

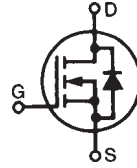
# GigaMOS™ TrenchT2

## HiperFET™

### Power MOSFET

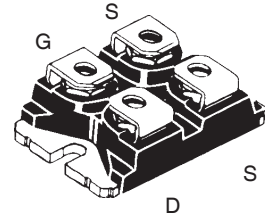
# IXFN320N17T2

N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode



$$\begin{aligned} V_{DSS} &= 170V \\ I_{D25} &= 260A \\ R_{DS(on)} &\leq 5.2m\Omega \\ t_{rr} &\leq 150ns \end{aligned}$$

miniBLOC, SOT-227  
E153432



G = Gate      D = Drain  
S = Source

Either Source Terminal S can be used as the Source Terminal or the Kelvin Source ( Gate Return ) Terminal.

| Symbol       | Test Conditions                                                          | Maximum Ratings |                  |
|--------------|--------------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$    | $T_J = 25^\circ\text{C}$ to $175^\circ\text{C}$                          | 170             | V                |
| $V_{DGR}$    | $T_J = 25^\circ\text{C}$ to $175^\circ\text{C}$ , $R_{GS} = 1M\Omega$    | 170             | V                |
| $V_{GSS}$    | Continuous                                                               | $\pm 20$        | V                |
| $V_{GSM}$    | Transient                                                                | $\pm 30$        | V                |
| $I_{D25}$    | $T_C = 25^\circ\text{C}$ (Chip Capability)                               | 260             | A                |
| $I_{L(RMS)}$ | External Lead Current Limit                                              | 200             | A                |
| $I_{DM}$     | $T_C = 25^\circ\text{C}$ , Pulse Width Limited by $T_{JM}$               | 800             | A                |
| $I_A$        | $T_C = 25^\circ\text{C}$                                                 | 100             | A                |
| $E_{AS}$     | $T_C = 25^\circ\text{C}$                                                 | 5               | J                |
| $dV/dt$      | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 175^\circ\text{C}$ | 20              | V/ns             |
| $P_D$        | $T_C = 25^\circ\text{C}$                                                 | 1070            | 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 10s                                                     | 260             | $^\circ\text{C}$ |
| $V_{ISOL}$   | 50/60 Hz, RMS $t = 1$ minute<br>$I_{ISOL} \leq 1mA$ $t = 1$ second       | 2500<br>3000    | V~<br>V~         |
| $M_d$        | Mounting Torque                                                          | 1.5/13          | Nm/lb.in.        |
|              | Terminal Connection Torque                                               | 1.3/11.5        | Nm/lb.in.        |
| Weight       |                                                                          | 30              | g                |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified) | Characteristic Values |      |                    |
|--------------|-----------------------------------------------------------------------------|-----------------------|------|--------------------|
|              |                                                                             | Min.                  | Typ. | Max.               |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 3mA$                                                 | 170                   |      | V                  |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 8mA$                                             | 2.5                   |      | 5.0 V              |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$                                          |                       |      | $\pm 200$ nA       |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 150^\circ\text{C}$             |                       |      | 50 $\mu A$<br>5 mA |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 60A$ , Note 1                                       |                       |      | 5.2 m $\Omega$     |

## Features

- International Standard Package
- miniBLOC, with Aluminium Nitride Isolation
- Isolation Voltage 2500 V~
- High Current Handling Capability
- Fast Intrinsic Diode
- Avalanche Rated
- Low  $R_{DS(on)}$

