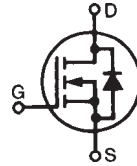


# TrenchT2™ Power MOSFET

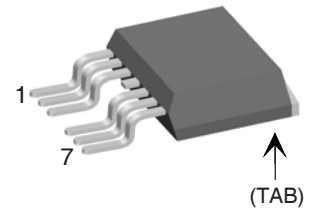
## IXTA300N04T2-7

$$\begin{aligned} V_{DSS} &= 40V \\ I_{D25} &= 300A \\ R_{DS(on)} &\leq 2.5m\Omega \end{aligned}$$

N-Channel Enhancement Mode  
Avalanche Rated



TO-263 (7-lead)



Pins: 1 - Gate  
2, 3 - Source  
5, 6, 7 - Source  
TAB (8) - Drain

| Symbol     | Test Conditions                                                       | Maximum Ratings |                  |
|------------|-----------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C}$ to $175^\circ\text{C}$                       | 40              | V                |
| $V_{DGR}$  | $T_J = 25^\circ\text{C}$ to $175^\circ\text{C}$ , $R_{GS} = 1M\Omega$ | 40              | V                |
| $V_{GSM}$  | Transient                                                             | $\pm 20$        | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                              | 300             | A                |
| $I_{LRMS}$ | Lead Current Limit, RMS                                               | 160             | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$            | 900             | A                |
| $I_A$      | $T_C = 25^\circ\text{C}$                                              | 100             | A                |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                              | 600             | mJ               |
| $P_D$      | $T_C = 25^\circ\text{C}$                                              | 480             | 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                                    | 300             | $^\circ\text{C}$ |
| $T_{sold}$ | Plastic body for 10 seconds                                           | 260             | $^\circ\text{C}$ |
| Weight     |                                                                       | 3               | g                |

### Features

- International standard package
- $175^\circ\text{C}$  Operating Temperature
- Avalanche rated
- High current handling capability
- Low  $R_{DS(on)}$

### Advantages

- Easy to mount
- Space savings
- High power density

### Applications

- Synchronous Buck Converters
- High Current Switching Power Supplies
- Battery Powered Electric Motors
- Resonant-mode power supplies
- Electronics Ballast Application
- Class D Audio Amplifiers

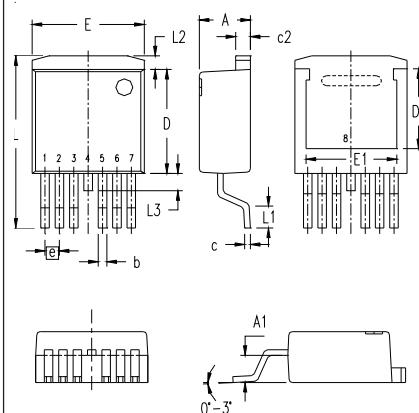
| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified) | Characteristic Values |      |               |
|--------------|---------------------------------------------------------------------------|-----------------------|------|---------------|
|              |                                                                           | Min.                  | Typ. | Max.          |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu A$                                          | 40                    |      | V             |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250\mu A$                                      | 2.0                   |      | 4.0 V         |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$                                        |                       |      | $\pm 200$ nA  |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$                                                        |                       |      | 5 $\mu A$     |
|              | $V_{GS} = 0V$ , $T_J = 150^\circ\text{C}$                                 |                       |      | 150 $\mu A$   |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 50A$ , Notes 1, 2                                 |                       |      | 2.5 $m\Omega$ |

| 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                                                                                          | 55                    | 94   | S                       |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                             |                       | 10.7 | nF                      |
| $C_{oss}$    |                                                                                                                                              |                       | 1630 | pF                      |
| $C_{rss}$    |                                                                                                                                              |                       | 263  | pF                      |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 100\text{A}$<br>$R_G = 2\Omega$ (External) |                       | 22   | ns                      |
| $t_r$        |                                                                                                                                              |                       | 17   | ns                      |
| $t_{d(off)}$ |                                                                                                                                              |                       | 32   | ns                      |
| $t_f$        |                                                                                                                                              |                       | 13   | ns                      |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$                                                             |                       | 145  | nC                      |
| $Q_{gs}$     |                                                                                                                                              |                       | 44   | nC                      |
| $Q_{gd}$     |                                                                                                                                              |                       | 36   | nC                      |
| $R_{thJC}$   |                                                                                                                                              |                       |      | 0.31 $^\circ\text{C/W}$ |

## Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                            | Characteristic Values |      |        |
|----------|--------------------------------------------------------------------------------------------------------|-----------------------|------|--------|
|          |                                                                                                        | Min.                  | Typ. | Max.   |
| $I_S$    | $V_{GS} = 0\text{V}$                                                                                   |                       |      | 300 A  |
| $I_{SM}$ | Repetitive, Pulse width limited by $T_{JM}$                                                            |                       |      | 1000 A |
| $V_{SD}$ | $I_F = 100\text{A}$ , $V_{GS} = 0\text{V}$ , Note 1                                                    |                       |      | 1.3 V  |
| $t_{rr}$ | $I_F = 150\text{A}$ , $V_{GS} = 0\text{V}$<br>$-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 20\text{V}$ |                       | 53   | ns     |
| $I_{RM}$ |                                                                                                        |                       | 1.8  | A      |
| $Q_{RM}$ |                                                                                                        |                       | 47.7 | nC     |

## TO-263 (7-lead) (IXTA..7) Outline



Pins: 1 - Gate  
2, 3 - Source  
4 - Drain  
5, 6, 7 - Source  
Tab (8) - Drain

| SYM | INCHES   |      | MILLIMETER |       |
|-----|----------|------|------------|-------|
|     | MIN      | MAX  | MIN        | MAX   |
| A   | .170     | .185 | 4.30       | 4.70  |
| A1  | .085     | .104 | 2.15       | 2.65  |
| b   | .026     | .035 | 0.65       | 0.90  |
| c   | .016     | .024 | 0.40       | 0.60  |
| c2  | .049     | .055 | 1.25       | 1.40  |
| D   | .355     | .370 | 9.00       | 9.40  |
| D1  | .272     | .280 | 6.90       | 7.10  |
| E   | .386     | .402 | 9.80       | 10.20 |
| E1  | .311     | .319 | 7.90       | 8.10  |
| e   | .050 BSC |      | 1.27 BSC   |       |
| L   | .591     | .614 | 15.00      | 15.60 |
| L1  | .091     | .110 | 2.30       | 2.80  |
| L2  | .039     | .059 | 1.00       | 1.50  |
| L3  | .000     | .059 | 0.00       | 1.50  |

- Notes: 1. Pulse test,  $t \leq 300\mu\text{s}$ ; duty cycle,  $d \leq 2\%$ .  
2. On through-hole packages,  $R_{DS(on)}$  Kelvin test contact location must be 5mm or less from the package body.

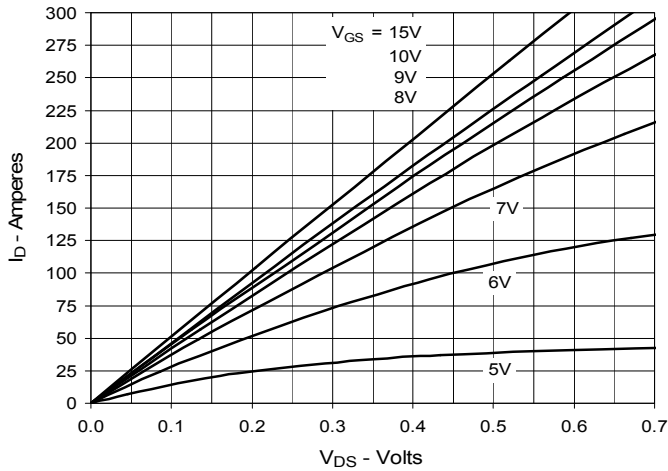
**PRELIMINARY TECHNICAL INFORMATION**

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.

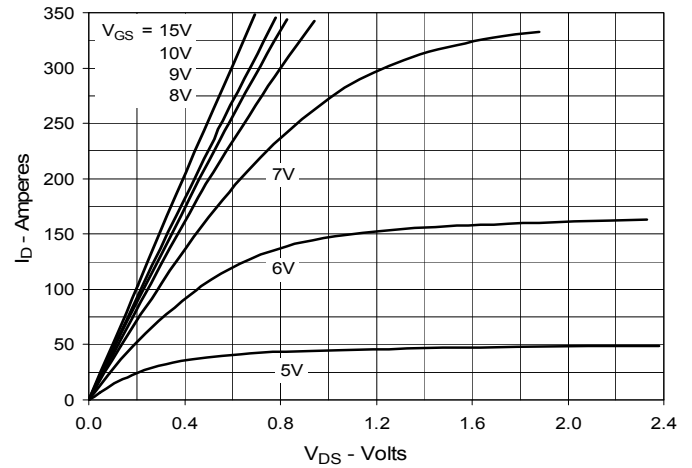
IXYS reserves the right to change limits, test conditions, and dimensions.

