IXYS

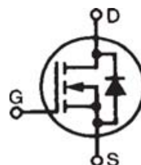
Advance Technical Information

# High Voltage Power MOSFETs

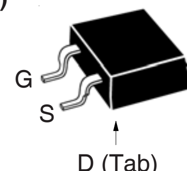
# IXTA02N450HV IXTT02N450HV

$V_{DSS}$ = 4500V
$I_{D25}$ = 200mA
$R_{DS(on)}$ ≤ 750Ω

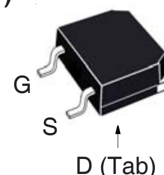
N-Channel Enhancement Mode




TO-263 (IXTA)




TO-268 (IXTT)




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

| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{DSS}$ | $T_J$ = 25°C to 150°C | 4500 | V |
| $V_{DGR}$ | $T_J$ = 25°C to 150°C, $R_{GS}$ = 1MΩ | 4500 | V |
| $V_{GSS}$ | Continuous | ±20 | V |
| $V_{GSM}$ | Transient | ±30 | V |
| $I_{D25}$ | $T_C$ = 25°C | 200 | mA |
| $I_{DM}$ | $T_C$ = 25°C, Pulse Width Limited by $T_{JM}$ | 600 | mA |
| $P_D$ | $T_C$ = 25°C | 113 | W |
| $T_J$ | | - 55 ... +150 | °C |
| $T_{JM}$ | | 150 | °C |
| $T_{stg}$ | | - 55 ... +150 | °C |
| $T_L$ | 1.6mm (0.062 in.) from Case for 10s | 300 | °C |
| $T_{SOLD}$ | Plastic Body for 10 seconds | 260 | °C |
| $F_C$ | Mounting Force (TO-263) | 10..65 / 22..14.6 | N/lb |
| Weight | TO-263 | 2.5 | g |
| | TO-268 | 4.0 | g |

## Features

- High Blocking Voltage
- High Voltage Packages

## Advantages

- Easy to Mount
- Space Savings
- High Power Density

## Applications

- High Voltage Power Supplies
- Capacitor Discharge Applications
- Pulse Circuits
- Laser and X-Ray Generation Systems

| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|---|
| $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | | 4.0 | | 6.5 | V |
| $I_{GSS}$ | $V_{GS}$ = ±20V, $V_{DS}$ = 0V | | | | ±100 | nA |
| $I_{DSS}$ | $V_{DS}$ = 3.6kV, $V_{GS}$ = 0V | | | | 5 | μA |
| | $V_{DS}$ = 4.5kV | | | | 10 | μA |
| | $V_{DS}$ = 3.6kV | $T_J$ = 100°C | | 25 | | μA |
| $R_{DS(on)}$ | $V_{GS}$ = 10V, $I_D$ = 10mA, Note 1 | | | | 750 | Ω |

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| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. |
|---|---|---|---|---|
| $g_{fs}$ | $V_{DS}$ = 60V, $I_D$ = 30mA, Note 1 | 60 | 100 | mS |
| $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = 25V, f = 1MHz | | 256 | pF |
| $C_{oss}$ | | | 19 | pF |
| $C_{rss}$ | | | 5.5 | pF |
| $R_{Gi}$ | Gate Input Resistance | | 76 | Ω |
| $t_{d(on)}$ | **Resistive Switching Times** $V_{GS}$ = 10V, $V_{DS}$ = 500V, $I_D$ = 0.5 • $I_{D25}$ $R_G$ = 10Ω (External) | | 17 | ns |
| $t_r$ | | | 48 | ns |
| $t_{d(off)}$ | | | 28 | ns |
| $t_f$ | | | 143 | ns |
| $Q_{g(on)}$ | $V_{GS}$ = 10V, $V_{DS}$ = 1kV, $I_D$ = 0.5 • $I_{D25}$ | | 10.4 | nC |
| $Q_{gs}$ | | | 3.4 | nC |
| $Q_{gd}$ | | | 5.0 | nC |
| $R_{thJC}$ | | | | 1.1 °C/W |

