

# Trench™ Power MOSFET

## IXTC110N25T

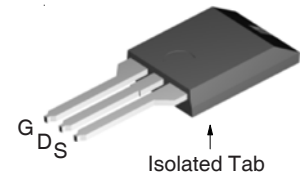
$V_{DSS} = 250V$   
 $I_{D25} = 50A$   
 $R_{DS(on)} \leq 29m\Omega$

(Electrically Isolated Tab)

N-Channel Enhancement Mode  
 Fast Intrinsic Rectifier  
 Avalanche Rated



ISOPLUS220  
 E153432



G = Gate      D = Drain  
 S = Source

| 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          |
| $V_{GSS}$     | Continuous   | $\pm 20$         | V          |
| $V_{GSM}$     | Transient  | $\pm 30$         | V          |
| $I_{D25}$     | $T_C = 25^\circ C$   | 50               | A          |
| $I_{DM}$      | $T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$               | 300              | A          |
| $I_A$         | $T_C = 25^\circ C$   | 25               | A          |
| $E_{AS}$      | $T_C = 25^\circ C$   | 1                | J          |
| $dv/dt$       | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ C$ | 10               | V/ns       |
| $P_D$         | $T_C = 25^\circ C$   | 180              | W          |
| $T_J$         |  | -55 ... +150     | $^\circ C$ |
| $T_{JM}$      |  | 150              | $^\circ C$ |
| $T_{stg}$     |  | -55 ... +150     | $^\circ C$ |
| $T_L$         | Maximum Lead Temperature for Soldering                             | 300              | $^\circ C$ |
| $T_{SOLD}$    | 1.6 mm (0.062in.) from Case for 10s                                | 260              | $^\circ C$ |
| $V_{ISOL}$    | 50/60 Hz, 1 Minute   | 2500             | V~         |
| $F_C$         | Mounting Force   | 11..65/2.5..14.6 | N/lb.      |
| <b>Weight</b> |  | 4                | g          |

### Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- International Standard Package
- 2500V~ Electrical Isolation
- Fast Intrinsic Rectifier
- Avalanche Rated
- Low  $R_{DS(on)}$

### Advantages

- High Power Density
- Easy to Mount
- Space Savings

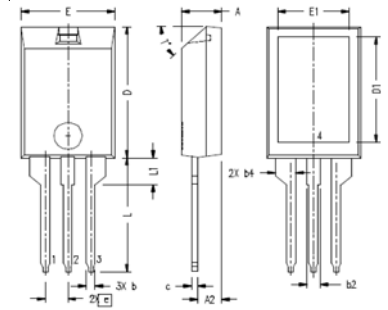
### Applications

- DC-DC Converters
- Battery Chargers
- Switch-Mode and Resonant-Mode Power Supplies
- DC Choppers
- AC Motor Drives
- Uninterruptible Power Supplies

| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ Unless Otherwise Specified) | Characteristic Values |      |                          |
|--------------|---|-----------------------|------|--------------------------|
|              |   | Min.                  | Typ. | Max.                     |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu A$                                    | 250                   |      | V                        |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 1mA$                                     | 3.0                   |      | 5.0 V                    |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$                                  |                       |      | $\pm 200$ nA             |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 125^\circ C$           |                       |      | 5 $\mu A$<br>250 $\mu A$ |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 55A$ , Notes 1, 2                           |                       |      | 29 m $\Omega$            |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)   | Characteristic Values |      |                        |
|--------------|---|-----------------------|------|------------------------|
|              |   | Min.                  | Typ. | Max.                   |
| $g_{fs}$     | $V_{DS} = 10\text{V}, I_D = 55\text{A}$ , Note 1  | 65                    | 110  | S                      |
| $C_{iss}$    | $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$  |                       | 9400 | pF                     |
| $C_{oss}$    |   |                       | 850  | pF                     |
| $C_{rss}$    |   |                       | 55   | pF                     |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 15\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 55\text{A}$<br>$R_G = 2\Omega$ (External) |                       | 19   | ns                     |
| $t_r$        |   |                       | 27   | ns                     |
| $t_{d(off)}$ |   |                       | 60   | ns                     |
| $t_f$        |   |                       | 27   | ns                     |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 25\text{A}$   |                       | 157  | nC                     |
| $Q_{gs}$     |   |                       | 40   | nC                     |
| $Q_{gd}$     |   |                       | 50   | nC                     |
| $R_{thJC}$   |   |                       |      | $0.69^\circ\text{C/W}$ |
| $R_{thCS}$   |   | 0.21                  |      | $^\circ\text{C/W}$     |

