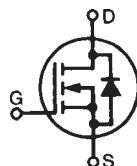


## TrenchMV™ Power MOSFET

**IXTA130N10T**  
**IXTP130N10T**

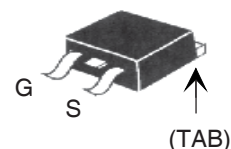
N-Channel Enhancement Mode  
Avalanche Rated



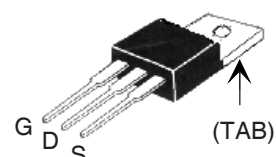
$$\begin{aligned} V_{DSS} &= 100V \\ I_{D25} &= 130A \\ R_{DS(on)} &\leq 9.1m\Omega \end{aligned}$$

| 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 $175^\circ\text{C}$ , $R_{GS} = 1M\Omega$ | 100             | V                |
| $V_{GSM}$  | Transient                                                             | $\pm 30$        | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                              | 130             | A                |
| $I_{LRMS}$ | Lead Current Limit, RMS                                               | 75              | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$            | 350             | A                |
| $I_A$      | $T_C = 25^\circ\text{C}$                                              | 65              | A                |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                              | 500             | mJ               |
| $P_D$      | $T_C = 25^\circ\text{C}$                                              | 360             | W                |
| $T_J$      |                                                                       | -55 ... +175    | $^\circ\text{C}$ |
| $T_{JM}$   |                                                                       | 175             | $^\circ\text{C}$ |
| $T_{stg}$  |                                                                       | -55 ... +175    | $^\circ\text{C}$ |
| $T_L$      | 1.6mm (0.062 in.) from case for 10s                                   | 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                                                                | 3.0             | 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
- 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.                                 |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu\text{A}$                                    | 100                   |      | V                                    |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250\mu\text{A}$                                | 2.5                   |      | 4.5 V                                |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$                                        |                       |      | $\pm 200$ nA                         |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0V$ $T_J = 150^\circ\text{C}$             |                       |      | 5 $\mu\text{A}$<br>250 $\mu\text{A}$ |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 25A$ , Notes 1, 2                                 |                       |      | 9.1 m $\Omega$                       |

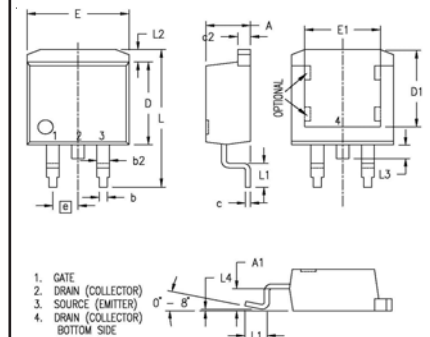
| Symbol                                             | Test Conditions                                                                                                                                              | Characteristic Values |      |           |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-----------|
| (T <sub>J</sub> = 25°C unless otherwise specified) |                                                                                                                                                              | Min.                  | Typ. | Max.      |
| <b>g<sub>fs</sub></b>                              | V <sub>DS</sub> = 10V, I <sub>D</sub> = 60A, Note 1                                                                                                          | 55                    | 93   | S         |
| <b>C<sub>iss</sub></b>                             | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 25V, f = 1MHz                                                                                                        |                       | 5080 | pF        |
| <b>C<sub>oss</sub></b>                             |                                                                                                                                                              |                       | 635  | pF        |
| <b>C<sub>rss</sub></b>                             |                                                                                                                                                              |                       | 95   | pF        |
| <b>t<sub>d(on)</sub></b>                           | <b>Resistive Switching Times</b><br>V <sub>GS</sub> = 10V, V <sub>DS</sub> = 0.5 • V <sub>DSS</sub> , I <sub>D</sub> = 25A<br>R <sub>G</sub> = 5Ω (External) |                       | 30   | ns        |
| <b>t<sub>r</sub></b>                               |                                                                                                                                                              |                       | 47   | ns        |
| <b>t<sub>d(off)</sub></b>                          |                                                                                                                                                              |                       | 44   | ns        |
| <b>t<sub>f</sub></b>                               |                                                                                                                                                              |                       | 28   | ns        |
| <b>Q<sub>g(on)</sub></b>                           | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 0.5 • V <sub>DSS</sub> , I <sub>D</sub> = 25A                                                                       |                       | 104  | nC        |
| <b>Q<sub>gs</sub></b>                              |                                                                                                                                                              |                       | 30   | nC        |
| <b>Q<sub>gd</sub></b>                              |                                                                                                                                                              |                       | 29   | nC        |
| <b>R<sub>thJC</sub></b>                            | TO-220                                                                                                                                                       |                       | 0.50 | 0.42 °C/W |
| <b>R<sub>thCH</sub></b>                            |                                                                                                                                                              |                       |      | °C/W      |

