

TrenchMV™ Power MOSFET

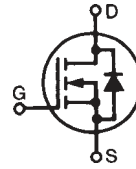
IXTA220N055T7

$$V_{DSS} = 55 \text{ V}$$

$$I_{D25} = 220 \text{ A}$$

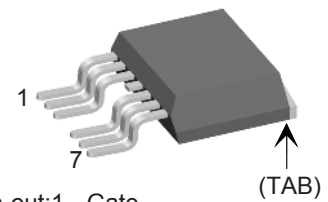
$$R_{DS(on)} \leq 4.0 \text{ m}\Omega$$

N-Channel Enhancement Mode
Avalanche Rated



| Symbol | Test Conditions | Maximum Ratings | |
|---------------|---|-----------------|------------------|
| V_{DSS} | $T_J = 25^\circ\text{C to } 175^\circ\text{C}$ | 55 | V |
| V_{DGR} | $T_J = 25^\circ\text{C to } 175^\circ\text{C}; R_{GS} = 1 \text{ M}\Omega$ | 55 | V |
| V_{GSM} | Transient | ± 20 | V |
| I_{D25} | $T_C = 25^\circ\text{C}$ | 220 | A |
| I_{LRMS} | Package Current Limit, RMS | 120 | A |
| I_{DM} | $T_C = 25^\circ\text{C}$, pulse width limited by T_{JM} | 600 | A |
| I_{AR} | $T_C = 25^\circ\text{C}$ | 25 | A |
| E_{AS} | $T_C = 25^\circ\text{C}$ | 1.0 | J |
| dv/dt | $I_S \leq I_{DM}$, $di/dt \leq 100 \text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DSS}$ $T_J \leq 175^\circ\text{C}$, $R_G = 5 \Omega$ | 3 | V/ns |
| P_D | $T_C = 25^\circ\text{C}$ | 430 | W |
| T_J | | -55 ... +175 | $^\circ\text{C}$ |
| T_{JM} | | 175 | $^\circ\text{C}$ |
| T_{stg} | | -55 ... +175 | $^\circ\text{C}$ |
| T_L | 1.6 mm (0.062 in.) from case for 10 s | 300 | $^\circ\text{C}$ |
| T_{SOLD} | Plastic body for 10 seconds | 260 | $^\circ\text{C}$ |
| Weight | | 3 | g |

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



Pin-out: 1 - Gate
2, 3 - Source
4 - NC (cut)
5,6,7 - Source
TAB (8) - Drain

Features

- Ultra-low On Resistance
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
- easy to drive and to protect
- 175 °C Operating Temperature

Advantages

- Easy to mount
- Space savings
- High power density

Applications

- Automotive
 - Motor Drives
 - High Side Switch
 - 12V Battery
 - ABS Systems
- DC/DC Converters and Off-line UPS
- Primary- Side Switch
- High Current Switching Applications

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$ unless otherwise specified) | Characteristic Values | | |
|--------------|---|-----------------------|------|--------------------------------------|
| | | Min. | Typ. | Max. |
| BV_{DSS} | $V_{GS} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$ | 55 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 250 \mu\text{A}$ | 2.0 | | V |
| I_{GSS} | $V_{GS} = \pm 20 \text{ V}$, $V_{DS} = 0 \text{ V}$ | | | $\pm 200 \text{ nA}$ |
| I_{DSS} | $V_{DS} = V_{DSS}$ $V_{GS} = 0 \text{ V}$ $T_J = 150^\circ\text{C}$ | | | 5 μA 250 μA |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$, $I_D = 25 \text{ A}$, Note 1 | 3.1 | 4.0 | $\text{m}\Omega$ |

