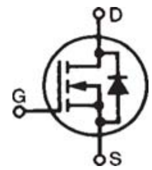
IXYS **Advance Technical Information**

# High Voltage Power MOSFET

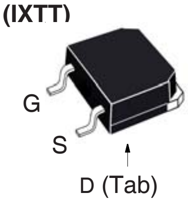
# IXTT2N300P3HV
# IXTH2N300P3HV

$V_{DSS}$ = 3000V
$I_{D25}$ = 2A
$R_{DS(on)}$ ≤ 21Ω

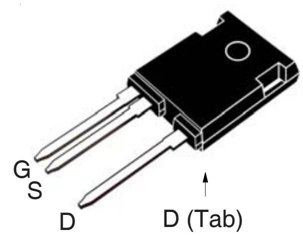
N-Channel Enhancement Mode




**TO-268HV (IXTT)**




**TO-247HV (IXTH)**




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

| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{DSS}$ | $T_J$ = 25°C to 150°C | 3000 | V |
| $V_{DGR}$ | $T_J$ = 25°C to 150°C, $R_{GS}$ = 1MΩ | 3000 | V |
| $V_{GSS}$ | Continuous | ±20 | V |
| $V_{GSM}$ | Transient | ±30 | V |
| $I_{D25}$ | $T_C$ = 25°C | 2.0 | A |
| $I_{D110}$ | $T_C$ = 110°C | 1.6 | A |
| $I_{DM}$ | $T_C$ = 25°C, Pulse Width Limited by $T_{JM}$ | 6.0 | A |
| $P_D$ | $T_C$ = 25°C | 520 | W |
| $T_J$ | | - 55 ... +150 | °C |
| $T_{JM}$ | | 150 | °C |
| $T_{stg}$ | | - 55 ... +150 | °C |
| $T_L$ | Maximum Lead Temperature for Soldering | 300 | °C |
| $T_{SOLD}$ | Plastic Body for 10s | 260 | °C |
| $M_d$ | Mounting Torque | 1.13/10 | Nm/lb.in |
| **Weight** | TO-268HV | 4 | g |
| | TO-247HV | 6 | 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. | |
|---|---|---|---|---|---|
| $BV_{DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250µA | 3000 | | | V |
| $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA | 3.0 | | 5.0 | V |
| $I_{GSS}$ | $V_{GS}$ = ±20V, $V_{DS}$ = 0V | | | ±100 | nA |
| $I_{DSS}$ | $V_{DS}$ = $V_{DSS}$, $V_{GS}$ = 0V | | | 10 | µA |
| | $T_J$ = 125°C | | | 250 | µA |
| $R_{DS(on)}$ | $V_{GS}$ = 10V, $I_D$ = 1A, Note 1 | | | 21 | Ω |

# IXYS

**IXTT2N300P3HV**
**IXTH2N300P3HV**

| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $V_{DS}$ = 50V, $I_D$ = 1A, Note 1 | 1.8 | 3.0 | | S |
| $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = 25V, f = 1MHz | | 1890 | | pF |
| $C_{oss}$ | | | 90 | | pF |
| $C_{rss}$ | | | 42 | | pF |
| $R_{Gi}$ | Gate Input Resistance | | 7.7 | | Ω |
| $t_{d(on)}$ | **Resistive Switching Times** | | 21 | | ns |
| $t_r$ | $V_{GS}$ = 10V, $V_{DS}$ = 500V, $I_D$ = 0.5 • $I_{D25}$ | | 17 | | ns |
| $t_{d(off)}$ | $R_G$ = 5Ω (External) | | 69 | | ns |
| $t_f$ | | | 62 | | ns |
| $Q_{g(on)}$ | $V_{GS}$ = 10V, $V_{DS}$ = 1.5kV, $I_D$ = 0.5 • $I_{D25}$ | | 73 | | nC |
| $Q_{gs}$ | | | 9 | | nC |
| $Q_{gd}$ | | | 40 | | nC |
| $R_{thJC}$ | | | | 0.24 | °C/W |
| $R_{thCS}$ | TO-247HV | | 0.21 | | °C/W |

