IXYS

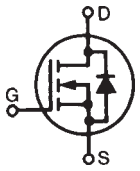
Preliminary Technical Information

# TrenchMV™ Power MOSFET

**IXTV250N075T**
**IXTV250N075TS**

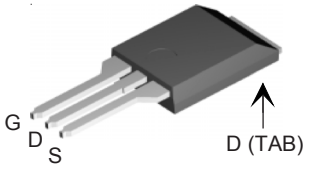
$V_{DSS}$ = 75 V
$I_{D25}$ = 250 A
$R_{DS(on)}$ ≤ 4.0 mΩ

N-Channel Enhancement Mode
Avalanche Rated

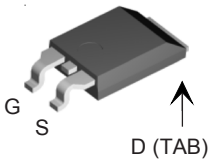



| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{DSS}$ | $T_J$ = 25° C to 175° C | 75 | V |
| $V_{DGR}$ | $T_J$ = 25° C to 175° C; $R_{GS}$ = 1 MΩ | 75 | V |
| $V_{GSM}$ | Transient | ± 20 | V |
| $I_{D25}$ | $T_C$ = 25° C | 250 | A |
| $I_{LRMS}$ | Lead Current Limit, RMS | 75 | A |
| $I_{DM}$ | $T_C$ = 25° C, pulse width limited by $T_{JM}$ | 560 | A |
| $I_{AR}$ | $T_C$ = 25° C | 40 | A |
| $E_{AS}$ | $T_C$ = 25° C | 1.5 | J |
| dv/dt | $I_S \le I_{DM}$, di/dt ≤100 A/μs, $V_{DD} \le V_{DSS}$ $T_J$ ≤175° C, $R_G$ = 3.3 Ω | 3 | V/ns |
| $P_D$ | $T_C$ = 25° C | 550 | W |
| $T_J$ | | -55 ... +175 | °C |
| $T_{JM}$ | | 175 | °C |
| $T_{stg}$ | | -55 ... +175 | °C |
| $T_L$ | 1.6 mm (0.062 in.) from case for 10 s | 300 | °C |
| $T_{SOLD}$ | Plastic body for 10 seconds | 260 | °C |
| $F_C$ | Mounting force (PLUS220) | 11...65 /2.5...15 | N/lb. |
| Weight | | 3 | g |

**PLUS220 (IXTV)**




**PLUS220SMD (IXTV_S)**




G = Gate D = Drain
S = Source TAB = 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
- High Current Switching Applications

| Symbol (T_J = 25° C unless otherwise specified) | Test Conditions | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $BV_{DSS}$ | $V_{GS}$ = 0 V, $I_D$ = 250 μA | 75 | | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D$ = 250 μA | 2.0 | | 4.0 | V |
| $I_{GSS}$ | $V_{GS}$ = ±20 V, $V_{DS}$ = 0 V | | | ± 200 | nA |
| $I_{DSS}$ | $V_{DS} = V_{DSS}$ | | | 25 | μA |
| | $V_{GS}$ = 0 V $T_J$ = 150° C | | | 250 | μA |
| $R_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 50 A, Notes 1, 2 | | 3.3 | 4.0 | mΩ |

| Symbol | Test Conditions ($T_J$ = 25°C unless otherwise specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $V_{DS}$ = 10 V; $I_D$ = 60 A, Note 1 | 75 | 122 | | S |
| $C_{iss}$ | | | 9900 | | pF |
| $C_{oss}$ | $V_{GS}$ = 0 V, $V_{DS}$ = 25 V, f = 1 MHz | | 1330 | | pF |
| $C_{rss}$ | | | 285 | | pF |
| $t_{d(on)}$ | | | 32 | | ns |
| $t_r$ | $V_{GS}$ = 10 V, $V_{DS}$ = 0.5 $V_{DSS}$, $I_D$ = 50 A | | 50 | | ns |
| $t_{d(off)}$ | $R_G$ = 3.3 Ω (External) | | 58 | | ns |
| $t_f$ | | | 45 | | ns |
| $Q_{g(on)}$ | | | 200 | | nC |
| $Q_{gs}$ | $V_{GS}$ = 10 V, $V_{DS}$ = 0.5 $V_{DSS}$, $I_D$ = 25 A | | 50 | | nC |
| $Q_{gd}$ | | | 60 | | nC |
| $R_{thJC}$ | | | | 0.27 | °C/W |
| $R_{thCS}$ | PLUS220 | | .25 | | °C/W |

