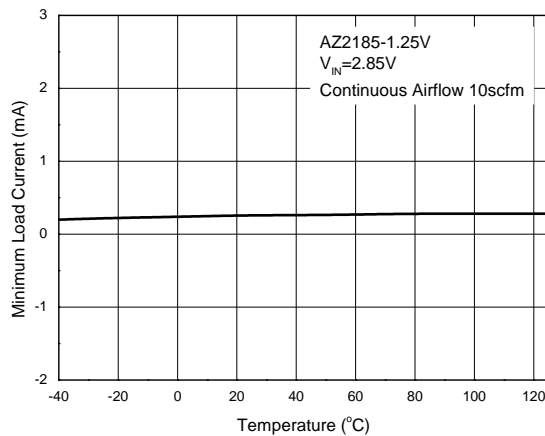
Reference Voltage vs. Temperature



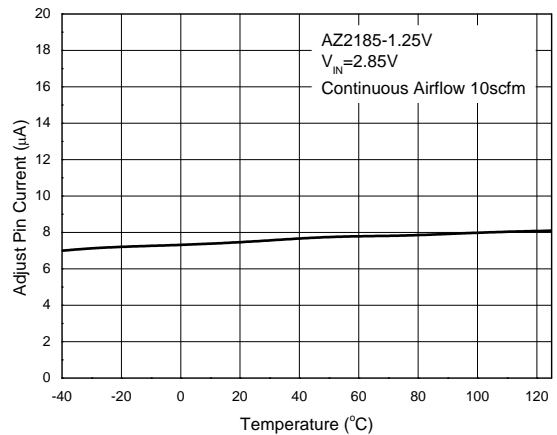
Current Limit vs. Temperature



Minimum Load Current vs. Temperature

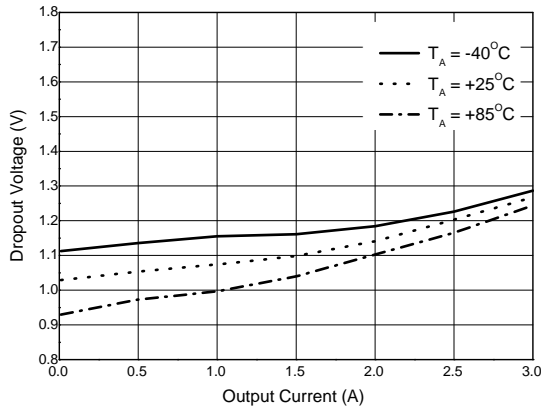


Adjust Pin Current vs. Temperature

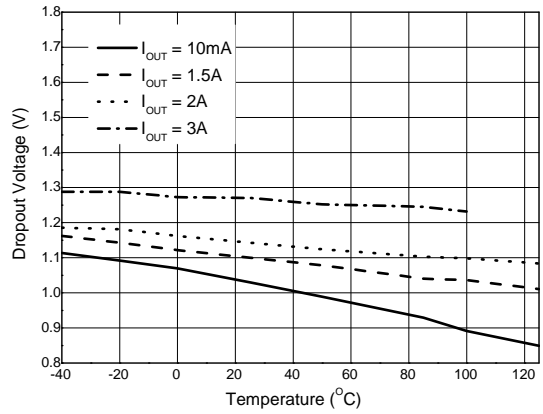


Performance Characteristics (Cont.)

