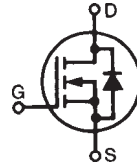


# TrenchT2™ HiperFET™ Power MOSFET

## IXFA180N10T2 IXFP180N10T2

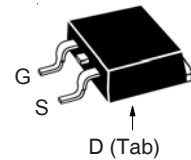
$V_{DSS} = 100V$   
 $I_{D25} = 180A$   
 $R_{DS(on)} \leq 6m\Omega$

N-Channel Enhancement Mode  
 Avalanche Rated  
 Fast Intrinsic Rectifier

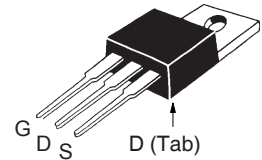


| Symbol     | Test Conditions  | Maximum Ratings |            |
|------------|--|-----------------|------------|
| $V_{DSS}$  | $T_J = 25^\circ C$ to $175^\circ C$                                | 100             | V          |
| $V_{DGR}$  | $T_J = 25^\circ C$ to $175^\circ C$ , $R_{GS} = 1M\Omega$          | 100             | V          |
| $V_{GSS}$  | Continuous   | $\pm 20$        | V          |
| $V_{GSM}$  | Transient  | $\pm 30$        | V          |
| $I_{D25}$  | $T_C = 25^\circ C$ (Chip Capability)                               | 180             | A          |
| $I_{LRMS}$ | Lead Current Limit, RMS  | 120             | A          |
| $I_{DM}$   | $T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$               | 450             | A          |
| $I_A$      | $T_C = 25^\circ C$   | 90              | A          |
| $E_{AS}$   | $T_C = 25^\circ C$   | 750             | mJ         |
| $dv/dt$    | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 175^\circ C$ | 15              | V/ns       |
| $P_D$      | $T_C = 25^\circ C$   | 480             | W          |
| $T_J$      |  | -55 ... +175    | $^\circ C$ |
| $T_{JM}$   |  | 175             | $^\circ C$ |
| $T_{stg}$  |  | -55 ... +175    | $^\circ C$ |
| $T_L$      | Maximum Lead Temperature for Soldering                             | 300             | $^\circ C$ |
| $T_{SOLD}$ | 1.6 mm (0.062in.) from Case for 10s                                | 260             | $^\circ C$ |
| $M_d$      | Mounting Torque (TO-220)   | 1.13 / 10       | Nm/lb.in   |
| Weight     | TO-263   | 2.5             | g          |
|            | TO-220   | 3.0             | g          |

TO-263AB (IXFA)



TO-220AB (IXFP)



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

### Features

- International Standard Packages
- High Current Handling Capability
- Fast Intrinsic Rectifier
- Avalanche Rated
- Low  $R_{DS(on)}$

### Advantages

- Easy to Mount
- Space Savings
- High Power Density

### Applications

- Synchronous Rectification
- DC-DC Converters
- Battery Chargers
- Switch-Mode and Resonant-Mode Power Supplies
- DC Choppers
- AC Motor Drives
- Uninterruptible Power Supplies
- High Speed Power Switching Applications

| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ Unless Otherwise Specified) | Characteristic Values |      |              |
|--------------|---|-----------------------|------|--------------|
|              |   | Min.                  | Typ. | Max.         |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu A$                                    | 100                   |      | V            |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250\mu A$                                | 2.0                   |      | 4.0 V        |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$                                  |                       |      | $\pm 100$ nA |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 150^\circ C$           |                       |      | 10 $\mu A$   |
|              |   |                       |      | 750 $\mu A$  |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 50A$ , Notes 1, 2                           |                       |      | 6 m $\Omega$ |

