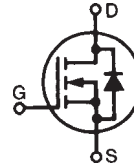


# TrenchMV™ Power MOSFET

**IXTA160N075T**  
**IXTP160N075T**

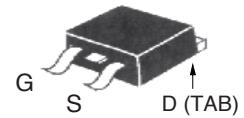
$$\begin{aligned} V_{DSS} &= 75 \text{ V} \\ I_{D25} &= 160 \text{ A} \\ R_{DS(on)} &\leq 6.0 \text{ m}\Omega \end{aligned}$$

N-Channel Enhancement Mode  
Avalanche Rated

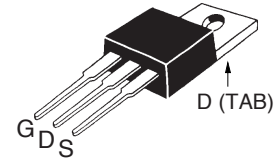


| Symbol     | Test Conditions                                                                                                                       | Maximum Ratings |                  |
|------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C}$ 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                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                                                                              | 160             | A                |
| $I_{LRMS}$ | Lead 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                |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                                                                                              | 750             | mJ               |
| $dv/dt$    | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$<br>$T_J \leq 175^\circ\text{C}$ , $R_G = 5 \Omega$ | 3               | V/ns             |
| $P_D$      | $T_C = 25^\circ\text{C}$                                                                                                              | 360             | 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             | $^\circ\text{C}$ |
| $M_d$      | Mounting torque (TO-3P, TO-220)                                                                                                       | 1.13 / 10       | Nm/lb.in.        |
| Weight     | TO-220                                                                                                                                | 3               | g                |
|            | TO-263                                                                                                                                | 2.5             | g                |

TO-263 (IXTA)



TO-220 (IXTP)



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  $^\circ\text{C}$  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                |
| $I_{GSS}$    | $V_{GS} = \pm 20 \text{ V}$ , $V_{DS} = 0 \text{ V}$                      |                       |      | $\pm 200 \text{ nA}$ |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$                                                        |                       |      | 5 $\mu\text{A}$      |
|              | $V_{GS} = 0 \text{ V}$ $T_J = 150^\circ\text{C}$                          |                       |      | 250 $\mu\text{A}$    |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 25 \text{ A}$ , Notes 1, 2               | 5.1                   | 6.0  | 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                                  | 65                    | 100  | S         |
| <b>C<sub>iss</sub></b>                             | V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz                               |                       | 4950 | pF        |
| <b>C<sub>oss</sub></b>                             |                                                                                        |                       | 790  | pF        |
| <b>C<sub>rss</sub></b>                             |                                                                                        |                       | 145  | pF        |
| <b>t<sub>d(on)</sub></b>                           | <b>Resistive Switching Times</b>                                                       |                       | 29   | ns        |
| <b>t<sub>r</sub></b>                               | V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 0.5 V <sub>DSS</sub> , I <sub>D</sub> = 25 A |                       | 64   | ns        |
| <b>t<sub>d(off)</sub></b>                          | R <sub>G</sub> = 5 Ω (External)                                                        |                       | 60   | ns        |
| <b>t<sub>f</sub></b>                               |                                                                                        |                       | 60   | 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 |                       | 112  | nC        |
| <b>Q<sub>gs</sub></b>                              |                                                                                        |                       | 30   | nC        |
| <b>Q<sub>gd</sub></b>                              |                                                                                        |                       | 30   | nC        |
| <b>R<sub>thJC</sub></b>                            | TO-220                                                                                 |                       |      | 0.42 °C/W |
| <b>R<sub>thCH</sub></b>                            |                                                                                        |                       | 0.50 | °C/W      |

## Source-Drain Diode

| Symbol                                            | Test Conditions                                                                          | Characteristic Values |      |       |
|---------------------------------------------------|------------------------------------------------------------------------------------------|-----------------------|------|-------|
|                                                   |                                                                                          | Min.                  | Typ. | Max.  |
| T <sub>J</sub> = 25°C unless otherwise specified) |                                                                                          |                       |      |       |
| I <sub>S</sub>                                    | V <sub>GS</sub> = 0 V                                                                    |                       |      | 160 A |
| I <sub>SM</sub>                                   | Pulse width limited by T <sub>JM</sub>                                                   |                       |      | 430 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    |

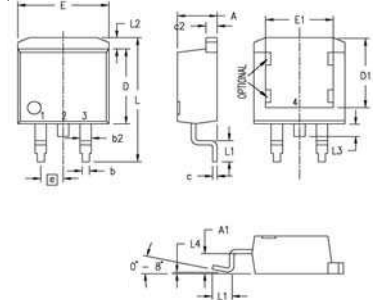
- Notes: 1. Pulse test,  $t \leq 300\ \mu\text{s}$ , duty cycle  $d \leq 2\%$ ;  
2. On through-hole packages,  $R_{DS(on)}$  Kelvin test contact location must be 5 mm or less from the package body.

