

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub>           | I <sub>D</sub><br>T <sub>C</sub> = +25°C |
|-------------------|-------------------------------|------------------------------------------|
| 40V               | 4.0mΩ @ V <sub>GS</sub> = 10V | 150A                                     |

## Description

This new generation Enhancement Mode MOSFET is designed to minimize R<sub>DS(ON)</sub> and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

## Applications

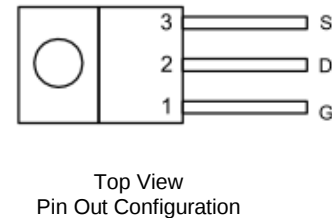
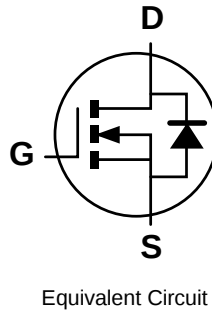
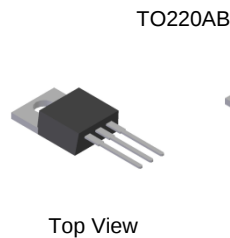
- Motor Control
- Backlighting
- DC-DC Converters
- Power Management Functions

## Features

- Low Input Capacitance
- Low Input/Output Leakage
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **An Automotive-Compliant Part is Available Under Separate Datasheet ([DMNH4005SCTQ](#))**

## 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)

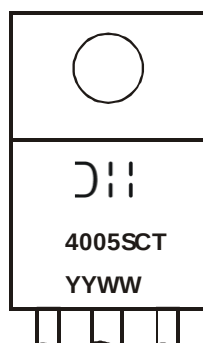


## Ordering Information (Note 4)

| Part Number | Case    | Packaging      |
|-------------|---------|----------------|
| DMNH4005SCT | TO220AB | 50 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](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  
 4005SCT = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Two Digits of Year (ex: 16 = 2016)  
 WW = Week (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> | 40         | V    |
| Gate-Source Voltage                                    |              |                                                   | V <sub>GSS</sub> | 20         | V    |
| Continuous Drain Current V <sub>GS</sub> = 10V         | Steady State | T <sub>C</sub> = +25°C<br>T <sub>C</sub> = +100°C | I <sub>D</sub>   | 150<br>100 | A    |
| Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)     |              |                                                   | I <sub>DM</sub>  | 90         | A    |
| Maximum Continuous Body Diode Forward Current (Note 5) |              |                                                   | I <sub>S</sub>   | 80         | A    |
| Avalanche Current (Note 6) L=1mH                       |              |                                                   | I <sub>AS</sub>  | 30         | A    |
| Avalanche Energy (Note 6) L=1mH                        |              |                                                   | E <sub>AS</sub>  | 500        | mJ   |

**Thermal Characteristics**

| Characteristic                          |                        | Symbol                            | Value       | Unit |
|-----------------------------------------|------------------------|-----------------------------------|-------------|------|
| Power Dissipation                       | T <sub>C</sub> = +25°C | P <sub>D</sub>                    | 165         | W    |
|                                         | T <sub>C</sub> = +70°C |                                   | 100         |      |
| Thermal Resistance, Junction to Case    |                        | R <sub>θJC</sub>                  | 0.9         | °C/W |
| Operating and Storage Temperature Range |                        | T <sub>J</sub> , T <sub>STG</sub> | -55 to +175 | °C   |