#### Source-Drain Diode

| Symbol                                             | Test Conditions                                                                                                            | Characteristic Values |      |       |
|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-------|
| (T <sub>J</sub> = 25°C unless otherwise specified) |                                                                                                                            | Min.                  | Typ. | Max.  |
| <b>I<sub>S</sub></b>                               | V <sub>GS</sub> = 0V                                                                                                       |                       |      | 130 A |
| <b>I<sub>SM</sub></b>                              | Pulse width limited by T <sub>JM</sub>                                                                                     |                       |      | 350 A |
| <b>V<sub>SD</sub></b>                              | I <sub>F</sub> = 25A, V <sub>GS</sub> = 0V, Note 1                                                                         |                       |      | 1.0 V |
| <b>t<sub>rr</sub></b>                              | I <sub>F</sub> = 0.5 • I <sub>S</sub> , -di/dt = 100A/μs<br>V <sub>R</sub> = 0.5 • V <sub>DSS</sub> , V <sub>GS</sub> = 0V |                       | 67   | ns    |
| <b>I<sub>RM</sub></b>                              |                                                                                                                            |                       | 4.7  | A     |
| <b>Q<sub>rr</sub></b>                              |                                                                                                                            |                       | 160  | nC    |

Notes: 1. Pulse test, t ≤ 300 μs; duty cycle, d ≤ 2%.  
2. On through-hole packages, R<sub>DS(on)</sub> Kelvin test contact location must be 5 mm or less from the package body.

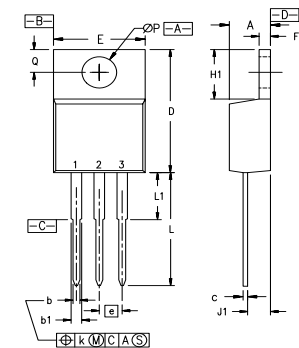
#### TO-263 (IXTA) Outline



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



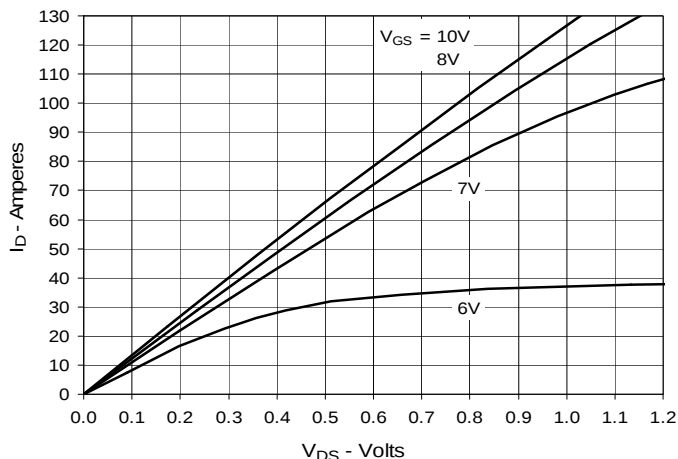
Pins: 1 - Gate 2 - Drain  
3 - Source 4, TAB - Drain