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

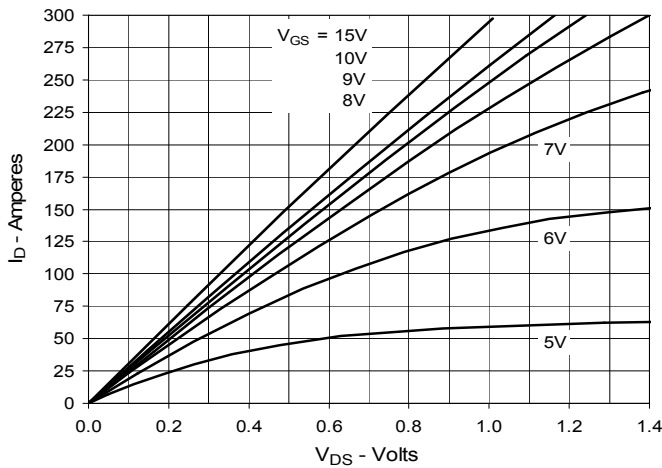
**Fig. 1. Output Characteristics**  
@ 25°C



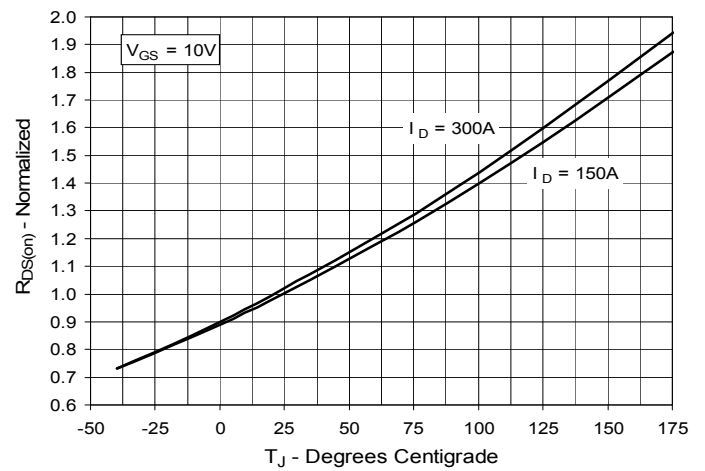
**Fig. 2. Extended Output Characteristics**  
@ 25°C



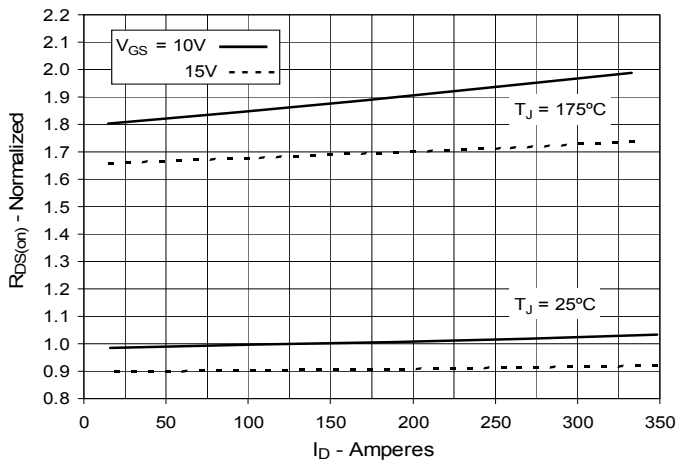
**Fig. 3. Output Characteristics**  
@ 150°C