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

| Characteristic                             | Symbol              | Min | Typ  | Max  | Unit | Test Condition                                                                             |
|--------------------------------------------|---------------------|-----|------|------|------|--------------------------------------------------------------------------------------------|
| <b>OFF CHARACTERISTICS (Note 7)</b>        |                     |     |      |      |      |                                                                                            |
| Drain-Source Breakdown Voltage             | BV <sub>DSS</sub>   | 40  | —    | —    | 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> = 32V, 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 (Note 7)</b>         |                     |     |      |      |      |                                                                                            |
| Gate Threshold Voltage                     | V <sub>GS(TH)</sub> | 1   | —    | 3    | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                 |
| Static Drain-Source On-Resistance          | R <sub>DS(ON)</sub> | —   | 3.4  | 4.0  | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A                                                |
| Diode Forward Voltage                      | V <sub>SD</sub>     | —   | —    | 1.2  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A                                                  |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b>    |                     |     |      |      |      |                                                                                            |
| Input Capacitance                          | C <sub>ISS</sub>    | —   | 2846 | —    | pF   | V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V<br>f = 1.0MHz                                  |
| Output Capacitance                         | C <sub>OSS</sub>    | —   | 742  | —    |      |                                                                                            |
| Reverse Transfer Capacitance               | C <sub>ISS</sub>    | —   | 242  | —    |      |                                                                                            |
| Gate Resistance                            | R <sub>G</sub>      | —   | 1.9  | —    | 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>      | —   | 48   | —    | nC   | V <sub>DD</sub> = 20V, I <sub>D</sub> = 20A                                                |
| Total Gate Charge (V <sub>GS</sub> = 4.5V) | Q <sub>g</sub>      | —   | 23   | —    |      |                                                                                            |
| Gate-Source Charge                         | Q <sub>gs</sub>     | —   | 9.5  | —    |      |                                                                                            |
| Gate-Drain Charge                          | Q <sub>gd</sub>     | —   | 11.5 | —    |      |                                                                                            |
| Turn-On Delay Time                         | t <sub>D(ON)</sub>  | —   | 6.6  | —    | ns   | V <sub>DD</sub> = 20V, V <sub>GS</sub> = 10V,<br>R <sub>G</sub> = 1Ω, I <sub>D</sub> = 20A |
| Turn-On Rise Time                          | t <sub>R</sub>      | —   | 12.1 | —    |      |                                                                                            |
| Turn-Off Delay Time                        | t <sub>D(OFF)</sub> | —   | 18.3 | —    |      |                                                                                            |
| Turn-Off Fall Time                         | t <sub>F</sub>      | —   | 4.9  | —    |      |                                                                                            |
| Reverse Recovery Time                      | t <sub>RR</sub>     | —   | 29   | —    | ns   | I <sub>F</sub> = 15A, di/dt = 100A/μs                                                      |
| Reverse Recovery Charge                    | Q <sub>RR</sub>     | —   | 24   | —    | nC   |                                                                                            |

- Notes: 5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.  
6. I<sub>AS</sub> and E<sub>AS</sub> ratings are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.  
7. Short duration pulse test used to minimize self-heating effect.  
8. Guaranteed by design. Not subject to product testing.

