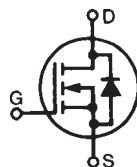


## TrenchMV™ Power MOSFET

**IXTH130N10T**  
**IXTQ130N10T**

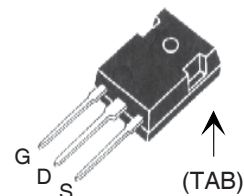
$$\begin{aligned} V_{DSS} &= 100V \\ I_{D25} &= 130A \\ R_{DS(on)} &\leq 9.1m\Omega \end{aligned}$$

N-Channel Enhancement Mode  
Avalanche Rated

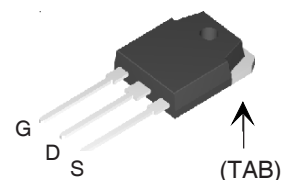


| Symbol     | Test Conditions                                                   | Maximum Ratings |                                      |
|------------|-------------------------------------------------------------------|-----------------|--------------------------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C to } 175^\circ\text{C}$                    | 100             | V                                    |
| $V_{DGR}$  | $T_J = 25^\circ\text{C to } 175^\circ\text{C}, R_{GS} = 1M\Omega$ | 100             | V                                    |
| $V_{GSM}$  | Transient                                                         | $\pm 20$        | 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 $T_{JM}$        | 300             | 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 (0.062in.) from case for 10s<br>Plastic body for 10 seconds | 300<br>260      | $^\circ\text{C}$<br>$^\circ\text{C}$ |
| $M_d$      | Mounting torque (TO-247)(TO-3P)                                   | 1.13 / 10       | Nm/lb.in.                            |
| Weight     | TO-247<br>TO-3P                                                   | 6.0<br>5.5      | g<br>g                               |

TO-247 (IXTH)



TO-3P (IXTQ)



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
  - High Side Switch
  - 12V Battery
  - ABS Systems
- DC/DC Converters and Off-line UPS
- Primary- Side Switch
- High Current Switching Applications

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified) | Characteristic Values |      |                          |
|--------------|---------------------------------------------------------------------------|-----------------------|------|--------------------------|
|              |                                                                           | Min.                  | Typ. | Max.                     |
| $BV_{DSS}$   | $V_{GS} = 0V, I_D = 250\mu A$                                             | 100                   |      | V                        |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu A$                                         | 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 $\mu A$<br>250 $\mu A$ |
| $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 25A$ , Notes 1, 2                                    |                       |      | 9.1 m $\Omega$           |

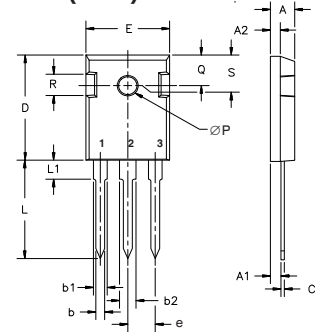
| Symbol                                             | Test Conditions                                                                                                                                              | Characteristic Values |      |           |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-----------|
|                                                    |                                                                                                                                                              | Min.                  | Typ. | Max.      |
| (T <sub>J</sub> = 25°C unless otherwise specified) |                                                                                                                                                              |                       |      |           |
| <b>g<sub>fs</sub></b>                              | V <sub>DS</sub> = 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>                            |                                                                                                                                                              |                       | 0.25 | 0.42 °C/W |
| <b>R<sub>thCH</sub></b>                            |                                                                                                                                                              |                       |      | °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> = 0V                                                                   |                       |      | 130 A |
| I <sub>SM</sub>                                   | Repetitive, pulse width limited by T <sub>JM</sub>                                     |                       |      | 350 A |
| V <sub>SD</sub>                                   | I <sub>F</sub> = 25A, V <sub>GS</sub> = 0V, Note 1                                     |                       |      | 1.0 V |
| t <sub>rr</sub>                                   | I <sub>F</sub> = 25A, V <sub>GS</sub> = 0V<br>-di/dt = 100A/μs<br>V <sub>R</sub> = 50V |                       | 67   | ns    |
| I <sub>RM</sub>                                   |                                                                                        |                       | 4.7  | A     |
| Q <sub>rr</sub>                                   |                                                                                        |                       | 160  | nC    |