### ISOPLUS220 (IXTC) Outline



1. Gate 2. Drain  
3. Source 4. Isolated

Note: Bottom heatsink (Pin 4) is electrically isolated from Pins 1, 2, & 3.

| SYM | INCHES     |      | MILLIMETERS |       |
|-----|------------|------|-------------|-------|
|     | MIN        | MAX  | MIN         | MAX   |
| A   | .157       | .197 | 4.00        | 5.00  |
| A2  | .098       | .118 | 2.50        | 3.00  |
| b   | .035       | .051 | 0.90        | 1.30  |
| b2  | .049       | .065 | 1.25        | 1.65  |
| b4  | .093       | .100 | 2.35        | 2.55  |
| c   | .028       | .039 | 0.70        | 1.00  |
| D   | .591       | .630 | 15.00       | 16.00 |
| D1  | .472       | .512 | 12.00       | 13.00 |
| E   | .394       | .433 | 10.00       | 11.00 |
| E1  | .295       | .335 | 7.50        | 8.50  |
| e   | .100 BASIC |      | 2.55 BASIC  |       |
| L   | .512       | .571 | 13.00       | 14.50 |
| L1  | .118       | .138 | 3.00        | 3.50  |
| T*  |            |      | 42.5*       | 47.5* |

### 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 $T_{JM}$   |                       |      | 350 A         |
| $V_{SD}$ | $I_F = 55\text{A}, V_{GS} = 0\text{V}$ , Note 1   |                       |      | 1.2 V         |
| $t_{rr}$ | $I_F = 55\text{A}, -di/dt = 250\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}, V_{GS} = 0\text{V}$ |                       | 170  | ns            |
| $I_{RM}$ |   |                       | 27   | A             |
| $Q_{RM}$ |   |                       | 2.3  | $\mu\text{C}$ |

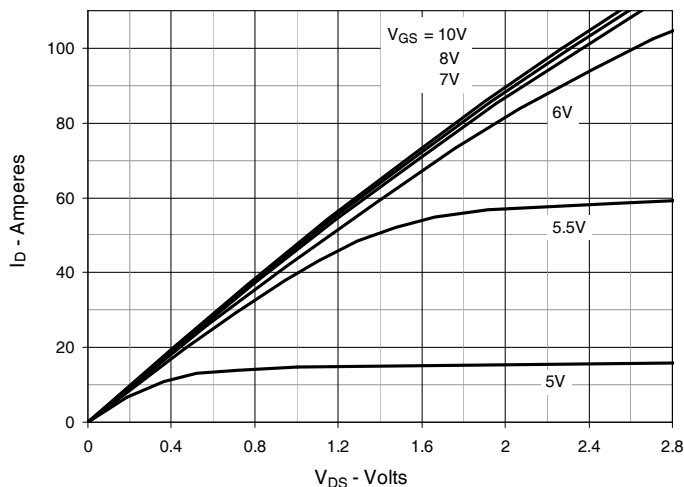
### Notes:

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.

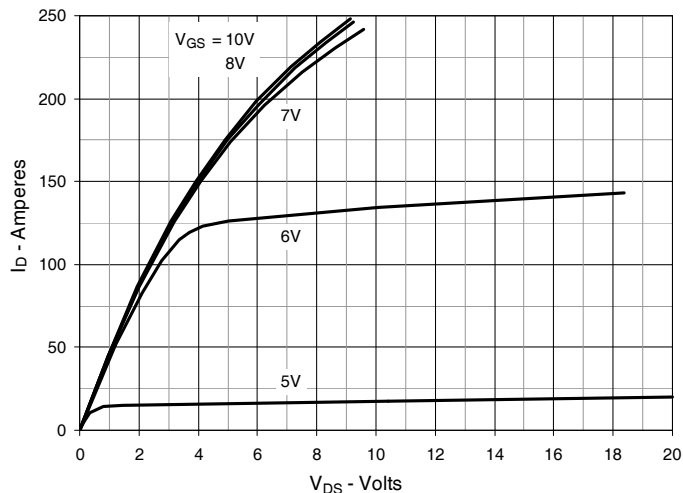
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

|  |           |           |           |           |              |              |              |              |              |             |
|--|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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 |
|  | 4,860,072 | 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    |             |

