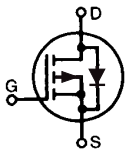
IXYS

# TrenchP™ Power MOSFETs

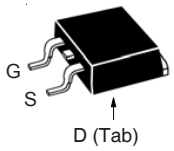
**IXTA120P065T**
**IXTP120P065T**
**IXTH120P065T**

$V_{DSS}$ = - 65V
$I_{D25}$ = - 120A
$R_{DS(on)}$ ≤ 10mΩ

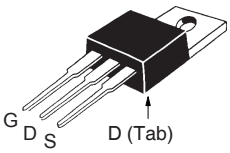
P-Channel Enhancement Mode
Avalanche Rated



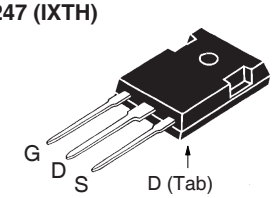

**TO-263 AA (IXTA)**




**TO-220AB (IXTP)**




**TO-247 (IXTH)**




G = Gate D = Drain
S = Source Tab = Drain

| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{DSS}$ | $T_J$ = 25°C to 150°C | - 65 | V |
| $V_{DGR}$ | $T_J$ = 25°C to 150°C, $R_{GS}$ = 1MΩ | - 65 | V |
| $V_{GSS}$ | Continuous | ±15 | V |
| $V_{GSM}$ | Transient | ±25 | V |
| $I_{D25}$ | $T_C$ = 25°C | - 120 | A |
| $I_{DM}$ | $T_C$ = 25°C, Pulse Width Limited by $T_{JM}$ | - 360 | A |
| $I_A$ | $T_C$ = 25°C | - 60 | A |
| $E_{AS}$ | $T_C$ = 25°C | 1 | J |
| $P_D$ | $T_C$ = 25°C | 298 | W |
| $T_J$ | | -55 ... +150 | °C |
| $T_{JM}$ | | 150 | °C |
| $T_{stg}$ | | -55 ... +150 | °C |
| $T_L$ | 1.6mm (0.062 in.) from Case for 10s | 300 | °C |
| $T_{SOLD}$ | Plastic Body for 10s | 260 | °C |
| $M_d$ | Mounting Torque (TO-220 & TO-247) | 1.13/10 | Nm/lb.in. |
| **Weight** | TO-263 | 2.5 | g |
| | TO-220 | 3.0 | g |
| | TO-247 | 6.0 | g |

| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $BV_{DSS}$ | $V_{GS}$ = 0V, $I_D$ = - 250μA | - 65 | | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D$ = - 250μA | - 2.0 | | - 4.0 | V |
| $I_{GSS}$ | $V_{GS}$ = ± 15V, $V_{DS}$ = 0V | | | ±100 | nA |
| $I_{DSS}$ | $V_{DS} = V_{DSS}$, $V_{GS}$ = 0V | | | - 10 | μA |
| | $T_J$ = 125°C | | | - 750 | μA |
| $R_{DS(on)}$ | $V_{GS}$ = -10V, $I_D = 0.5 \bullet I_{D25}$, Note 1 | | | 10 | mΩ |

## Features

- International Standard Packages
- Avalanche Rated
- Extended FBSOA
- Fast Intrinsic Diode
- Low $R_{DS(ON)}$ and $Q_G$

## Advantages

- Easy to Mount
- Space Savings
- High Power Density

## Applications

- High-Side Switching
- Push Pull Amplifiers
- DC Choppers
- Automatic Test Equipment
- Current Regulators
- Battery Charger Applications