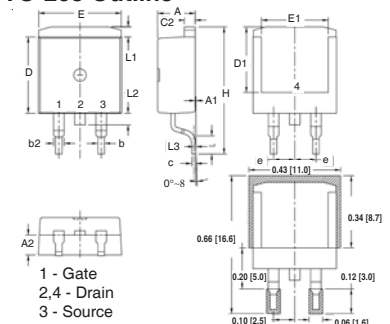
| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)  | Characteristic Values |      |                           |
|--------------|--|-----------------------|------|---------------------------|
|              |  | Min.                  | Typ. | Max.                      |
| $g_{fs}$     | $V_{DS} = 10\text{V}$ , $I_D = 60\text{A}$ , Note 1  | 50                    | 88   | S                         |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$   |                       | 10.5 | nF                        |
| $C_{oss}$    |  |                       | 945  | pF                        |
| $C_{rss}$    |  |                       | 100  | pF                        |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$<br>$R_G = 2\Omega$ (External) |                       | 21   | ns                        |
| $t_r$        |  |                       | 37   | ns                        |
| $t_{d(off)}$ |  |                       | 34   | ns                        |
| $t_f$        |  |                       | 13   | ns                        |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$   |                       | 185  | nC                        |
| $Q_{gs}$     |  |                       | 48   | nC                        |
| $Q_{gd}$     |  |                       | 52   | nC                        |
| $R_{thJC}$   |  |                       | 0.31 | $^\circ\text{C}/\text{W}$ |
| $R_{thCH}$   | TO-220   | 0.50                  |      | $^\circ\text{C}/\text{W}$ |

### Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)   | Characteristic Values |      |       |
|----------|---|-----------------------|------|-------|
|          |   | Min.                  | Typ. | Max.  |
| $I_S$    | $V_{GS} = 0\text{V}$  |                       |      | 180 A |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$   |                       |      | 720 A |
| $V_{SD}$ | $I_F = 100\text{A}$ , $V_{GS} = 0\text{V}$ , Note 1   |                       |      | 1.3 V |
| $t_{rr}$ | $I_F = 0.5 \cdot I_{D25}$ , $V_{GS} = 0\text{V}$<br>$-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 0.5 \cdot V_{DSS}$ |                       | 66   | ns    |
| $I_{RM}$ |   |                       | 5.8  | A     |
| $Q_{RM}$ |   |                       | 190  | nC    |

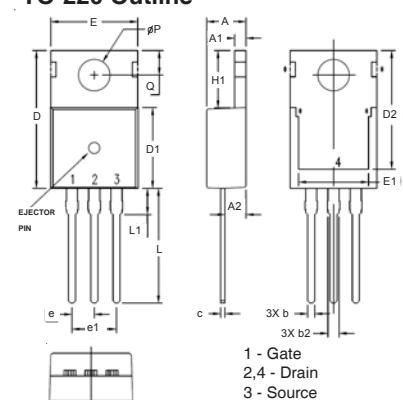
- Notes: 1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .  
2. On through-hole package,  $R_{DS(on)}$  Kelvin test contact location must be 5mm or less from the package body.

### TO-263 Outline



| SYM | INCHES   |      | MILLIMETER |       |
|-----|----------|------|------------|-------|
|     | MIN      | MAX  | MIN        | MAX   |
| A   | .170     | .185 | 4.30       | 4.70  |
| A1  | .000     | .008 | 0.00       | 0.20  |
| A2  | .091     | .098 | 2.30       | 2.50  |
| b   | .028     | .035 | 0.70       | 0.90  |
| b2  | .046     | .060 | 1.18       | 1.52  |
| C   | .018     | .024 | 0.45       | 0.60  |
| C2  | .049     | .060 | 1.25       | 1.52  |
| D   | .340     | .370 | 8.63       | 9.40  |
| D1  | .300     | .327 | 7.62       | 8.30  |
| E   | .380     | .410 | 9.65       | 10.41 |
| E1  | .270     | .330 | 6.86       | 8.38  |
| e   | .100 BSC |      | 2.54 BSC   |       |
| H   | .580     | .620 | 14.73      | 15.75 |
| L   | .075     | .105 | 1.91       | 2.67  |
| L1  | .039     | .060 | 1.00       | 1.52  |
| L2  | —        | .070 | —          | 1.77  |
| L3  | .010 BSC |      | 0.254 BSC  |       |

