IXYS

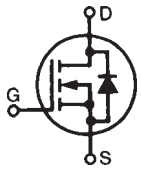
Preliminary Technical Information

# TrenchT2™ Power MOSFET

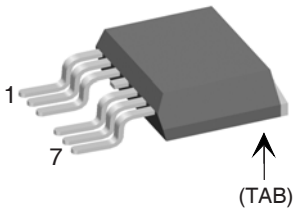
# IXTA300N04T2-7

$V_{DSS}$ = 40V
$I_{D25}$ = 300A
$R_{DS(on)}$ ≤ 2.5mΩ

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°C to 175°C | 40 | V |
| $V_{DGR}$ | $T_J$ = 25°C to 175°C, $R_{GS}$ = 1MΩ | 40 | V |
| $V_{GSM}$ | Transient | ± 20 | V |
| $I_{D25}$ | $T_C$ = 25°C | 300 | A |
| $I_{LRMS}$ | Lead Current Limit, RMS | 160 | A |
| $I_{DM}$ | $T_C$ = 25°C, pulse width limited by $T_{JM}$ | 900 | A |
| $I_A$ | $T_C$ = 25°C | 100 | A |
| $E_{AS}$ | $T_C$ = 25°C | 600 | mJ |
| $P_D$ | $T_C$ = 25°C | 480 | W |
| $T_J$ | | -55 ... +175 | °C |
| $T_{JM}$ | | 175 | °C |
| $T_{stg}$ | | -55 ... +175 | °C |
| $T_L$ | 1.6mm (0.062in.) from case for 10s | 300 | °C |
| $T_{sold}$ | Plastic body for 10 seconds | 260 | °C |
| Weight | | 3 | g |

| Symbol | Test Conditions ($T_J$ = 25°C unless otherwise specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $BV_{DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250μA | 40 | | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D$ = 250μA | 2.0 | | 4.0 | V |
| $I_{GSS}$ | $V_{GS}$ = ± 20V, $V_{DS}$ = 0V | | | ±200 | nA |
| $I_{DSS}$ | $V_{DS} = V_{DSS}$ | | | 5 | μA |
| | $V_{GS}$ = 0V $T_J$ = 150°C | | | 150 | μA |
| $R_{DS(on)}$ | $V_{GS}$ = 10V, $I_D$ = 50A, Notes 1, 2 | | | 2.5 | mΩ |

### Features

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

### Advantages

- Easy to mount
- Space savings
- High power density

### Applications

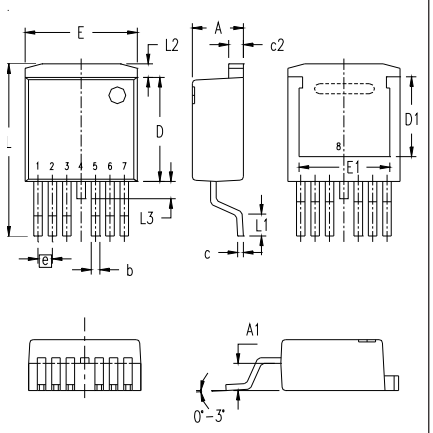
- Synchronous Buck Converters
- High Current Switching Power Supplies
- Battery Powered Electric Motors
- Resonant-mode power supplies
- Electronics Ballast Application
- Class D Audio Amplifiers

| Symbol | Test Conditions ($T_J$ = 25°C, unless otherwise specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $V_{DS}$ = 10V, $I_D$ = 60A, Note 1 | 55 | 94 | | S |
| $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = 25V, f = 1MHz | | 10.7 | | nF |
| $C_{oss}$ | | | 1630 | | pF |
| $C_{rss}$ | | | 263 | | pF |
| $t_{d(on)}$ | **Resistive Switching Times** | | 22 | | ns |
| $t_r$ | $V_{GS}$ = 10V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 100A | | 17 | | ns |
| $t_{d(off)}$ | $R_G$ = 2Ω (External) | | 32 | | ns |
| $t_f$ | | | 13 | | ns |
| $Q_{g(on)}$ | $V_{GS}$ = 10V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 0.5 • $I_{D25}$ | | 145 | | nC |
| $Q_{gs}$ | | | 44 | | nC |
| $Q_{gd}$ | | | 36 | | nC |
| $R_{thJC}$ | | | | 0.31 | °C/W |

