## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)}$ Max | $I_D$ $T_C$ = +25°C |
|---|---|---|
| 700V | 1.3Ω @ $V_{GS}$ = 10V | 4.6A |

## Features and Benefits

- Low On-Resistance
- High $BV_{DSS}$ Rating for Power Application
- Low Input Capacitance
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

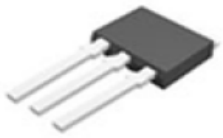
## Description and Applications

This MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$), yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

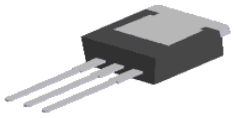
- Motor Control
- Backlighting
- DC-DC Converters
- Power Management Functions

## Mechanical Data

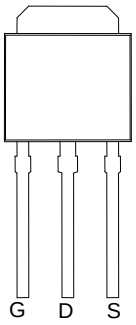
- Case: TO251
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.33 grams (Approximate)



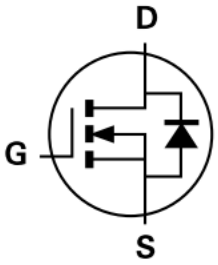
TO251
Top View



TO251
Bottom View




Top View
Pin Configuration




Internal Schematic

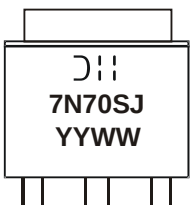
## Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---|---|---|
| DMJ70H1D3SJ3 | TO251 | 75 Pieces/Tube |

Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
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.
4. For packaging details, go to our website at http"//www.diodes.com/products/packages.html.

## Marking Information

**TO251**




=Manufacturer's Marking
7N70SJ = Product Type Marking Code
YYWW = Date Code Marking
YY or YY= Last Digit of Year (ex: 16 = 2016)
WW or WW = Week Code (01 to 53)

## Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Units |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 700 | V |
| Gate-Source Voltage | | $V_{GSS}$ | ±30 | V |
| Continuous Drain Current (Note 5) $V_{GS}$ = 10V | $T_C$ = +25°C<br>$T_C$ = +100°C | $I_D$ | 4.6<br>2.9 | A |
| Maximum Body Diode Forward Current (Note 6) | | $I_S$ | 3.0 | A |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) | | $I_{DM}$ | 5.4 | A |
| Avalanche Current (Note 7) | L = 60mH | $I_{AS}$ | 1.1 | A |
| Avalanche Energy (Note 7) | L = 60mH | $E_{AS}$ | 40 | mJ |
| Peak Diode Recovery dv/dt (Note 7) | | dv/dt | 5 | V/ns |

## Thermal Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Units |
|---|---|---|---|---|
| Total Power Dissipation (Note 5) | $T_C$ = +25°C | $P_D$ | 41 | W |
| | $T_C$ = +100°C | | 16 | |
| Thermal Resistance, Junction to Ambient (Note 6) | | $R_{\Theta JA}$ | 79 | °C/W |
| Thermal Resistance, Junction to Case (Note 5) | | $R_{\Theta JC}$ | 3.0 | |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

## Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** (Note 8) | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 700 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | 1 | µA | $V_{DS}$ = 700V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | 100 | nA | $V_{GS}$ = ±30V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS** (Note 8) | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | 2 | 2.9 | 4 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 1.0 | 1.3 | Ω | $V_{GS}$ = 10V, $I_D$ = 2.5A |
| Diode Forward Voltage | $V_{SD}$ | — | 0.9 | 1.3 | V | $V_{GS}$ = 0V, $I_S$ = 5A |
| **DYNAMIC CHARACTERISTICS** (Note 7) | | | | | | |
| Input Capacitance | $C_{ISS}$ | — | 351 | — | pF | $V_{DS}$ = 50V, f = 1MHz, $V_{GS}$ = 0V |
| Output Capacitance | $C_{OSS}$ | — | 66 | — | | |
| Reverse Transfer Capacitance | $C_{RSS}$ | — | 1.1 | — | | |
| Gate Resistance | $R_G$ | — | 3.5 | — | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1MHz |
| Total Gate Charge | $Q_G$ | — | 13.9 | — | nC | $V_{DD}$ = 560V, $I_D$ = 5A, $V_{GS}$ = 10V |
| Gate-Source Charge | $Q_{GS}$ | — | 1.9 | — | | |
| Gate-Drain Charge | $Q_{GD}$ | — | 8.5 | — | | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 8.5 | — | ns | $V_{DD}$ = 350V, $V_{GS}$ = 10V, $R_G$ = 4.7Ω, $I_D$ = 2.5A |
| Turn-On Rise Time | $t_R$ | — | 11.6 | — | | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 24.5 | — | | |
| Turn-Off Fall Time | $t_F$ | — | 10 | — | | |
| Body Diode Reverse Recovery Time | $t_{RR}$ | — | 212 | — | ns | $I_S$ = 5A, dI/dt = 100A/µs |
| Body Diode Reverse Recovery Time ($T_J$ = +150°C) | $t_{RR}$ | — | 251 | — | ns | |
| Body Diode Reverse Recovery Charge | $Q_{RR}$ | — | 1.8 | — | µC | |
| Body Diode Reverse Recovery Charge ($T_J$ = +150°C) | $Q_{RR}$ | — | 2.3 | — | µC | |