## Advantages

- Easy to Mount
- Space Savings
- High Power Density

## Applications

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

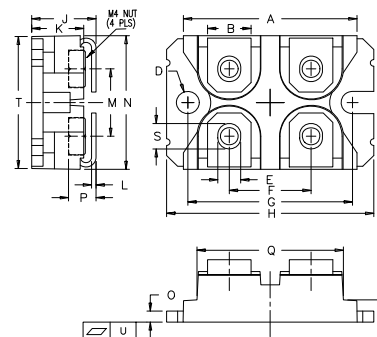
| Symbol       | Test Conditions<br>( $T_J = 25^{\circ}\text{C}$ Unless Otherwise Specified)                                                                  | Characteristic Values |      |                      |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|----------------------|
|              |                                                                                                                                              | Min.                  | Typ. | Max.                 |
| $g_{fs}$     | $V_{DS} = 10\text{V}$ , $I_D = 60\text{A}$ , Note 1                                                                                          | 120                   | 190  | S                    |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                             |                       | 45   | nF                   |
| $C_{oss}$    |                                                                                                                                              |                       | 2890 | pF                   |
| $C_{rss}$    |                                                                                                                                              |                       | 410  | pF                   |
| $R_{Gi}$     | Gate Input Resistance                                                                                                                        |                       | 1.96 | $\Omega$             |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 100\text{A}$<br>$R_G = 1\Omega$ (External) |                       | 46   | ns                   |
| $t_r$        |                                                                                                                                              |                       | 170  | ns                   |
| $t_{d(off)}$ |                                                                                                                                              |                       | 115  | ns                   |
| $t_f$        |                                                                                                                                              |                       | 230  | ns                   |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 160\text{A}$                                                                   |                       | 640  | nC                   |
| $Q_{gs}$     |                                                                                                                                              |                       | 185  | nC                   |
| $Q_{gd}$     |                                                                                                                                              |                       | 175  | nC                   |
| $R_{thJC}$   |                                                                                                                                              |                       | 0.14 | $^{\circ}\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                              | 0.05                  |      | $^{\circ}\text{C/W}$ |

## Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^{\circ}\text{C}$ , Unless Otherwise Specified)                         | Characteristic Values |      |               |
|----------|-------------------------------------------------------------------------------------------------------|-----------------------|------|---------------|
|          |                                                                                                       | Min.                  | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{V}$                                                                                  |                       |      | 320 A         |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$                                                           |                       |      | 1280 A        |
| $V_{SD}$ | $I_F = 100\text{A}$ , $V_{GS} = 0\text{V}$ , Note 1                                                   |                       |      | 1.25 V        |
| $t_{rr}$ | $I_F = 160\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 60\text{V}$ , $V_{GS} = 0\text{V}$ |                       |      | 150 ns        |
| $Q_{RM}$ |                                                                                                       |                       | 0.53 | $\mu\text{C}$ |
| $I_{RM}$ |                                                                                                       |                       | 9.00 | A             |

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

## SOT-227B (IXFN) Outline



(M4 screws (4x) supplied)

| SYM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 1.240  | 1.255 | 31.50       | 31.88 |
| B   | .307   | .323  | 7.80        | 8.20  |
| C   | .161   | .169  | 4.09        | 4.29  |
| D   | .161   | .169  | 4.09        | 4.29  |
| E   | .161   | .169  | 4.09        | 4.29  |
| F   | .587   | .595  | 14.91       | 15.11 |
| G   | 1.186  | 1.193 | 30.12       | 30.30 |
| H   | 1.496  | 1.505 | 38.00       | 38.23 |
| J   | .460   | .481  | 11.68       | 12.22 |
| K   | .351   | .378  | 8.92        | 9.60  |
| L   | .030   | .033  | 0.76        | 0.84  |
| M   | .496   | .506  | 12.60       | 12.85 |
| N   | .990   | 1.001 | 25.15       | 25.42 |
| O   | .078   | .084  | 1.98        | 2.13  |
| P   | .195   | .235  | 4.95        | 5.97  |
| Q   | 1.045  | 1.059 | 26.54       | 26.90 |
| R   | .155   | .174  | 3.94        | 4.42  |
| S   | .186   | .191  | 4.72        | 4.85  |
| T   | .968   | .987  | 24.59       | 25.07 |
| U   | -.002  | .004  | -0.05       | 0.1   |