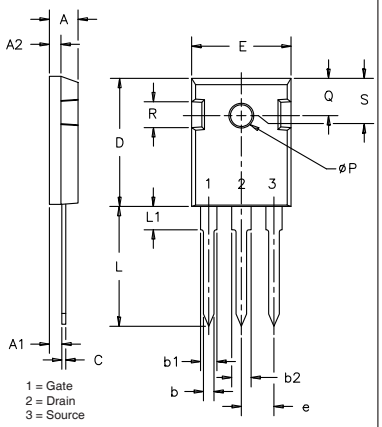
| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. |
|---|---|---|---|---|
| $g_{fs}$ | $V_{DS}$ = -10V, $I_D$ = 0.5 • $I_{D25}$, Note 1 | 45 | 75 | S |
| $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = - 25V, f = 1MHz | | 13.2 | nF |
| $C_{oss}$ | | | 1345 | pF |
| $C_{rss}$ | | | 505 | pF |
| $t_{d(on)}$ | **Resistive Switching Times** | | 31 | ns |
| $t_r$ | $V_{GS}$ = -10V, $V_{DS}$ = - 33V, $I_D$ = - 50A | | 28 | ns |
| $t_{d(off)}$ | $R_G$ = 1Ω (External) | | 38 | ns |
| $t_f$ | | | 21 | ns |
| $Q_{g(on)}$ | $V_{GS}$ = -10V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 0.5 • $I_{D25}$ | | 185 | nC |
| $Q_{gs}$ | | | 55 | nC |
| $Q_{gd}$ | | | 58 | nC |
| $R_{thJC}$ | | | | 0.42 °C/W |
| $R_{thCS}$ | (TO-220) | | 0.50 | °C/W |
| | (TO-247) | | 0.21 | °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 | | | - 120 A |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$ | | | - 480 A |
| $V_{SD}$ | $I_F$ = - 60A, $V_{GS}$ = 0V, Note 1 | | | -1.3 V |
| $t_{rr}$ | $I_F$ = - 60A, -di/dt = -100A/μs | | 53 | ns |
| $Q_{RM}$ | $V_R$ = - 33V, $V_{GS}$ = 0V | | 77 | nC |
| $I_{RM}$ | | | - 2.9 | A |

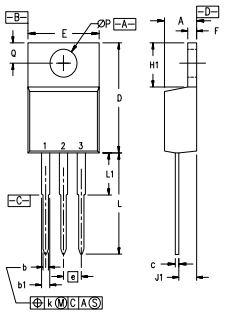
Note 1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.

**TO-247 Outline**




| SYM | INCHES MIN | INCHES MAX | MILLIMETERS MIN | MILLIMETERS MAX |
|---|---|---|---|---|
| A | .185 | .209 | 4.7 | 5.3 |
| $A_1$ | .087 | .102 | 2.2 | 2.54 |
| $A_2$ | .059 | .098 | 2.2 | 2.6 |
| b | .040 | .055 | 1.0 | 1.4 |
| $b_1$ | .065 | .084 | 1.65 | 2.13 |
| $b_2$ | .113 | .123 | 2.87 | 3.12 |
| C | .016 | .031 | .4 | .8 |
| D | .819 | .845 | 20.80 | 21.46 |
| E | .610 | .640 | 15.75 | 16.26 |
| e | .215 BSC | | 5.45 BSC | |
| L | .780 | .800 | 19.81 | 20.32 |
| L1 | | .177 | | 4.50 |
| øP | .140 | .144 | 3.55 | 3.65 |
| Q | .212 | .244 | 5.4 | 6.2 |
| R | .170 | .216 | 4.32 | 5.49 |
| S | .242 BSC | | 6.15 BSC | |

