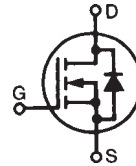


# TrenchMV™ Power MOSFET

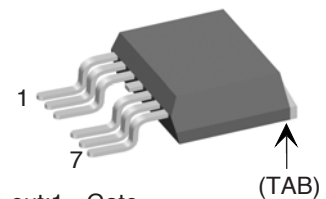
**IXTA220N075T7**

$$\begin{aligned} V_{DSS} &= 75 \text{ V} \\ I_{D25} &= 220 \text{ A} \\ R_{DS(on)} &\leq 4.5 \text{ m}\Omega \end{aligned}$$

N-Channel Enhancement Mode  
Avalanche Rated



| Symbol     | Test Conditions                                                                                                                         | Maximum Ratings |                  |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C to } 175^\circ\text{C}$                                                                                          | 75              | V                |
| $V_{DGR}$  | $T_J = 25^\circ\text{C to } 175^\circ\text{C}; R_{GS} = 1 \text{ M}\Omega$                                                              | 75              | V                |
| $V_{GSM}$  | Transient                                                                                                                               | $\pm 20$        | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                                                                                | 220             | A                |
| $I_{LRMS}$ | Package Current Limit, RMS                                                                                                              | 120             | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                              | 600             | A                |
| $I_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                                | 25              | A                |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                                                                                                | 1.0             | J                |
| $dv/dt$    | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$<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             | $^\circ\text{C}$ |
| Weight     |                                                                                                                                         | 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  $^\circ\text{C}$  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
- High Current Switching Applications

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified) | Characteristic Values |      |                                      |
|--------------|---------------------------------------------------------------------------|-----------------------|------|--------------------------------------|
|              |                                                                           | Min.                  | Typ. | Max.                                 |
| $BV_{DSS}$   | $V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$                          | 75                    |      | V                                    |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250 \mu\text{A}$                               | 2.0                   |      | 4.0 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                   | 3.6                   | 4.5  | $\text{m}\Omega$                     |

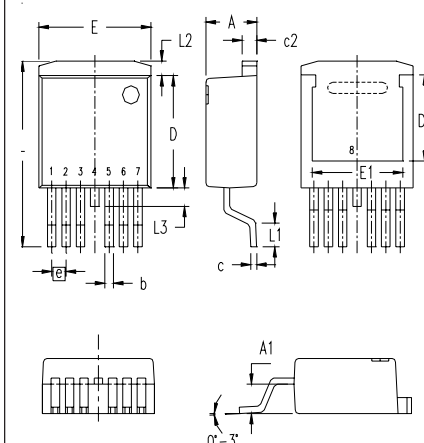
| Symbol                                             | Test Conditions                                                                                                             | Characteristic Values |      |           |
|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-----------|
|                                                    |                                                                                                                             | Min.                  | Typ. | Max.      |
| (T <sub>J</sub> = 25°C unless otherwise specified) |                                                                                                                             |                       |      |           |
| <b>g<sub>fs</sub></b>                              | V <sub>DS</sub> = 10 V; I <sub>D</sub> = 60 A, Note 1                                                                       | 75                    | 120  | S         |
| <b>C<sub>iss</sub></b>                             | V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz                                                                    |                       | 7700 | pF        |
| <b>C<sub>oss</sub></b>                             |                                                                                                                             |                       | 1100 | pF        |
| <b>C<sub>rss</sub></b>                             |                                                                                                                             |                       | 230  | pF        |
| <b>Resistive Switching Times</b>                   |                                                                                                                             |                       |      |           |
| <b>t<sub>d(on)</sub></b>                           | V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 0.5 V <sub>DSS</sub> , I <sub>D</sub> = 25 A<br>R <sub>G</sub> = 3.3 Ω (External) |                       | 29   | ns        |
| <b>t<sub>r</sub></b>                               |                                                                                                                             |                       | 65   | ns        |
| <b>t<sub>d(off)</sub></b>                          |                                                                                                                             |                       | 55   | ns        |
| <b>t<sub>f</sub></b>                               |                                                                                                                             |                       | 47   | ns        |
| <b>Q<sub>g(on)</sub></b>                           | V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 0.5 V <sub>DSS</sub> , I <sub>D</sub> = 25 A                                      |                       | 165  | nC        |
| <b>Q<sub>gs</sub></b>                              |                                                                                                                             |                       | 40   | nC        |
| <b>Q<sub>gd</sub></b>                              |                                                                                                                             |                       | 50   | nC        |
| <b>R<sub>thJC</sub></b>                            |                                                                                                                             |                       |      | 0.31 °C/W |

