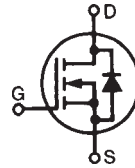


# TrenchT2™ HiperFET™ Power MOSFET

## IXFH160N15T2

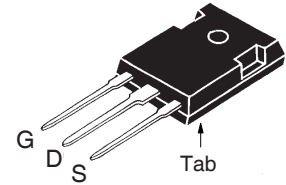
N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode



$$\begin{aligned} V_{DSS} &= 150V \\ I_{D25} &= 160A \\ R_{DS(on)} &\leq 9.0m\Omega \\ t_{rr} &\leq 160ns \end{aligned}$$

| Symbol     | Test Conditions                                                    | Maximum Ratings |            |
|------------|--------------------------------------------------------------------|-----------------|------------|
| $V_{DSS}$  | $T_J = 25^\circ C$ to $175^\circ C$                                | 150             | V          |
| $V_{DGR}$  | $T_J = 25^\circ C$ to $175^\circ C$ , $R_{GS} = 1M\Omega$          | 150             | V          |
| $V_{GSS}$  | Continuous                                                         | $\pm 20$        | V          |
| $V_{GSM}$  | Transient                                                          | $\pm 30$        | V          |
| $I_{D25}$  | $T_C = 25^\circ C$                                                 | 160             | A          |
| $I_{DM}$   | $T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$               | 440             | A          |
| $I_A$      | $T_C = 25^\circ C$                                                 | 80              | A          |
| $E_{AS}$   | $T_C = 25^\circ C$                                                 | 1.5             | J          |
| $dv/dt$    | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 175^\circ C$ | 15              | V/ns       |
| $P_D$      | $T_C = 25^\circ C$                                                 | 880             | W          |
| $T_J$      |                                                                    | -55 ... +175    | $^\circ C$ |
| $T_{JM}$   |                                                                    | 175             | $^\circ C$ |
| $T_{stg}$  |                                                                    | -55 ... +175    | $^\circ C$ |
| $T_L$      | Maximum Lead Temperature for Soldering                             | 300             | $^\circ C$ |
| $T_{SOLD}$ | Plastic Body for 10s                                               | 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

- International Standard Package
- High Current Handling Capability
- Fast Intrinsic Diode
- Dynamic  $dv/dt$  Rated
- Avalanche Rated
- Low  $R_{DS(on)}$

### Advantages

- Easy to Mount
- Space Savings
- High Power Density

### Applications

- DC-DC Converters
- Battery Chargers
- Switch-Mode and Resonant-Mode Power Supplies
- DC Choppers
- AC Motor Drives
- Uninterruptible Power Supplies
- High Speed Power Switching Applications

| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ , Unless Otherwise Specified) | Characteristic Values |      |                    |
|--------------|-----------------------------------------------------------------------|-----------------------|------|--------------------|
|              |                                                                       | Min.                  | Typ. | Max.               |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu A$                                      | 150                   |      | V                  |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 1mA$                                       | 2.5                   |      | 4.5 V              |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$                                    |                       |      | $\pm 200$ nA       |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 150^\circ C$             |                       |      | 10 $\mu A$<br>1 mA |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                   |                       | 7.7  | 9.0 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                                                                                             | 80                    | 130  | S                      |
| $C_{iss}$    | $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$                                                                                   |                       | 15   | nF                     |
| $C_{oss}$    |                                                                                                                                              |                       | 1120 | pF                     |
| $C_{rss}$    |                                                                                                                                              |                       | 113  | pF                     |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$<br>$R_G = 2\Omega$ (External) |                       | 37   | ns                     |
| $t_r$        |                                                                                                                                              |                       | 15   | ns                     |
| $t_{d(off)}$ |                                                                                                                                              |                       | 50   | ns                     |
| $t_f$        |                                                                                                                                              |                       | 26   | ns                     |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$                                                                   |                       | 253  | nC                     |
| $Q_{gs}$     |                                                                                                                                              |                       | 67   | nC                     |
| $Q_{gd}$     |                                                                                                                                              |                       | 73   | nC                     |
| $R_{thJC}$   |                                                                                                                                              |                       |      | $0.17^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                              | 0.21                  |      | $^\circ\text{C/W}$     |