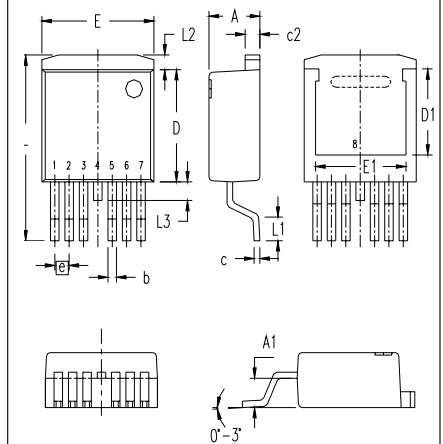
| Symbol | Test Conditions | Characteristic Values | | |
|---|---|-----------------------|------|--------------------|
| | | Min. | Typ. | Max. |
| $(T_j = 25^\circ\text{C unless otherwise specified})$ | | | | |
| g_{fs} | $V_{DS} = 10\text{ V}; I_D = 60\text{ A, Note 1}$ | 75 | 120 | S |
| C_{iss} | | | 7200 | pF |
| C_{oss} | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$ | | 1270 | pF |
| C_{rss} | | | 285 | pF |
| $t_{d(on)}$ | Resistive Switching Times | | 36 | ns |
| t_r | $V_{GS} = 10\text{ V}, V_{DS} = 30\text{ V}, I_D = 25\text{ A}$ | | 62 | ns |
| $t_{d(off)}$ | $R_G = 5\ \Omega$ (External) | | 53 | ns |
| t_f | | | 53 | ns |
| $Q_{g(on)}$ | | | 158 | nC |
| Q_{gs} | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 25\text{ A}$ | | 42 | nC |
| Q_{gd} | | | 46 | nC |
| R_{thJC} | | | 0.35 | $^\circ\text{C/W}$ |

Source-Drain Diode

| Symbol | Test Conditions | Characteristic Values | | |
|---|--|-----------------------|------|-------|
| | | Min. | Typ. | Max. |
| $T_j = 25^\circ\text{C unless otherwise specified}$ | | | | |
| I_s | $V_{GS} = 0\text{ V}$ | | | 220 A |
| I_{SM} | Pulse width limited by T_{JM} | | | 600 A |
| V_{SD} | $I_F = 25\text{ A}, V_{GS} = 0\text{ V, Note 1}$ | | | 1.0 V |
| t_{rr} | $I_F = 25\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}$ $V_R = 25\text{ V}, V_{GS} = 0\text{ V}$ | | 70 | ns |

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

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 |

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.

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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 | 6,404,065B1 | 6,683,344 | 6,727,585 | 7,005,734B2 | 7,063,975B2 |
| | 4,850,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123B1 | 6,534,343 | 6,710,405B2 | 6,759,692 | 7,063,975B2 | 7,071,537 |
| | 4,881,106 | | 5,034,796 | 5,187,117 | 5,486,715 | 6,306,728B1 | 6,583,505 | 6,710,463 | 6,771,478B2 | 7,071,537 |

