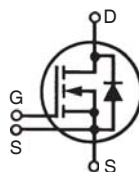


## Polar3™ HiPerFET™ Power MOSFET

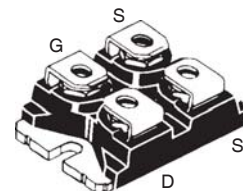
### IXFN132N50P3

N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Rectifier



$$\begin{aligned} V_{DSS} &= 500V \\ I_{D25} &= 112A \\ R_{DS(on)} &\leq 39m\Omega \\ t_{rr} &\leq 250ns \end{aligned}$$

miniBLOC  
E153432



G = Gate      D = Drain  
S = Source

Either Source Terminal S can be used as the Source Terminal or the Kelvin Source (Gate Return) Terminal.

| Symbol     | Test Conditions                                                    | Maximum Ratings    |                      |
|------------|--------------------------------------------------------------------|--------------------|----------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C to } 150^\circ\text{C}$                     | 500                | V                    |
| $V_{DGR}$  | $T_J = 25^\circ\text{C to } 150^\circ\text{C}, R_{GS} = 1M\Omega$  | 500                | V                    |
| $V_{GSS}$  | Continuous                                                         | $\pm 30$           | V                    |
| $V_{GSM}$  | Transient                                                          | $\pm 40$           | V                    |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                           | 112                | A                    |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , Pulse Width Limited by $T_{JM}$         | 330                | A                    |
| $I_A$      | $T_C = 25^\circ\text{C}$                                           | 66                 | A                    |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                           | 2                  | J                    |
| $dv/dt$    | $I_S \leq I_{DM}, V_{DD} \leq V_{DSS}, T_J \leq 150^\circ\text{C}$ | 35                 | V/ns                 |
| $P_D$      | $T_C = 25^\circ\text{C}$                                           | 1500               | W                    |
| $T_J$      |                                                                    | -55 ... +150       | $^\circ\text{C}$     |
| $T_{JM}$   |                                                                    | 150                | $^\circ\text{C}$     |
| $T_{stg}$  |                                                                    | -55 ... +150       | $^\circ\text{C}$     |
| $V_{ISOL}$ | 50/60 Hz, RMS, $t = 1\text{minute}$                                | 2500               | V~                   |
|            | $I_{ISOL} \leq 1\text{mA}, t = 1\text{s}$                          | 3000               | V~                   |
| $M_d$      | Mounting Torque for Base Plate<br>Terminal Connection Torque       | 1.5/13<br>1.3/11.5 | Nm/lb.in<br>Nm/lb.in |
| Weight     |                                                                    | 30                 | g                    |

### Features

- International Standard Package
- miniBLOC with Aluminum Nitride Isolation
- Avalanche Rated
- Low Package Inductance
- Fast Intrinsic Rectifier
- Low  $R_{DS(on)}$  and  $Q_G$

### Advantages

- Easy to Mount
- Space Savings

### Applications

- DC-DC Converters
- Battery Chargers
- Switch-Mode and Resonant-Mode Power Supplies
- Uninterrupted Power Supplies
- AC Motor Drives
- High Speed Power Switching Applications

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified) | Characteristic Values |      |                          |
|--------------|---------------------------------------------------------------------------|-----------------------|------|--------------------------|
|              |                                                                           | Min.                  | Typ. | Max.                     |
| $BV_{DSS}$   | $V_{GS} = 0V, I_D = 3mA$                                                  | 500                   |      | V                        |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 8mA$                                              | 3.0                   |      | 5.0 V                    |
| $I_{GSS}$    | $V_{GS} = \pm 30V, V_{DS} = 0V$                                           |                       |      | $\pm 200$ nA             |
| $I_{DSS}$    | $V_{DS} = V_{DSS}, V_{GS} = 0V$<br>$T_J = 125^\circ\text{C}$              |                       |      | 50 $\mu\text{A}$<br>3 mA |
| $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 66A$ , Note 1                                        |                       |      | 39 m $\Omega$            |