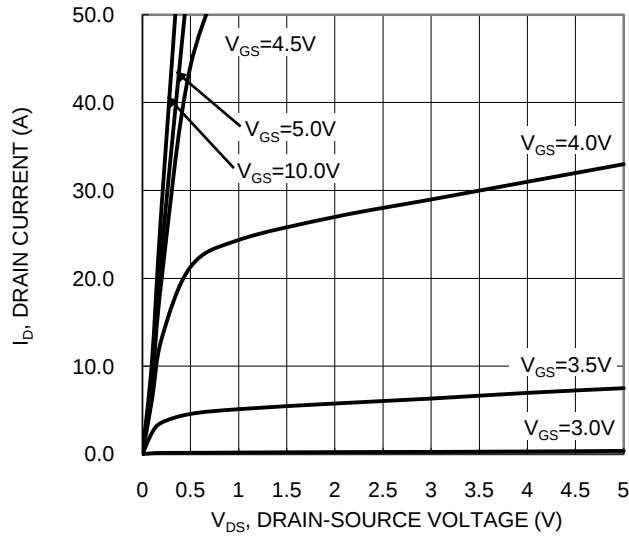


Figure 1. Typical Output Characteristic

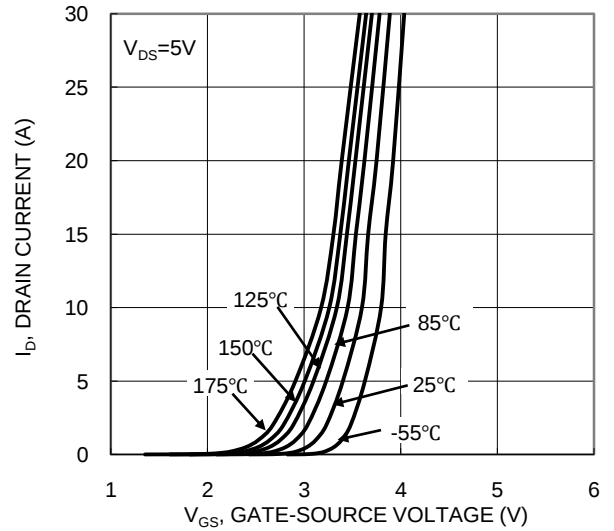


Figure 2. Typical Transfer Characteristic

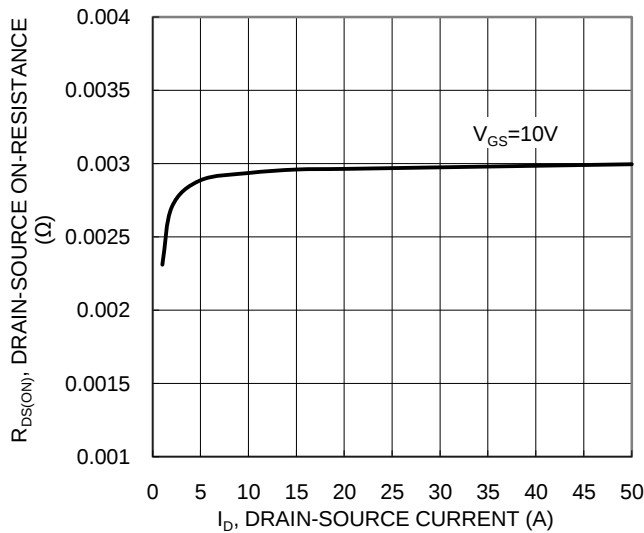


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

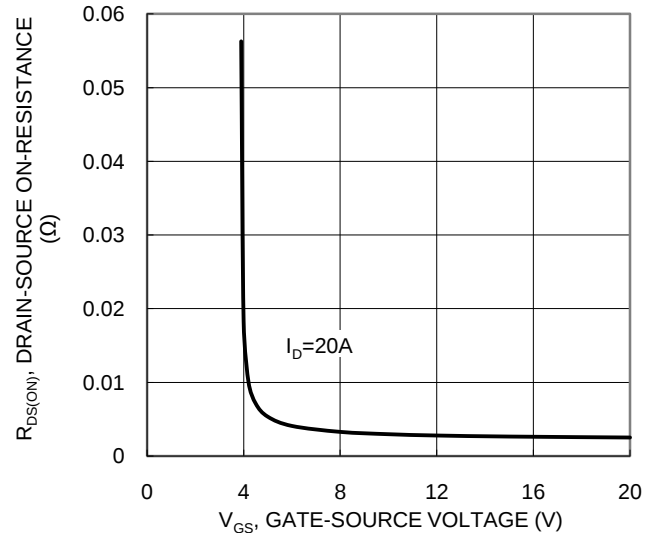


Figure 4. Typical Transfer Characteristic