Notes:
5. Device mounted on infinite heatsink.
6. Device mounted on FR-4 substrate PC board, 2oz. copper, with minimum recommended pad layout.
7. Guaranteed by design. Not subject to production testing.
8. Short duration pulse test used to minimize self-heating effect.

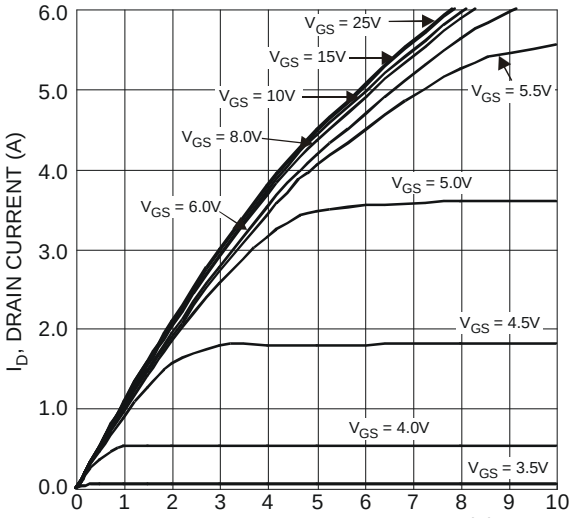



Figure 1 Typical Output Characteristics

