

**Electrical Characteristics**  $T_J = 25^\circ\text{C}$  unless otherwise noted.

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|--------|-----------|-----------------|------|------|------|-------|
|--------|-----------|-----------------|------|------|------|-------|

**Off Characteristics**

|              |                                   |                                                                                                               |    |   |           |               |
|--------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------|----|---|-----------|---------------|
| $B_{V_{DS}}$ | Drain-to-Source Breakdown Voltage | $I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$                                                                 | 40 | - | -         | V             |
| $I_{DSS}$    | Drain-to-Source Leakage Current   | $V_{DS} = 40\text{V}$ , $T_J = 25^\circ\text{C}$<br>$V_{GS} = 0\text{V}$ , $T_J = 175^\circ\text{C}$ (Note 4) | -  | - | 1         | $\mu\text{A}$ |
| $I_{GSS}$    | Gate-to-Source Leakage Current    | $V_{GS} = \pm 20\text{V}$                                                                                     | -  | - | $\pm 100$ | nA            |

**On Characteristics**

|              |                                  |                                                            |     |     |     |                  |
|--------------|----------------------------------|------------------------------------------------------------|-----|-----|-----|------------------|
| $V_{GS(th)}$ | Gate to Source Threshold Voltage | $V_{GS} = V_{DS}$ , $I_D = 250\mu\text{A}$                 | 1.0 | 1.8 | 3.0 | V                |
| $R_{DS(on)}$ | Drain to Source On Resistance    | $I_D = 80\text{A}$ , $V_{GS} = 4.5\text{V}$                | -   | 1.7 | 2.2 | $\text{m}\Omega$ |
|              |                                  | $I_D = 80\text{A}$ , $T_J = 25^\circ\text{C}$              | -   | 1.2 | 1.5 | $\text{m}\Omega$ |
|              |                                  | $V_{GS} = 10\text{V}$ , $T_J = 175^\circ\text{C}$ (Note 4) | -   | 2.1 | 2.6 | $\text{m}\Omega$ |

**Dynamic Characteristics**

|                     |                               |                                                          |                                               |   |      |     |    |
|---------------------|-------------------------------|----------------------------------------------------------|-----------------------------------------------|---|------|-----|----|
| C <sub>iss</sub>    | Input Capacitance             | V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V,<br>f = 1MHz |                                               | - | 8600 | -   | pF |
| C <sub>oss</sub>    | Output Capacitance            |                                                          |                                               | - | 2500 | -   | pF |
| C <sub>rss</sub>    | Reverse Transfer Capacitance  |                                                          |                                               | - | 107  | -   | pF |
| R <sub>g</sub>      | Gate Resistance               | f = 1MHz                                                 |                                               | - | 2.1  | -   | Ω  |
| Q <sub>g(ToT)</sub> | Total Gate Charge             | V <sub>GS</sub> = 0 to 10V                               | V <sub>DD</sub> = 32V<br>I <sub>D</sub> = 80A | - | 121  | 170 | nC |
| Q <sub>g(th)</sub>  | Threshold Gate Charge         | V <sub>GS</sub> = 0 to 2V                                |                                               | - | 15   | -   | nC |
| Q <sub>gs</sub>     | Gate-to-Source Gate Charge    |                                                          |                                               | - | 26   | -   | nC |
| Q <sub>gd</sub>     | Gate-to-Drain "Miller" Charge |                                                          |                                               | - | 18   | -   | nC |

**Switching Characteristics**

|              |                |                                                                                             |   |    |     |    |
|--------------|----------------|---------------------------------------------------------------------------------------------|---|----|-----|----|
| $t_{on}$     | Turn-On Time   | $V_{DD} = 20\text{V}$ , $I_D = 80\text{A}$ ,<br>$V_{GS} = 10\text{V}$ , $R_{GEN} = 6\Omega$ | - | -  | 90  | ns |
| $t_{d(on)}$  | Turn-On Delay  |                                                                                             | - | 20 | -   | ns |
| $t_r$        | Rise Time      |                                                                                             | - | 44 | -   | ns |
| $t_{d(off)}$ | Turn-Off Delay |                                                                                             | - | 67 | -   | ns |
| $t_f$        | Fall Time      |                                                                                             | - | 23 | -   | ns |
| $t_{off}$    | Turn-Off Time  |                                                                                             | - | -  | 145 | ns |