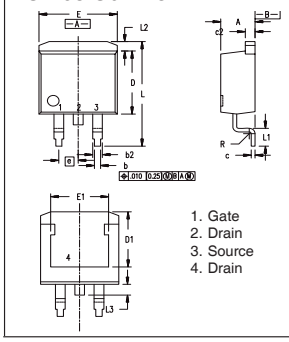
**TO-220 Outline**




Pins: 1 - Gate 2 - Drain
3 - Source 4 - Drain

| SYM | INCHES MIN | INCHES MAX | MILLIMETERS MIN | MILLIMETERS MAX |
|---|---|---|---|---|
| A | .170 | .190 | 4.32 | 4.83 |
| b | .025 | .040 | 0.64 | 1.02 |
| b1 | .045 | .065 | 1.15 | 1.65 |
| c | .014 | .022 | 0.35 | 0.56 |
| D | .580 | .630 | 14.73 | 16.00 |
| E | .390 | .420 | 9.91 | 10.66 |
| e | .100 BSC | | 2.54 BSC | |
| F | .045 | .055 | 1.14 | 1.40 |
| H1 | .230 | .270 | 5.85 | 6.85 |
| J1 | .090 | .110 | 2.29 | 2.79 |
| k | 0 | .015 | 0 | 0.38 |
| L | .500 | .550 | 12.70 | 13.97 |
| L1 | .110 | .230 | 2.79 | 5.84 |
| øP | .139 | .161 | 3.53 | 4.08 |
| Q | .100 | .125 | 2.54 | 3.18 |

**TO-263 Outline**




| Dim. | Millimeter Min. | Millimeter Max. | Inches Min. | Inches Max. |
|---|---|---|---|---|
| A | 4.06 | 4.83 | .160 | .190 |
| b | 0.51 | 0.99 | .020 | .039 |
| b2 | 1.14 | 1.40 | .045 | .055 |
| c | 0.40 | 0.74 | .016 | .029 |
| c2 | 1.14 | 1.40 | .045 | .055 |
| D | 8.64 | 9.65 | .340 | .380 |
| D1 | 8.00 | 8.89 | .280 | .320 |
| E | 9.65 | 10.41 | .380 | .405 |
| E1 | 6.22 | 8.13 | .270 | .320 |
| e | 2.54 | BSC | .100 | BSC |
| L | 14.61 | 15.88 | .575 | .625 |
| L1 | 2.29 | 2.79 | .090 | .110 |
| L2 | 1.02 | 1.40 | .040 | .055 |
| L3 | 1.27 | 1.78 | .050 | .070 |
| L4 | 0 | 0.13 | 0 | .005 |

