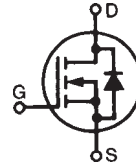


### TrenchT3™ HiperFET™ Power MOSFET

**IXFA270N06T3**  
**IXFP270N06T3**  
**IXFH270N06T3**

**$V_{DSS} = 60V$**   
 **$I_{D25} = 270A$**   
 **$R_{DS(on)} \leq 3.1m\Omega$**

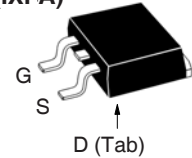
N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Rectifier



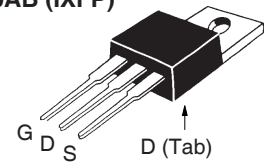
| Symbol        | Test Conditions                                           | Maximum Ratings    |            |
|---------------|-----------------------------------------------------------|--------------------|------------|
| $V_{DSS}$     | $T_J = 25^\circ C$ to $175^\circ C$                       | 60                 | V          |
| $V_{DGR}$     | $T_J = 25^\circ C$ to $175^\circ C$ , $R_{GS} = 1M\Omega$ | 60                 | V          |
| $V_{GSM}$     | Transient                                                 | $\pm 20$           | V          |
| $I_{D25}$     | $T_C = 25^\circ C$                                        | 270                | A          |
| $I_{LRMS}$    | Lead Current Limit, RMS                                   | 160                | A          |
| $I_{DM}$      | $T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$      | 675                | A          |
| $I_A$         | $T_C = 25^\circ C$                                        | 135                | A          |
| $E_{AS}$      | $T_C = 25^\circ C$                                        | 1.5                | J          |
| $P_D$         | $T_C = 25^\circ C$                                        | 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                | $^\circ C$ |
| $T_{SOLD}$    | Plastic Body for 10s                                      | 260                | $^\circ C$ |
| $F_C$         | Mounting Force (TO-263)                                   | 10..65 / 2.2..14.6 | N/lb       |
| $M_d$         | Mounting Torque (TO-220 & TO-247)                         | 1.13 / 10          | m/lb.in    |
| <b>Weight</b> | TO-263                                                    | 2.5                | g          |
|               | TO-220                                                    | 3.0                | g          |
|               | TO-247                                                    | 6.0                | g          |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ Unless Otherwise Specified) | Characteristic Values |      |                |
|--------------|---------------------------------------------------------------------|-----------------------|------|----------------|
|              |                                                                     | Min.                  | Typ. | Max.           |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu A$                                    | 60                    |      | V              |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250\mu A$                                | 2.0                   |      | 4.0 V          |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$                                  |                       |      | $\pm 200$ nA   |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$                                  |                       |      | 10 $\mu A$     |
|              | $T_J = 150^\circ C$                                                 |                       |      | 1.5 mA         |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 100A$ , Notes 1, 2                          |                       |      | 3.1 m $\Omega$ |

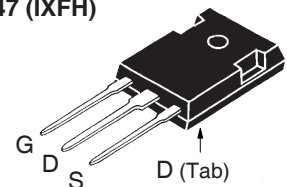
TO-263 AA (IXFA)



TO-220AB (IXFP)



TO-247 (IXFH)



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

#### Features

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

#### Advantages

- Easy to Mount
- Space Savings
- High Power Density

#### Applications

- DC-DC Converters & Off-Line UPS
- Primary-Side Switch
- High Current Switching Applications

| 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                                                                                                | 83                    | 138  | S                       |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                                   |                       | 12.6 | nF                      |
| $C_{oss}$    |                                                                                                                                                    |                       | 1380 | pF                      |
| $C_{rss}$    |                                                                                                                                                    |                       | 62   | pF                      |
| $R_{Gi}$     | Gate Input Resistance                                                                                                                              |                       | 1.1  | $\Omega$                |
| $t_{d(on)}$  | <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>$R_G = 3\Omega$ (External) |                       | 39   | ns                      |
| $t_r$        |                                                                                                                                                    |                       | 36   | ns                      |
| $t_{d(off)}$ |                                                                                                                                                    |                       | 48   | ns                      |
| $t_f$        |                                                                                                                                                    |                       | 20   | ns                      |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$                                                                   |                       | 200  | nC                      |
| $Q_{gs}$     |                                                                                                                                                    |                       | 68   | nC                      |
| $Q_{gd}$     |                                                                                                                                                    |                       | 40   | nC                      |
| $R_{thJC}$   |                                                                                                                                                    |                       |      | 0.31 $^\circ\text{C/W}$ |
| $R_{thCS}$   | TO-220                                                                                                                                             |                       | 0.50 | $^\circ\text{C/W}$      |
|              | TO-247                                                                                                                                             |                       | 0.21 | $^\circ\text{C/W}$      |

#### Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                            | Characteristic Values |      |        |
|----------|--------------------------------------------------------------------------------------------------------|-----------------------|------|--------|
|          |                                                                                                        | Min.                  | Typ. | Max.   |
| $I_S$    | $V_{GS} = 0\text{V}$                                                                                   |                       |      | 270 A  |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$                                                            |                       |      | 1080 A |
| $V_{SD}$ | $I_F = 100\text{A}$ , $V_{GS} = 0\text{V}$ , Note 1                                                    |                       |      | 1.4 V  |
| $t_{rr}$ | $I_F = 135\text{A}$ , $V_{GS} = 0\text{V}$<br>$-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 40\text{V}$ |                       | 47   | ns     |
| $I_{RM}$ |                                                                                                        |                       | 23   | A      |
| $Q_{RM}$ |                                                                                                        |                       | 530  | 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

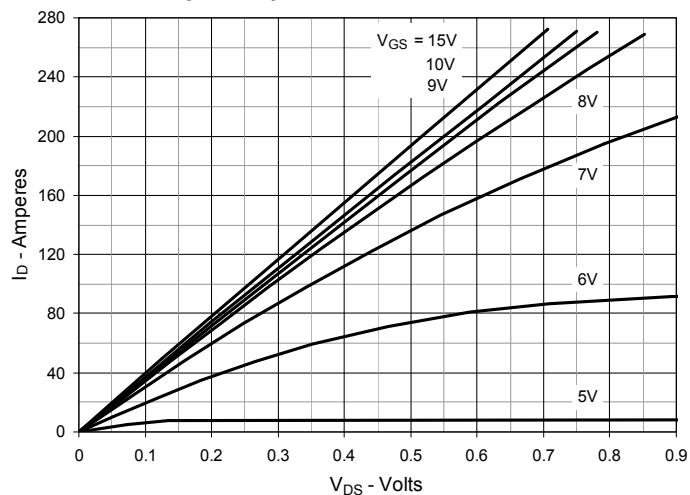
The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test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

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

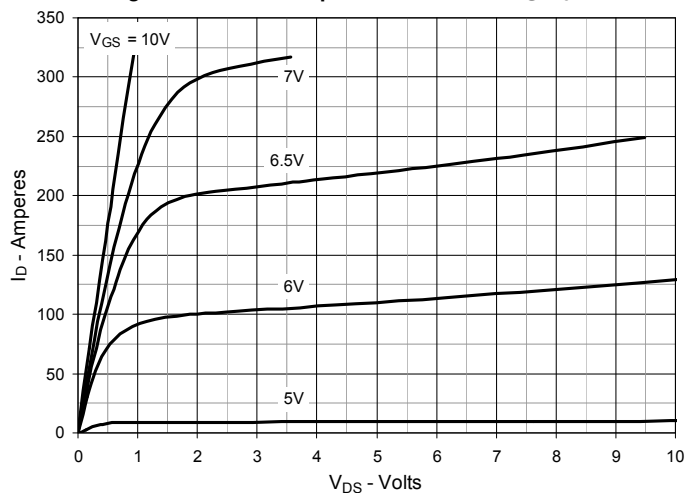
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