### Source-Drain Diode

| Symbol          | Test Conditions<br>T <sub>J</sub> = 25°C unless otherwise specified)                     | Characteristic Values |      |       |
|-----------------|------------------------------------------------------------------------------------------|-----------------------|------|-------|
|                 |                                                                                          | Min.                  | Typ. | Max.  |
| I <sub>S</sub>  | V <sub>GS</sub> = 0 V                                                                    |                       |      | 220 A |
| I <sub>SM</sub> | Pulse width limited by T <sub>JM</sub>                                                   |                       |      | 600 A |
| V <sub>SD</sub> | I <sub>F</sub> = 25 A, V <sub>GS</sub> = 0 V, Note 1                                     |                       |      | 1.0 V |
| t <sub>rr</sub> | I <sub>F</sub> = 25 A, -di/dt = 100 A/μs<br>V <sub>R</sub> = 40 V, V <sub>GS</sub> = 0 V |                       | 80   | ns    |

Notes: 1. Pulse test, t ≤ 300 μs, duty cycle d ≤ 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  |

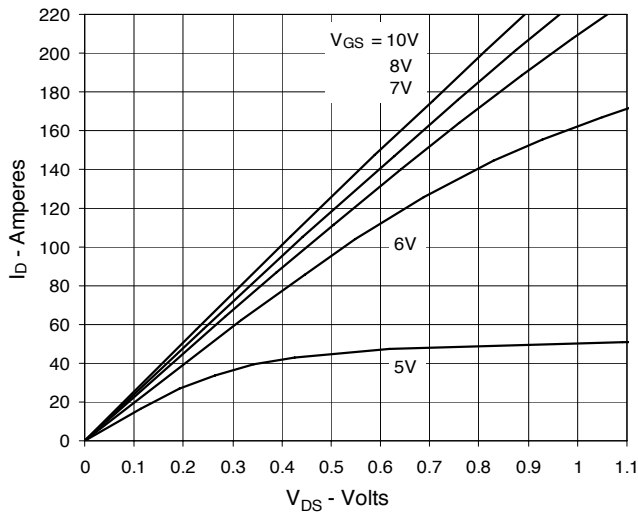
### PRELIMINARY TECHNICAL INFORMATION

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.

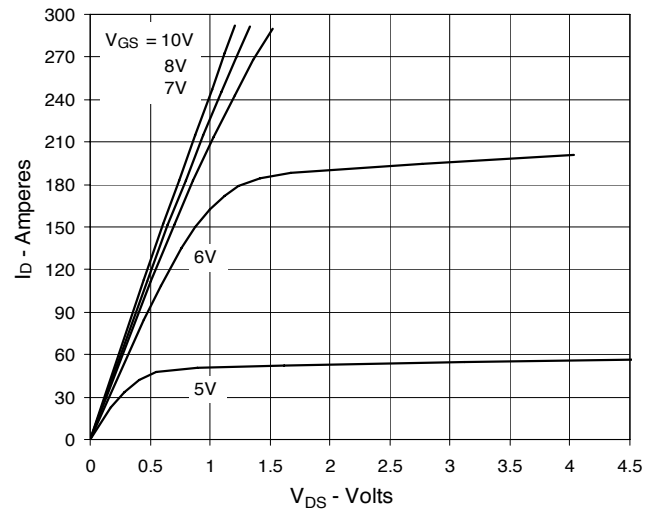
IXYS reserves the right to change limits, test conditions, and dimensions.

|                                                                                  |           |           |           |           |              |              |              |              |              |
|----------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|
| 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    |