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

**Fig. 1. Output Characteristics @ $T_J$ = 25ºC**

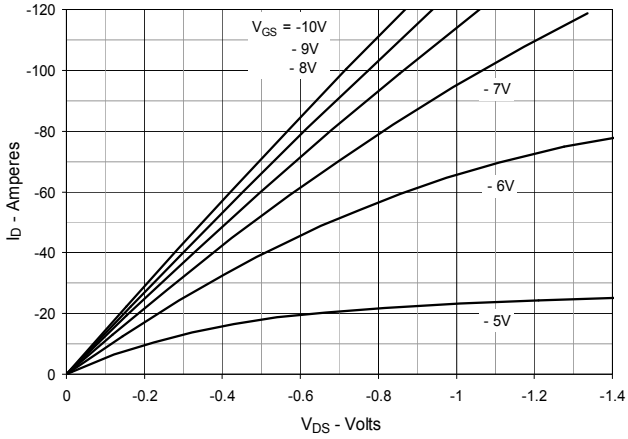



**Fig. 2. Extended Output Characteristics @ $T_J$ = 25ºC**

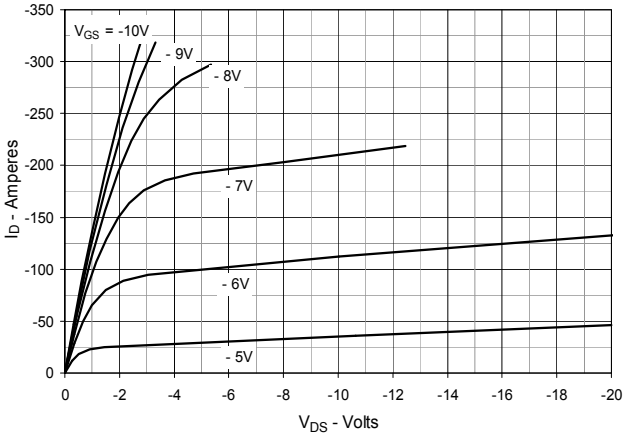



**Fig. 3. Output Characteristics @ $T_J$ = 125ºC**

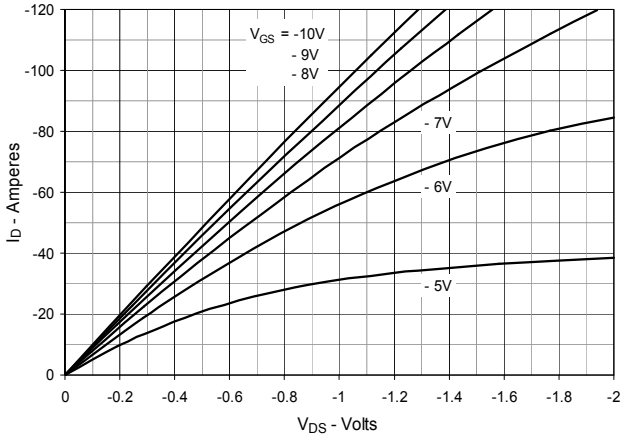



**Fig. 4. $R_{DS(on)}$ Normalized to $I_D$ = - 60A Value vs. Junction Temperature**

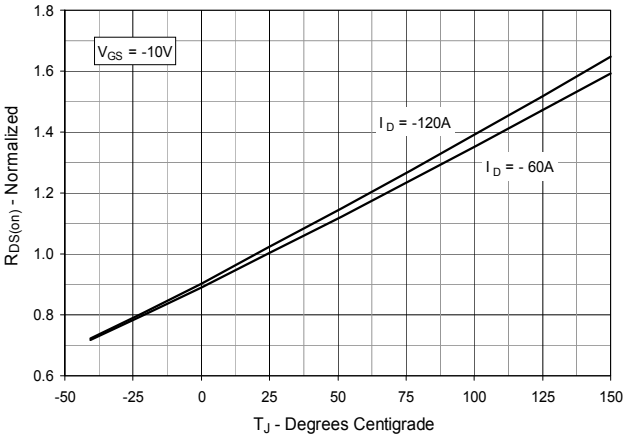



