

TrenchHV™ Power MOSFET

IXTH96N25T
IXTQ96N25T
IXTV96N25T

N-Channel Enhancement Mode
Avalanche Rated



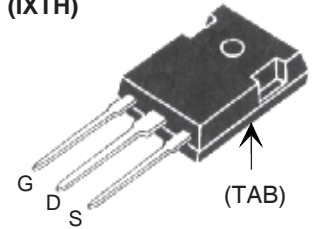
$$V_{DSS} = 250V$$

$$I_{D25} = 96A$$

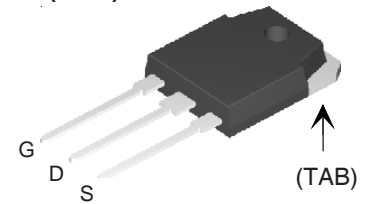
$$R_{DS(on)} \leq 29m\Omega$$

| Symbol | Test Conditions | Maximum Ratings | |
|---------------|---|--------------------|------------|
| V_{DSS} | $T_J = 25^\circ C$ to $150^\circ C$ | 250 | V |
| V_{DGR} | $T_J = 25^\circ C$ to $150^\circ C$, $R_{GS} = 1M\Omega$ | 250 | V |
| V_{GSM} | Transient | ± 30 | V |
| I_{D25} | $T_C = 25^\circ C$ | 96 | A |
| I_{LRMS} | Lead Current Limit, RMS | 75 | A |
| I_{DM} | $T_C = 25^\circ C$, pulse width limited by T_{JM} | 250 | A |
| I_{AS} | $T_C = 25^\circ C$ | 5 | A |
| E_{AS} | $T_C = 25^\circ C$ | 2 | J |
| P_D | $T_C = 25^\circ C$ | 625 | W |
| T_J | | -55 ... +150 | $^\circ C$ |
| T_{JM} | | 150 | $^\circ C$ |
| T_{stg} | | -55 ... +150 | $^\circ C$ |
| T_L | 1.6mm (0.062 in.) from case for 10s | 300 | $^\circ C$ |
| T_{SOLD} | Plastic body for 10 seconds | 260 | $^\circ C$ |
| M_d | Mounting torque (TO-247 & TO-3P) | 1.13 / 10 | Nm/lb.in. |
| F_C | Mounting force (PLUS220) | 11..65 / 2.5..14.6 | N/lb. |
| Weight | TO-247 | 6.0 | g |
| | TO-3P | 5.5 | g |
| | PLUS220 | 4.0 | g |

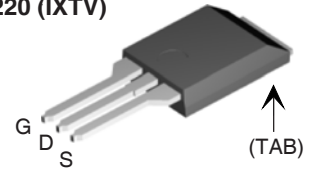
TO-247 (IXTH)



TO-3P (IXTQ)



PLUS220 (IXTV)



G = Gate D = Drain
S = Source TAB = Drain

Features

- International standard packages
- Avalanche rated
- Low package inductance
 - easy to drive and to protect

Advantages

- Easy to mount
- Space savings
- High power density

Applications

- DC-DC converters
- Battery chargers
- Switched-mode and resonant-mode power supplies
- DC choppers
- AC motor control
- Uninterruptible power supplies

| Symbol | Test Conditions ($T_J = 25^\circ C$ unless otherwise specified) | Characteristic Values | | |
|--------------|---|-----------------------|------|--------------------------|
| | | Min. | Typ. | Max. |
| BV_{DSS} | $V_{GS} = 0V$, $I_D = 250\mu A$ | 250 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 1mA$ | 3 | | 5 V |
| I_{GSS} | $V_{GS} = \pm 20V$, $V_{DS} = 0V$ | | | ± 200 nA |
| I_{DSS} | $V_{DS} = V_{DSS}$ $V_{GS} = 0V$ $T_J = 125^\circ C$ | | | 5 μA 250 μA |
| $R_{DS(on)}$ | $V_{GS} = 10V$, $I_D = 0.5 \cdot I_{D25}$, Notes 1, 2 | | | 29 m Ω |