Fig. 1. Output Characteristics @ 25°C

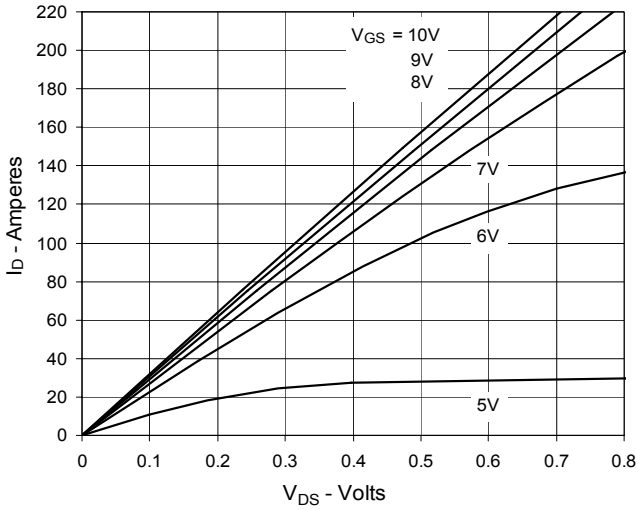


Fig. 2. Extended Output Characteristics @ 25°C

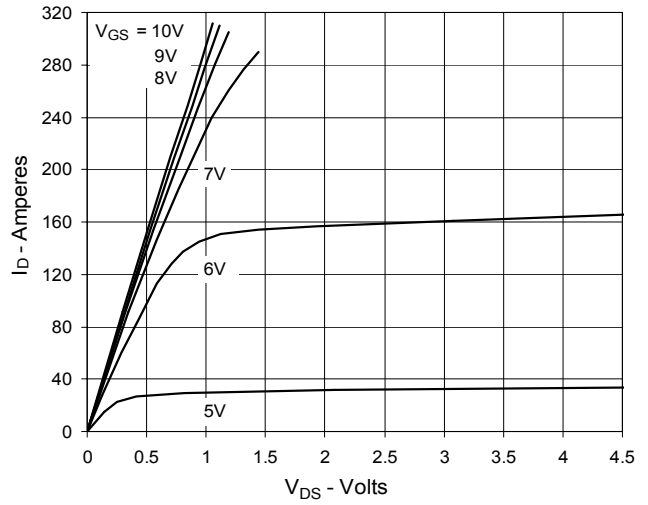


Fig. 3. Output Characteristics @ 150°C

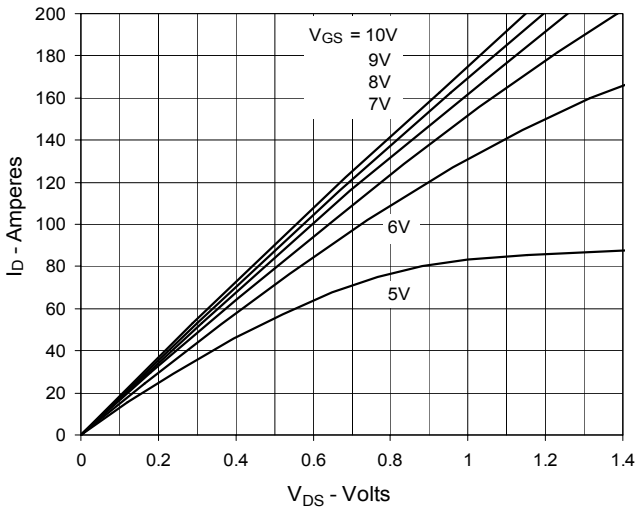


Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 110A$ Value vs. Junction Temperature

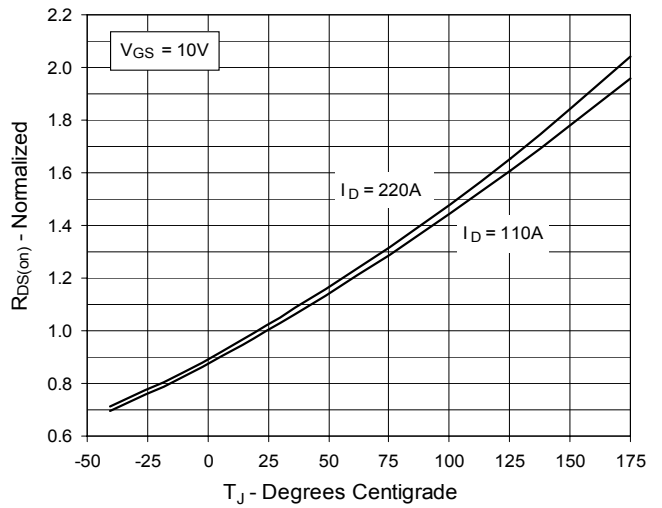


Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 110A$ Value vs. Drain Current

