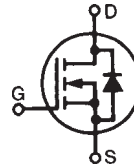


# TrenchMV™ Power MOSFET

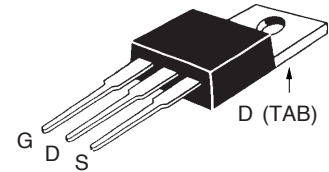
**IXTP55N075T**  
**IXTY55N075T**

$$\begin{aligned} V_{DSS} &= 75 \text{ V} \\ I_{D25} &= 55 \text{ A} \\ R_{DS(on)} &\leq 19.5 \text{ m}\Omega \end{aligned}$$

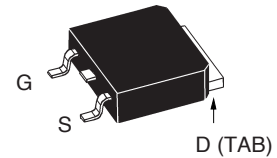
N-Channel Enhancement Mode  
Avalanche Rated



TO-220 (IXTP)



TO-252 (IXTY)



G = Gate  
S = Source  
D = Drain  
TAB = Drain

| 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                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                                                                               | 55              | A                |
| $I_L$      | Package Current Limit, RMS TO-252                                                                                                      | 25              | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                             | 150             | A                |
| $I_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                               | 10              | A                |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                                                                                               | 250             | mJ               |
| $dv/dt$    | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$<br>$T_J \leq 175^\circ\text{C}$ , $R_G = 18 \Omega$ | 3               | V/ns             |
| $P_D$      | $T_C = 25^\circ\text{C}$                                                                                                               | 130             | 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-220)                                                                                                               | 1.13 / 10       | Nm/lb.in.        |
| Weight     | TO-220                                                                                                                                 | 3               | g                |
|            | TO-252                                                                                                                                 | 0.35            | g                |

| 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                     |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 25 \mu\text{A}$                                | 2.0                   |      | 4.0 V                 |
| $I_{GSS}$    | $V_{GS} = \pm 20 \text{ V}$ , $V_{DS} = 0 \text{ V}$                      |                       |      | $\pm 100 \text{ nA}$  |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$                                                        |                       |      | 1 $\mu\text{A}$       |
|              | $V_{GS} = 0 \text{ V}$ $T_J = 150^\circ\text{C}$                          |                       |      | 100 $\mu\text{A}$     |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 0.5 I_{D25}$ , Notes 1, 2                |                       |      | 19.5 $\text{m}\Omega$ |

## 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

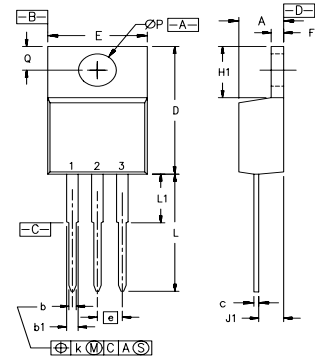
- Automotive
  - Motor Drives
  - 42V Power Bus
  - ABS Systems
- DC/DC Converters and Off-line UPS
- Primary Switch for 24V and 48V Systems
- High Current Switching Applications

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified)                        | Characteristic Values |          |      |
|--------------|--------------------------------------------------------------------------------------------------|-----------------------|----------|------|
|              |                                                                                                  | Min.                  | Typ.     | Max. |
| $g_{fs}$     | $V_{DS} = 10\text{ V}; I_D = 0.5 I_{D25}, \text{ Note 1}$                                        | 16                    | 27       | S    |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                    |                       | 1400     | pF   |
| $C_{oss}$    |                                                                                                  |                       | 235      | pF   |
| $C_{rss}$    |                                                                                                  |                       | 123      | pF   |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 10\text{ A}$<br>$R_G = 18\ \Omega$ (External) |                       | 20       | ns   |
| $t_r$        |                                                                                                  |                       | 50       | ns   |
| $t_{d(off)}$ |                                                                                                  |                       | 44       | ns   |
| $t_f$        |                                                                                                  |                       | 41       | ns   |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 10\text{ A}$                                  |                       | 33       | nC   |
| $Q_{gs}$     |                                                                                                  |                       | 10       | nC   |
| $Q_{gd}$     |                                                                                                  |                       | 9        | nC   |
| $R_{thJC}$   | TO-220                                                                                           | 0.5                   | 1.15°C/W |      |
| $R_{thCS}$   |                                                                                                  |                       |          |      |

#### Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified)                          | Characteristic Values |      |       |
|----------|----------------------------------------------------------------------------------------------------|-----------------------|------|-------|
|          |                                                                                                    | Min.                  | Typ. | Max.  |
| $I_S$    | $V_{GS} = 0\text{ V}$                                                                              |                       |      | 55 A  |
| $I_{SM}$ | Repetitive                                                                                         |                       |      | 150 A |
| $V_{SD}$ | $I_F = 25\text{ A}, V_{GS} = 0\text{ V}, \text{ Note 1}$                                           |                       |      | 1.2 V |
| $t_{rr}$ | $I_F = 25\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}$<br>$V_R = 40\text{ V}, V_{GS} = 0\text{ V}$ |                       | 50   | ns    |

#### TO-220 (IXTP) Outline



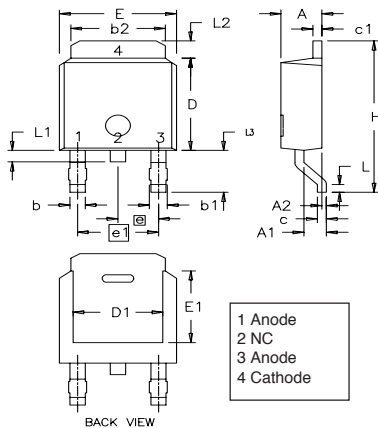
Pins: 1 - Gate 2 - Drain  
3 - Source 4, TAB - Drain

| 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  |

#### Notes:

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

#### TO-252 (IXTY) Outline



| Dim. | Millimeter |       | Inches    |       |
|------|------------|-------|-----------|-------|
|      | Min.       | Max.  | Min.      | Max.  |
| A    | 2.19       | 2.38  | 0.086     | 0.094 |
| A1   | 0.89       | 1.14  | 0.035     | 0.045 |
| A2   | 0          | 0.13  | 0         | 0.005 |
| b    | 0.64       | 0.89  | 0.025     | 0.035 |
| b1   | 0.76       | 1.14  | 0.030     | 0.045 |
| b2   | 5.21       | 5.46  | 0.205     | 0.215 |
| c    | 0.46       | 0.58  | 0.018     | 0.023 |
| c1   | 0.46       | 0.58  | 0.018     | 0.023 |
| D    | 5.97       | 6.22  | 0.235     | 0.245 |
| D1   | 4.32       | 5.21  | 0.170     | 0.205 |
| E    | 6.35       | 6.73  | 0.250     | 0.265 |
| E1   | 4.32       | 5.21  | 0.170     | 0.205 |
| e    | 2.28 BSC   |       | 0.090 BSC |       |
| e1   | 4.57 BSC   |       | 0.180 BSC |       |
| H    | 9.40       | 10.42 | 0.370     | 0.410 |
| L    | 0.51       | 1.02  | 0.020     | 0.040 |
| L1   | 0.64       | 1.02  | 0.025     | 0.040 |
| L2   | 0.89       | 1.27  | 0.035     | 0.050 |
| L3   | 2.54       | 2.92  | 0.100     | 0.115 |