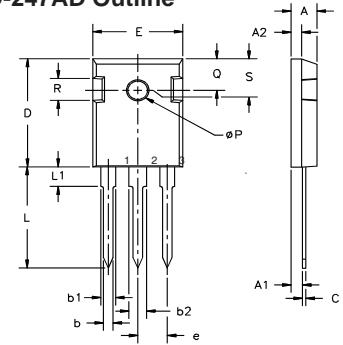
| Symbol | Test Conditions | Characteristic Values | | |
|---|--|-----------------------|------|-------------------------|
| | | Min. | Typ. | Max. |
| $(T_J = 25^\circ\text{C unless otherwise specified})$ | | | | |
| g_{fs} | $V_{DS} = 10\text{V}, I_D = 0.5 \cdot I_{D25}$, Note 1 | 50 | 82 | S |
| C_{iss} | $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$ | | 6100 | pF |
| C_{oss} | | | 625 | pF |
| C_{rss} | | | 75 | pF |
| $t_{d(on)}$ | Resistive Switching Times $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$ $R_G = 2.5\Omega$ (External) | | 20 | ns |
| t_r | | | 22 | ns |
| $t_{d(off)}$ | | | 59 | ns |
| t_f | | | 28 | ns |
| $Q_{g(on)}$ | $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 25\text{A}$ | | 114 | nC |
| Q_{gs} | | | 33 | nC |
| Q_{gd} | | | 34 | nC |
| R_{thJC} | | | | 0.20 $^\circ\text{C/W}$ |
| R_{thCS} | | | | 0.25 $^\circ\text{C/W}$ |

Source-Drain Diode

| Symbol | Test Conditions | Characteristic Values | | |
|---|--|-----------------------|------|---------------|
| | | Min. | Typ. | Max. |
| $T_J = 25^\circ\text{C unless otherwise specified}$ | | | | |
| I_S | $V_{GS} = 0\text{V}$ | | | 96 A |
| I_{SM} | Repetitive, pulse width limited by T_{JM} | | | 300 A |
| V_{SD} | $I_F = I_S, V_{GS} = 0\text{V}$, Note 1 | | | 1.5 V |
| t_{rr} | $I_F = 48\text{A}, -di/dt = 250\text{ A}/\mu\text{s}$ $V_R = 100\text{V}, V_{GS} = 0\text{V}$ | | 158 | ns |
| I_{RM} | | | 23 | A |
| Q_{RM} | | | 1.8 | μC |

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

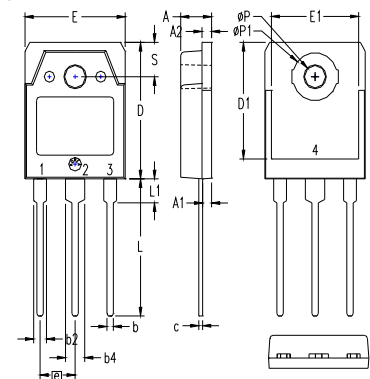
TO-247AD Outline



Terminals: 1 - Gate 2 - Drain
3 - Source Tab - Drain

| Dim. | Millimeter | | Inches | |
|----------------|------------|-------|--------|-------|
| | Min. | Max. | Min. | Max. |
| A | 4.7 | 5.3 | .185 | .209 |
| A ₁ | 2.2 | 2.54 | .087 | .102 |
| A ₂ | 2.2 | 2.6 | .059 | .098 |
| b | 1.0 | 1.4 | .040 | .055 |
| b ₁ | 1.65 | 2.13 | .065 | .084 |
| b ₂ | 2.87 | 3.12 | .113 | .123 |
| C | .4 | .8 | .016 | .031 |
| D | 20.80 | 21.46 | .819 | .845 |
| E | 15.75 | 16.26 | .610 | .640 |
| e | 5.20 | 5.72 | 0.205 | 0.225 |
| L | 19.81 | 20.32 | .780 | .800 |
| L1 | | 4.50 | | .177 |
| ∅EP | 3.55 | 3.65 | .140 | .144 |
| Q | 5.89 | 6.40 | 0.232 | 0.252 |
| R | 4.32 | 5.49 | .170 | .216 |
| S | 6.15 | BSC | 242 | BSC |