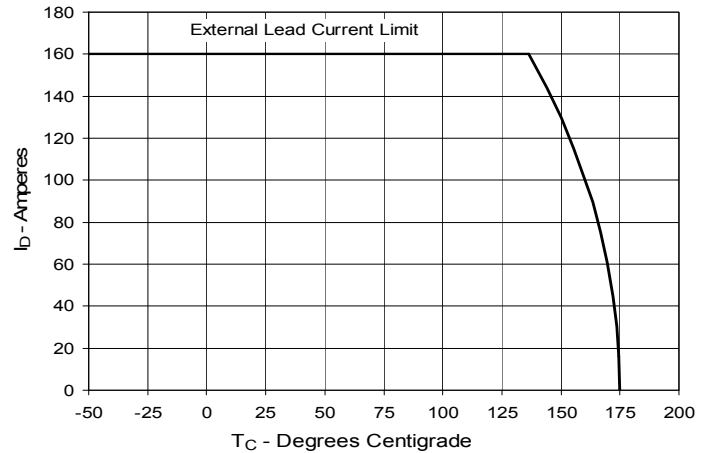
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 150A$  Value**  
vs. Junction Temperature

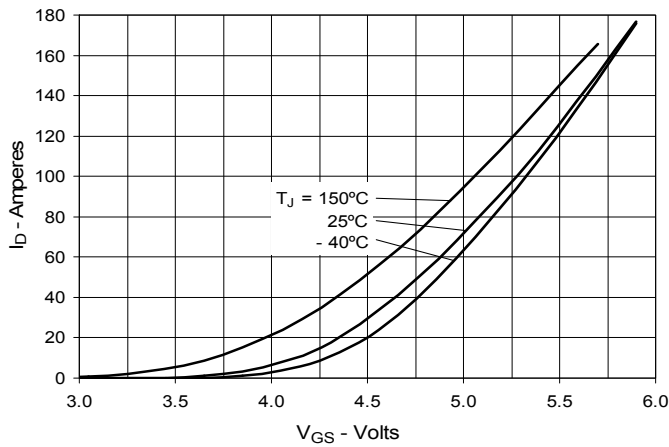