## ADVANCE TECHNICAL INFORMATION

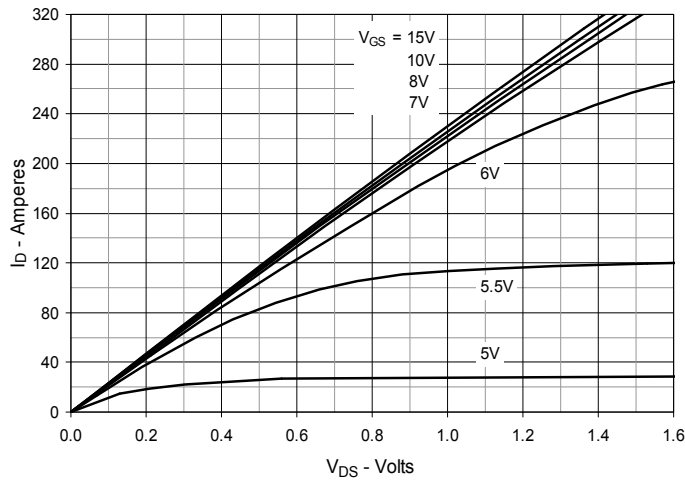
The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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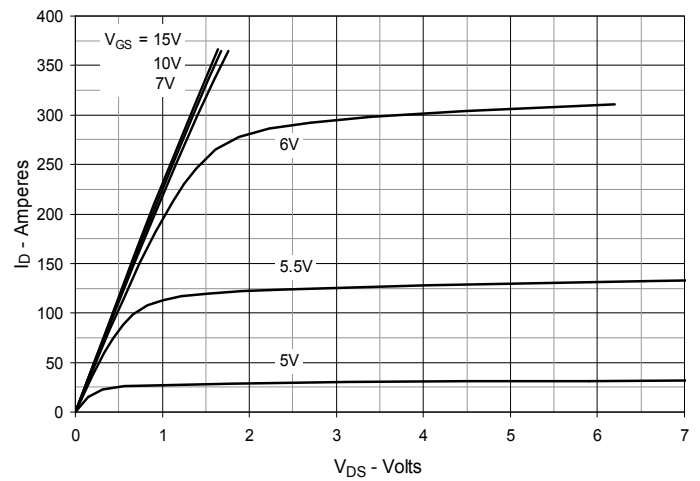
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

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

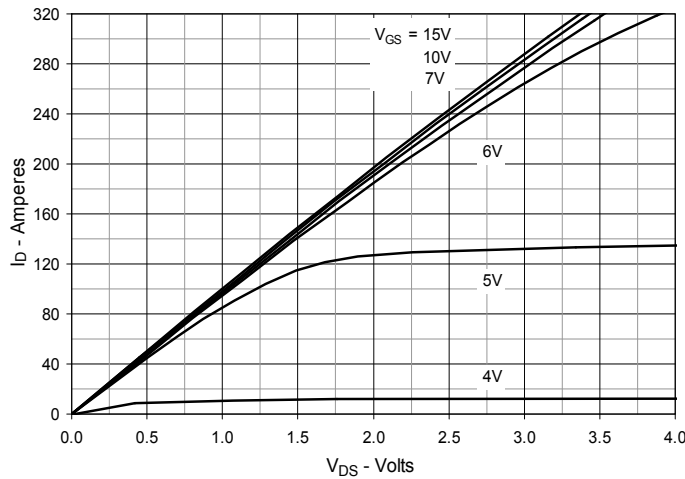
**Fig. 1. Output Characteristics**  
@  $T_J = 25^\circ\text{C}$



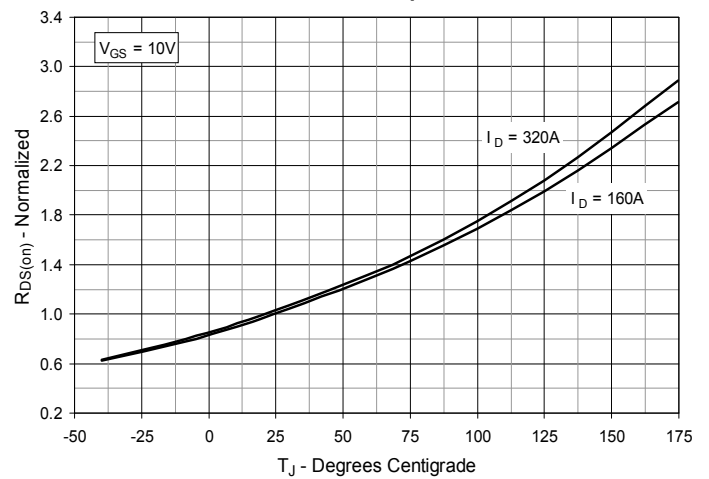
**Fig. 2. Extended Output Characteristics**  
@  $T_J = 25^\circ\text{C}$