TO-3P (IXTQ) Outline

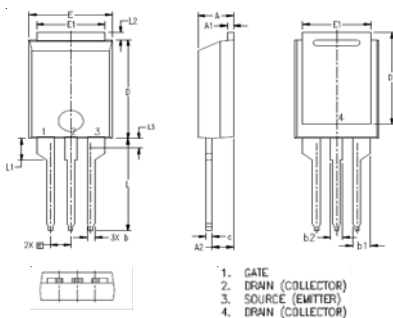


Pins: 1 - Gate 2 - Drain
3 - Source 4, TAB - Drain

| SYM | INCHES | | MILLIMETERS | |
|-----|----------|------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .185 | .193 | 4.70 | 4.90 |
| A1 | .051 | .059 | 1.30 | 1.50 |
| A2 | .057 | .065 | 1.45 | 1.65 |
| b | .035 | .045 | 0.90 | 1.15 |
| b2 | .075 | .087 | 1.90 | 2.20 |
| b4 | .114 | .126 | 2.90 | 3.20 |
| c | .022 | .031 | 0.55 | 0.80 |
| D | .780 | .791 | 19.80 | 20.10 |
| D1 | .665 | .677 | 16.90 | 17.20 |
| E | .610 | .622 | 15.50 | 15.80 |
| E1 | .531 | .539 | 13.50 | 13.70 |
| e | .215 BSC | | 5.45 BSC | |
| L | .779 | .795 | 19.80 | 20.20 |
| L1 | .134 | .142 | 3.40 | 3.60 |
| ∅P | .126 | .134 | 3.20 | 3.40 |
| ∅P1 | .272 | .280 | 6.90 | 7.10 |
| S | .193 | .201 | 4.90 | 5.10 |

All metal area are tin plated.

PLUS220 (IXTV) Outline



| SYM | INCHES | | MILLIMETER | |
|-----|----------|------|------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .169 | .185 | 4.30 | 4.70 |
| A1 | .028 | .035 | 0.70 | 0.90 |
| A2 | .098 | .118 | 2.50 | 3.00 |
| b | .035 | .047 | 0.90 | 1.20 |
| b1 | .080 | .095 | 2.03 | 2.41 |
| b2 | .054 | .064 | 1.37 | 1.63 |
| c | .028 | .035 | 0.70 | 0.90 |
| D | .551 | .591 | 14.00 | 15.00 |
| D1 | .512 | .539 | 13.00 | 13.70 |
| E | .394 | .433 | 10.00 | 11.00 |
| E1 | .331 | .345 | 8.40 | 8.80 |
| e | .100 BSC | | 2.54 BSC | |
| L | .512 | .551 | 13.00 | 14.00 |
| L1 | .118 | .138 | 3.00 | 3.50 |
| L2 | .035 | .051 | 0.90 | 1.30 |
| L3 | .047 | .059 | 1.20 | 1.50 |

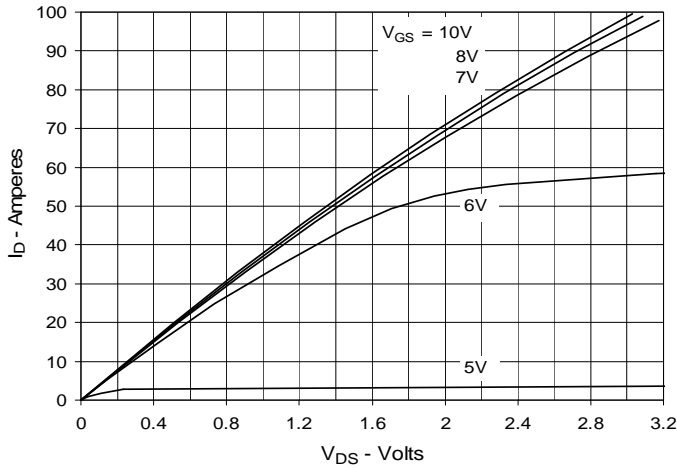
PRELIMINARY TECHNICAL INFORMATION

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.