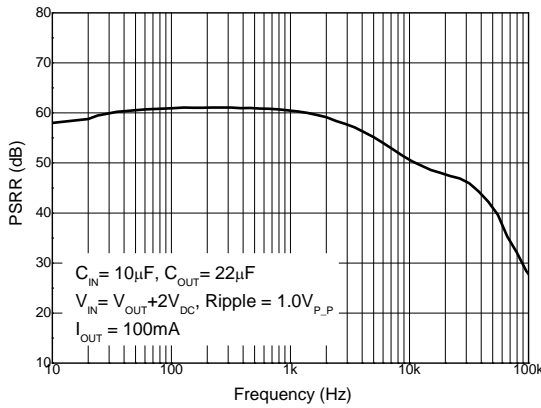
Dropout Voltage vs. Output Current



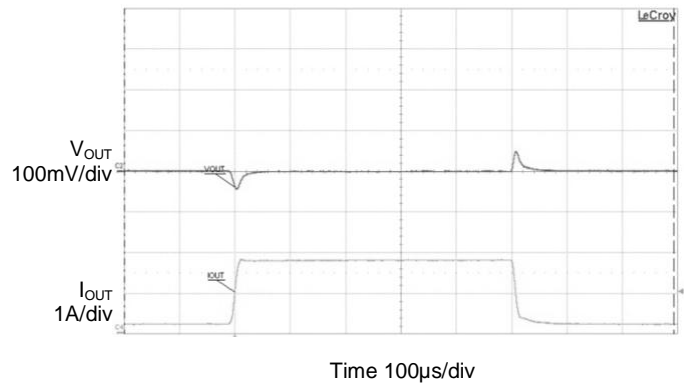
Dropout Voltage vs. Temperature



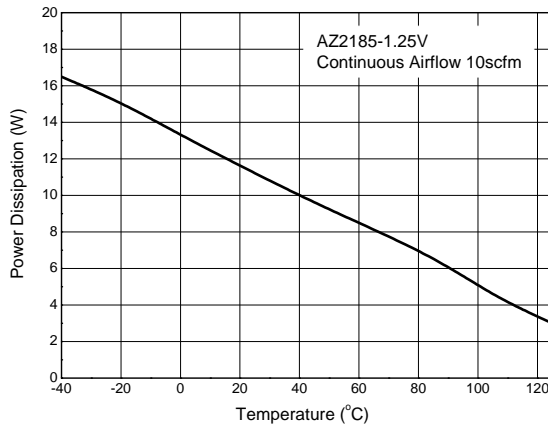
PSRR vs. Frequency



Load Transient Response

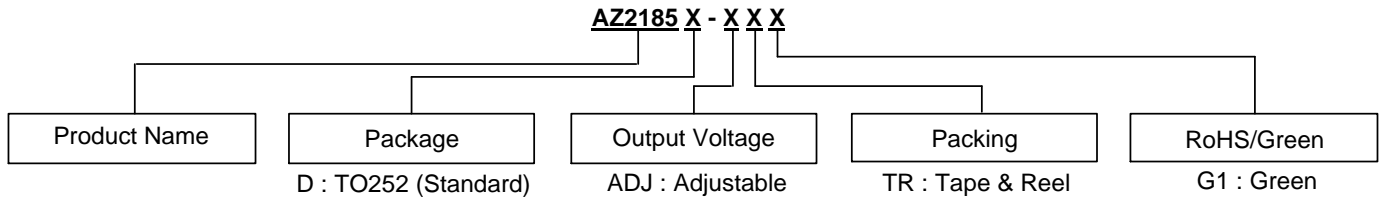


Power Dissipation vs. Temperature



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Ordering Information

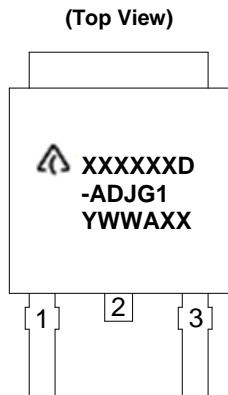


| Package | Temperature Range | Part Number | Marking ID | Packing |
|------------------|-------------------|-----------------|---------------|------------------|
| TO252 (Standard) | -40 to +125°C | AZ2185D-ADJTRG1 | AZ2185D-ADJG1 | 2500/Tape & Reel |

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Marking Information

(1) TO252 (Standard)

