

| 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                                                                                   | 16                    | 26   | S                       |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = -25\text{V}$ , $f = 1\text{MHz}$                                                                             |                       | 3660 | pF                      |
| $C_{oss}$    |                                                                                                                                               |                       | 495  | pF                      |
| $C_{rss}$    |                                                                                                                                               |                       | 215  | pF                      |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = -10\text{V}$ , $V_{DS} = -30\text{V}$ , $I_D = 0.5 \cdot I_{D25}$<br>$R_G = 3\Omega$ (External) |                       | 20   | ns                      |
| $t_r$        |                                                                                                                                               |                       | 15   | ns                      |
| $t_{d(off)}$ |                                                                                                                                               |                       | 30   | ns                      |
| $t_f$        |                                                                                                                                               |                       | 13   | ns                      |
| $Q_{g(on)}$  | $V_{GS} = -10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$                                                             |                       | 53   | nC                      |
| $Q_{gs}$     |                                                                                                                                               |                       | 16   | nC                      |
| $Q_{gd}$     |                                                                                                                                               |                       | 21   | nC                      |
| $R_{thJC}$   | TO-220                                                                                                                                        |                       |      | 0.83 $^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                               |                       | 0.50 | $^\circ\text{C/W}$      |

## Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                                   | Characteristic Values |      |        |
|----------|---------------------------------------------------------------------------------------------------------------|-----------------------|------|--------|
|          |                                                                                                               | Min.                  | Typ. | Max.   |
| $I_S$    | $V_{GS} = 0\text{V}$                                                                                          |                       |      | -48 A  |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$                                                                   |                       |      | -192 A |
| $V_{SD}$ | $I_F = I_S$ , $V_{GS} = 0\text{V}$ , Note 1                                                                   |                       |      | -1.5 V |
| $t_{rr}$ | $I_F = 0.5 \cdot I_{D25}$ , $-di/dt = -100\text{A}/\mu\text{s}$<br>$V_R = -25\text{V}$ , $V_{GS} = 0\text{V}$ |                       | 30   | ns     |
| $Q_{RM}$ |                                                                                                               |                       | 43.4 | nC     |
| $I_{RM}$ |                                                                                                               |                       | -2.8 | A      |

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

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   | 6,404,065B1 | 6,683,344   | 6,727,585   | 7,005,734B2 | 7,157,338B2 |
| 4,860,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123B1 | 6,534,343   | 6,710,405B2 | 6,759,692   | 7,063,975B2 |             |
| 4,881,106 | 5,034,796 | 5,187,117 | 5,486,715 | 6,306,728B1 | 6,583,505   | 6,710,463   | 6,771,478B2 | 7,071,537   |             |

