

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub> Max        | I <sub>D</sub><br>T <sub>C</sub> = +25°C |
|-------------------|--------------------------------|------------------------------------------|
| 60V               | 12mΩ @V <sub>GS</sub> = 10V    | 37.2A                                    |
|                   | 14.5mΩ @V <sub>GS</sub> = 4.5V | 33.9A                                    |

## Description and Applications

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

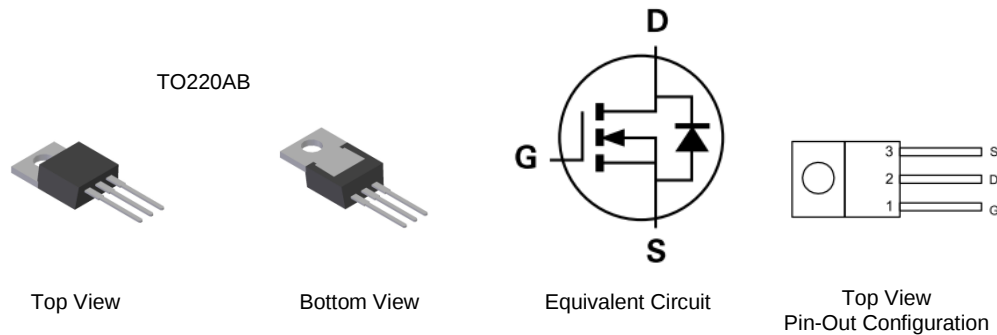
- DC-DC Converters
- Power Management Functions
- Load Switch

## Features

- Excellent Q<sub>GD</sub> x R<sub>DS(ON)</sub> Product (FOM)
- Advanced Technology for DC-DC Converts
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

## Mechanical Data

- Case: TO220AB
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Terminals: Matte Tin Finish Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 
- Terminal Connections: See Diagram Below
- Weight: 1.85 grams (Approximate)

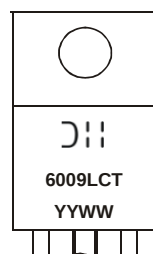


## Ordering Information (Note 4)

| Part Number | Case    | Packaging      |
|-------------|---------|----------------|
| DMT6009LCT  | TO220AB | 50 Pieces/Tube |

- 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](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  
 6009LCT = 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<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                          | Symbol           | Value                           | Units |
|---------------------------------------------------------|------------------|---------------------------------|-------|
| Drain-Source Voltage                                    | V <sub>DSS</sub> | 60                              | V     |
| Gate-Source Voltage                                     | V <sub>GSS</sub> | ±16                             | V     |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V | I <sub>D</sub>   | T <sub>C</sub> = +25°C<br>37.2  | A     |
|                                                         |                  | T <sub>C</sub> = +100°C<br>29.8 |       |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)      | I <sub>DM</sub>  | 80                              | A     |
| Maximum Body Diode Forward Current (Note 6)             | I <sub>S</sub>   | 80                              | A     |
| Avalanche Current, L = 0.1mH                            | I <sub>AS</sub>  | 19.8                            | A     |
| Avalanche Energy, L = 0.1mH                             | E <sub>AS</sub>  | 19.6                            | mJ    |

