

# TrenchMV™ Power MOSFET

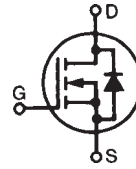
## IXTA180N10T7

$$V_{DSS} = 100 \text{ V}$$

$$I_{D25} = 180 \text{ A}$$

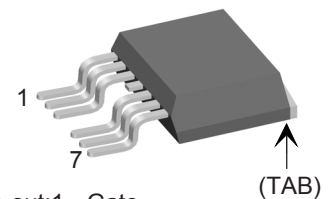
$$R_{DS(on)} \leq 6.4 \text{ m}\Omega$$

N-Channel Enhancement Mode  
Avalanche Rated



| Symbol        | Test Conditions   | Maximum Ratings |                  |
|---------------|---|-----------------|------------------|
| $V_{DSS}$     | $T_J = 25^\circ\text{C to } 175^\circ\text{C}$  | 100             | V                |
| $V_{DGR}$     | $T_J = 25^\circ\text{C to } 175^\circ\text{C}; R_{GS} = 1 \text{ M}\Omega$  | 100             | V                |
| $V_{GSM}$     | Transient   | $\pm 30$        | V                |
| $I_{D25}$     | $T_C = 25^\circ\text{C}$  | 180             | A                |
| $I_{LRMS}$    | Package Current Limit, RMS  | 120             | A                |
| $I_{DM}$      | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$  | 450             | A                |
| $I_{AR}$      | $T_C = 25^\circ\text{C}$  | 25              | A                |
| $E_{AS}$      | $T_C = 25^\circ\text{C}$  | 750             | mJ               |
| $dv/dt$       | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$<br>$T_J \leq 175^\circ\text{C}$ , $R_G = 3.3 \Omega$ | 3               | V/ns             |
| $P_D$         | $T_C = 25^\circ\text{C}$  | 480             | W                |
| $T_J$         |   | -55 ... +175    | $^\circ\text{C}$ |
| $T_{JM}$      |   | 175             | $^\circ\text{C}$ |
| $T_{stg}$     |   | -55 ... +175    | $^\circ\text{C}$ |
| $T_L$         | 1.6 mm (0.062 in.) from case for 10 s   | 300             | $^\circ\text{C}$ |
| $T_{SOLD}$    | Plastic body for 10 seconds   | 260             | $^\circ\text{C}$ |
| <b>Weight</b> |   | 3               | g                |

TO-263 (7-lead) (IXTA..7)



Pin-out: 1 - Gate  
2, 3 - Source  
4 - NC (cut)  
5,6,7 - Source  
TAB (8) - Drain

### Features

- Ultra-low On Resistance
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
  - easy to drive and to protect
- 175 °C Operating Temperature

### Advantages

- Easy to mount
- Space savings
- High power density

### Applications

- Automotive
  - Motor Drives
  - 42V Power Bus
  - ABS Systems
- DC/DC Converters and Off-line UPS
- Primary Switch for 24V and 48V Systems
- Distributed Power Architectures and VRMs
- Electronic Valve Train Systems
- High Current Switching Applications
- High Voltage Synchronous Rectifier

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified) | Characteristic Values |      |                                      |
|--------------|---|-----------------------|------|--------------------------------------|
|              |   | Min.                  | Typ. | Max.                                 |
| $BV_{DSS}$   | $V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$                          | 100                   |      | V                                    |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250 \mu\text{A}$                               | 2.5                   |      | V                                    |
| $I_{GSS}$    | $V_{GS} = \pm 20 \text{ V}$ , $V_{DS} = 0 \text{ V}$                      |                       |      | $\pm 200 \text{ nA}$                 |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0 \text{ V}$<br>$T_J = 150^\circ\text{C}$ |                       |      | 5 $\mu\text{A}$<br>250 $\mu\text{A}$ |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 25 \text{ A}$ , Note 1                   | 5.4                   | 6.4  | m $\Omega$                           |