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

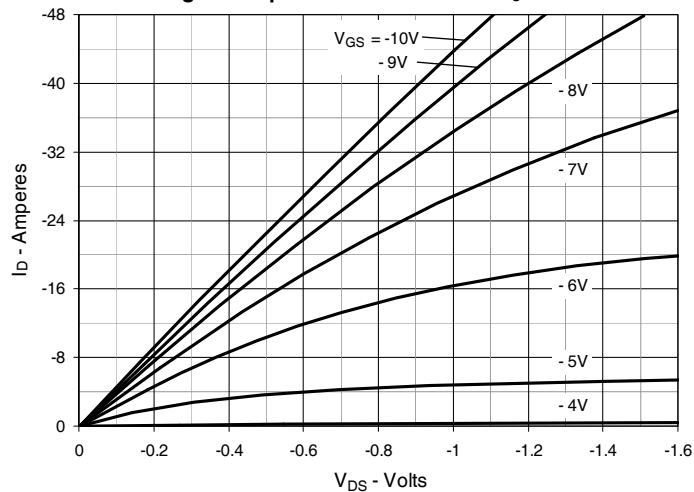


Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$

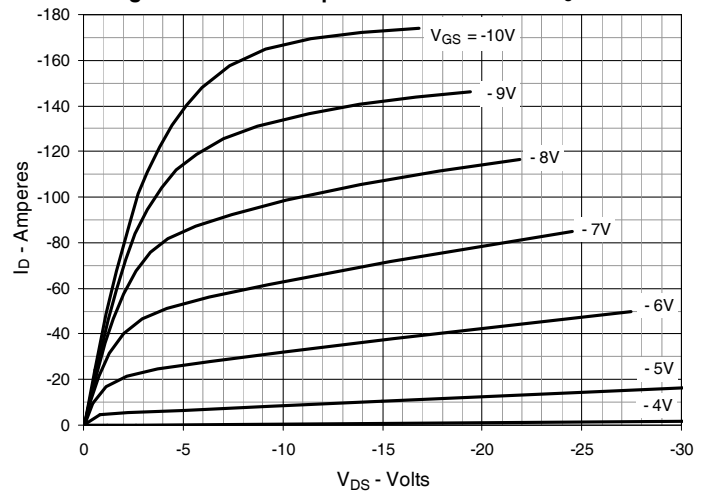


Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$

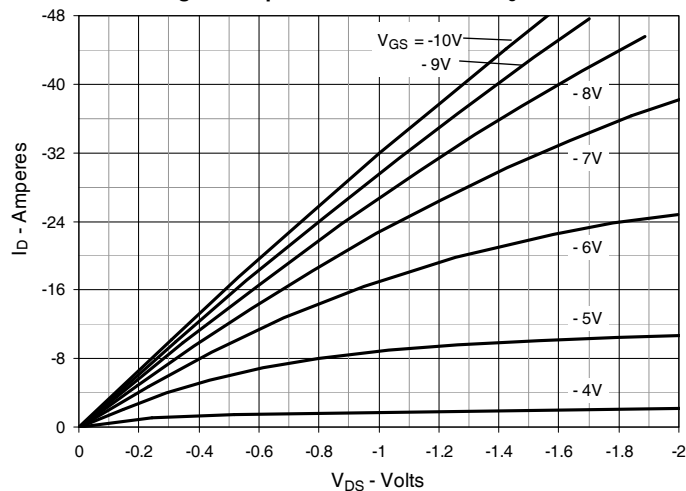


Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = -24\text{A}$  Value vs. Junction Temperature

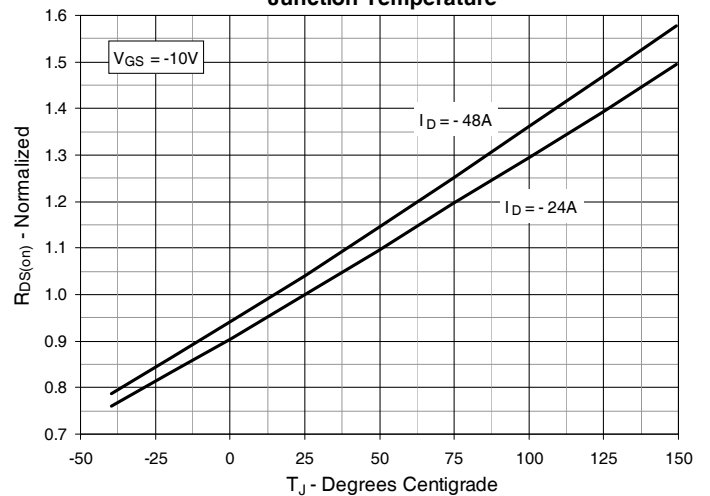


Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = -24\text{A}$  Value vs. Drain Current