**Drain-Source Diode Characteristics**

|          |                               |                                                             |   |     |      |    |
|----------|-------------------------------|-------------------------------------------------------------|---|-----|------|----|
| $V_{SD}$ | Source-to-Drain Diode Voltage | $I_{SD} = 80\text{A}$ , $V_{GS} = 0\text{V}$                | - | -   | 1.25 | V  |
|          |                               | $I_{SD} = 40\text{A}$ , $V_{GS} = 0\text{V}$                | - | -   | 1.2  | V  |
| $t_{rr}$ | Reverse-Recovery Time         | $I_F = 80\text{A}$ , $dI_{SD}/dt = 100\text{A}/\mu\text{s}$ | - | 90  | 120  | ns |
| $Q_{rr}$ | Reverse-Recovery Charge       | $V_{DD} = 32\text{V}$                                       | - | 125 | 164  | nC |

**Note:**

4: The maximum value is specified by design at  $T_J = 175^\circ\text{C}$ . Product is not tested to this condition in production.

## Typical Characteristics

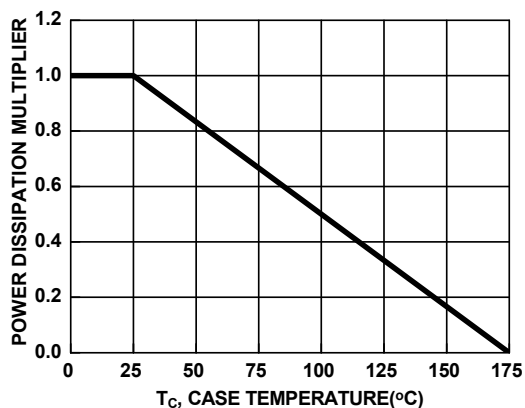


Figure 1. Normalized Power Dissipation vs. Case Temperature

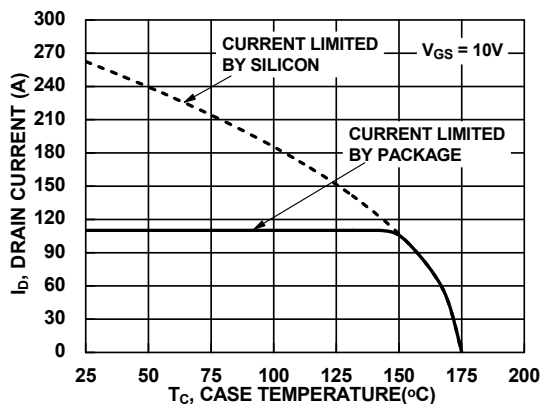


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

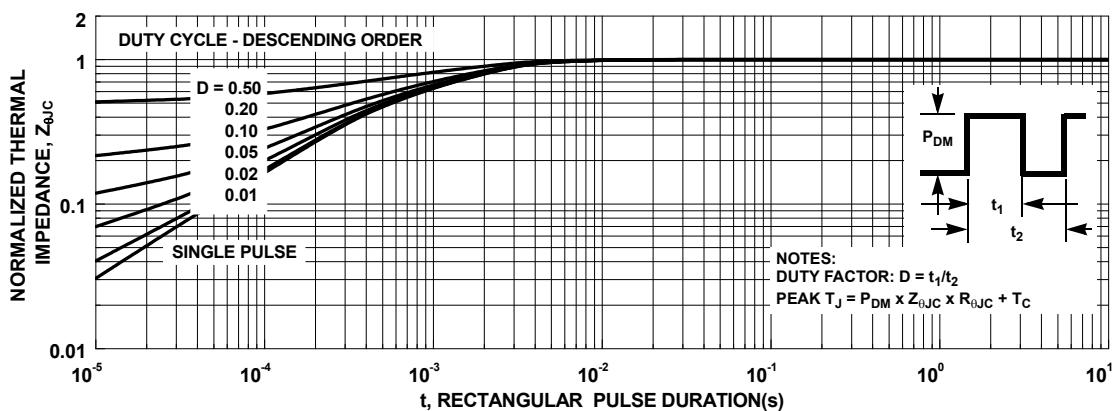


Figure 3. Normalized Maximum Transient Thermal Impedance

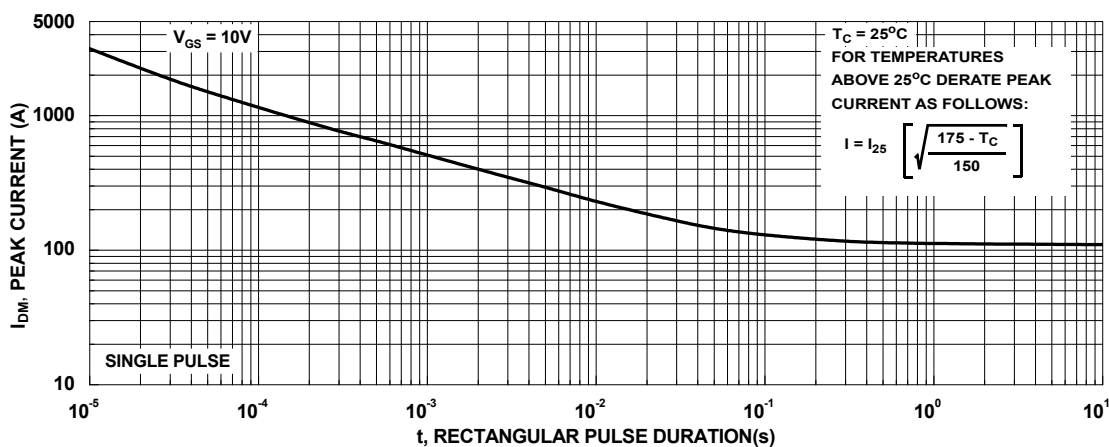


Figure 4. Peak Current Capability

## Typical Characteristics

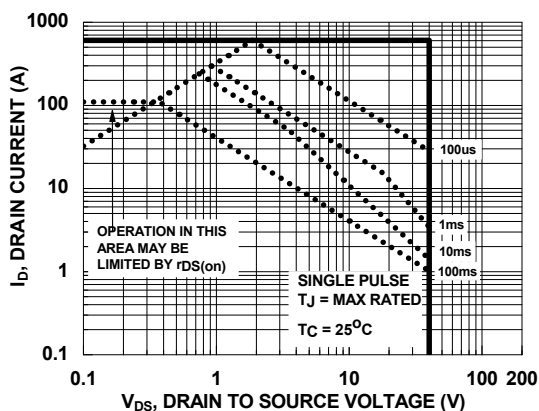
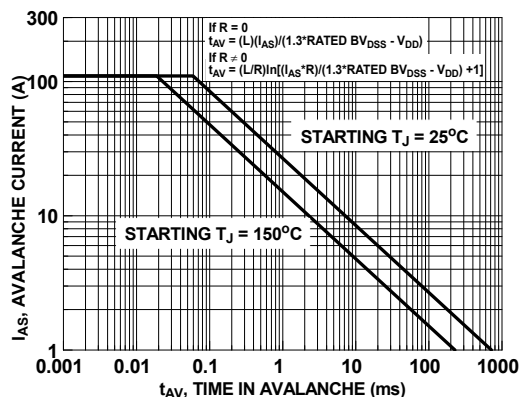


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to ON Semiconductor Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