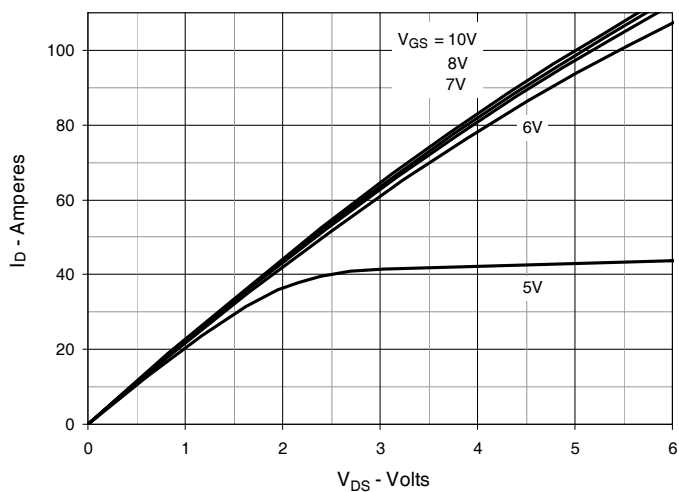
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



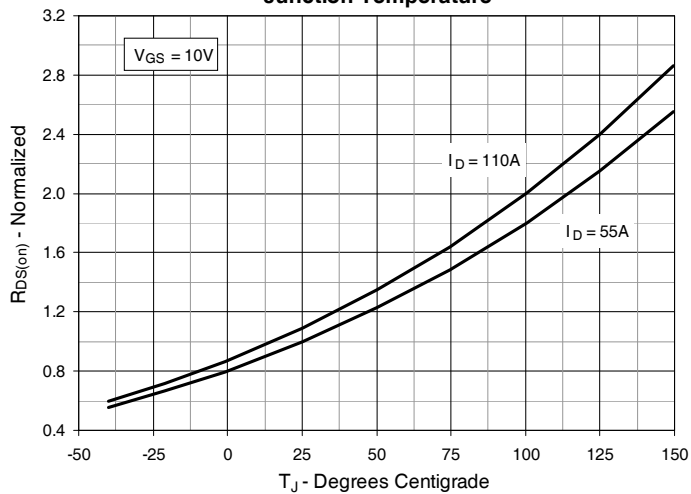
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



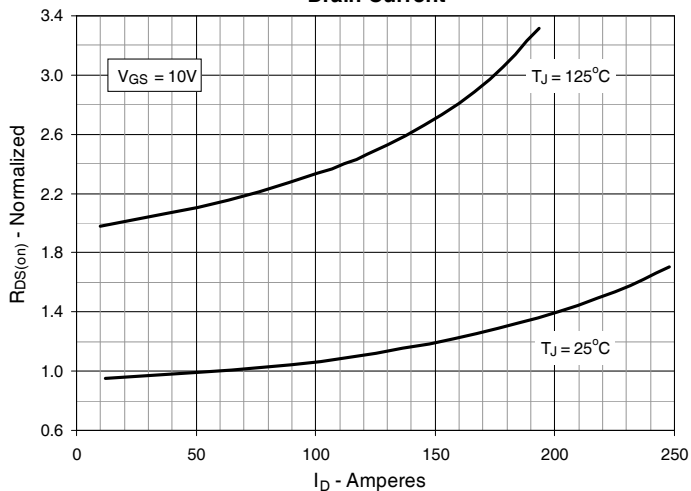
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



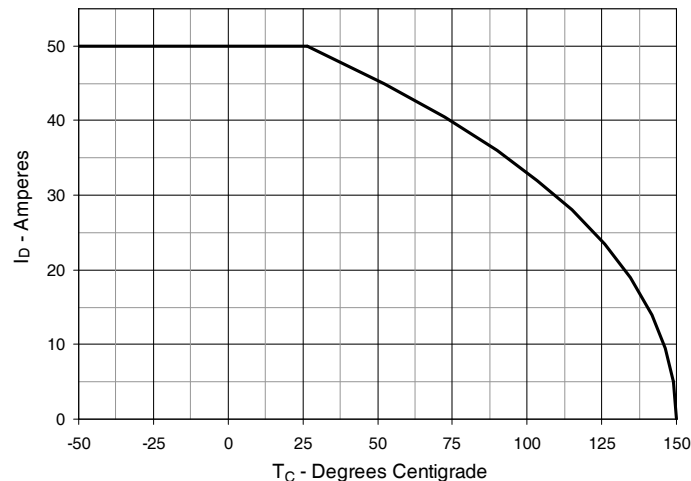
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 55\text{A}$  Value vs. Junction Temperature**