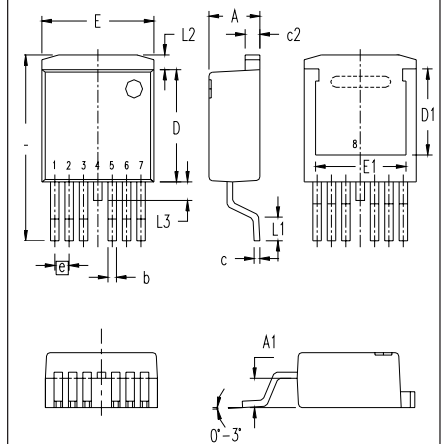
| Symbol  | Test Conditions   | Characteristic Values |      |                        |
|---|---|-----------------------|------|------------------------|
|   |   | Min.                  | Typ. | Max.                   |
| $(T_J = 25^\circ\text{C unless otherwise specified})$ |   |                       |      |                        |
| $g_{fs}$  | $V_{DS} = 10\text{ V}; I_D = 60\text{ A, Note 1}$               | 70                    | 110  | S                      |
| $C_{iss}$   | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$   |                       | 6900 | pF                     |
| $C_{oss}$   |   | 923                   | pF   |                        |
| $C_{rss}$   |   | 162                   | pF   |                        |
| <b>Resistive Switching Times</b>                      |   |                       |      |                        |
| $t_{d(on)}$   | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 25\text{ A}$ |                       | 33   | ns                     |
| $t_r$   | $R_G = 3.3\ \Omega$ (External)                                  |                       | 54   | ns                     |
| $t_{d(off)}$  |   |                       | 42   | ns                     |
| $t_f$   |   |                       | 31   | ns                     |
| $Q_{g(on)}$   | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 25\text{ A}$ |                       | 151  | nC                     |
| $Q_{gs}$  |   | 39                    | nC   |                        |
| $Q_{gd}$  |   | 45                    | nC   |                        |
| $R_{thJC}$  |   |                       |      | $0.31^\circ\text{C/W}$ |

### Source-Drain Diode

| Symbol  | Test Conditions  | Characteristic Values |      |        |
|---|--|-----------------------|------|--------|
|   |  | Min.                  | Typ. | Max.   |
| $T_J = 25^\circ\text{C unless otherwise specified}$ |  |                       |      |        |
| $I_s$   | $V_{GS} = 0\text{ V}$  |                       |      | 180 A  |
| $I_{SM}$  | Pulse width limited by $T_{JM}$  |                       |      | 450 A  |
| $V_{SD}$  | $I_F = 25\text{ A}, V_{GS} = 0\text{ V, Note 1}$   |                       |      | 0.95 V |
| $t_{rr}$  | $I_F = 25\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}$<br>$V_R = 50\text{ V}, V_{GS} = 0\text{ V}$ |                       | 100  | ns     |

Notes: 1. Pulse test,  $t \leq 300\ \mu\text{s}$ , duty cycle  $d \leq 2\%$ .

### TO-263 (7-lead) (IXTA...7) Outline



- Pins: 1 - Gate  
 2, 3 - Source  
 4 - Drain  
 5, 6, 7 - Source  
 Tab (8) - Drain