## Source-Drain Diode

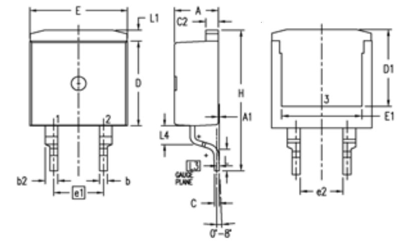
| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. |
|---|---|---|---|---|
| $I_S$ | $V_{GS}$ = 0V | | | 200 mA |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$ | | | 800 mA |
| $V_{SD}$ | $I_F = I_S$, $V_{GS}$ = 0V, Note 1 | | | 1.5 V |
| $t_{rr}$ | $I_F$ = 200mA, -di/dt = 50A/μs, $V_R$ = 100V | | 1.6 | μs |

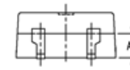
Note: 1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.

**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 (VHV) Outline**

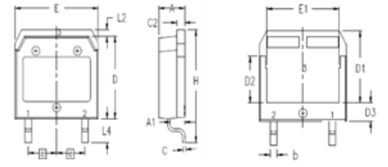


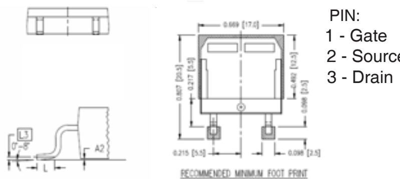


PIN: 1 - Gate
2 - Source
3 - Drain

| SYM | INCHES MIN | MAX | MILLIMETER 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 | .054 | 1.18 | 1.38 |
| C | .018 | .024 | 0.45 | 0.60 |
| C2 | .049 | .055 | 1.25 | 1.40 |
| D | .354 | .370 | 9.00 | 9.40 |
| D1 | .311 | .327 | 7.90 | 8.30 |
| E | .386 | .402 | 9.80 | 10.20 |
| E1 | .307 | .323 | 7.80 | 8.20 |
| e1 | .200 BSC | | 5.08 BSC | |
| (e2) | .163 | .174 | 4.13 | 4.43 |
| H | .591 | .614 | 15.00 | 15.60 |
| L | .079 | .102 | 2.00 | 2.60 |
| L1 | .039 | .055 | 1.00 | 1.40 |
| L3 | .010 BSC | | 0.254 BSC | |
| (L4) | .071 | .087 | 1.80 | 2.20 |

**TO-268 (VHV) Outline**





PIN:
1 - Gate
2 - Source
3 - Drain

| SYM | INCHES MIN | MAX | MILLIMETER MIN | MAX |
|---|---|---|---|---|
| A | .193 | .201 | 4.90 | 5.10 |
| A1 | .106 | .114 | 2.70 | 2.90 |
| A2 | .001 | .010 | 0.02 | 0.25 |
| b | .045 | .057 | 1.15 | 1.45 |
| C | .016 | .026 | 0.40 | 0.65 |
| C2 | .057 | .063 | 1.45 | 1.60 |
| D | .543 | .551 | 13.80 | 14.00 |
| D1 | .465 | .476 | 11.80 | 12.10 |
| D2 | .295 | .307 | 7.50 | 7.80 |
| D3 | .114 | .126 | 2.90 | 3.20 |
| E | .624 | .632 | 15.85 | 16.05 |
| E1 | .524 | .535 | 13.30 | 13.60 |
| e | .215 BSC | | 5.45 BSC | |
| H | .736 | .752 | 18.70 | 19.10 |
| L | .067 | .079 | 1.70 | 2.00 |
| L2 | .039 | .045 | 1.00 | 1.15 |
| L3 | .010 BSC | | 0.25 BSC | |
| L4 | .150 | .161 | 3.80 | 4.10 |

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

IXYS MOSFETs and IGBTs are covered by one or moreof 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 @ $T_J$ = 25ºC**