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

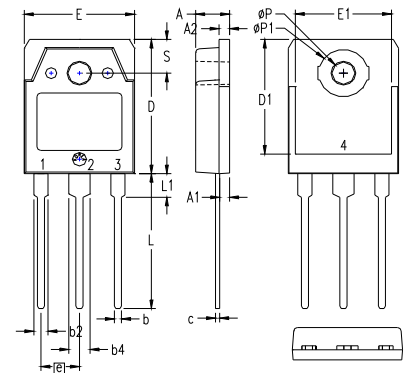
### TO-247 (IXTH) Outline



Terminals: 1 - Gate 2 - Drain

| Dim.           | Millimeter |       | Inches |       |
|----------------|------------|-------|--------|-------|
|                | Min.       | Max.  | Min.   | Max.  |
| A              | 4.7        | 5.3   | .185   | .209  |
| A <sub>1</sub> | 2.2        | 2.54  | .087   | .102  |
| A <sub>2</sub> | 2.2        | 2.6   | .059   | .098  |
| b              | 1.0        | 1.4   | .040   | .055  |
| b <sub>1</sub> | 1.65       | 2.13  | .065   | .084  |
| b <sub>2</sub> | 2.87       | 3.12  | .113   | .123  |
| C              | .4         | .8    | .016   | .031  |
| D              | 20.80      | 21.46 | .819   | .845  |
| E              | 15.75      | 16.26 | .610   | .640  |
| e              | 5.20       | 5.72  | 0.205  | 0.225 |
| L              | 19.81      | 20.32 | .780   | .800  |
| L1             |            | 4.50  |        | .177  |
| ØP             | 3.55       | 3.65  | .140   | .144  |
| Q              | 5.89       | 6.40  | 0.232  | 0.252 |
| R              | 4.32       | 5.49  | .170   | .216  |

### TO-3P (IXTQ) Outline



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

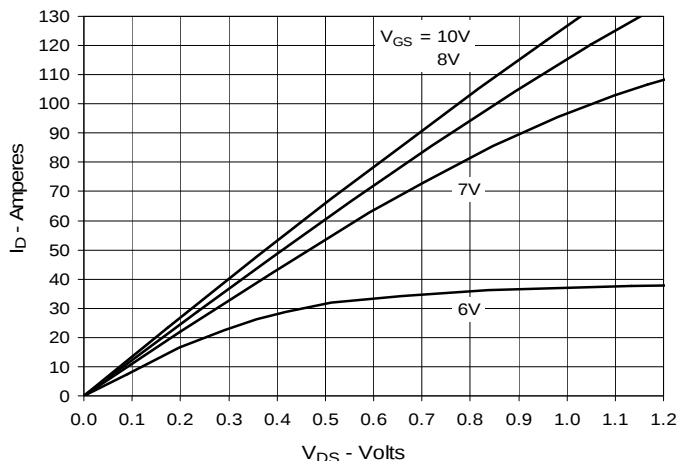
| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .185     | .193 | 4.70        | 4.90  |
| A1  | .051     | .059 | 1.30        | 1.50  |
| A2  | .057     | .065 | 1.45        | 1.65  |
| b   | .035     | .045 | 0.90        | 1.15  |
| b2  | .075     | .087 | 1.90        | 2.20  |
| b4  | .114     | .126 | 2.90        | 3.20  |
| c   | .022     | .031 | 0.55        | 0.80  |
| D   | .780     | .791 | 19.80       | 20.10 |
| D1  | .665     | .677 | 16.90       | 17.20 |
| E   | .610     | .622 | 15.50       | 15.80 |
| E1  | .531     | .539 | 13.50       | 13.70 |
| e   | .215 BSC |      | 5.45 BSC    |       |
| L   | .779     | .795 | 19.80       | 20.20 |
| L1  | .134     | .142 | 3.40        | 3.60  |
| ØP  | .126     | .134 | 3.20        | 3.40  |
| ØP1 | .272     | .280 | 6.90        | 7.10  |
| S   | .193     | .201 | 4.90        | 5.10  |

All metal area are tin plated.