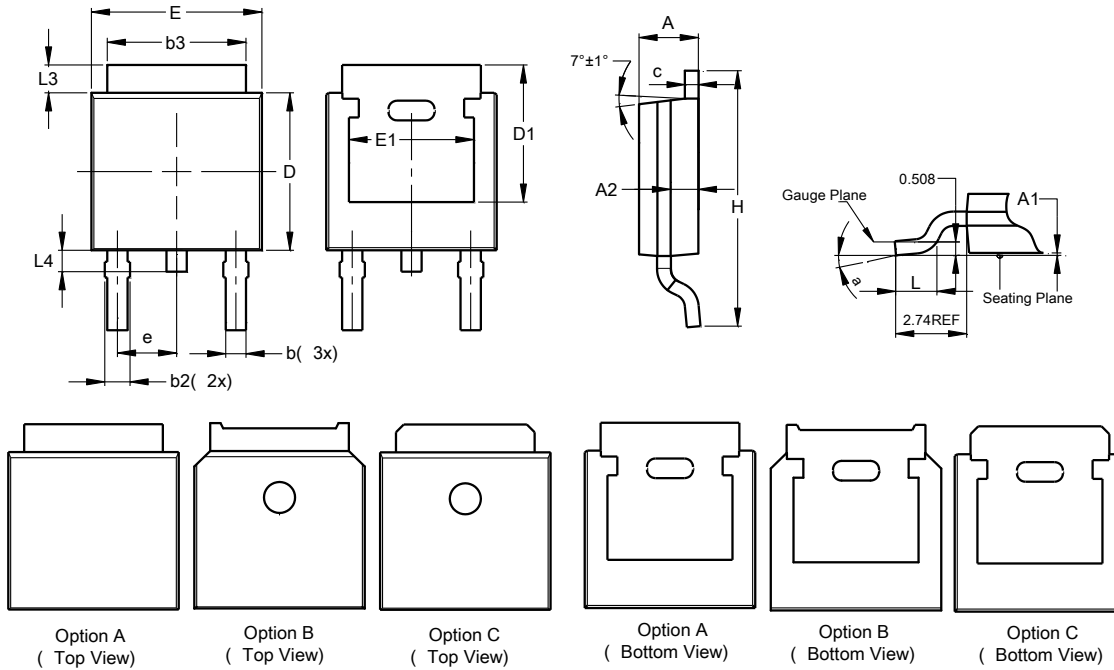


First and Second Lines: Logo and Marking ID (See Ordering Information)
 Third Line: Date Code
 Y: Year
 WW: Work Week of Molding
 A: Assembly House Code
 XX: 7th and 8th Digits of Batch Number

Package Outline Dimensions

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

(1) Package Type: TO252 (Standard)

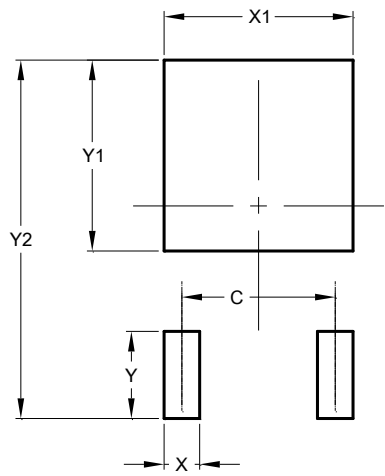


| TO252 (Standard) | | | |
|----------------------|------|-------|-------|
| Dim | Min | Max | Typ |
| A | 2.19 | 2.39 | 2.29 |
| A1 | 0.00 | 0.13 | 0.08 |
| A2 | 0.97 | 1.17 | 1.07 |
| b | 0.64 | 0.88 | 0.783 |
| b2 | 0.76 | 1.14 | 0.95 |
| b3 | 5.21 | 5.46 | 5.33 |
| c | 0.45 | 0.58 | 0.531 |
| D | 6.00 | 6.20 | 6.10 |
| D1 | 5.21 | - | - |
| e | - | - | 2.286 |
| E | 6.45 | 6.70 | 6.58 |
| E1 | 4.32 | - | - |
| H | 9.40 | 10.41 | 9.91 |
| L | 1.40 | 1.78 | 1.59 |
| L3 | 0.88 | 1.27 | 1.08 |
| L4 | 0.60 | 1.02 | 0.83 |
| a | 0° | 10° | - |
| All Dimensions in mm | | | |

Suggested Pad Layout

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

(1) Package Type: TO252 (Standard)



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 4.572 |
| X | 1.060 |
| X1 | 5.632 |
| Y | 2.600 |
| Y1 | 5.700 |
| Y2 | 10.700 |

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