**Fig. 5. $R_{DS(on)}$ Normalized to $I_D$ = - 60A Value vs. Drain Current**

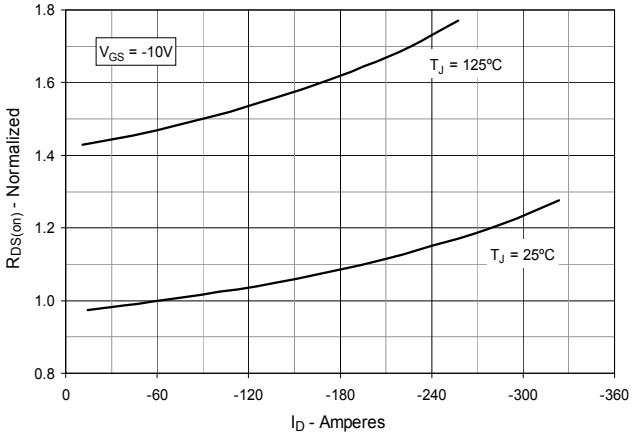



**Fig. 6. Maximum Drain Current vs. Case Temperature**

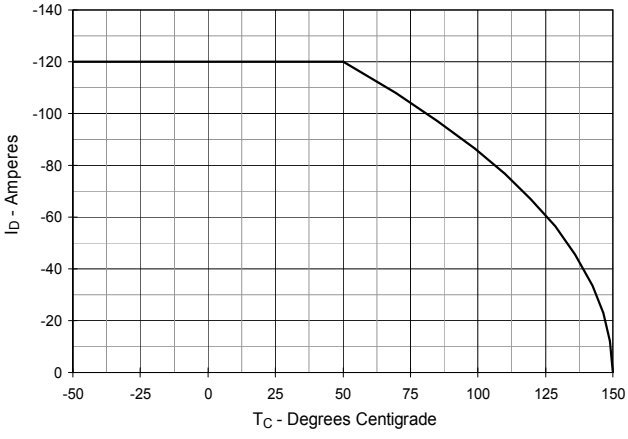


**Fig. 7. Input Admittance**

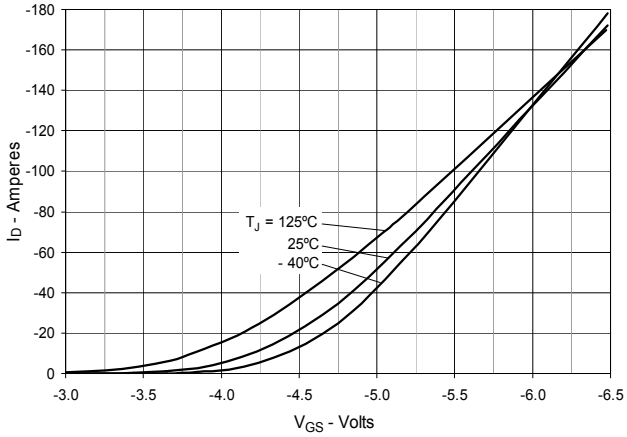



**Fig. 8. Transconductance**

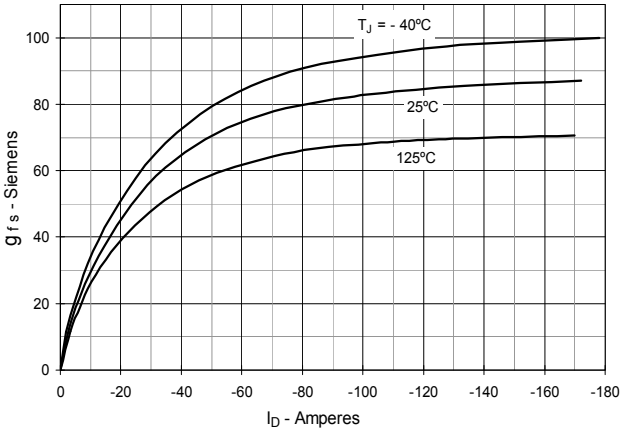



**Fig. 9. Forward Voltage Drop of Intrinsic Diode**

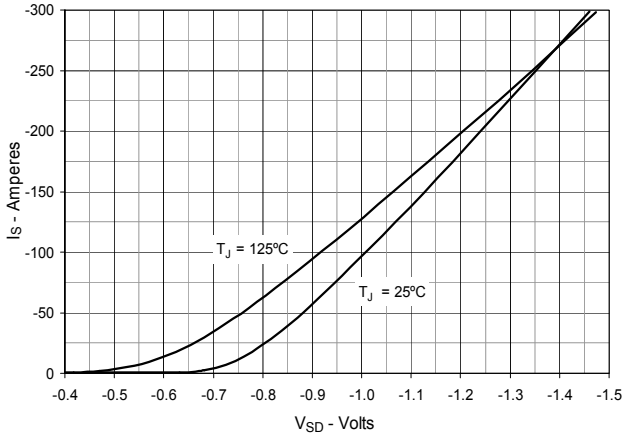



