

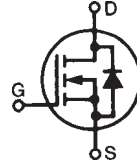
**TrenchT2™**  
**Power MOSFET**
**IXTA110N12T2**  
**IXTP110N12T2**

$$V_{DSS} = 120V$$

$$I_{D25} = 110A$$

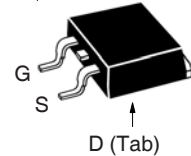
$$R_{DS(on)} \leq 14m\Omega$$

N-Channel Enhancement Mode  
 Avalanche Rated  
 Fast Intrinsic Rectifier

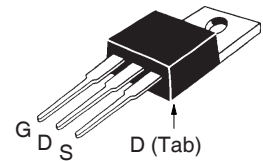


| Symbol     | Test Conditions   | Maximum Ratings |            |
|------------|---|-----------------|------------|
| $V_{DSS}$  | $T_J = 25^\circ C$ to $175^\circ C$                       | 120             | V          |
| $V_{DGR}$  | $T_J = 25^\circ C$ to $175^\circ C$ , $R_{GS} = 1M\Omega$ | 120             | V          |
| $V_{GSS}$  | Continuous  | $\pm 20$        | V          |
| $V_{GSM}$  | Transient   | $\pm 30$        | V          |
| $I_{D25}$  | $T_C = 25^\circ C$  | 110             | A          |
| $I_{DM}$   | $T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$      | 200             | A          |
| $I_A$      | $T_C = 25^\circ C$  | 55              | A          |
| $E_{AS}$   | $T_C = 25^\circ C$  | 800             | mJ         |
| $P_D$      | $T_C = 25^\circ C$  | 517             | 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             | $^\circ C$ |
| $T_{SOLD}$ | Plastic Body 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-263AA (IXTA)



TO-220AB (IXTP)



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

**Features**

- International Standard Packages
- 175°C Operating Temperature
- Avalanche Rated
- Low  $R_{DS(on)}$
- Fast Intrinsic Rectifier
- High Current Handling Capability

**Advantages**

- Easy to Mount
- Space Savings
- High Power Density

**Applications**

- Synchronous Rectification
- DC/DC Converters and Off-Line UPS
- Primary- Side Switch
- High Current Switching Applications

| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ Unless Otherwise Specified) | Characteristic Values |      |              |
|--------------|---|-----------------------|------|--------------|
|              |   | Min.                  | Typ. | Max.         |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu A$                                    | 120                   |      | V            |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250\mu A$                                | 2.5                   |      | V            |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$                                  |                       |      | $\pm 200$ nA |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 150^\circ C$           |                       |      | 5 $\mu A$    |
|              |   |                       |      | 350 $\mu A$  |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Notes 1, 2             | 11.4                  | 14.0 | m $\Omega$   |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)  | Characteristic Values |      |                    |
|--------------|--|-----------------------|------|--------------------|
|              |  | Min.                  | Typ. | Max.               |
| $g_{fs}$     | $V_{DS} = 10\text{V}$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1   | 46                    | 78   | S                  |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$   |                       | 6570 | pF                 |
| $C_{oss}$    |  |                       | 586  | pF                 |
| $C_{rss}$    |  |                       | 43   | 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                 |
| $t_r$        |  |                       | 30   | ns                 |
| $t_{d(off)}$ |  |                       | 29   | ns                 |
| $t_f$        |  |                       | 15   | ns                 |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$   |                       | 120  | nC                 |
| $Q_{gs}$     |  |                       | 36   | nC                 |
| $Q_{gd}$     |  |                       | 30   | nC                 |
| $R_{thJC}$   | TO-220   |                       | 0.50 | $^\circ\text{C/W}$ |
| $R_{thCH}$   |  |                       |      | $^\circ\text{C/W}$ |

### Source-Drain Diode

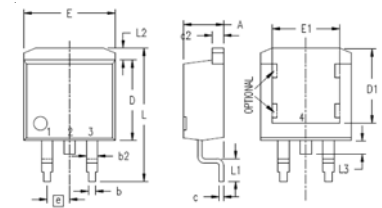
| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                                  | Characteristic Values |      |       |
|----------|--|-----------------------|------|-------|
|          |  | Min.                  | Typ. | Max.  |
| $I_S$    | $V_{GS} = 0\text{V}$   |                       |      | 110 A |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$  |                       |      | 440 A |
| $V_{SD}$ | $I_F = I_S$ , $V_{GS} = 0\text{V}$ , Note 1  |                       |      | 1.4 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>$V_R = 60\text{V}$ |                       | 64   | ns    |
| $I_{RM}$ |  |                       | 14.4 | A     |
| $Q_{RM}$ |  |                       | 460  | nC    |

- 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.