### TO-220 Outline



| SYM  | INCHES   |      | MILLIMETERS |       |
|------|----------|------|-------------|-------|
|      | MIN      | MAX  | MIN         | MAX   |
| A    | .169     | .185 | 4.30        | 4.70  |
| A1   | .047     | .055 | 1.20        | 1.40  |
| A2   | .079     | .106 | 2.00        | 2.70  |
| b    | .024     | .039 | 0.60        | 1.00  |
| b2   | .045     | .057 | 1.15        | 1.45  |
| c    | .014     | .026 | 0.35        | 0.65  |
| D    | .587     | .626 | 14.90       | 15.90 |
| D1   | .335     | .370 | 8.50        | 9.40  |
| (D2) | .500     | .531 | 12.70       | 13.50 |
| E    | .382     | .406 | 9.70        | 10.30 |
| (E1) | .283     | .323 | 7.20        | 8.20  |
| e    | .100 BSC |      | 2.54 BSC    |       |
| e1   | .200 BSC |      | 5.08 BSC    |       |
| H1   | .244     | .268 | 6.20        | 6.80  |
| L    | .492     | .547 | 12.50       | 13.90 |
| L1   | .110     | .154 | 2.80        | 3.90  |
| ∅P   | .134     | .150 | 3.40        | 3.80  |
| Q    | .106     | .126 | 2.70        | 3.20  |

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

Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$

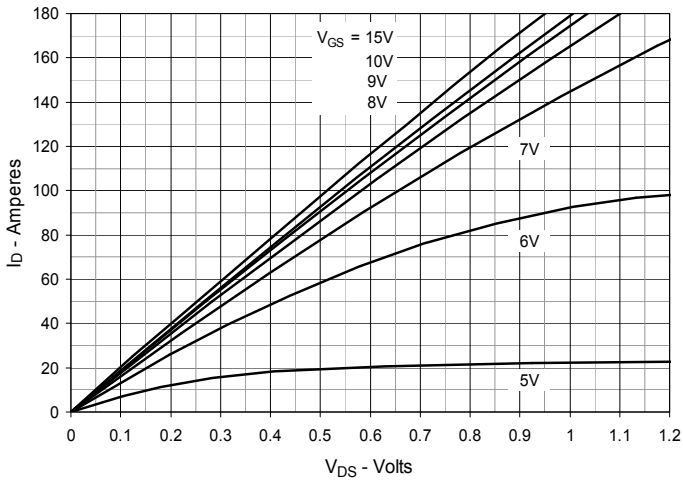


Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$

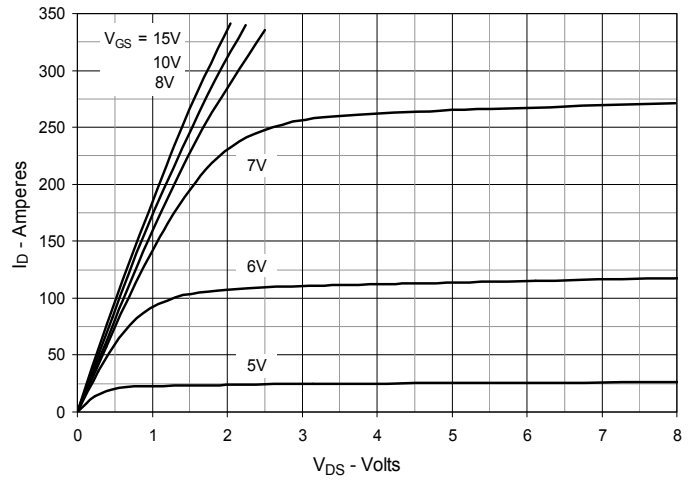


Fig. 3. Output Characteristics @  $T_J = 150^\circ\text{C}$

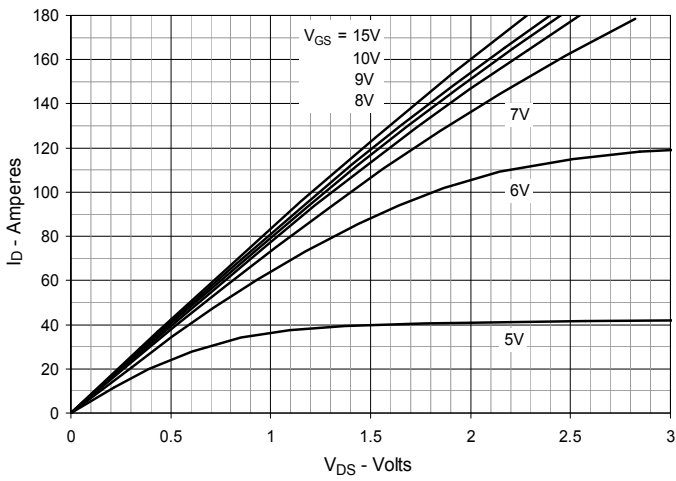


Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 90\text{A}$  Value vs. Junction Temperature