**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.

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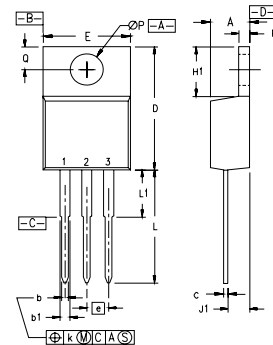
## TO-263 (IXTA) Outline



Pins: 1 - Gate 2 - Drain  
3 - Source 4, TAB - Drain

| Dim. | Millimeter |       | Inches |      |
|------|------------|-------|--------|------|
|      | Min.       | Max.  | Min.   | Max. |
| A    | 4.06       | 4.83  | .160   | .190 |
| A1   | 2.03       | 2.79  | .080   | .110 |
| b    | 0.51       | 0.99  | .020   | .039 |
| b2   | 1.14       | 1.40  | .045   | .055 |
| c    | 0.46       | 0.74  | .018   | .029 |
| c2   | 1.14       | 1.40  | .045   | .055 |
| D    | 8.64       | 9.65  | .340   | .380 |
| D1   | 7.11       | 8.13  | .280   | .320 |
| E    | 9.65       | 10.29 | .380   | .405 |
| E1   | 6.86       | 8.13  | .270   | .320 |
| e    | 2.54       | BSC   | .100   | BSC  |
| L    | 14.61      | 15.88 | .575   | .625 |
| L1   | 2.29       | 2.79  | .090   | .110 |
| L2   | 1.02       | 1.40  | .040   | .055 |
| L3   | 1.27       | 1.78  | .050   | .070 |
| L4   | 0          | 0.38  | 0      | .015 |
| R    | 0.46       | 0.74  | .018   | .029 |

## TO-220 (IXTP) Outline

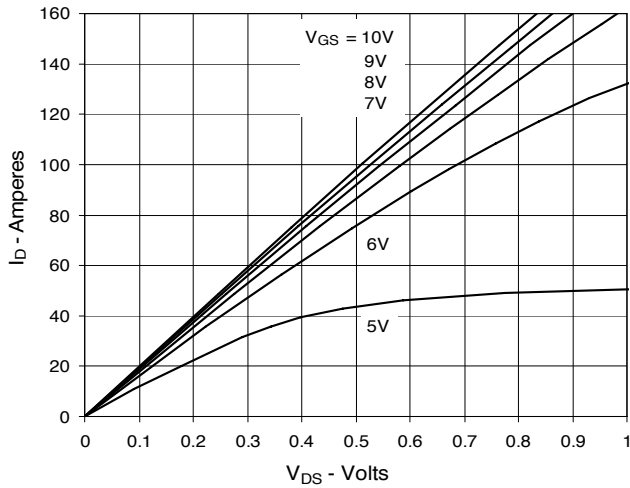


Pins: 1 - Gate 2 - Drain  
3 - Source 4, TAB - Drain

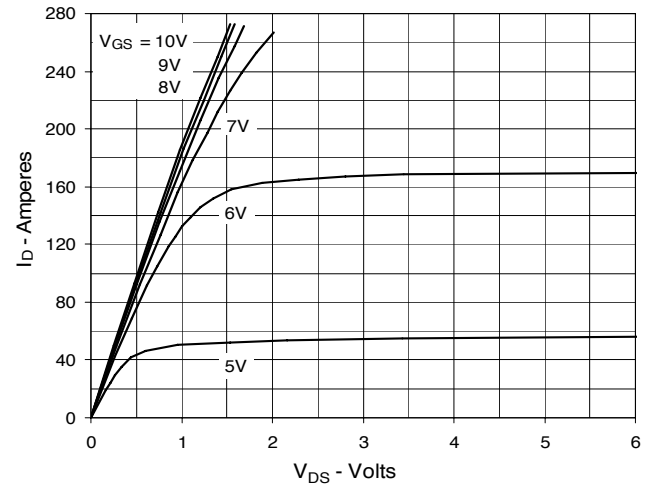
| SYM | INCHES |      | MILLIMETERS |       |
|-----|--------|------|-------------|-------|
|     | MIN    | MAX  | MIN         | MAX   |
| A   | .170   | .190 | 4.32        | 4.83  |
| b   | .025   | .040 | 0.64        | 1.02  |
| b1  | .045   | .065 | 1.15        | 1.65  |
| c   | .014   | .022 | 0.35        | 0.56  |
| D   | .580   | .630 | 14.73       | 16.00 |
| E   | .390   | .420 | 9.91        | 10.66 |
| e   | .100   | BSC  | 2.54        | BSC   |
| F   | .045   | .055 | 1.14        | 1.40  |
| H1  | .230   | .270 | 5.85        | 6.85  |
| J1  | .090   | .110 | 2.29        | 2.79  |
| k   | 0      | .015 | 0           | 0.38  |
| L   | .500   | .550 | 12.70       | 13.97 |
| L1  | .110   | .230 | 2.79        | 5.84  |
| ØP  | .139   | .161 | 3.53        | 4.08  |
| Q   | .100   | .125 | 2.54        | 3.18  |

