IXYS

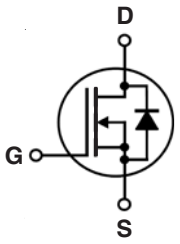
Preliminary Technical Information

# High Voltage Depletion Mode MOSFET

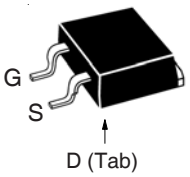
# IXTA3N100D2HV

$V_{DSX}$ = 1000V
$I_{D(on)}$ ≥ 3A
$R_{DS(on)}$ ≤ 6Ω

N-Channel




TO-263HV




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

| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{DSX}$ | $T_J$ = 25°C to 150°C | 1000 | V |
| $V_{GSX}$ | Continuous | ±20 | V |
| $V_{GSM}$ | Transient | ±30 | V |
| $P_D$ | $T_C$ = 25°C | 125 | W |
| $T_J$ | | - 55 ... +150 | °C |
| $T_{JM}$ | | 150 | °C |
| $T_{stg}$ | | - 55 ... +150 | °C |
| $T_L$ | Maximum Lead Temperature for Soldering | 300 | °C |
| $T_{SOLD}$ | 1.6 mm (0.062in.) from Case for 10s | 260 | °C |
| $M_d$ | Mounting Force | 10..65 / 2.2..14.6 | N/lb |
| Weight | | 2.5 | g |

## Features

- High Blocking Voltage
- Normally ON Mode
- High Voltage package

## Advantages

- Easy to Mount
- Space Savings
- High Power Density

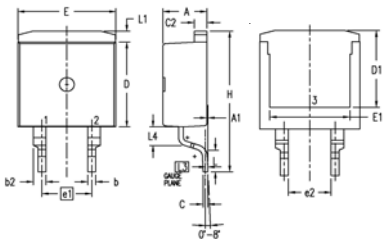
## Applications

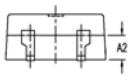
- Audio Amplifiers
- Start-Up Circuits
- Protection Circuits
- Ramp Generators
- Current Regulators
- Active Loads

| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $BV_{DSX}$ | $V_{GS}$ = - 5V, $I_D$ = 250μA | 1000 | | | V |
| $V_{GS(off)}$ | $V_{DS}$ = 25V, $I_D$ = 250μA | - 2.5 | | - 4.5 | V |
| $I_{GSX}$ | $V_{GS}$ = ±20V, $V_{DS}$ = 0V | | | ±100 | nA |
| $I_{DSX(off)}$ | $V_{DS}$ = $V_{DSX}$, $V_{GS}$ = - 5V | | | 5 | μA |
| | $T_J$ = 125°C | | | 50 | μA |
| $R_{DS(on)}$ | $V_{GS}$ = 0V, $I_D$ = 1.5A, Note 1 | | | 6 | Ω |
| $I_{D(on)}$ | $V_{GS}$ = 0V, $V_{DS}$ = 50V, Note 1 | 3 | | | A |

| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. |
|---|---|---|---|---|
| $g_{fs}$ | $V_{DS}$ = 30V, $I_D$ = 1.5A, Note 1 | 1.2 | 2.0 | S |
| $C_{iss}$ | $V_{GS}$ = -10V, $V_{DS}$ = 25V, f = 1MHz | | 1020 | pF |
| $C_{oss}$ | | | 68 | pF |
| $C_{rss}$ | | | 17 | pF |
| $t_{d(on)}$ | **Resistive Switching Times** | | 27 | ns |
| $t_r$ | $V_{GS}$ = ± 5V, $V_{DS}$ = 500V, $I_D$ = 1.5A | | 67 | ns |
| $t_{d(off)}$ | $R_G$ = 3.3Ω (External) | | 34 | ns |
| $t_f$ | | | 40 | ns |
| $Q_{g(on)}$ | $V_{GS}$ = 5V, $V_{DS}$ = 500V, $I_D$ = 1.5A | | 37.5 | nC |
| $Q_{gs}$ | | | 4.4 | nC |
| $Q_{gd}$ | | | 21.2 | nC |
| $R_{thJC}$ | | | | 1.0 °C/W |