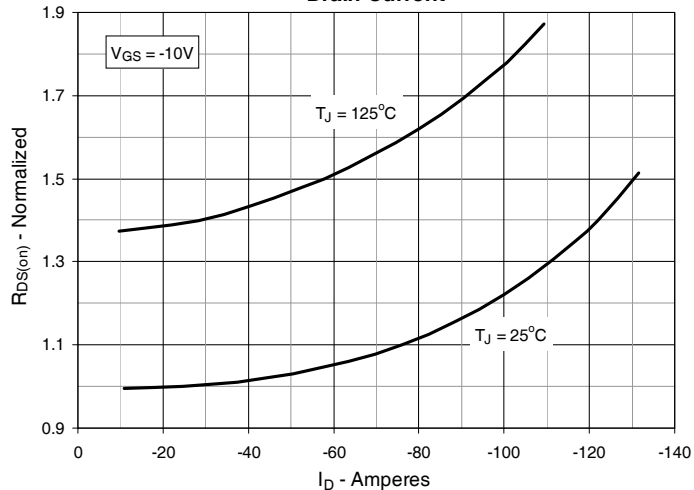


Fig. 6. Maximum Drain Current vs. Case Temperature

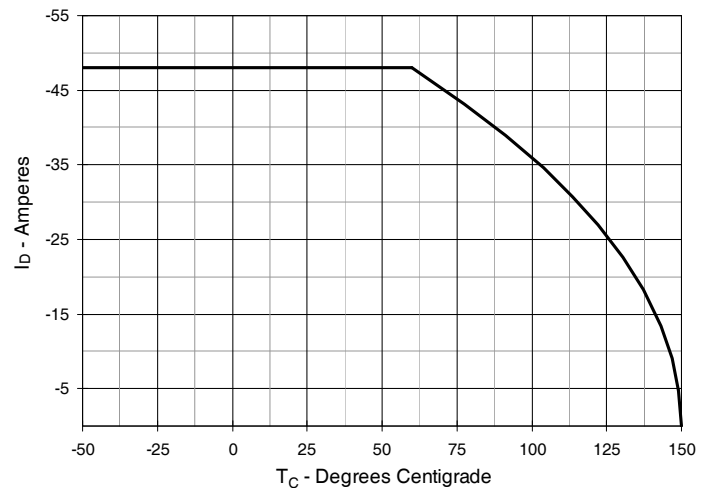


Fig. 7. Input Admittance

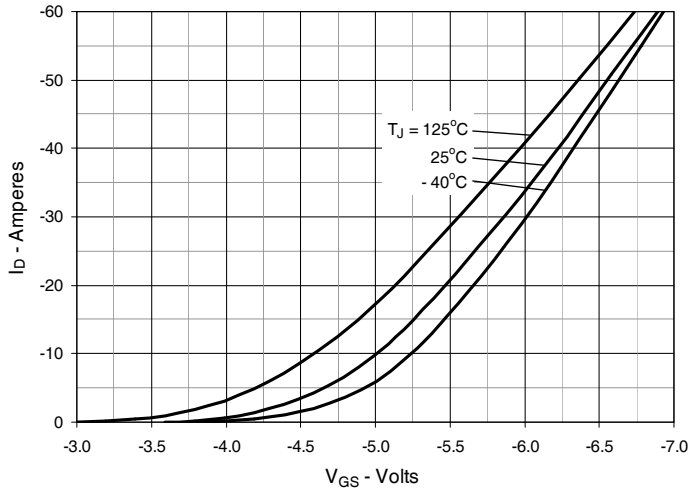


Fig. 8. Transconductance

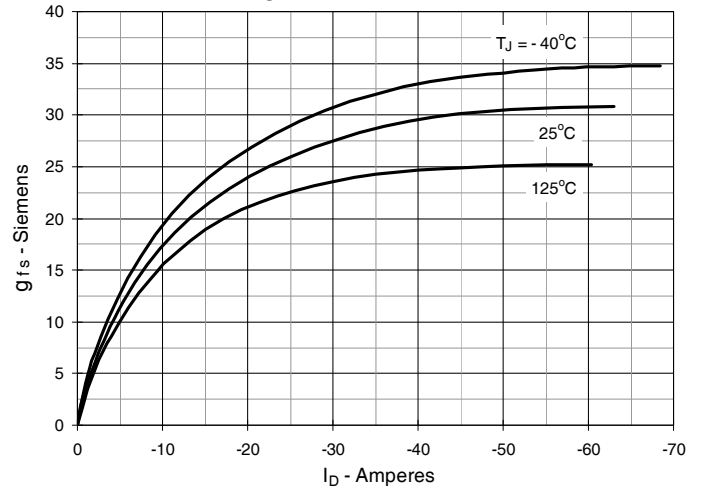


Fig. 9. Forward Voltage Drop of Intrinsic Diode