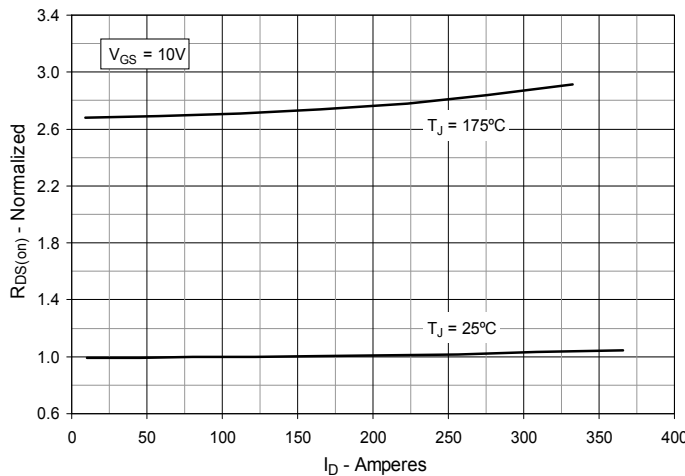
**Fig. 3. Output Characteristics**  
@  $T_J = 150^\circ\text{C}$



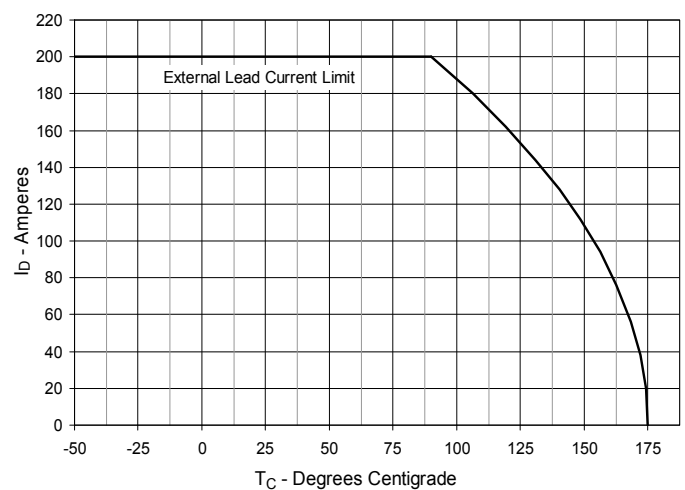
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 160\text{A}$  Value vs. Junction Temperature**



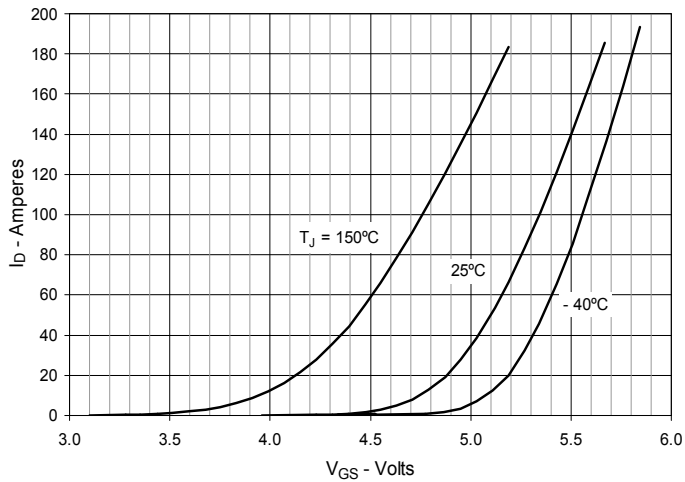
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 160\text{A}$  Value vs. Drain Current**