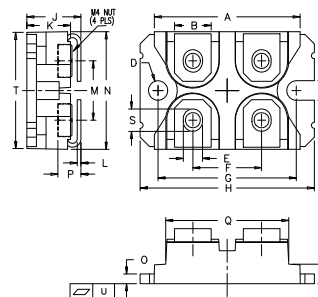
| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)                                                             | Characteristic Values |      |                         |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-------------------------|
|              |                                                                                                                                       | Min.                  | Typ. | Max.                    |
| $g_{fs}$     | $V_{DS} = 10\text{V}, I_D = 60\text{A}$ , Note 1                                                                                      | 68                    | 110  | S                       |
| $C_{iss}$    | $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$                                                                            |                       | 18.6 | nF                      |
| $C_{oss}$    |                                                                                                                                       |                       | 1710 | pF                      |
| $C_{rss}$    |                                                                                                                                       |                       | 12   | pF                      |
| $R_{Gi}$     | Gate Input Resistance                                                                                                                 |                       | 1.16 | $\Omega$                |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 66\text{A}$<br>$R_G = 1\Omega$ (External) |                       | 42   | ns                      |
| $t_r$        |                                                                                                                                       |                       | 18   | ns                      |
| $t_{d(off)}$ |                                                                                                                                       |                       | 90   | ns                      |
| $t_f$        |                                                                                                                                       |                       | 15   | ns                      |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 66\text{A}$                                                                   |                       | 267  | nC                      |
| $Q_{gs}$     |                                                                                                                                       |                       | 95   | nC                      |
| $Q_{gd}$     |                                                                                                                                       |                       | 63   | nC                      |
| $R_{thJC}$   |                                                                                                                                       |                       |      | $0.083^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                       | 0.05                  |      | $^\circ\text{C/W}$      |

## Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)                       | Characteristic Values |      |               |
|----------|-------------------------------------------------------------------------------------------------|-----------------------|------|---------------|
|          |                                                                                                 | Min.                  | Typ. | Max.          |
| $I_s$    | $V_{GS} = 0\text{V}$                                                                            |                       |      | 132 A         |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$                                                     |                       |      | 530 A         |
| $V_{SD}$ | $I_F = 100\text{A}, V_{GS} = 0\text{V}$ , Note 1                                                |                       |      | 1.5 V         |
| $t_{rr}$ | $I_F = 66\text{A}, -di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}, V_{GS} = 0\text{V}$ |                       |      | 250 ns        |
| $Q_{RM}$ |                                                                                                 |                       | 1.9  | $\mu\text{C}$ |
| $I_{RM}$ |                                                                                                 |                       | 16.4 | A             |

Note 1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .

## SOT-227B (IXFN) Outline

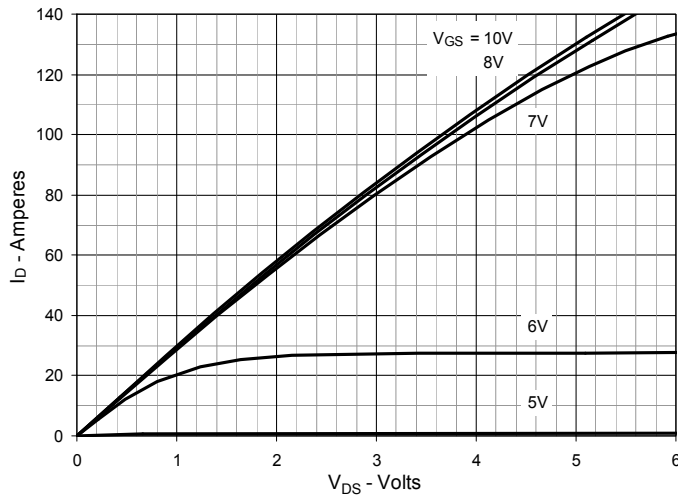
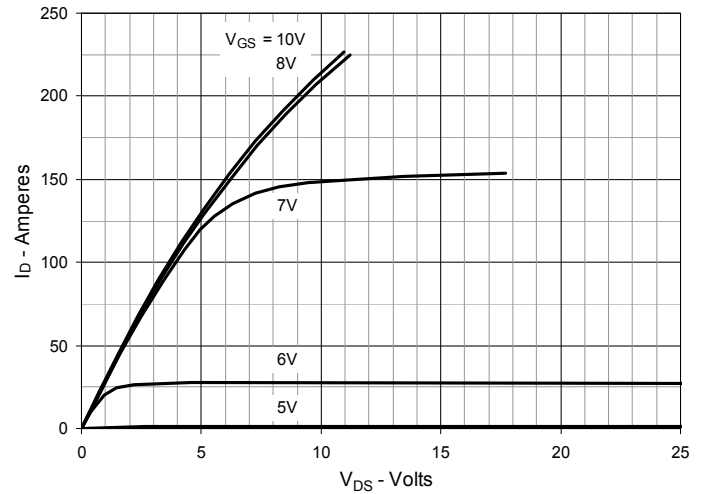
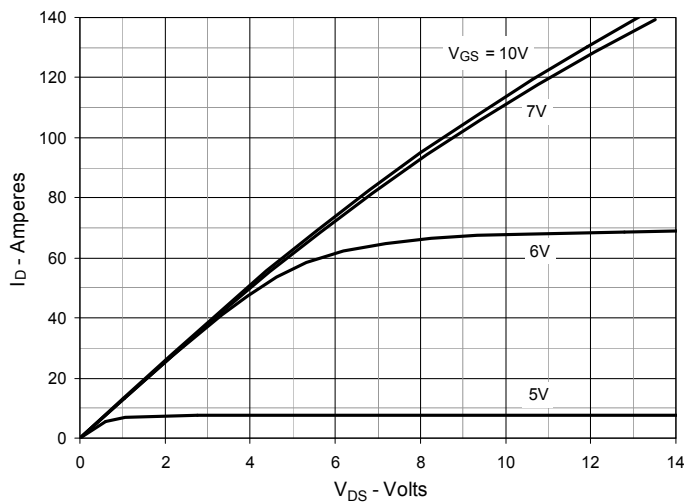
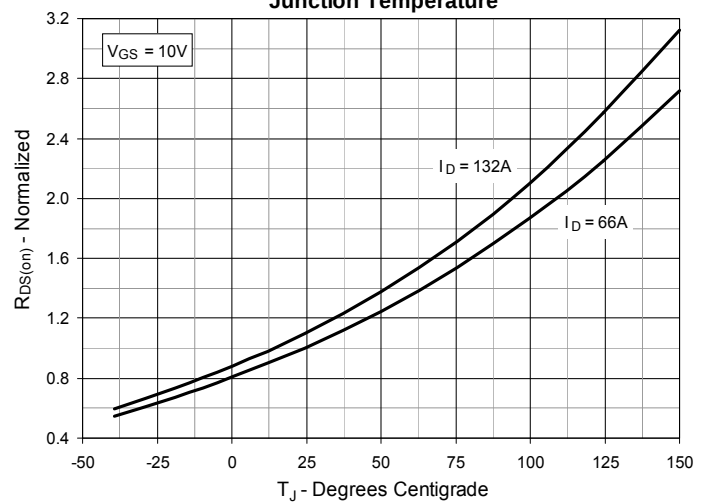
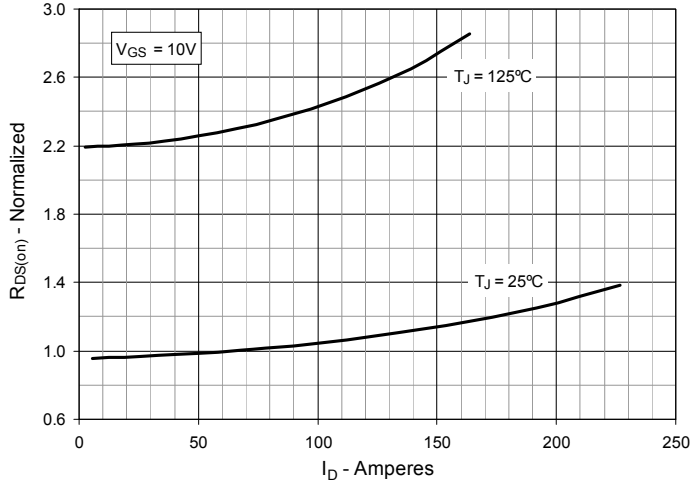
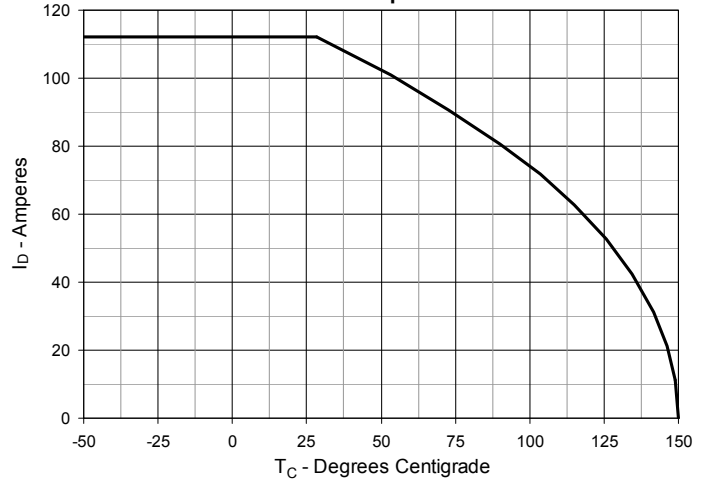