## Source-Drain Diode

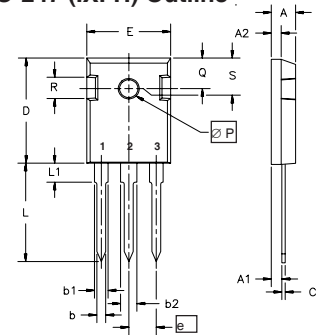
| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)                      | Characteristic Values |      |               |
|----------|------------------------------------------------------------------------------------------------|-----------------------|------|---------------|
|          |                                                                                                | Min.                  | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{V}$                                                                           |                       |      | 160 A         |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$                                                    |                       |      | 640 A         |
| $V_{SD}$ | $I_F = 100\text{A}, V_{GS} = 0\text{V}$ , Note 1                                               |                       |      | 1.4 V         |
| $t_{rr}$ | $I_F = 80\text{A}, -di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 75\text{V}, V_{GS} = 0\text{V}$ |                       |      | 160 ns        |
| $I_{RM}$ |                                                                                                |                       | 7.00 | A             |
| $Q_{RM}$ |                                                                                                |                       | 0.32 | $\mu\text{C}$ |

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

## 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.

## TO-247 (IXFH) Outline



Terminals: 1 - Gate  
2 - Drain  
3 - Source

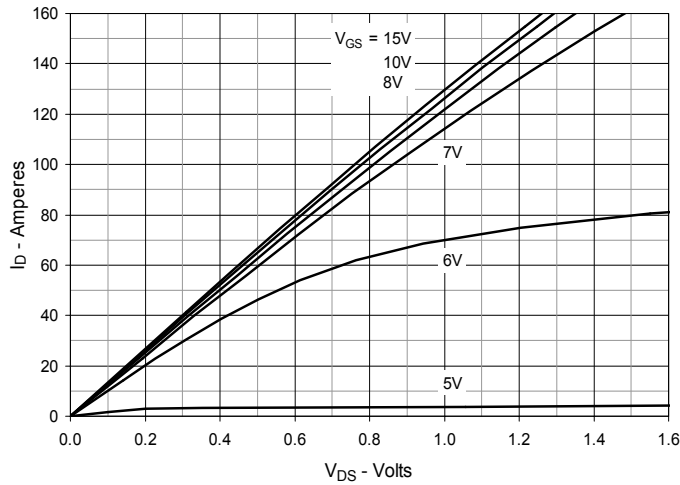
| Dim.           | Millimeter |       | Inches |       |
|----------------|------------|-------|--------|-------|
|                | Min.       | Max.  | Min.   | Max.  |
| A              | 4.7        | 5.3   | .185   | .209  |
| A <sub>1</sub> | 2.2        | 2.54  | .087   | .102  |
| A <sub>2</sub> | 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   |

IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

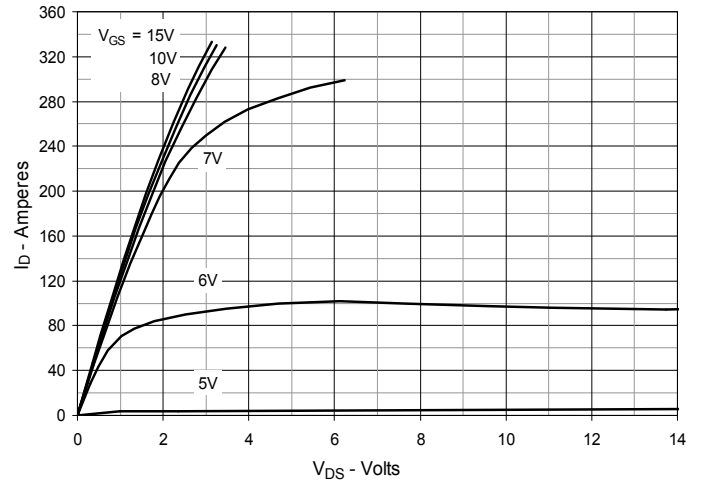
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