#### 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    |

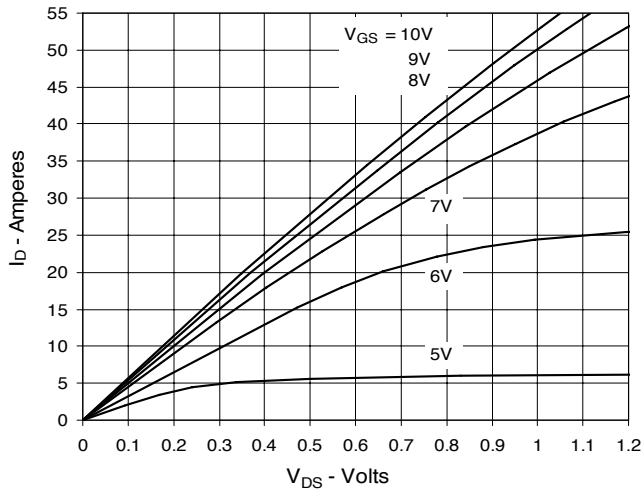
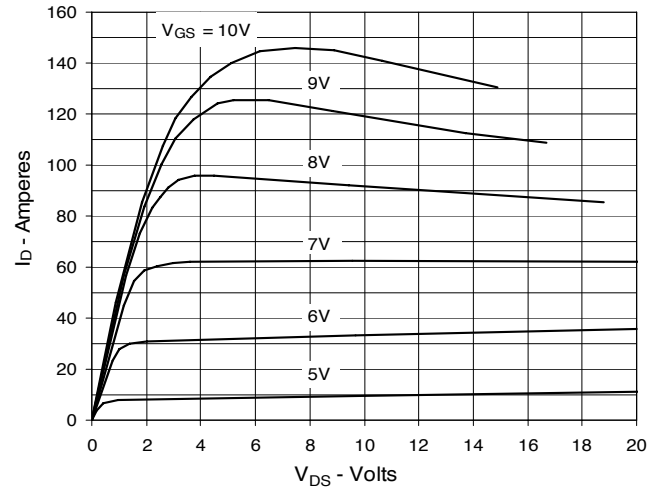
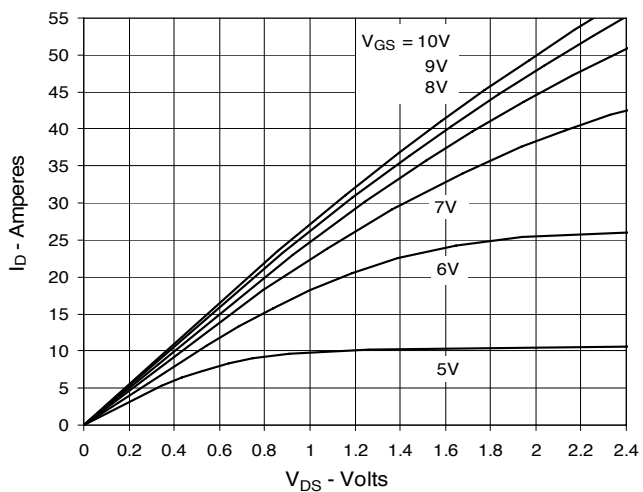