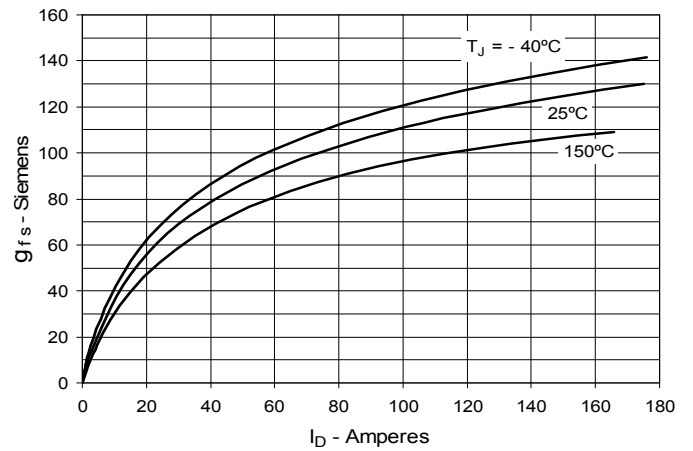
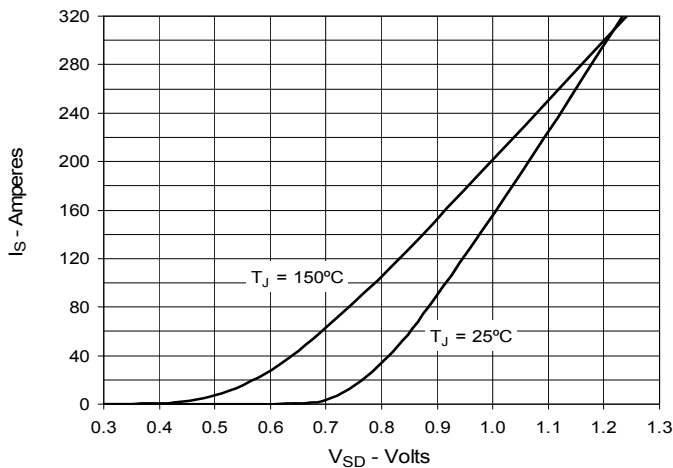
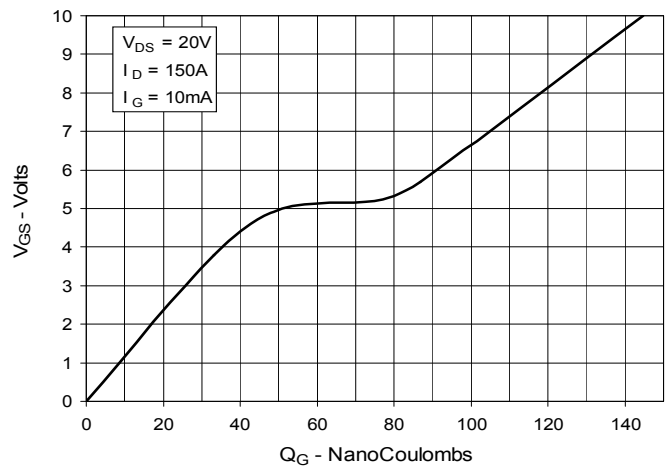
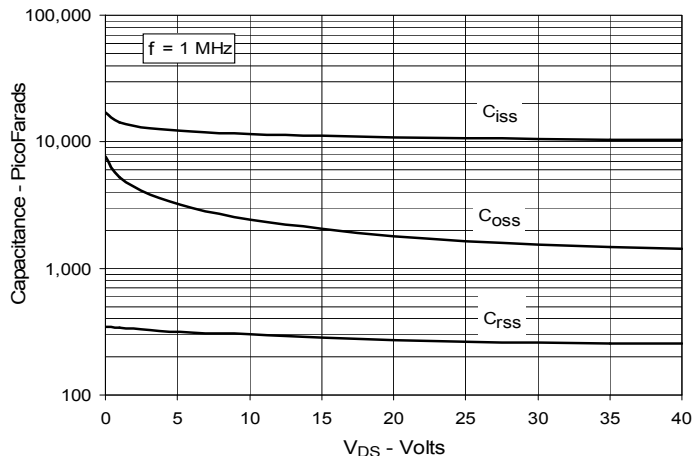
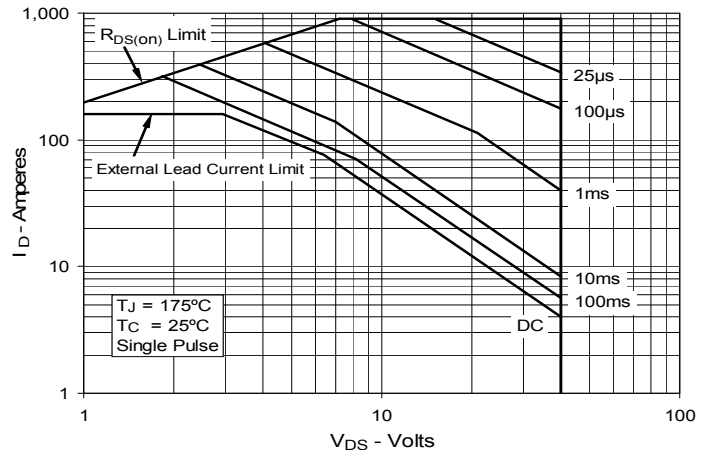