| 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  |

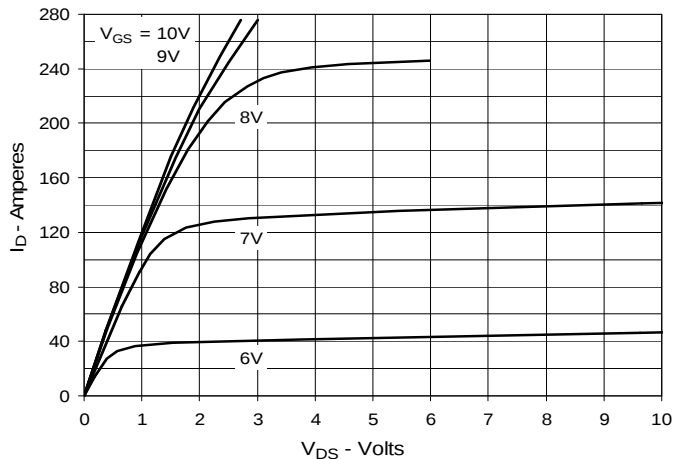
IXYS reserves the right to change limits, test conditions, and dimensions.

|                                                                                  |           |           |           |           |              |              |              |              |              |             |
|----------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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 | 7,157,338B2 |
|                                                                                  | 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    |             |

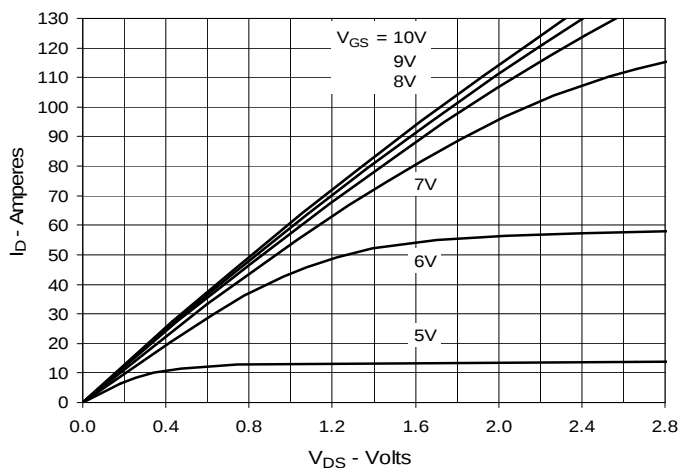
**Fig. 1. Output Characteristics  
@ 25°C**



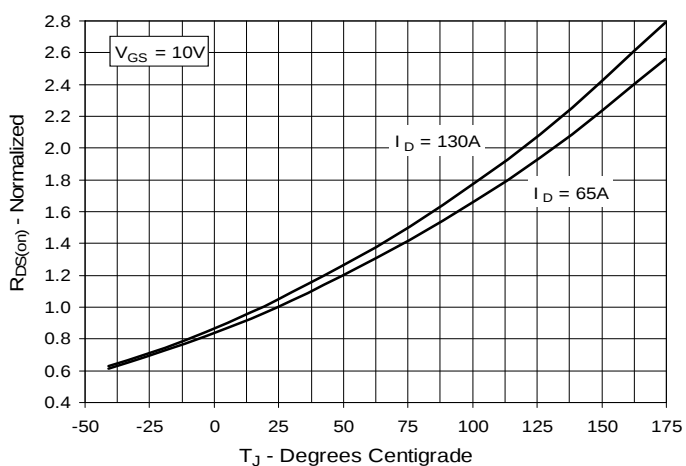
**Fig. 2. Extended Output Characteristics  
@ 25°C**