**Thermal Characteristics**

| Characteristic                                          | Symbol                            | Value       | Units |
|---------------------------------------------------------|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 5) T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 2.2         | W     |
| Thermal Resistance, Junction to Ambient (Note 5)        | R <sub>θJA</sub>                  | 55          | °C/W  |
| Total Power Dissipation (Note 6) T <sub>C</sub> = +25°C | P <sub>D</sub>                    | 25          | W     |
| Thermal Resistance, Junction to Case (Note 6)           | R <sub>θJC</sub>                  | 5           | °C/W  |
| 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</b> (Note 7)        |                     |     |       |      |      |                                                                                              |
| Drain-Source Breakdown Voltage             | BV <sub>DSS</sub>   | 60  | —     | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250µA                                                 |
| Zero Gate Voltage Drain Current            | I <sub>DSS</sub>    | —   | —     | 1    | µA   | V <sub>DS</sub> = 48V, V <sub>GS</sub> = 0V                                                  |
| Gate-Source Leakage                        | I <sub>GSS</sub>    | —   | —     | ±100 | nA   | V <sub>GS</sub> = ±16V, V <sub>DS</sub> = 0V                                                 |
| <b>ON CHARACTERISTICS</b> (Note 7)         |                     |     |       |      |      |                                                                                              |
| Gate Threshold Voltage                     | V <sub>GS(TH)</sub> | 0.7 | —     | 2    | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA                                   |
| Static Drain-Source On-Resistance          | R <sub>DS(ON)</sub> | —   | 9.4   | 12   | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 13.5A                                                |
|                                            |                     | —   | 7.6   | 14.5 |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 11.5A                                               |
| Diode Forward Voltage                      | V <sub>SD</sub>     | —   | —     | 1.2  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 20A                                                   |
| <b>DYNAMIC CHARACTERISTICS</b> (Note 8)    |                     |     |       |      |      |                                                                                              |
| Input Capacitance                          | C <sub>ISS</sub>    | —   | 1,925 | —    | pF   | V <sub>DS</sub> = 30V, f = 1MHz,<br>V <sub>GS</sub> = 0V                                     |
| Output Capacitance                         | C <sub>OSS</sub>    | —   | 438   | —    |      |                                                                                              |
| Reverse Transfer Capacitance               | C <sub>RSS</sub>    | —   | 41    | —    |      |                                                                                              |
| Gate Resistance                            | R <sub>G</sub>      | —   | 1.7   | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz                                         |
| Total Gate Charge (V <sub>GS</sub> = 4.5V) | Q <sub>G</sub>      | —   | 15.6  | —    | nC   | V <sub>DD</sub> = 30V, I <sub>D</sub> = 13.5A                                                |
| Total Gate Charge (V <sub>GS</sub> = 10V)  | Q <sub>G</sub>      | —   | 33.5  | —    |      |                                                                                              |
| Gate-Source Charge                         | Q <sub>GS</sub>     | —   | 4.7   | —    |      |                                                                                              |
| Gate-Drain Charge                          | Q <sub>GD</sub>     | —   | 5.3   | —    |      |                                                                                              |
| Turn-On Delay Time                         | t <sub>D(ON)</sub>  | —   | 4.5   | —    | ns   | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 10V,<br>R <sub>G</sub> = 6Ω, I <sub>D</sub> = 13.5A |
| Turn-On Rise Time                          | t <sub>R</sub>      | —   | 8.6   | —    |      |                                                                                              |
| Turn-Off Delay Time                        | t <sub>D(OFF)</sub> | —   | 35.9  | —    |      |                                                                                              |
| Turn-Off Fall Time                         | t <sub>F</sub>      | —   | 15.7  | —    |      |                                                                                              |
| Reverse Recovery Time                      | t <sub>RR</sub>     | —   | 18.2  | —    | ns   | I <sub>F</sub> = 13.5A, di/dt = 100A/µs                                                      |
| Reverse Recovery Charge                    | Q <sub>RR</sub>     | —   | 33.1  | —    | nC   |                                                                                              |

