

## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)}$ Max           | $I_D$<br>$T_C = +25^\circ C$ |
|------------|----------------------------|------------------------------|
| 600V       | $3.5\Omega @ V_{GS} = 10V$ | 2.8A                         |

## Description

This new generation complementary MOSFET features low on-resistance and fast switching, making it ideal for high efficiency power management applications.

## Applications

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

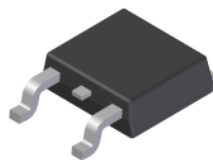
## Features

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

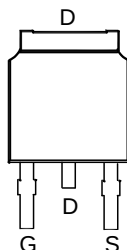
## Mechanical Data

- Case: TO252 (DPAK) (Type TH)
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 
- Weight: 0.33 grams (Approximate)

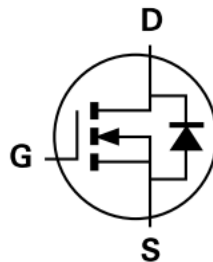
TO252 (DPAK) (Type TH)



Top View



Top View



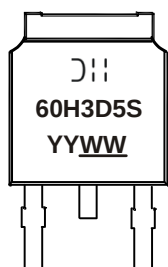
Internal Schematic

## Ordering Information (Note 4)

| Part Number     | Case                   | Packaging         |
|-----------------|------------------------|-------------------|
| DMN60H3D5SK3-13 | TO252 (DPAK) (Type TH) | 2,500/Tape & Reel |

- 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](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



 = Manufacturer's Marking  
 60H3D5S = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY or YY = Last Two Digits of Year (ex: 17 = 2017)  
 WW or WW = Week Code (01 to 53)

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

| Characteristic                                                            |              |                         | Symbol           | Value | Unit |
|---------------------------------------------------------------------------|--------------|-------------------------|------------------|-------|------|
| Drain-Source Voltage                                                      |              |                         | V <sub>DSS</sub> | 600   | V    |
| Gate-Source Voltage                                                       |              |                         | V <sub>GSS</sub> | ±30   | V    |
| Continuous Drain Current (Note 5) V <sub>GS</sub> = 10V                   | Steady State | T <sub>C</sub> = +25°C  | I <sub>D</sub>   | 2.8   | A    |
|                                                                           |              | T <sub>C</sub> = +100°C |                  | 1.8   |      |
| Maximum Body Diode Forward Current (Note 5)                               |              |                         | I <sub>S</sub>   | 2.5   | A    |
| Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)                        |              |                         | I <sub>DM</sub>  | 4.4   | A    |
| Avalanche Current, L = 60mH (Note 7)                                      |              |                         | I <sub>AS</sub>  | 1.0   | A    |
| Avalanche Energy, L = 60mH (Note 7)                                       |              |                         | E <sub>AS</sub>  | 30    | mJ   |
| Peak Diode Recovery dv/dt (V <sub>DD</sub> = 400V, I <sub>D</sub> = 2.7A) |              |                         | dv/dt            | 2.7   | V/ns |

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

| Characteristic                                   |                         | Symbol                            | Value       | Unit |
|--------------------------------------------------|-------------------------|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5)                 | T <sub>C</sub> = +25°C  | P <sub>D</sub>                    | 41          | W    |
|                                                  | T <sub>C</sub> = +100°C |                                   | 16          |      |
| Thermal Resistance, Junction to Ambient (Note 6) |                         | R <sub>θJA</sub>                  | 46          | °C/W |
| Thermal Resistance, Junction to Case (Note 5)    |                         | R <sub>θJC</sub>                  | 3.0         |      |
| Operating and Storage Temperature Range          |                         | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