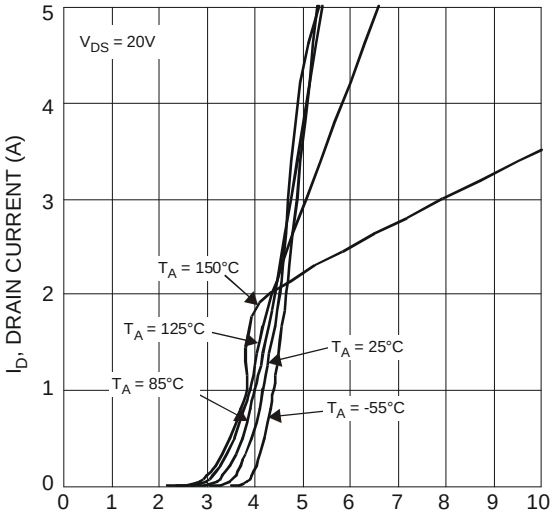



Figure 2 Typical Transfer Characteristics

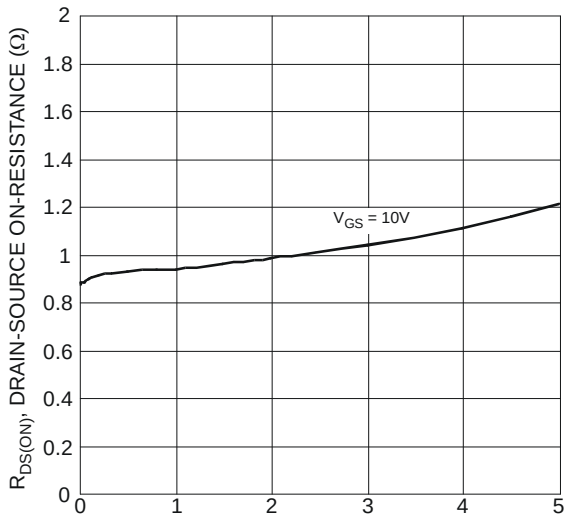



Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

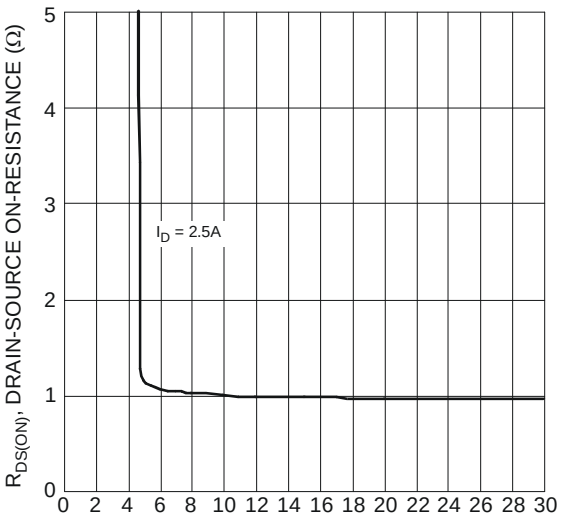



Figure 4 Typical Transfer Characteristics

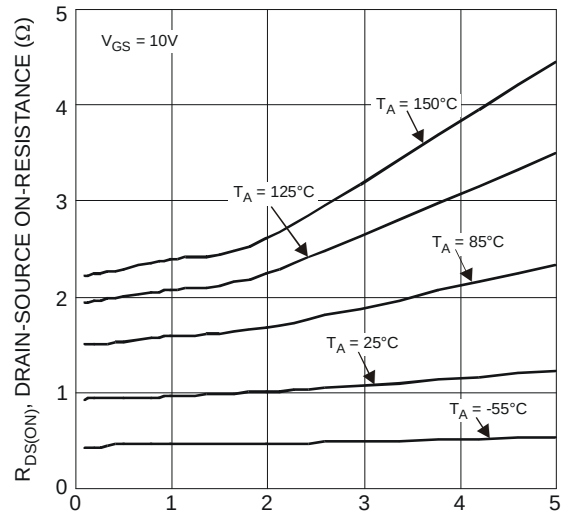



Figure 5 Typical On-Resistance vs. Drain Current and Temperature