**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 150A$  Value**  
vs. Drain Current

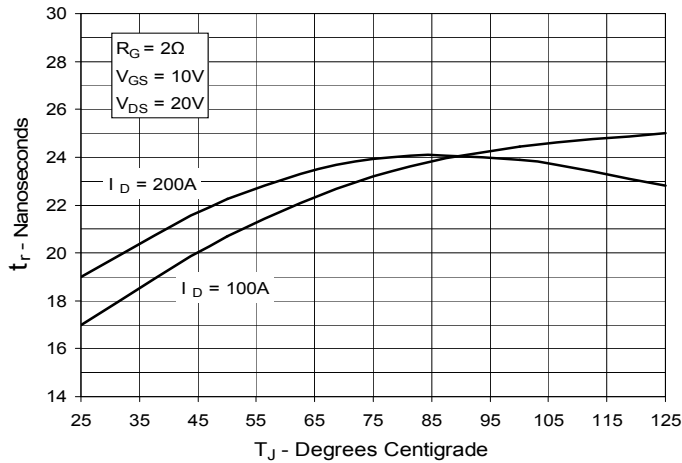


**Fig. 6. Drain Current vs. Case Temperature**

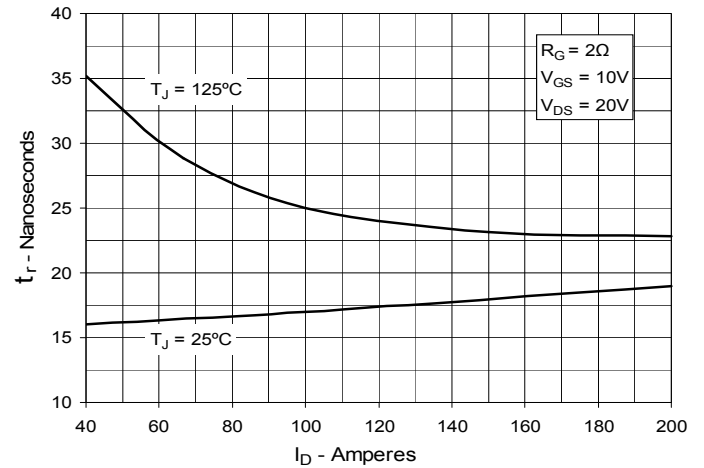


**Fig. 7. Input Admittance**

**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**


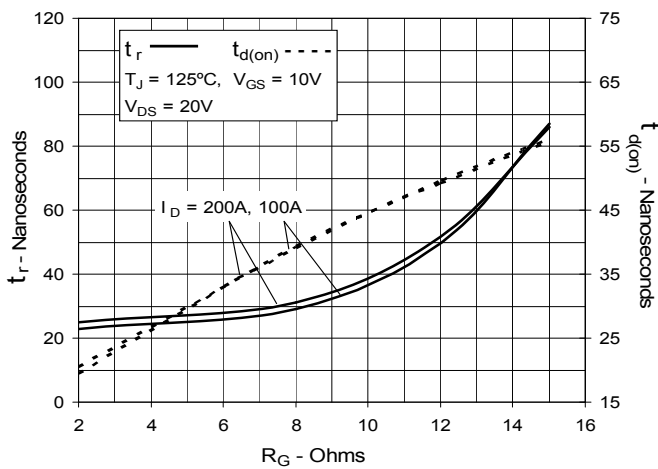
**Fig. 13. Resistive Turn-on  
Rise Time vs. Junction Temperature**



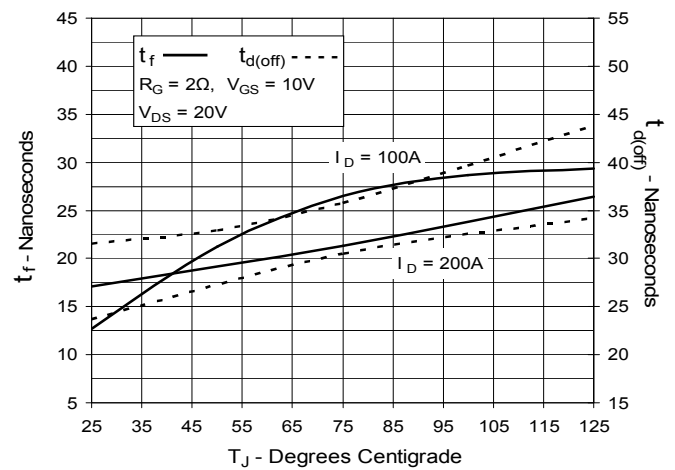
**Fig. 14. Resistive Turn-on  
Rise Time vs. Drain Current**



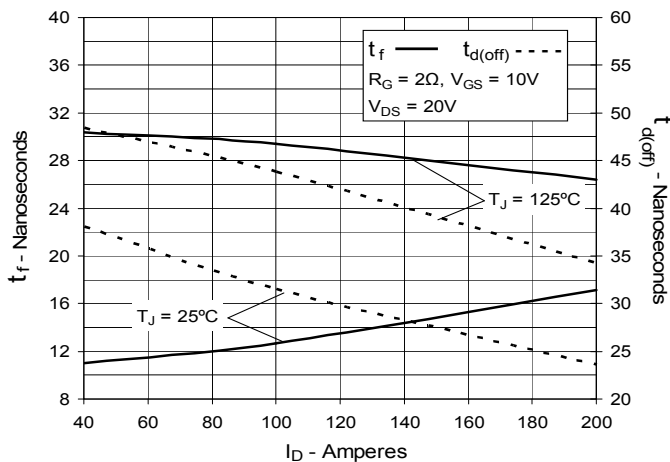
**Fig. 15. Resistive Turn-on  
Switching Times vs. Gate Resistance**



