

## TrenchMV™ Power MOSFET

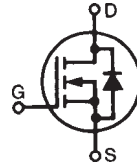
## IXTH200N10T IXTQ200N10T

$$V_{DSS} = 100V$$

$$I_{D25} = 200A$$

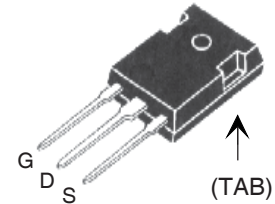
$$R_{DS(on)} \leq 5.5m\Omega$$

N-Channel Enhancement Mode  
Avalanche Rated

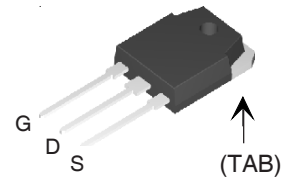


| Symbol     | Test Conditions   | Maximum Ratings |                          |
|------------|---|-----------------|--------------------------|
| $V_{DSS}$  | $T_J = 25^\circ C$ to $175^\circ C$                               | 100             | V                        |
| $V_{DGR}$  | $T_J = 25^\circ C$ to $175^\circ C$ , $R_{GS} = 1M\Omega$         | 100             | V                        |
| $V_{GSM}$  | Transient   | $\pm 30$        | V                        |
| $I_{D25}$  | $T_C = 25^\circ C$  | 200             | A                        |
| $I_{LRMS}$ | Lead Current Limit, RMS   | 75              | A                        |
| $I_{DM}$   | $T_C = 25^\circ C$ , pulse width limited by $T_{JM}$              | 500             | A                        |
| $I_A$      | $T_C = 25^\circ C$  | 40              | A                        |
| $E_{AS}$   | $T_C = 25^\circ C$  | 1.5             | J                        |
| $P_D$      | $T_C = 25^\circ C$  | 550             | W                        |
| $T_J$      |   | -55 ... +175    | $^\circ C$               |
| $T_{JM}$   |   | 175             | $^\circ C$               |
| $T_{stg}$  |   | -55 ... +175    | $^\circ C$               |
| $T_L$      | 1.6mm (0.062in.) from case for 10s<br>Plastic body for 10 seconds | 300<br>260      | $^\circ C$<br>$^\circ C$ |
| $M_d$      | Mounting torque   | 1.13 / 10       | Nm/lb.in.                |
| Weight     | TO-247  | 6.0             | g                        |
|            | TO-3P   | 5.5             | g                        |

TO-247 (IXTH)



TO-3P (IXTQ)



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

### Features

- International standard packages
- 175°C Operating Temperature
- Avalanche Rated
- Low  $R_{DS(on)}$

### 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                           | Characteristic Values |      |              |
|--------------|---|-----------------------|------|--------------|
|              |   | Min.                  | Typ. | Max.         |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu A$          | 100                   |      | V            |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250\mu A$      | 2.5                   |      | 4.5 V        |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$        |                       |      | $\pm 200$ nA |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$                        |                       |      | 5 $\mu A$    |
|              | $V_{GS} = 0V$ $T_J = 150^\circ C$         |                       |      | 250 $\mu A$  |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 50A$ , Notes 1, 2 | 4.5                   | 5.5  | m $\Omega$   |