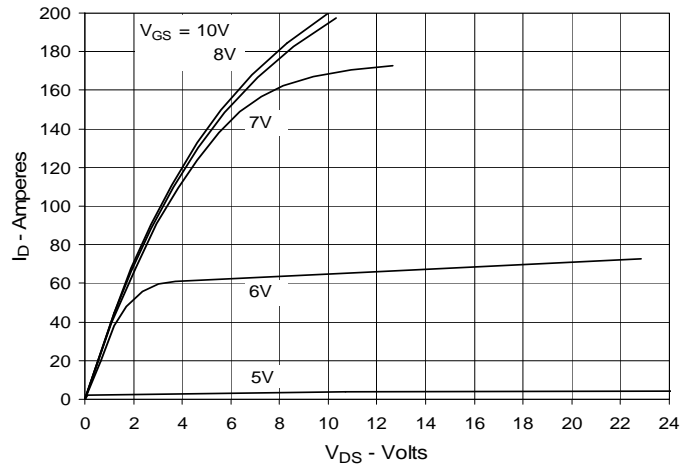
IXYS reserves the right to change limits, test conditions, and dimensions.

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

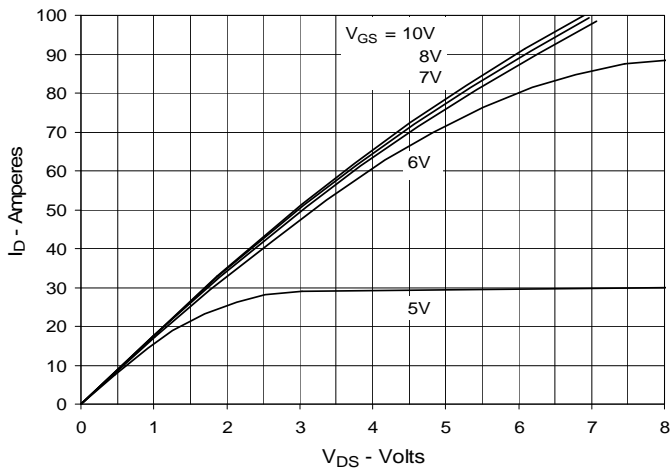
**Fig. 1. Output Characteristics
@ 25°C**



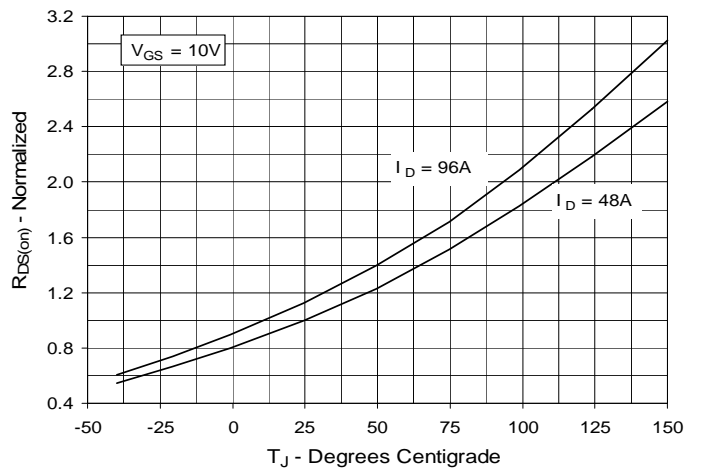
**Fig. 2. Extended Output Characteristics
@ 25°C**