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

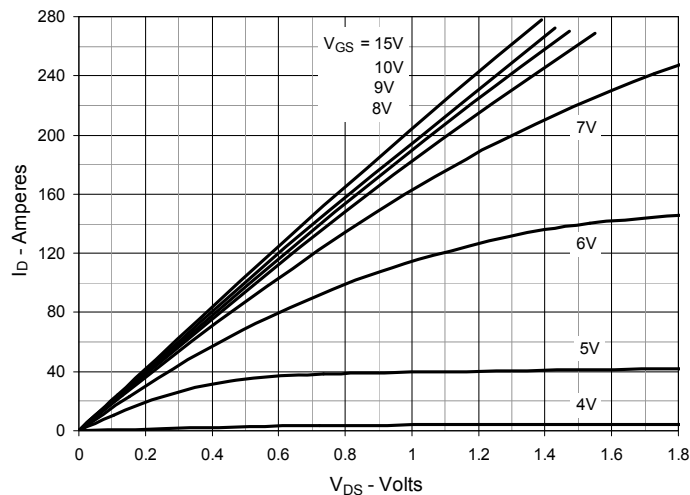
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



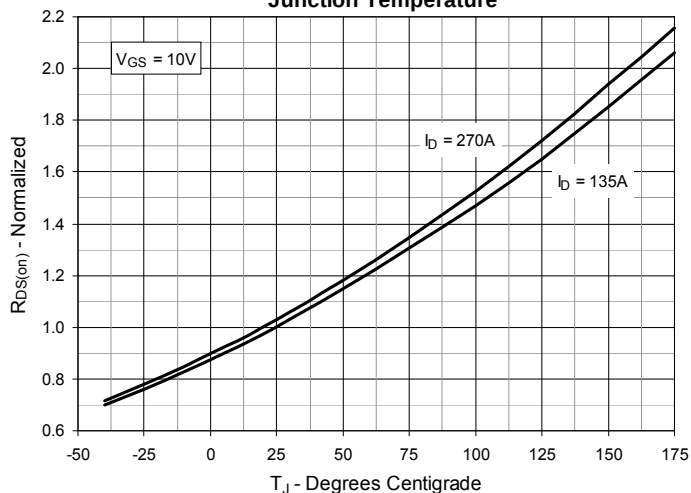
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



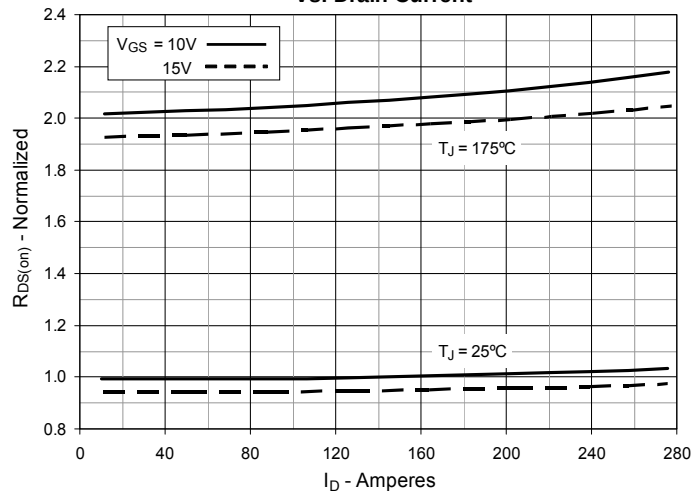
**Fig. 3. Output Characteristics @  $T_J = 150^\circ\text{C}$**



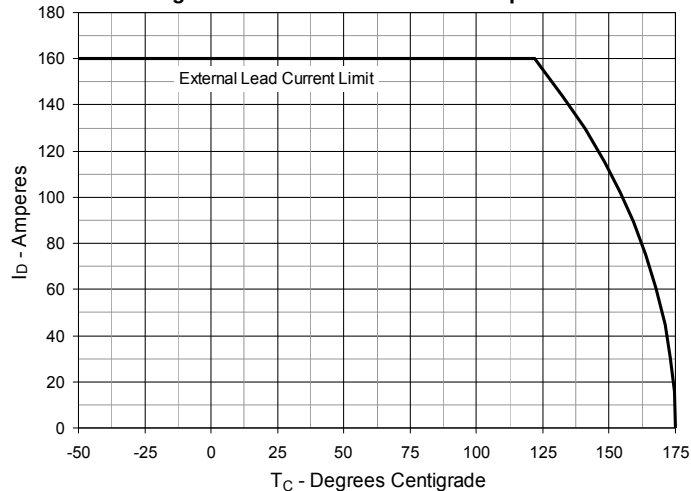
**Fig. 4. Normalized  $R_{DS(on)}$  to  $I_D = 135\text{A}$  Value vs. Junction Temperature**