### ADVANCE TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

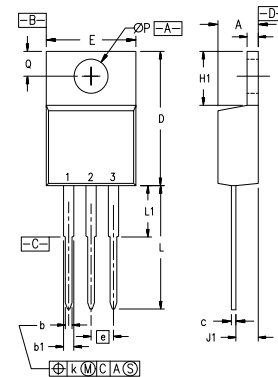
### TO-263 Outline



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

| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .160     | .190 | 4.06        | 4.83  |
| A1  | .080     | .110 | 2.03        | 2.79  |
| b   | .020     | .039 | 0.51        | 0.99  |
| b2  | .045     | .055 | 1.14        | 1.40  |
| c   | .016     | .029 | 0.40        | 0.74  |
| c2  | .045     | .055 | 1.14        | 1.40  |
| D   | .340     | .380 | 8.64        | 9.65  |
| D1  | .315     | .350 | 8.00        | 8.89  |
| E   | .380     | .410 | 9.65        | 10.41 |
| E1  | .245     | .320 | 6.22        | 8.13  |
| e   | .100 BSC |      | 2.54 BSC    |       |
| L   | .575     | .625 | 14.61       | 15.88 |
| L1  | .090     | .110 | 2.29        | 2.79  |
| L2  | .040     | .055 | 1.02        | 1.40  |
| L3  | .050     | .070 | 1.27        | 1.78  |
| L4  | 0        | .005 | 0           | 0.13  |

### TO-220 Outline



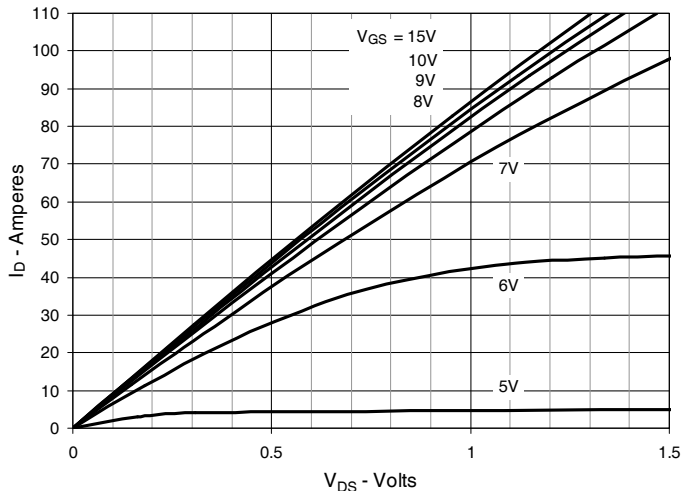
- Pins: 1 - Gate 2 - Drain  
3 - Source

| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | 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  |

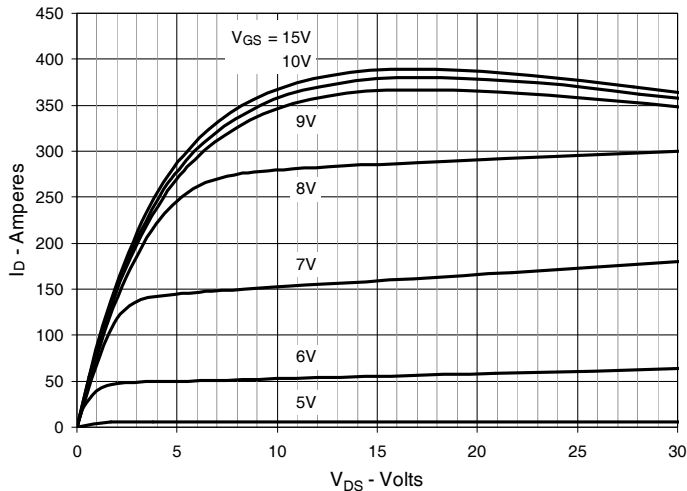
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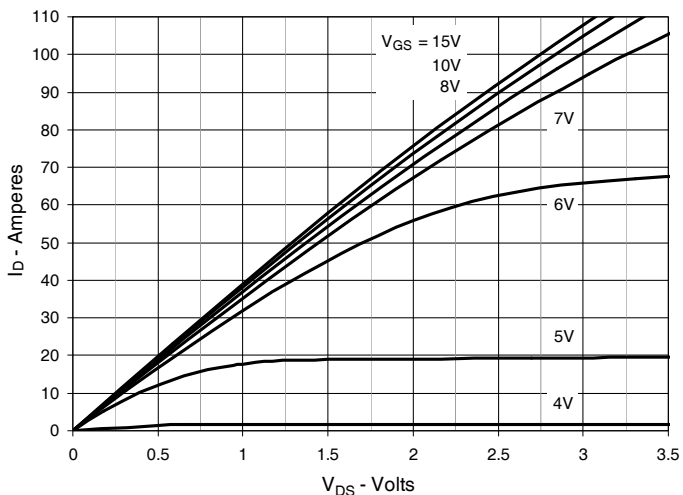
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