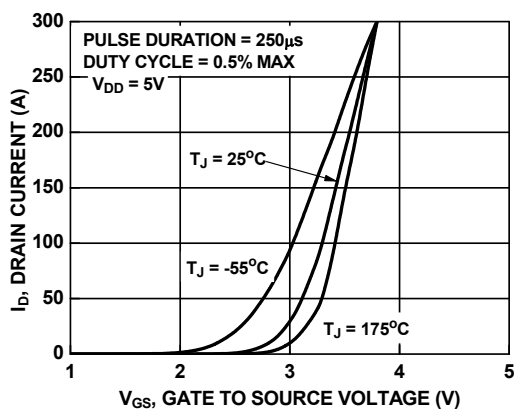


Figure 7. Transfer Characteristics

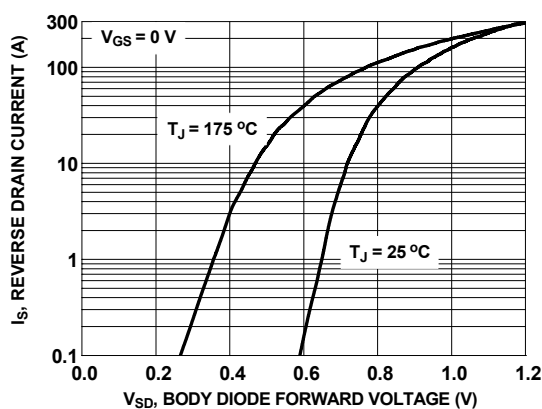


Figure 8. Forward Diode Characteristics

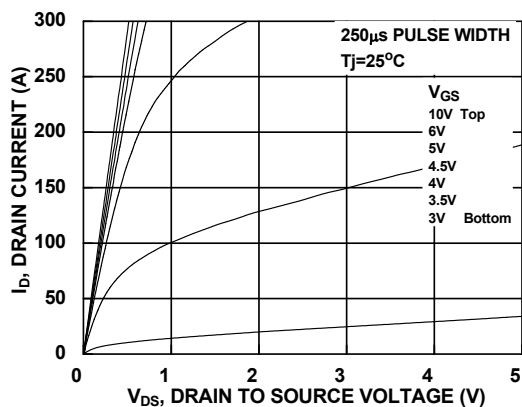


Figure 9. Saturation Characteristics

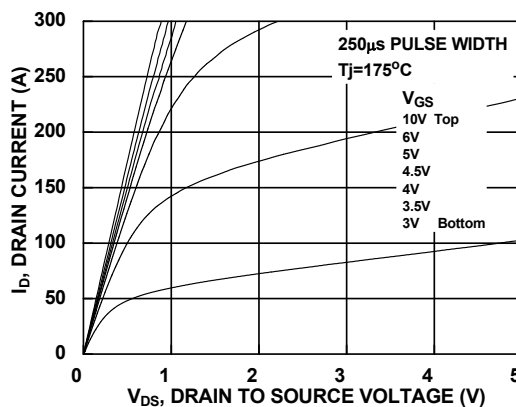


Figure 10. Saturation Characteristics

## Typical Characteristics

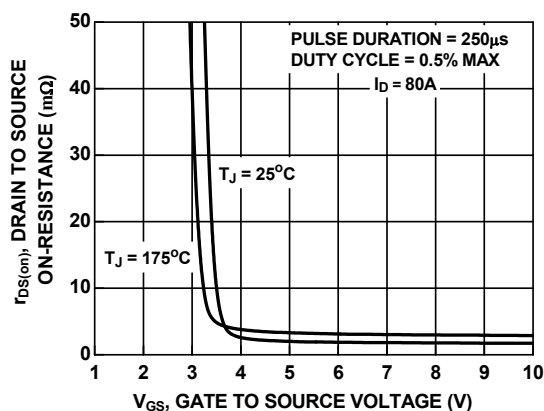


Figure 11.  $R_{DS(on)}$  vs. Gate Voltage

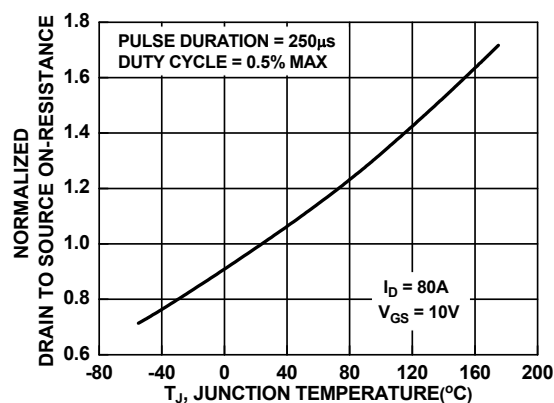