**Source-Drain Diode**

| Symbol | Test Conditions ($T_J$ = 25°C, unless otherwise specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $I_S$ | $V_{GS}$ = 0V | | | 300 | A |
| $I_{SM}$ | Repetitive, Pulse width limited by $T_{JM}$ | | | 1000 | A |
| $V_{SD}$ | $I_F$ = 100A, $V_{GS}$ = 0V, Note 1 | | | 1.3 | V |
| $t_{rr}$ | $I_F$ = 150A, $V_{GS}$ = 0V | | 53 | | ns |
| $I_{RM}$ | -di/dt = 100A/μs | | 1.8 | | A |
| $Q_{RM}$ | $V_R$ = 20V | | 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 MIN | INCHES MAX | MILLIMETER MIN | MILLIMETER 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 ≤ 300μs; duty cycle, d ≤ 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.

**Fig. 1. Output Characteristics @ 25ºC**

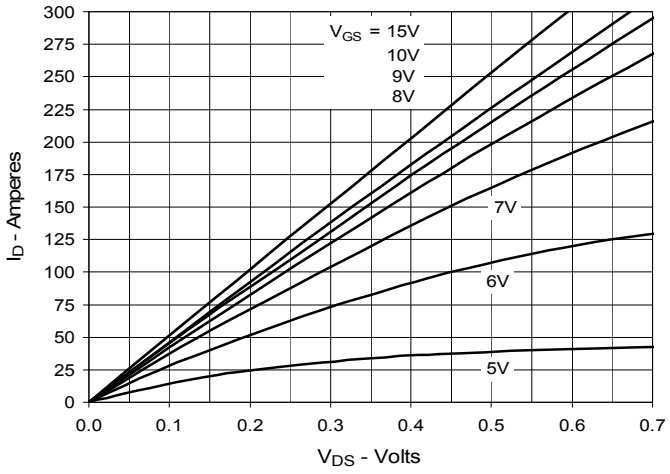



**Fig. 2. Extended Output Characteristics @ 25ºC**

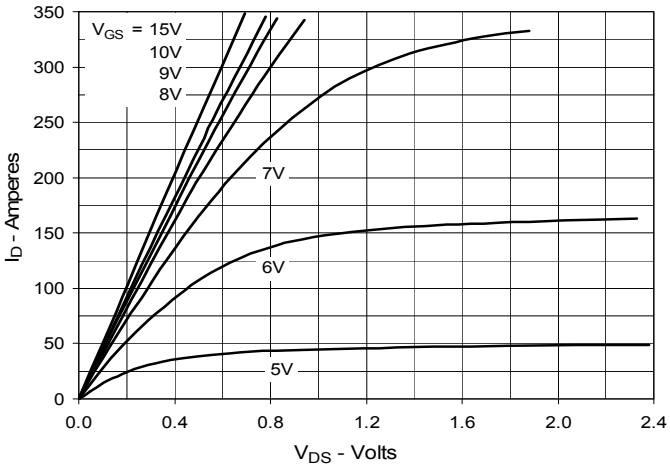



**Fig. 3. Output Characteristics @ 150ºC**

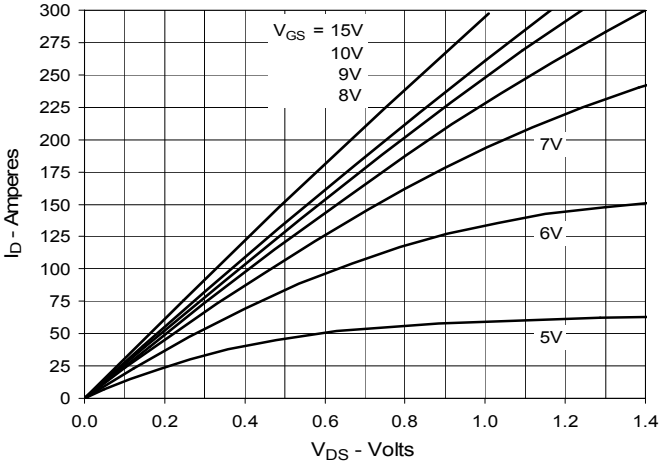