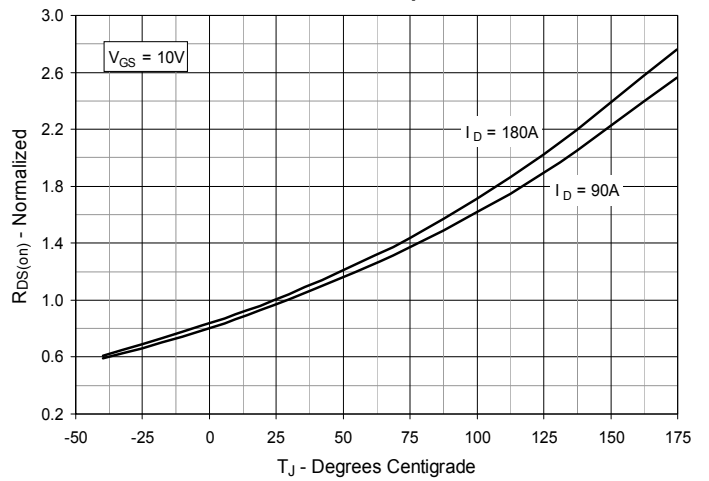


Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 90\text{A}$  Value vs. Drain Current

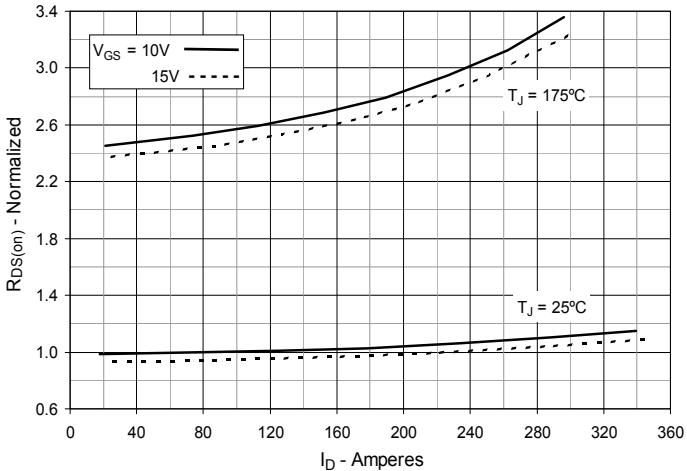


Fig. 6. Drain Current vs. Case Temperature

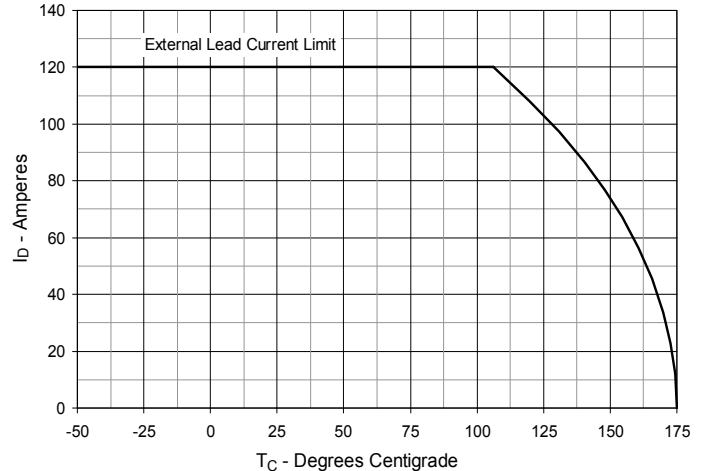