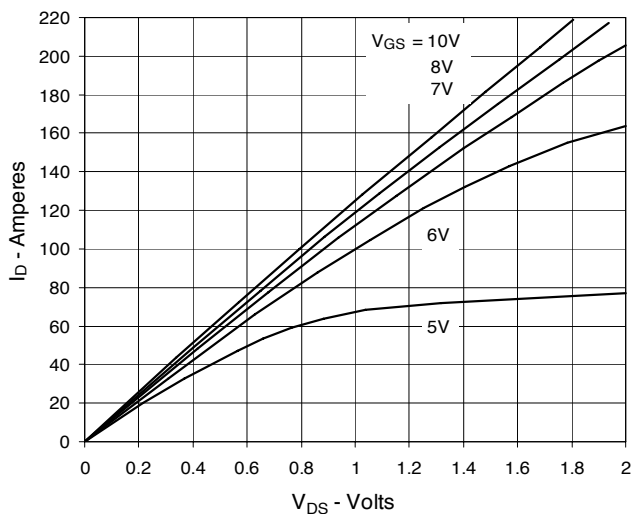
**Fig. 1. Output Characteristics  
@ 25°C**



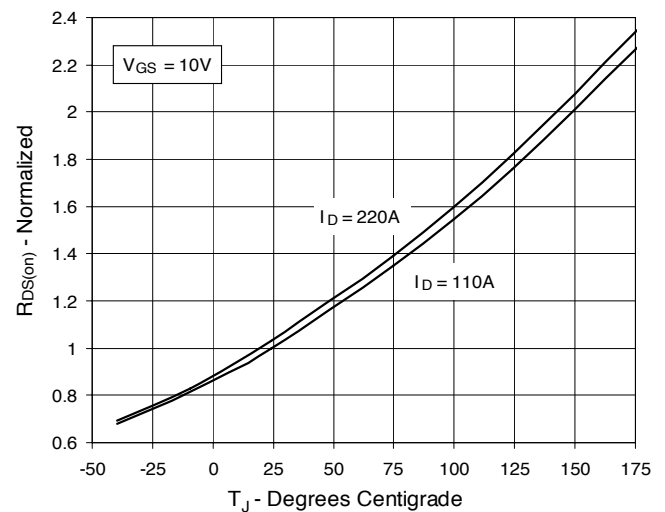
**Fig. 2. Extended Output Characteristics  
@ 25°C**



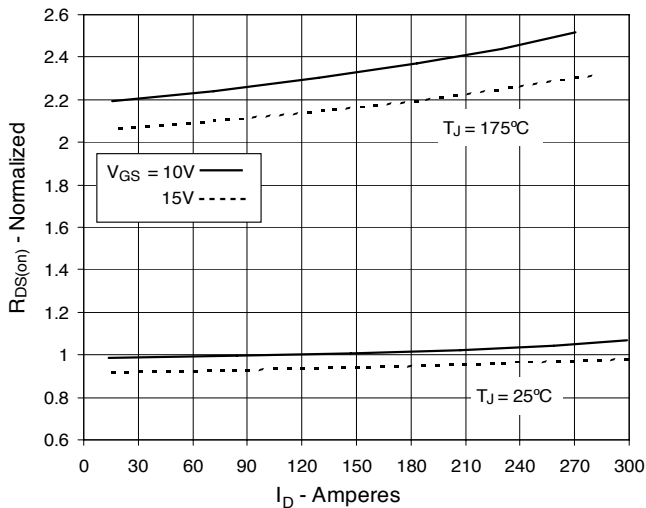
**Fig. 3. Output Characteristics  
@ 150°C**