(M4 screws (4x) supplied)

| SYM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 1.240  | 1.255 | 31.50       | 31.88 |
| B   | .307   | .323  | 7.80        | 8.20  |
| C   | .161   | .169  | 4.09        | 4.29  |
| D   | .161   | .169  | 4.09        | 4.29  |
| E   | .161   | .169  | 4.09        | 4.29  |
| F   | .587   | .595  | 14.91       | 15.11 |
| G   | 1.186  | 1.193 | 30.12       | 30.30 |
| H   | 1.496  | 1.505 | 38.00       | 38.23 |
| J   | .460   | .481  | 11.68       | 12.22 |
| K   | .351   | .378  | 8.92        | 9.60  |
| L   | .030   | .033  | 0.76        | 0.84  |
| M   | .496   | .506  | 12.60       | 12.85 |
| N   | .990   | 1.001 | 25.15       | 25.42 |
| O   | .078   | .084  | 1.98        | 2.13  |
| P   | .195   | .235  | 4.95        | 5.97  |
| Q   | 1.045  | 1.059 | 26.54       | 26.90 |
| R   | .155   | .174  | 3.94        | 4.42  |
| S   | .186   | .191  | 4.72        | 4.85  |
| T   | .968   | .987  | 24.59       | 25.07 |
| U   | -.002  | .004  | -0.05       | 0.1   |

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  $I_D = 66\text{A}$  Value vs. Junction Temperature**