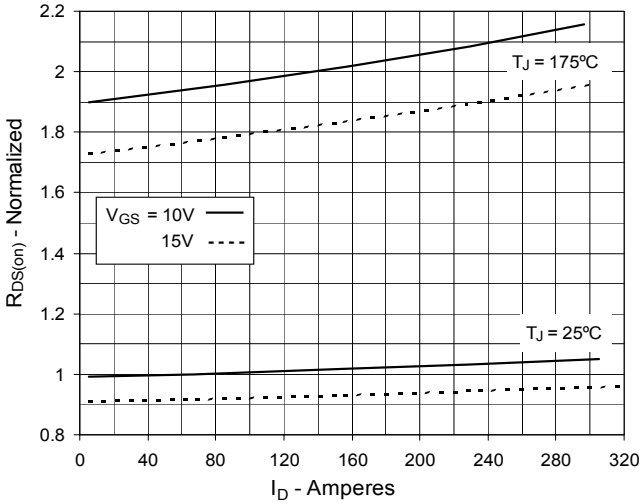


Fig. 6. Drain Current vs. Case Temperature

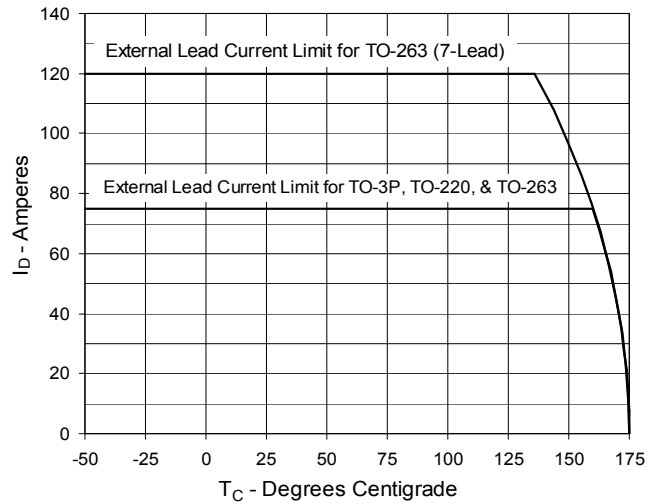


Fig. 7. Input Admittance

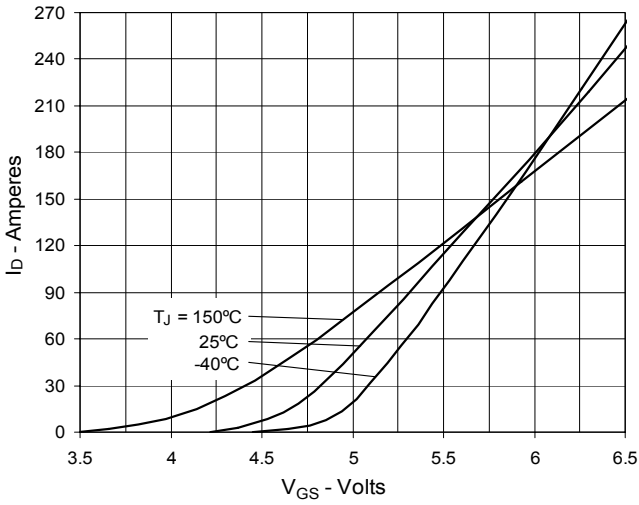


Fig. 8. Transconductance

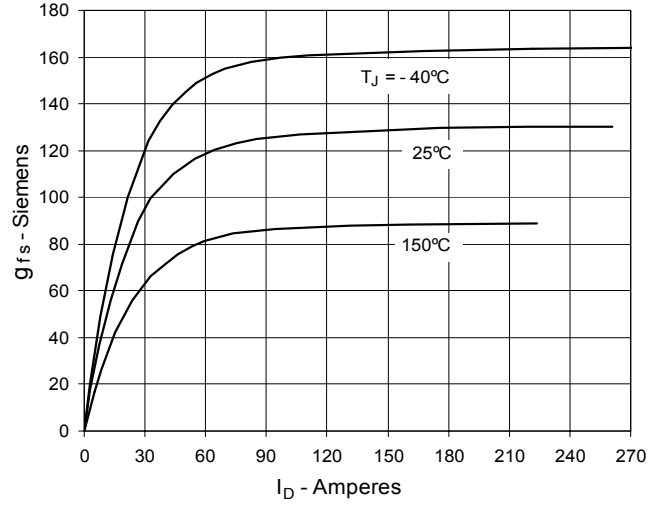


