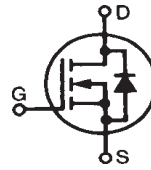


# TrenchHV™ Power MOSFET

N-Channel Enhancement Mode  
Avalanche Rated

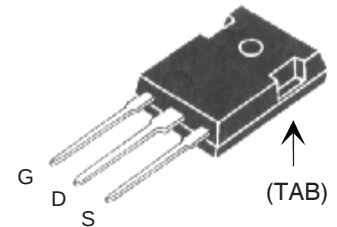
## IXTH130N20T



$$\begin{aligned} V_{DSS} &= 200V \\ I_{D25} &= 130A \\ R_{DS(on)} &\leq 16m\Omega \end{aligned}$$

| Symbol     | Test Conditions                                                    | Maximum Ratings |            |
|------------|--------------------------------------------------------------------|-----------------|------------|
| $V_{DSS}$  | $T_J = 25^\circ C$ to $175^\circ C$                                | 200             | V          |
| $V_{DGR}$  | $T_J = 25^\circ C$ to $175^\circ C$ ; $R_{GS} = 1M\Omega$          | 200             | V          |
| $V_{GSM}$  | Transient                                                          | $\pm 30$        | V          |
| $I_{D25}$  | $T_C = 25^\circ C$                                                 | 130             | A          |
| $I_{LRMS}$ | Lead Current Limit, RMS                                            | 75              | A          |
| $I_{DM}$   | $T_C = 25^\circ C$ , pulse width limited by $T_{JM}$               | 320             | A          |
| $I_A$      | $T_C = 25^\circ C$                                                 | 4               | A          |
| $E_{AS}$   | $T_C = 25^\circ C$                                                 | 1.0             | J          |
| $dv/dt$    | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 175^\circ C$ | 10              | V/ns       |
| $P_d$      | $T_C = 25^\circ C$                                                 | 830             | W          |
| $T_J$      |                                                                    | -55 ... +175    | $^\circ C$ |
| $T_{JM}$   |                                                                    | 175             | $^\circ C$ |
| $T_{stg}$  |                                                                    | -55 ... +175    | $^\circ C$ |
| $T_L$      | 1.6mm (0.062 in.) from case for 10s                                | 300             | $^\circ C$ |
| $T_{SOLD}$ | Plastic body for 10 seconds                                        | 260             | $^\circ C$ |
| $M_d$      | Mounting torque                                                    | 1.13/10         | Nm/lb.in   |
| Weight     |                                                                    | 6               | g          |

TO-247



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

### Features

- 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

- DC-DC converters
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- AC motor control
- High speed power switching applications
- DC choppers
- Battery chargers

| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ unless otherwise specified) | Characteristic Values |      |                           |
|--------------|---------------------------------------------------------------------|-----------------------|------|---------------------------|
|              |                                                                     | Min.                  | Typ. | Max.                      |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu A$                                    | 200                   |      | V                         |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 1mA$                                     | 2.5                   |      | 5.0 V                     |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$                                  |                       |      | $\pm 200$ nA              |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0V$<br>$T_J = 150^\circ C$          |                       |      | 25 $\mu A$<br>500 $\mu A$ |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Notes 1                |                       |      | 16 m $\Omega$             |

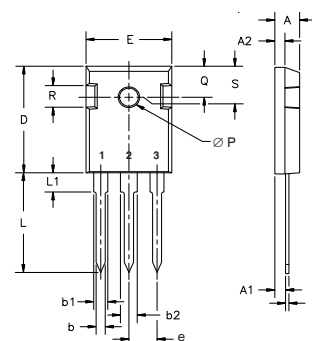
| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified)  | Characteristic Values |      |                        |
|--------------|----------------------------------------------------------------------------|-----------------------|------|------------------------|
|              |                                                                            | Min.                  | Typ. | Max.                   |
| $g_{fs}$     | $V_{DS} = 10\text{V}; I_D = 60\text{A}$ , Note 1                           | 70                    | 120  | S                      |
| $C_{iss}$    | $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$                 |                       | 8800 | pF                     |
| $C_{oss}$    |                                                                            |                       | 970  | pF                     |
| $C_{rss}$    |                                                                            |                       | 122  | pF                     |
| $t_{d(on)}$  | <b>Resistive Switching, <math>25^\circ\text{C}</math></b>                  |                       | 25   | ns                     |
| $t_r$        | $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$ |                       | 18   | ns                     |
| $t_{d(off)}$ | $R_G = 2.0\Omega$ (External)                                               |                       | 57   | ns                     |
| $t_f$        |                                                                            |                       | 22   | ns                     |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 25\text{A}$        |                       | 150  | nC                     |
| $Q_{gs}$     |                                                                            |                       | 44   | nC                     |
| $Q_{gd}$     |                                                                            |                       | 42   | nC                     |
| $R_{thJC}$   |                                                                            |                       |      | $0.18^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                            | 0.21                  |      | $^\circ\text{C/W}$     |

## Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified)                       | Characteristic Values |      |       |
|----------|-------------------------------------------------------------------------------------------------|-----------------------|------|-------|
|          |                                                                                                 | Min.                  | Typ. | Max.  |
| $I_S$    | $V_{GS} = 0\text{V}$                                                                            |                       |      | 130 A |
| $I_{SM}$ | Pulse width limited by $T_{JM}$                                                                 |                       |      | 320 A |
| $V_{SD}$ | $I_F = 50\text{A}, V_{GS} = 0\text{V}$ , Note 1                                                 |                       |      | 1.0 V |
| $t_{rr}$ | $I_F = 65\text{A}, -di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}, V_{GS} = 0\text{V}$ |                       | 150  | ns    |

Note 1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ ;

## TO-247 Outline



Terminals: 1 - Gate  
2 - Drain  
3 - Source  
Tab - 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  |
| S              | 6.15       | BSC   | .242   | BSC   |

## PRELIMINARY TECHNICAL INFORMATION

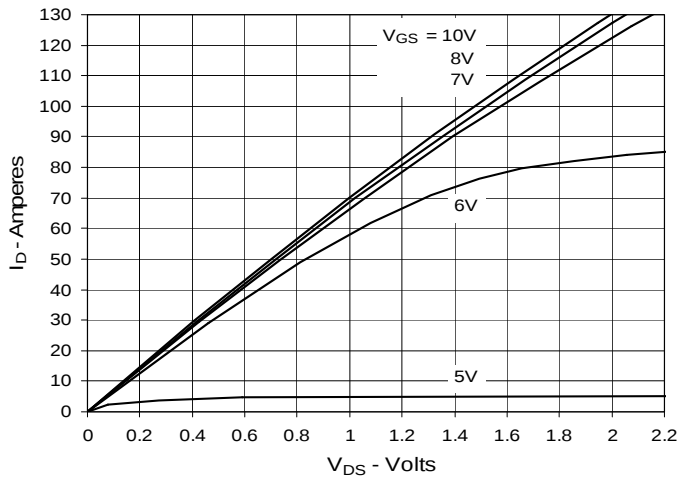
The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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

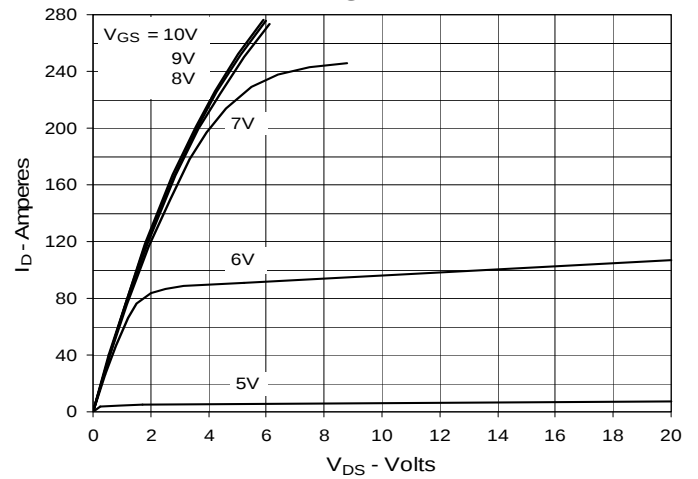
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