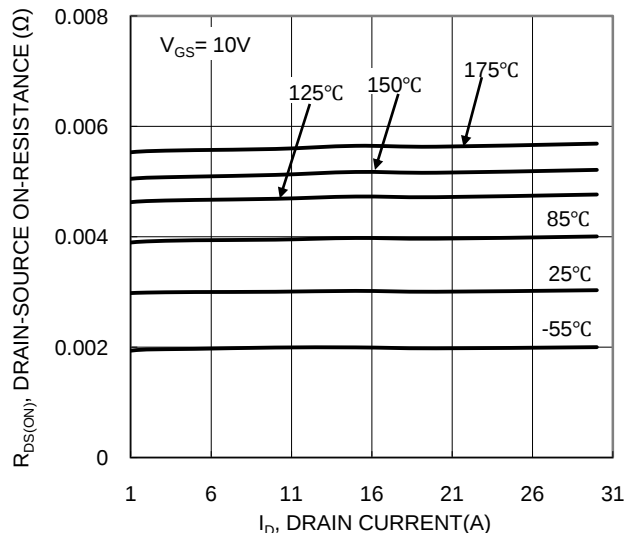


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

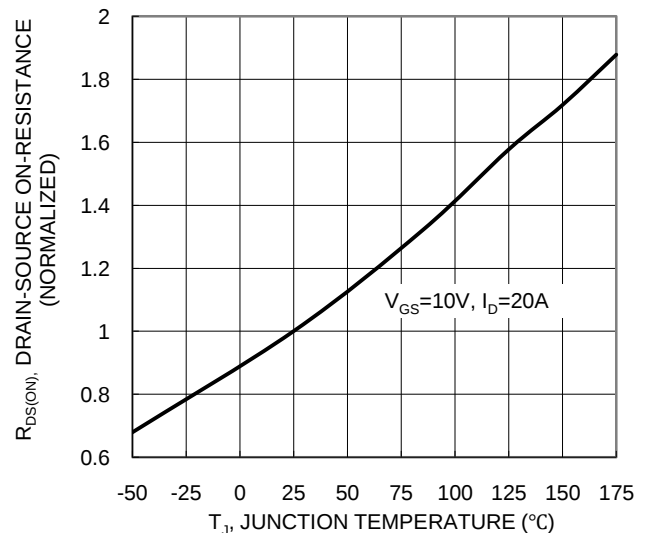


Figure 6. On-Resistance Variation with Junction Temperature

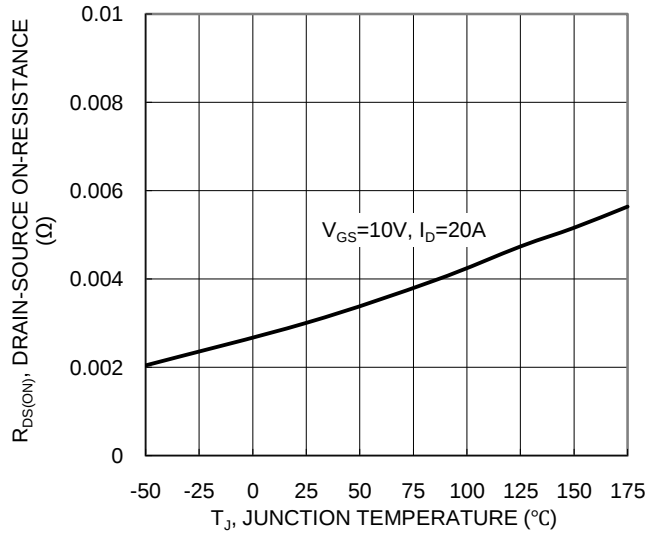


Figure 7. On-Resistance Variation with Junction Temperature