**Source-Drain Diode**

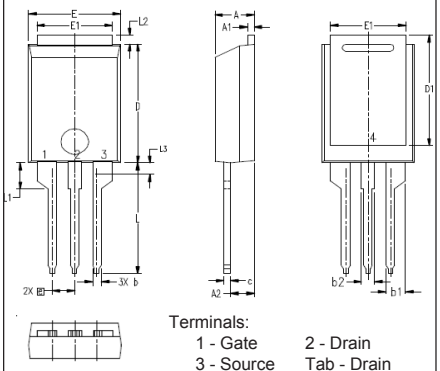
| Symbol Values | Test Conditions ($T_J$ = 25°C unless otherwise specified) | Characteristic Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $I_S$ | $V_{GS}$ = 0 V | | | 250 | A |
| $I_{SM}$ | Pulse width limited by $T_{JM}$ | | | 560 | A |
| $V_{SD}$ | $I_F$ = 50 A, $V_{GS}$ = 0 V, Note 1 | | | 1.0 | V |
| $t_{rr}$ | $I_F$ = 50 A, -di/dt = 100 A/μs<br>$V_R$ = 25 V, $V_{GS}$ = 0 V | | 80 | | ns |

Note 1. Pulse test, t ≤300 μs, duty cycle d ≤ 2 %;
2. On through-hole packages, $R_{DS(on)}$ Kelvin test contact location is 5 mm or less from the package body.

**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.

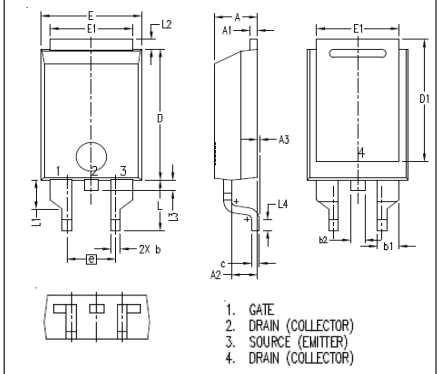
**PLUS220 (IXTV) Outline**



Terminals:
1 - Gate 2 - Drain
3 - Source Tab - Drain

| SYM | INCHES MIN | INCHES MAX | MILLIMETER MIN | MILLIMETER MAX |
|---|---|---|---|---|
| A | .169 | .185 | 4.30 | 4.70 |
| A1 | .028 | .035 | 0.70 | 0.90 |
| A2 | .098 | .118 | 2.50 | 3.00 |
| b | .035 | .047 | 0.90 | 1.20 |
| b1 | .080 | .095 | 2.03 | 2.41 |
| b2 | .054 | .064 | 1.37 | 1.63 |
| c | .028 | .035 | 0.70 | 0.90 |
| D | .551 | .591 | 14.00 | 15.00 |
| D1 | .512 | .539 | 13.00 | 13.70 |
| E | .394 | .433 | 10.00 | 11.00 |
| E1 | .331 | .346 | 8.40 | 8.80 |
| e | .100 BSC | | 2.54 BSC | |
| L | .512 | .551 | 13.00 | 14.00 |
| L1 | .118 | .138 | 3.00 | 3.50 |
| L2 | .035 | .051 | 0.90 | 1.30 |
| L3 | .047 | .059 | 1.20 | 1.50 |