**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 66\text{A}$  Value vs. Drain Current**

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


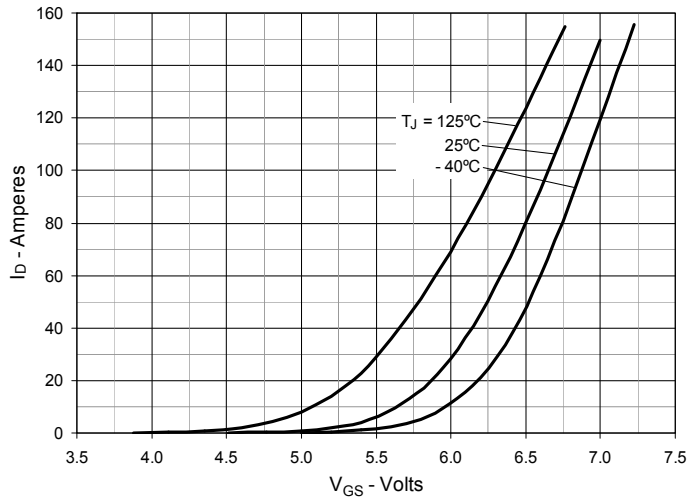
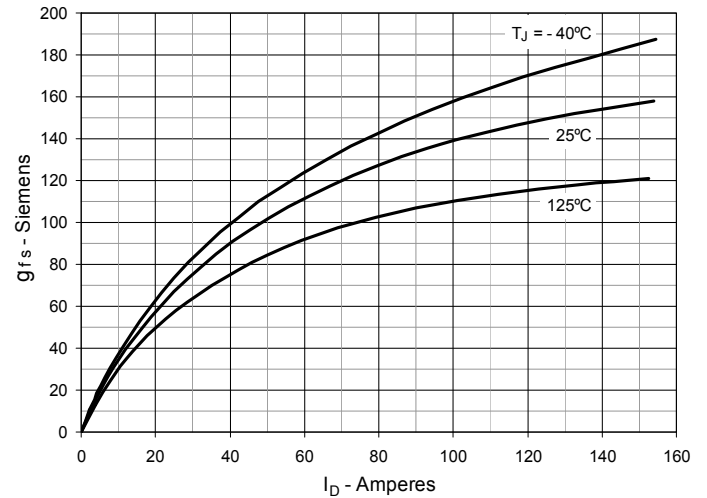