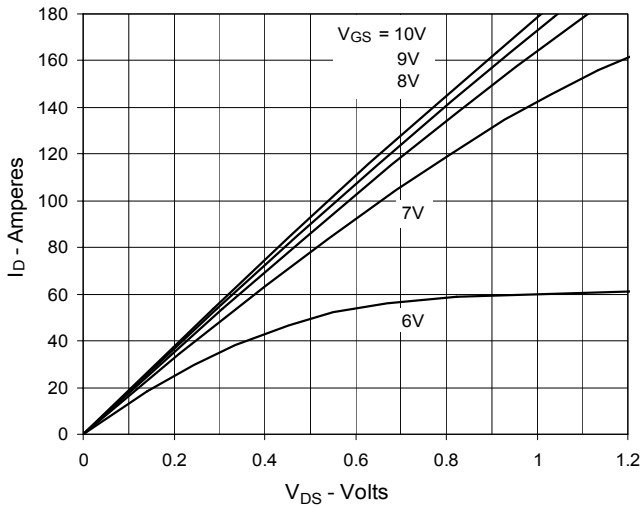
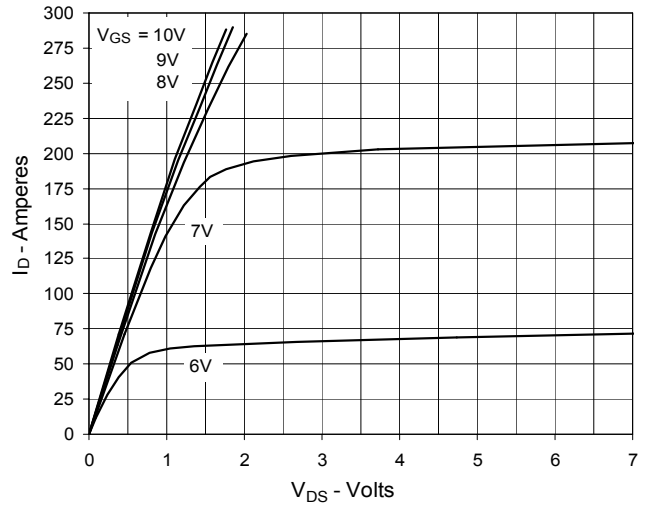
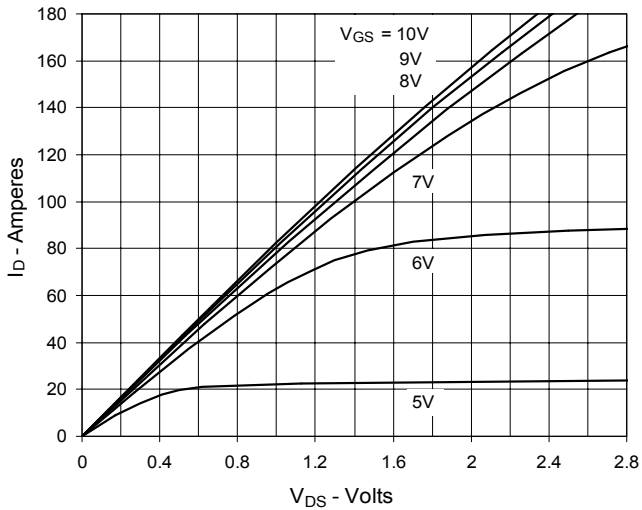
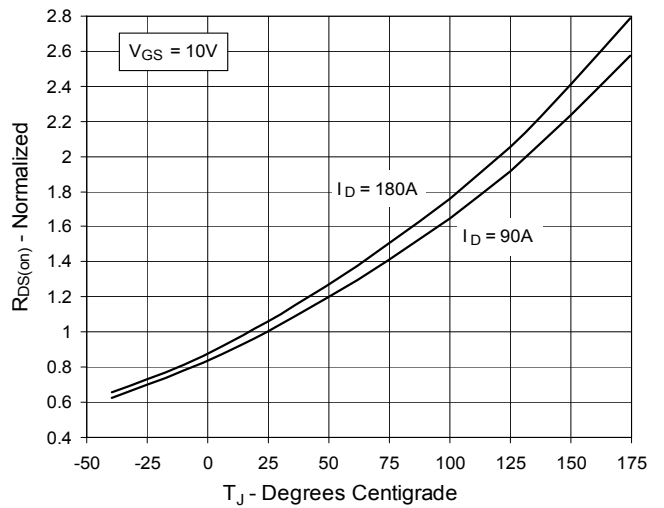
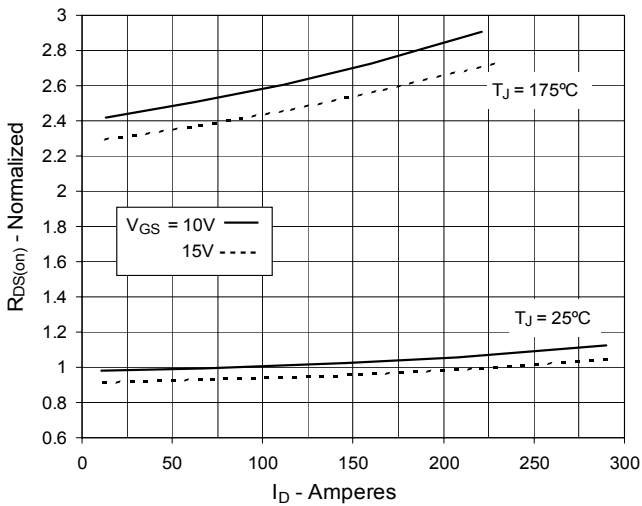
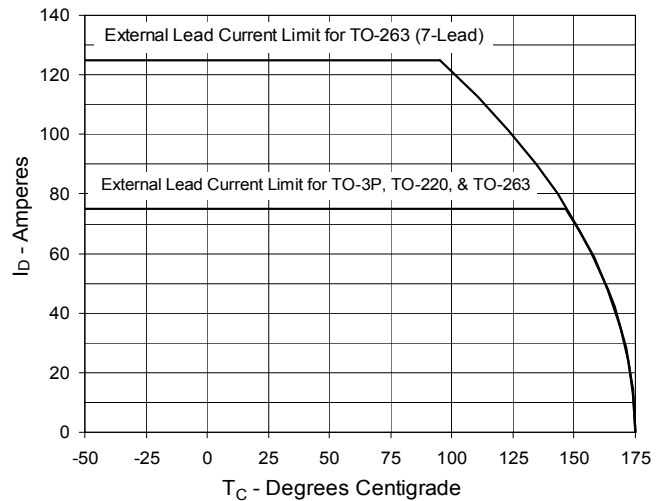
| SYM | INCHES   |      | MILLIMETER |       |
|-----|----------|------|------------|-------|
|     | MIN      | MAX  | MIN        | MAX   |
| A   | .170     | .185 | 4.30       | 4.70  |
| A1  | .085     | .104 | 2.15       | 2.65  |
| b   | .026     | .035 | 0.65       | 0.90  |
| c   | .016     | .024 | 0.40       | 0.60  |
| c2  | .049     | .055 | 1.25       | 1.40  |
| D   | .355     | .370 | 9.00       | 9.40  |
| D1  | .272     | .280 | 6.90       | 7.10  |
| E   | .386     | .402 | 9.80       | 10.20 |
| E1  | .311     | .319 | 7.90       | 8.10  |
| e   | .050 BSC |      | 1.27 BSC   |       |
| L   | .591     | .614 | 15.00      | 15.60 |
| L1  | .091     | .110 | 2.30       | 2.80  |
| L2  | .039     | .059 | 1.00       | 1.50  |
| L3  | .000     | .059 | 0.00       | 1.50  |