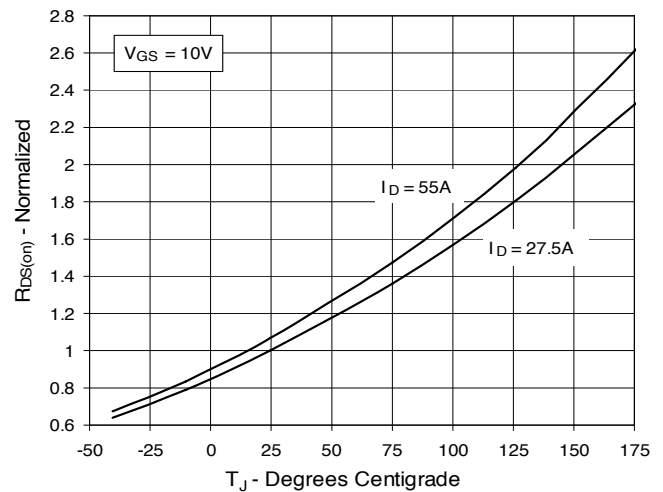
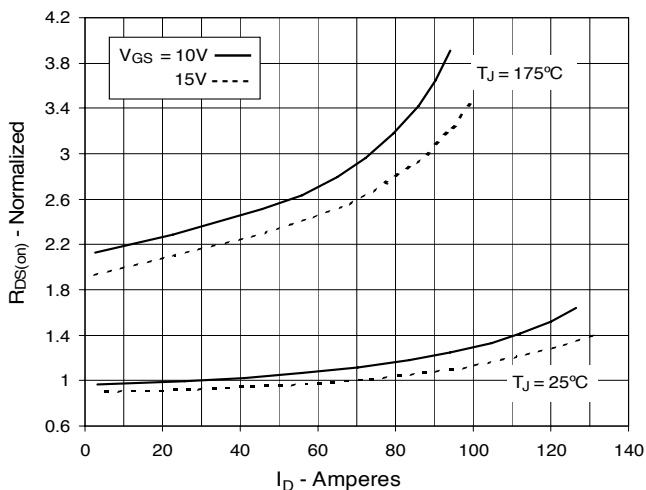
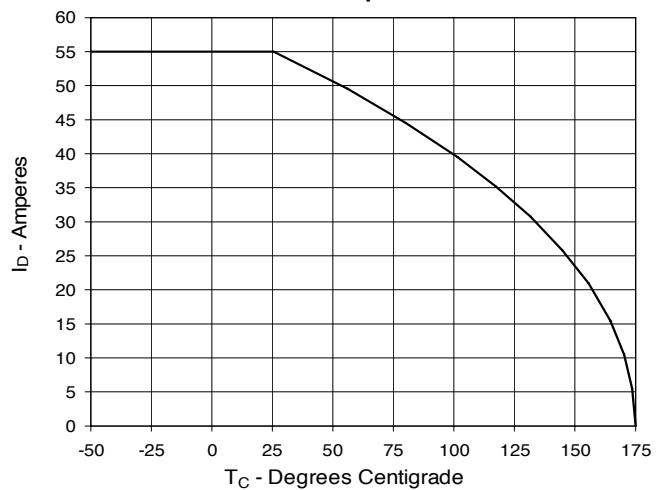
**Fig. 1. Output Characteristics**  
**@ 25°C**