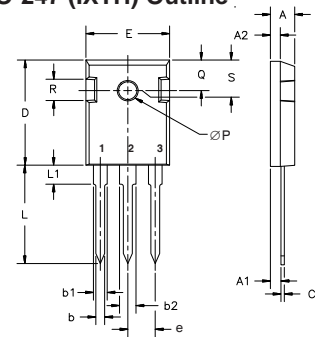
| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)   | Characteristic Values |      |                    |
|--------------|---|-----------------------|------|--------------------|
|              |   | Min.                  | Typ. | Max.               |
| $g_{fs}$     | $V_{DS} = 10\text{V}$ , $I_D = 60\text{A}$ , Note 1   | 60                    | 96   | S                  |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$  |                       | 9400 | pF                 |
| $C_{oss}$    |   |                       | 1087 | pF                 |
| $C_{rss}$    |   |                       | 140  | pF                 |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 50\text{A}$<br>$R_G = 3.3\Omega$ (External) |                       | 35   | ns                 |
| $t_r$        |   |                       | 31   | ns                 |
| $t_{d(off)}$ |   |                       | 45   | ns                 |
| $t_f$        |   |                       | 34   | ns                 |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 50\text{A}$   |                       | 152  | nC                 |
| $Q_{gs}$     |   |                       | 47   | nC                 |
| $Q_{gd}$     |   |                       | 47   | nC                 |
| $R_{thJC}$   |   |                       | 0.27 | $^\circ\text{C/W}$ |
| $R_{thCH}$   |   | 0.25                  |      | $^\circ\text{C/W}$ |

### Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                           | Characteristic Values |      |       |
|----------|---|-----------------------|------|-------|
|          |   | Min.                  | Typ. | Max.  |
| $I_S$    | $V_{GS} = 0\text{V}$  |                       |      | 200 A |
| $I_{SM}$ | Repetitive, Pulse width limited by $T_{JM}$   |                       |      | 500 A |
| $V_{SD}$ | $I_F = 50\text{A}$ , $V_{GS} = 0\text{V}$ , Note 1  |                       |      | 1.0 V |
| $t_{rr}$ | $I_F = 100\text{A}$ , $V_{GS} = 0\text{V}$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 50\text{V}$ |                       | 76   | ns    |
| $Q_{RM}$ |   |                       | 205  | nC    |
| $I_{RM}$ |   |                       | 5.4  | A     |

- 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.

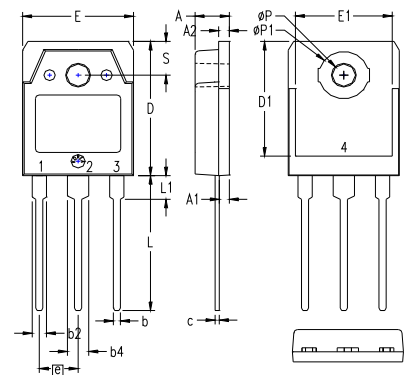
### TO-247 (IXTH) Outline



Terminals: 1 - Gate 2 - Drain

| Dim.           | Millimeter |       | Inches |       |
|----------------|------------|-------|--------|-------|
|                | Min.       | Max.  | Min.   | Max.  |
| A              | 4.7        | 5.3   | .185   | .209  |
| A <sub>1</sub> | 2.2        | 2.54  | .087   | .102  |
| A <sub>2</sub> | 2.2        | 2.6   | .059   | .098  |
| b              | 1.0        | 1.4   | .040   | .055  |
| b <sub>1</sub> | 1.65       | 2.13  | .065   | .084  |
| b <sub>2</sub> | 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  |
| ØP             | 3.55       | 3.65  | .140   | .144  |
| Q              | 5.89       | 6.40  | 0.232  | 0.252 |
| R              | 4.32       | 5.49  | .170   | .216  |

### TO-3P (IXTQ) Outline



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

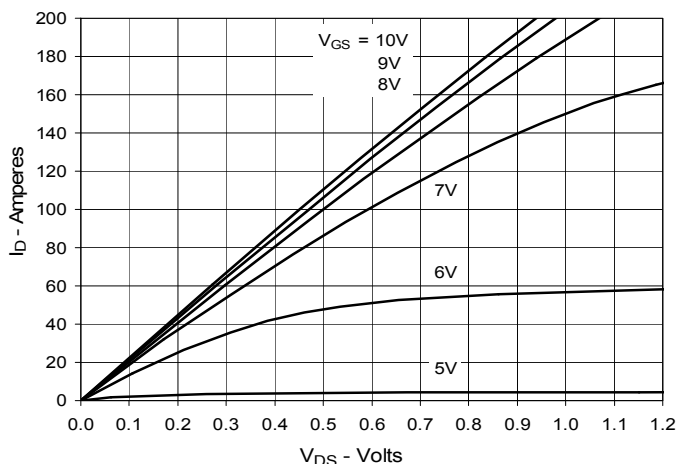
| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .185     | .193 | 4.70        | 4.90  |
| A1  | .051     | .059 | 1.30        | 1.50  |
| A2  | .057     | .065 | 1.45        | 1.65  |
| b   | .035     | .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  |
| ØP  | .126     | .134 | 3.20        | 3.40  |
| ØP1 | .272     | .280 | 6.90        | 7.10  |
| S   | .193     | .201 | 4.90        | 5.10  |