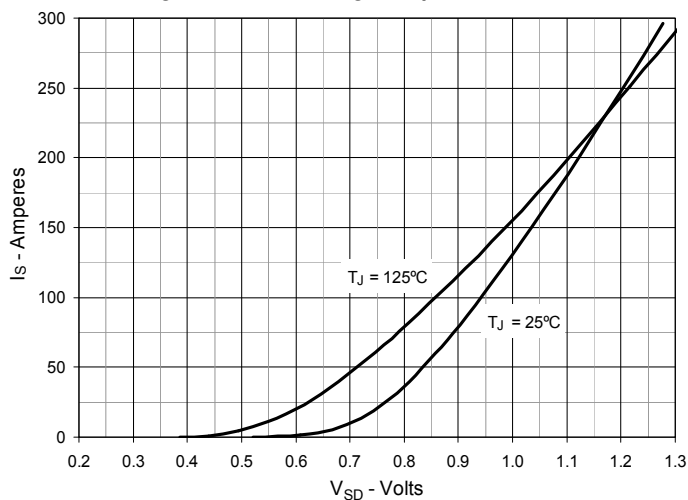
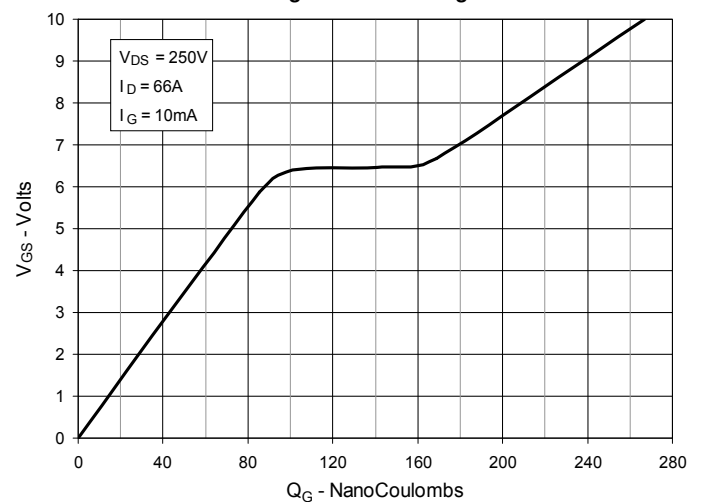
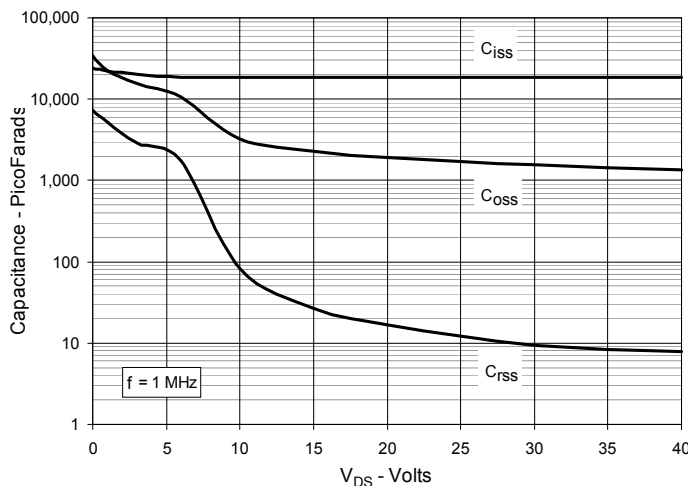
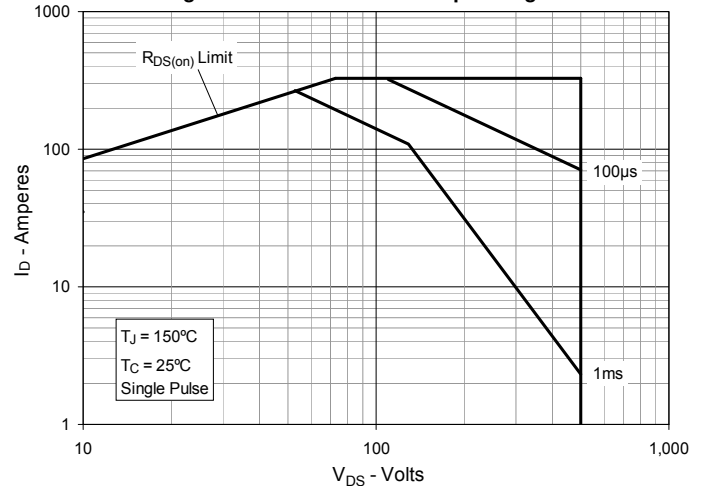
**Fig. 7. Input Admittance**