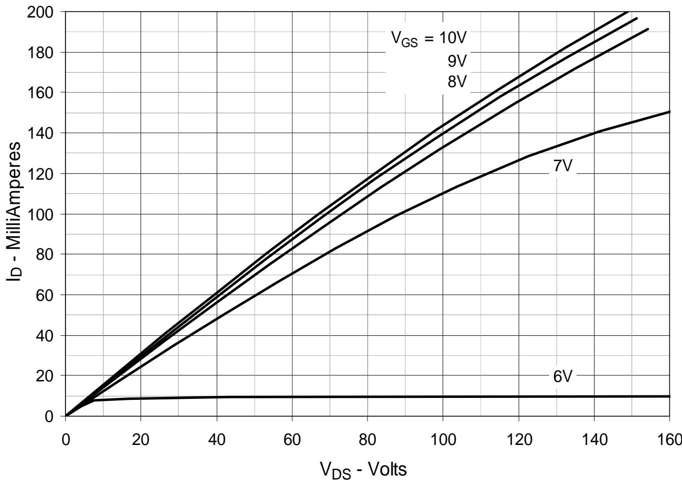



**Fig. 2. Extended Output Characteristics @ $T_J$ = 25ºC**

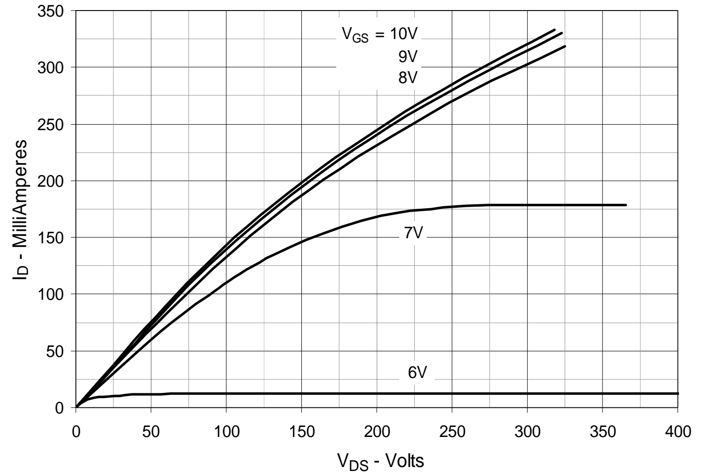



**Fig. 3. Output Characteristics @ $T_J$ = 125ºC**

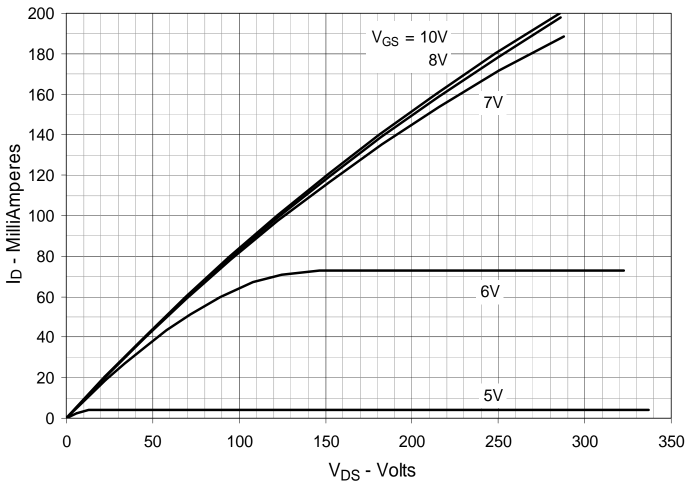



**Fig. 4. $R_{DS(on)}$ Normalized to $I_D$ = 100mA Value vs. Junction Temperature**

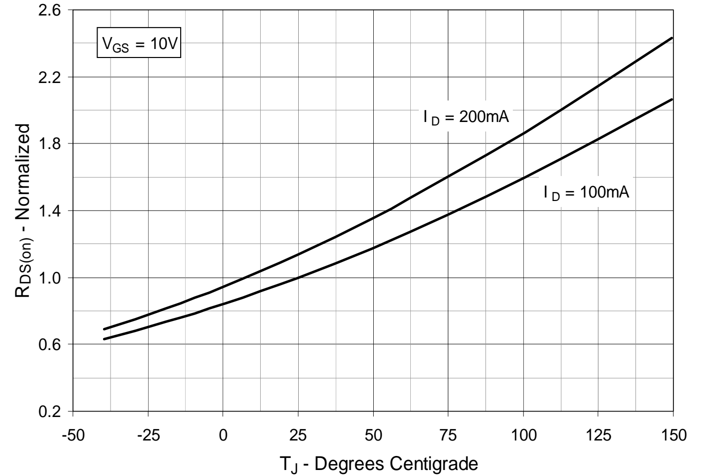