**Fig. 10. Gate Charge**

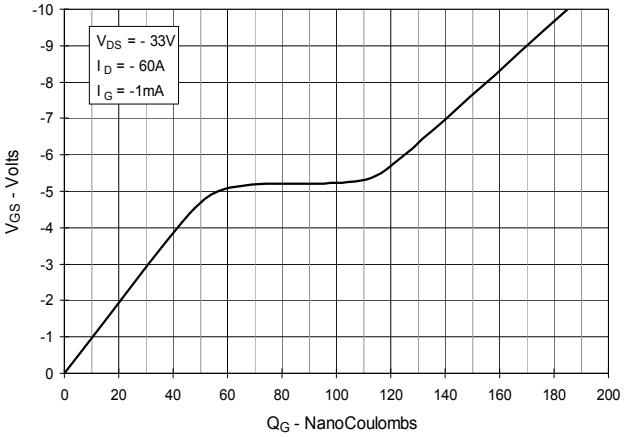



**Fig. 11. Capacitance**

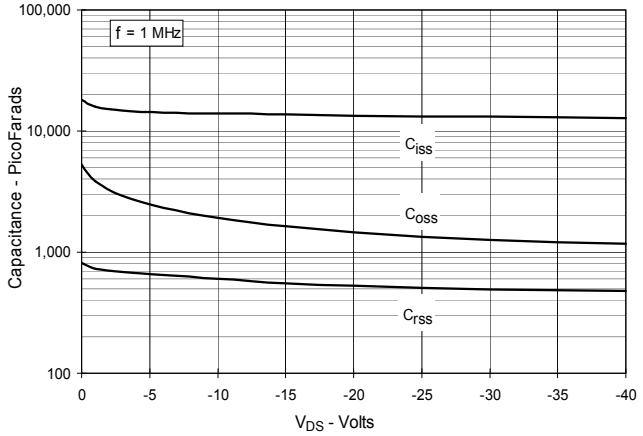



**Fig. 12. Forward-Bias Safe Operating Area**

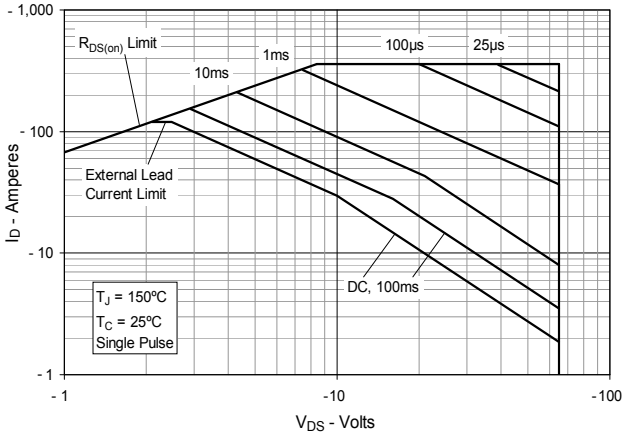


**Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature**

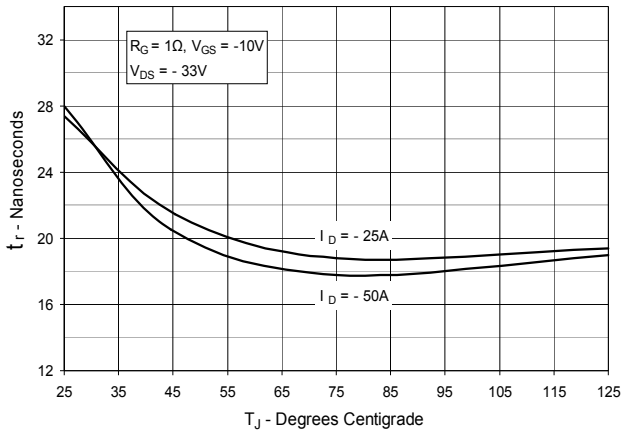



**Fig. 14. Resistive Turn-on Rise Time vs. Drain Current**

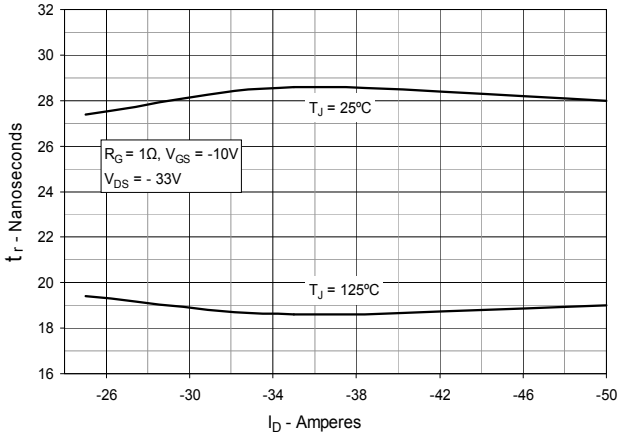



**Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance**

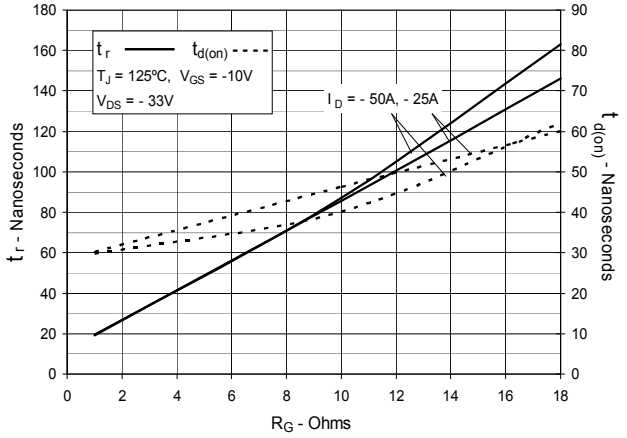



**Fig. 16. Resistive Turn-off Switching Times vs. Junction Temperature**

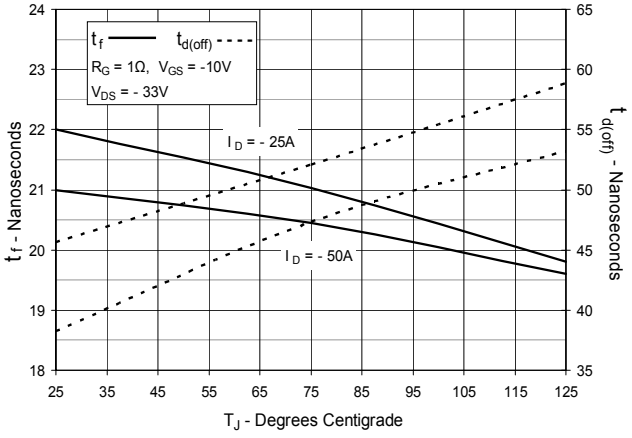



**Fig. 17. Resistive Turn-off Switching Times vs. Drain Current**

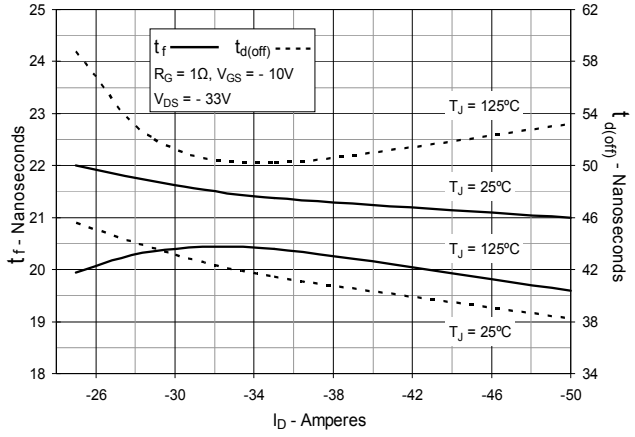



**Fig. 18. Resistive Turn-off Switching Times vs. Gate Resistance**

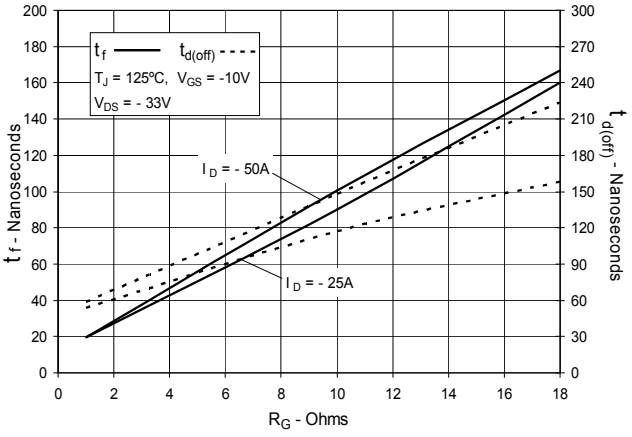


**Fig. 19. Maximum Transient Thermal Impedance**