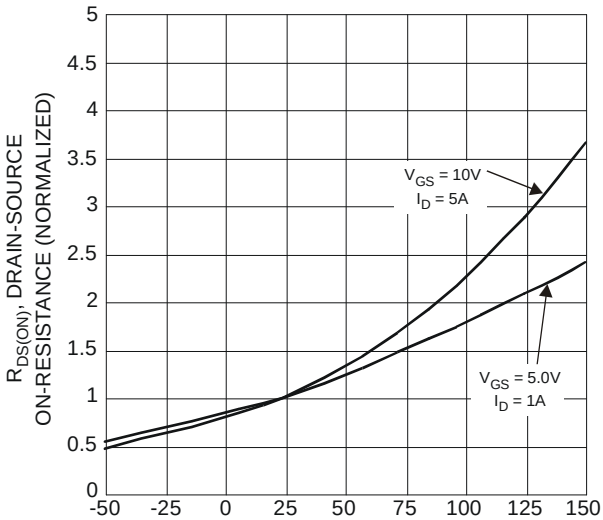



Figure 6 On-Resistance Variation with Temperature

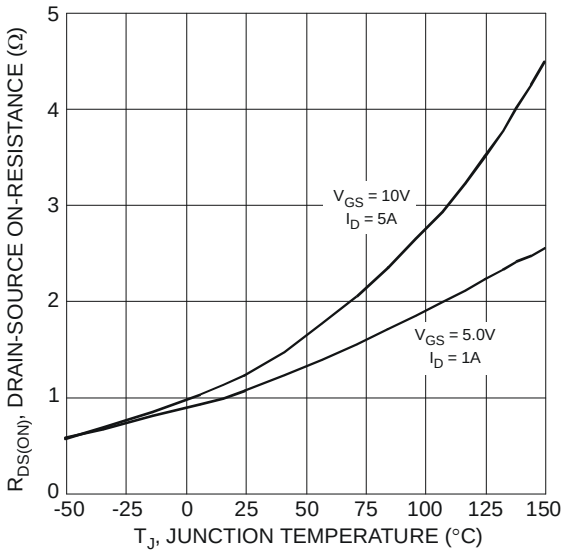



Figure 7 On-Resistance Variation with Temperature

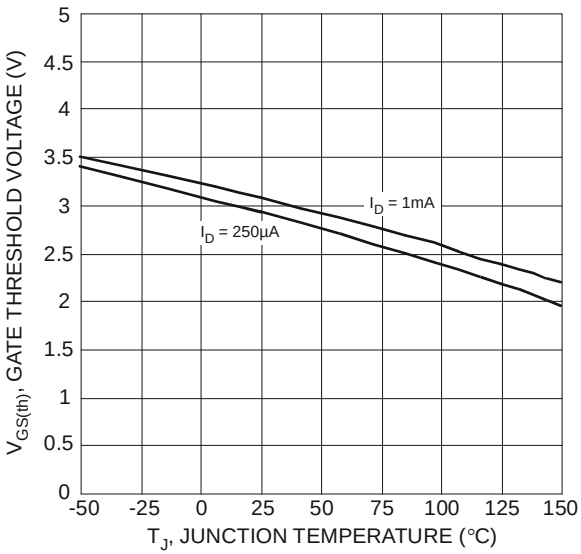



Figure 8 Gate Threshold Variation vs. Ambient Temperature

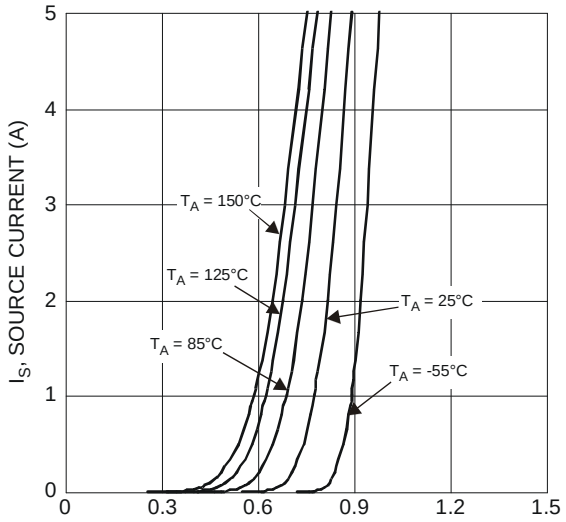