### Source-Drain Diode

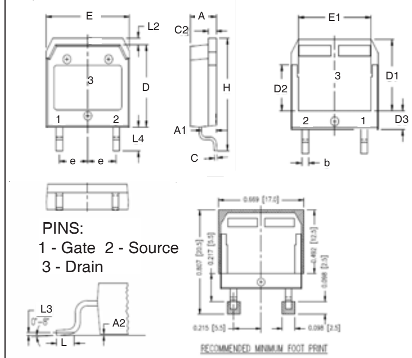
| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $I_S$ | $V_{GS}$ = 0V | | | 2.0 | A |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$ | | | 8.0 | A |
| $V_{SD}$ | $I_F = I_S$, $V_{GS}$ = 0V, Note 1 | | | 1.5 | V |
| $t_{rr}$ | $I_F$ = 1A, -di/dt = 100A/μs | | 400 | | ns |
| $Q_{RM}$ | $V_R$ = 100V, $V_{GS}$ = 0V | | 250 | | nC |
| $I_{RM}$ | | | 1.3 | | A |

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.

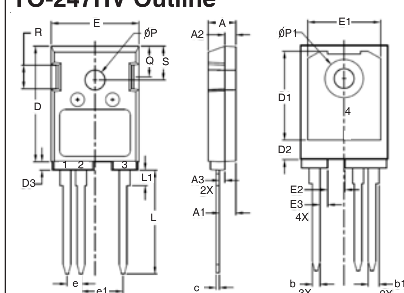
### TO-268HV Outline



PINS:
1 - Gate 2 - Source
3 - Drain

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

### TO-247HV Outline



PINS:
1 - Gate 2 - Source
3, 4 - Drain

| SYM | INCHES MIN | INCHES MAX | MILLIMETERS MIN | MILLIMETERS MAX |
|---|---|---|---|---|
| A | .193 | .201 | 4.90 | 5.10 |
| A1 | .114 | .122 | 2.90 | 3.10 |
| A2 | .075 | .083 | 1.90 | 2.10 |
| A3 | .035 | .043 | 0.90 | 1.10 |
| b | .053 | .059 | 1.35 | 1.50 |
| b1 | .075 | .083 | 1.90 | 2.10 |
| c | .022 | .030 | 0.55 | 0.75 |
| D | .819 | .843 | 20.80 | 21.40 |
| D1 | .638 | .646 | 16.20 | 16.40 |
| D2 | .134 | .146 | 3.40 | 3.70 |
| D3 | .055 | .063 | 1.40 | 1.60 |
| E | .622 | .638 | 15.80 | 16.20 |
| E1 | .520 | .528 | 13.20 | 13.40 |
| E2 | .118 | .126 | 3.00 | 3.20 |
| E3 | .051 | .059 | 1.30 | 1.50 |
| e | .100 BSC | | 2.54 BSC | |
| e1 | .300 BSC | | 7.62 BSC | |
| L | .732 | .748 | 18.60 | 19.00 |
| L1 | .106 | .118 | 2.70 | 3.00 |
| øP | .138 | .142 | 3.50 | 3.60 |
| øP1 | .272 | .280 | 6.90 | 7.10 |
| Q | .216 | .224 | 5.50 | 5.70 |
| R | .165 | .169 | 4.20 | 4.30 |
| S | .240 | .248 | 6.10 | 6.30 |