All metal area are tin plated.

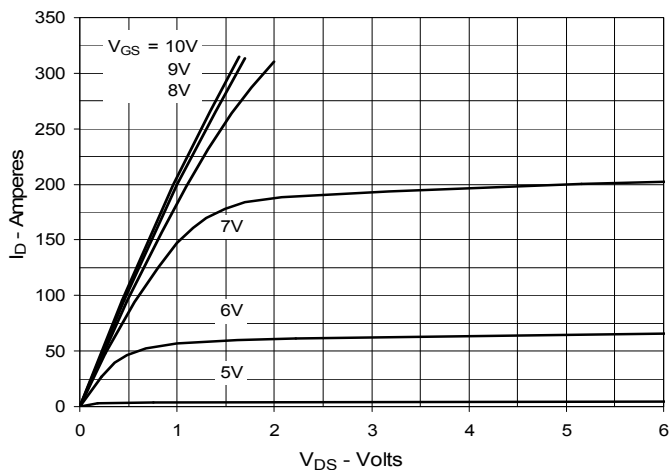
IXYS reserves the right to change limits, test conditions, and dimensions.

|  |           |           |           |           |              |              |              |              |              |             |
|--|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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    |             |

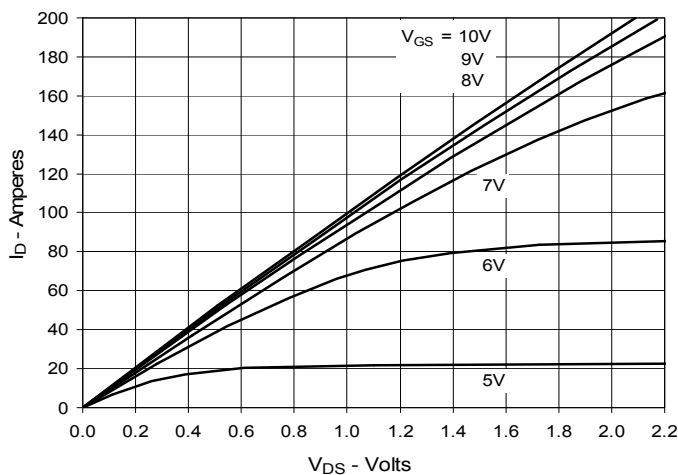
**Fig. 1. Output Characteristics @ 25°C**



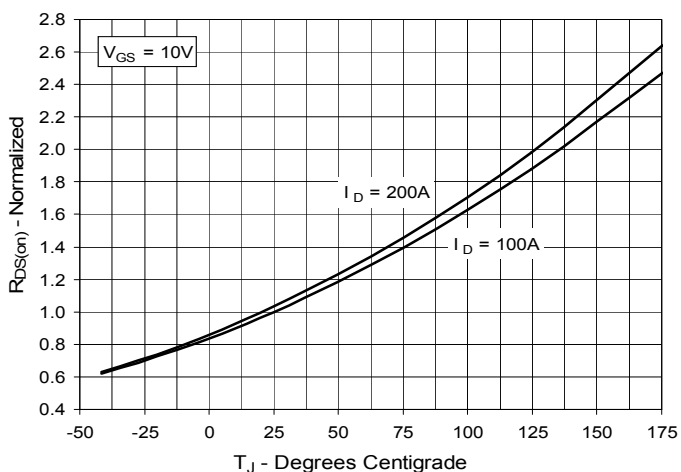
**Fig. 2. Extended Output Characteristics @ 25°C**