**PLUS220SMD (IXTV_S) Outline**



1. GATE
2. DRAIN (COLLECTOR)
3. SOURCE (EMITTER)
4. DRAIN (COLLECTOR)

| SYM | INCHES MIN | INCHES MAX | MILLIMETER MIN | MILLIMETER MAX |
|---|---|---|---|---|
| A | .169 | .185 | 4.30 | 4.70 |
| A1 | .028 | .035 | 0.70 | 0.90 |
| A2 | .098 | .118 | 2.50 | 3.00 |
| A3 | .000 | .010 | 0.00 | 0.25 |
| b | .035 | .047 | 0.90 | 1.20 |
| b1 | .080 | .095 | 2.03 | 2.41 |
| b2 | .054 | .064 | 1.37 | 1.63 |
| c | .028 | .035 | 0.70 | 0.90 |
| D | .551 | .591 | 14.00 | 15.00 |
| D1 | .512 | .539 | 13.00 | 13.70 |
| E | .394 | .433 | 10.00 | 11.00 |
| E1 | .331 | .346 | 8.40 | 8.80 |
| e | .200BSC | | 5.08 BSC | |
| L | .209 | .228 | 5.30 | 5.80 |
| L1 | .118 | .138 | 3.00 | 3.50 |
| L2 | .035 | .051 | 0.90 | 1.30 |
| L3 | .047 | .059 | 1.20 | 1.50 |
| L4 | .039 | .059 | 1.00 | 1.50 |