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

| Characteristic                            | Symbol              | Min | Typ  | Max  | Unit | Test Condition                                                                             |
|-------------------------------------------|---------------------|-----|------|------|------|--------------------------------------------------------------------------------------------|
| <b>OFF CHARACTERISTICS (Note 8)</b>       |                     |     |      |      |      |                                                                                            |
| Drain-Source Breakdown Voltage            | BV <sub>DSS</sub>   | 600 | —    | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                                               |
| Zero Gate Voltage Drain Current           | I <sub>DSS</sub>    | —   | —    | 1.0  | μA   | V <sub>DS</sub> = 600V, V <sub>GS</sub> = 0V                                               |
| Gate-Source Leakage                       | I <sub>GSS</sub>    | —   | —    | ±100 | nA   | V <sub>GS</sub> = ±30V, V <sub>DS</sub> = 0V                                               |
| <b>ON CHARACTERISTICS (Note 8)</b>        |                     |     |      |      |      |                                                                                            |
| Gate Threshold Voltage                    | V <sub>GS(TH)</sub> | 2.0 | 3.1  | 4.0  | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                 |
| Static Drain-Source On-Resistance         | R <sub>DS(ON)</sub> | —   | 2.7  | 3.5  | Ω    | V <sub>GS</sub> = 10V, I <sub>D</sub> = 1.5A                                               |
| Diode Forward Voltage                     | V <sub>SD</sub>     | —   | 0.9  | 1.5  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 3.0A                                                |
| <b>DYNAMIC CHARACTERISTICS (Note 7)</b>   |                     |     |      |      |      |                                                                                            |
| Input Capacitance                         | C <sub>ISS</sub>    | —   | 354  | —    | pF   | V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz                                    |
| Output Capacitance                        | C <sub>OSS</sub>    | —   | 41   | —    |      |                                                                                            |
| Reverse Transfer Capacitance              | C <sub>RSS</sub>    | —   | 4    | —    |      |                                                                                            |
| Gate Resistance                           | R <sub>G</sub>      | —   | 2.6  | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz                                     |
| Total Gate Charge (V <sub>GS</sub> = 10V) | Q <sub>g</sub>      | —   | 12.6 | —    | nC   | V <sub>DS</sub> = 480V, I <sub>D</sub> = 2.5A                                              |
| Gate-Source Charge                        | Q <sub>gs</sub>     | —   | 1.7  | —    |      |                                                                                            |
| Gate-Drain Charge                         | Q <sub>gd</sub>     | —   | 7.1  | —    |      |                                                                                            |
| Turn-On Delay Time                        | t <sub>D(ON)</sub>  | —   | 10.6 | —    | ns   | V <sub>GS</sub> = 10V, V <sub>DD</sub> = 300V, R <sub>G</sub> = 25Ω, I <sub>D</sub> = 2.5A |
| Turn-On Rise Time                         | t <sub>r</sub>      | —   | 22   | —    |      |                                                                                            |
| Turn-Off Delay Time                       | t <sub>D(OFF)</sub> | —   | 34   | —    |      |                                                                                            |
| Turn-Off Fall Time                        | t <sub>f</sub>      | —   | 28   | —    |      |                                                                                            |
| Body Diode Reverse Recovery Time          | t <sub>RR</sub>     | —   | 198  | —    | ns   | V <sub>GS</sub> = 0V, I <sub>S</sub> = 2.5A, dI/dt = 100A/μs                               |
| Body Diode Reverse Recovery Charge        | Q <sub>RR</sub>     | —   | 952  | —    | nC   |                                                                                            |

- Notes:
- Device mounted on infinite heatsink.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper pad layout.
  - Guaranteed by design. Not subject to production testing.
  - Short duration pulse test used to minimize self-heating effect.