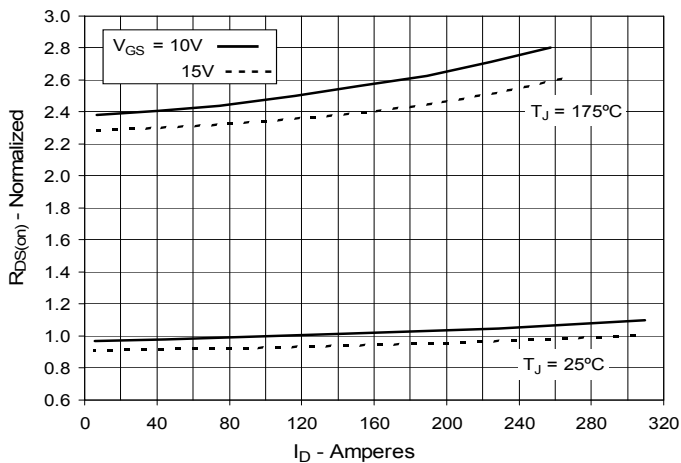
**Fig. 3. Output Characteristics @ 150°C**



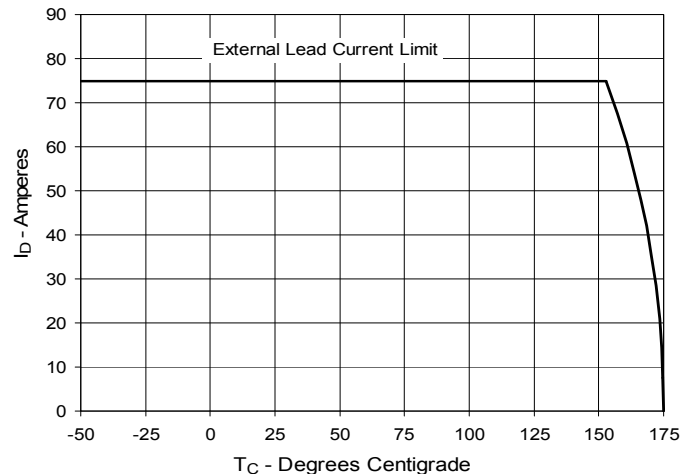
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 100A$  Value vs. Junction Temperature**



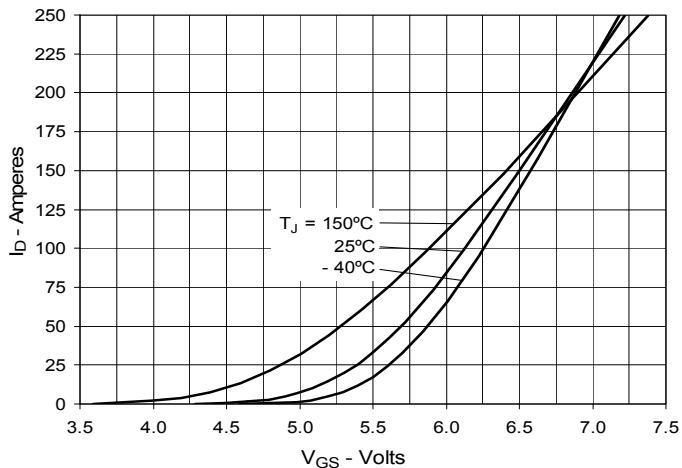
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 100A$  Value vs. Drain Current**