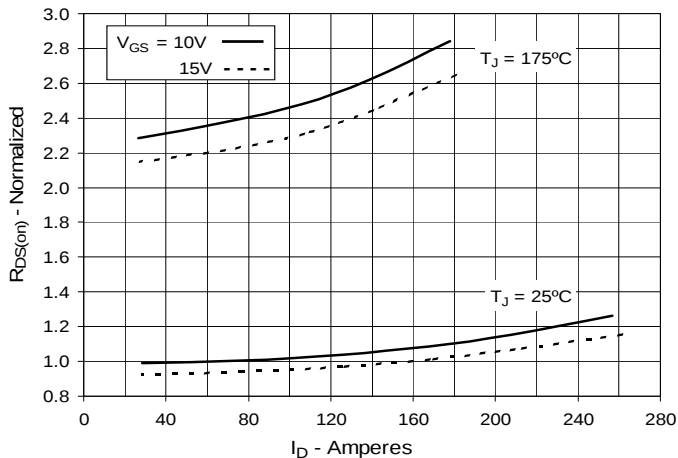
**Fig. 3. Output Characteristics  
@ 150°C**



**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 65A$  Value  
vs. Junction Temperature**



**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 65A$  Value  
vs. Drain Current**



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

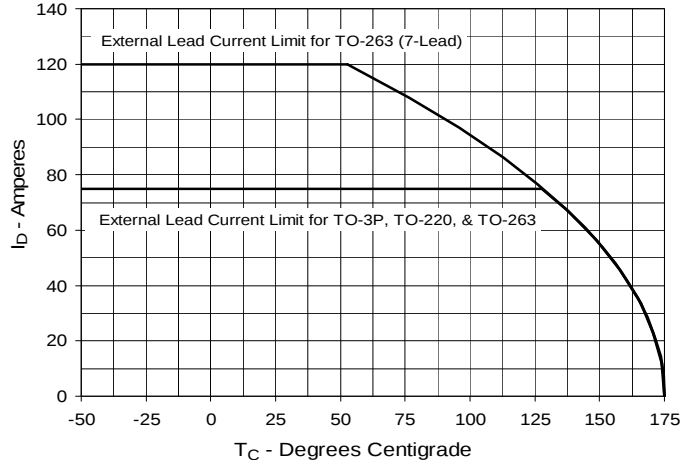


Fig. 7. Input Admittance

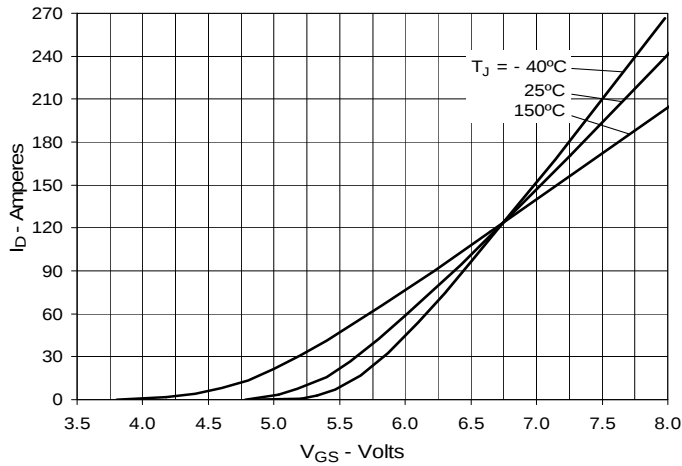


Fig. 8. Transconductance

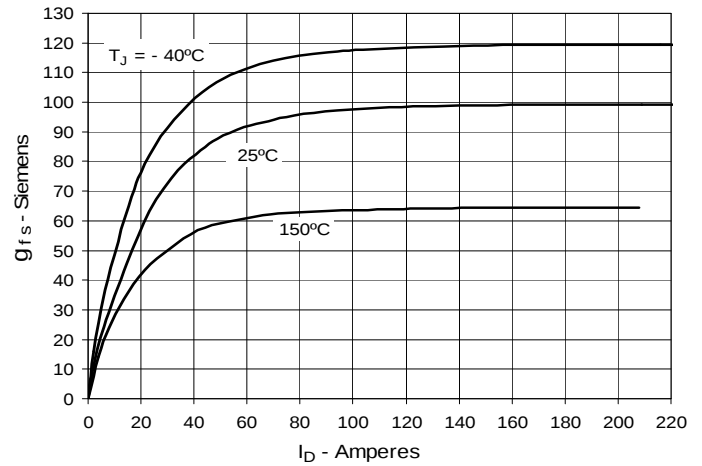


Fig. 9. Forward Voltage Drop of Intrinsic Diode

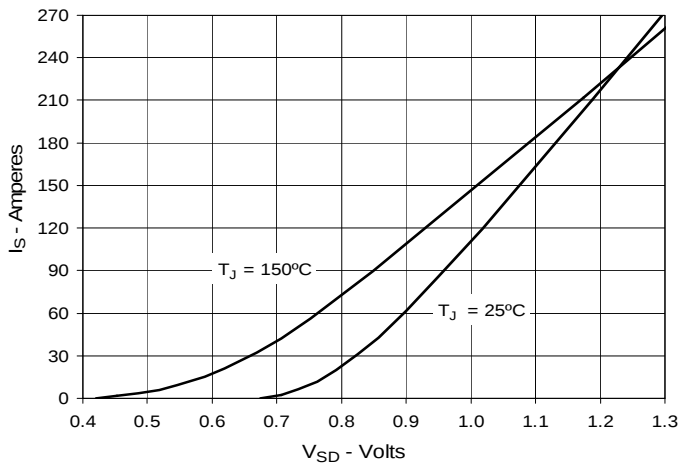


Fig. 10. Gate Charge

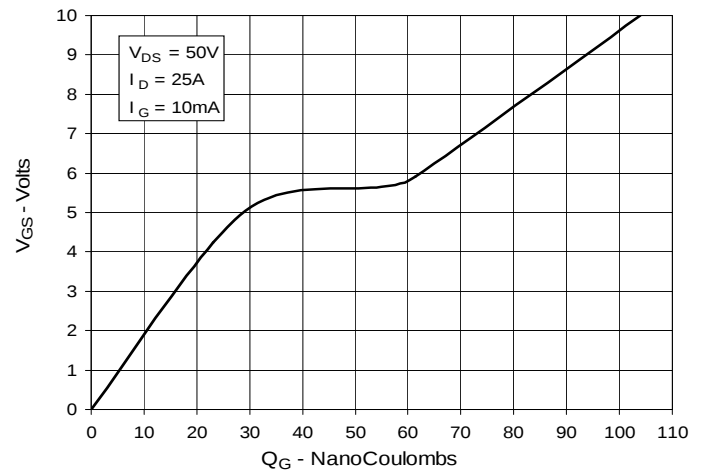