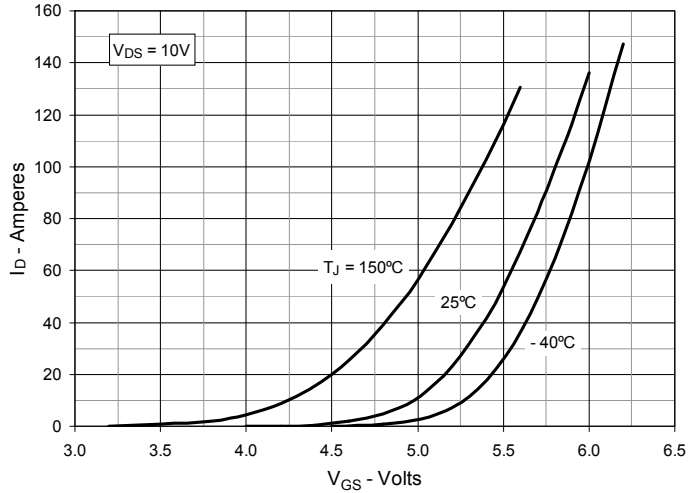
**Fig. 5. Normalized  $R_{DS(on)}$  to  $I_D = 135\text{A}$  vs. Drain Current**



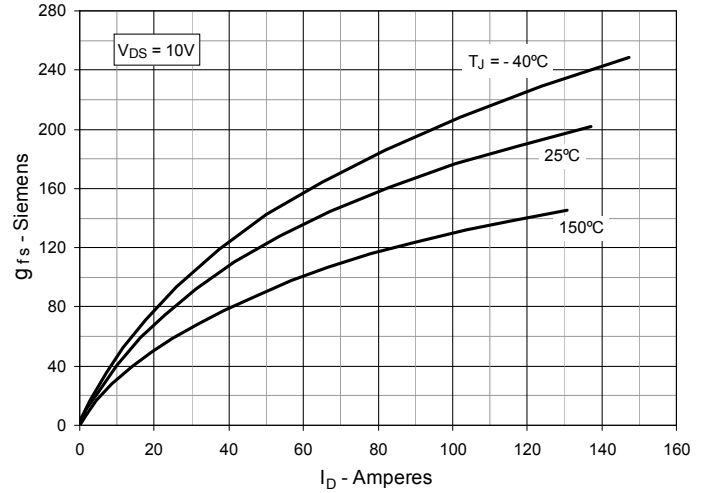
**Fig. 6. Drain Current vs. Case Temperature**