Fig. 7. Input Admittance

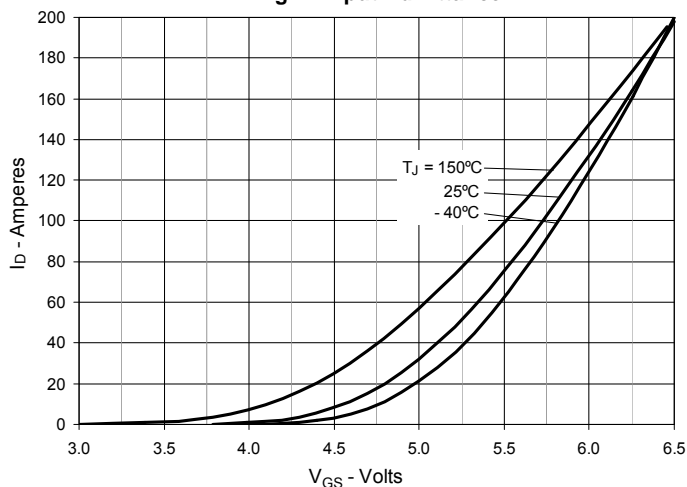


Fig. 8. Transconductance

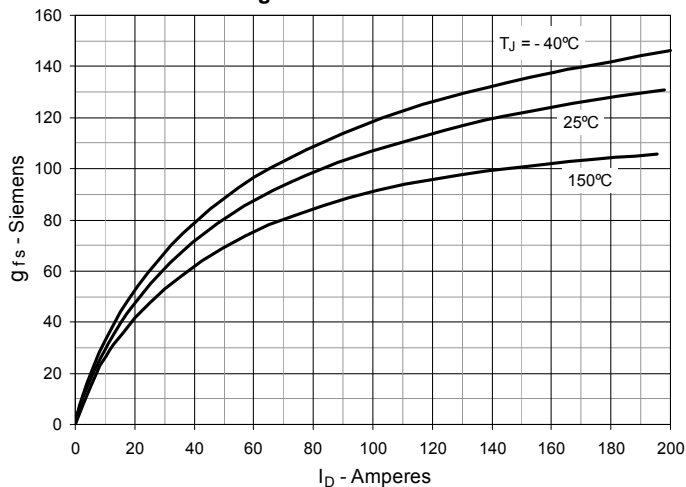


Fig. 9. Forward Voltage Drop of Intrinsic Diode

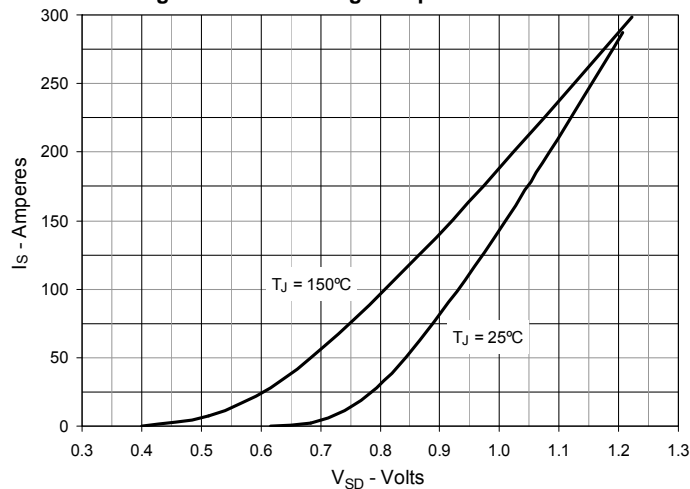


Fig. 10. Gate Charge