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

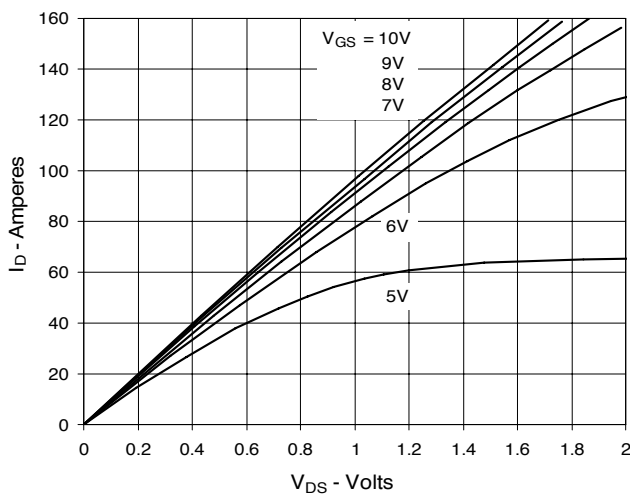
**Fig. 1. Output Characteristics**  
@ 25°C



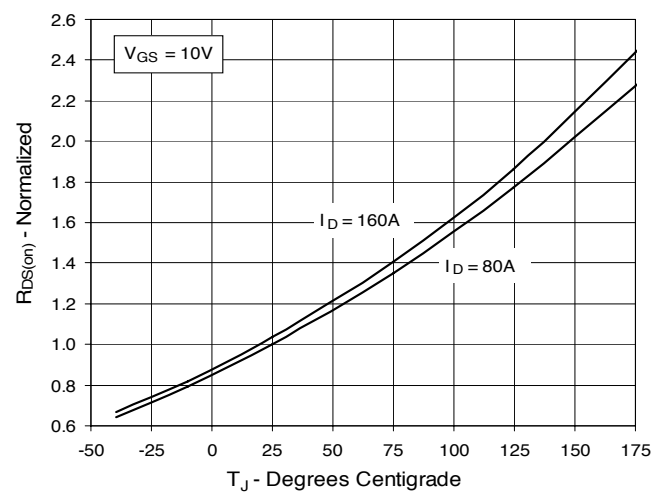
**Fig. 2. Extended Output Characteristics**  
@ 25°C



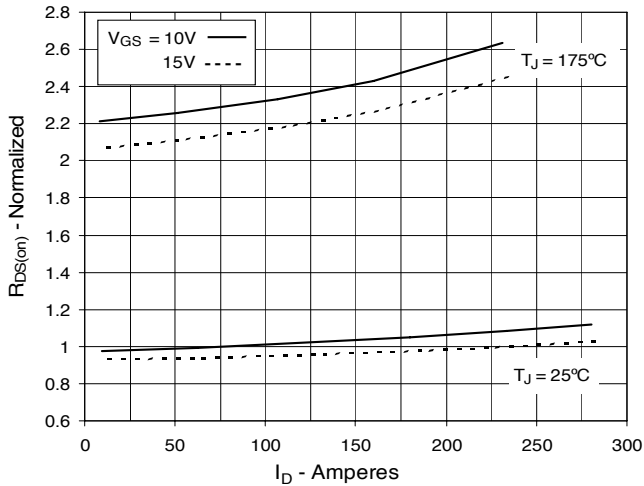
**Fig. 3. Output Characteristics**  
@ 150°C