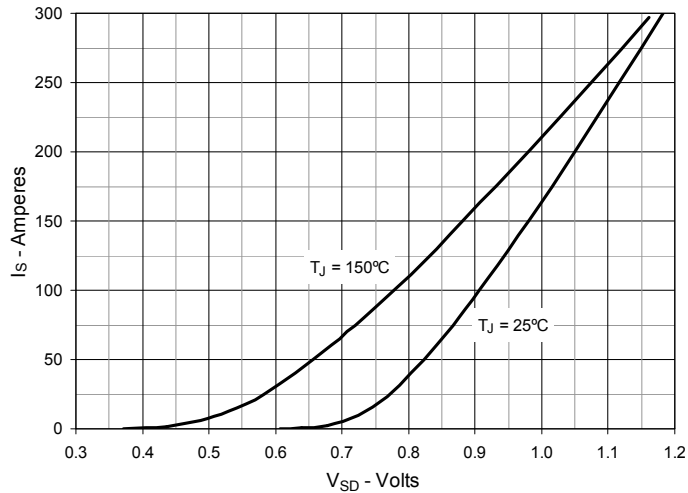
**Fig. 7. Input Admittance**



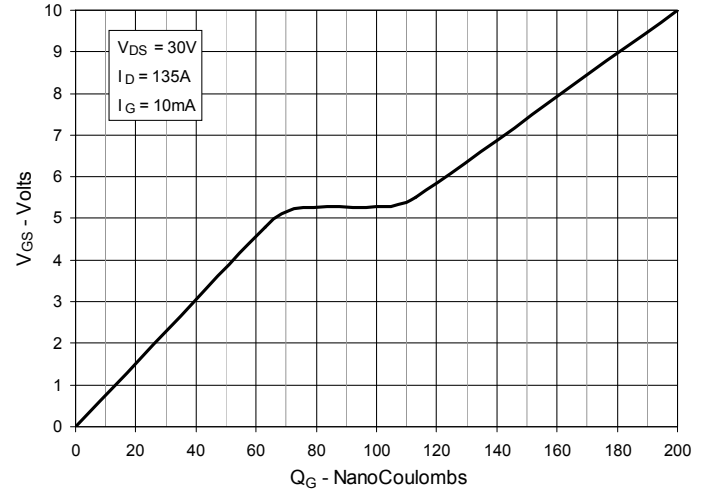
**Fig. 8. Transconductance**



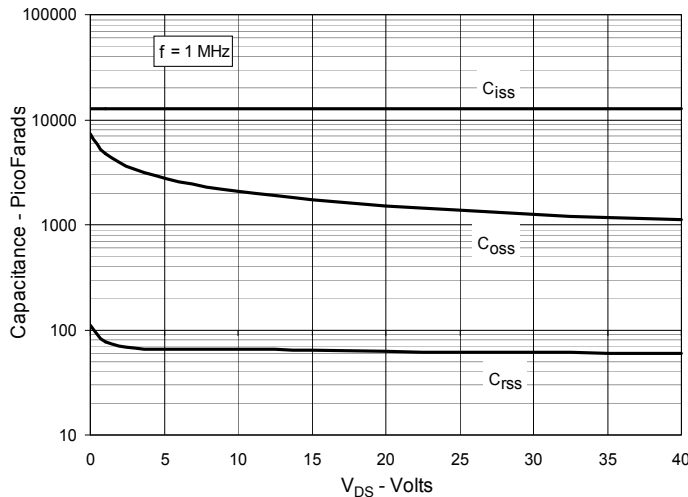
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