Figure 12. Normalized  $R_{DS(on)}$  vs. Junction Temperature

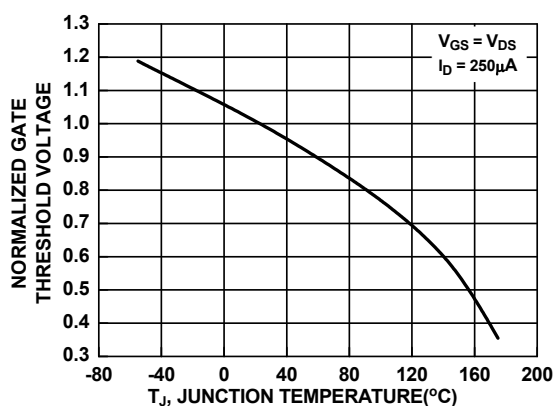


Figure 13. Normalized Gate Threshold Voltage vs. Temperature

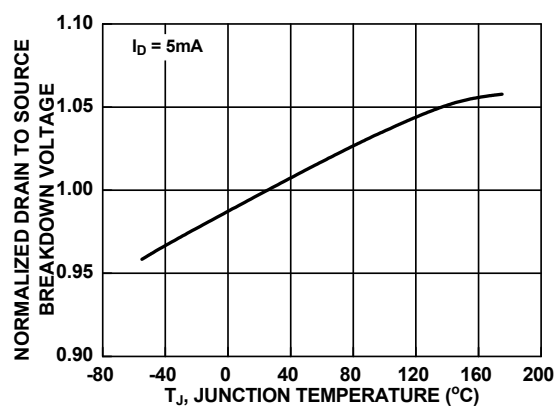


Figure 14. Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

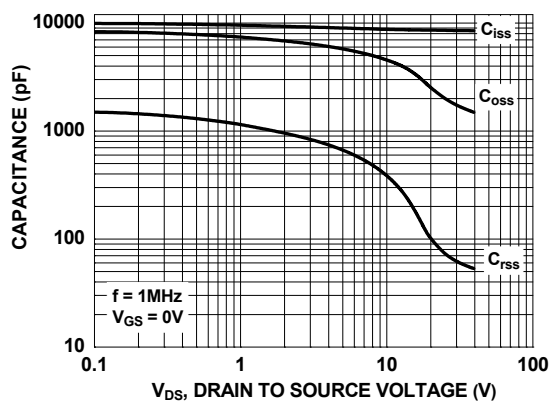


Figure 15. Capacitance vs. Drain to Source Voltage

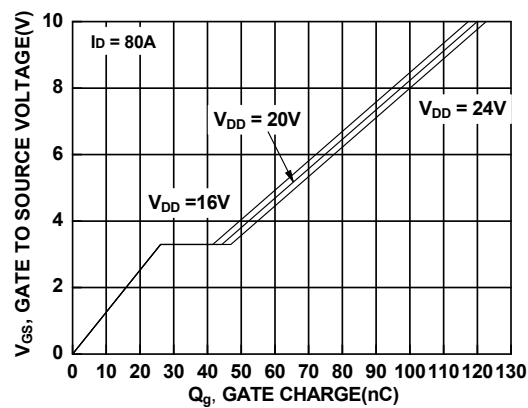


Figure 16. Gate Charge vs. Gate to Source Voltage

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