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

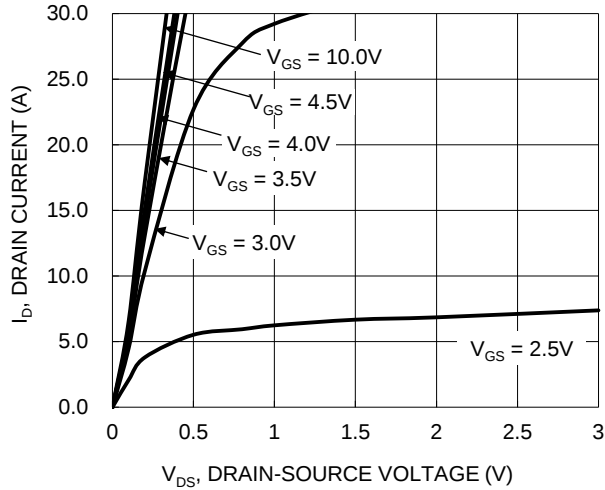


Figure 1. Typical Output Characteristic

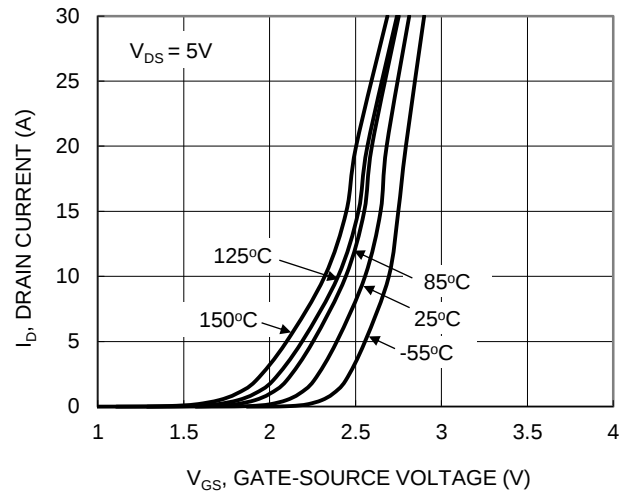


Figure 2. Typical Transfer Characteristic

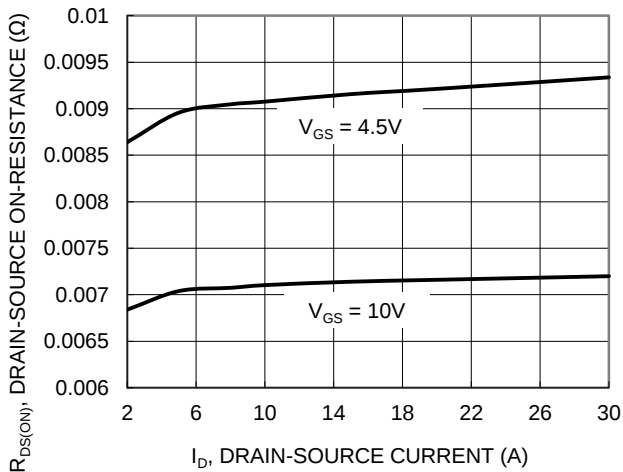


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

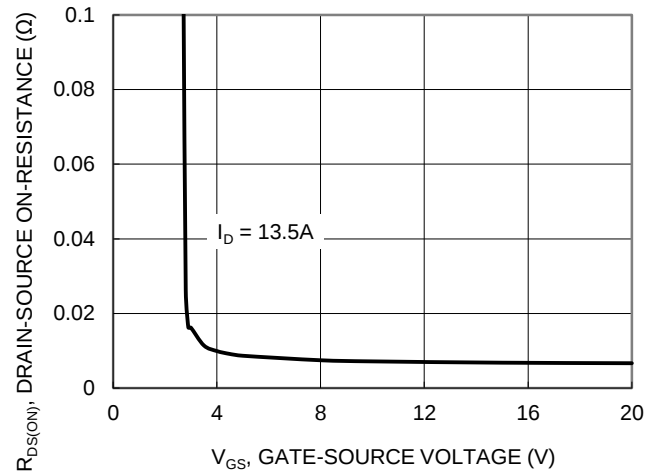


Figure 4. Typical Transfer Characteristic

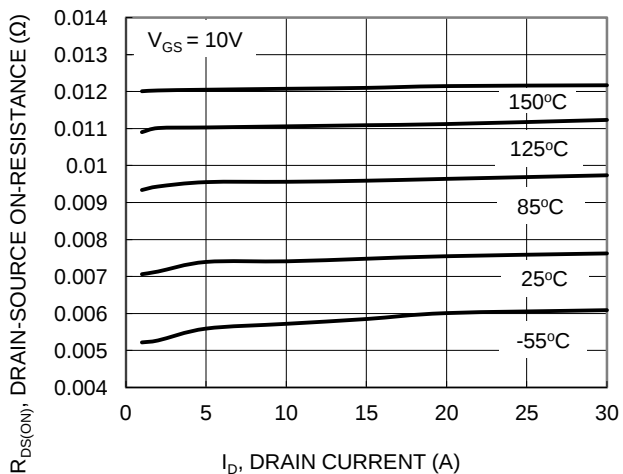


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

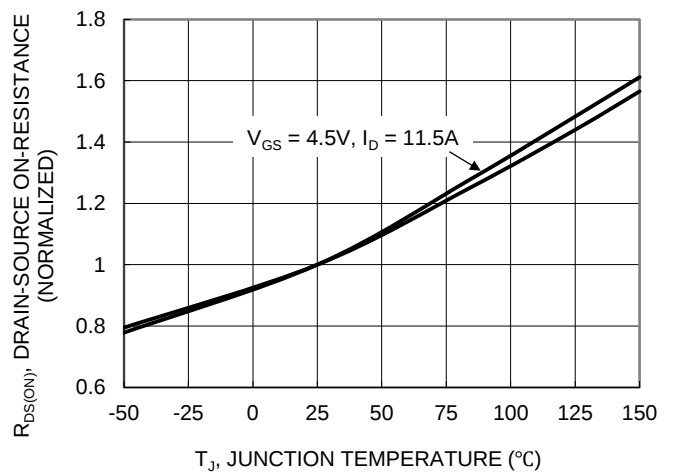


Figure 6. On-Resistance Variation with Junction Temperature

