

# TrenchMV™ IXTC160N10T

## Power MOSFET

(Electrically Isolated Back Surface)

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

$$I_{D25} = 83 \text{ A}$$

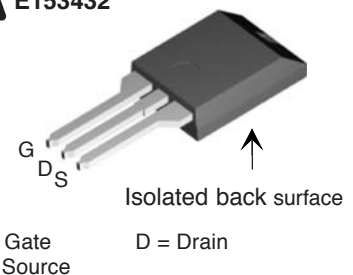
$$R_{DS(on)} \leq 7.5 \text{ m}\Omega$$

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   | $\pm 20$        | V                |
| $I_{D25}$     | $T_C = 25^\circ\text{C}$  | 83              | A                |
| $I_L$         | Package Current Limit, RMS  | 75              | A                |
| $I_{DM}$      | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$  | 430             | A                |
| $I_{AR}$      | $T_C = 25^\circ\text{C}$  | 25              | A                |
| $E_{AS}$      | $T_C = 25^\circ\text{C}$  | 500             | mJ               |
| $dv/dt$       | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$<br>$T_J \leq 175^\circ\text{C}$ , $R_G = 5 \Omega$ | 3               | V/ns             |
| $P_D$         | $T_C = 25^\circ\text{C}$  | 140             | 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             | $^\circ\text{C}$ |
| $V_{ISOL}$    | 50/60 Hz, $t = 1$ minute, $I_{ISOL} < 1 \text{ mA}$ , RMS   | 2500            | V                |
| $F_C$         | Mounting force  | 11..65/2.5..15  | N/lb.            |
| <b>Weight</b> |   | 2               | g                |

ISOPLUS220 (IXTC)  
E153432



### 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
- 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                   |      | 4.5 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 $\mu\text{A}$ |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 25 \text{ A}$ , Notes 1, 2               | 6.5                   |      | 7.5 m $\Omega$                       |

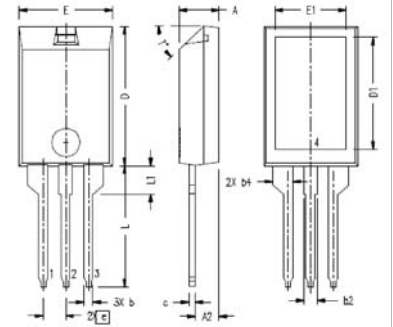
| Symbol       | Test Conditions   | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified) |      |                        |
|--------------|---|---|------|------------------------|
|              |   | Min.  | Typ. | Max.                   |
| $g_{fs}$     | $V_{DS} = 10\text{ V}; I_D = 60\text{ A}$ , Note 1  | 65  | 102  | S                      |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                   |   | 6600 | pF                     |
| $C_{oss}$    |   | 880   | pF   |                        |
| $C_{rss}$    |   | 135   | pF   |                        |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 25\text{ A}$<br>$R_G = 5\ \Omega$ (External) |   | 33   | ns                     |
| $t_r$        |   | 61  | ns   |                        |
| $t_{d(off)}$ |   | 49  | ns   |                        |
| $t_f$        |   | 42  | ns   |                        |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 25\text{ A}$                                 |   | 132  | nC                     |
| $Q_{gs}$     |   | 37  | nC   |                        |
| $Q_{gd}$     |   | 40  | nC   |                        |
| $R_{thJC}$   |   |   |      | $1.06^\circ\text{C/W}$ |
| $R_{thCS}$   |   | 0.5   |      | $^\circ\text{C/W}$     |

### Source-Drain Diode

| Symbol   | Test Conditions  | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified) |      |       |
|----------|--|---|------|-------|
|          |  | Min.  | Typ. | Max.  |
| $I_S$    | $V_{GS} = 0\text{ V}$  |   |      | 160 A |
| $I_{SM}$ | Pulse width limited by $T_{JM}$  |   |      | 430 A |
| $V_{SD}$ | $I_F = 25\text{ A}, V_{GS} = 0\text{ V}$ , Note 1  |   |      | 1.0 V |
| $t_{rr}$ | $I_F = 25\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}$<br>$V_R = 30\text{ V}, V_{GS} = 0\text{ V}$ |   | 60   | ns    |

- Notes: 1. Pulse test:  $t \leq 300\ \mu\text{s}$ , duty cycle  $d \leq 2\%$ ;  
2. Drain and Source Kelvin contacts must be located less than 5 mm from the plastic body.