Fig. 11. Capacitance

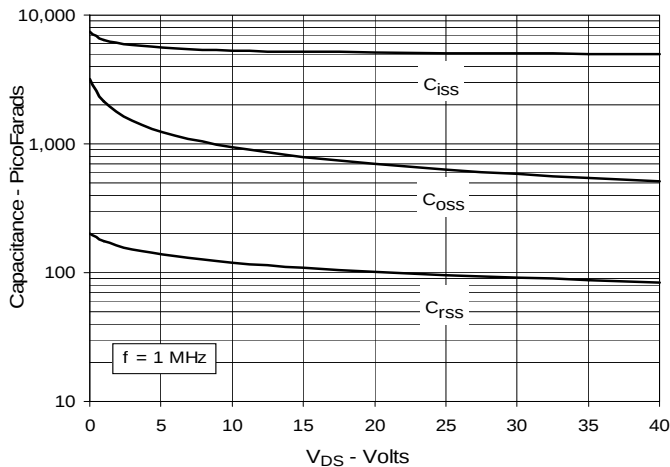
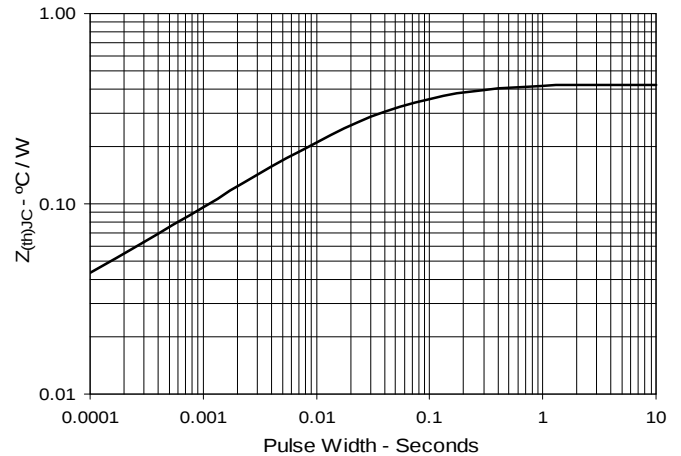
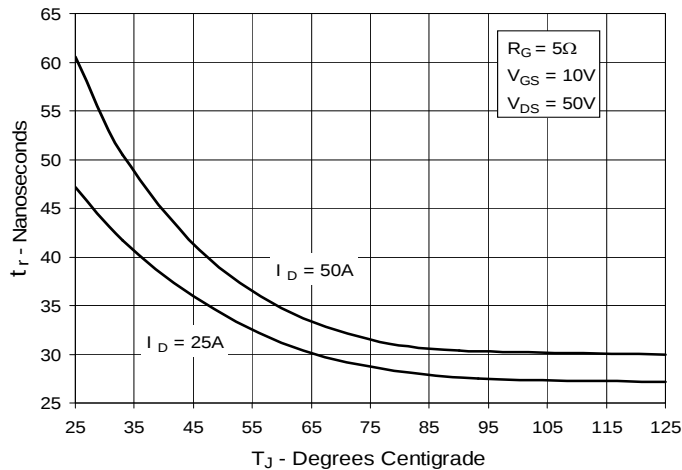


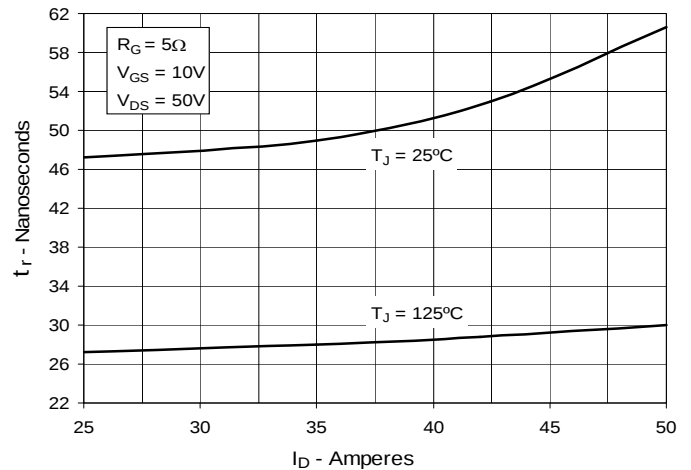
Fig. 12. Maximum Transient Thermal Impedance



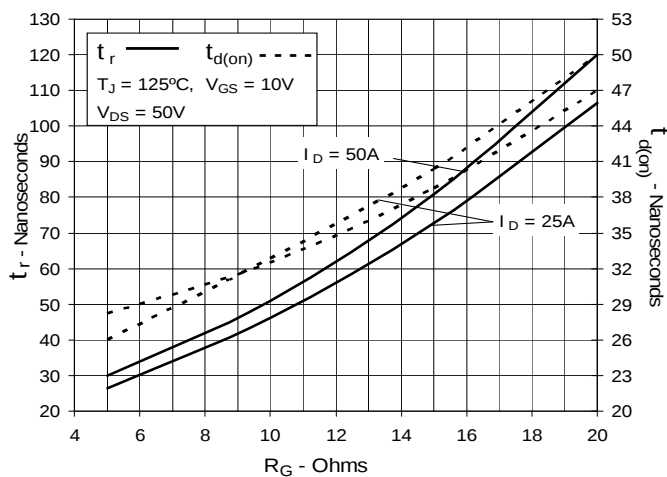
**Fig. 13. Resistive Turn-on  
Rise Time vs. Junction Temperature**