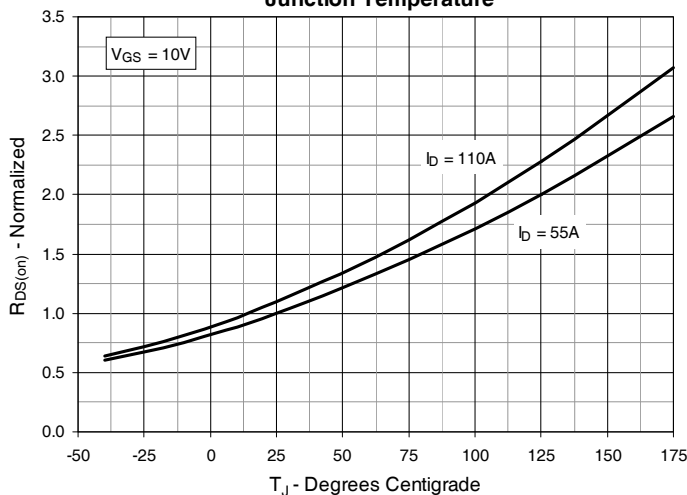
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



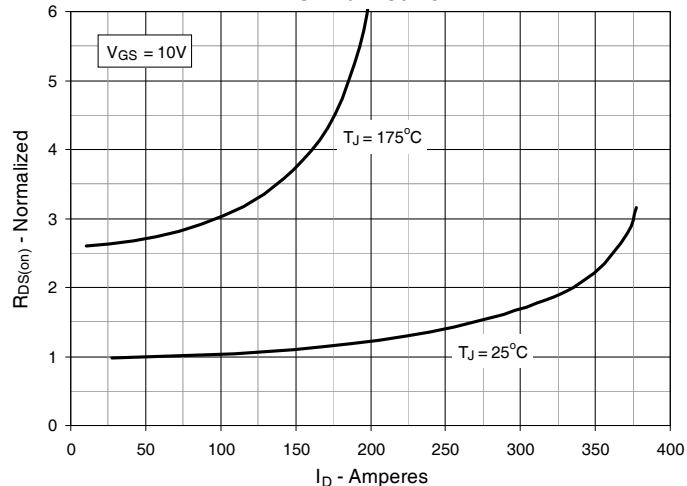
**Fig. 3. Output Characteristics @  $T_J = 150^\circ\text{C}$**



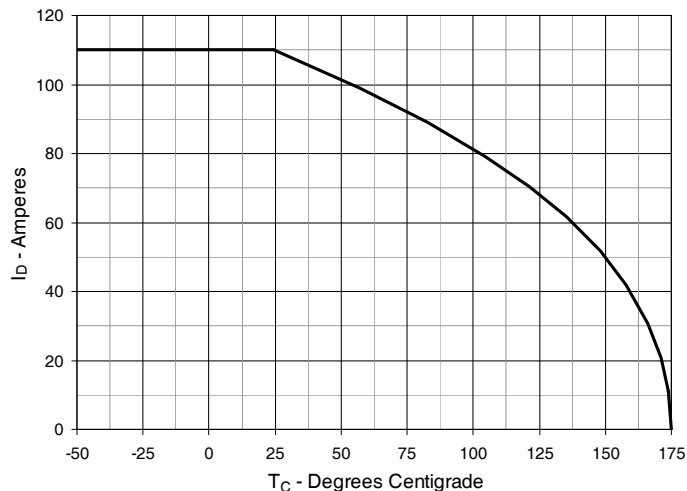
**Fig. 4. Normalized  $R_{DS(on)}$  to  $I_D = 55\text{A}$  Value vs. Junction Temperature**