**Fig. 1. Output Characteristics @ $T_J$ = 25ºC**

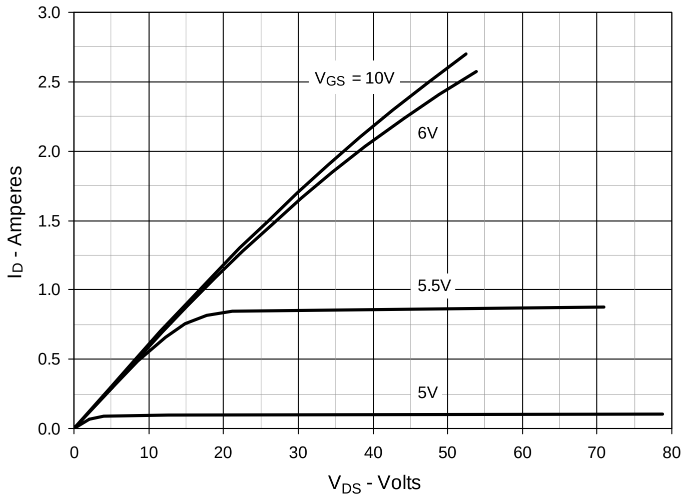



**Fig. 2. Output Characteristics @ $T_J$ = 125ºC**

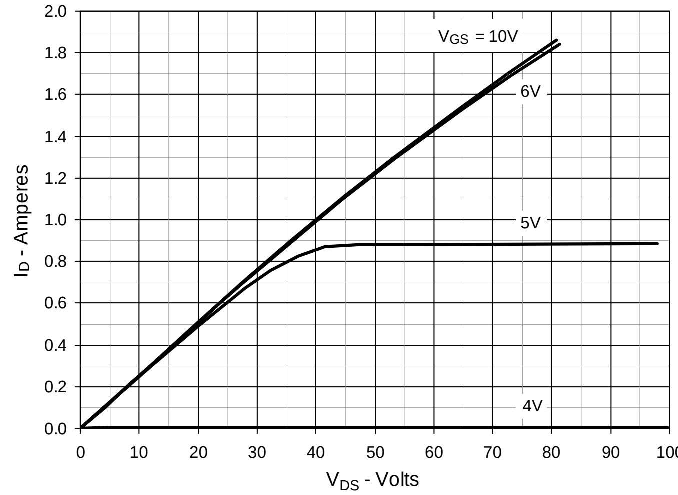



**Fig. 3. $R_{DS(on)}$ Normalized to $I_D$ = 1A Value vs. Junction Temperature**

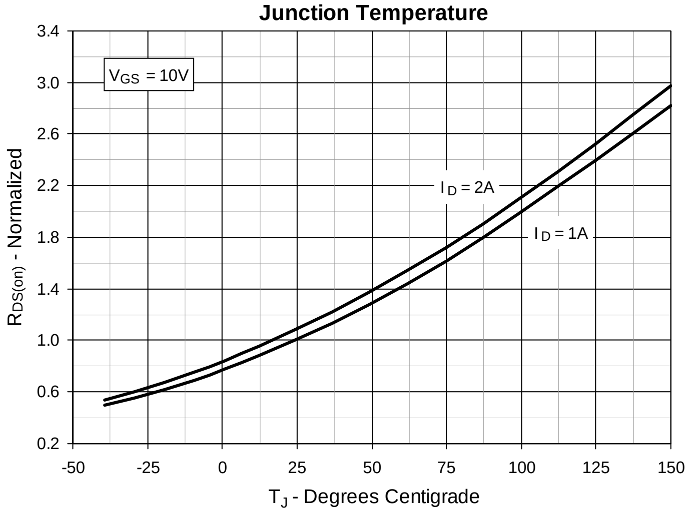



**Fig. 4. $R_{DS(on)}$ Normalized to $I_D$ = 1A Value vs. Drain