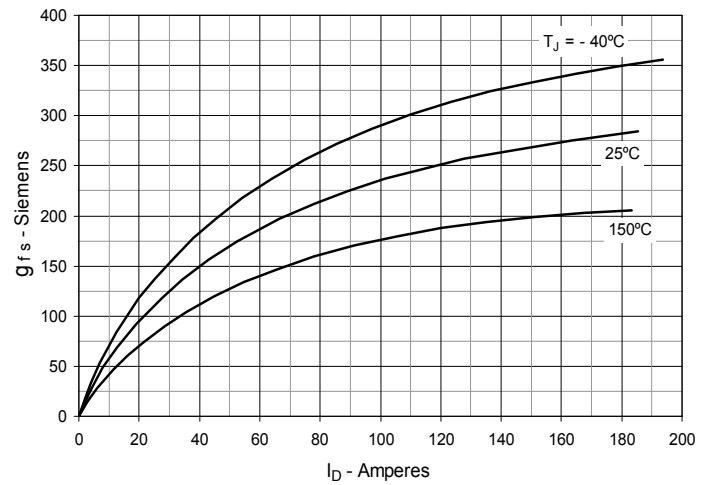
**Fig. 6. Drain Current vs. Case Temperature**



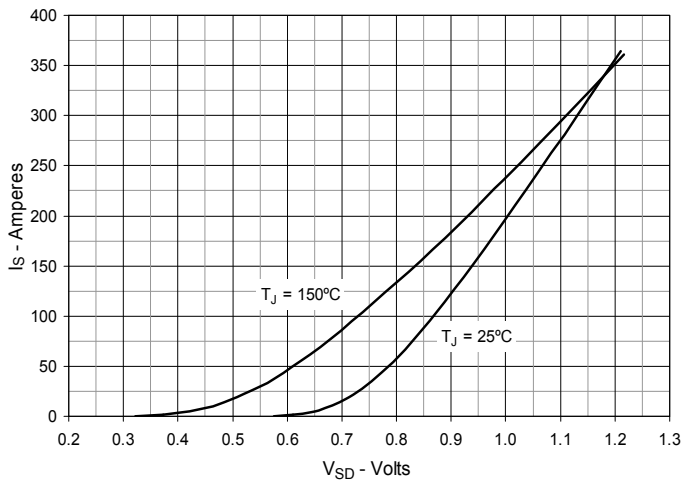
**Fig. 7. Input Admittance**



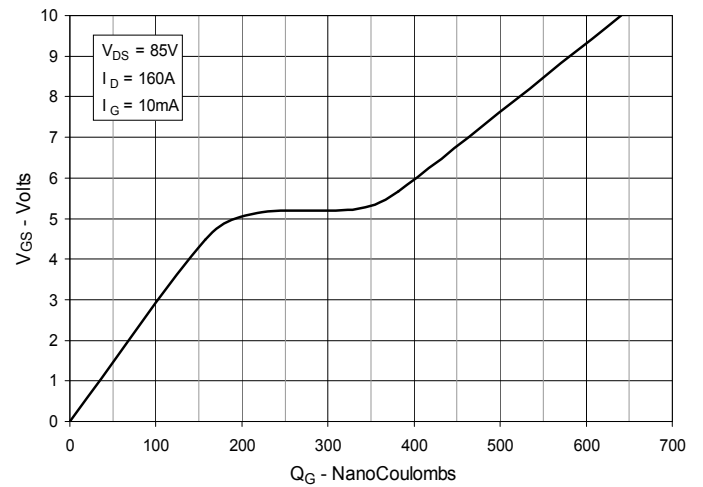
**Fig. 8. Transconductance**



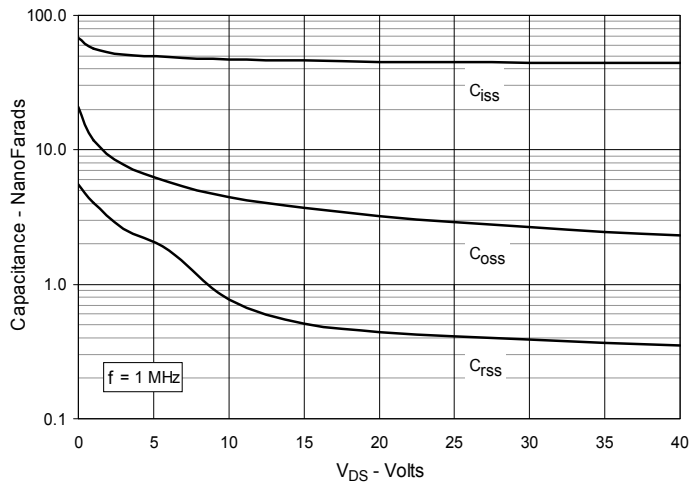
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