**Fig. 5. $R_{DS(on)}$ Normalized to $I_D$ = 100mA Value vs. Drain Current**

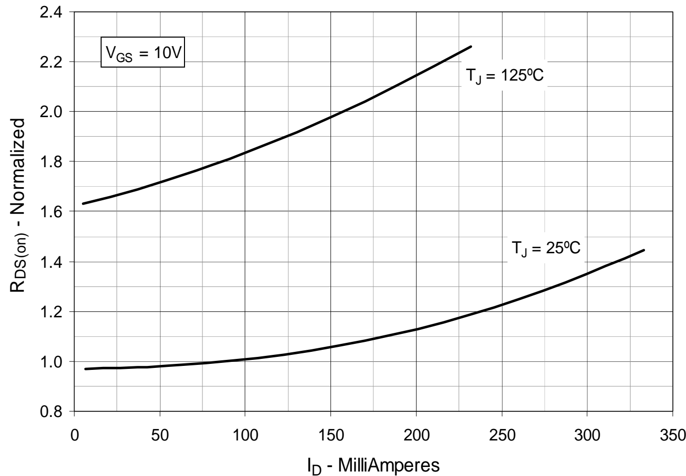
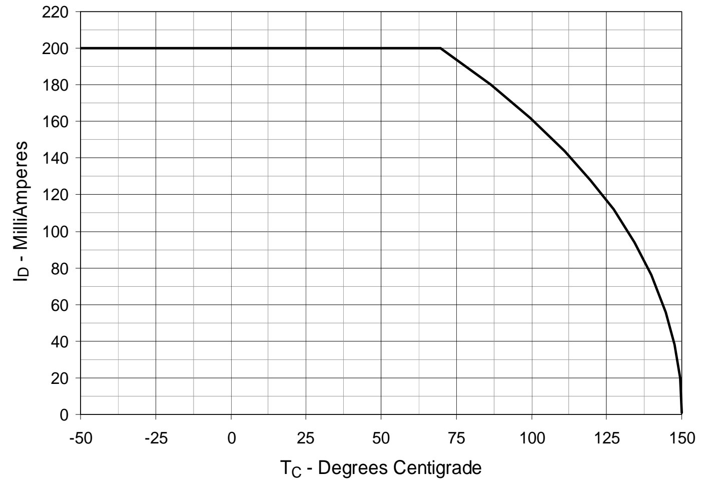



**Fig. 6. Maximum Drain Current vs. Case Temperature**

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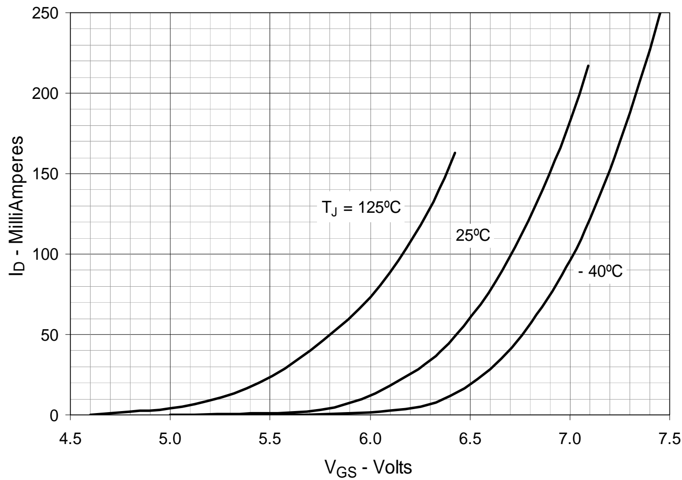