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

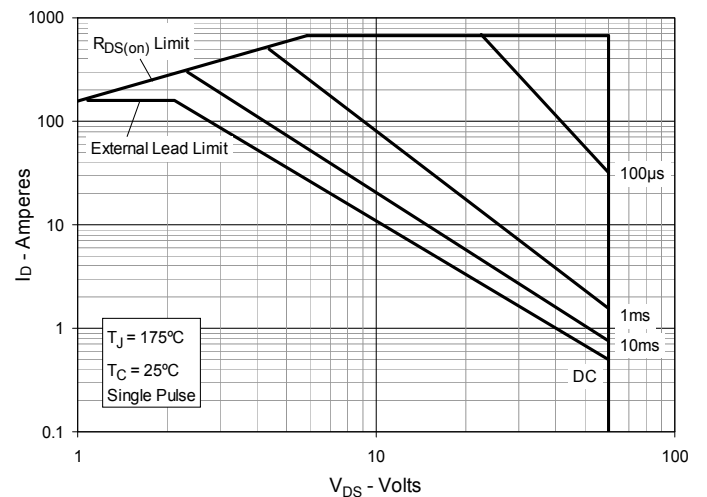


Fig. 13. Resistive Turn-on Rise Time  
vs. Junction Temperature

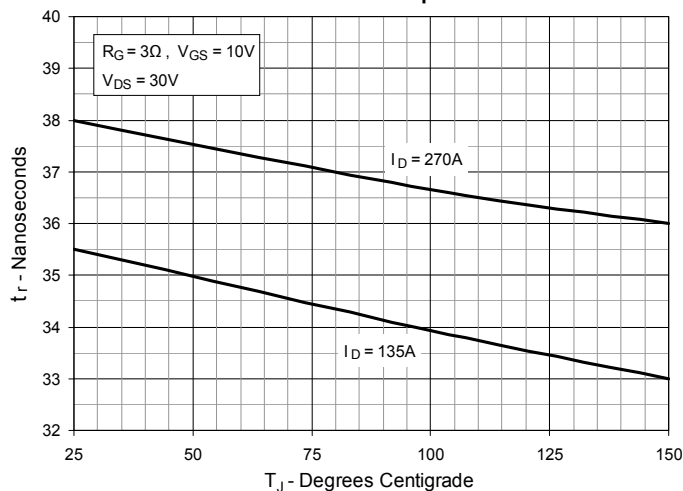


Fig. 14. Resistive Turn-on Rise Time  
vs. Drain Current

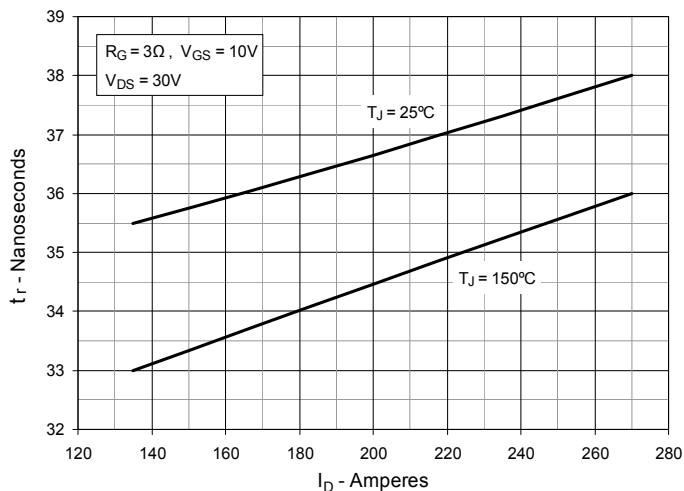


Fig. 15. Resistive Turn-on Switching Times  
vs. Gate Resistance

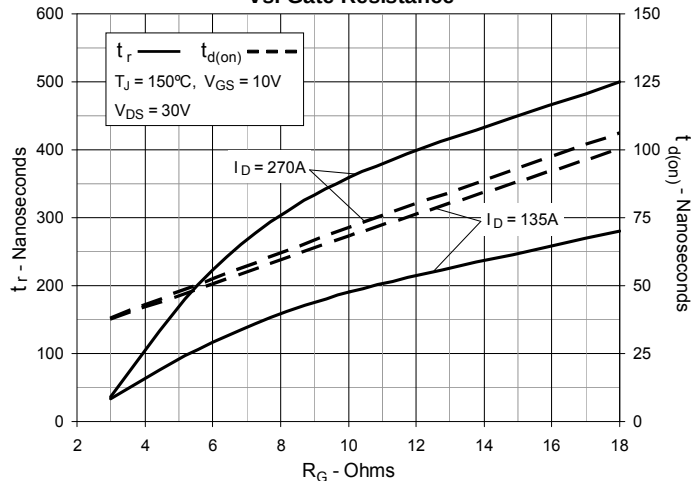