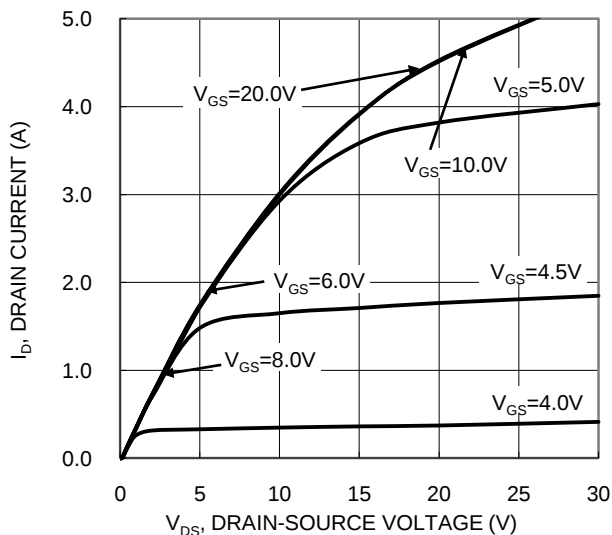


Figure 1. Typical Output Characteristic

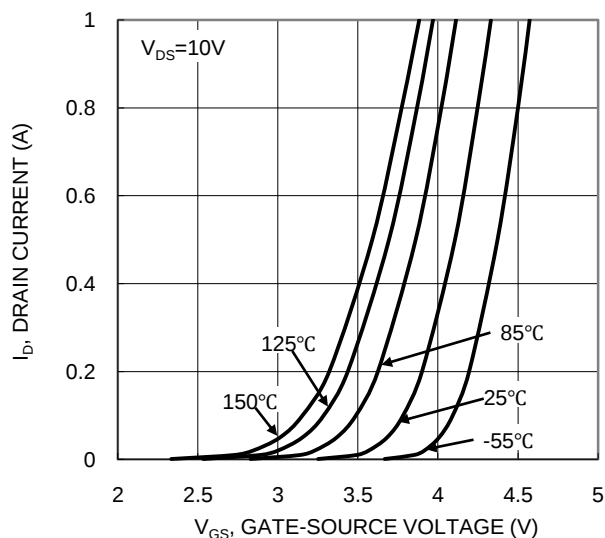


Figure 2. Typical Transfer Characteristic

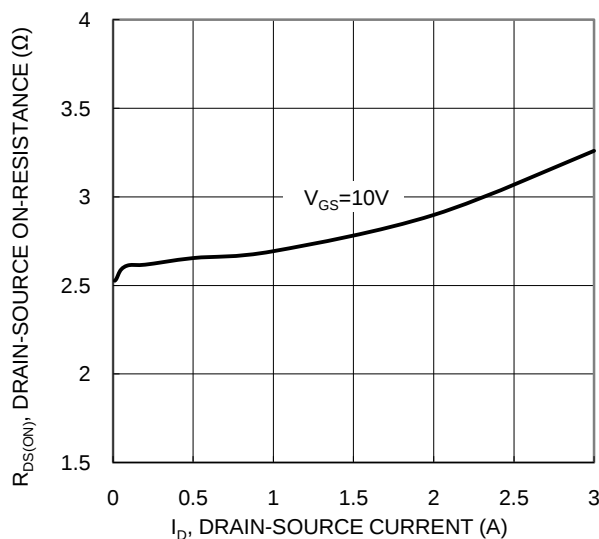


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