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

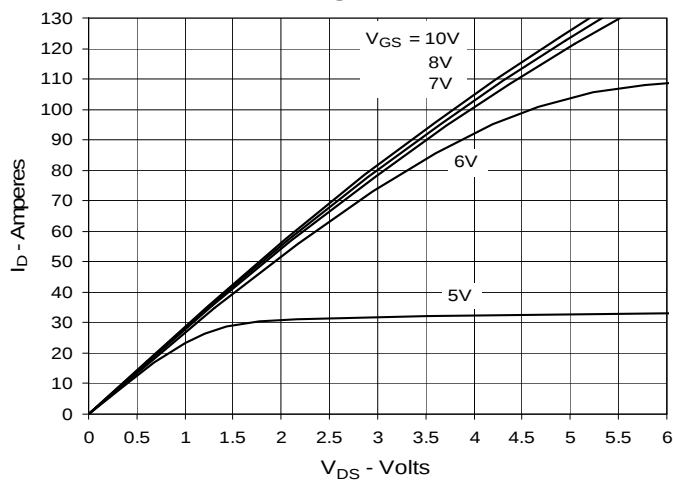
**Fig. 1. Output Characteristics  
@ 25°C**



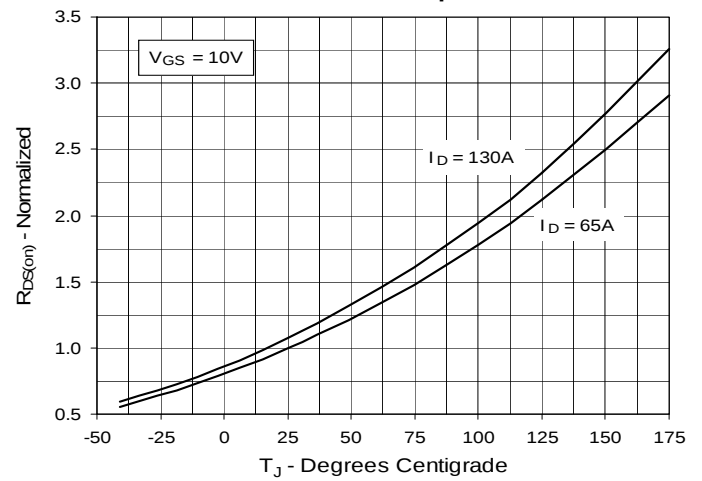
**Fig. 2. Extended Output Characteristics  
@ 25°C**



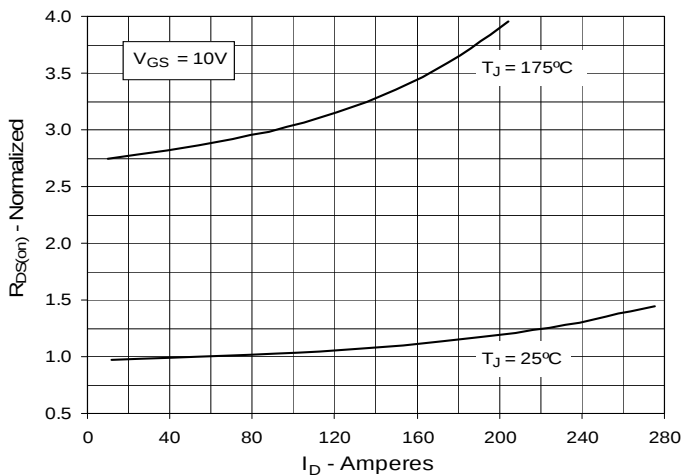
**Fig. 3. Output Characteristics  
@ 150°C**



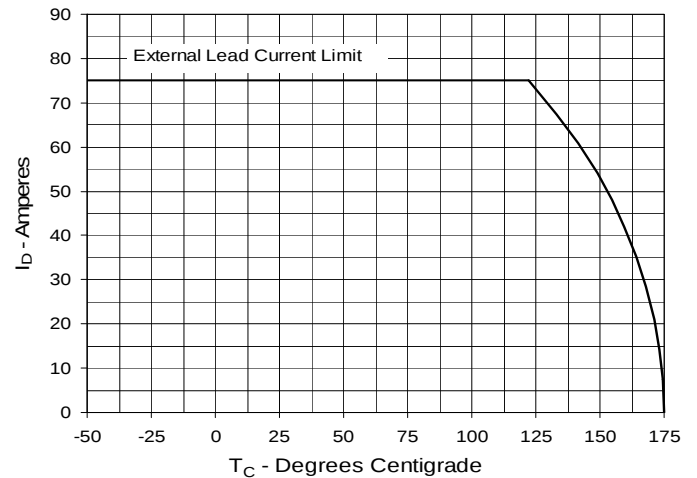
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 65A$  Value  
vs. Junction Temperature**