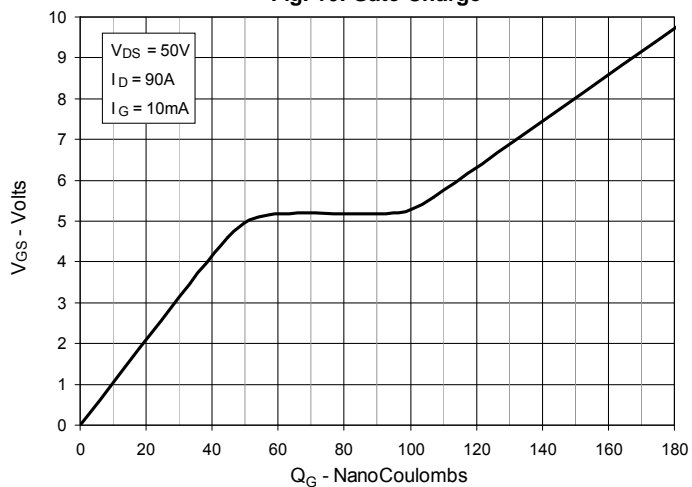


Fig. 11. Capacitance

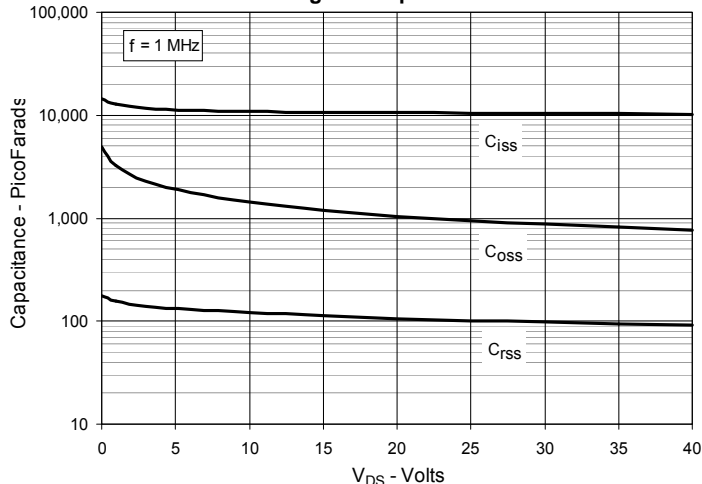
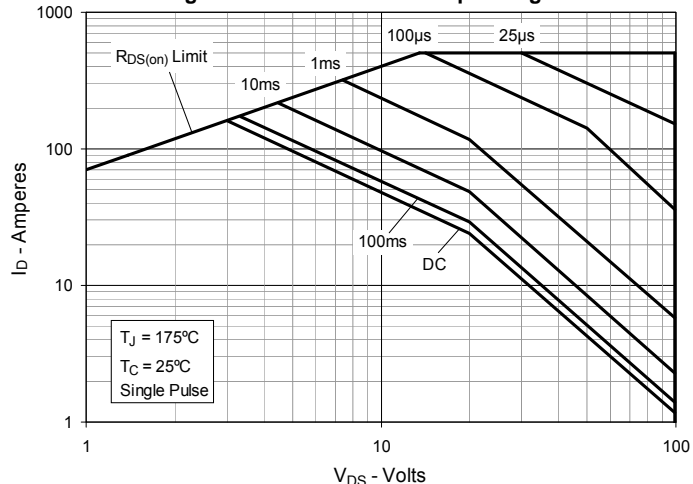
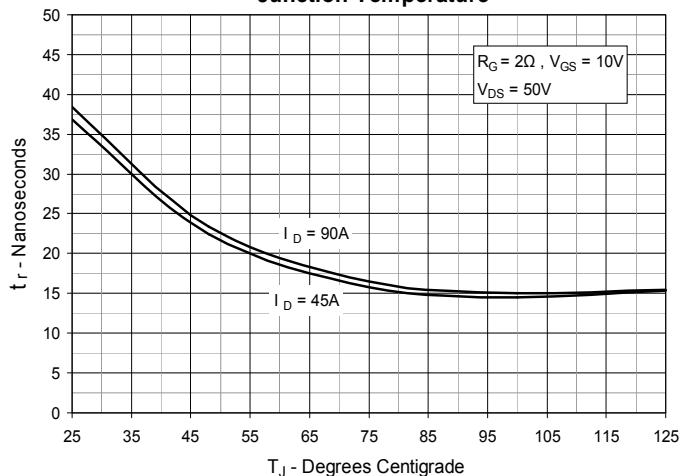


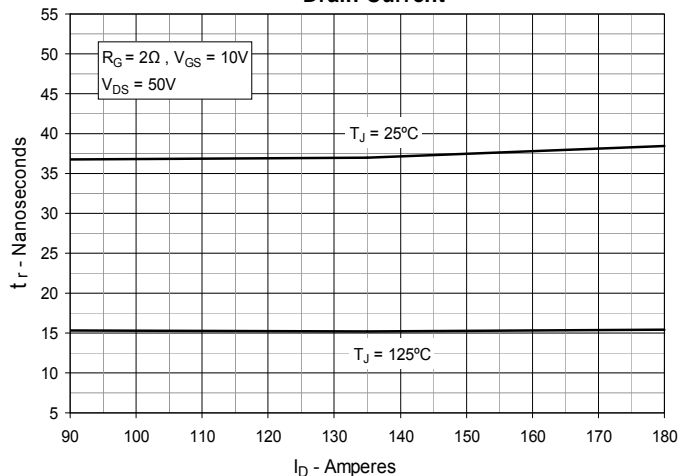
Fig. 12. Forward-Bias Safe Operating Area