Fig. 9. Forward Voltage Drop of Intrinsic Diode

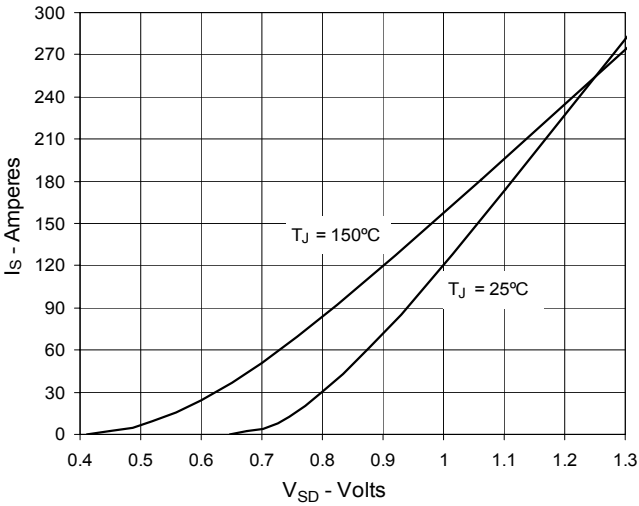


Fig. 10. Gate Charge

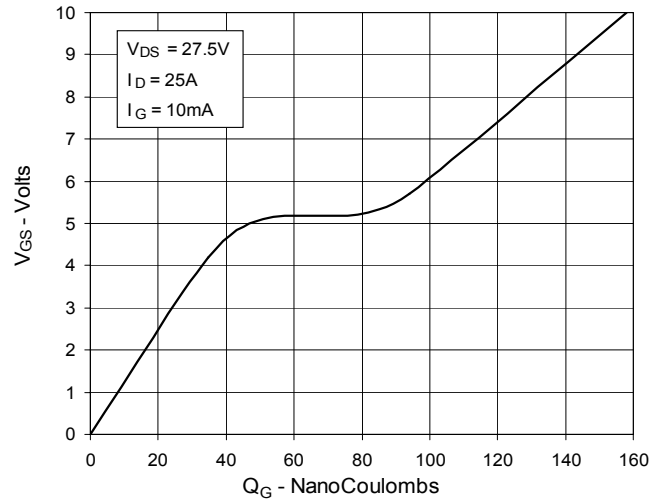


Fig. 11. Capacitance

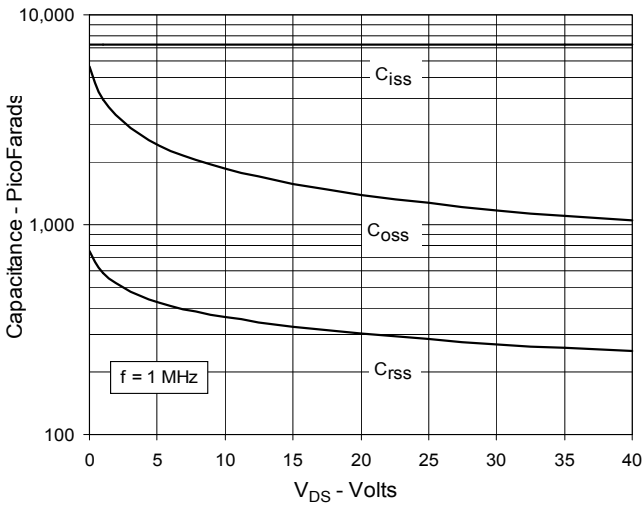
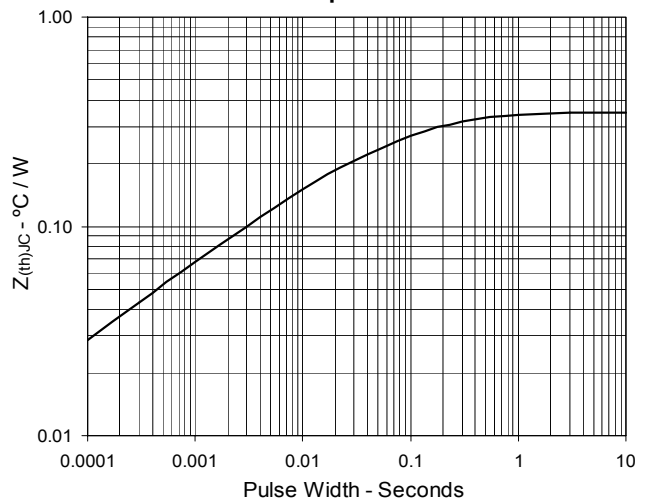
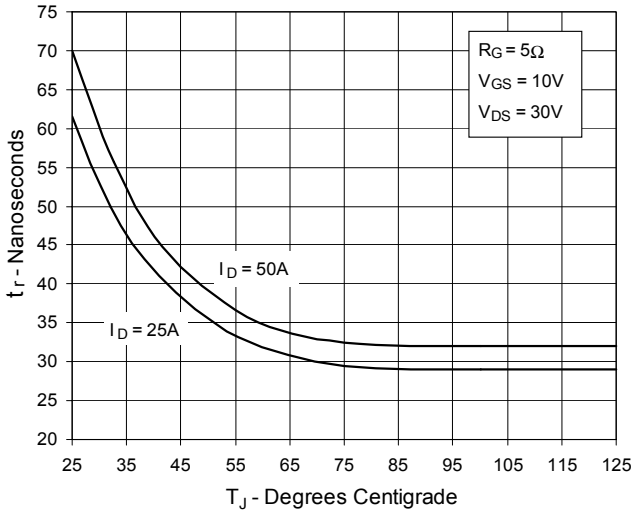