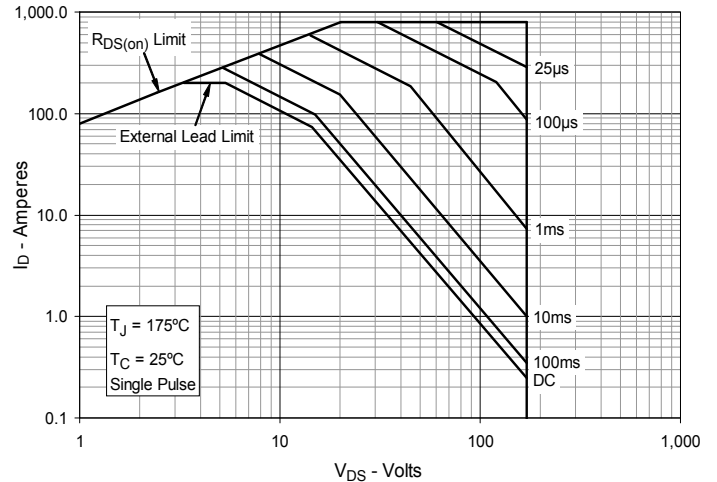
**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



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



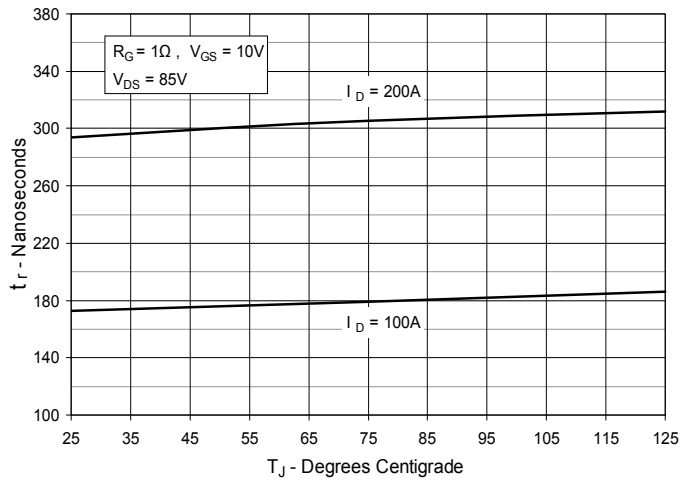
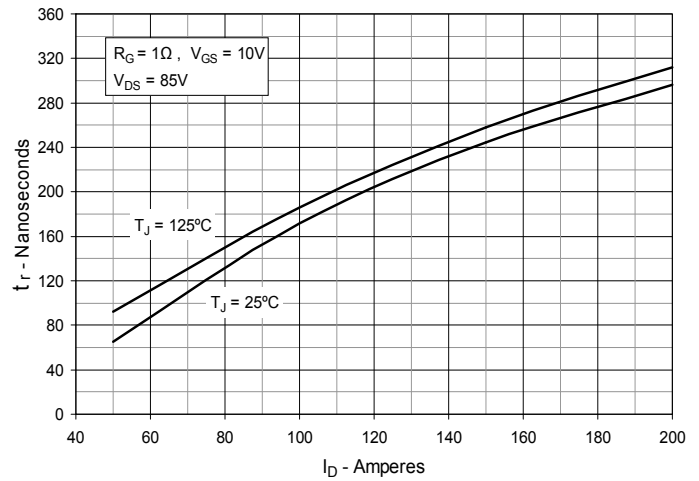
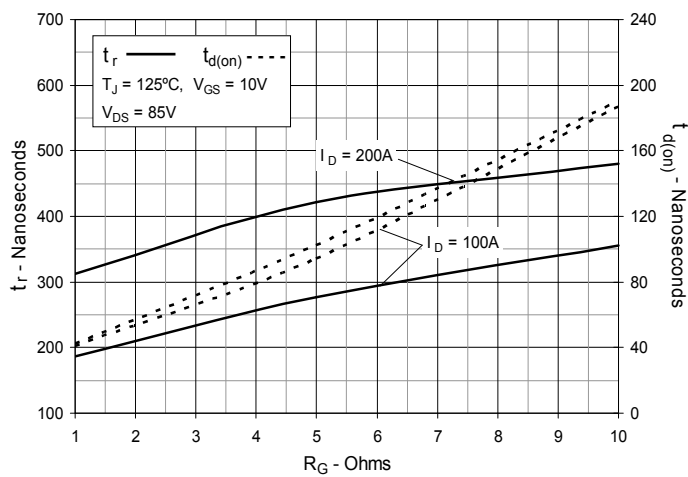