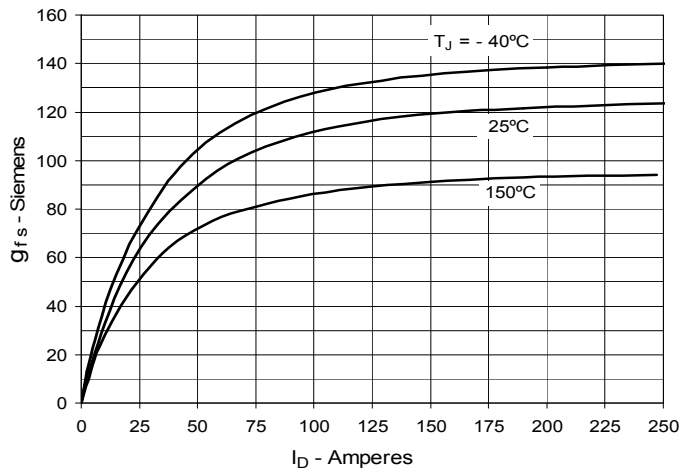
**Fig. 6. Drain Current vs. Case Temperature**



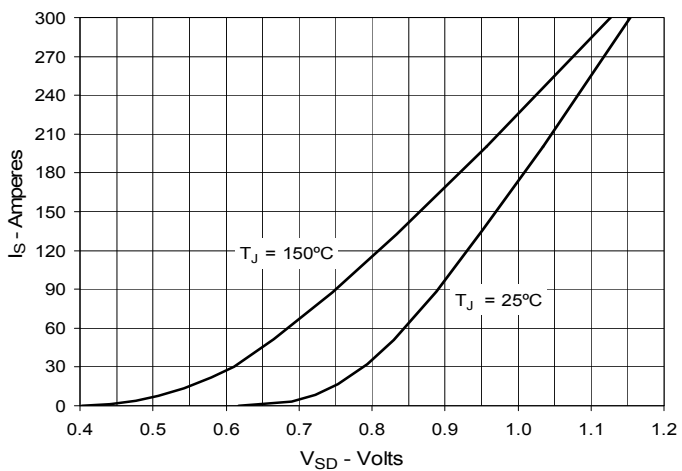
**Fig. 7. Input Admittance**



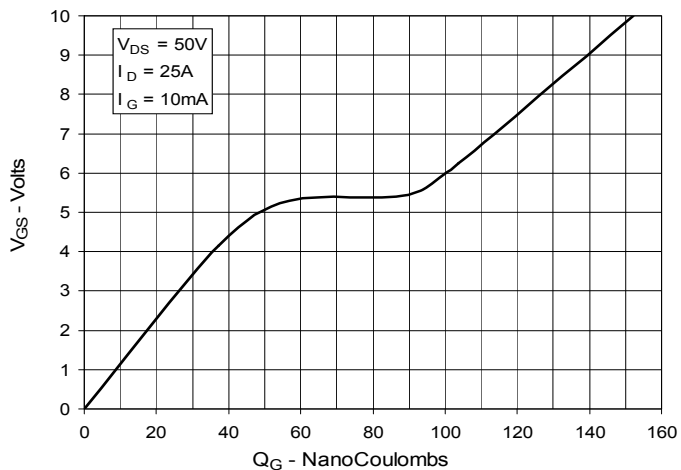
**Fig. 8. Transconductance**



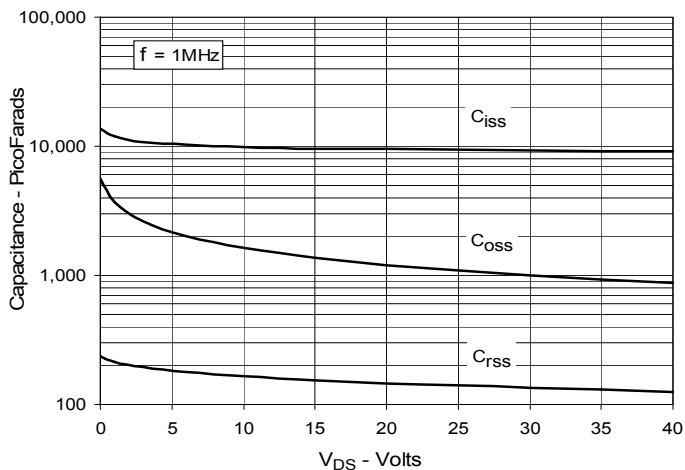
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