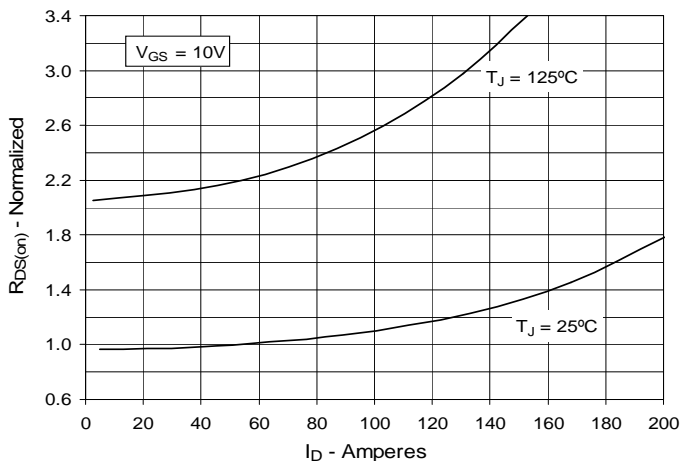
**Fig. 3. Output Characteristics
@ 125°C**



**Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 48A$ Value
vs. Junction Temperature**



**Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 48A$ Value
vs. Drain Current**



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

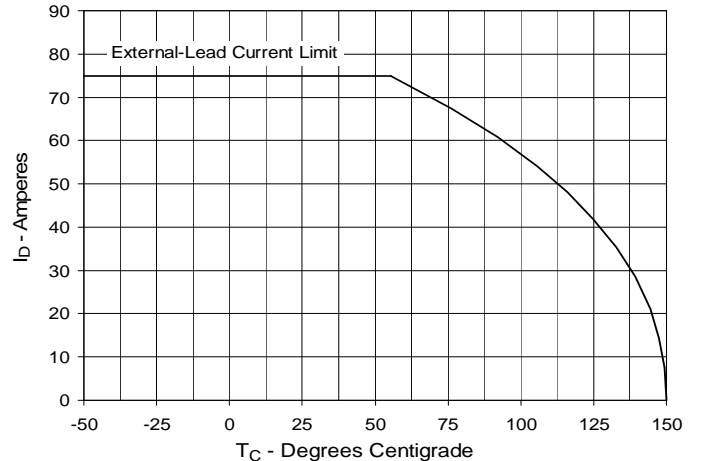


Fig. 7. Input Admittance

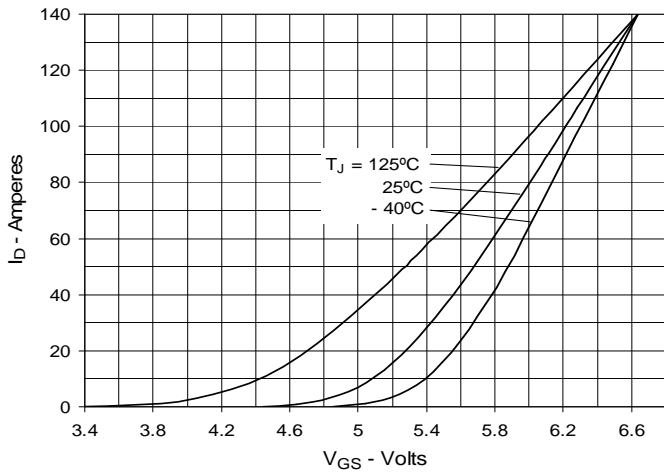


Fig. 8. Transconductance

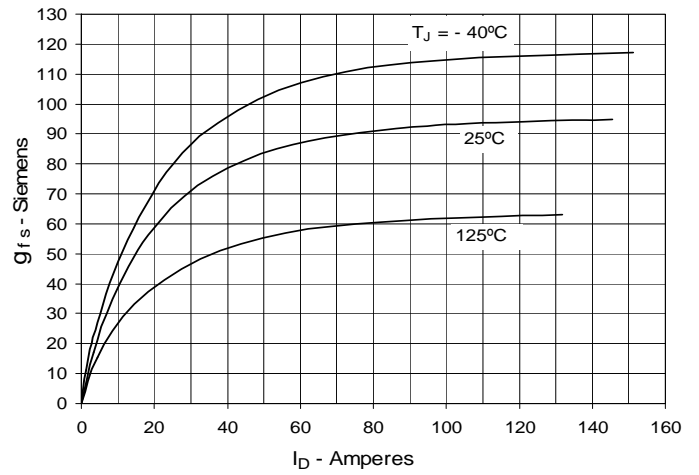


Fig. 9. Forward Voltage Drop of Intrinsic Diode

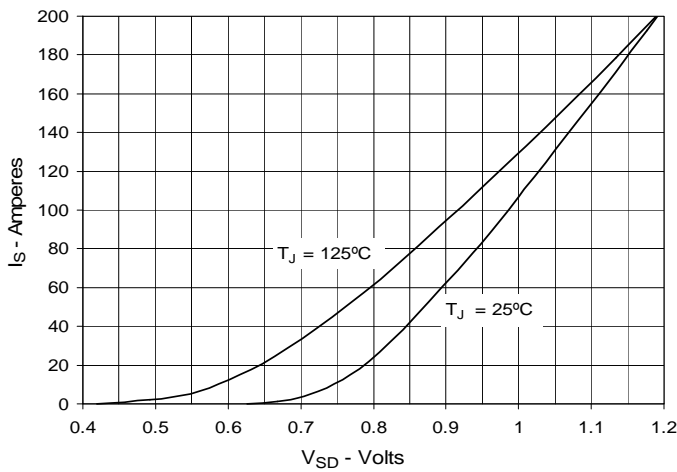


Fig. 10. Gate Charge

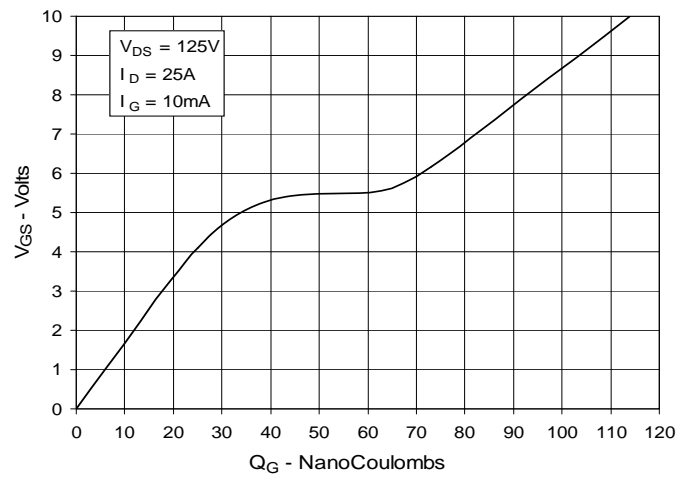