Current**

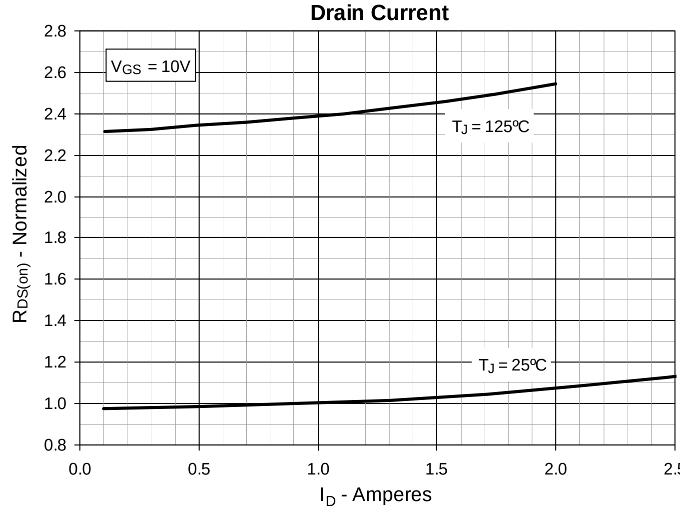



**Fig. 5. Maximum Drain Current vs. Case Temperature**

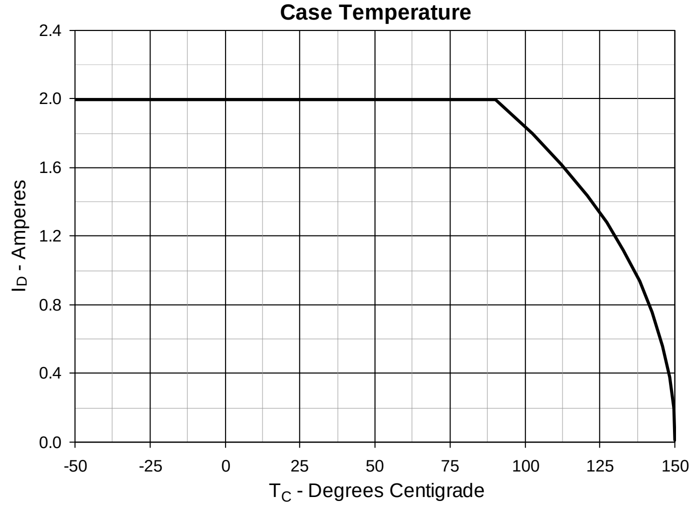



**Fig. 6. Input Admittance**

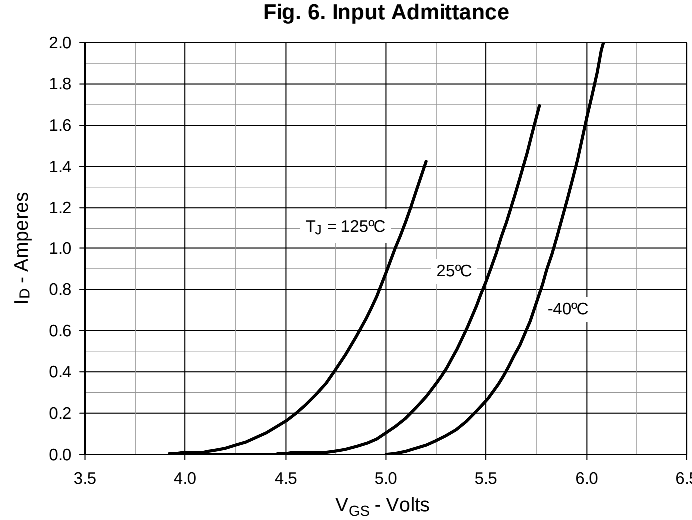


Fig. 7. Transconductance

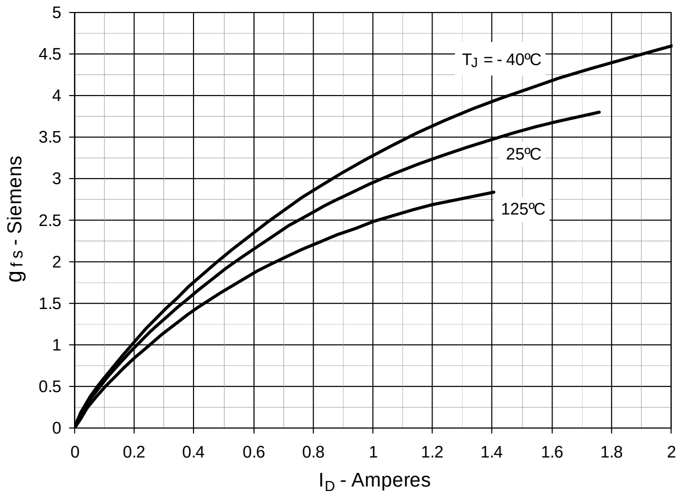



Fig. 8. Forward Voltage Drop of Intrinsic Diode

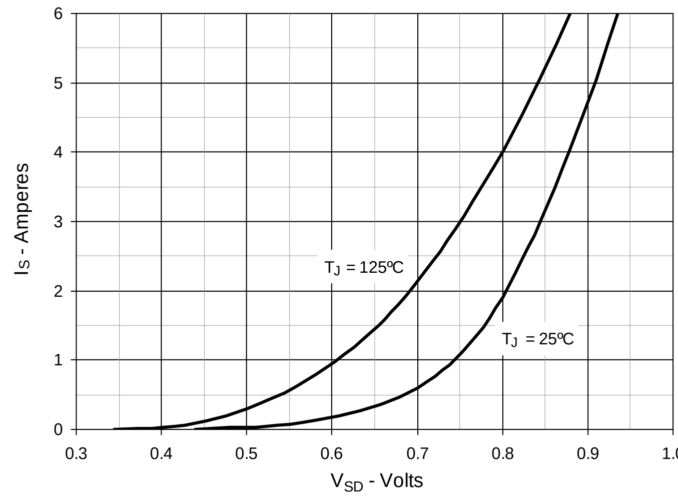