**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**

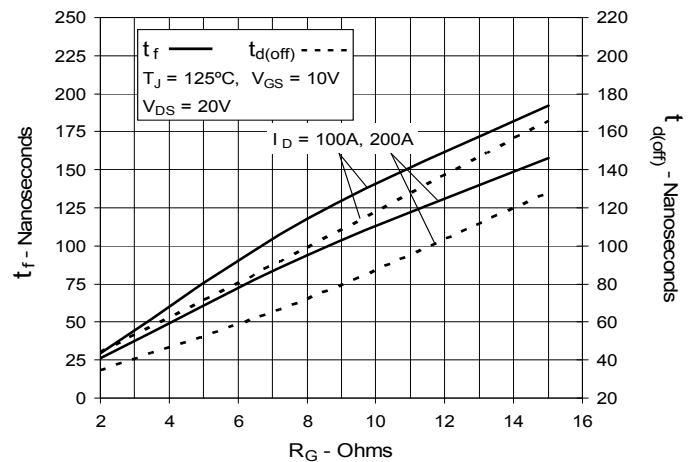
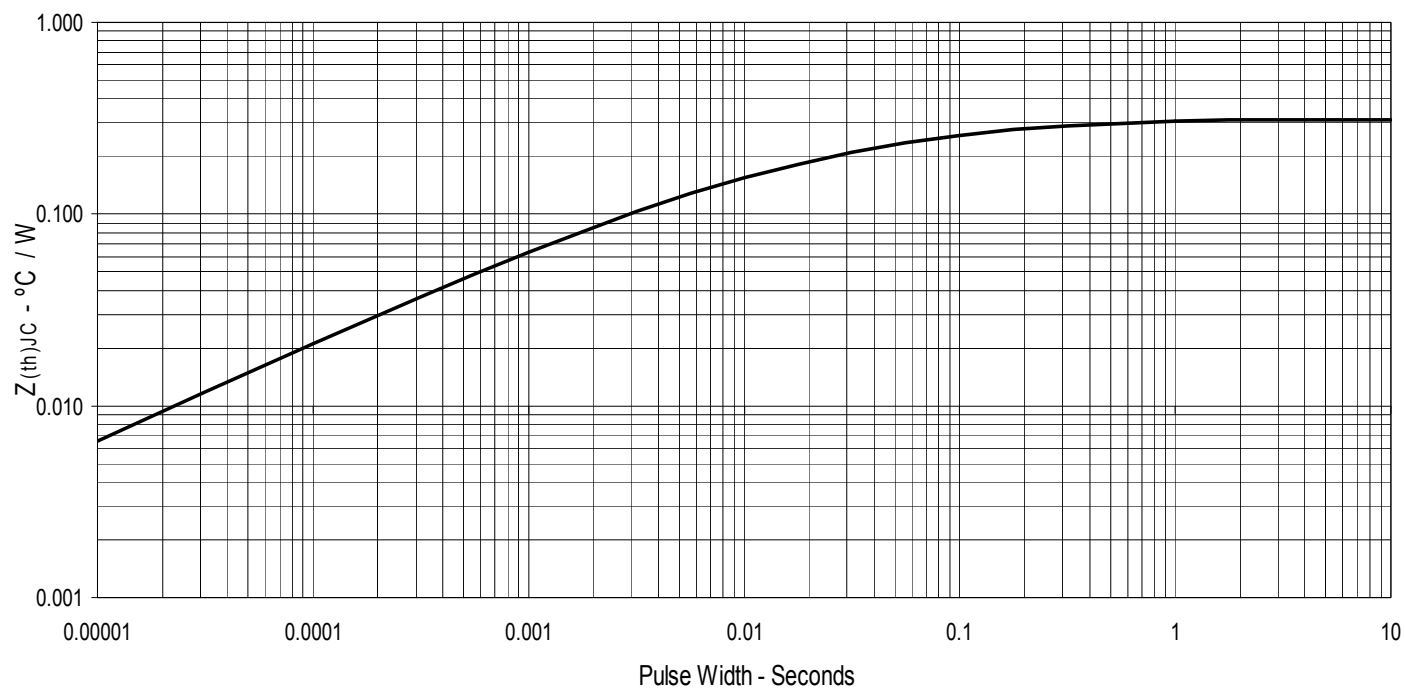


Fig. 19. Maximum Transient Thermal Impedance





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