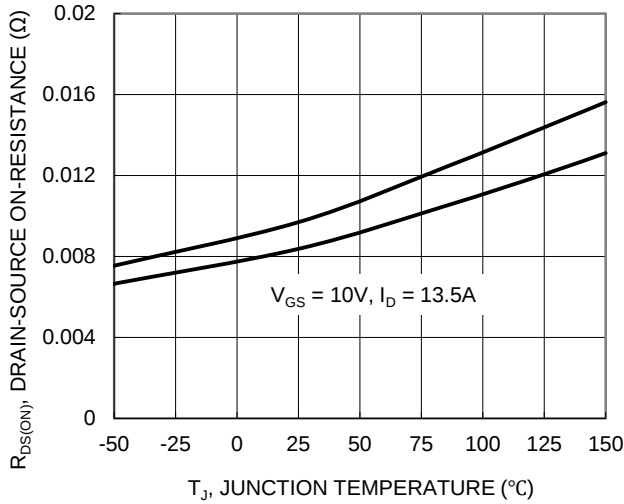


Figure 7. On-Resistance Variation with Junction Temperature

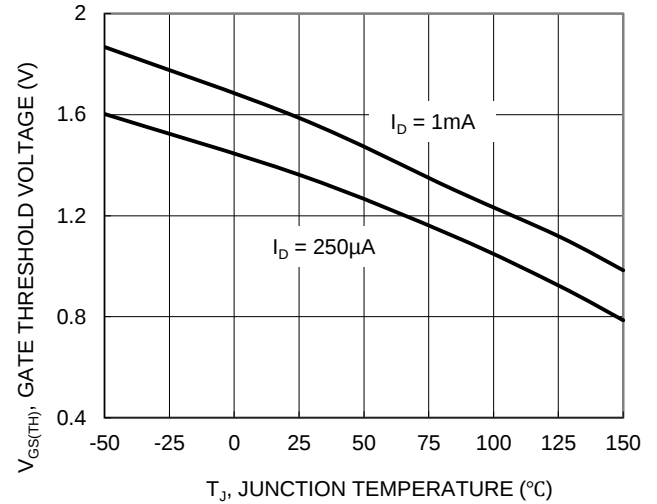


Figure 8. Gate Threshold Variation vs. Junction Temperature

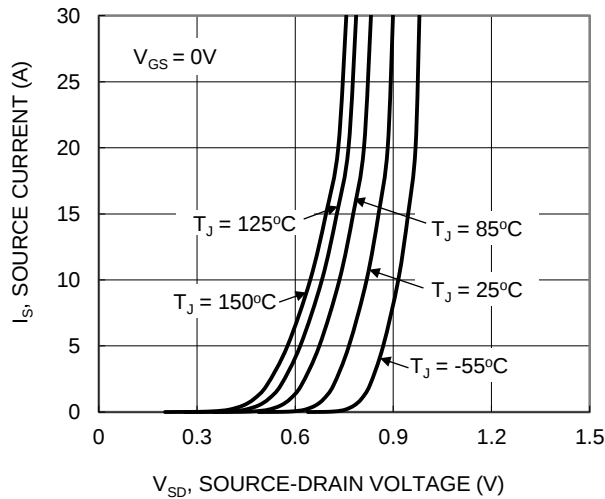


Figure 9. Diode Forward Voltage vs. Current

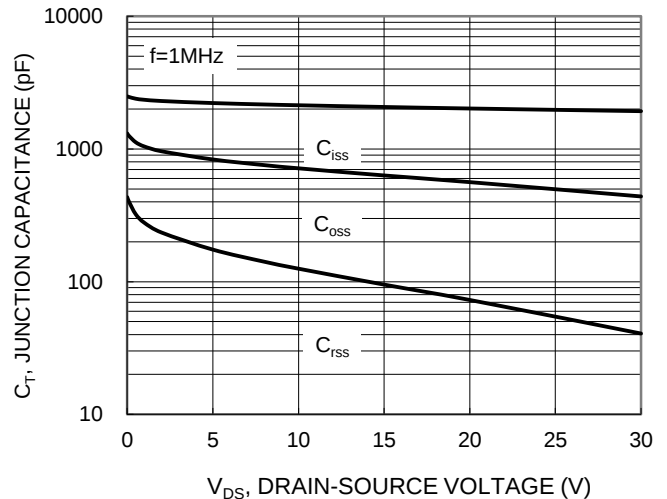


Figure 10. Typical Junction Capacitance

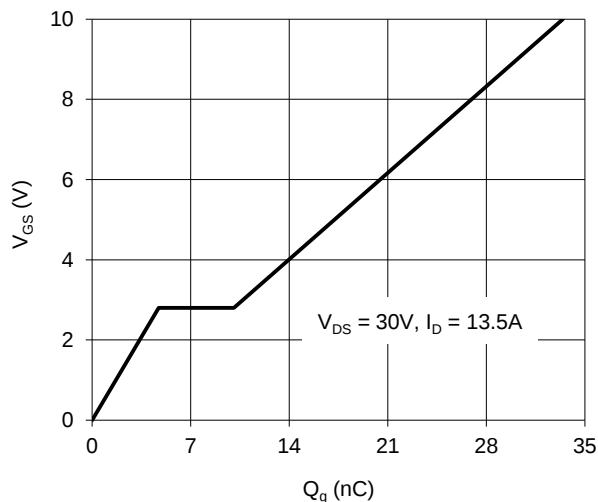


Figure 11. Gate Charge

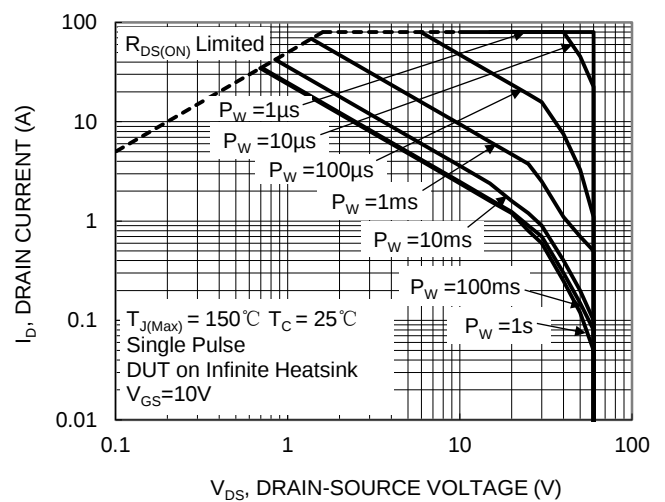


Figure 12. SOA, Safe Operation Area

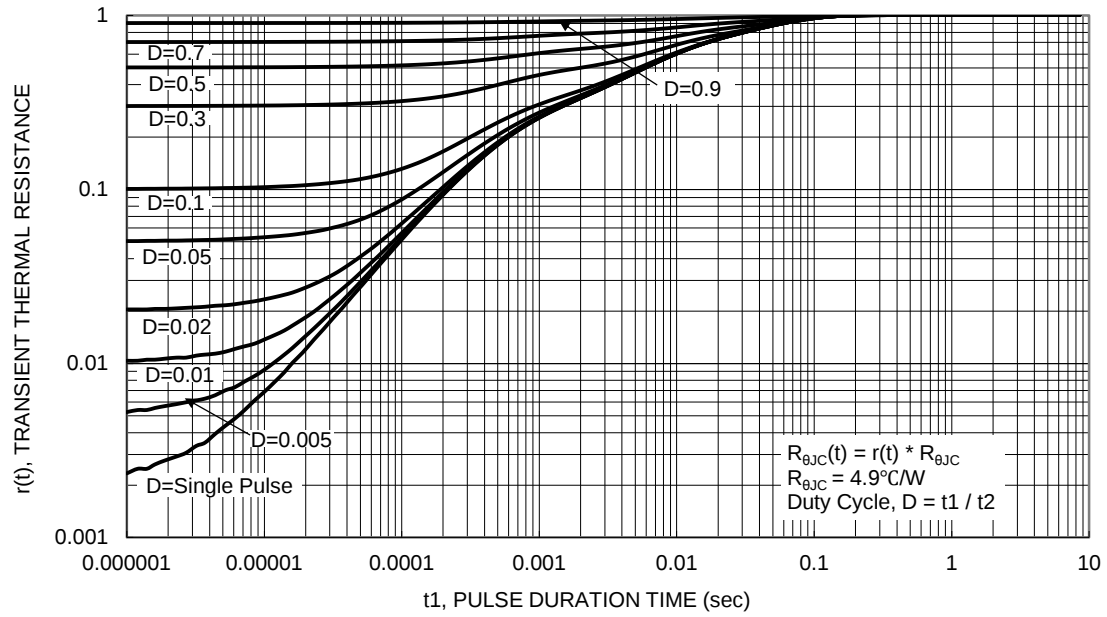
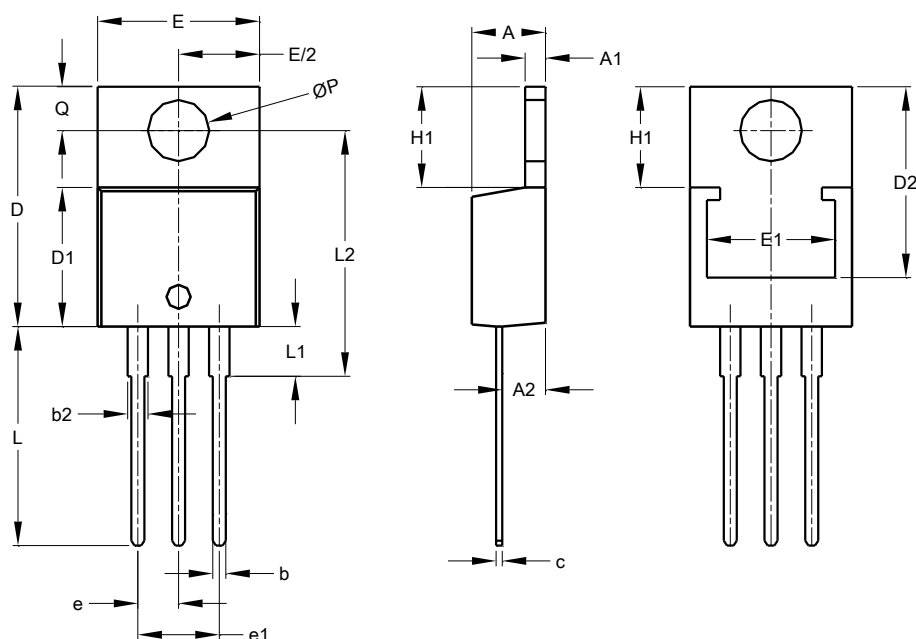


Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

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

TO220AB



| TO220AB              |       |       |       |
|----------------------|-------|-------|-------|
| Dim                  | Min   | Max   | Typ   |
| A                    | 3.56  | 4.82  | —     |
| A1                   | 0.51  | 1.39  | —     |
| A2                   | 2.04  | 2.92  | —     |
| b                    | 0.39  | 1.01  | 0.81  |
| b2                   | 1.15  | 1.77  | 1.24  |
| c                    | 0.356 | 0.61  | —     |
| D                    | 14.22 | 16.51 | —     |
| D1                   | 8.39  | 9.01  | —     |
| D2                   | 11.45 | 12.87 | —     |
| e                    | —     | —     | 2.54  |
| e1                   | —     | —     | 5.08  |
| E                    | 9.66  | 10.66 | —     |
| E1                   | 6.86  | 8.89  | —     |
| H1                   | 5.85  | 6.85  | —     |
| L                    | 12.70 | 14.73 | —     |
| L1                   | —     | 6.35  | —     |
| L2                   | 15.80 | 16.20 | 16.00 |
| P                    | 3.54  | 4.08  | —     |
| Q                    | 2.54  | 3.42  | —     |
| All Dimensions in mm |       |       |       |

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