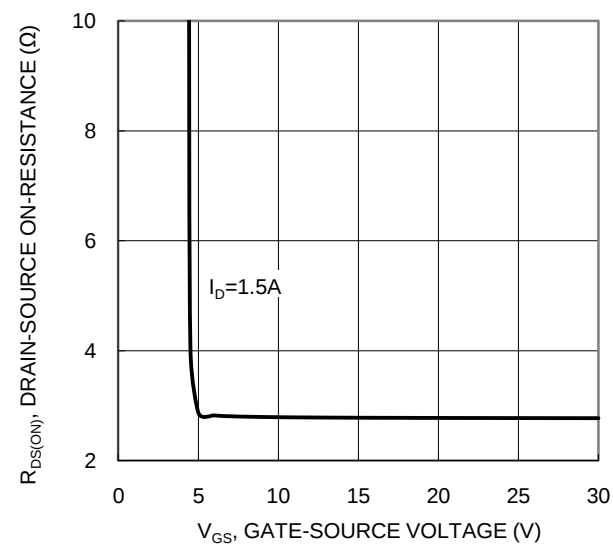


Figure 4. Typical Transfer Characteristic

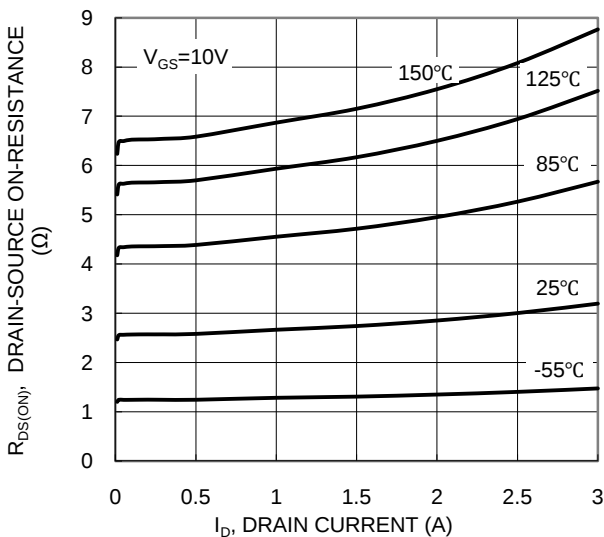


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

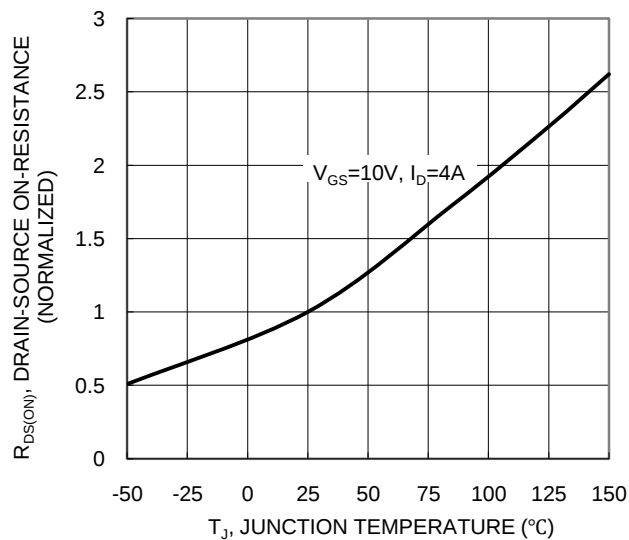


Figure 6. On-Resistance Variation with Temperature

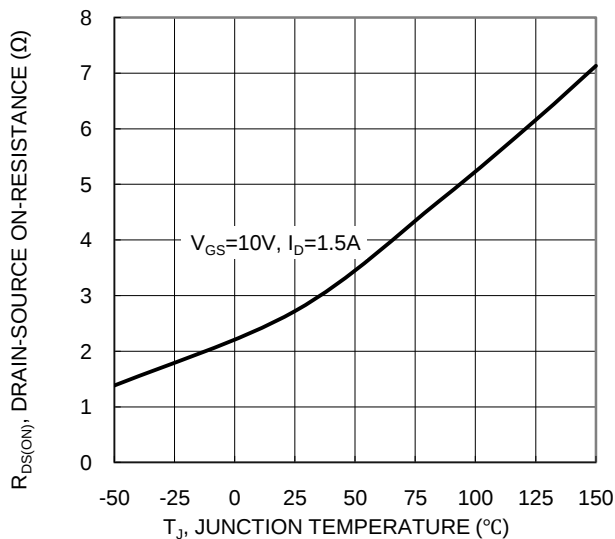