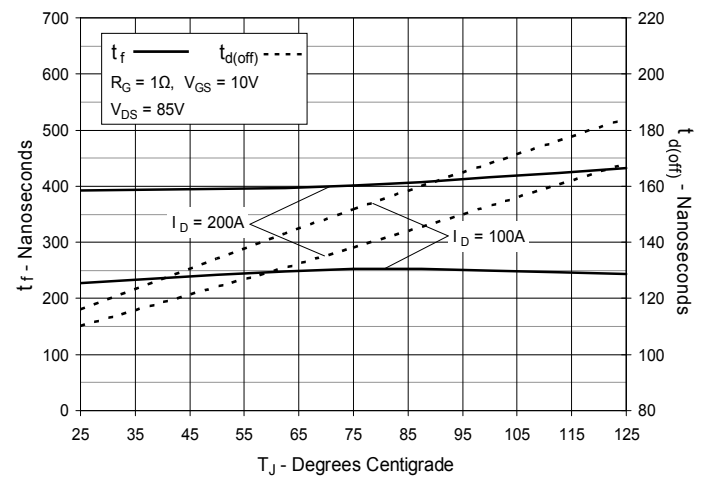
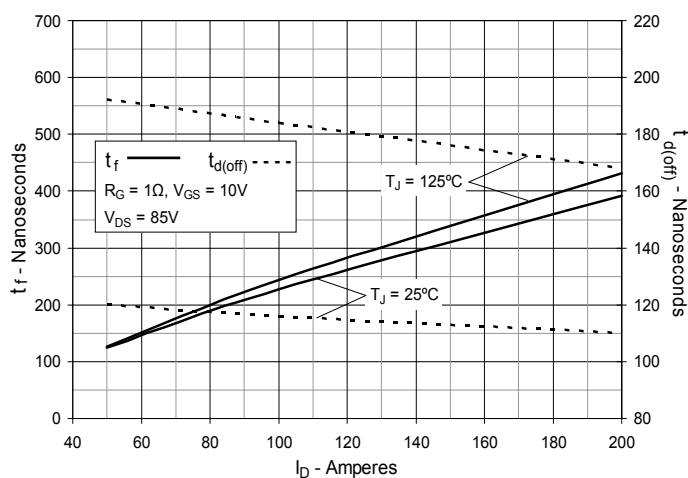
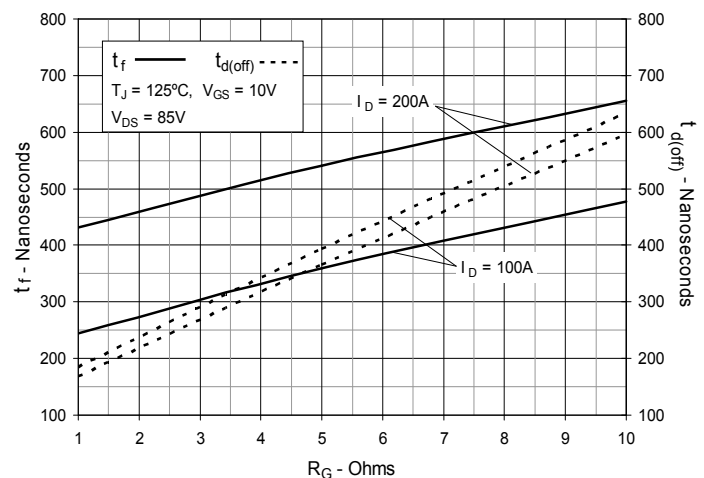
**Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature**

**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