**Fig. 8. Transconductance**

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

**Fig. 10. Gate Charge**

**Fig. 11. Capacitance**

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


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

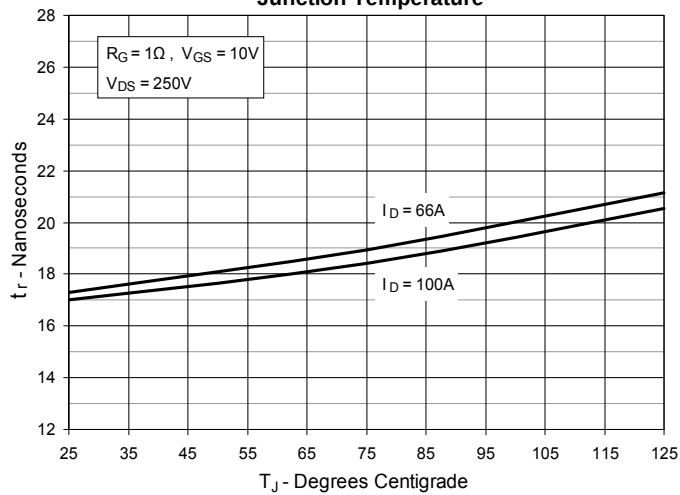


Fig. 14. Resistive Turn-on Rise Time vs. Drain Current

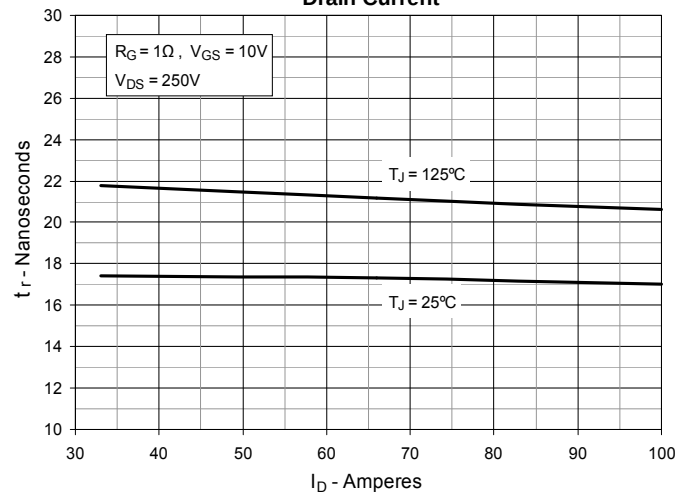


Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance

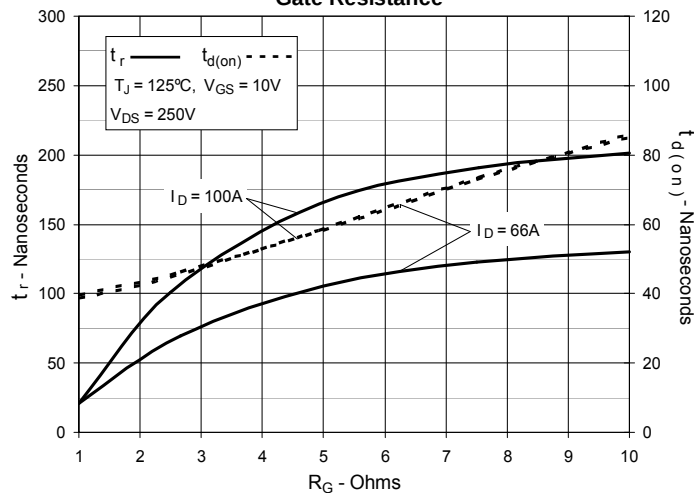