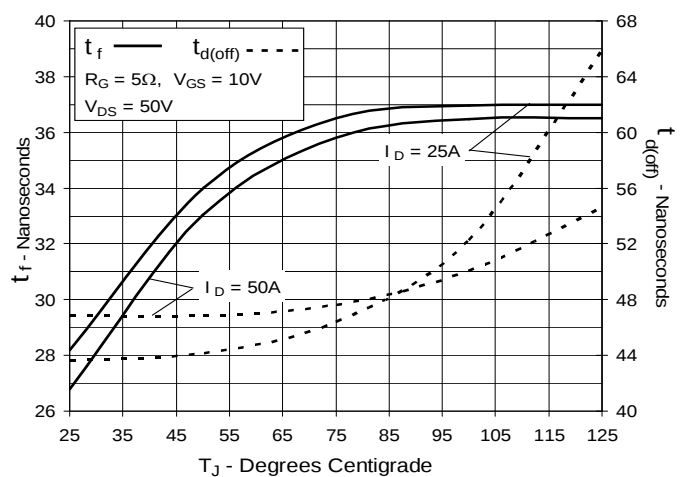
**Fig. 14. Resistive Turn-on  
Rise Time vs. Drain Current**



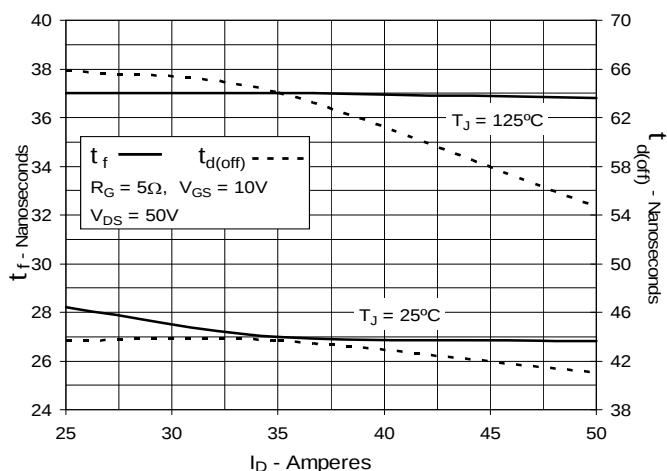
**Fig. 15. Resistive Turn-on  
Switching Times vs. Gate Resistance**



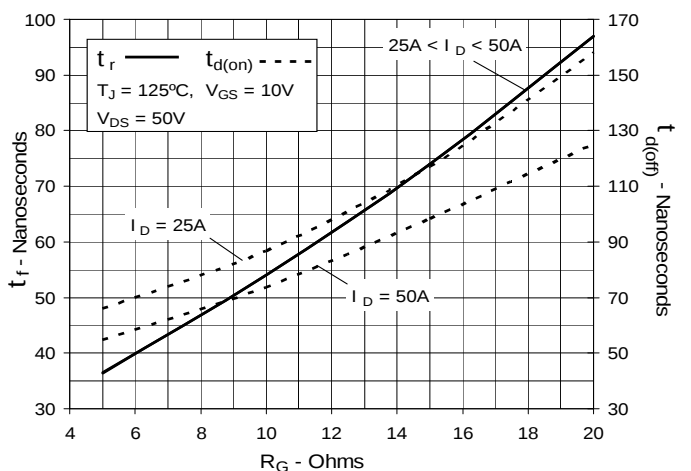
**Fig. 16. Resistive Turn-off  
Switching Times vs. Junction Temperature**



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



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





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