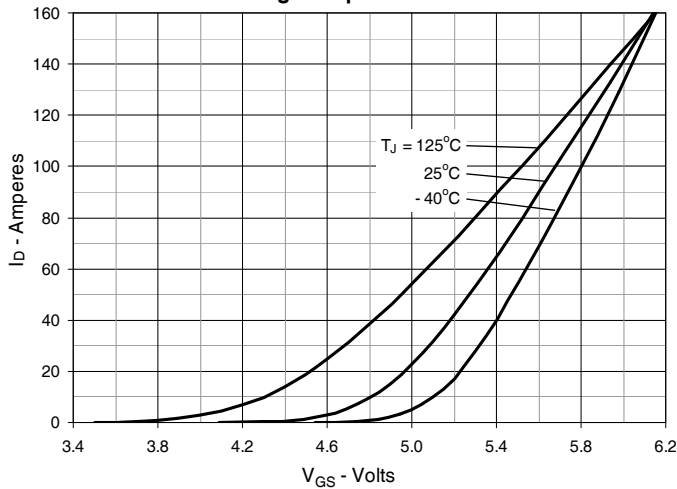
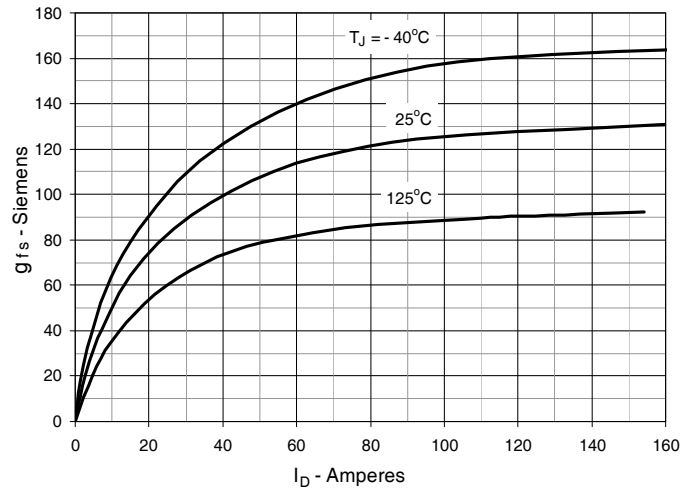
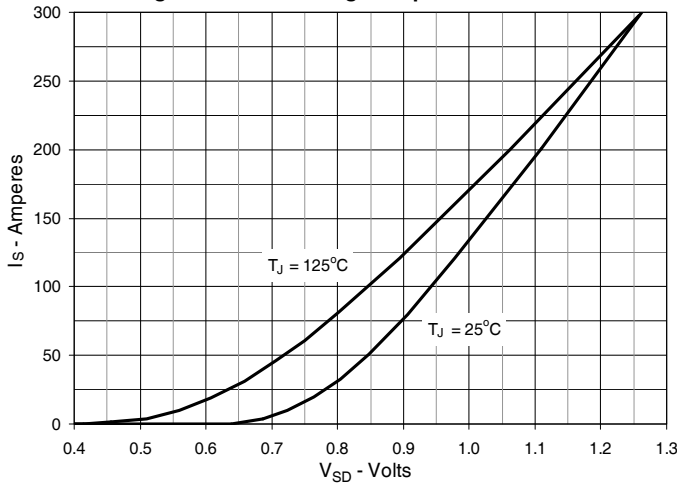