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

**Fig. 1. Output Characteristics @ 25ºC**

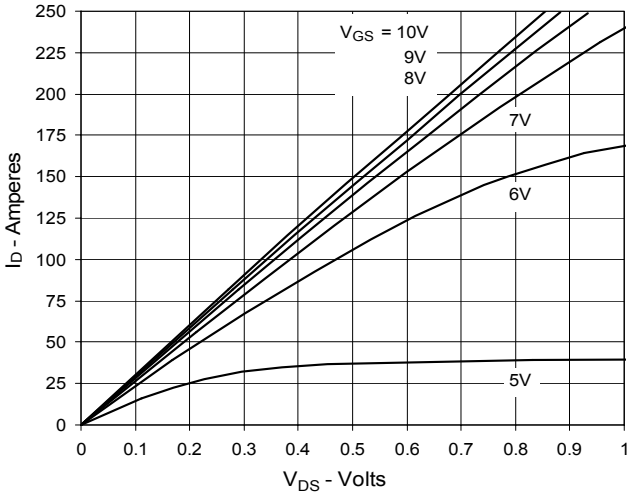



**Fig. 2. Extended Output Characteristics @ 25ºC**

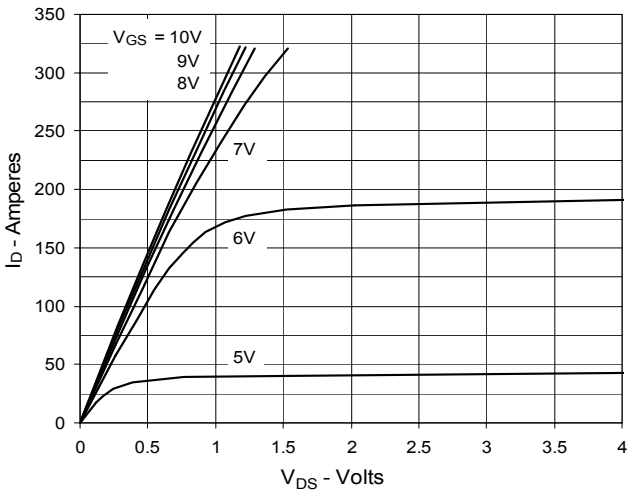



**Fig. 3. Output Characteristics @ 150ºC**

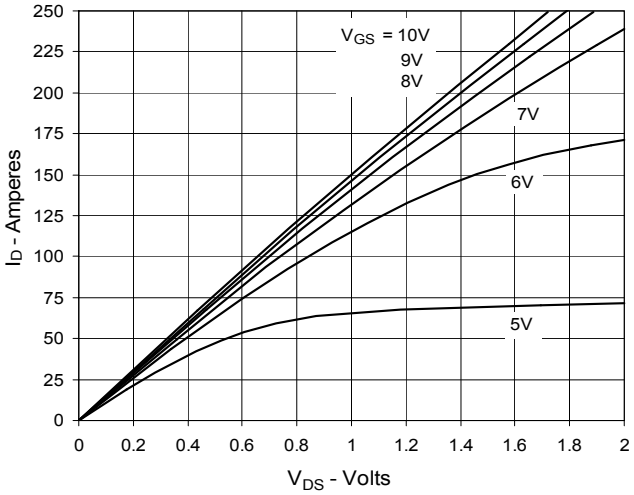



**Fig. 4. $R_{DS(on)}$ Normalized to $I_D$ = 125A Value vs. Junction Temperature**

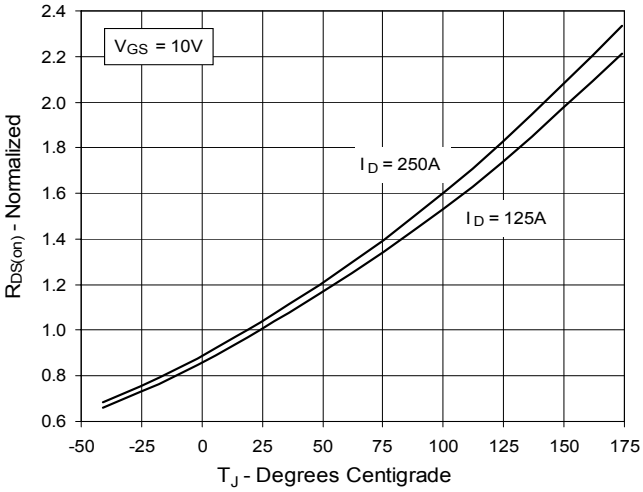