**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 80A$  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**

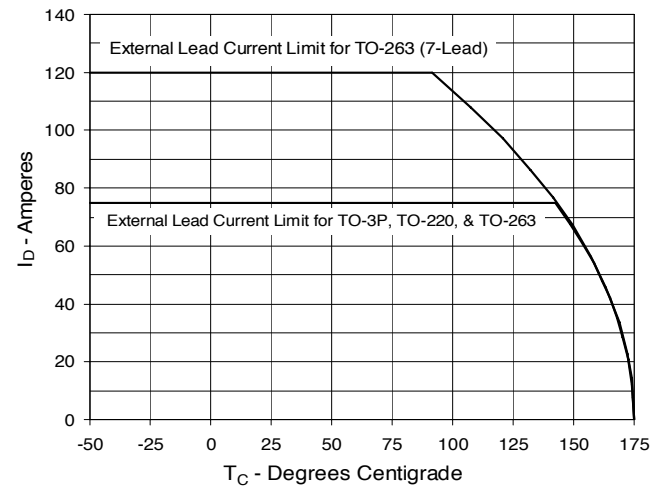


Fig. 7. Input Admittance

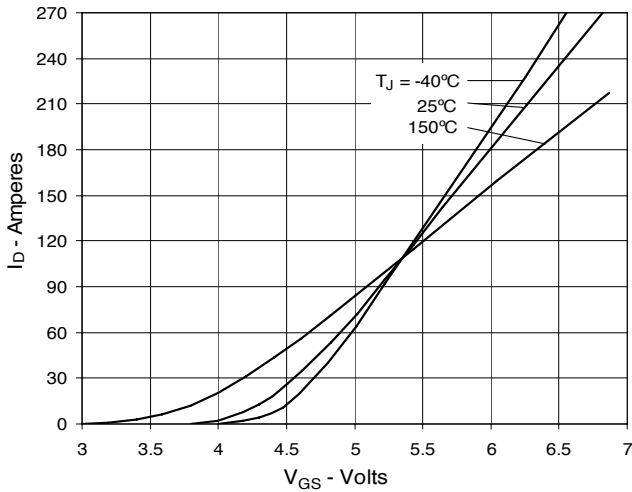


Fig. 8. Transconductance

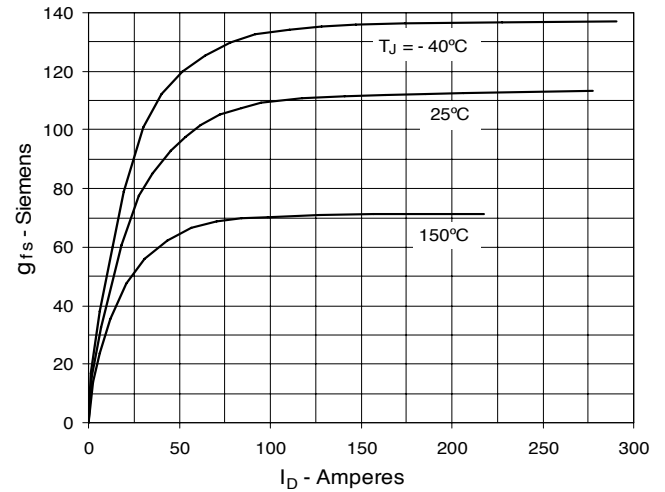