Fig. 16. Resistive Turn-off Switching Times  
vs. Junction Temperature

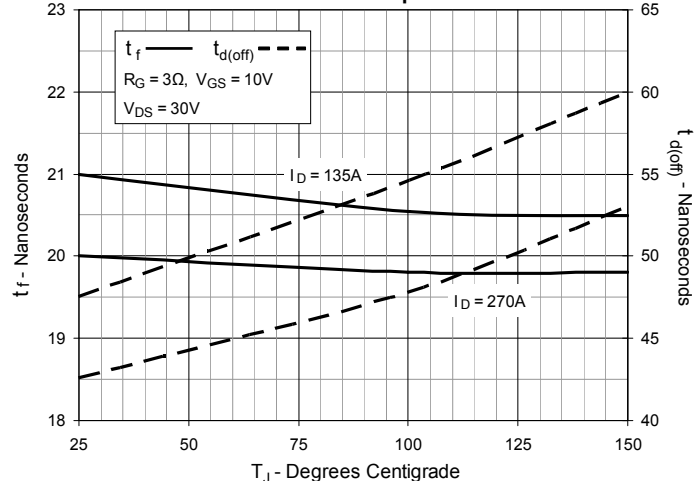


Fig. 17. Resistive Turn-off Switching Times  
vs. Drain Current

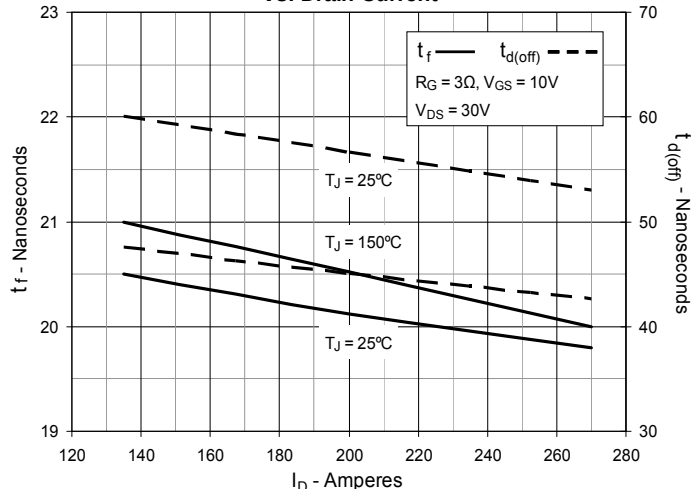


Fig. 18. Resistive Turn-off Switching Times  
vs. Gate Resistance

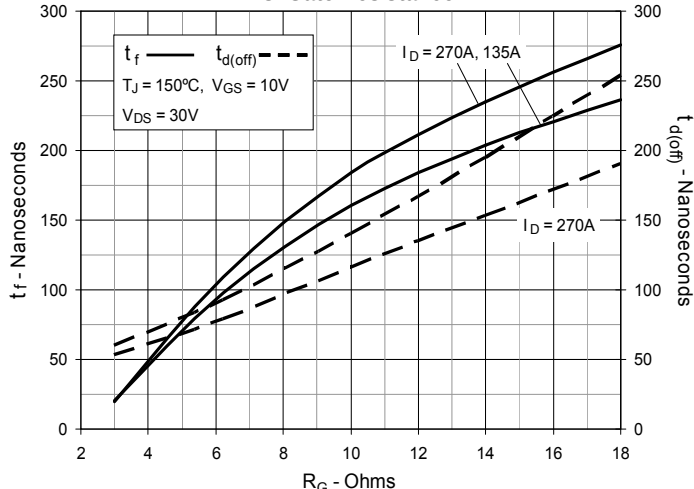
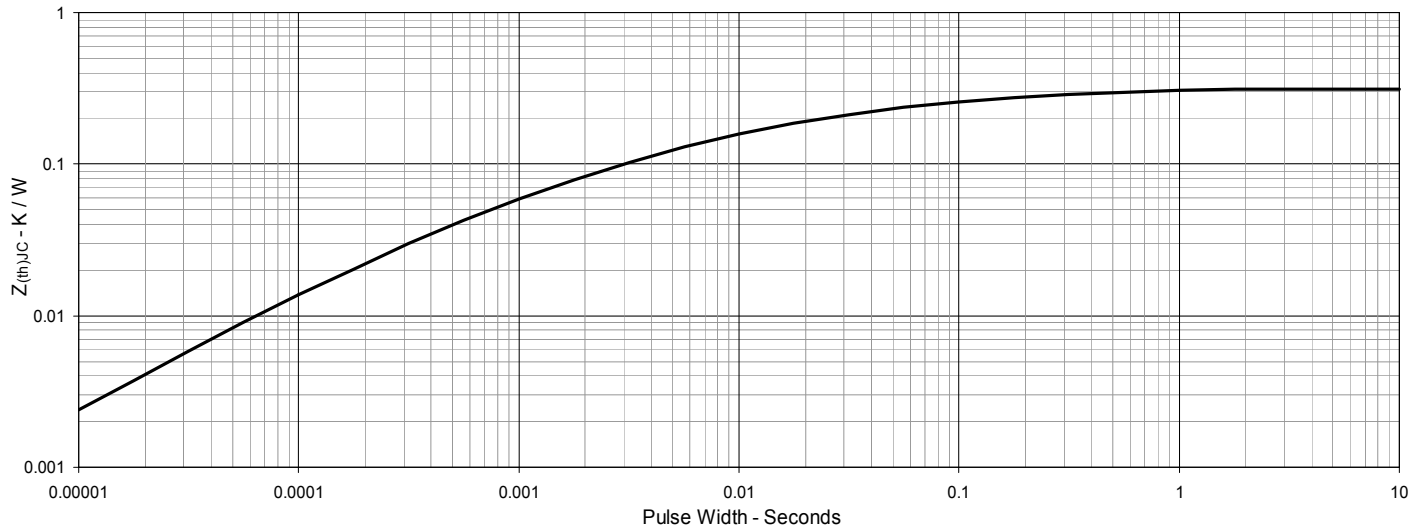
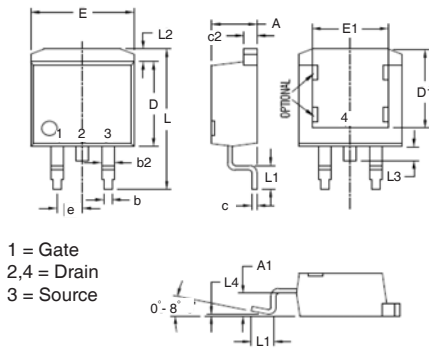