**Fig. 4. $R_{DS(on)}$ Normalized to $I_D$ = 150A Value vs. Junction Temperature**

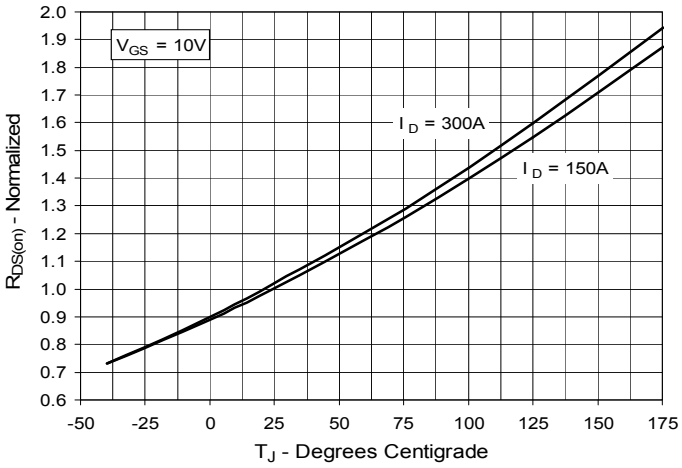



**Fig. 5. $R_{DS(on)}$ Normalized to $I_D$ = 150A Value vs. Drain Current**

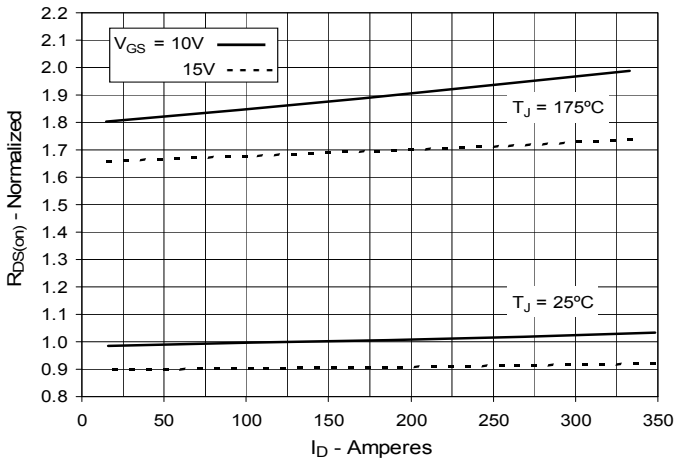



**Fig. 6. Drain Current vs. Case Temperature**

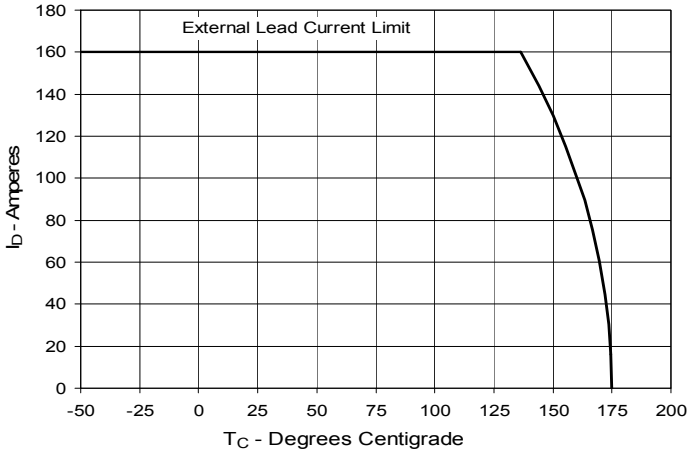


**Fig. 7. Input Admittance**

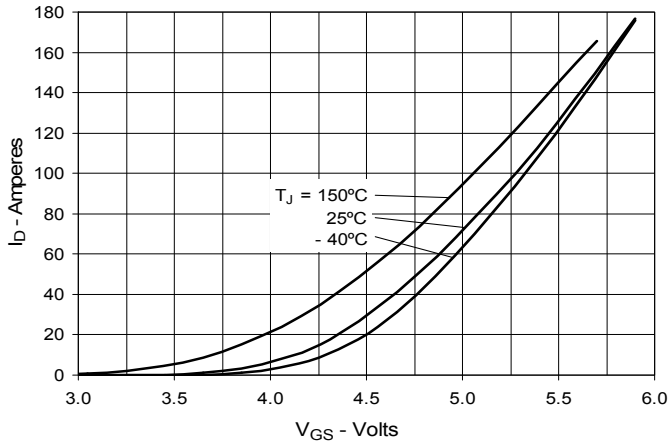



**Fig. 8. Transconductance**

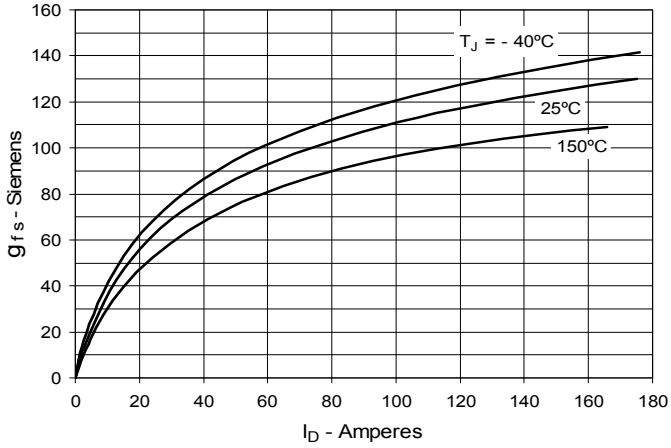