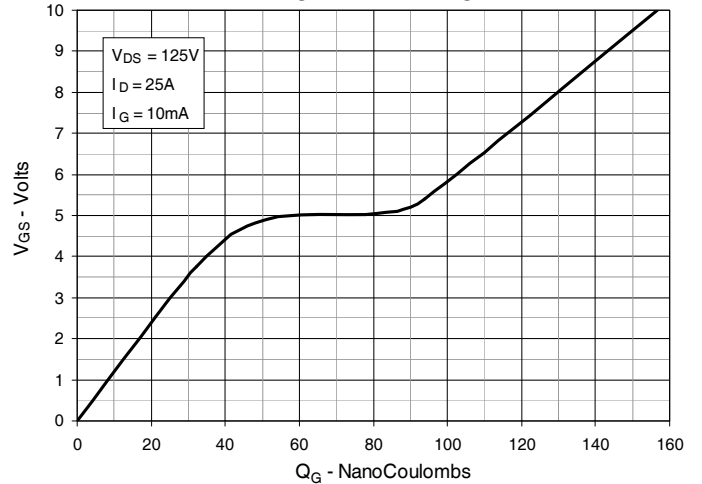
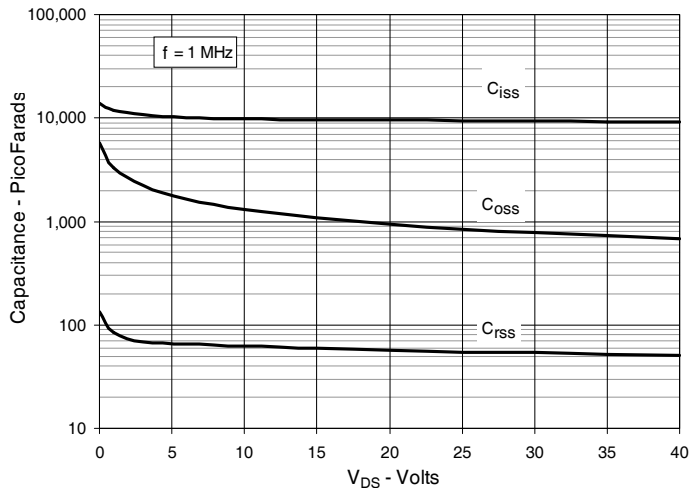
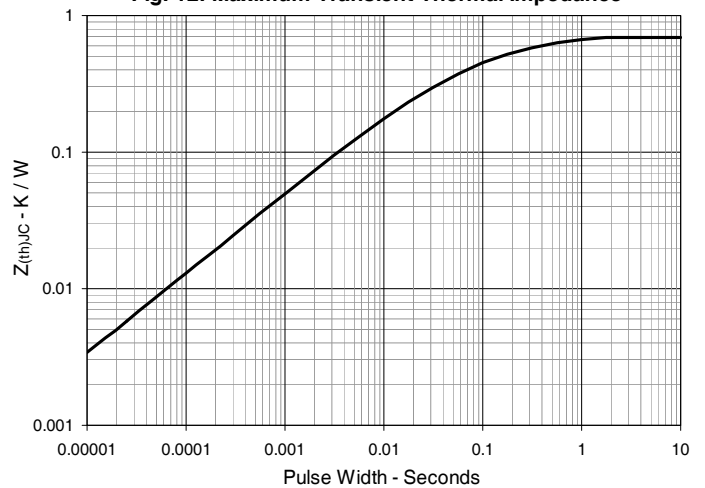