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

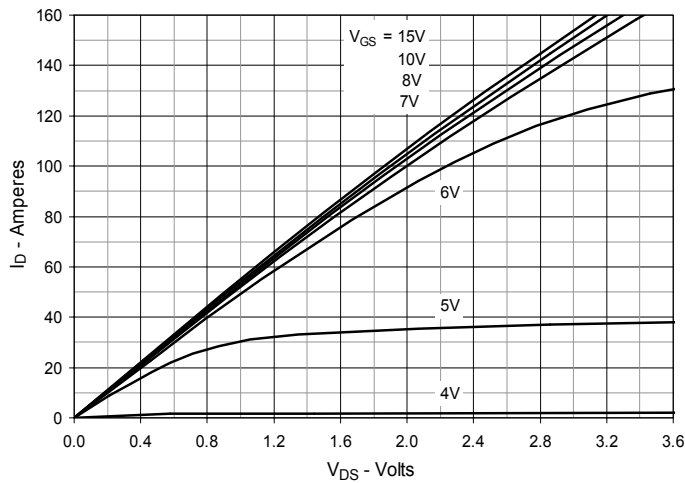
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



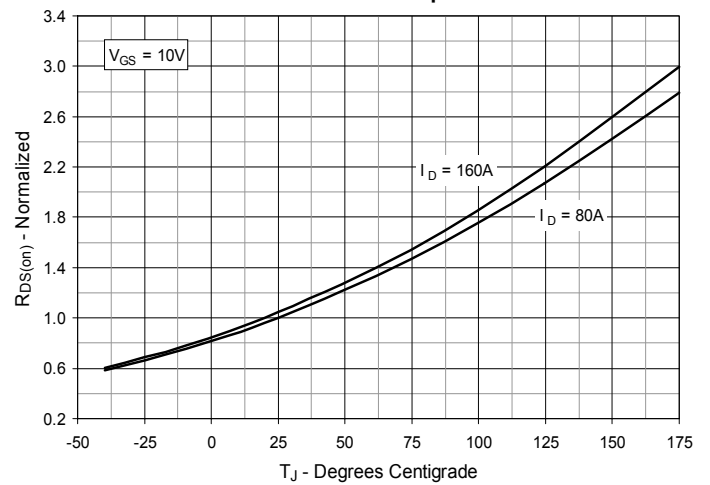
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



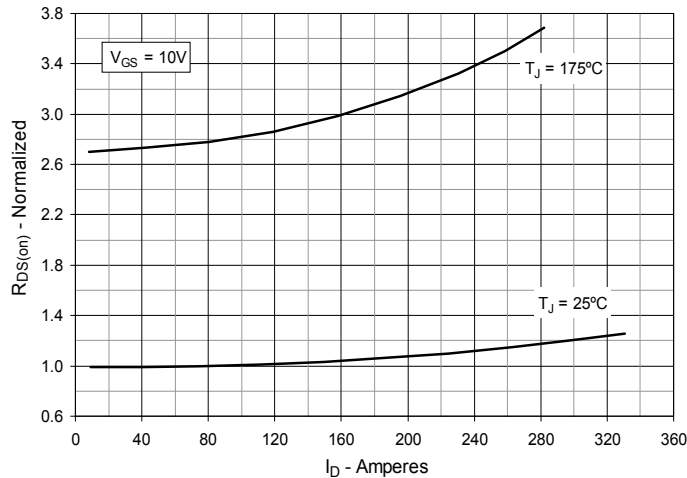
**Fig. 3. Output Characteristics @  $T_J = 150^\circ\text{C}$**