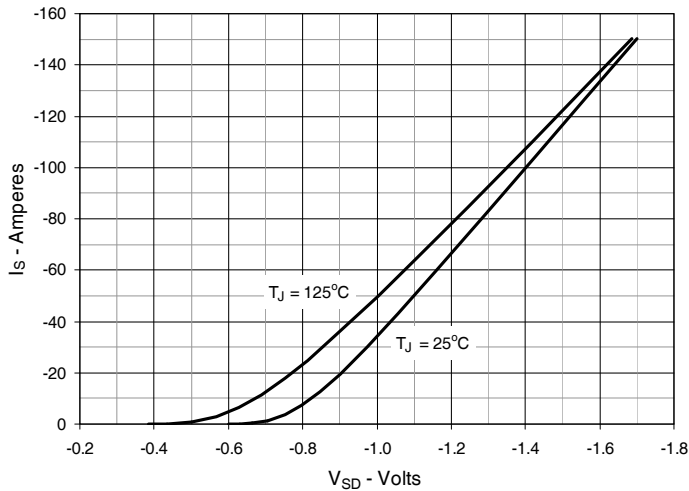


Fig. 10. Gate Charge

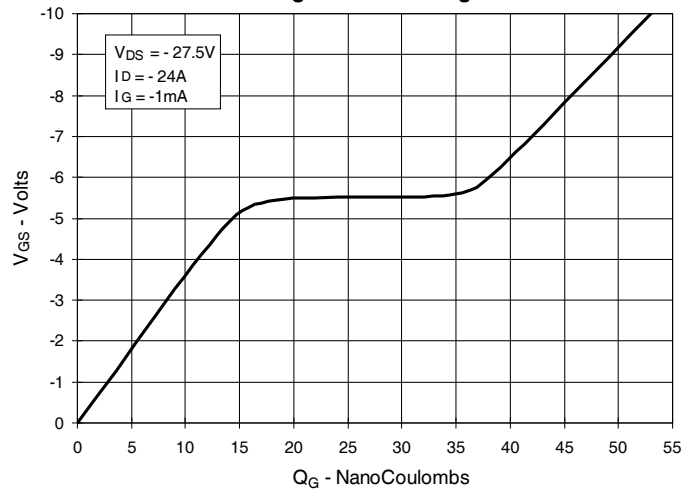


Fig. 11. Capacitance

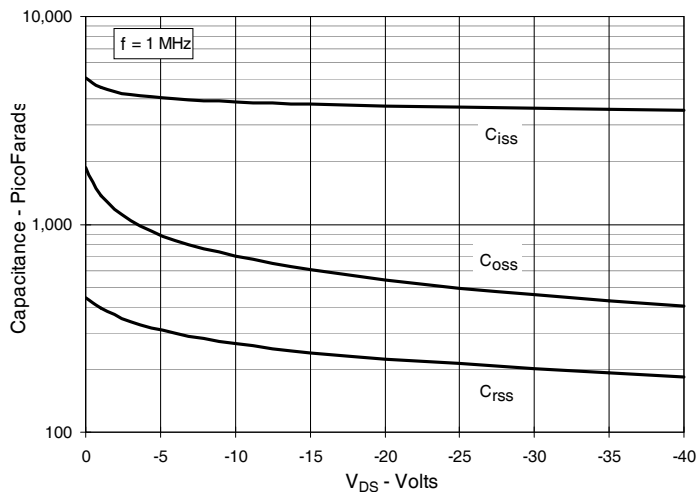


Fig. 12. Forward-Bias Safe Operating Area

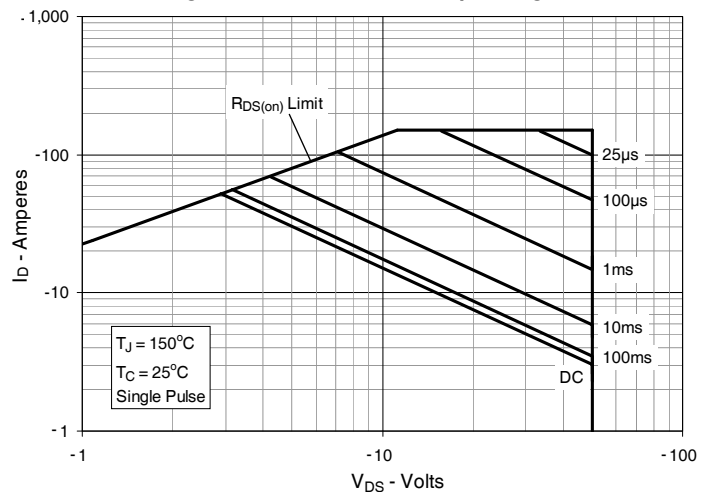


Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature

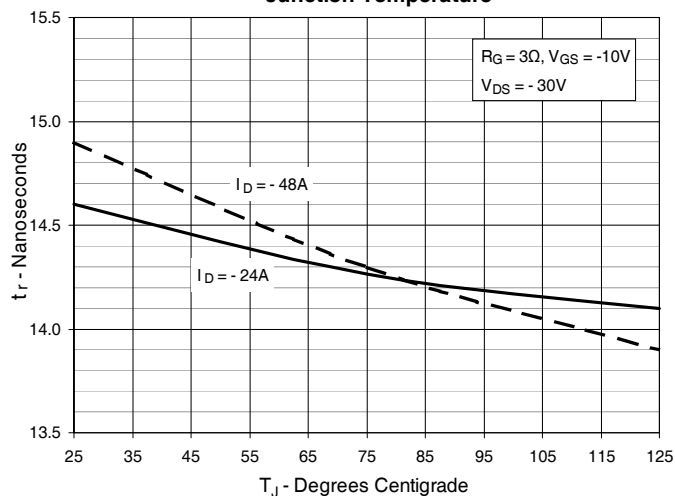


Fig. 14. Resistive Turn-on Rise Time vs. Drain Current

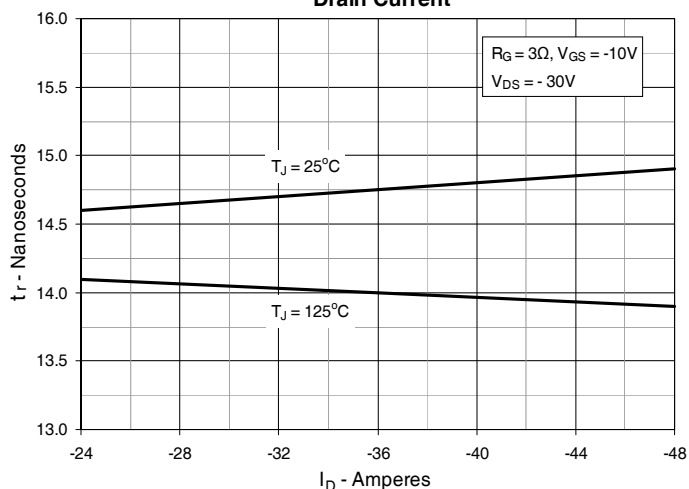


Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance

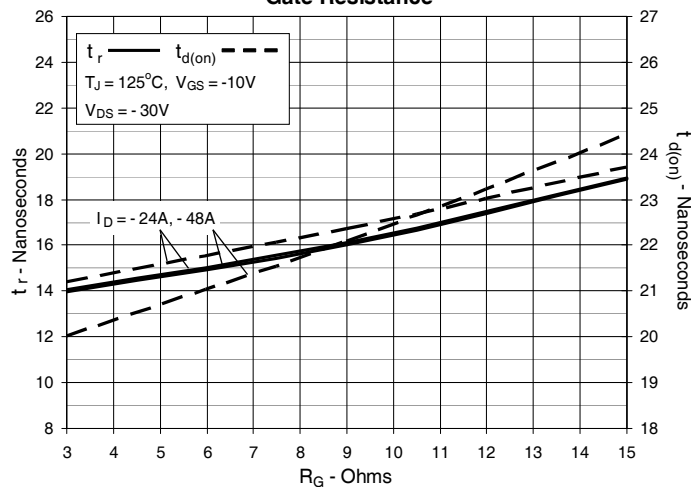


Fig. 16. Resistive Turn-off Switching Times vs. Junction Temperature