Figure 7. On-Resistance Variation with Temperature

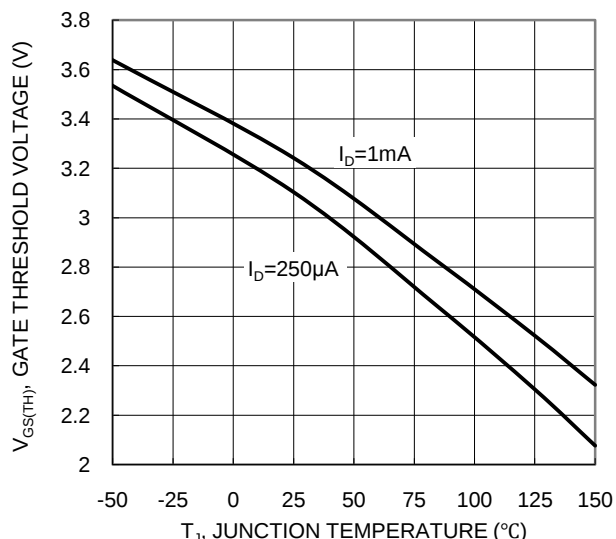


Figure 8. Gate Threshold Variation vs. Temperature

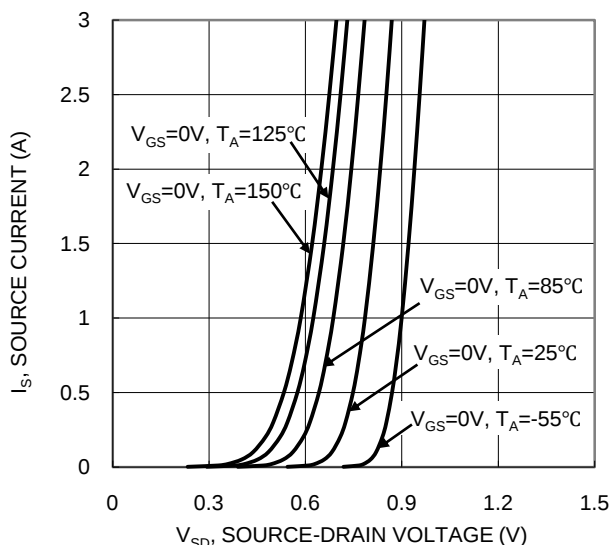


Figure 9. Diode Forward Voltage vs. Current

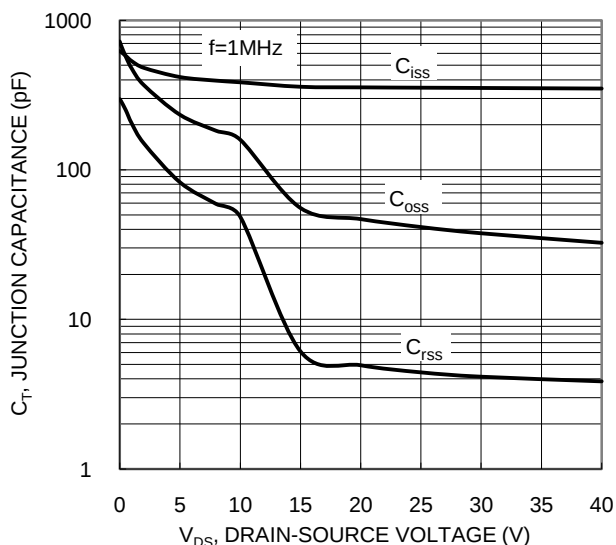