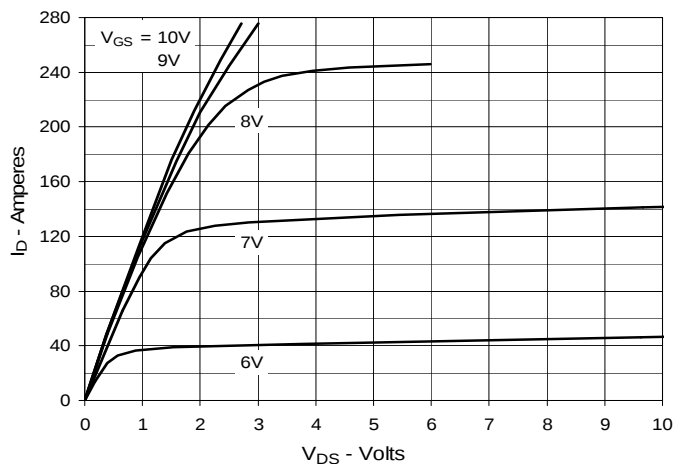
IXYS reserves the right to change limits, test conditions, and dimensions.

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

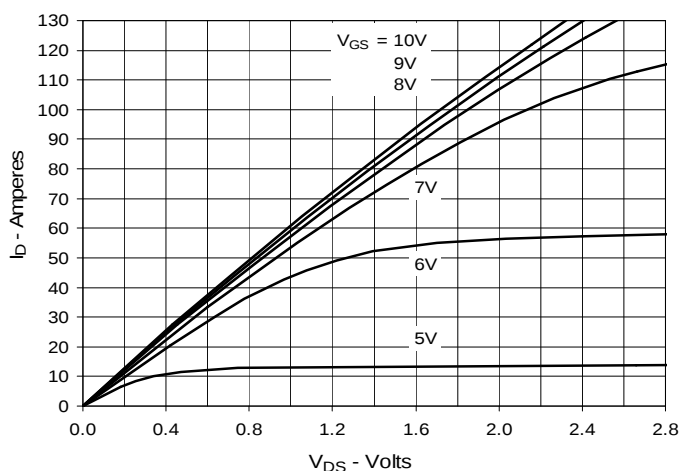
**Fig. 1. Output Characteristics  
@ 25°C**



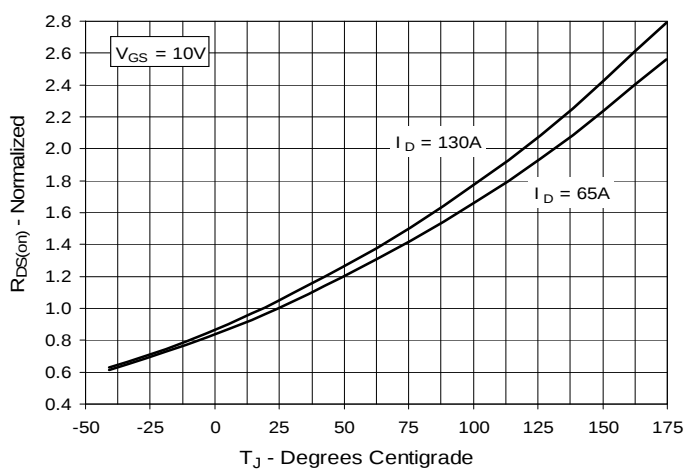
**Fig. 2. Extended Output Characteristics  
@ 25°C**



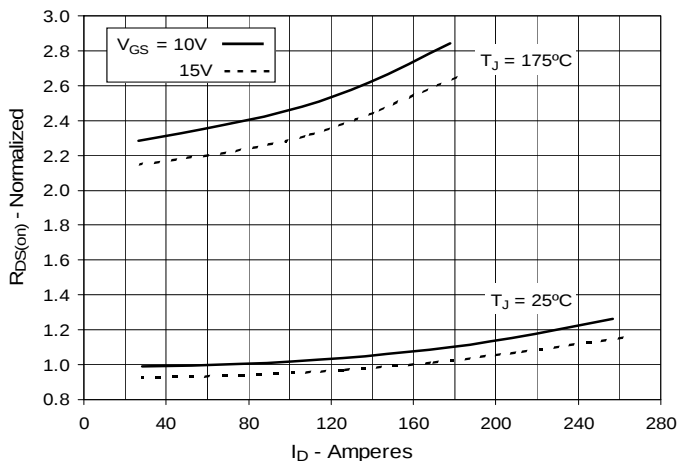
**Fig. 3. Output Characteristics  
@ 150°C**