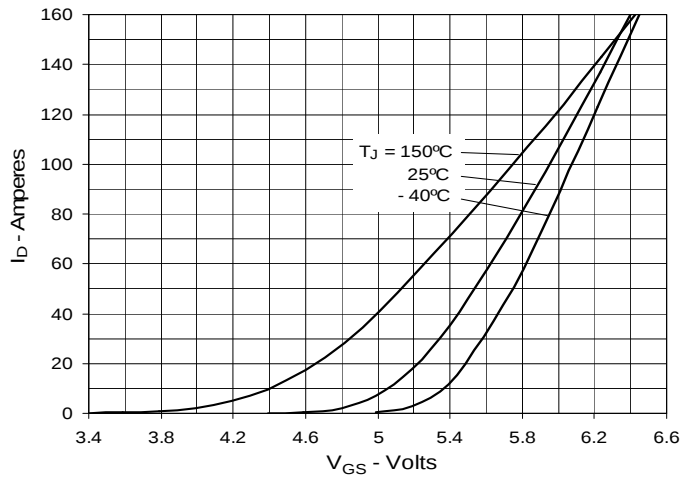
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 65A$  Value  
vs. Drain Current**



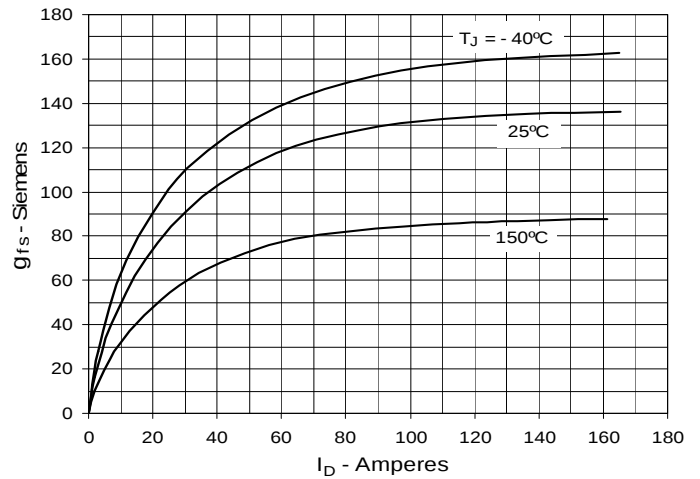
**Fig. 6. Drain Current vs. Case Temperature**