### ISOPLUS220 (IXTC) Outline



1. Gate 2. Drain  
3. Source

Note: Bottom heatsink (Pin 4) is electrically isolated from Pins 1, 2, and 3.

| SYM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | .157   | .197  | 4.00        | 5.00  |
| A2  | .098   | .118  | 2.50        | 3.00  |
| b   | .035   | .051  | 0.90        | 1.30  |
| b2  | .049   | .065  | 1.25        | 1.65  |
| b4  | .093   | .100  | 2.35        | 2.55  |
| c   | .028   | .039  | 0.70        | 1.00  |
| D   | .591   | .630  | 15.00       | 16.00 |
| D1  | .472   | .512  | 12.00       | 13.00 |
| E   | .394   | .433  | 10.00       | 11.00 |
| E1  | .295   | .335  | 7.50        | 8.50  |
| e   | .100   | BASIC | 2.55        | BASIC |
| L   | .512   | .571  | 13.00       | 14.50 |
| L1  | .118   | .138  | 3.00        | 3.50  |
| T*  |        |       | 42.5*       | 47.5* |

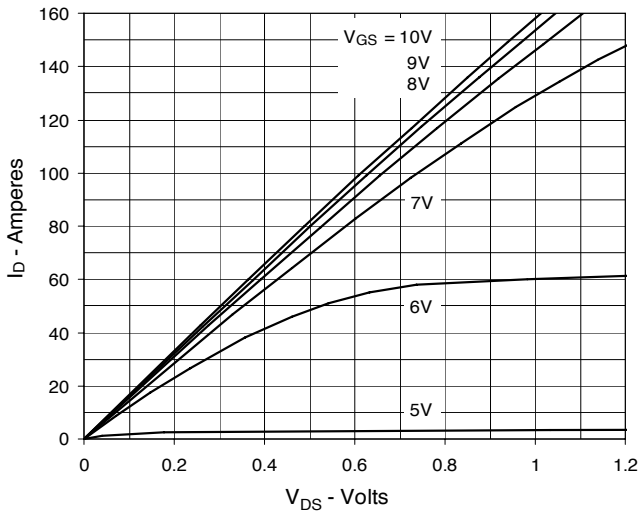
### PRELIMINARY TECHNICAL INFORMATION

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.

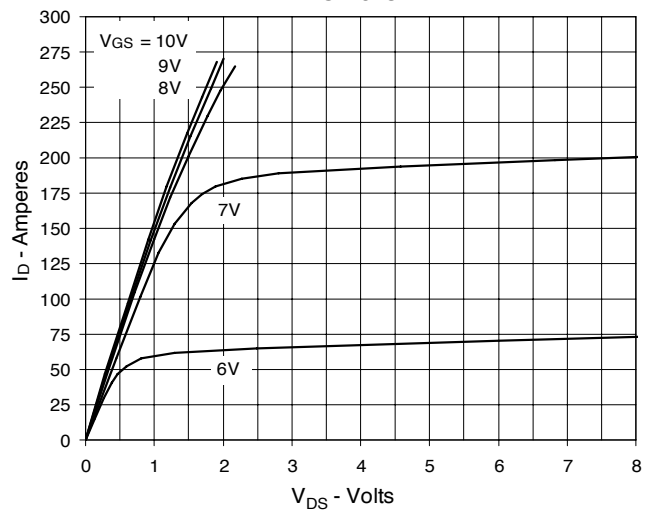
IXYS reserves the right to change limits, test conditions, and dimensions.