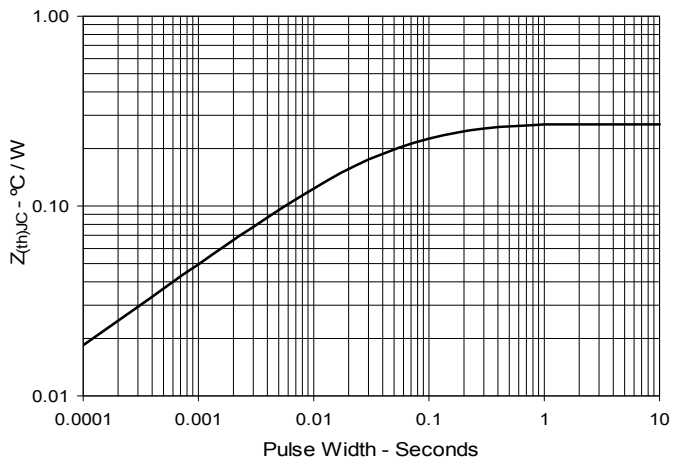
**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**

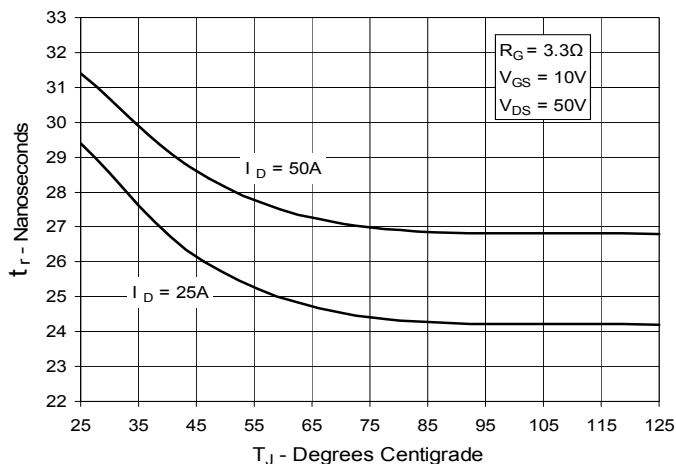


**Fig. 12. Maximum Transient Thermal Impedance**

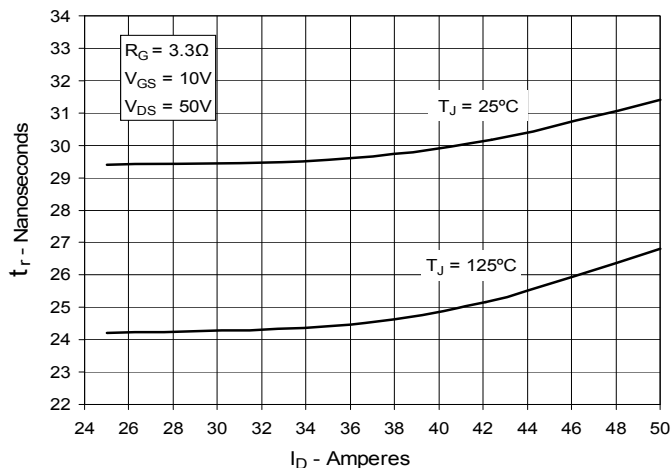


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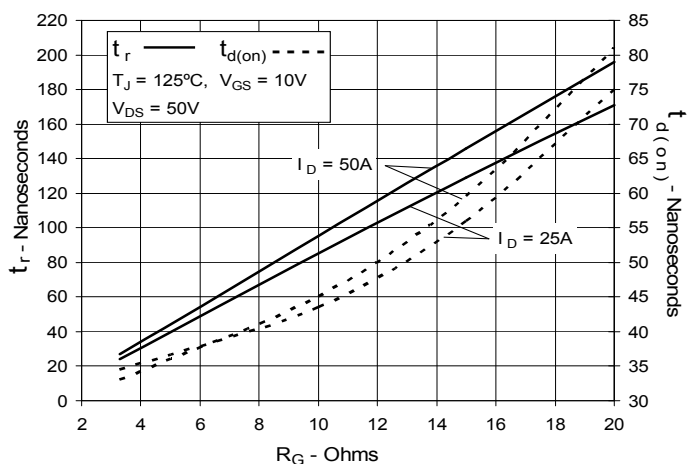
**Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature**