**TO-263HV Outline**





PIN: 1 - Gate
2 - Source
3 - Drain

| SYM | INCHES MIN | INCHES MAX | MILLIMETER MIN | MILLIMETER 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 |

**Safe-Operating-Area Specification**

| Symbol | Test Conditions | Characteristic Values Min. | Typ. | Max. |
|---|---|---|---|---|
| **SOA** | $V_{DS}$ = 800V, $I_D$ = 94mA, $T_C$ = 75°C, Tp = 5s | 75 | | W |

**Source-Drain Diode**

| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. |
|---|---|---|---|---|
| $V_{SD}$ | $I_F$ = 3A, $V_{GS}$ = -10V, Note 1 | | 0.8 | 1.3 V |
| $t_{rr}$ | $I_F$ = 3A, -di/dt = 100A/µs | | 970 | ns |
| $I_{RM}$ | $V_R$ = 100V, $V_{GS}$ = -10V | | 12.7 | A |
| $Q_{RM}$ | | | 6.16 | µC |

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

**PRELIMANARY 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.

**Fig. 1. Output Characteristics @ $T_J$ = 25°C**

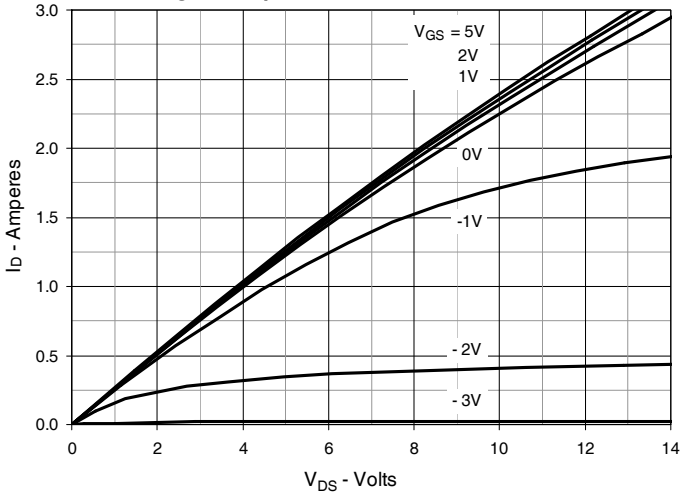