**Fig. 5. $R_{DS(on)}$ Normalized to $I_D$ = 125A Value vs. Drain Current**

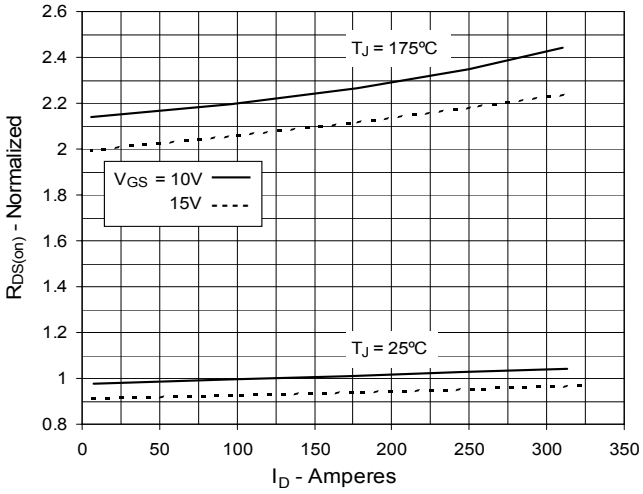



**Fig. 6. Drain Current vs. Case Temperature**

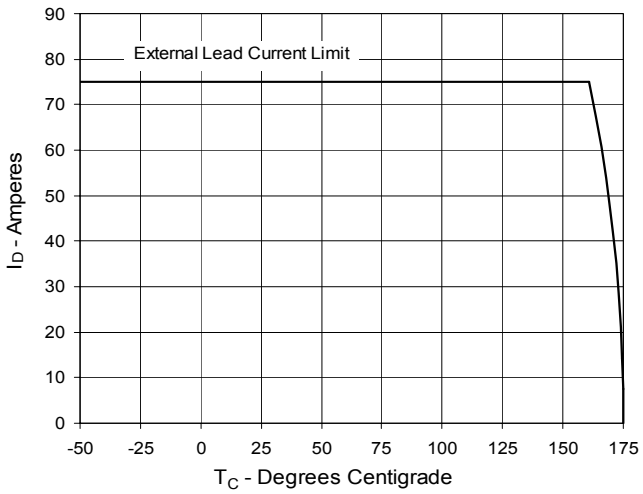


**Fig. 7. Input Admittance**

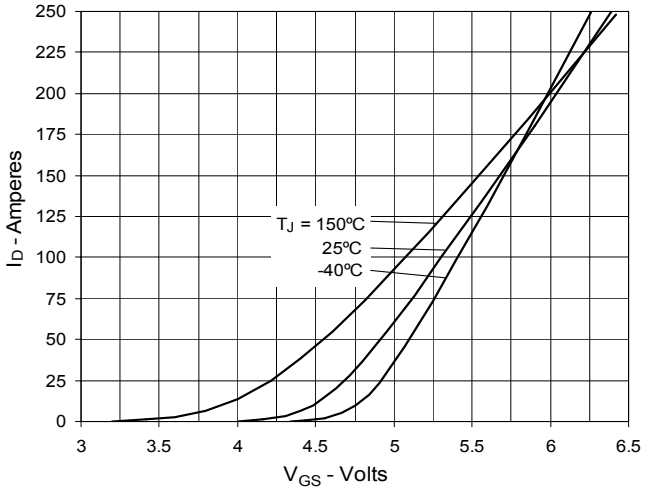



**Fig. 8. Transconductance**

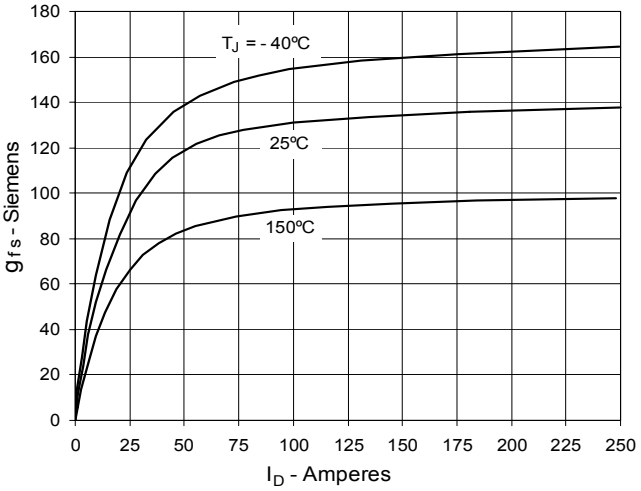



**Fig. 9. Forward Voltage Drop of Intrinsic Diode**

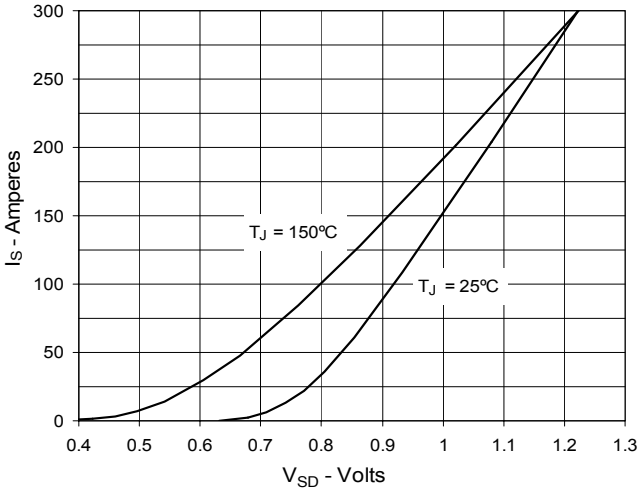