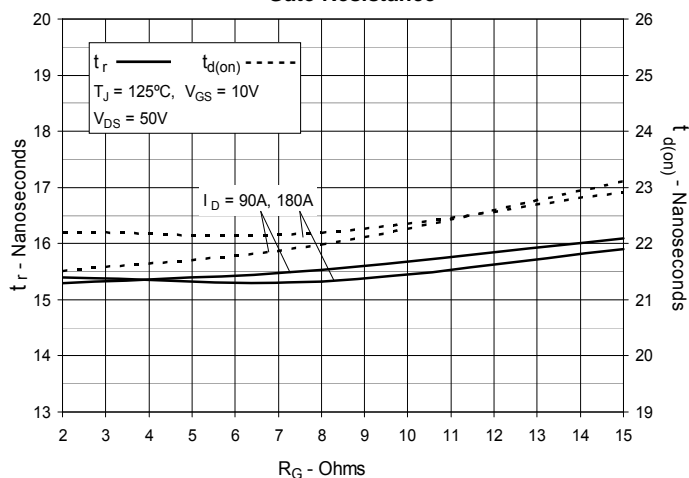
**Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature**



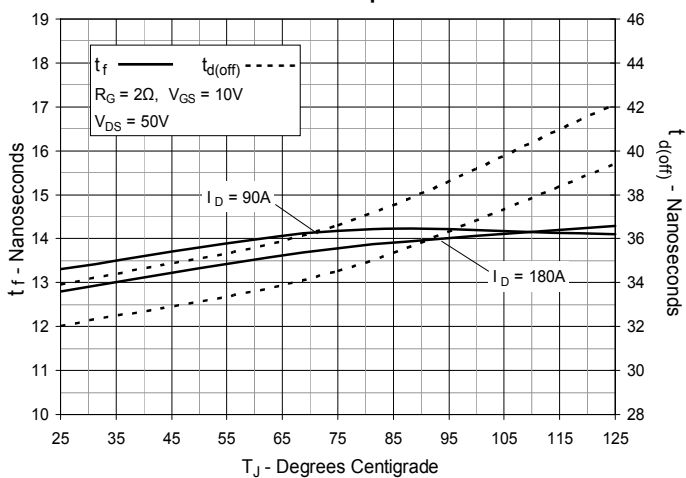
**Fig. 14. Resistive Turn-on Rise Time vs. Drain Current**



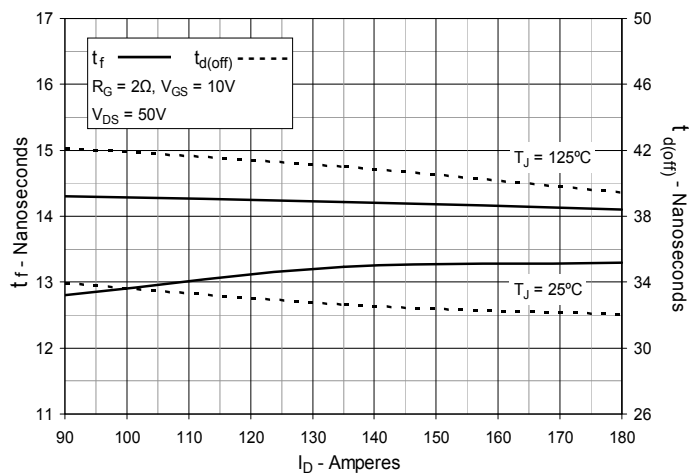
**Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance**



**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**

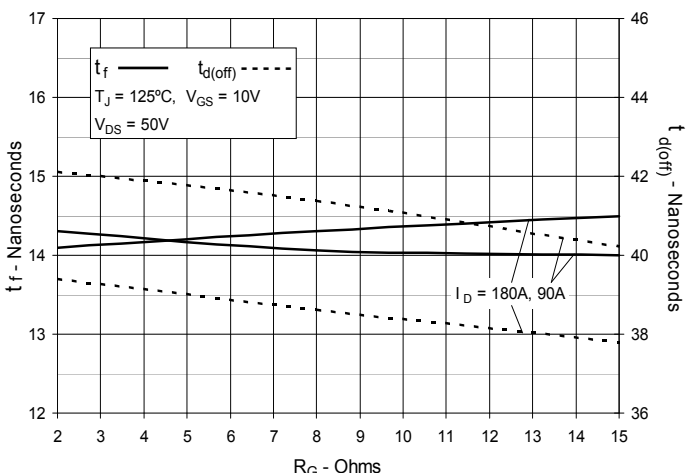


Fig. 19. Maximum Transient Thermal Impedance