**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**

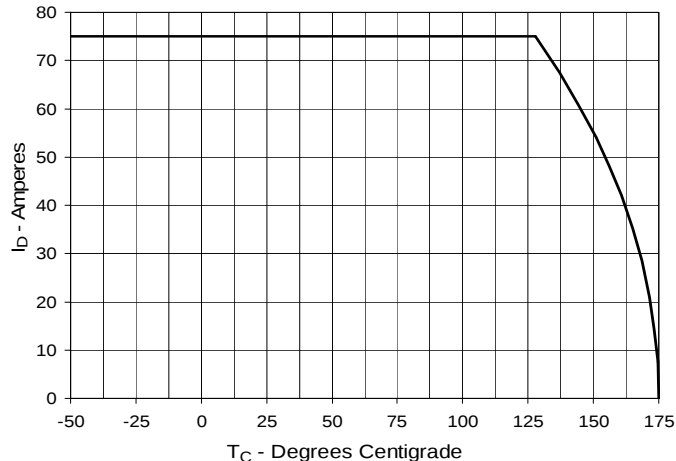


Fig. 7. Input Admittance

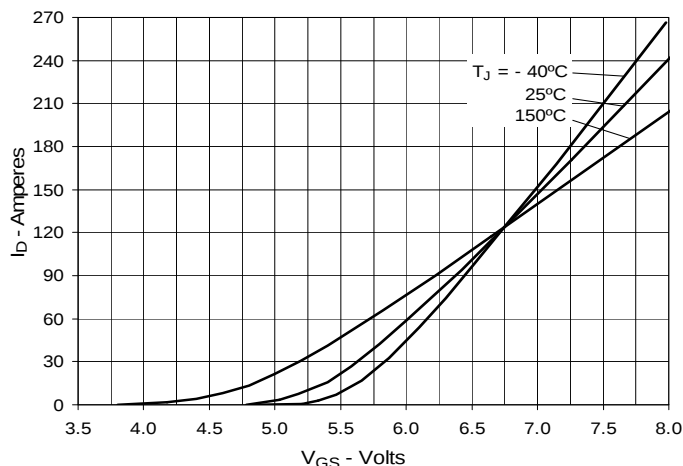


Fig. 8. Transconductance

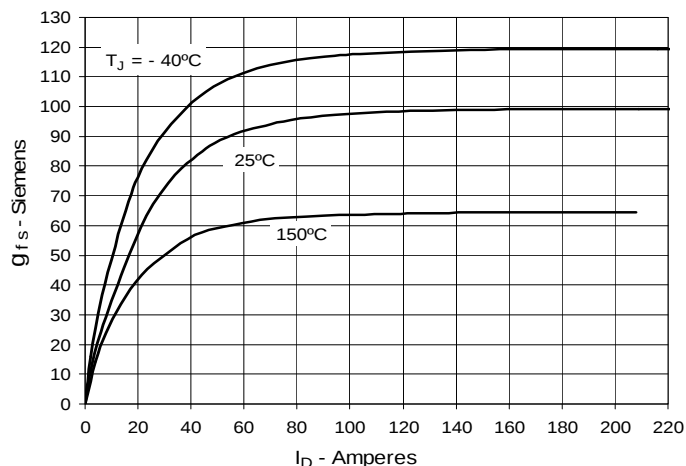


Fig. 9. Forward Voltage Drop of Intrinsic Diode