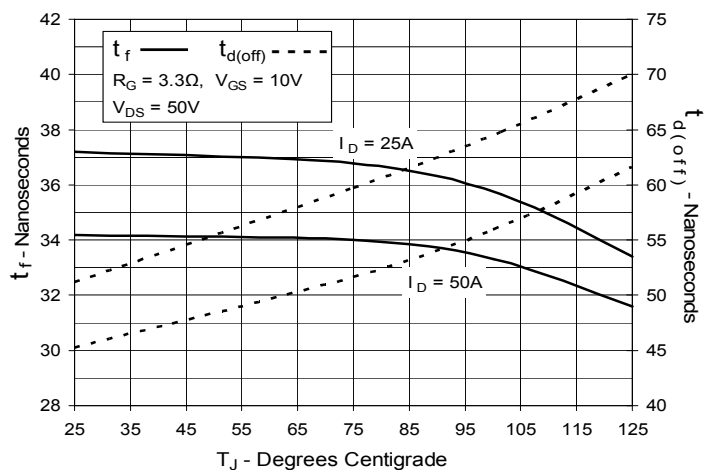
**Fig. 14. Resistive Turn-on Rise Time vs. Drain Current**



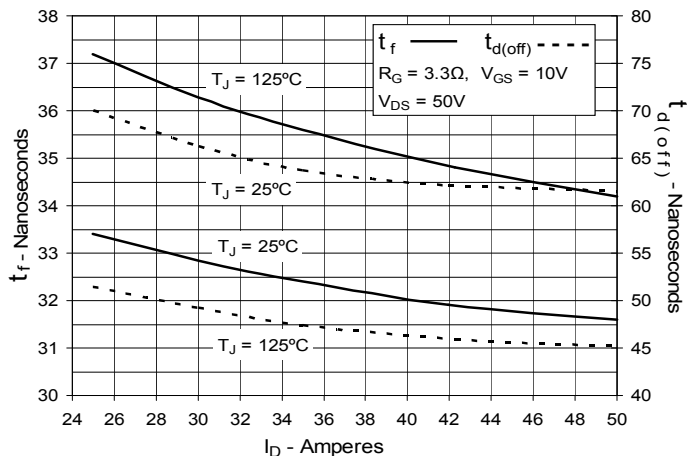
**Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance**



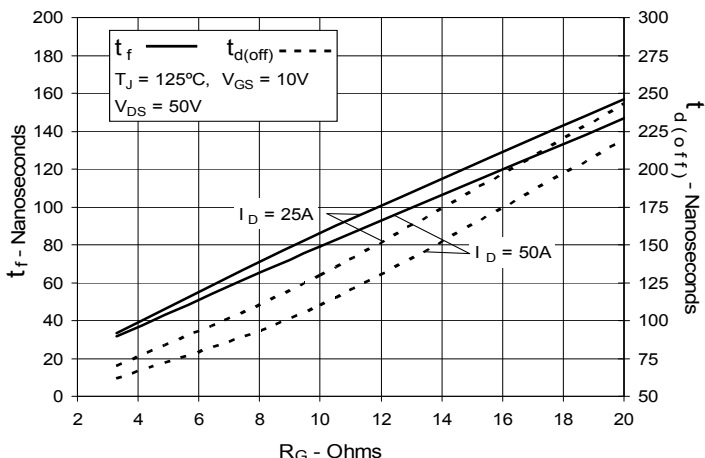
**Fig. 16. Resistive Turn-off Switching Times vs. Junction Temperature**



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



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





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