Fig. 19. Maximum Transient Thermal Impedance

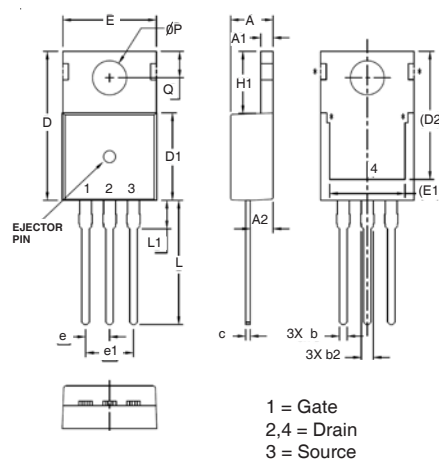


## TO-263 Outline



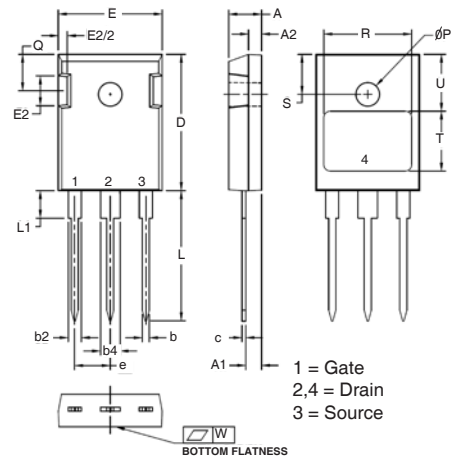
| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .160     | .190 | 4.06        | 4.83  |
| A1  | .080     | .110 | 2.03        | 2.79  |
| b   | .020     | .039 | 0.51        | 0.99  |
| b2  | .045     | .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



| 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  |
| ØP   | .134     | .150 | 3.40        | 3.80  |
| Q    | .106     | .126 | 2.70        | 3.20  |

## TO-247 Outline



| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .190     | .205 | 4.83        | 5.21  |
| A1  | .087     | .100 | 2.21        | 2.54  |
| A2  | .075     | .085 | 1.91        | 2.16  |
| b   | .045     | .055 | 1.14        | 1.40  |
| b2  | .075     | .085 | 1.91        | 2.16  |
| b4  | .115     | .126 | 2.92        | 3.20  |
| c   | .023     | .033 | 0.58        | 0.84  |
| D   | .820     | .840 | 20.83       | 21.34 |
| E   | .620     | .635 | 15.75       | 16.13 |
| E2  | .175     | .195 | 4.44        | 4.95  |
| e   | .215 BSC |      | 5.45 BSC    |       |
| L   | .780     | .810 | 19.81       | 20.57 |
| L1  | .160     | .177 | 4.06        | 4.50  |
| Q   | .220     | .240 | 5.59        | 6.10  |
| R   | .520     | .540 | 13.21       | 13.72 |
| S   | .242 BSC |      | 6.15 BSC    |       |
| T   | .355     | .375 | 9.02        | 9.53  |
| U   | .345     | .370 | 8.76        | 9.40  |
| ØP  | .140     | .144 | 3.55        | 3.66  |
| W   | .000     | .004 | 0.00        | 0.10  |



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