Fig. 9. Gate Charge

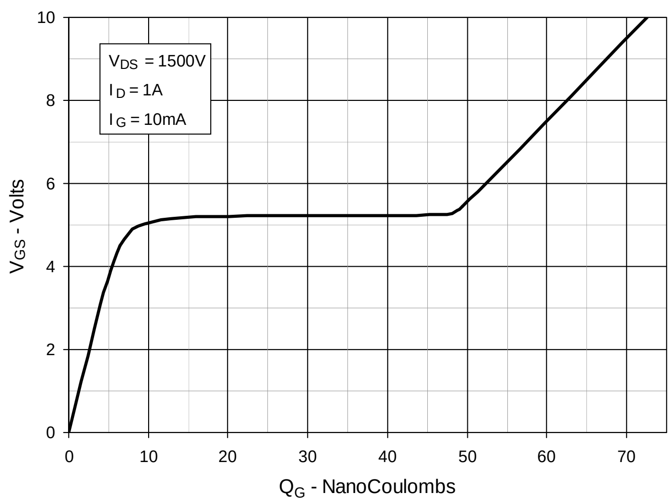



Fig. 10. Capacitance

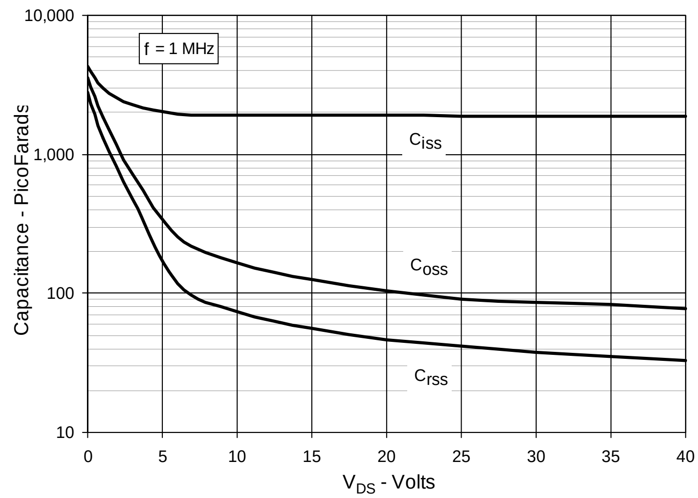



Fig. 11. Forward-Bias Safe Operating Area

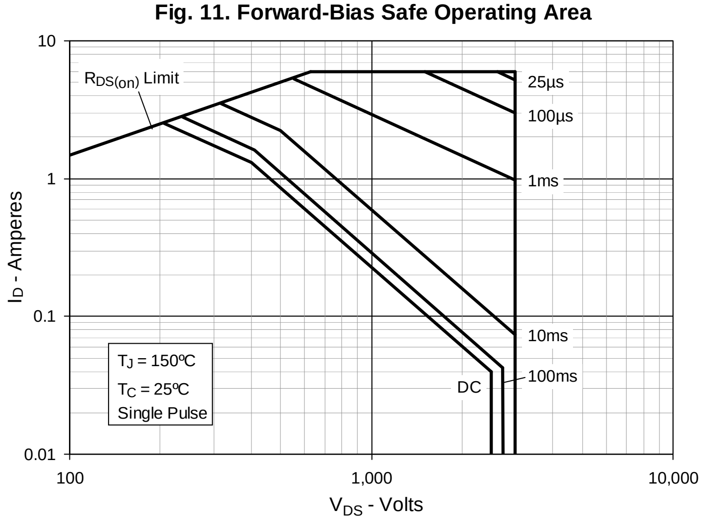
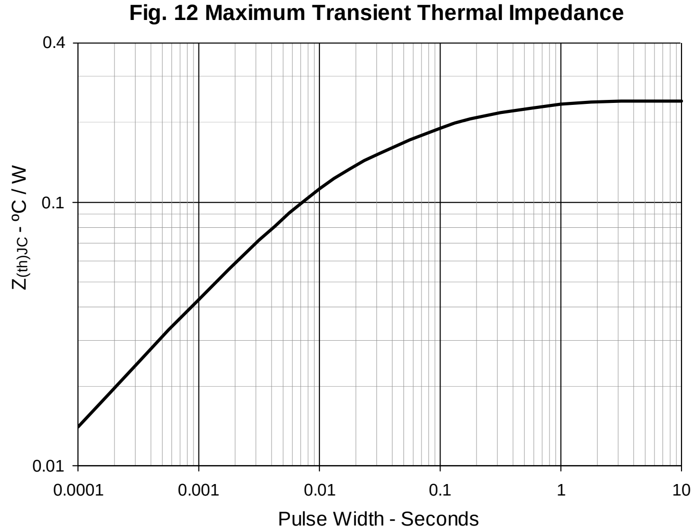



Fig. 12 Maximum Transient Thermal Impedance




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