Fig. 11. Capacitance

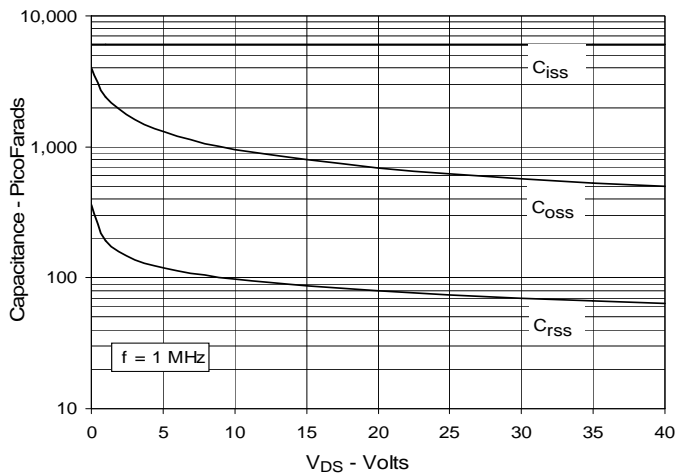
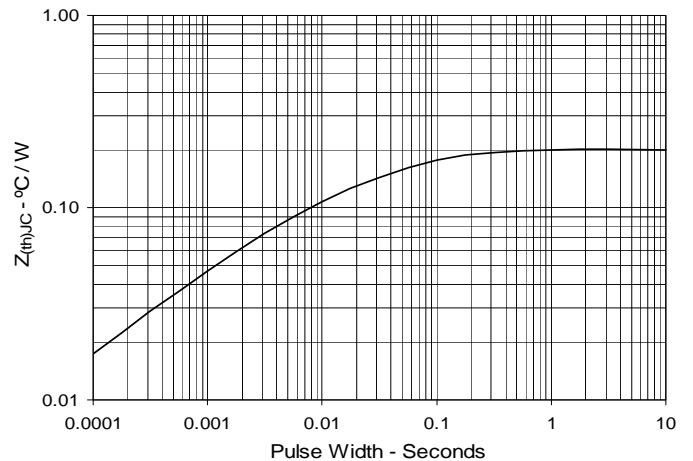
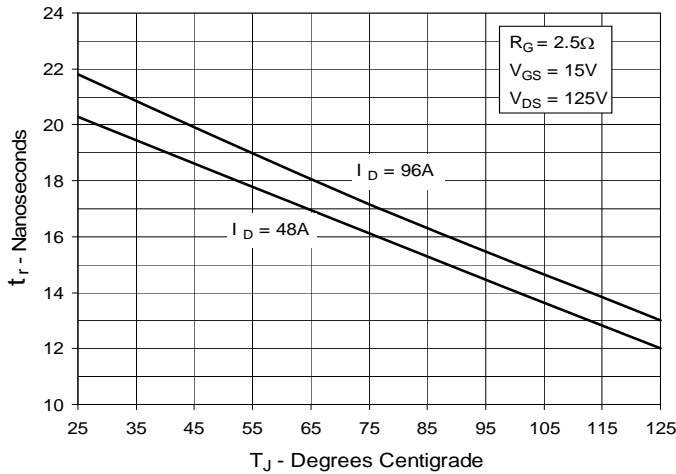


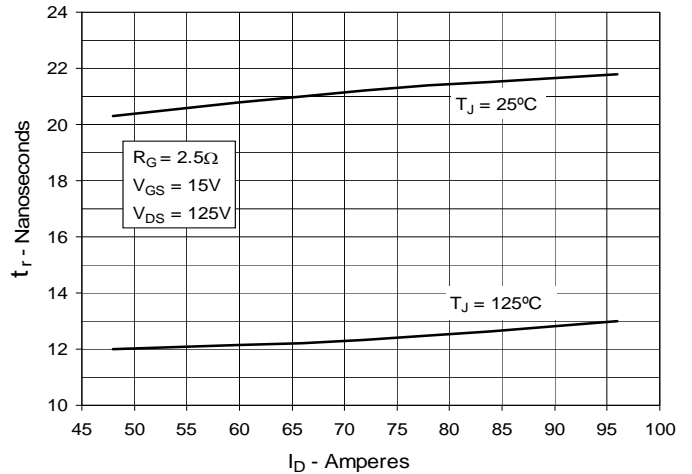
Fig. 12. Maximum Transient Thermal Impedance



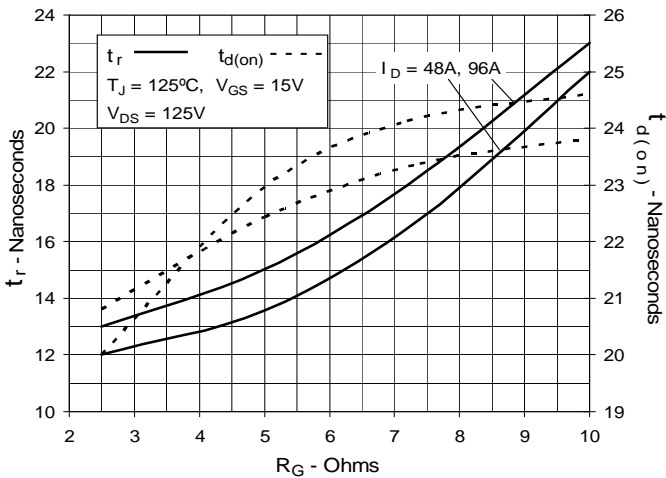
**Fig. 13. Resistive Turn-on
Rise Time vs. Junction Temperature**