**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 55\text{A}$  Value vs. Drain Current**

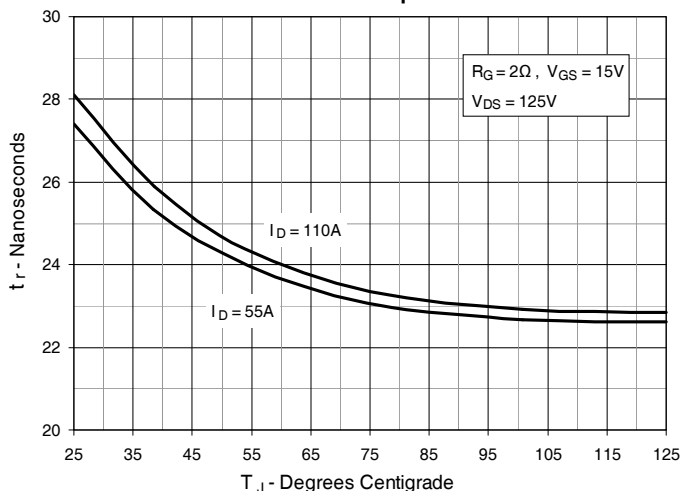


**Fig. 6. Drain Current vs. Case Temperature**

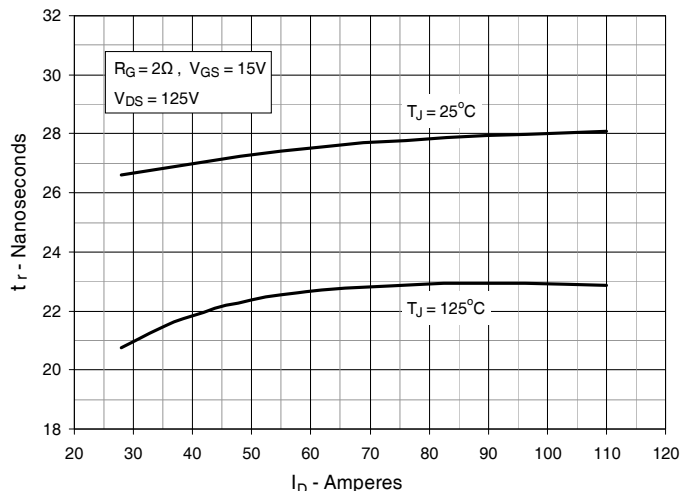


**Fig. 7. Input Admittance**

**Fig. 8. Transconductance**

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

**Fig. 10. Gate Charge**

**Fig. 11. Capacitance**

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


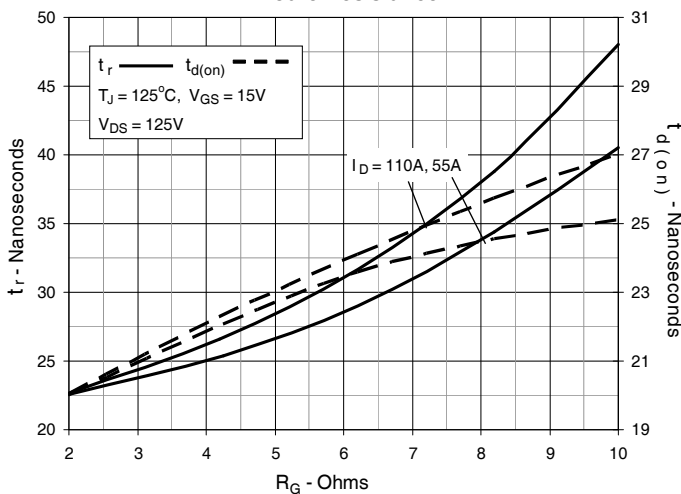
**Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature**



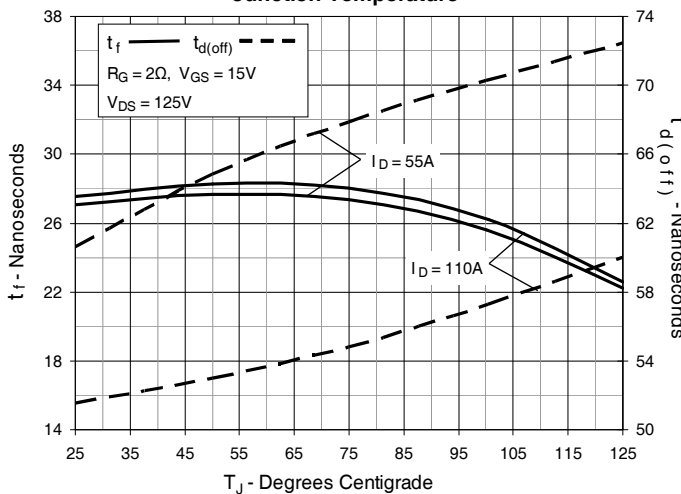
**Fig. 14. Resistive Turn-on Rise Time vs. Drain Current**



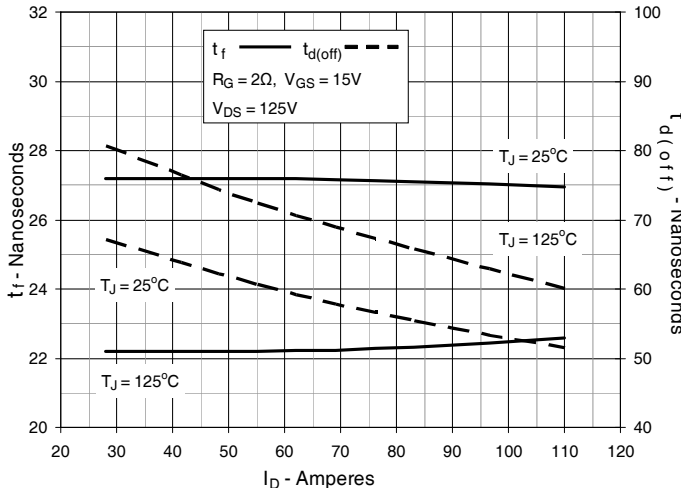
**Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance**



**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**