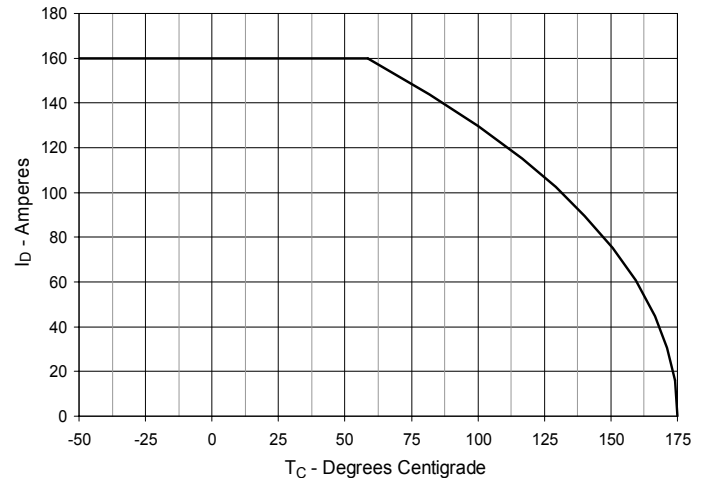
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 80\text{A}$  Value vs. Junction Temperature**

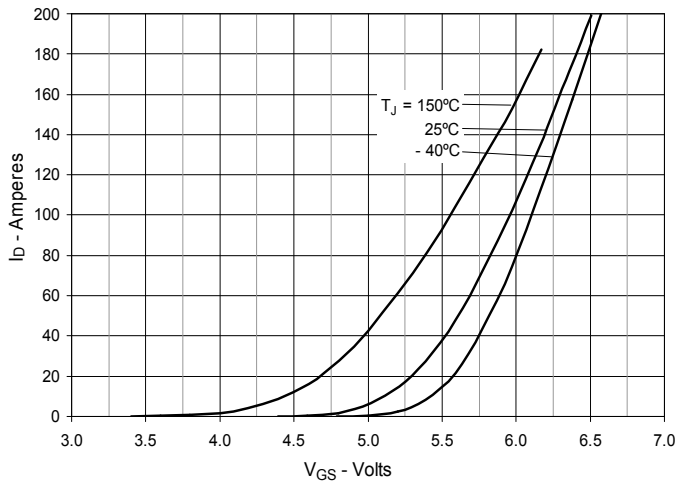