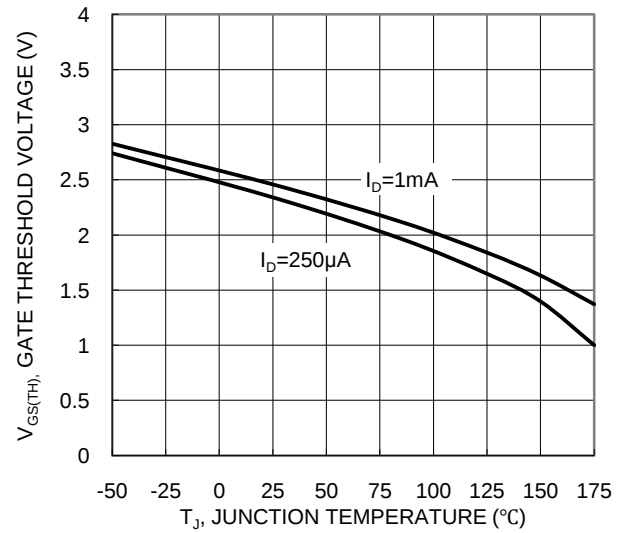


Figure 8. Gate Threshold Variation vs. Junction Temperature

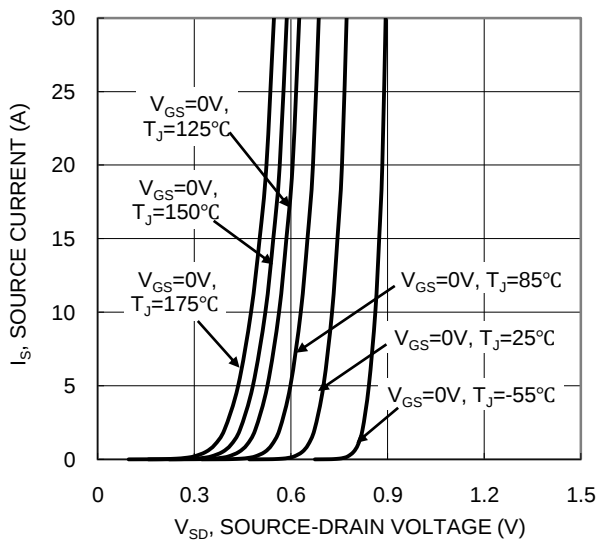


Figure 9. Diode Forward Voltage vs. Current

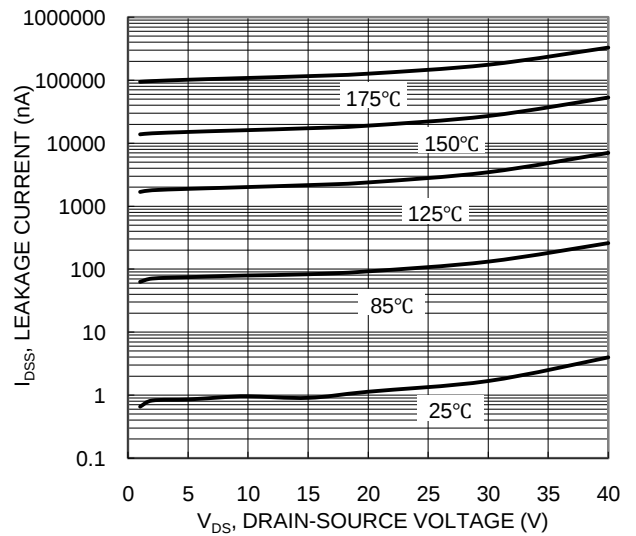


Figure 10. Typical Drain-Source Leakage Current vs. Voltage

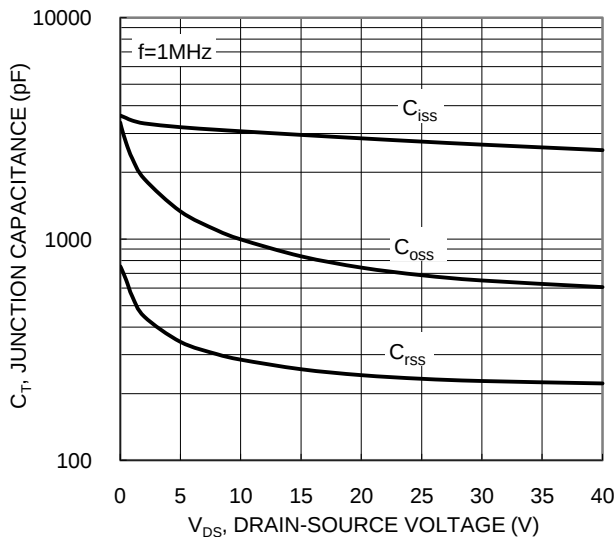