Figure 9 Diode Forward Voltage vs. Current

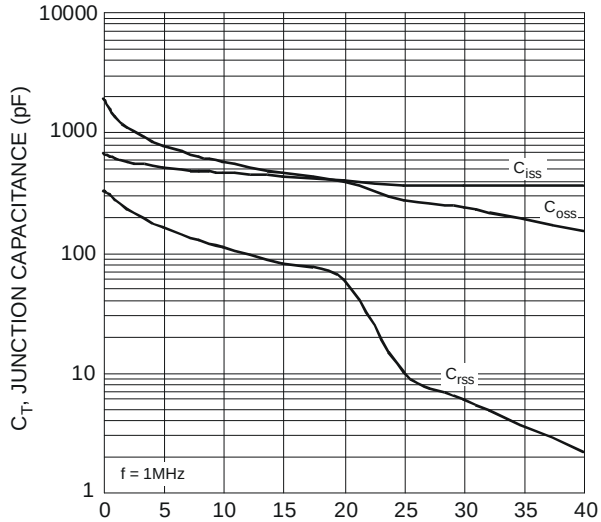



Figure 10 Typical Junction Capacitance

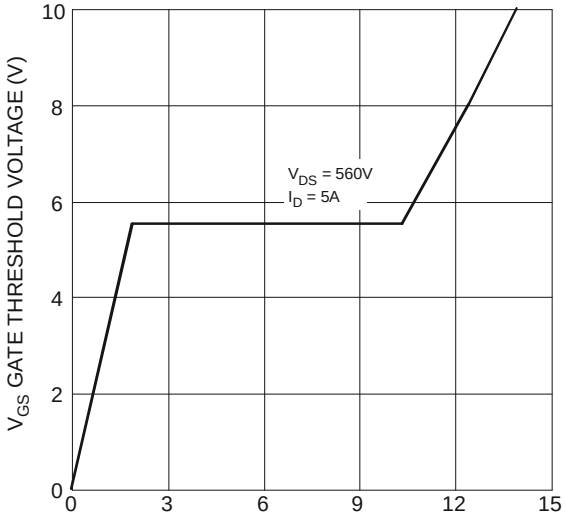



Figure 11 Gate Charge

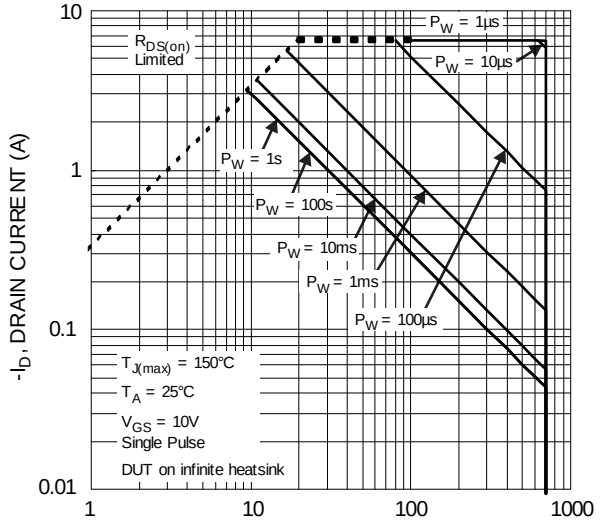



Figure 12 SOA, Safe Operation Area

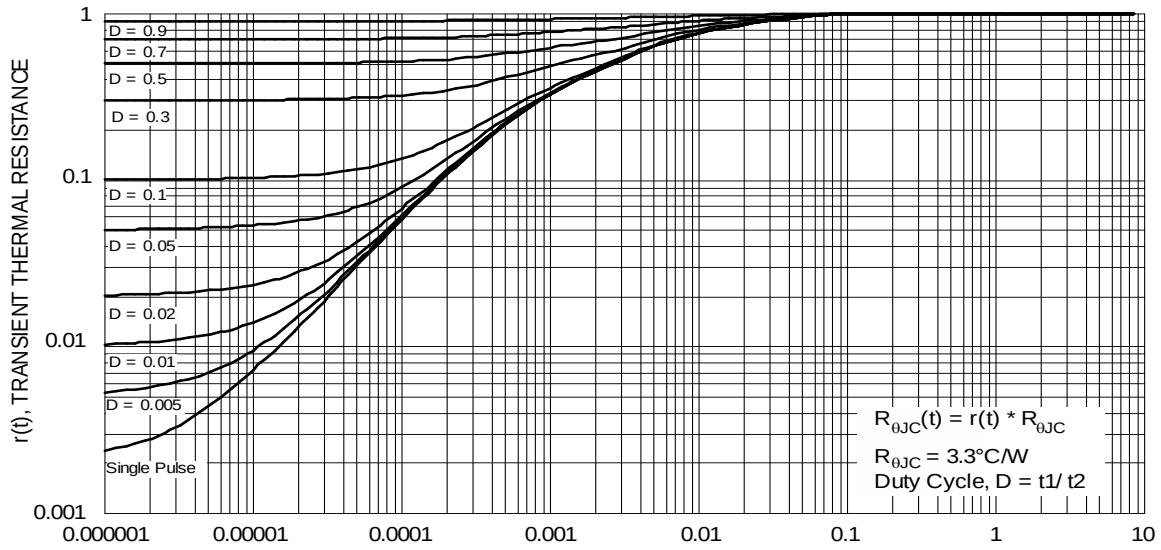
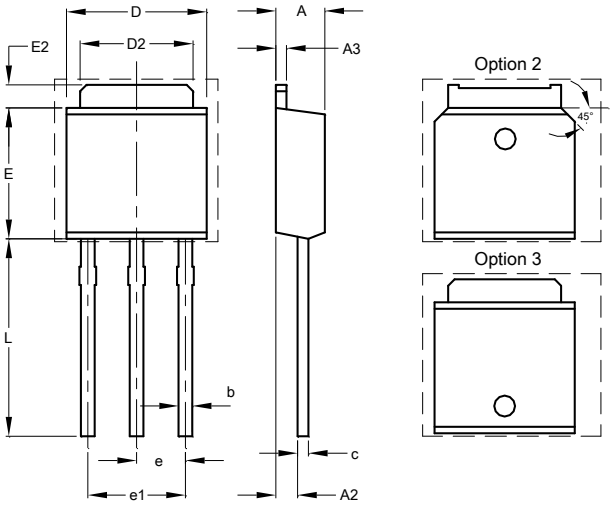