**Fig. 2. Extended Output Characteristics @ $T_J$ = 25°C**

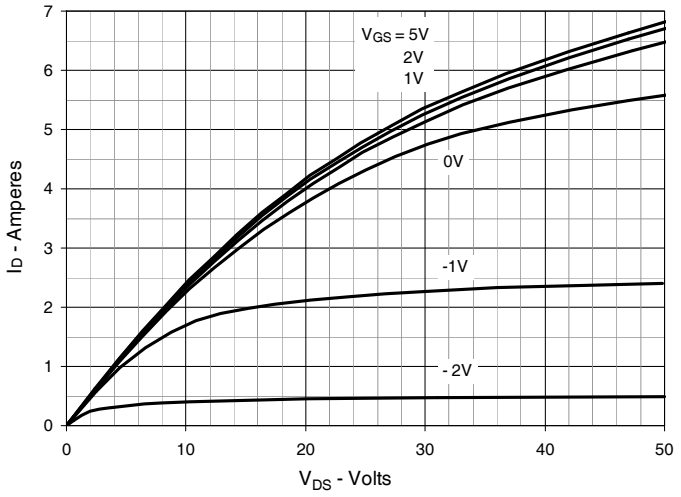



**Fig. 3. Output Characteristics @ $T_J$ = 125°C**

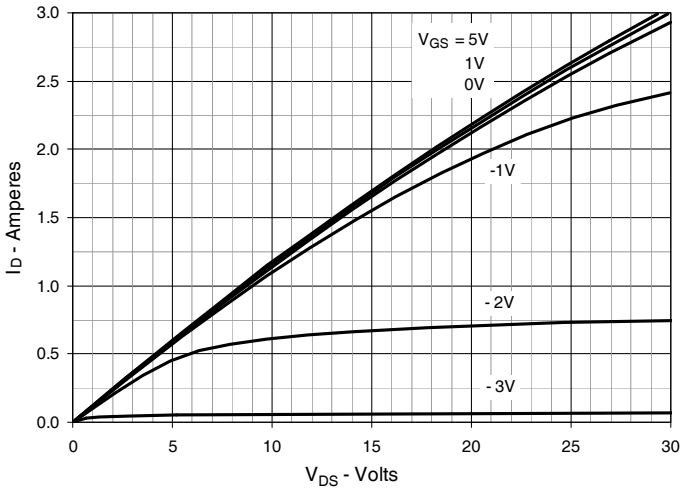



**Fig. 4. Drain Current @ $T_J$ = 25°C**

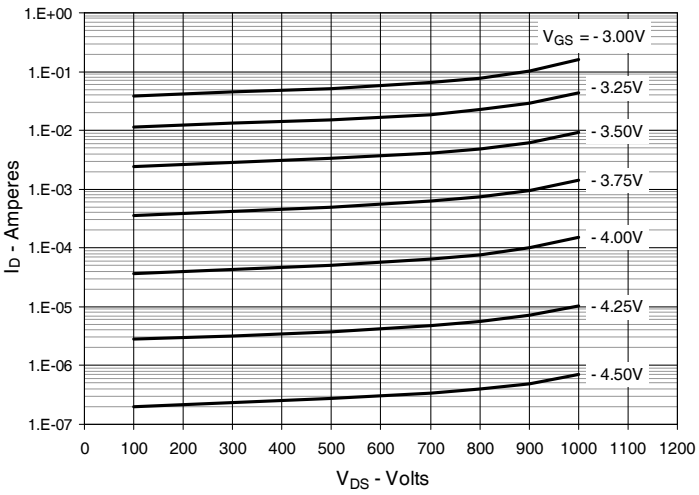



**Fig. 5. Drain Current @ $T_J$ = 100°C**

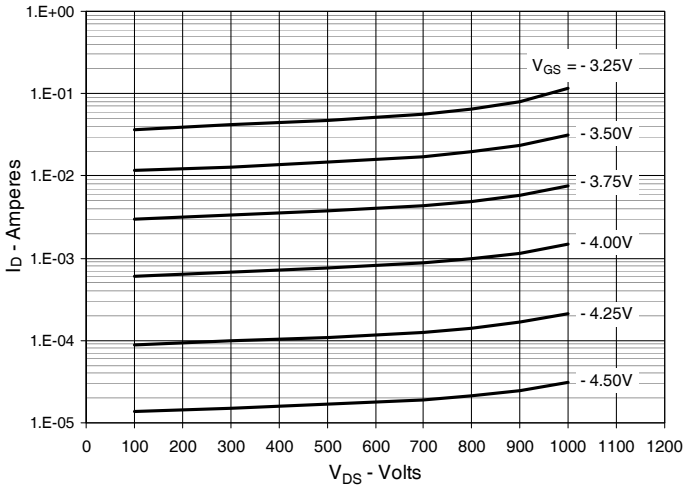



**Fig. 6. Dynamic Resistance vs. Gate Voltage**

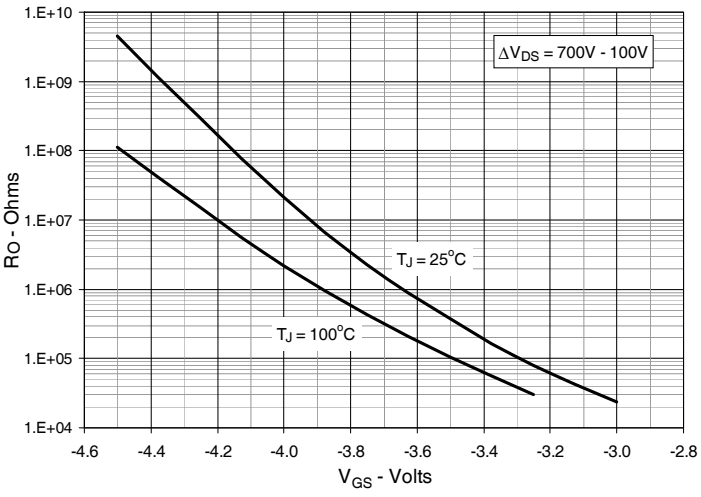