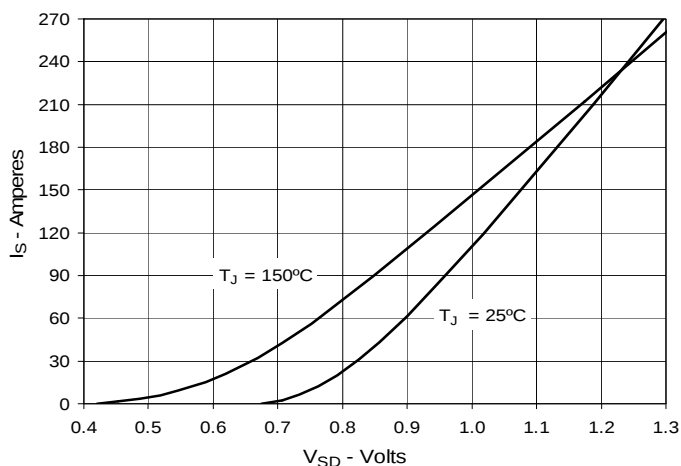


Fig. 10. Gate Charge

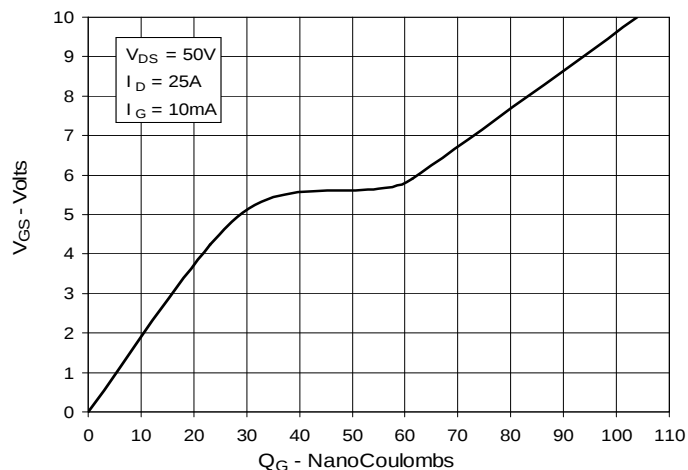


Fig. 11. Capacitance

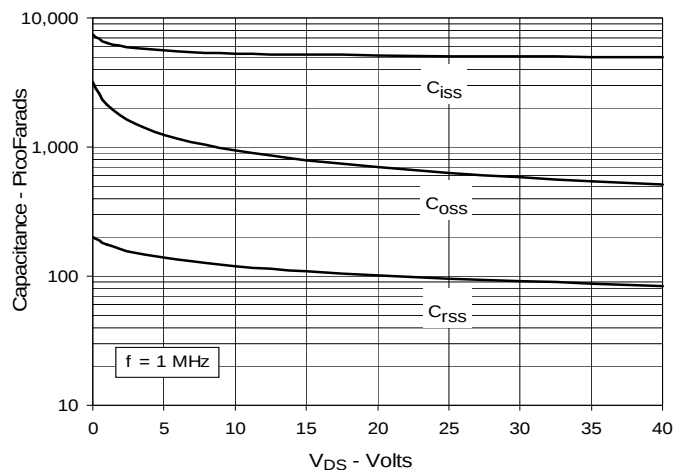
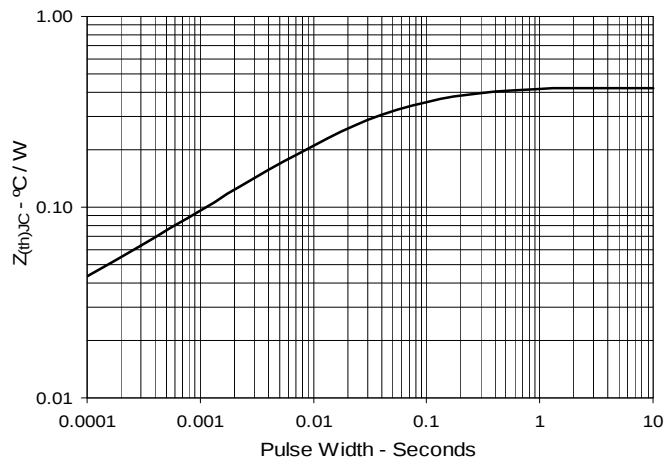
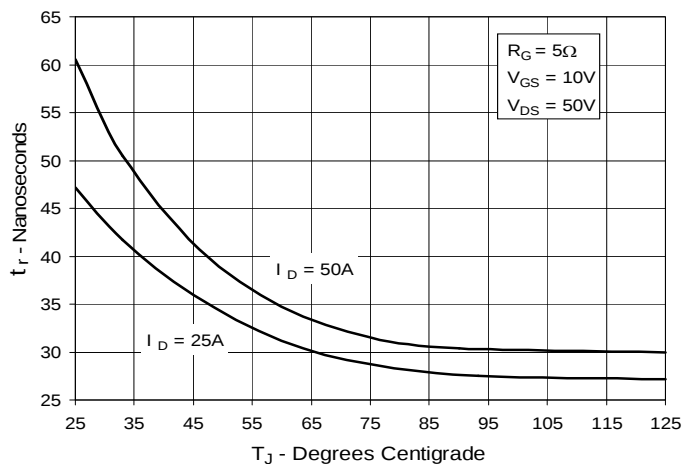