### PRELIMINARY TECHNICAL INFORMATION

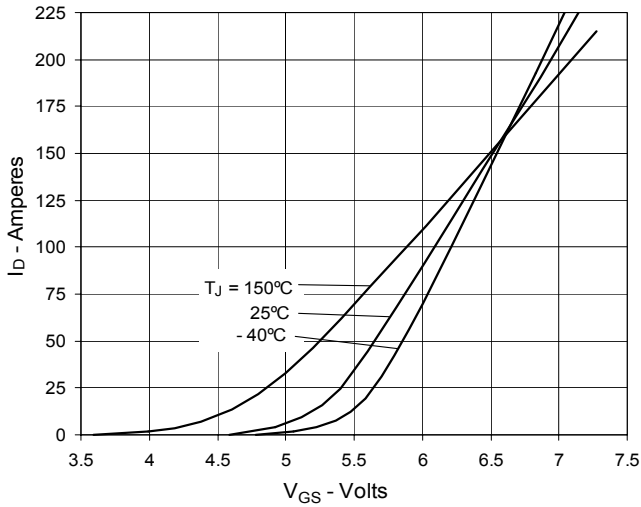
The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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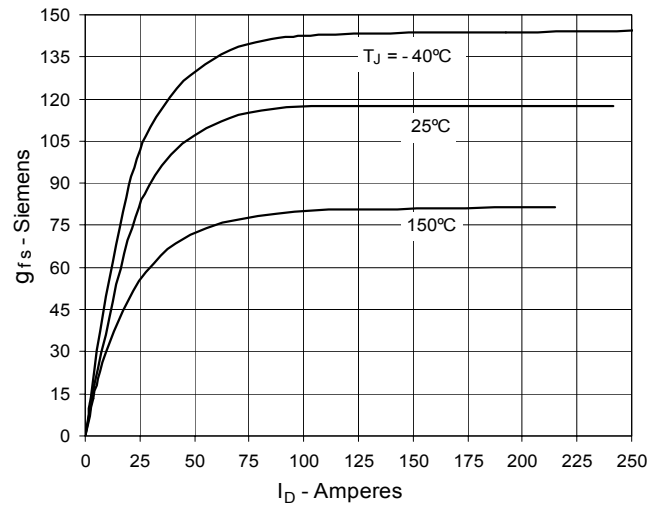
|  |           |           |           |           |              |              |              |              |              |
|--|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|
| IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents: | 4,835,592 | 4,931,844 | 5,049,961 | 5,237,481 | 6,162,665    | 6,404,065 B1 | 6,683,344    | 6,727,585    | 7,005,734 B2 |
|  | 4,850,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123 B1 | 6,534,343    | 6,710,405 B2 | 6,759,692    | 7,063,975 B2 |
|  | 4,881,106 | 5,034,796 | 5,187,117 | 5,486,715 | 6,306,728 B1 | 6,583,505    | 6,710,463    | 6,771,478 B2 | 7,071,537    |