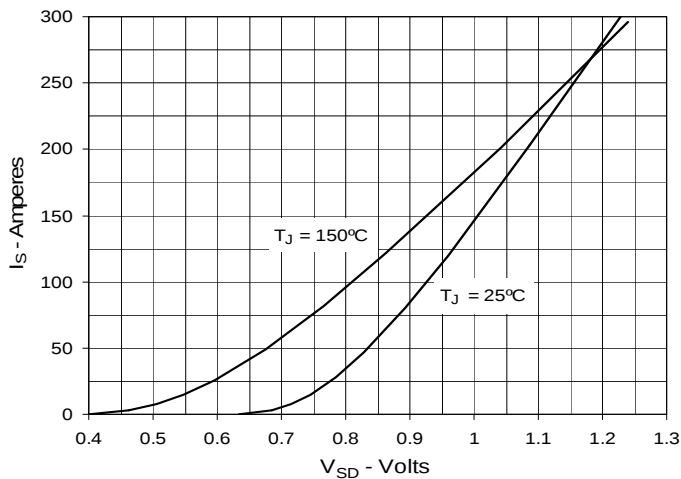
**Fig. 7. Input Admittance**



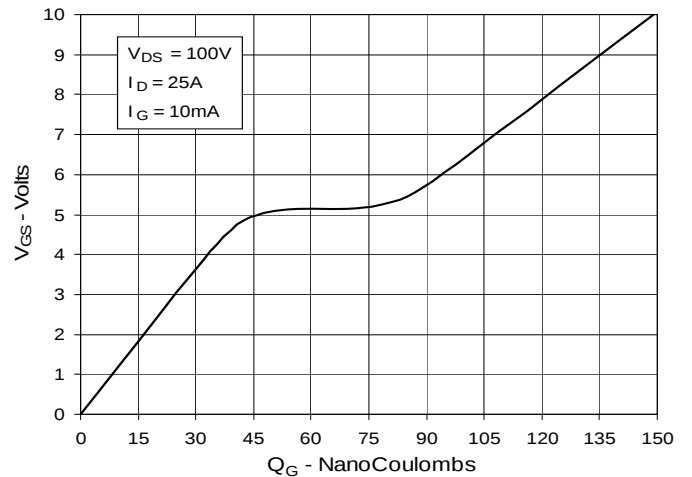
**Fig. 8. Transconductance**



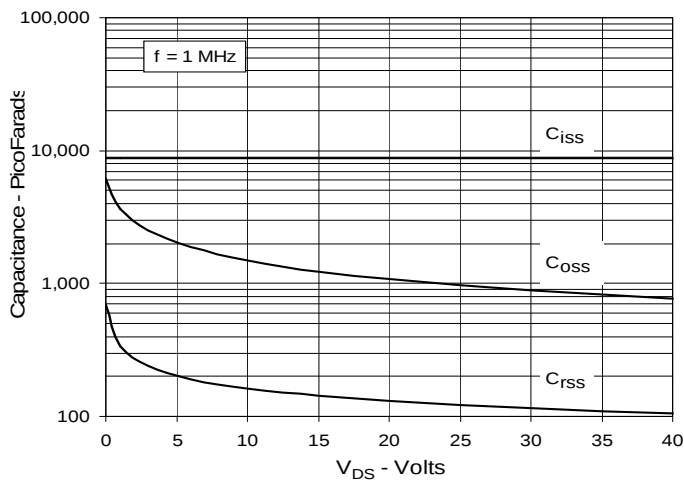
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