Fig. 16. Resistive Turn-off Switching Times vs. Junction Temperature

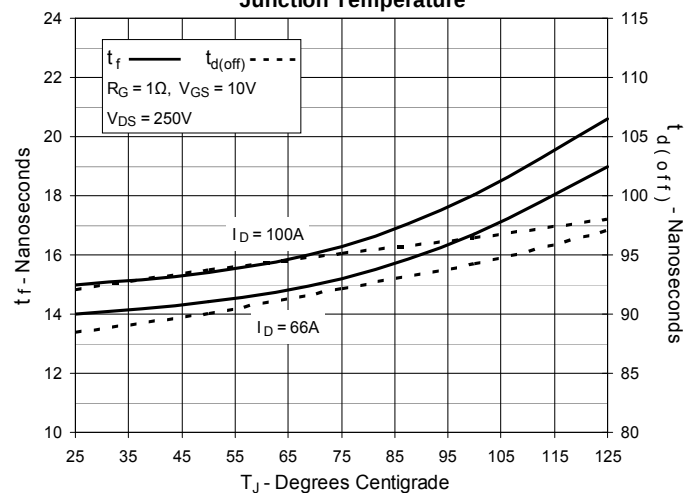


Fig. 17. Resistive Turn-off Switching Times vs. Drain Current

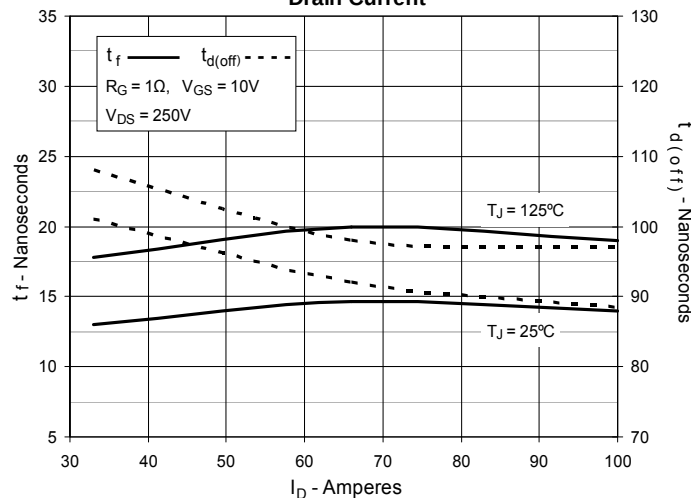


Fig. 18. Resistive Turn-off Switching Times vs. Gate Resistance

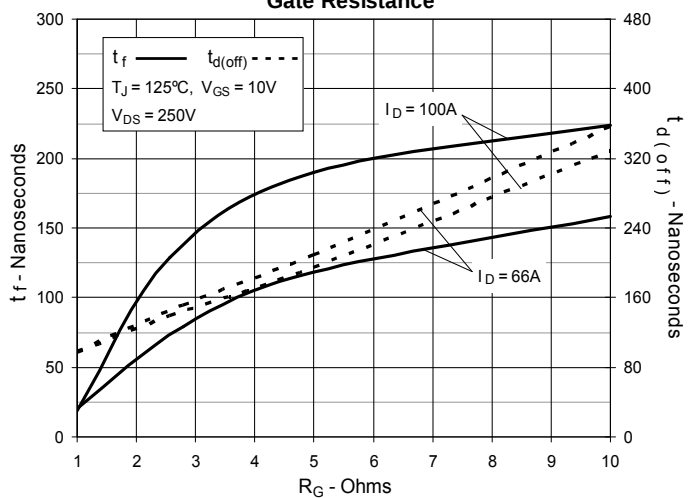
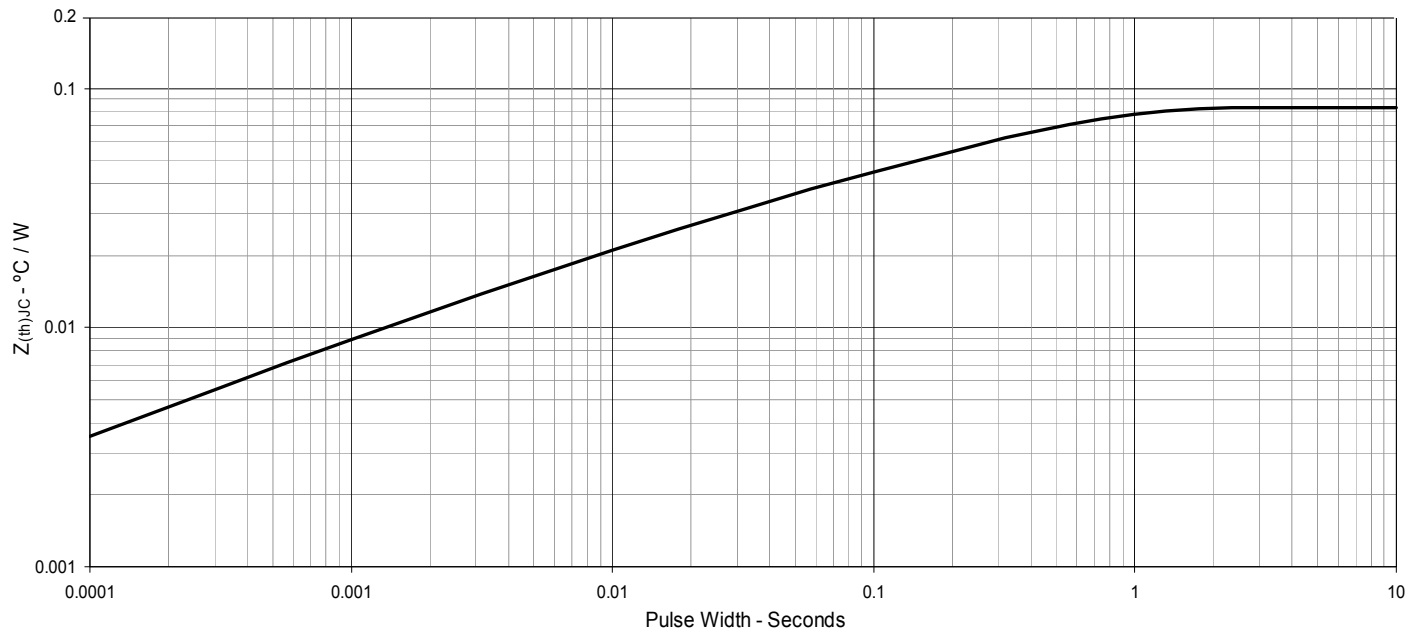


Fig. 19. Maximum Transient Thermal Impedance





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