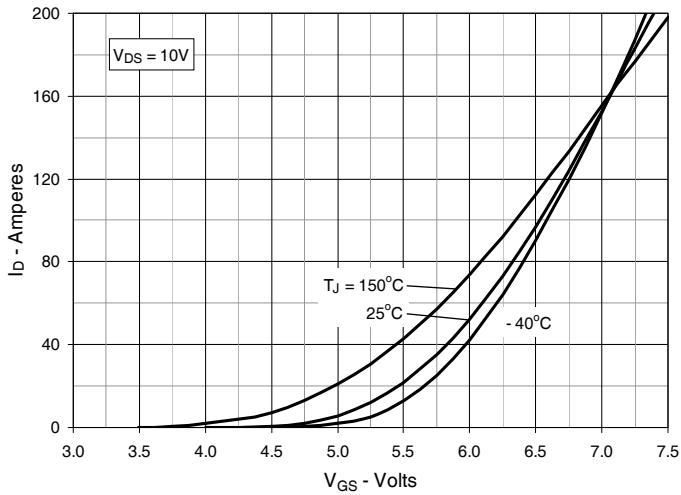
**Fig. 5. Normalized  $R_{DS(on)}$  to  $I_D = 55\text{A}$  vs. Drain Current**



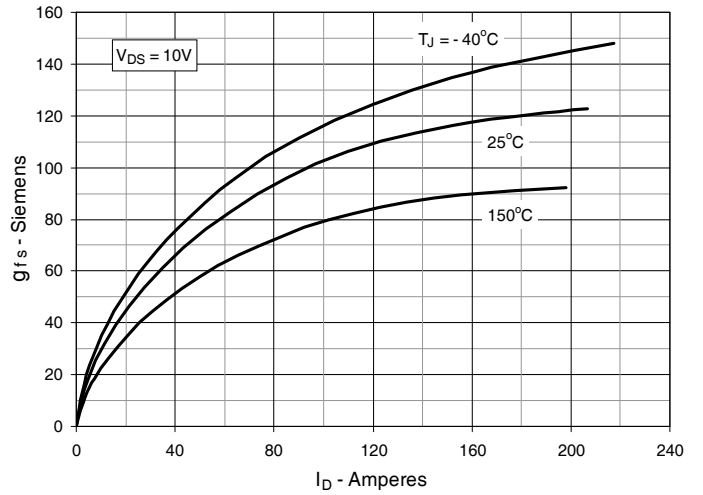
**Fig. 6. Drain Current vs. Case Temperature**