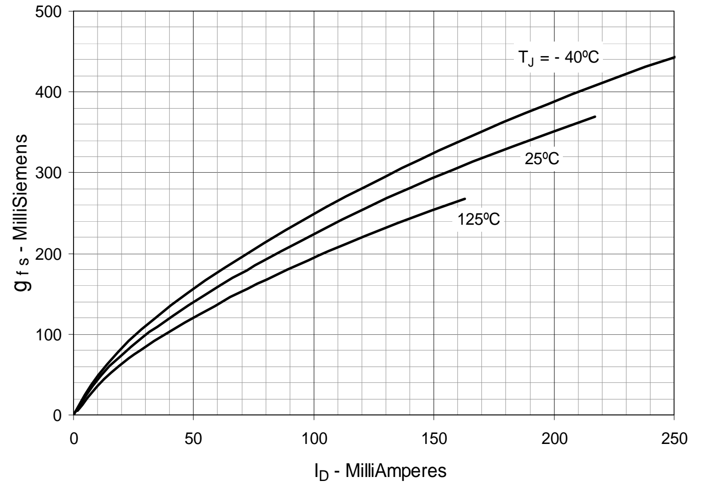


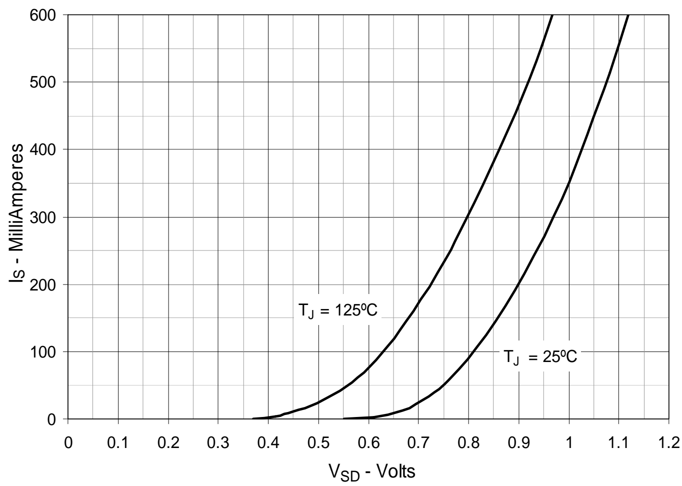


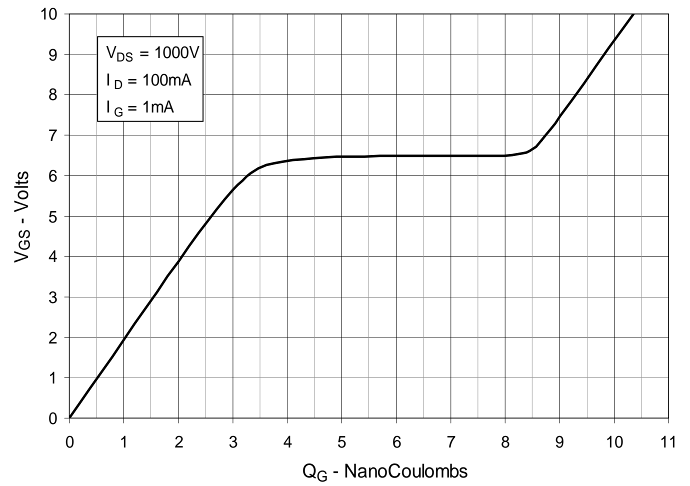


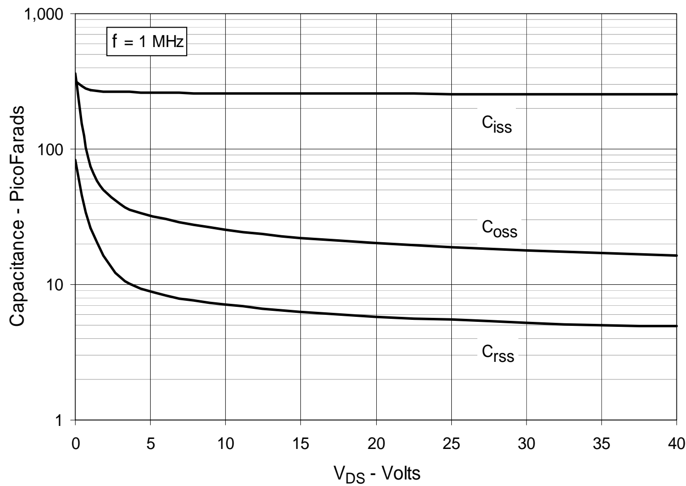


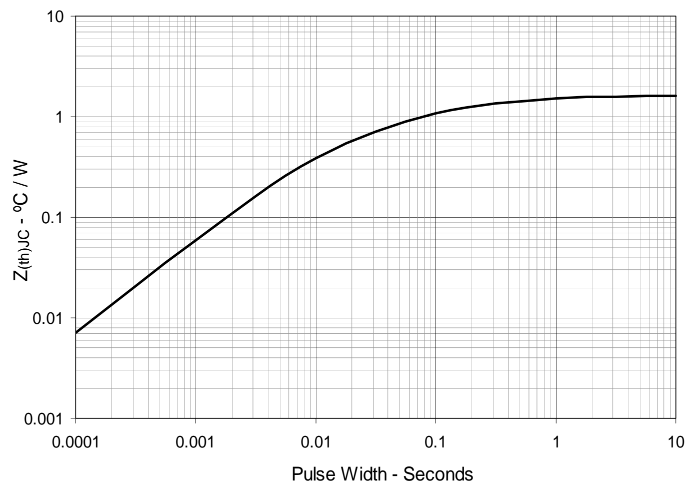