**Fig. 7. Normalized $R_{DS(on)}$ vs. Junction Temperature**

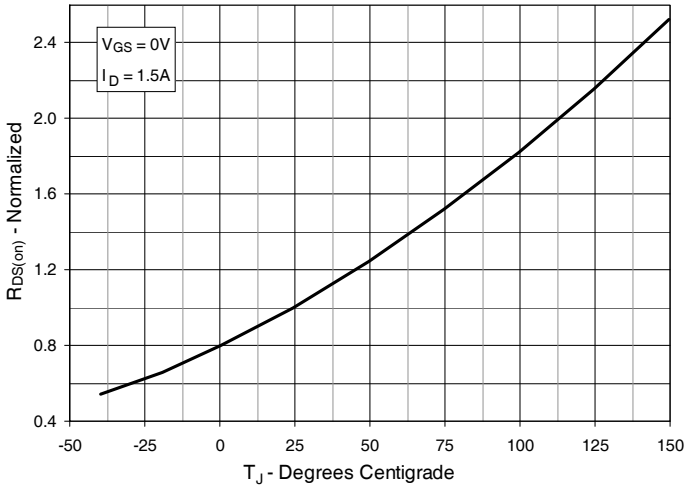



**Fig. 8. $R_{DS(on)}$ Normalized to $I_D$ = 1.5A Value vs. Drain Current**

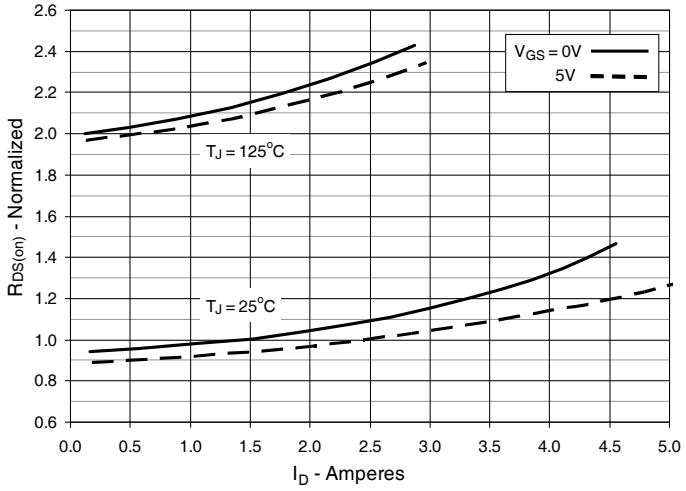



**Fig. 9. Input Admittance**

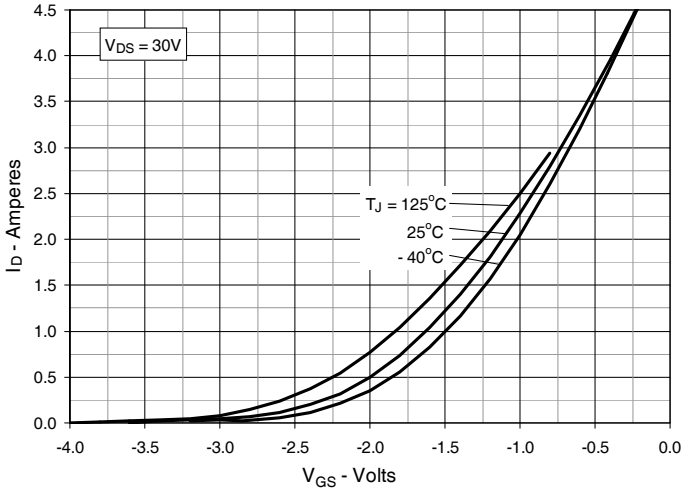



**Fig. 10. Transconductance**

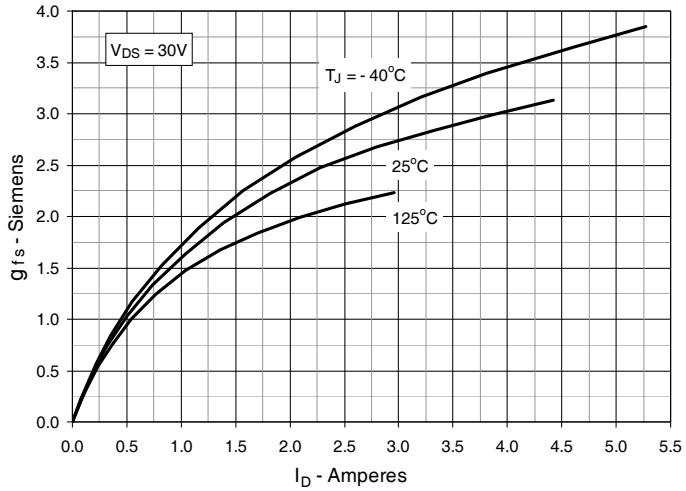



**Fig. 11. Breakdown and Threshold Voltages vs. Junction Temperature**

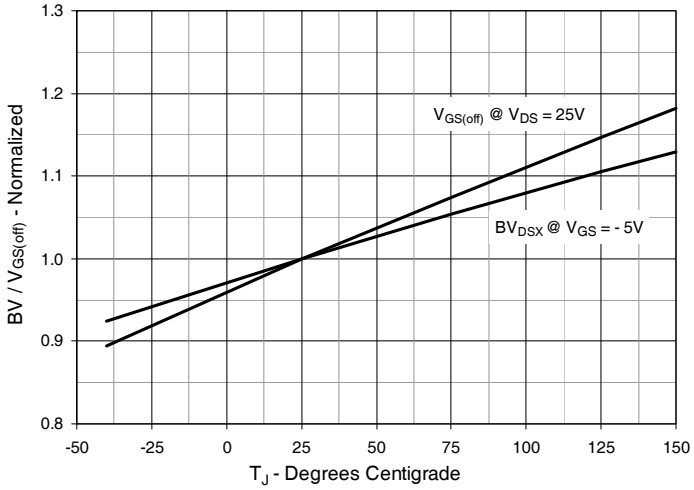