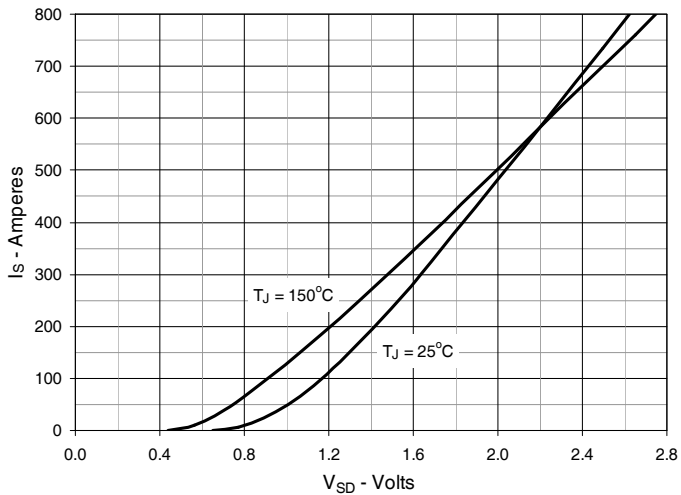
**Fig. 7. Input Admittance**



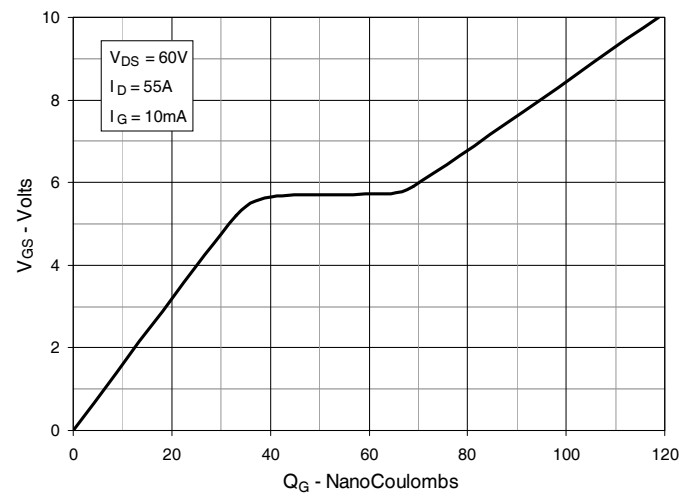
**Fig. 8. Transconductance**



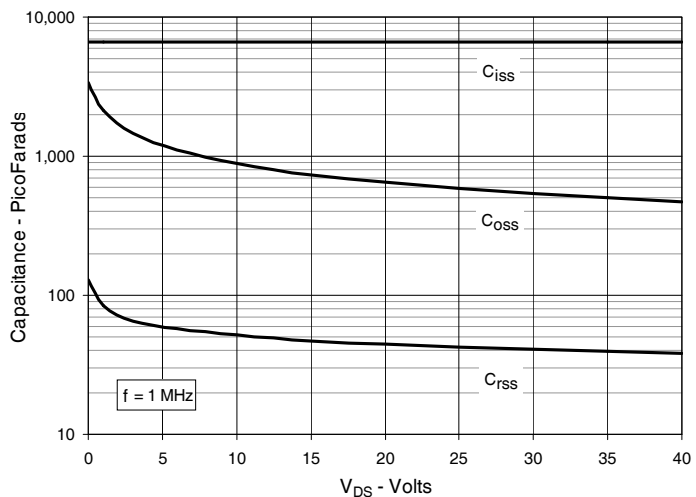
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