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

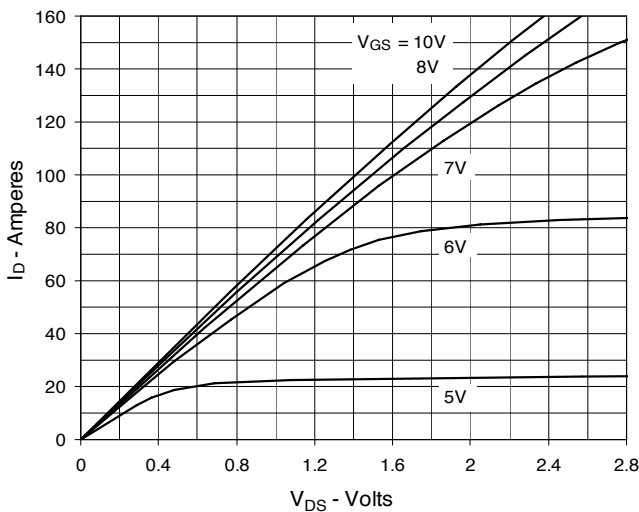
**Fig. 1. Output Characteristics @ 25°C**



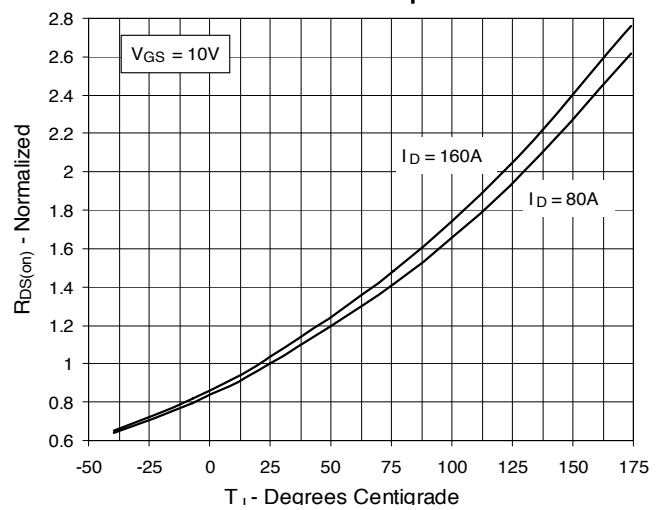
**Fig. 2. Extended Output Characteristics @ 25°C**



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



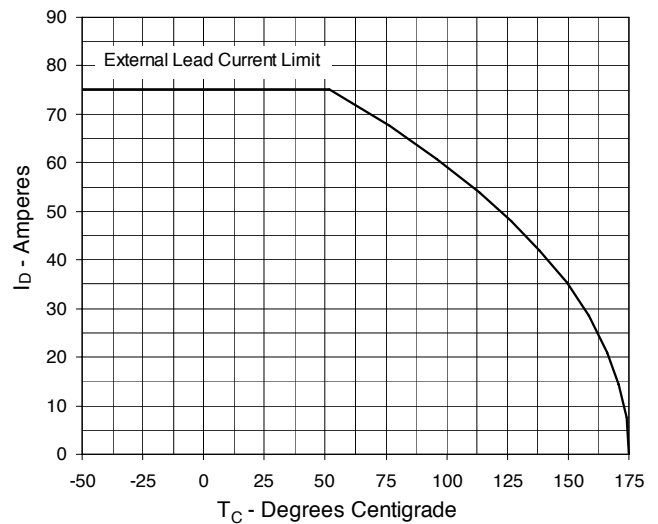
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 160A$  Value vs. Junction Temperature**



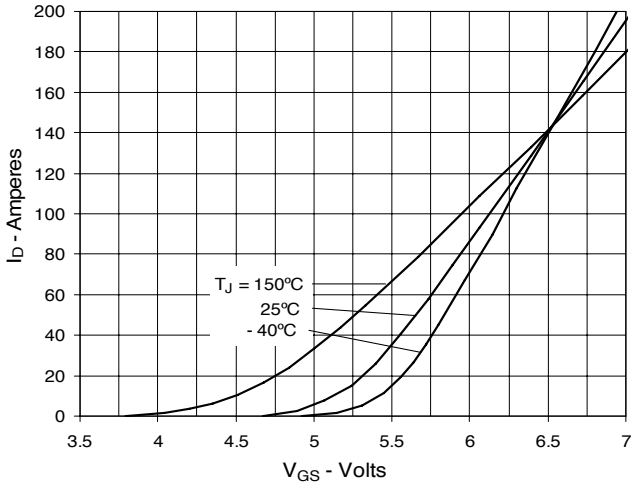
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 80A$  Value vs. Drain Current**