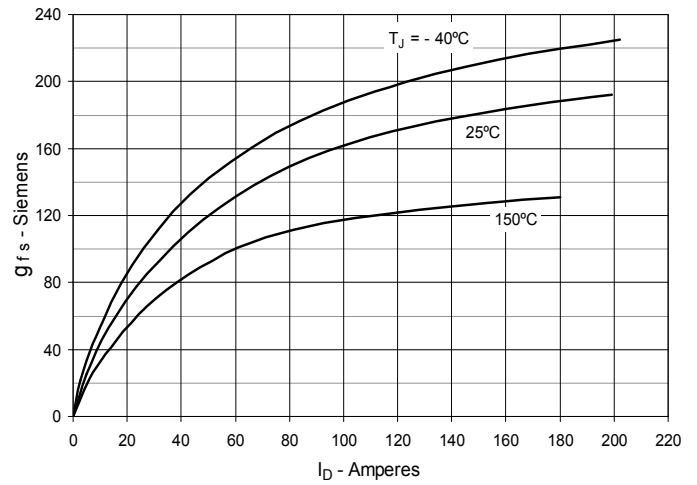
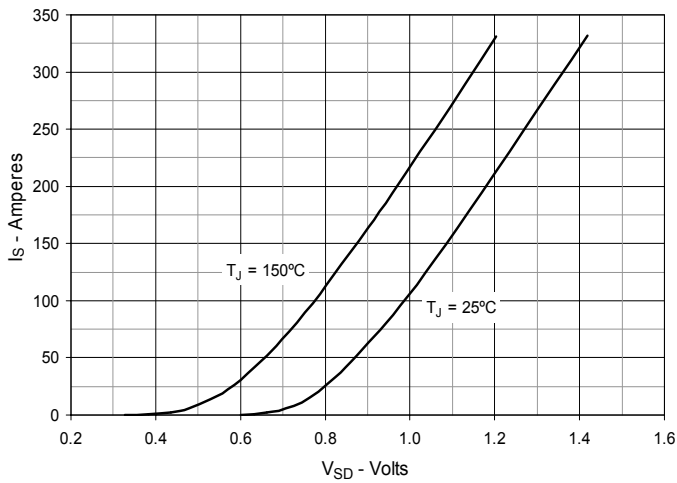
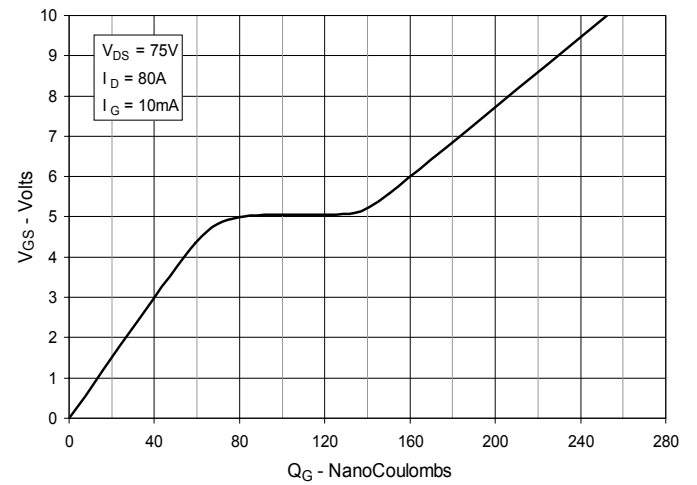
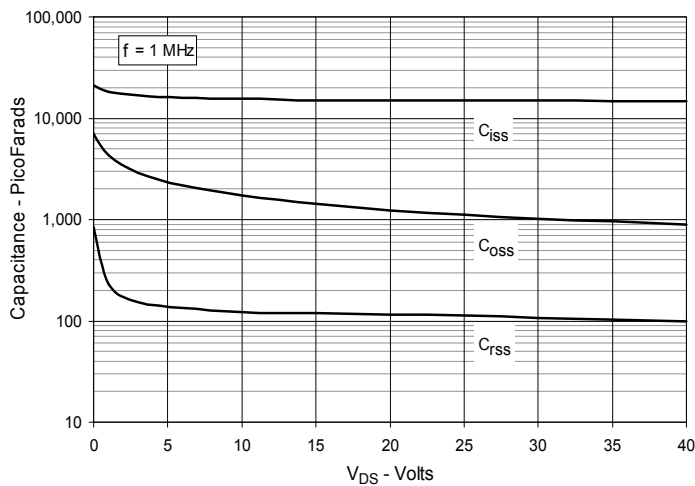
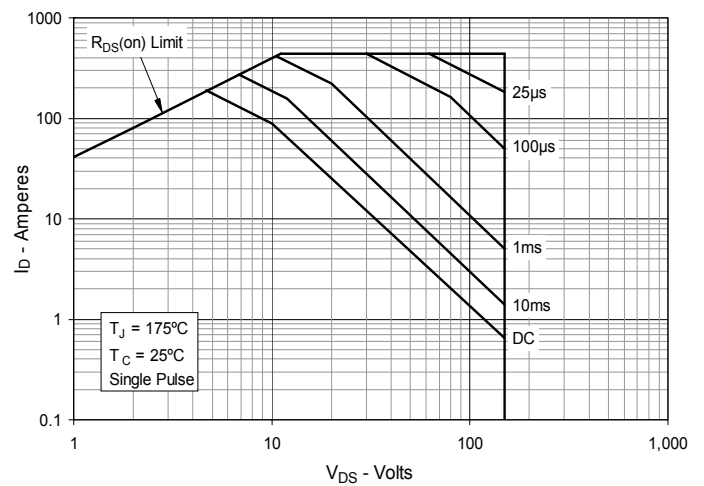