**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 110A$  Value  
vs. Junction Temperature**



**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 110A$  Value  
vs. Drain Current**



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

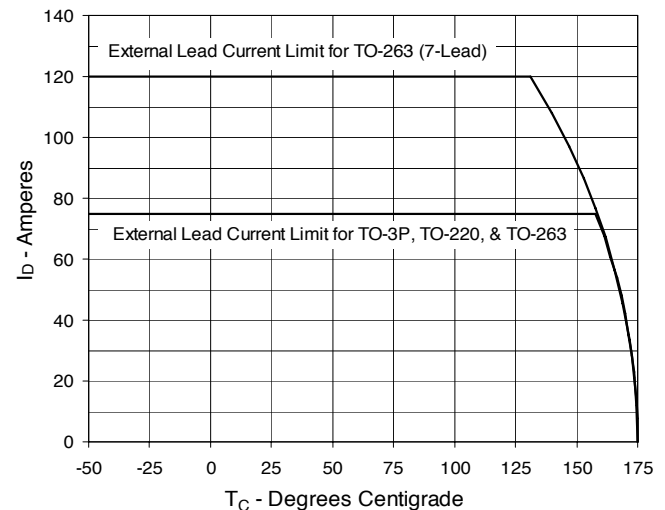


Fig. 7. Input Admittance

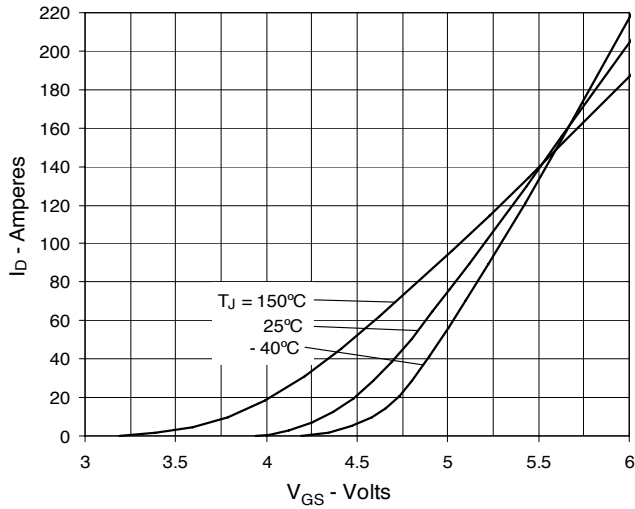