**Fig. 1. Output Characteristics @ 25°C**

**Fig. 2. Extended Output Characteristics @ 25°C**

**Fig. 3. Output Characteristics @ 150°C**

**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 90A$  Value vs. Junction Temperature**

**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 90A$  Value vs. Drain Current**

**Fig. 6. Drain Current vs. Case Temperature**


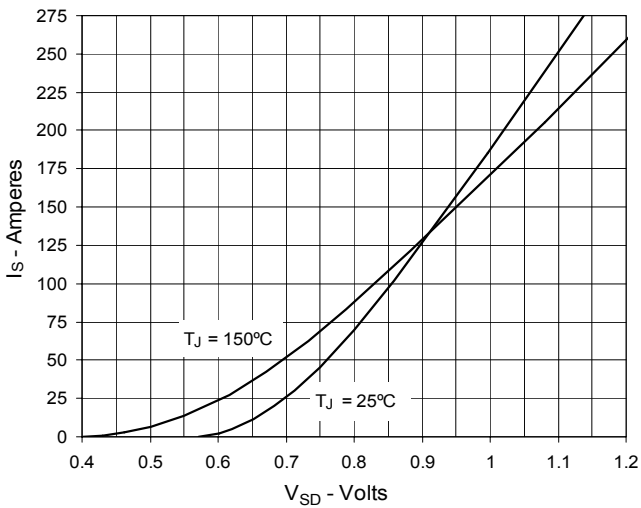
**Fig. 7. Input Admittance**



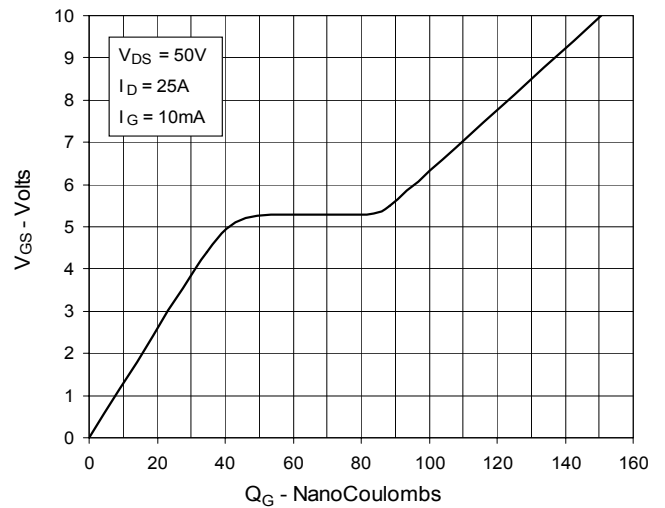
**Fig. 8. Transconductance**



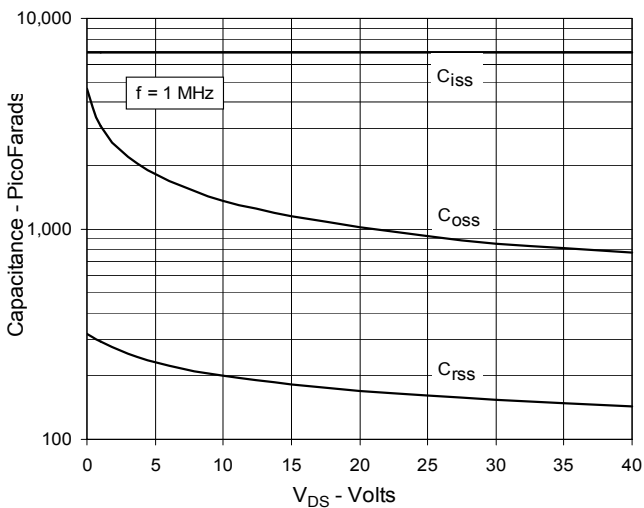
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



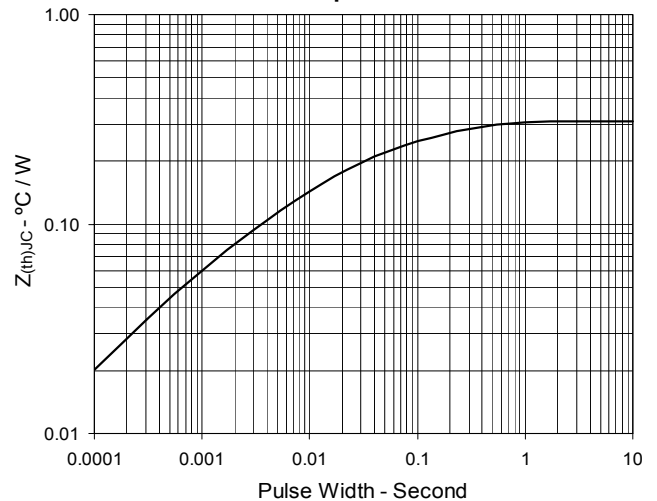
**Fig. 10. Gate Charge**



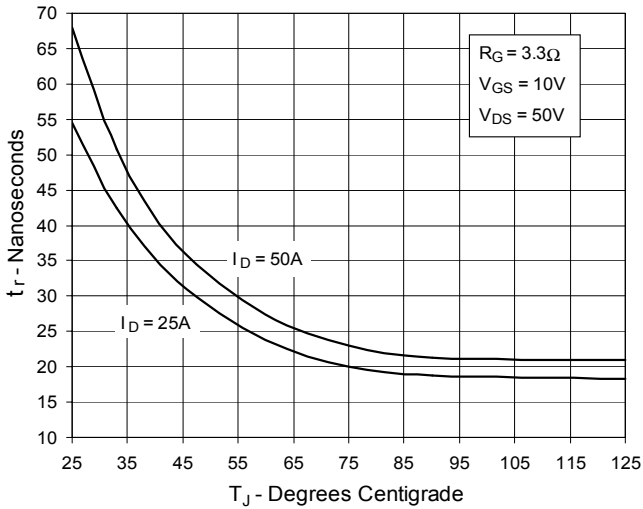
**Fig. 11. Capacitance**



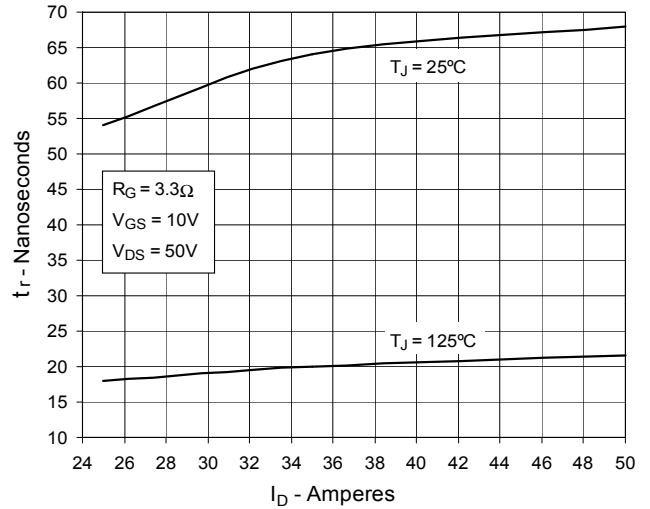
**Fig. 12. Maximum Transient Thermal Impedance**