**Fig. 9. Forward Voltage Drop of Intrinsic Diode**

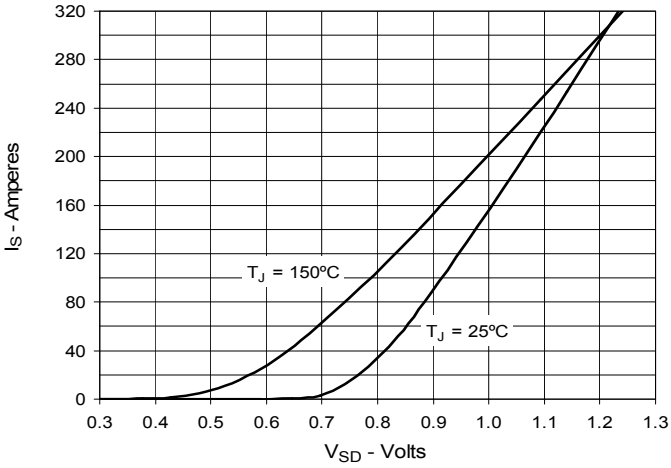



**Fig. 10. Gate Charge**

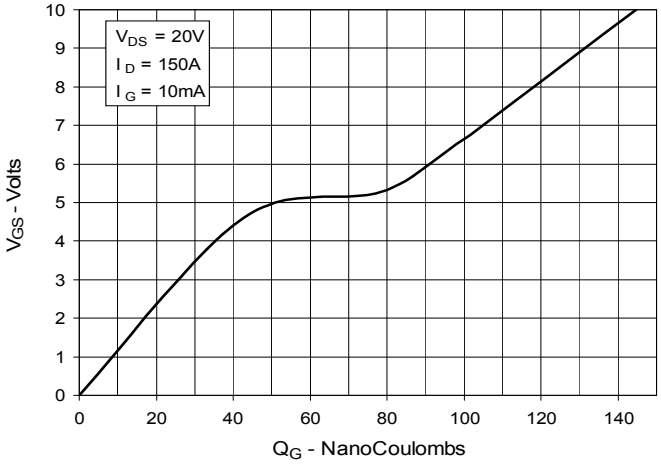



**Fig. 11. Capacitance**

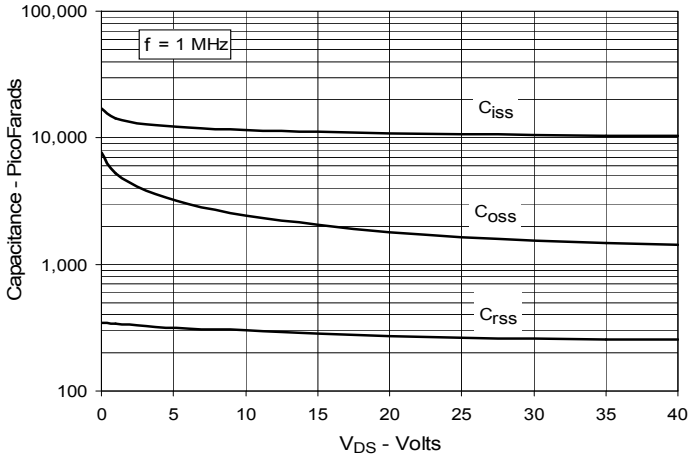



**Fig. 12. Forward-Bias Safe Operating Area**

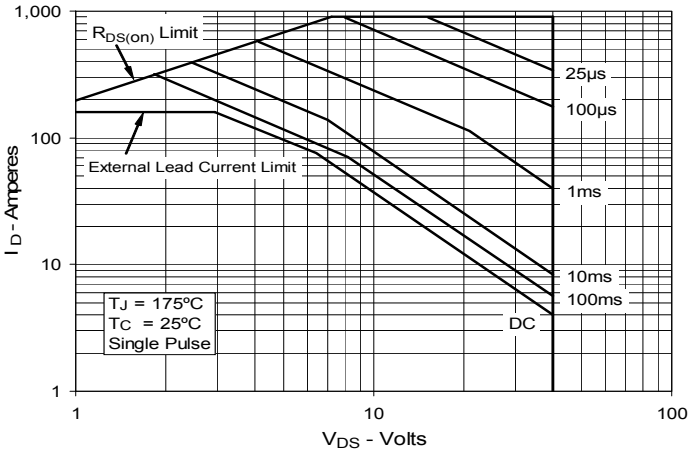


**Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature**

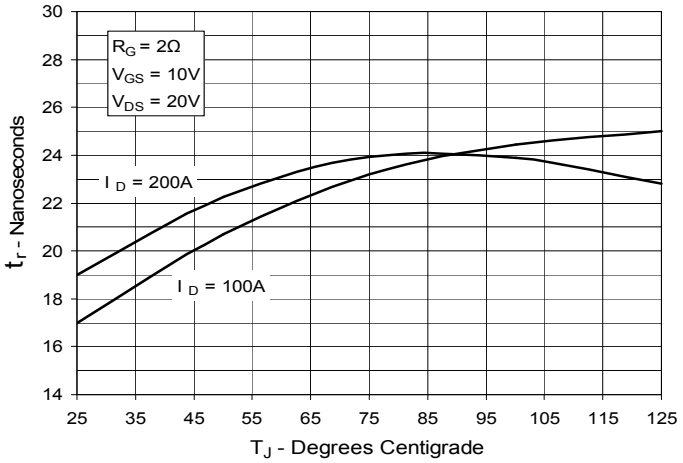



**Fig. 14. Resistive Turn-on Rise Time vs. Drain Current**

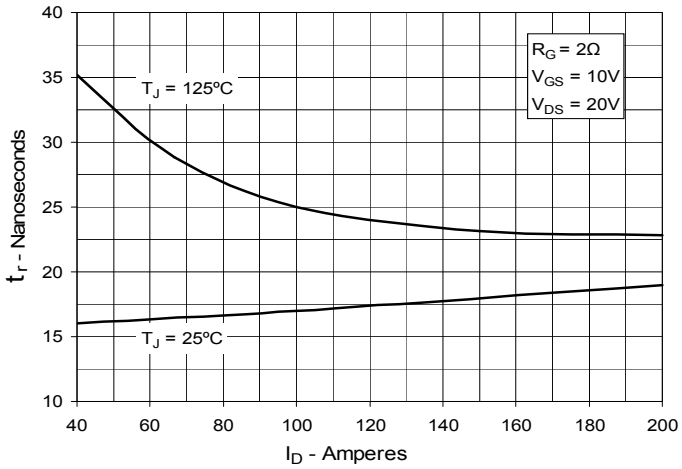



**Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance**

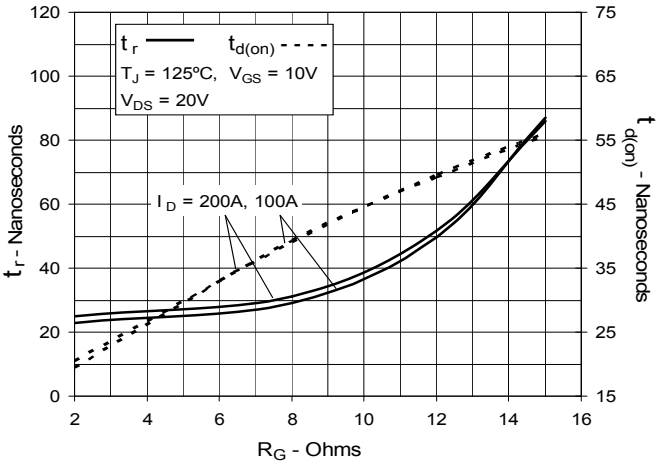



**Fig. 16. Resistive Turn-off Switching Times vs. Junction Temperature**

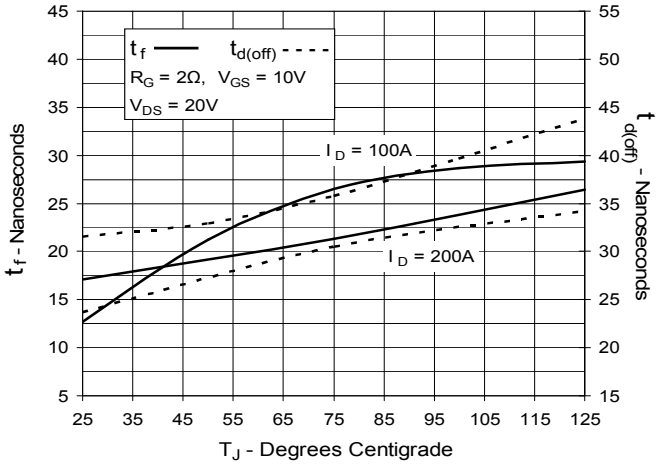



**Fig. 17. Resistive Turn-off Switching Times vs. Drain Current**

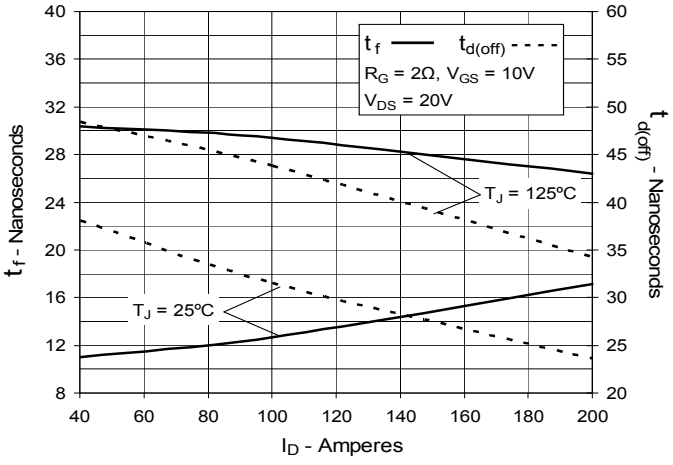



**Fig. 18. Resistive Turn-off Switching Times vs. Gate Resistance**

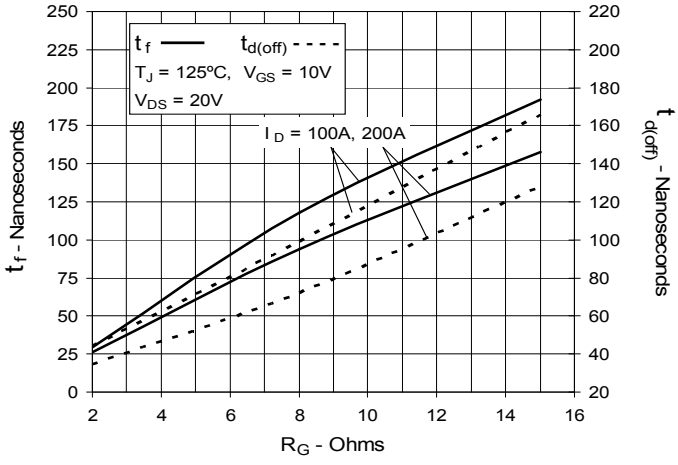


**Fig. 19. Maximum Transient Thermal Impedance**