**Fig. 12. Forward Voltage Drop of Intrinsic Diode**

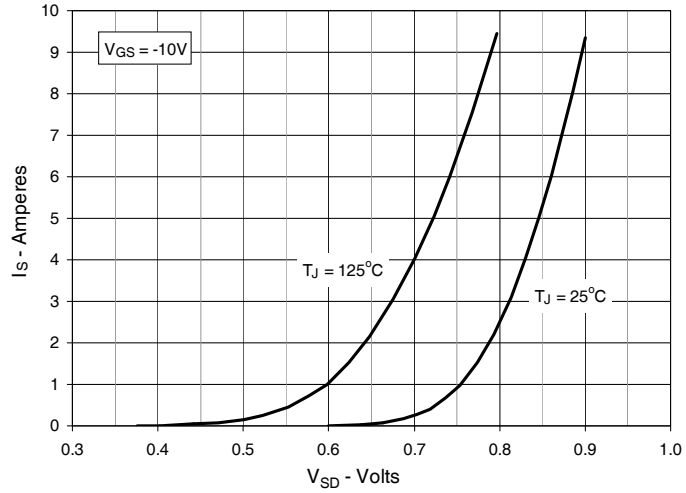


**Fig. 13. Capacitance**

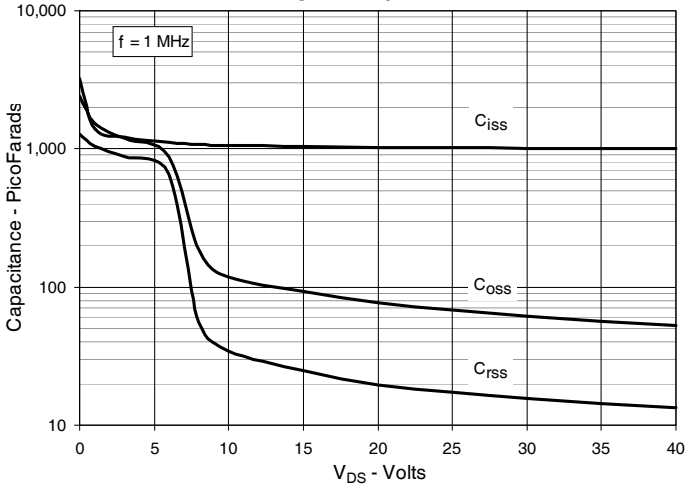



**Fig. 14. Gate Charge**

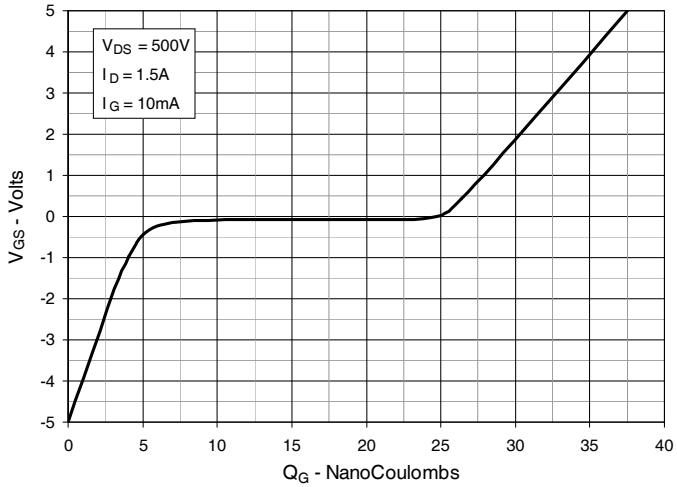



**Fig. 15. Forward-Bias Safe Operating Area @ $T_C$ = 25°C**

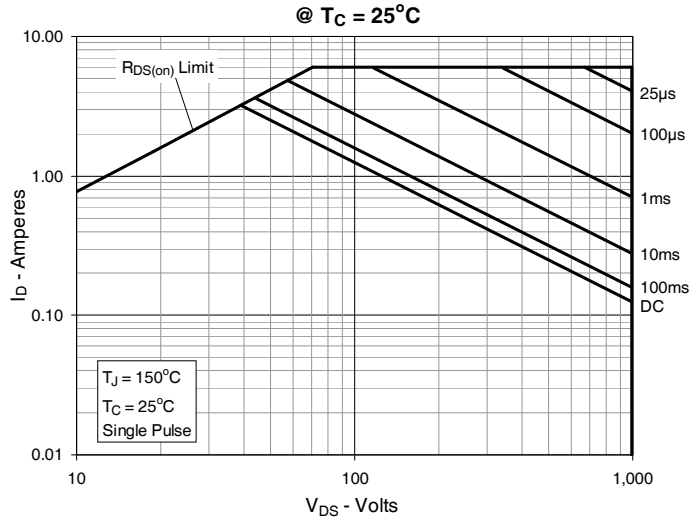



**Fig. 16. Forward-Bias Safe Operating Area @ $T_C$ = 75°C**

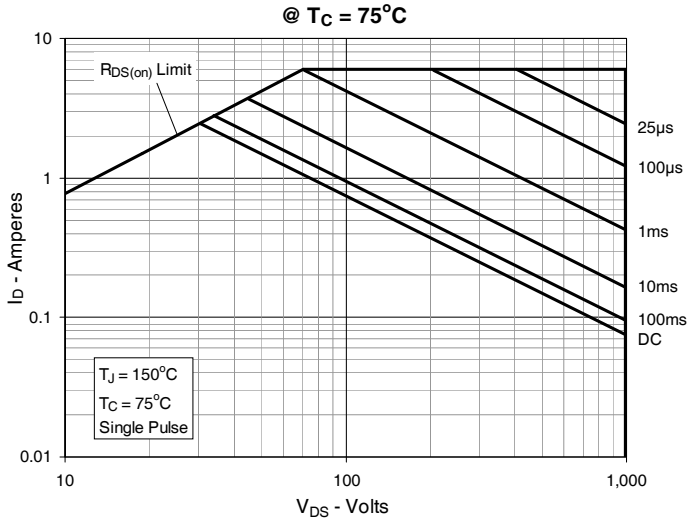



**Fig. 17. Maximum Transient Thermal Impedance**