Fig. 9. Forward Voltage Drop of Intrinsic Diode

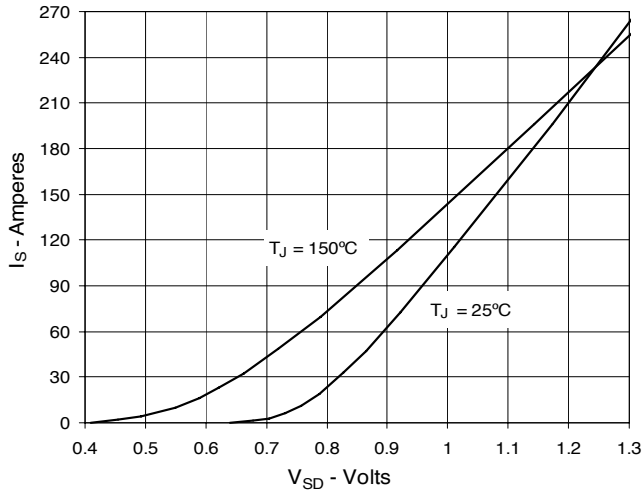


Fig. 10. Gate Charge

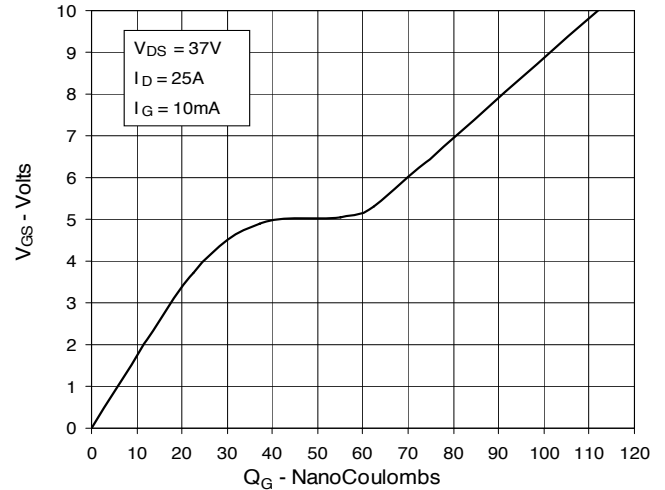


Fig. 11. Capacitance

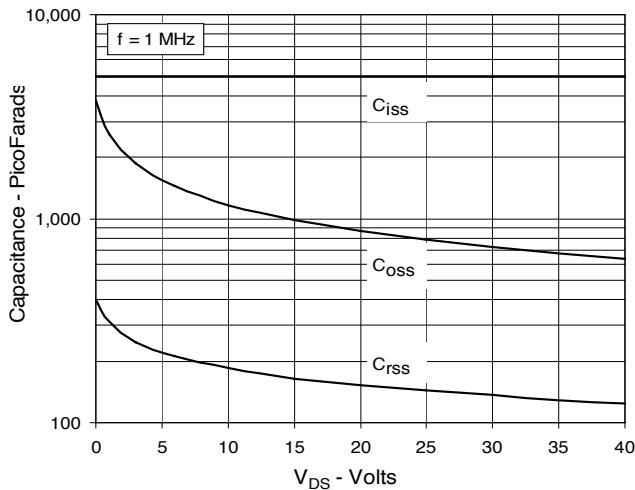
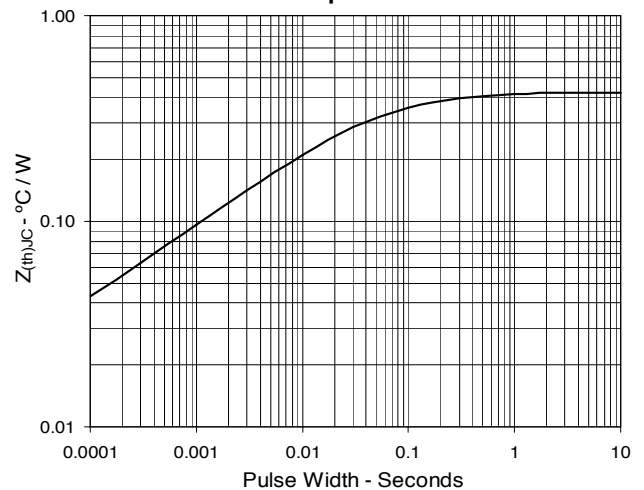
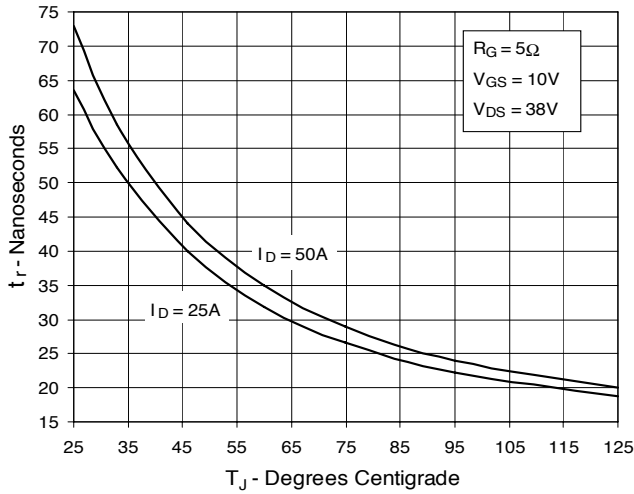