Figure 10. Typical Junction Capacitance

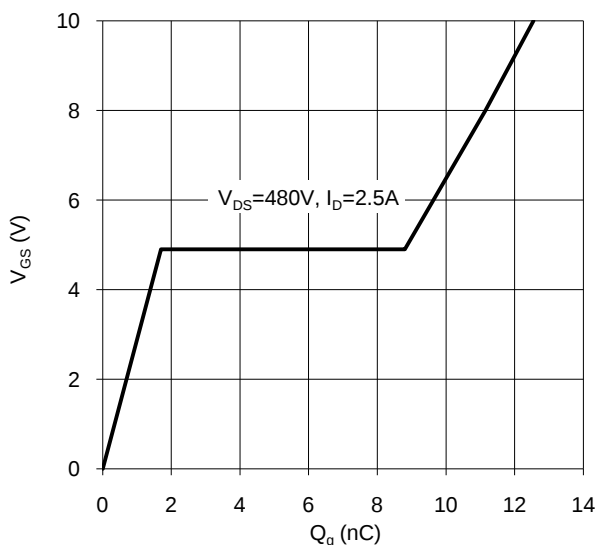


Figure 11. Gate Charge

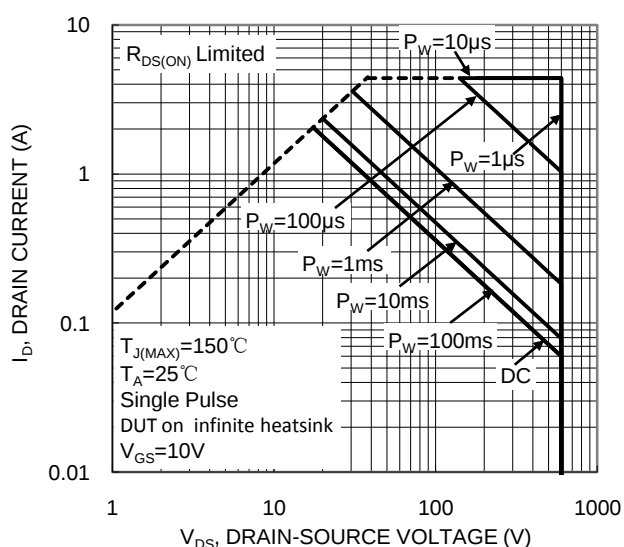


Figure 12. SOA, Safe Operation Area

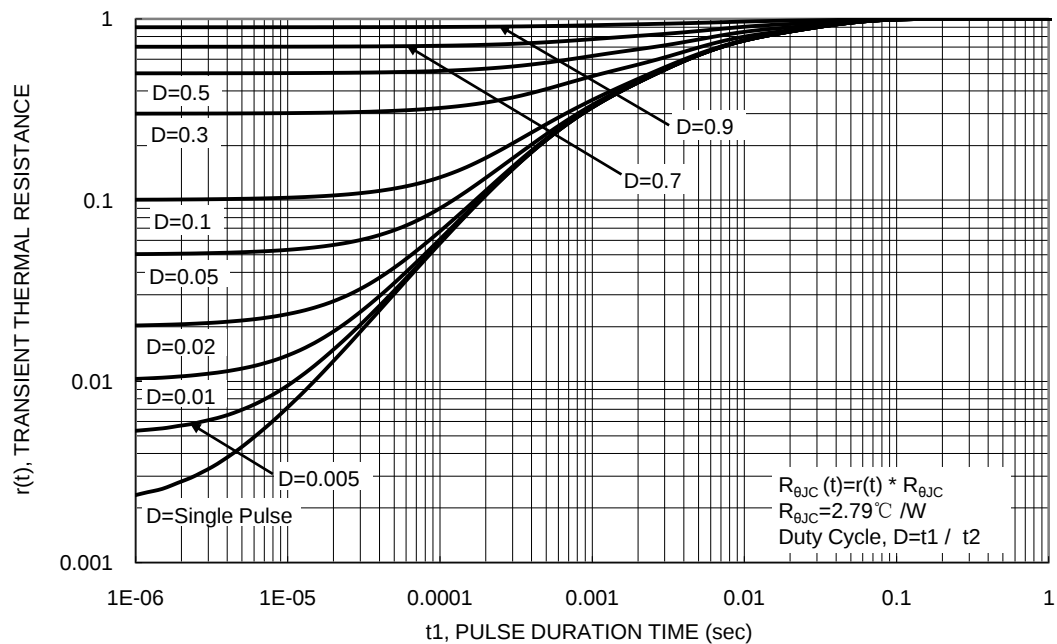
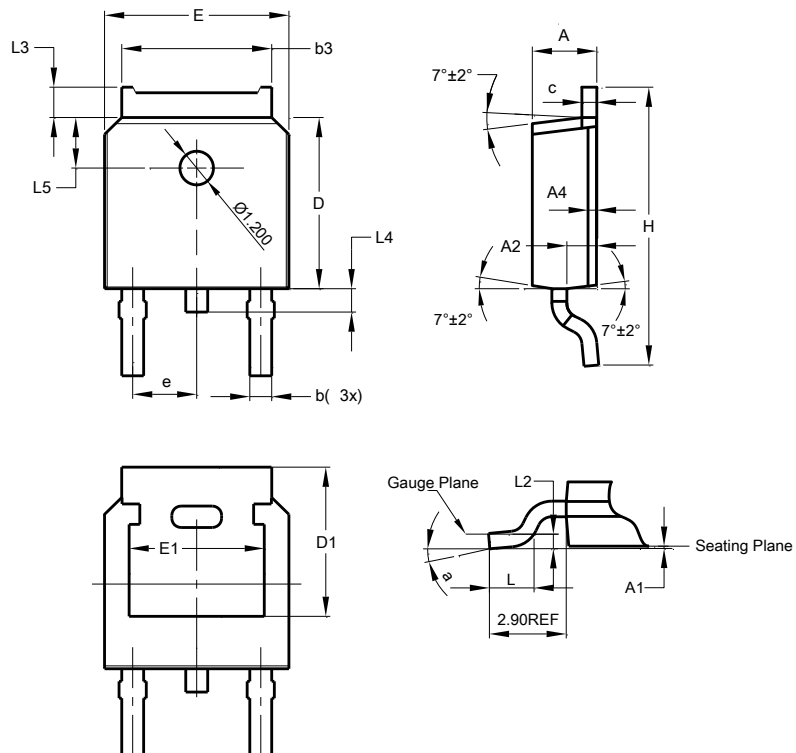


Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

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

TO252 (DPAK) (Type TH)

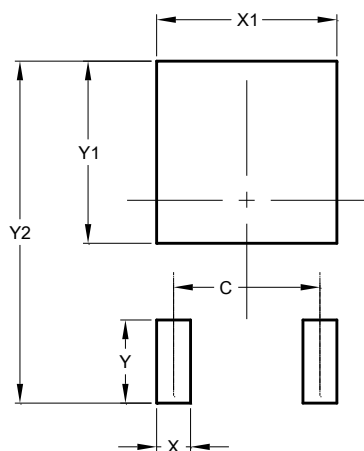


| TO252 (DPAK)<br>(Type TH) |           |       |       |
|---------------------------|-----------|-------|-------|
| Dim                       | Min       | Max   | Typ   |
| A                         | 2.20      | 2.38  | 2.30  |
| A1                        | 0.00      | 0.10  | -     |
| A2                        | 0.97      | 1.17  | 1.07  |
| A4                        | 0.10 REF  |       |       |
| b                         | 0.72      | 0.85  | 0.78  |
| b3                        | 5.23      | 5.45  | 5.33  |
| c                         | 0.47      | 0.58  | 0.53  |
| D                         | 6.00      | 6.20  | 6.10  |
| D1                        | 5.30 REF  |       |       |
| e                         | 2.286 BSC |       |       |
| E                         | 6.50      | 6.70  | 6.60  |
| E1                        | 4.70      | 4.92  | 4.83  |
| H                         | 9.90      | 10.10 | 10.30 |
| L                         | 1.40      | 1.70  | 1.60  |
| L2                        | 0.51 BSC  |       |       |
| L3                        | 0.90      | 1.25  | -     |
| L4                        | 0.60      | 1.00  | 0.80  |
| L5                        | 1.70      | 1.90  | 1.80  |
| a                         | 0°        | 8°    | -     |
| All Dimensions in mm      |           |       |       |

## Suggested Pad Layout

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

TO252 (DPAK) (Type TH)



| 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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