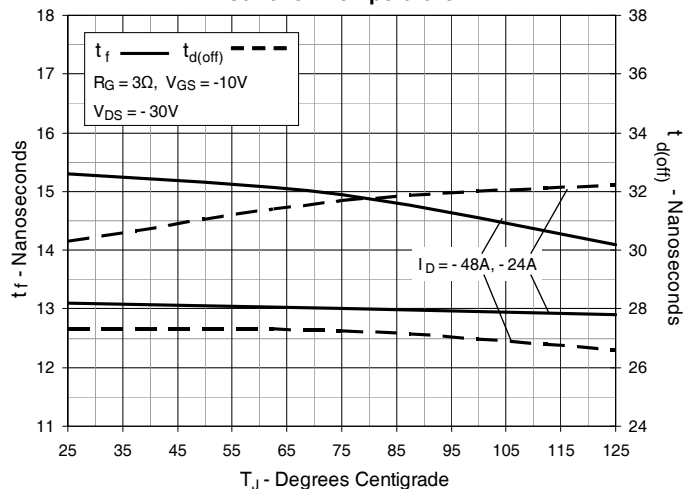


Fig. 17. Resistive Turn-off Switching Times vs. Drain Current

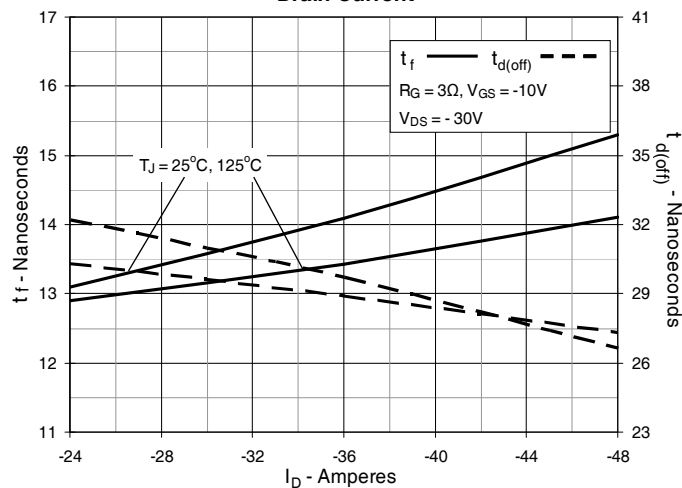


Fig. 18. Resistive Turn-off Switching Times vs. Gate Resistance

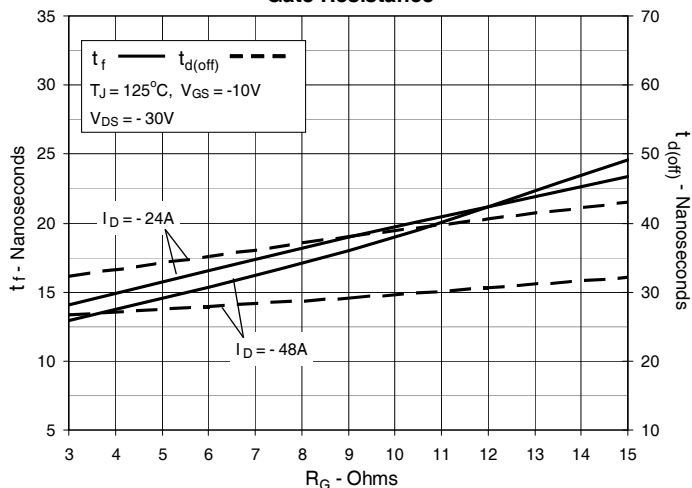
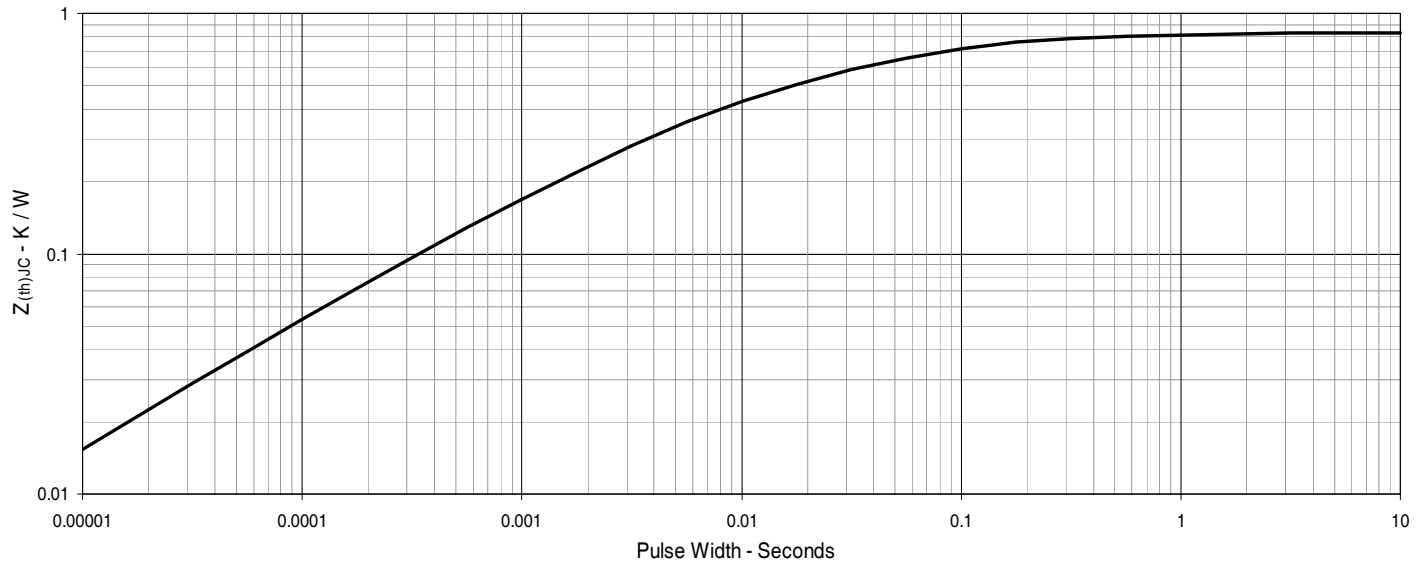
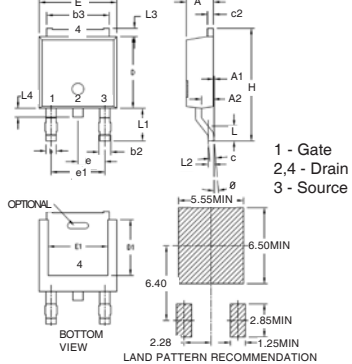