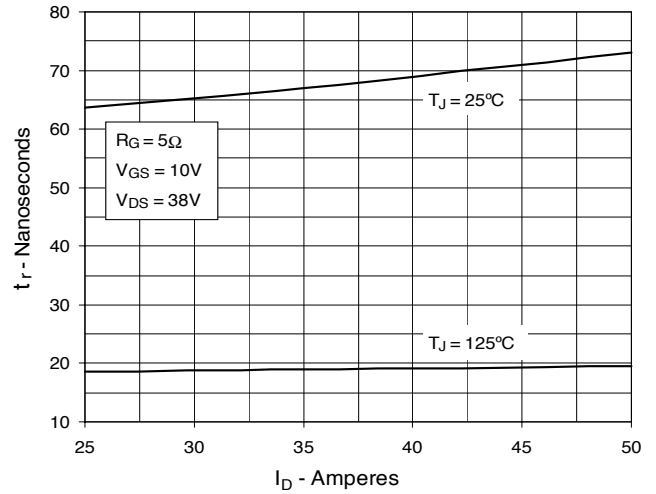
Fig. 12. Maximum Transient Thermal Impedance



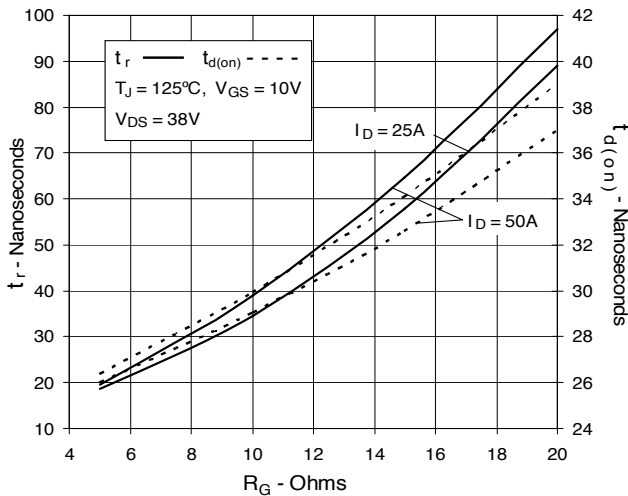
**Fig. 13. Resistive Turn-on**  
**Rise Time vs. Junction Temperature**



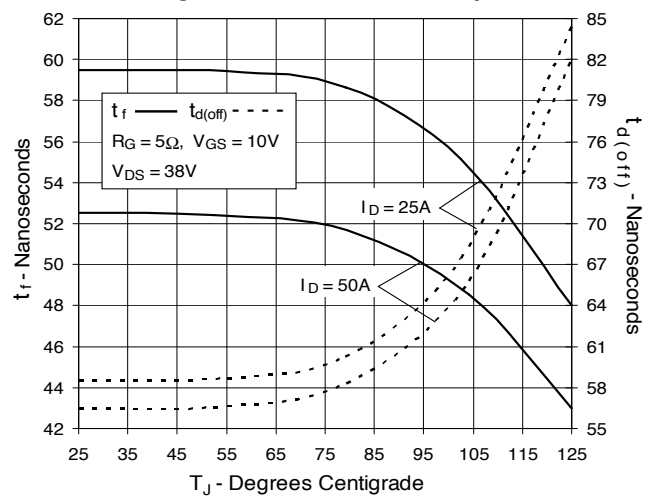
**Fig. 14. Resistive Turn-on**  
**Rise Time vs. Drain Current**



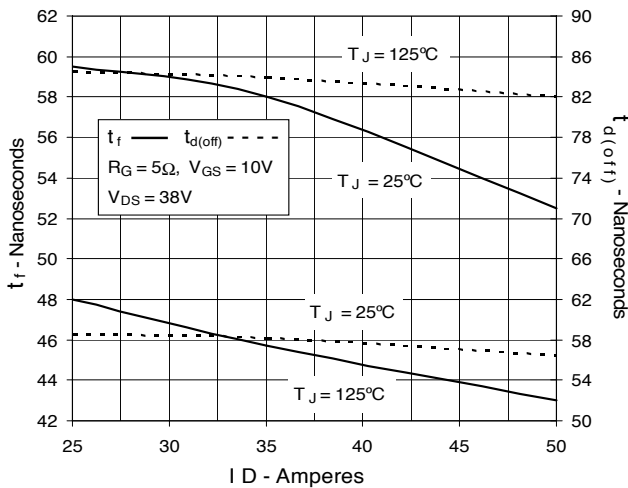
**Fig. 15. Resistive Turn-on**  
**Switching Times vs. Gate Resistance**



**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**