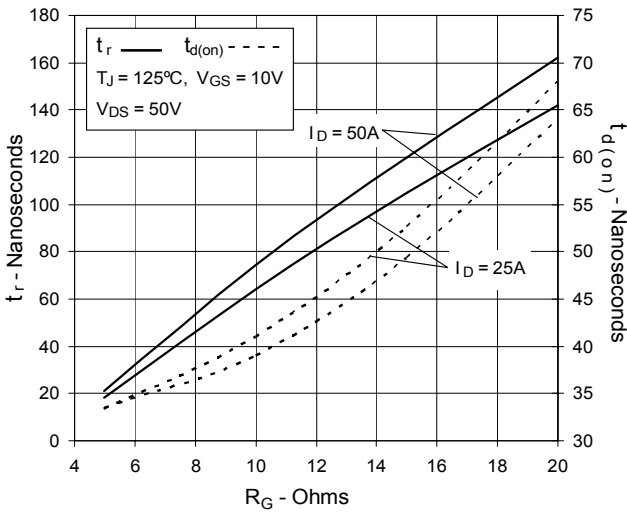
**Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature**



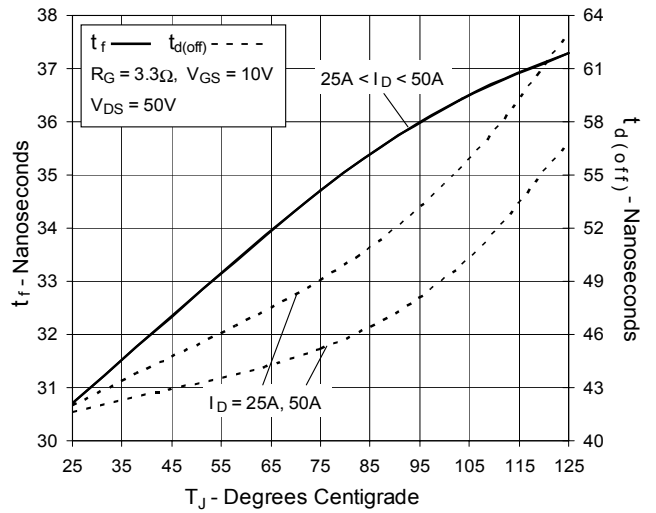
**Fig. 14. Resistive Turn-on Rise Time vs. Drain Current**



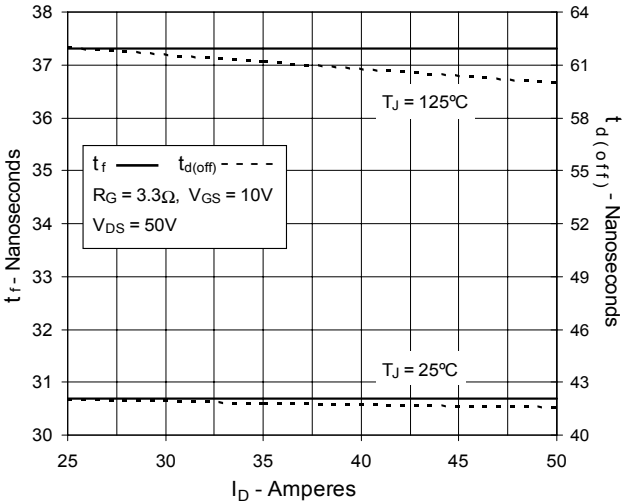
**Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance**



**Fig. 16. Resistive Turn-off Switching Times vs. Junction Temperature**



**Fig. 17. Resistive Turn-off Switching Times vs. Drain Current**



**Fig. 18. Resistive Turn-off Switching Times vs. Gate Resistance**