Fig. 19. Maximum Transient Thermal Impedance

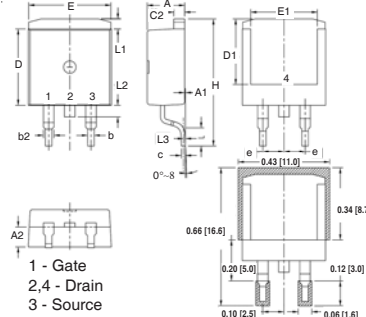


## TO-252 AA Outline



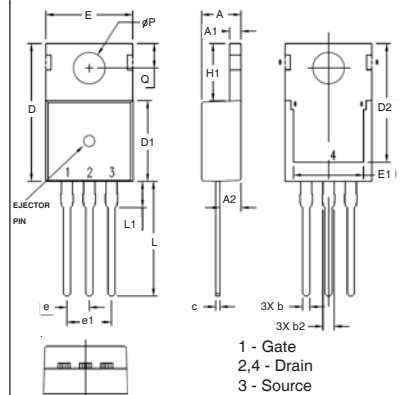
| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .086     | .094 | 2.19        | 2.38  |
| A1  | 0        | .005 | 0           | 0.12  |
| A2  | .038     | .046 | 0.97        | 1.17  |
| b   | .025     | .035 | 0.64        | 0.89  |
| b2  | .030     | .045 | 0.76        | 1.14  |
| b3  | .200     | .215 | 5.08        | 5.46  |
| c   | .018     | .024 | 0.46        | 0.61  |
| c2  | .018     | .023 | 0.46        | 0.58  |
| D   | .235     | .245 | 5.97        | 6.22  |
| D1  | .180     | .205 | 4.57        | 5.21  |
| E   | .250     | .265 | 6.35        | 6.73  |
| E1  | .170     | .205 | 4.32        | 5.21  |
| e   | .090 BSC |      | 2.28 BSC    |       |
| e1  | .180 BSC |      | 4.57 BSC    |       |
| H   | .370     | .410 | 9.40        | 10.42 |
| L   | .055     | .070 | 1.40        | 1.78  |
| L1  | .100     | .115 | 2.54        | 2.92  |
| L2  | .020 BSC |      | 0.50 BSC    |       |
| L3  | .025     | .040 | 0.64        | 1.02  |
| L4  | .025     | .040 | 0.64        | 1.02  |
| ø   | 0*       | 10*  | 0*          | 10*   |

## 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  |
| øP   | .134     | .150 | 3.40        | 3.80  |
| Q    | .106     | .126 | 2.70        | 3.20  |



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