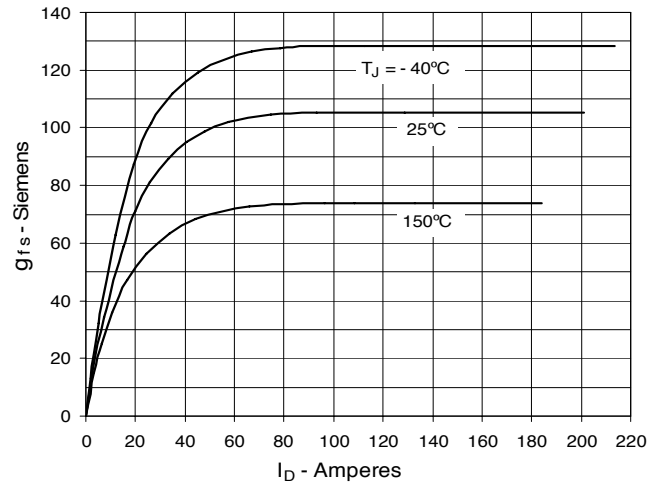
**Fig. 6. Drain Current vs. Case Temperature**



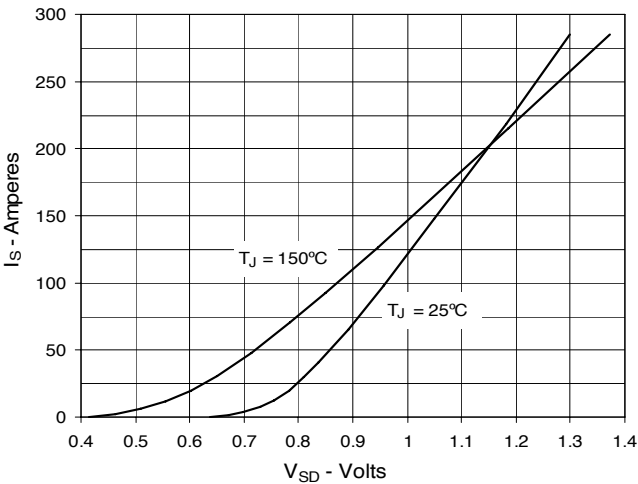
**Fig. 7. Input Admittance**



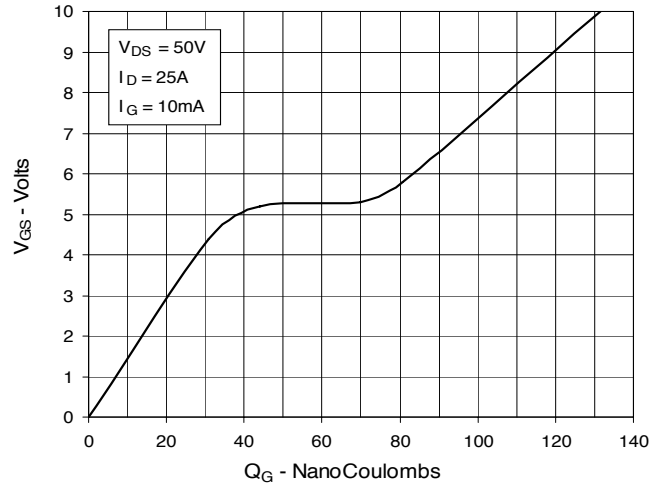
**Fig. 8. Transconductance**



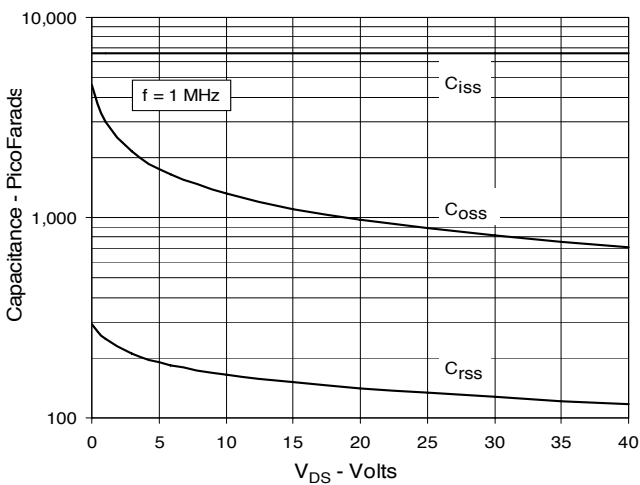