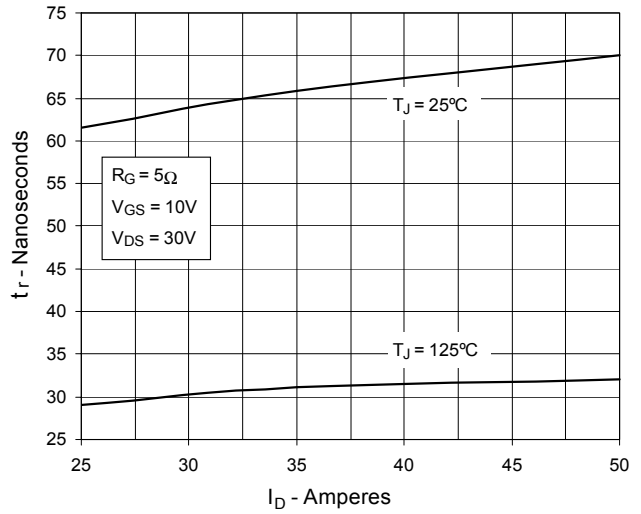
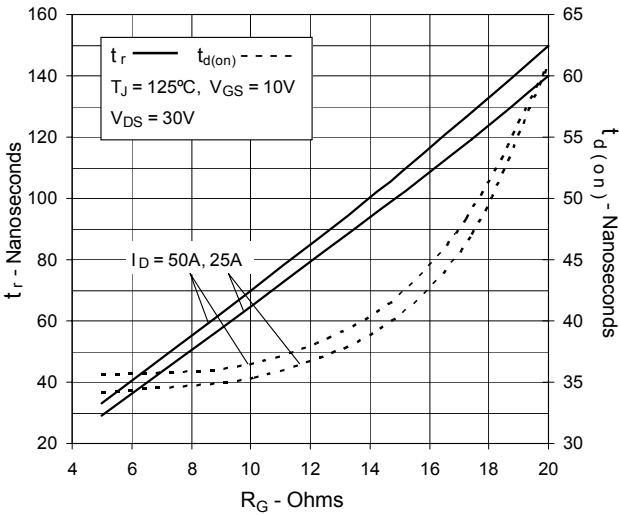
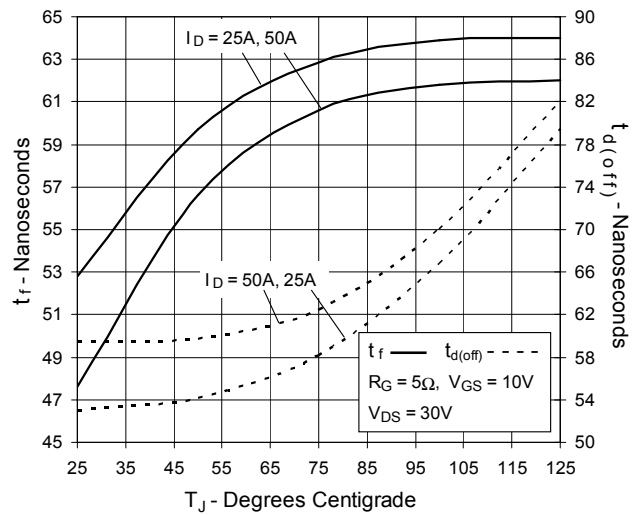
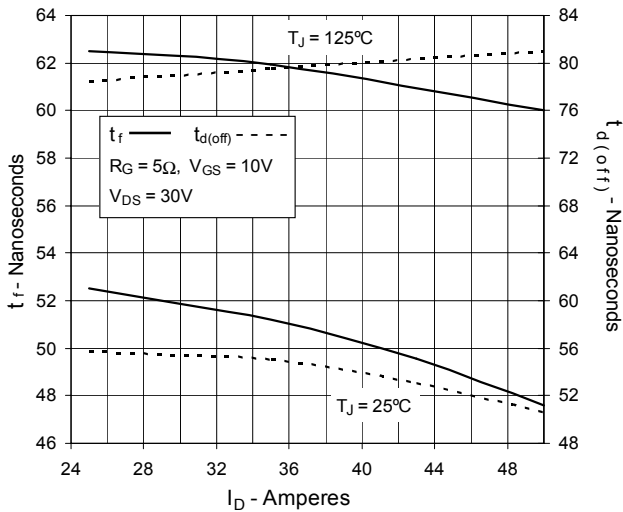


Fig. 12. Maximum Transient Thermal Impedance



**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**