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

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

**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 27.5A$  Value**  
**vs. Junction Temperature**

**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 27.5A$  Value**  
**vs. Drain Current**

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


Fig. 7. Input Admittance

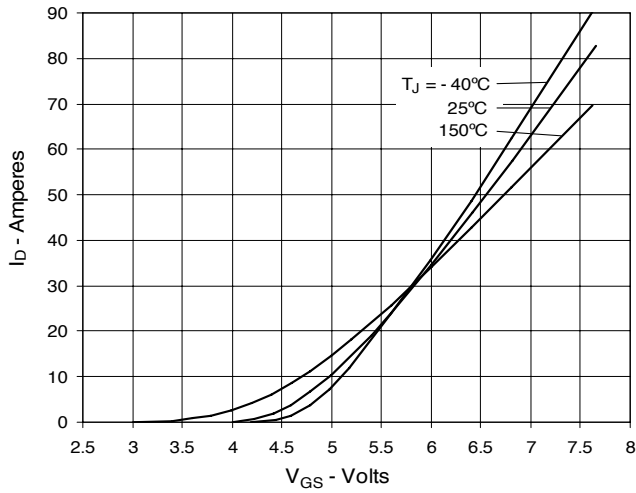


Fig. 8. Transconductance

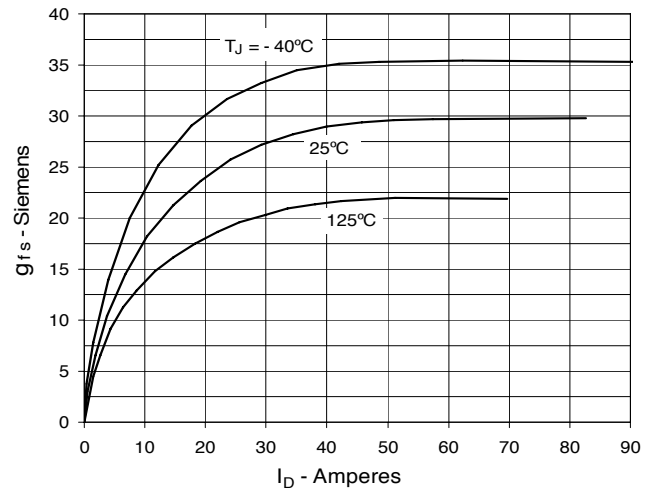