Fig. 8. Transconductance

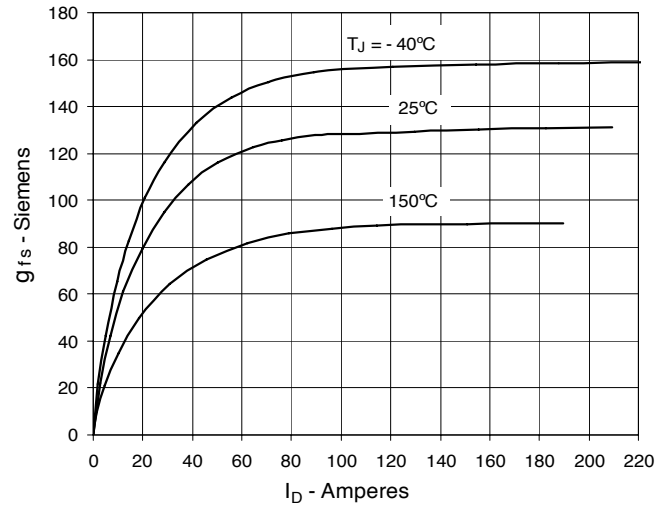


Fig. 9. Forward Voltage Drop of Intrinsic Diode

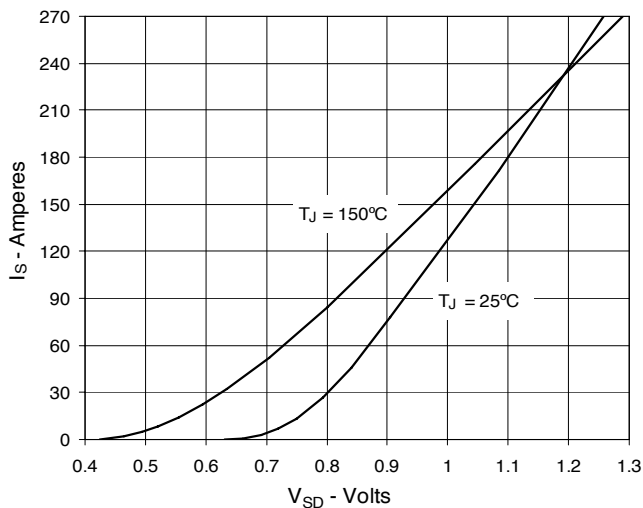


Fig. 10. Gate Charge

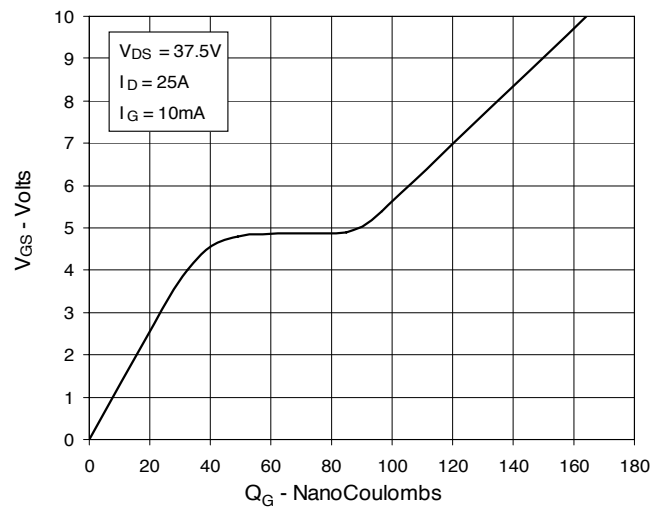


Fig. 11. Capacitance

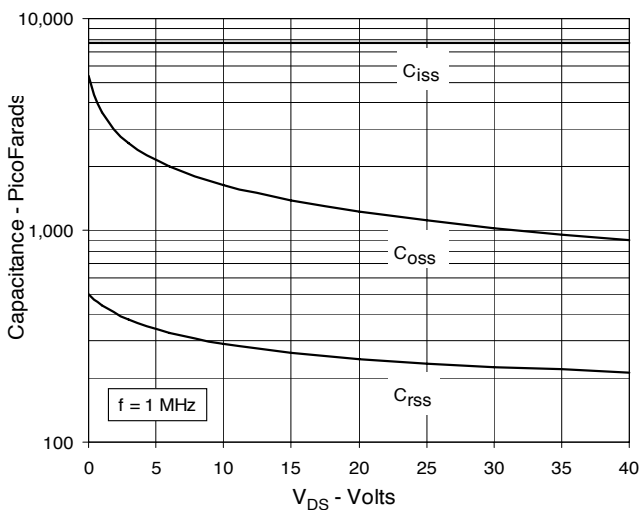
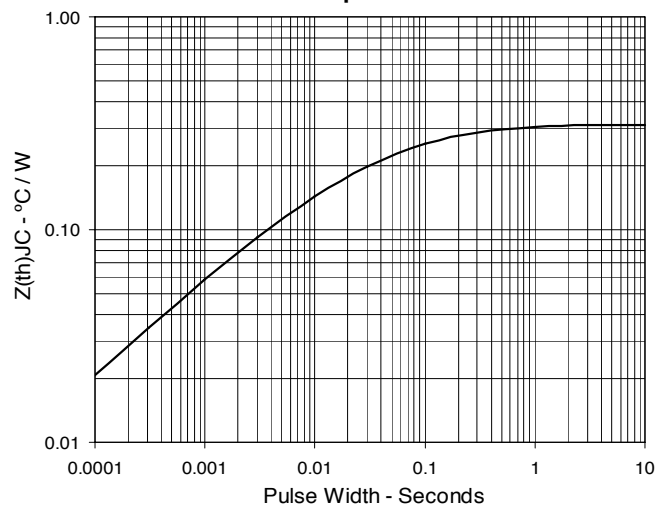
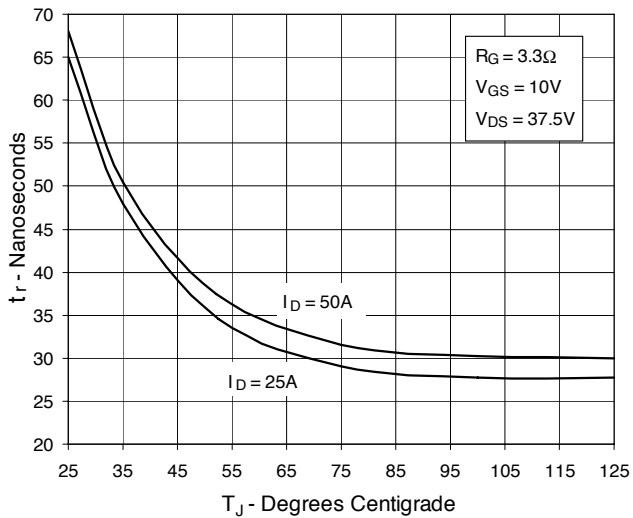