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



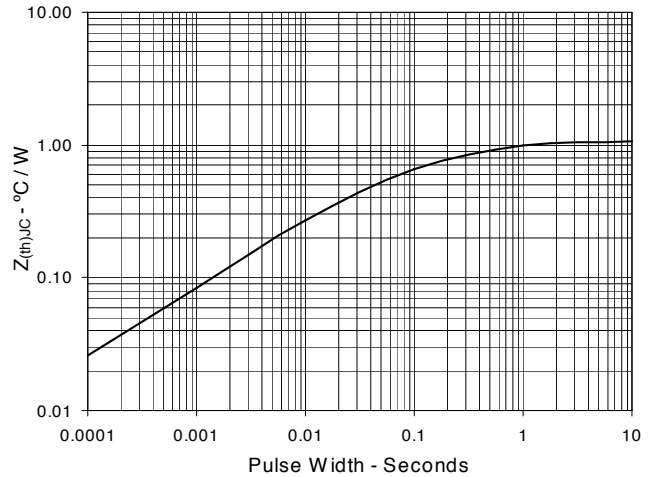
**Fig. 10. Gate Charge**



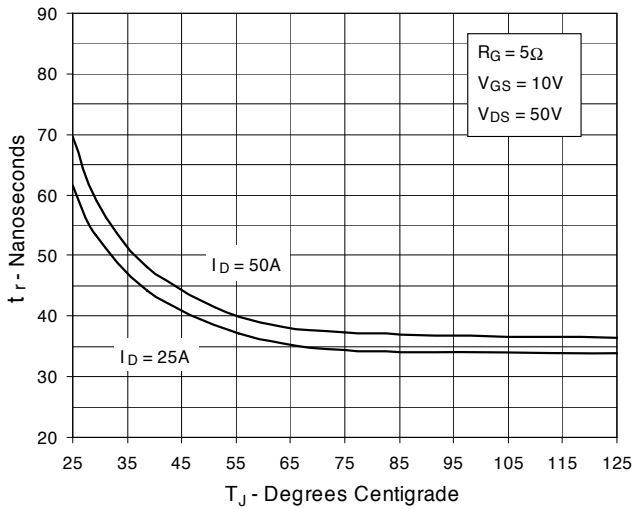
**Fig. 11. Capacitance**



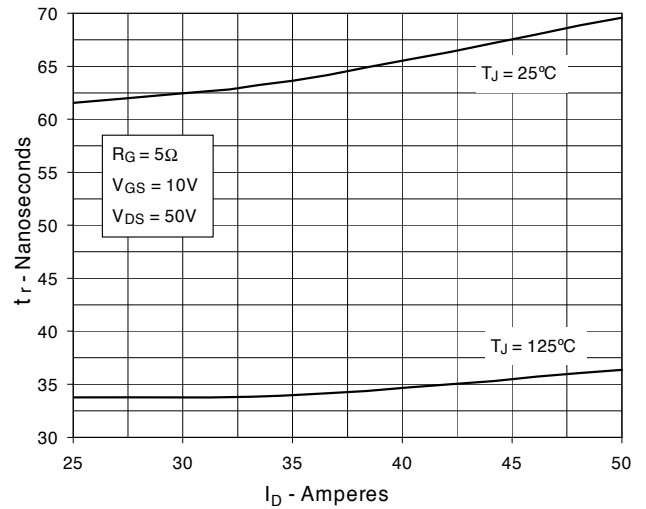
**Fig. 12. Maximum Transient Thermal Impedance**