Fig. 9. Forward Voltage Drop of Intrinsic Diode

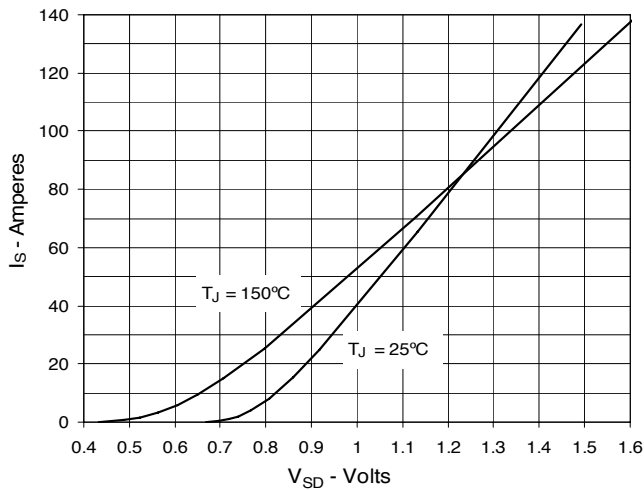


Fig. 10. Gate Charge

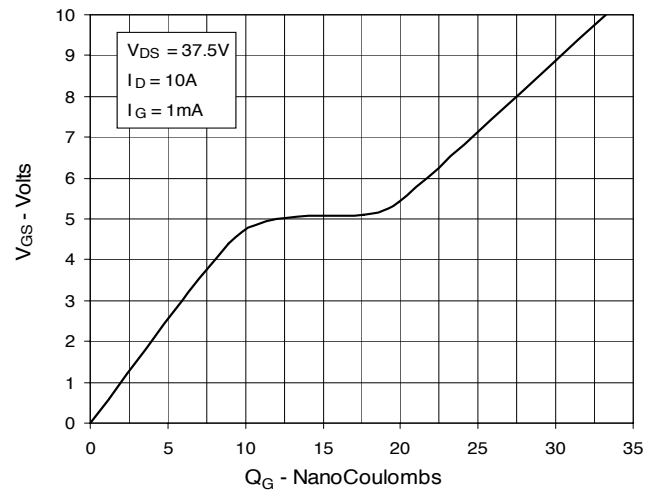


Fig. 11. Capacitance

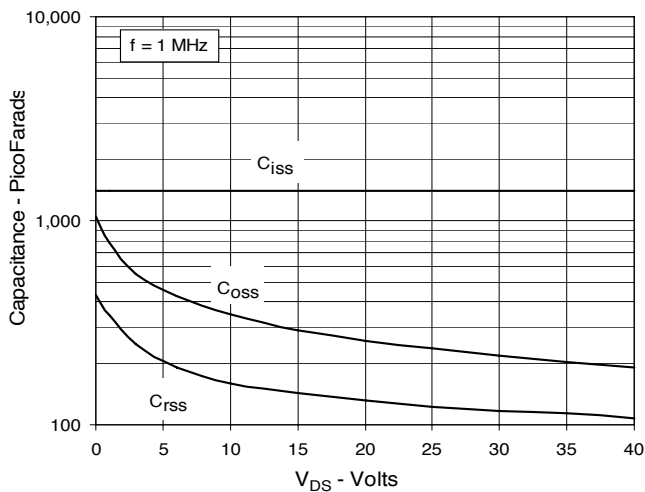
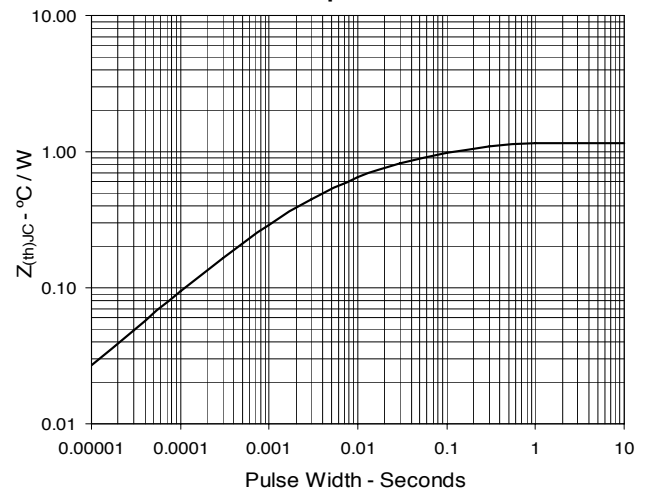
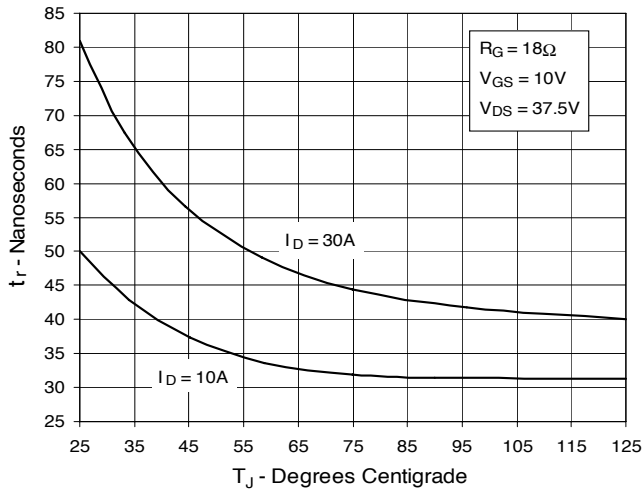


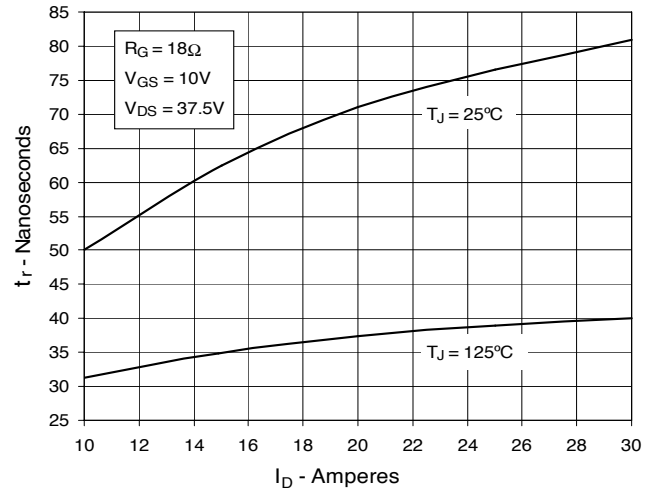
Fig. 12. Maximum Transient Thermal Impedance



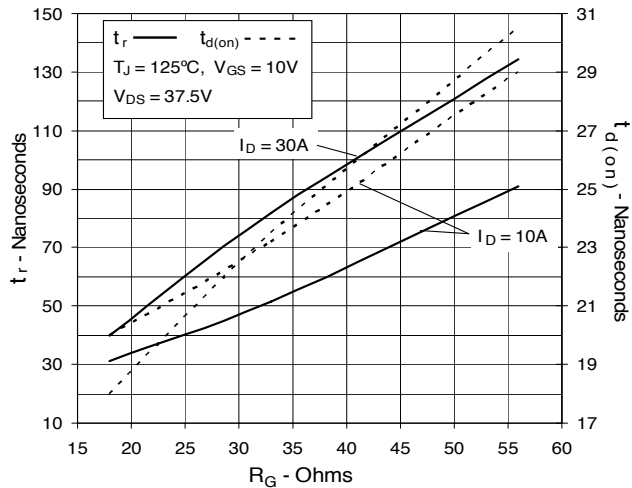
**Fig. 13. Resistive Turn-on**  
**Rise Time vs. Junction Temperature**