Figure 13 Transient Thermal Resistance

## Package Outline Dimensions

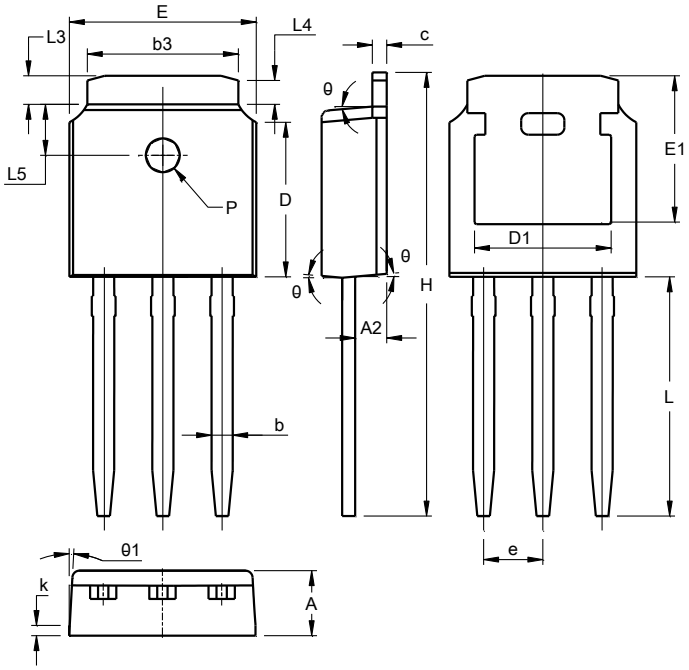
Please see AP02001 at http://www.diodes.com/_files/datasheets/ap02001.pdf for the latest version.

**TO251**




| TO251 | | |
|---|---|---|
| **Dim** | **Min** | **Max** |
| **A** | 2.200 | 2.400 |
| **A2** | 0.890 | 1.150 |
| **A3** | 0.450 | 0.550 |
| **B** | 0.550 | 0.740 |
| **C** | 0.450 | 0.570 |
| **D** | 6.400 | 6.750 |
| **D2** | 5.200 | 5.400 |
| **E** | 5.950 | 6.250 |
| **E2** | 0.900 | 1.250 |
| **E** | 2.240 | 2.340 |
| **e1** | 4.430 | 4.730 |
| **L** | 8.900 | 9.500 |
| **All Dimensions in mm** | | |

**TO251 (Type TH)**




| TO251 (Type TH) | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 2.20 | 2.40 | 2.30 |
| **A2** | 0.97 | 1.17 | 1.07 |
| **b** | 0.68 | 0.90 | 0.78 |
| **b3** | 5.20 | 5.50 | 5.33 |
| **c** | 0.43 | 0.63 | 0.53 |
| **D** | 5.98 | 6.22 | 6.10 |
| **D1** | 5.30 REF | | |
| **e** | 2.286 BSC | | |
| **E** | 6.40 | 6.80 | 6.60 |
| **E1** | 4.63 | 5.03 | 4.83 |
| **H** | 16.22 | 16.82 | 16.52 |
| **k** | 0.40REF | | |
| **L** | 9.15 | 9.65 | 9.40 |
| **L3** | 0.88 | 1.28 | 1.02 |
| **L4** | 0.75 REF | | |
| **L5** | 1.65 | 1.95 | 1.80 |
| **PØ** | 1.20 | | |
| **θ** | 5° | 9° | 7° |
| **θ1** | 5° | 9° | 7° |
| **All Dimensions in mm** | | | |

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