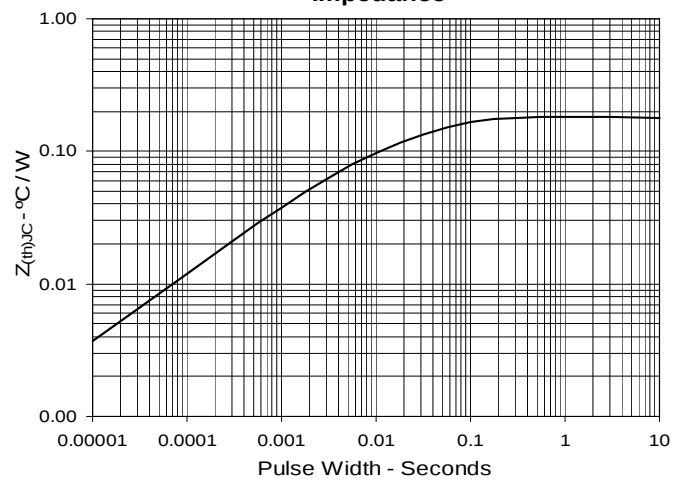
**Fig. 10. Gate Charge**



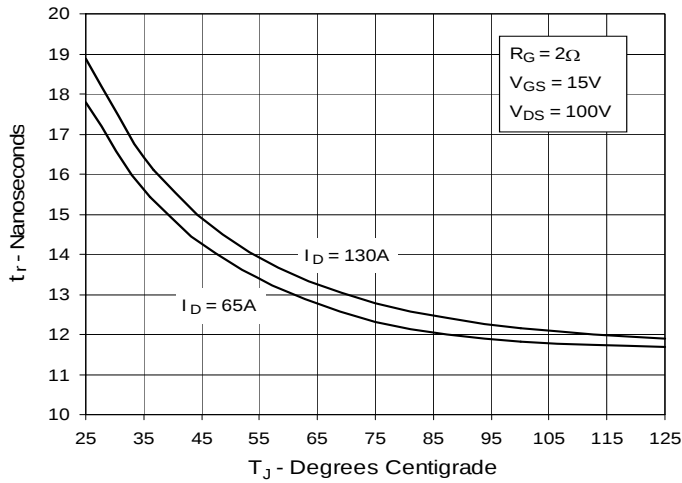
**Fig. 11. Capacitance**



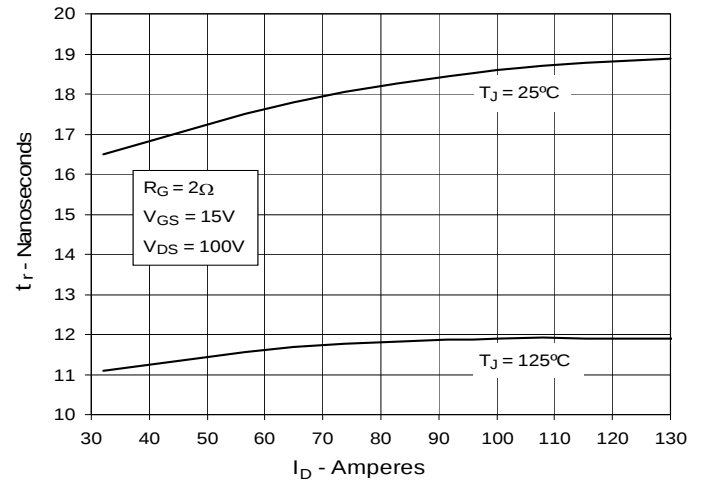
**Fig. 12. Maximum Transient Thermal Impedance**



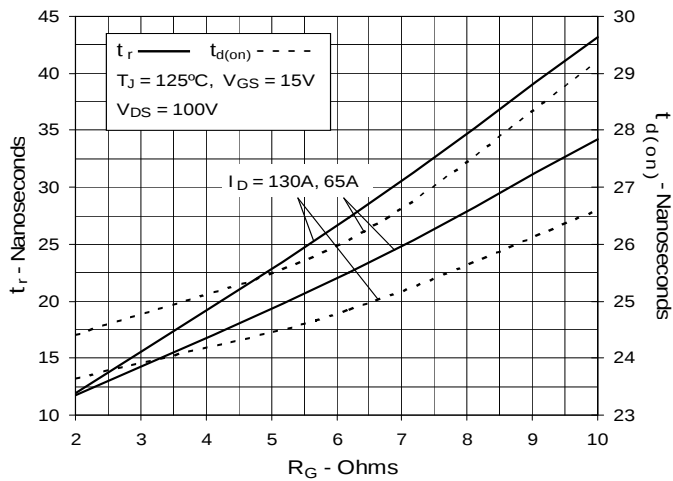
**Fig. 13. Resistive Turn-on  
Rise Time vs. Junction Temperature**



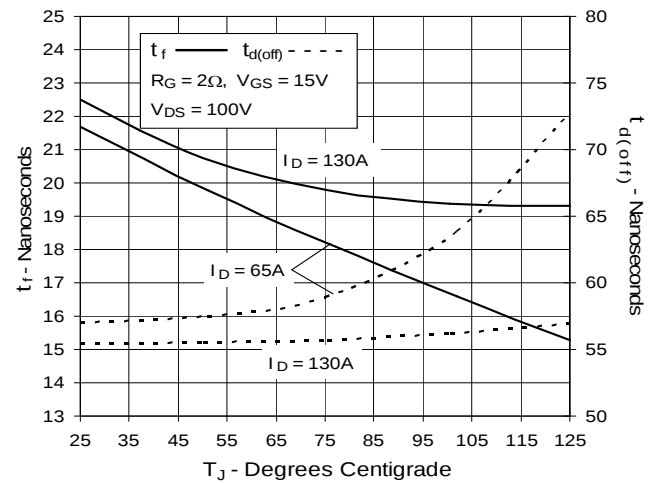
**Fig. 14. Resistive Turn-on  
Rise Time vs. Drain Current**



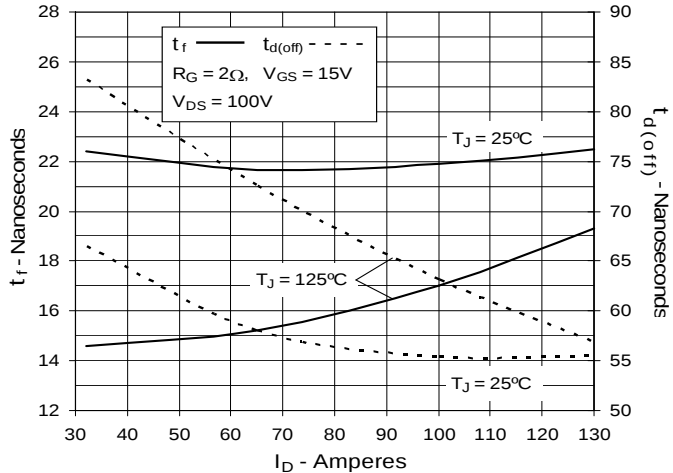
**Fig. 15. Resistive Turn-on  
Switching Times vs. Gate Resistance**



**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**