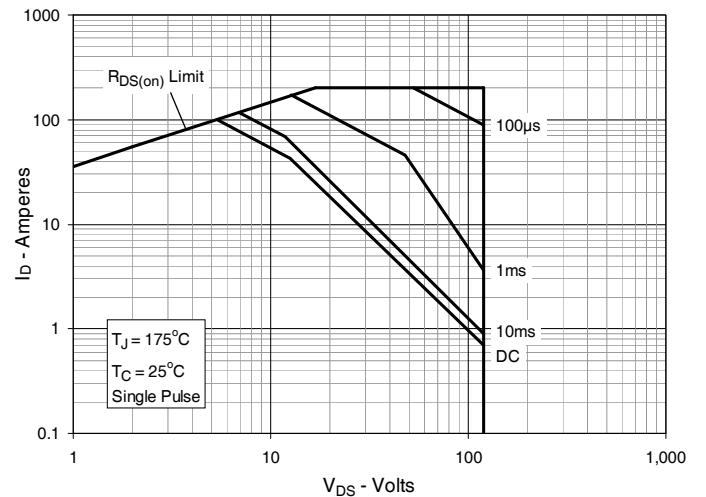
**Fig. 10. Gate Charge**



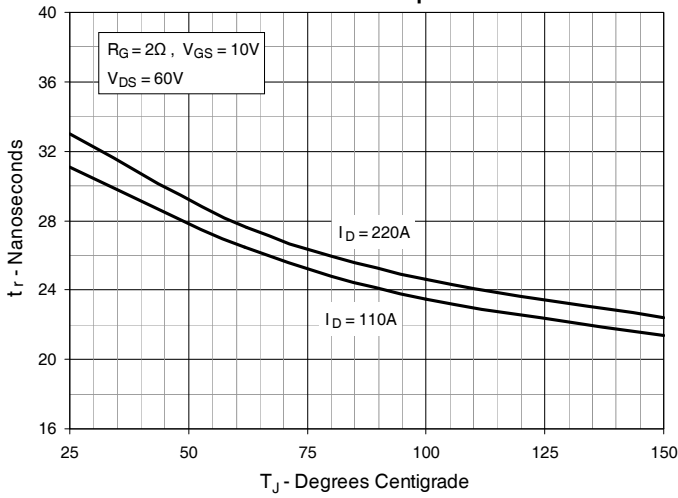
**Fig. 11. Capacitance**



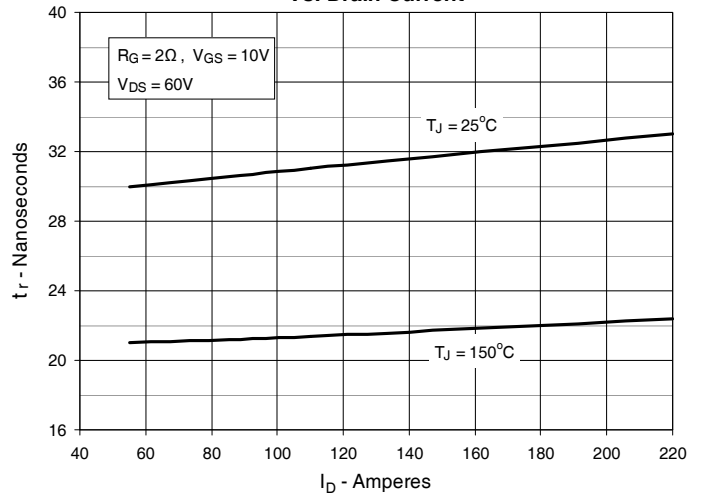
**Fig. 12. Forward-Bias Safe Operating Area**



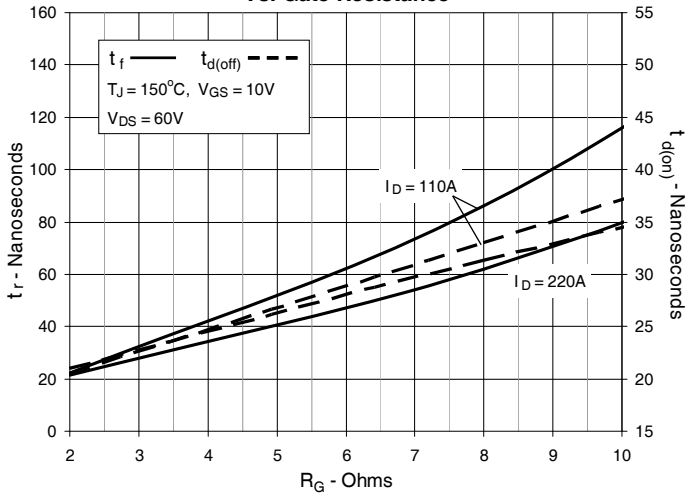
**Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature**



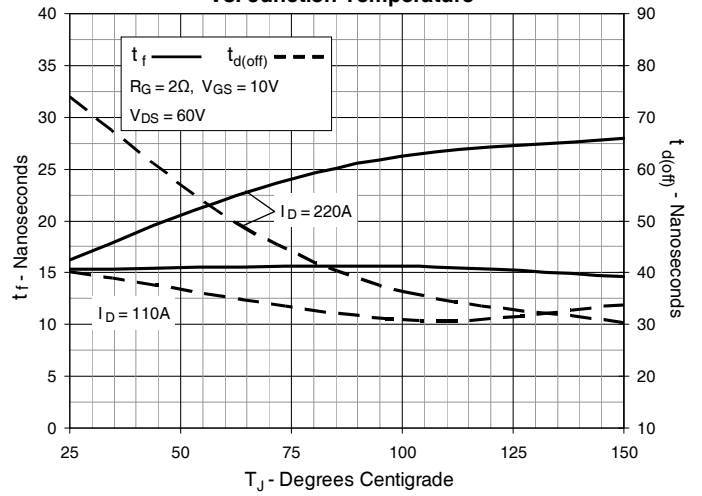
**Fig. 14. Resistive Turn-on Rise Time vs. Drain Current**



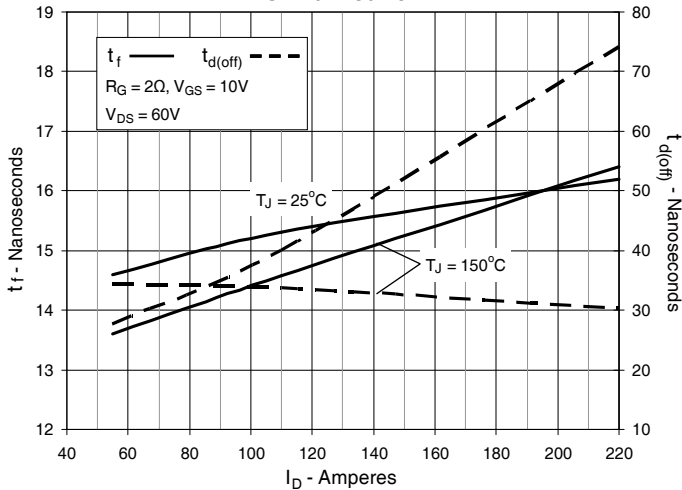
**Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance**