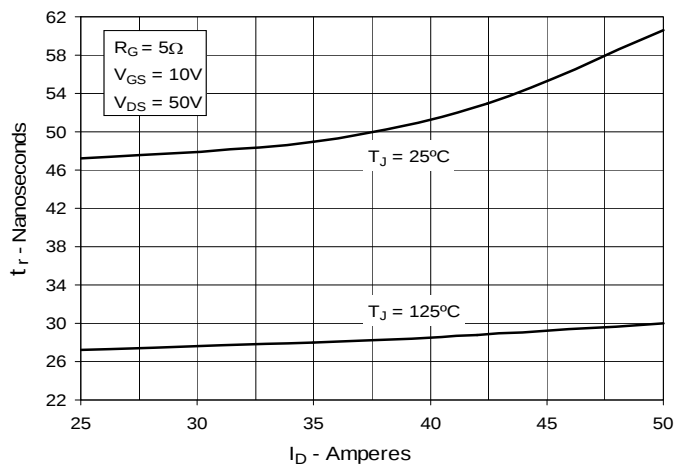
Fig. 12. Maximum Transient Thermal Impedance



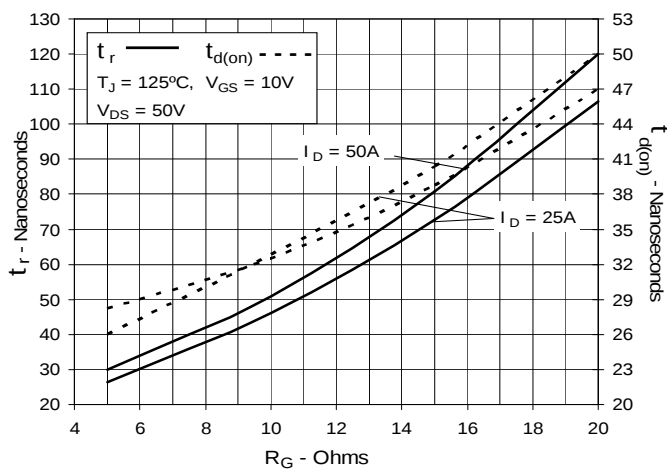
**Fig. 13. Resistive Turn-on  
Rise Time vs. Junction Temperature**



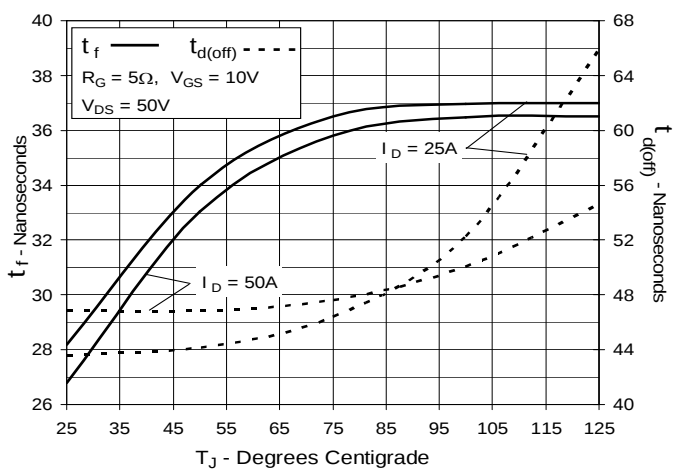
**Fig. 14. Resistive Turn-on  
Rise Time vs. Drain Current**



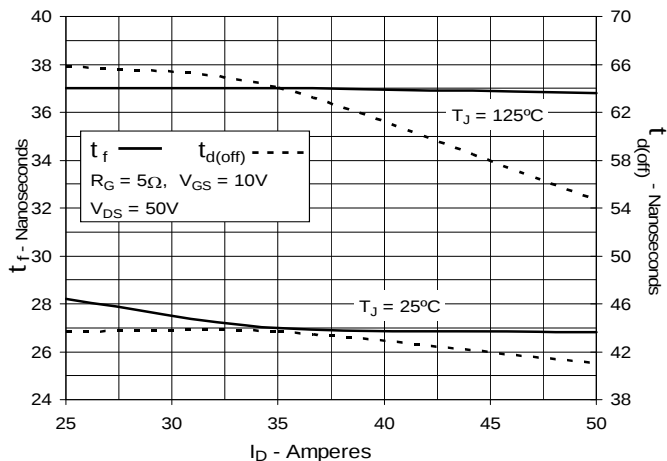
**Fig. 15. Resistive Turn-on  
Switching Times vs. Gate Resistance**



**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**