Figure 11. Typical Junction Capacitance

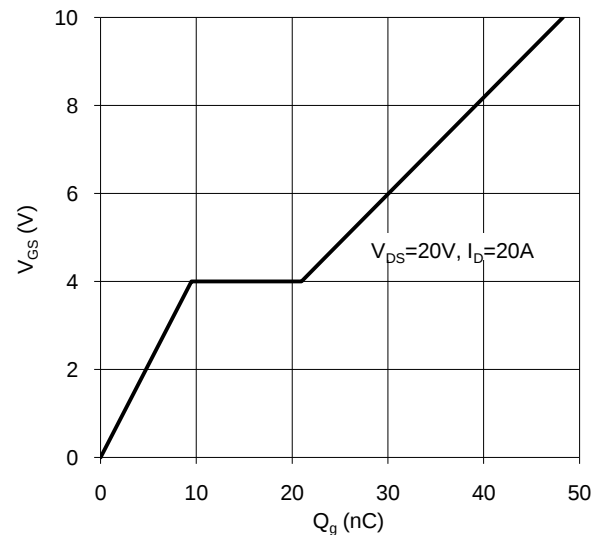
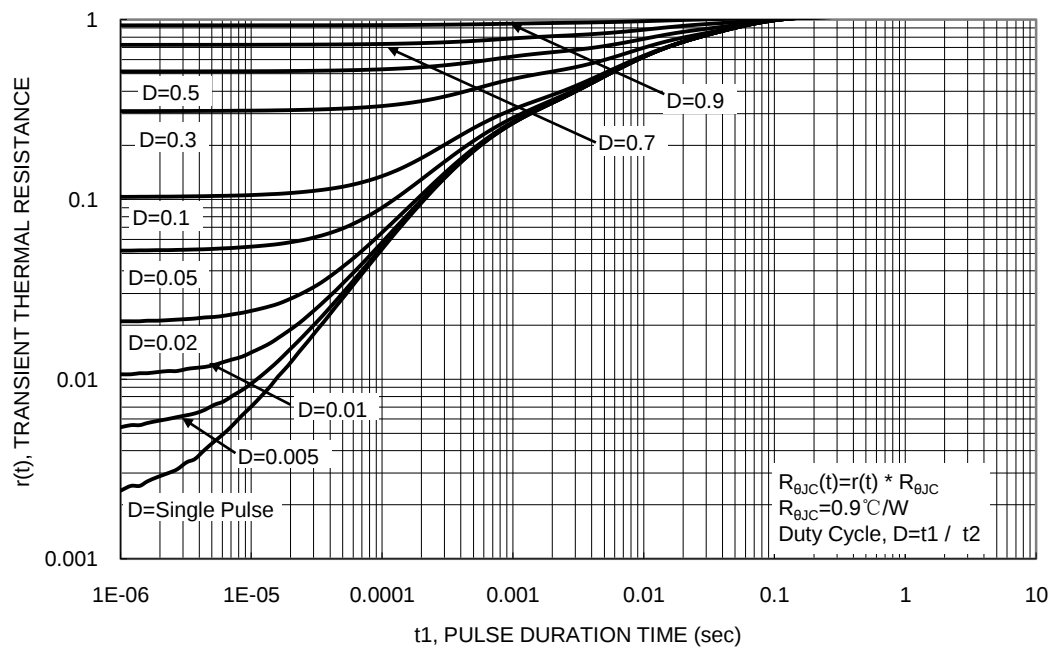
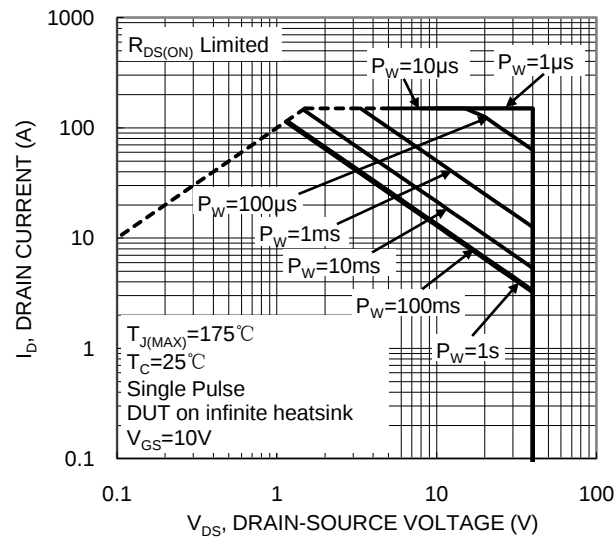


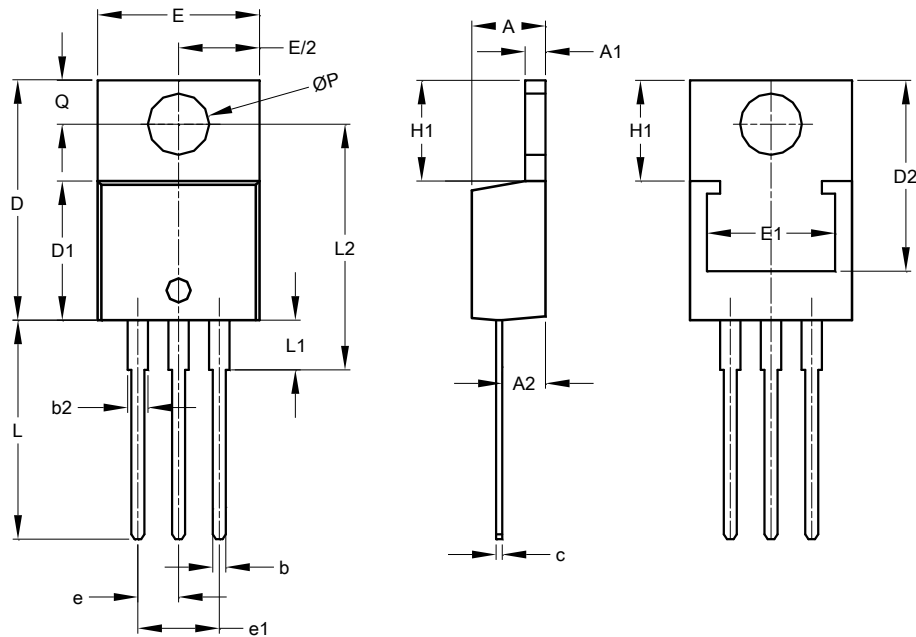
Figure 12. Gate Charge



## 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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