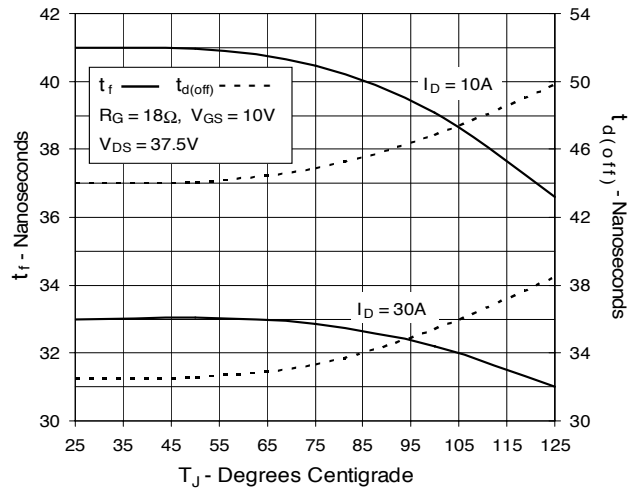
**Fig. 14. Resistive Turn-on**  
**Rise Time vs. Drain Current**



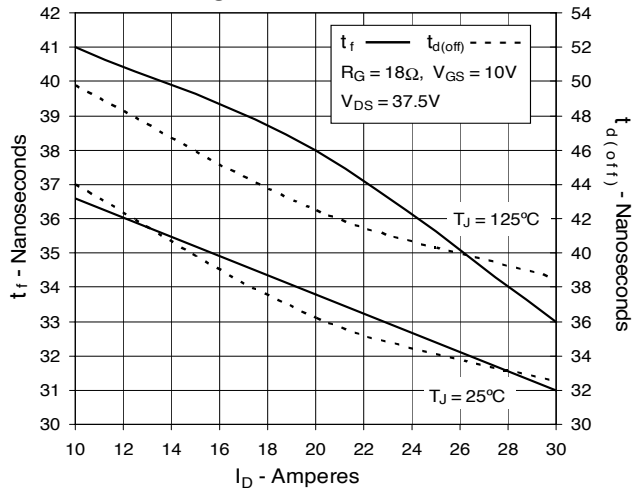
**Fig. 15. Resistive Turn-on**  
**Switching Times vs. Gate Resistance**



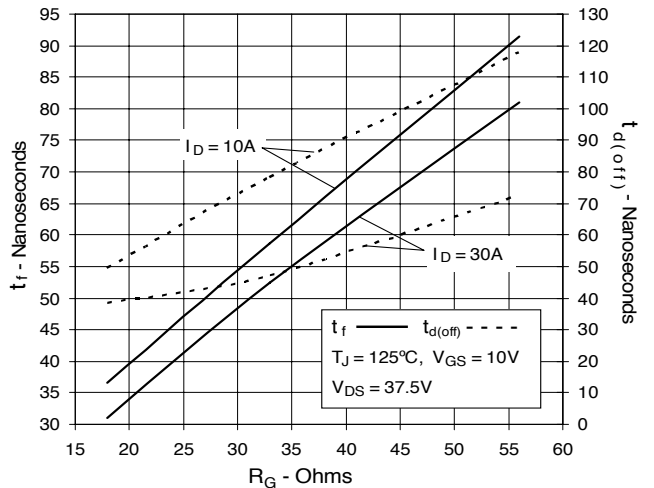
**Fig. 16. Resistive Turn-off**  
**Switching Times vs. Junction Temperature**



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



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





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