**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 80\text{A}$  Value vs. Drain Current**

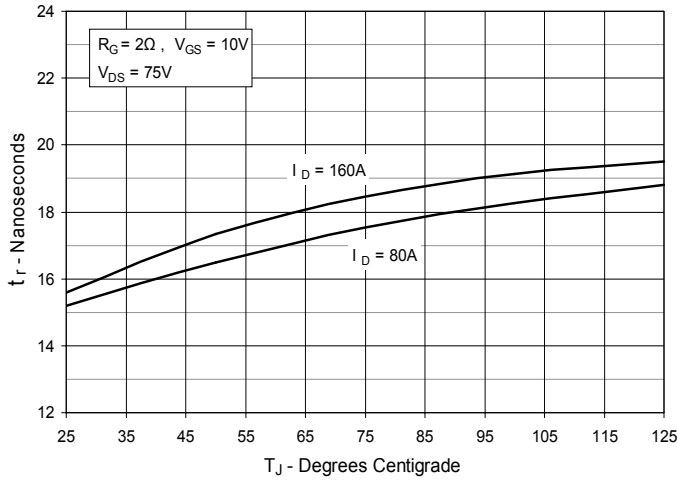


**Fig. 6. Drain Current vs. Case Temperature**

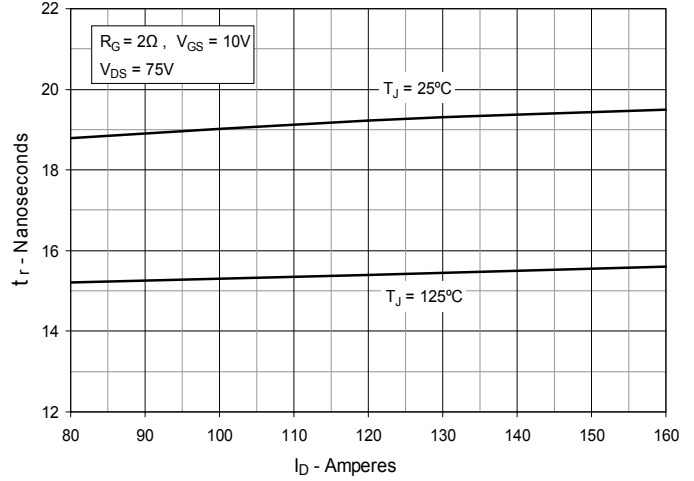


**Fig. 7. Input Admittance**

**Fig. 8. Transconductance**

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

**Fig. 10. Gate Charge**

**Fig. 11. Capacitance**

**Fig. 12. Forward-Bias Safe Operating Area**


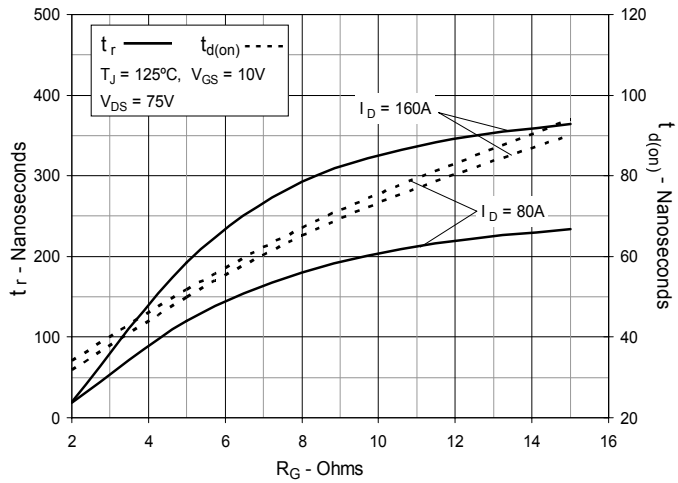
**Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature**