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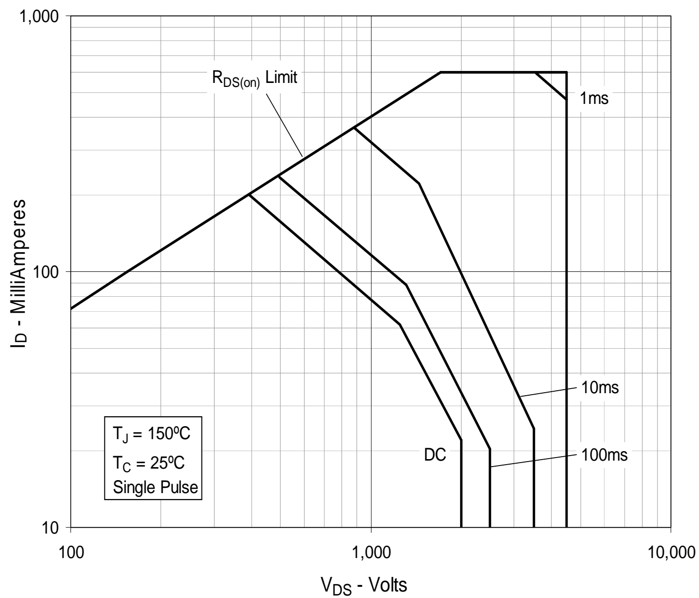


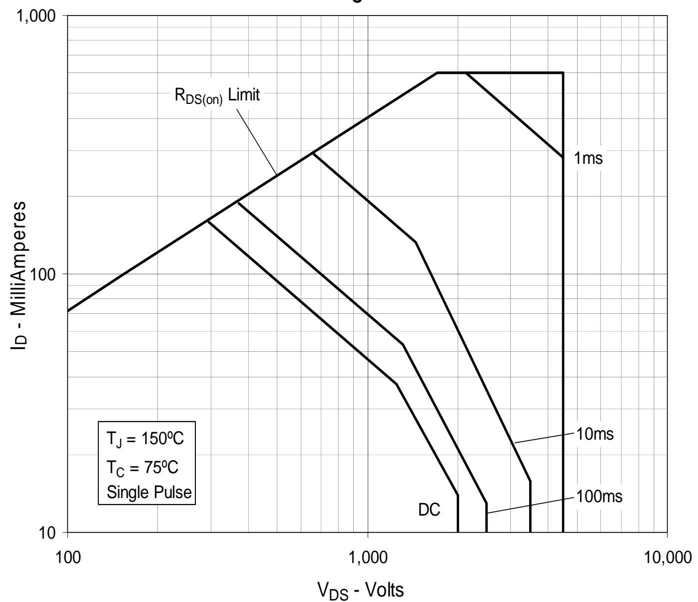


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