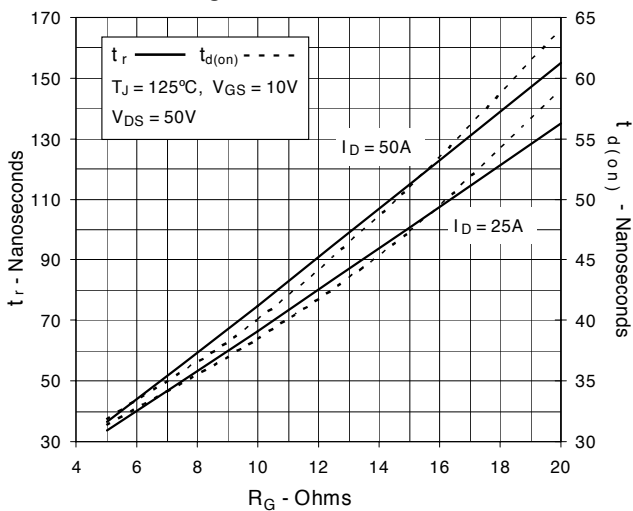
**Fig. 13. Resistive Turn-on  
Rise Time vs. Junction Temperature**



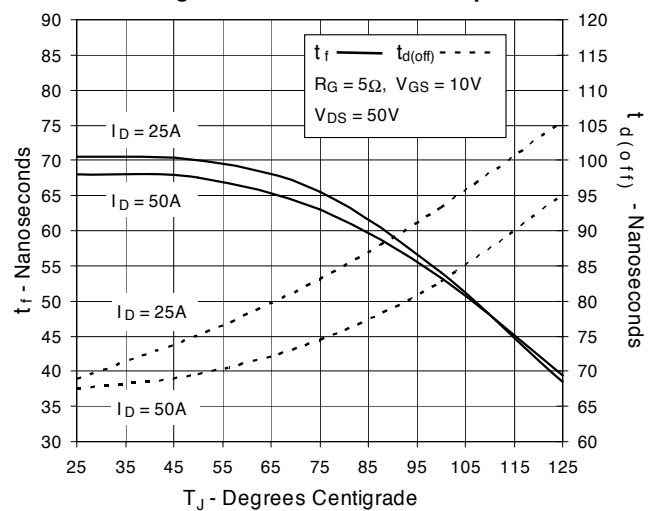
**Fig. 14. Resistive Turn-on  
Rise Time vs. Drain Current**



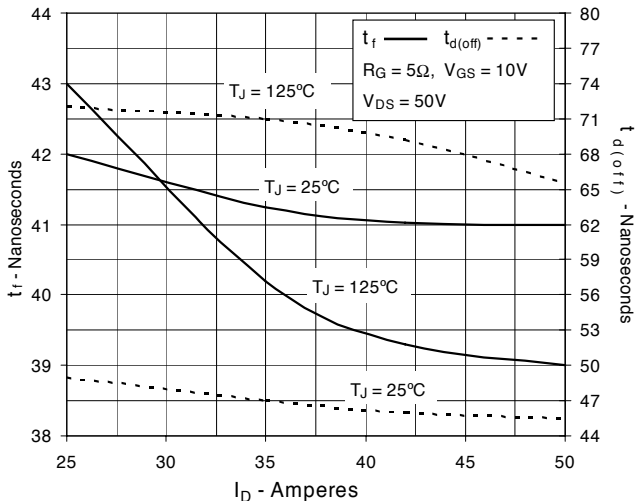
**Fig. 15. Resistive Turn-on  
Switching Times vs. Gate Resistance**



**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**