**Fig. 10. Gate Charge**

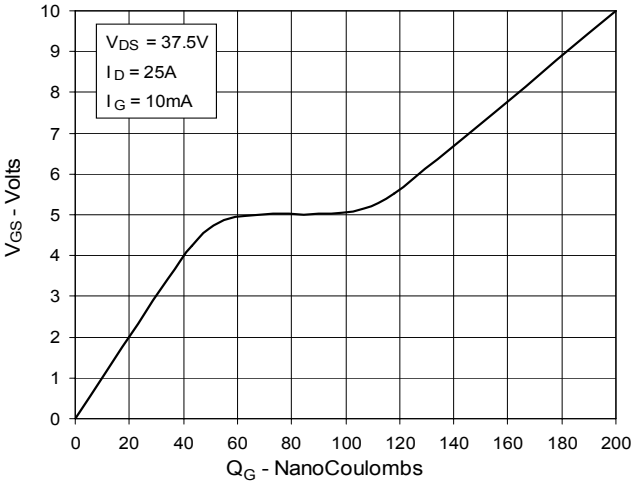



**Fig. 11. Capacitance**

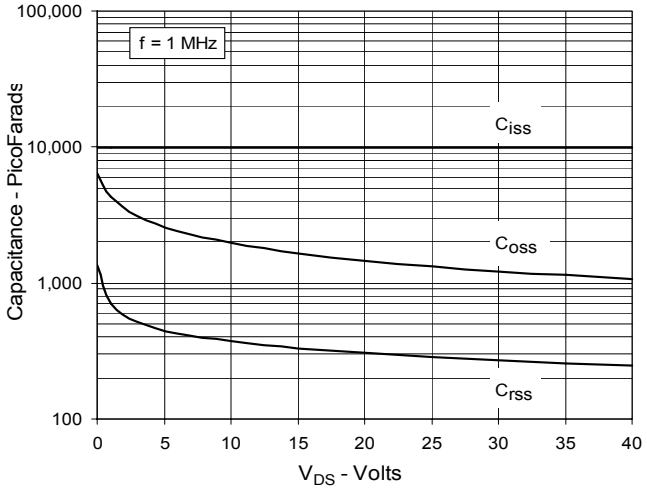



**Fig. 12. Maximum Transient Thermal Impedance**

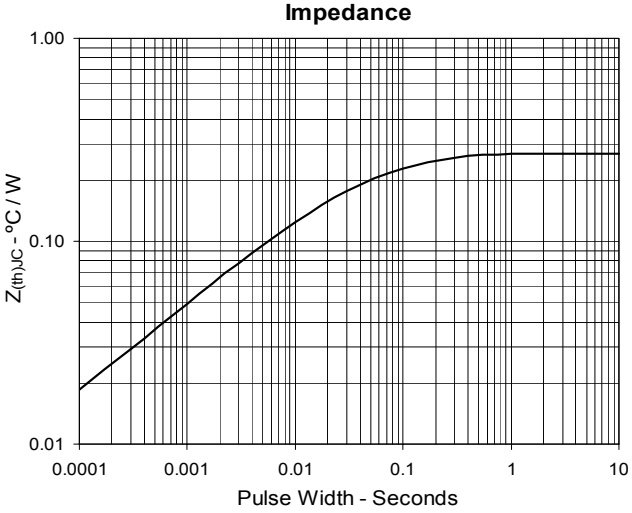


**Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature**

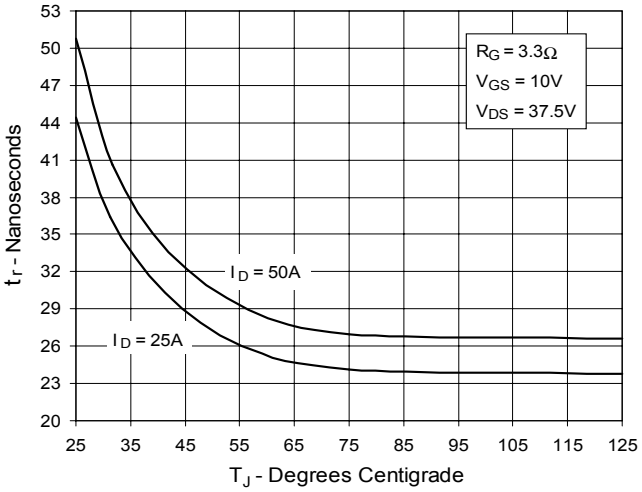



**Fig. 14. Resistive Turn-on Rise Time vs. Drain Current**

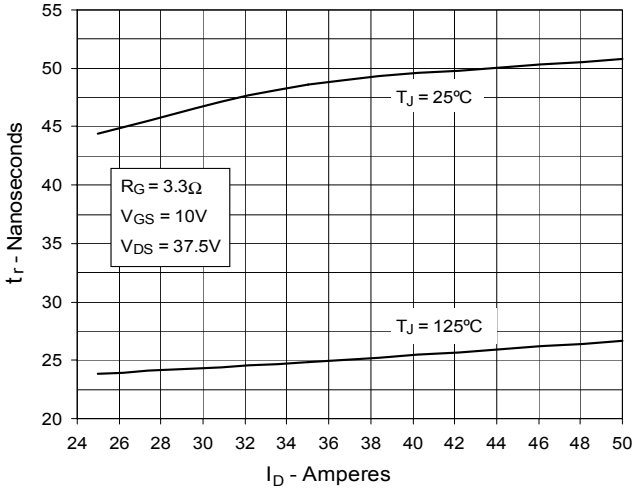



**Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance**

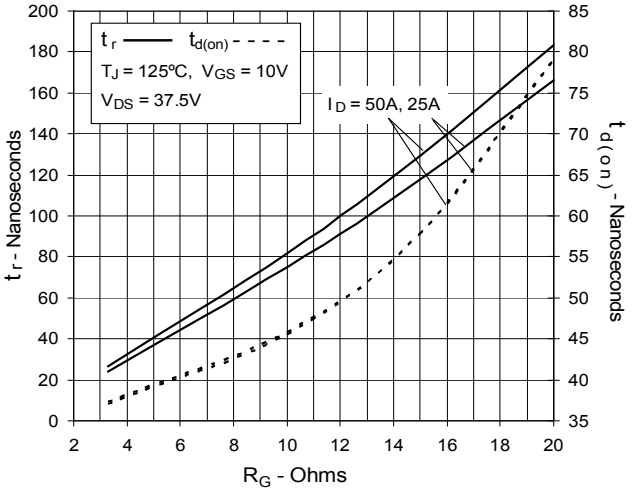



**Fig. 16. Resistive Turn-off Switching Times vs. Junction Temperature**

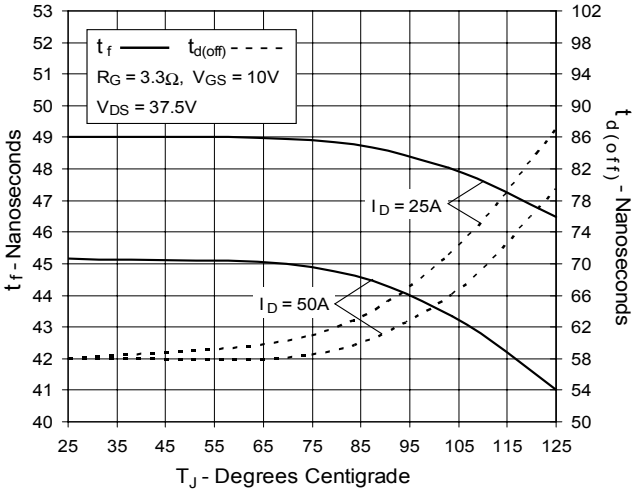



**Fig. 17. Resistive Turn-off Switching Times vs. Drain Current**

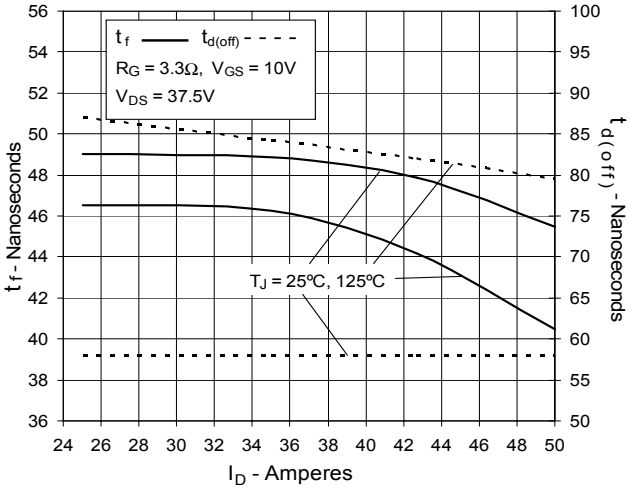



**Fig. 18. Resistive Turn-off Switching Times vs. Gate Resistance**