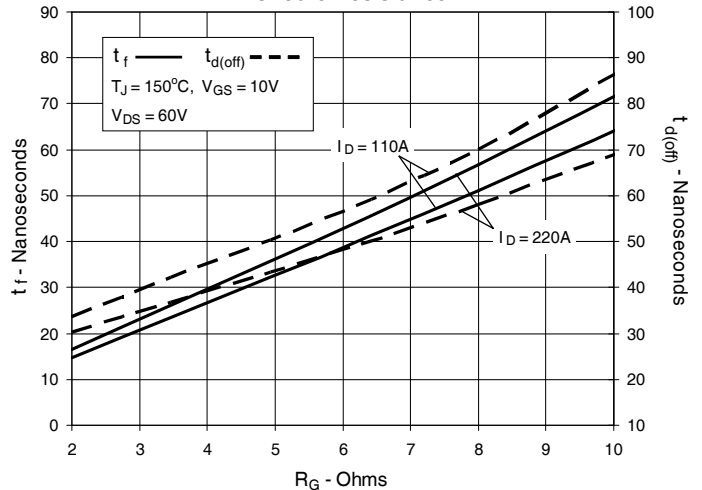
**Fig. 16. Resistive Turn-off Switching Times vs. Junction Temperature**



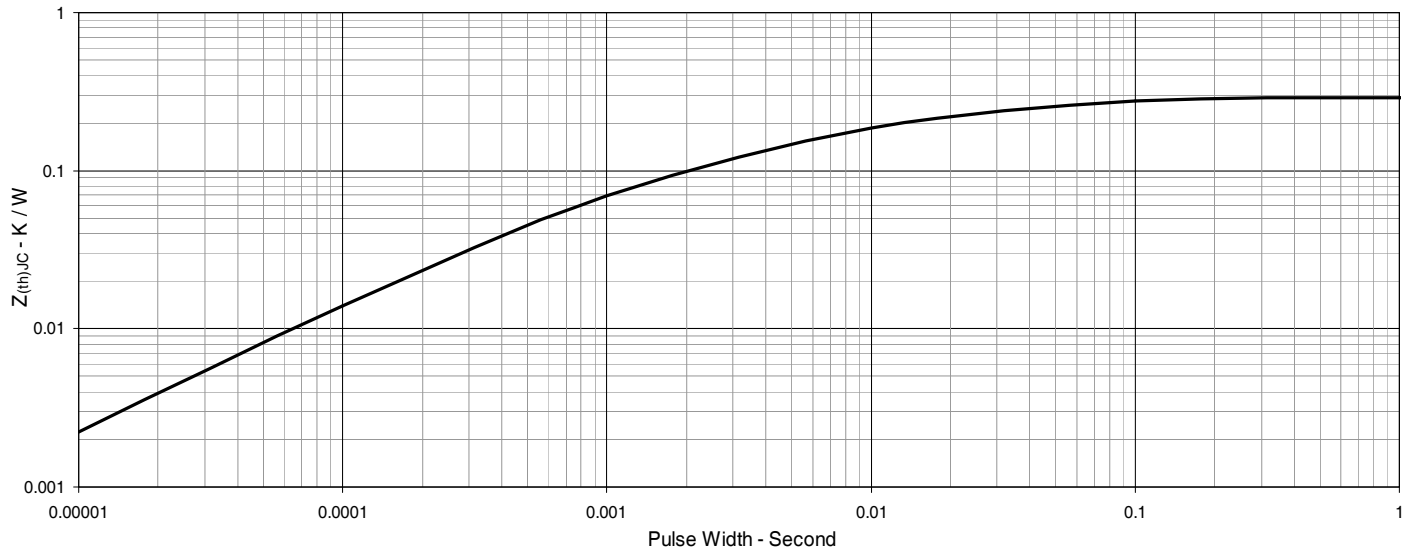
**Fig. 17. Resistive Turn-off Switching Times vs. Drain Current**



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



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





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