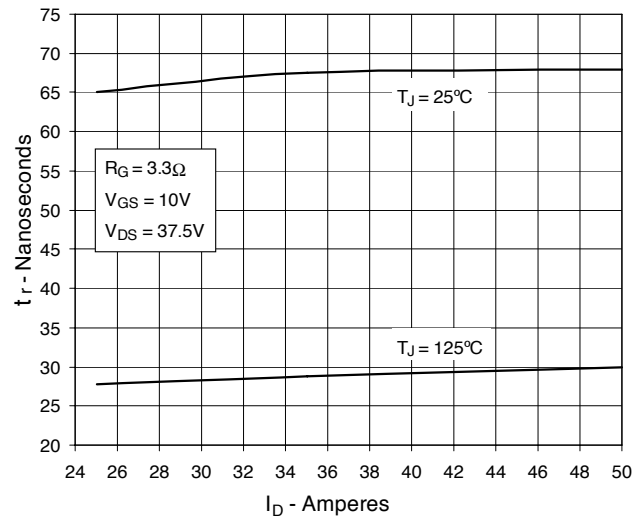
Fig. 12. Maximum Transient Thermal Impedance



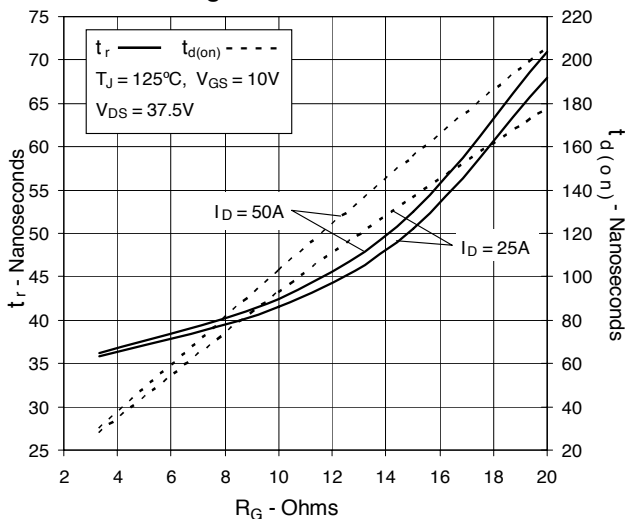
**Fig. 13. Resistive Turn-on  
Rise Time vs. Junction Temperature**



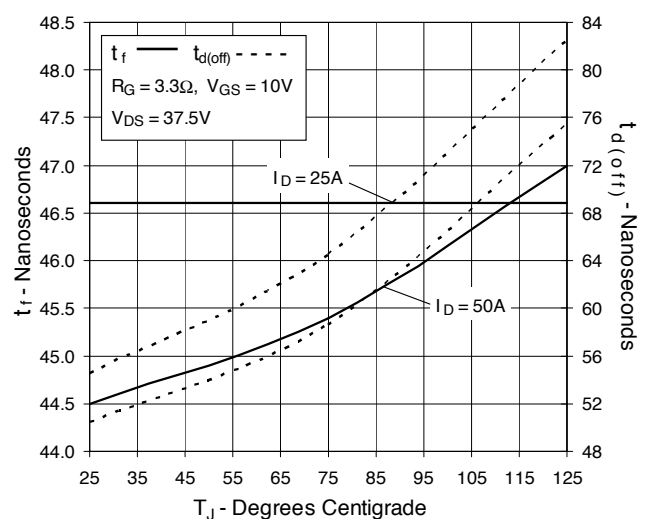
**Fig. 14. Resistive Turn-on  
Rise Time vs. Drain Current**



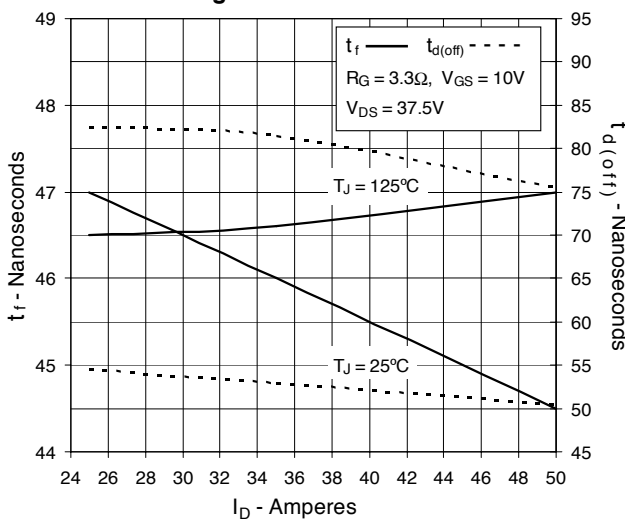
**Fig. 15. Resistive Turn-on  
Switching Times vs. Gate Resistance**



**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**