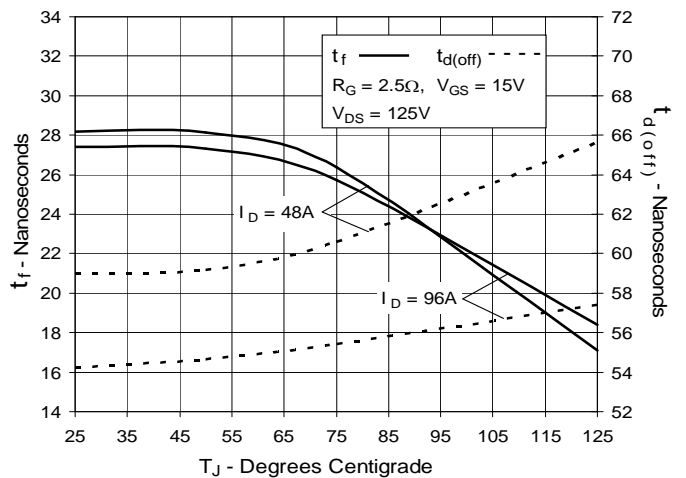
**Fig. 14. Resistive Turn-on
Rise Time vs. Drain Current**



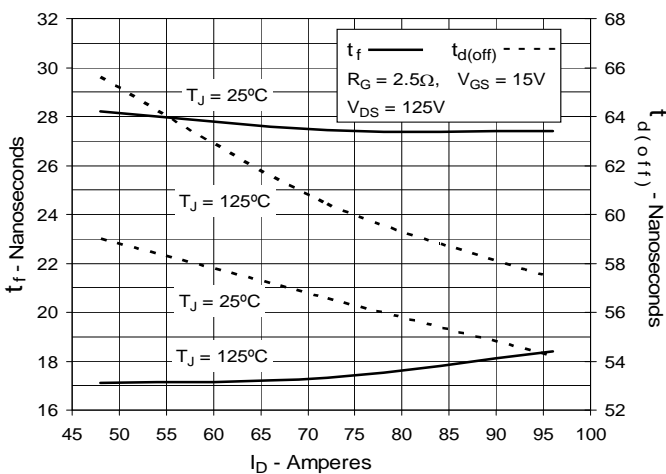
**Fig. 15. Resistive Turn-on
Switching Times vs. Gate Resistance**



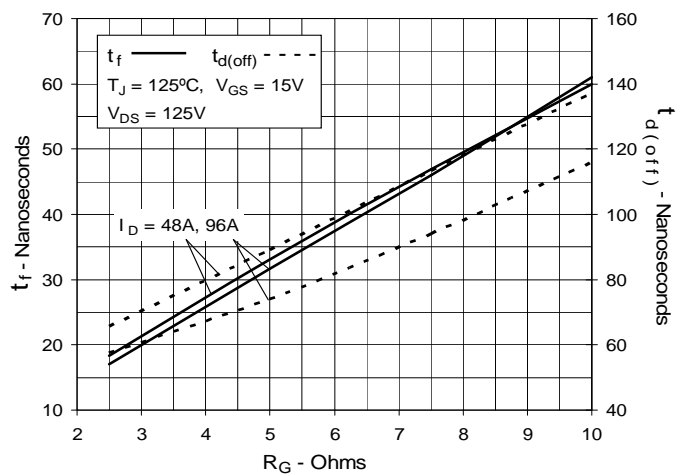
**Fig. 16. Resistive Turn-off
Switching Times vs. Junction Temperature**



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



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





Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.