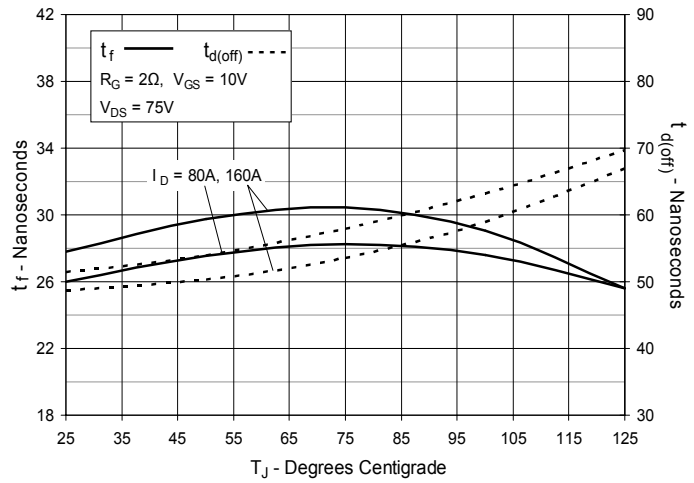
**Fig. 14. Resistive Turn-on Rise Time vs. Drain Current**



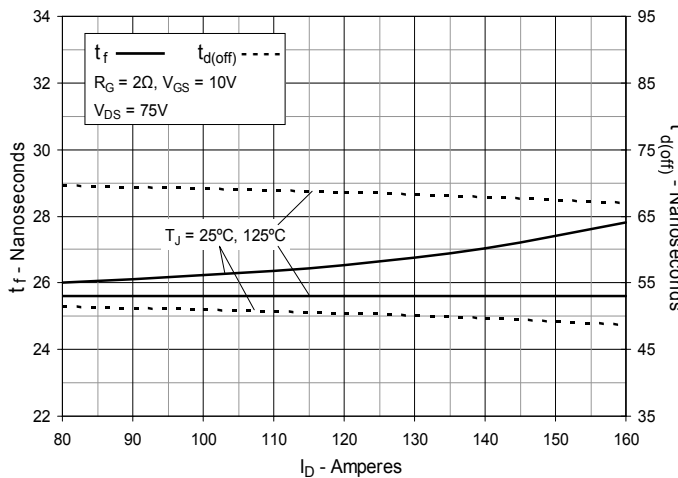
**Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance**



**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**

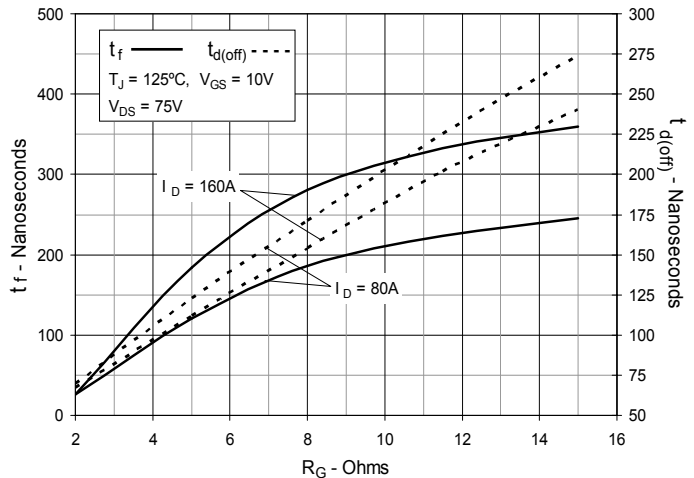


Fig. 19. Maximum Transient Thermal Impedance

