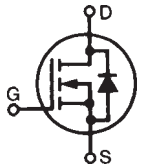
IXYS

Advance Technical Information

# High Voltage Power MOSFET

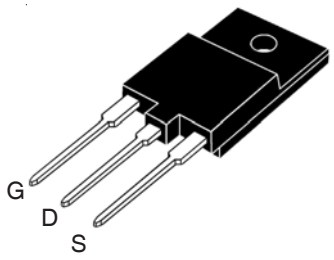
# IXTQ3N150M

$V_{DSS}$ = 1500V
$I_{D25}$ = 1.83A
$R_{DS(on)}$ ≤ 7.3Ω




N-Channel Enhancement Mode
Avalanche Rated
Fast Intrinsic Diode

**OVERMOLDED (IXTQ...M) OUTLINE**




G = Gate D = Drain
S = Source

| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{DSS}$ | $T_J$ = 25°C to 150°C | 1500 | V |
| $V_{DGR}$ | $T_J$ = 25°C to 150°C, $R_{GS}$ = 1 MΩ | 1500 | V |
| $V_{GSS}$ | Continuous | ± 30 | V |
| $V_{GSM}$ | Transient | ± 40 | V |
| $I_{D25}$ | $T_C$ = 25°C | 1.83 | A |
| $I_{DM}$ | $T_C$ = 25°C, Pulse Width Limited by $T_{JM}$ | 9.00 | A |
| $I_A$ | $T_C$ = 25°C | 3 | A |
| $E_{AS}$ | $T_C$ = 25°C | 250 | mJ |
| dv/dt | $I_S \le I_{DM}$, $V_{DD} \le V_{DSS}$, $T_J$ =150°C | 5 | V/ns |
| $P_D$ | $T_C$ = 25°C | 73 | 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 Torque | 1.13/10 | Nm/lb.in. |
| Weight | | 6 | g |

| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $BV_{DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250μA | 1500 | | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D$ = 250μA | 2.5 | | 5.0 | V |
| $I_{GSS}$ | $V_{GS}$ = ±30V, $V_{DS}$ = 0V | | | ±100 | nA |
| $I_{DSS}$ | $V_{DS} = V_{DSS}$, $V_{GS}$ = 0V | | | 10 | μA |
| | $T_J$ = 125°C | | | 100 | μA |
| $R_{DS(on)}$ | $V_{GS}$ = 10V, $I_D$ = 1.5A, Note 1 | | | 7.3 | Ω |

### Features

- Plastic Overmolded Tab for Electrical Isolation
- Avalanche Rated
- Fast Intrinsic Diode
- Low Package Inductance

### Advantages

- High Power Density
- Easy to Mount
- Space Savings

### Applications

- High Voltage Power Supplies
- Capacitor Discharge Applications
- Pulse Circuits

| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $V_{DS}$ = 20V, $I_D$ = 1.5A, Note 1 | 2.2 | 3.6 | | S |
| $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = 25V, f = 1MHz | | 1375 | | pF |
| $C_{oss}$ | | | 90 | | pF |
| $C_{rss}$ | | | 30 | | pF |
| $R_{Gi}$ | Gate Input Resistance | | 3.0 | | Ω |
| $t_{d(on)}$ | **Resistive Switching Times** | | 19 | | ns |
| $t_r$ | $V_{GS}$ = 10V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 1.5A | | 21 | | ns |
| $t_{d(off)}$ | $R_G$ = 5Ω (External) | | 42 | | ns |
| $t_f$ | | | 25 | | ns |
| $Q_{g(on)}$ | $V_{GS}$ = 10V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 1.5A | | 38.6 | | nC |
| $Q_{gs}$ | | | 6.5 | | nC |
| $Q_{gd}$ | | | 19.0 | | nC |
| $R_{thJC}$ | | | | 1.7 | °C/W |
| $R_{thCS}$ | | | 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, Note1 | | | 3 | A |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$ | | | 12 | A |
| $V_{SD}$ | $I_F$ = $I_S$, $V_{GS}$ = 0V, Note 1 | | | 1.3 | V |
| $t_{rr}$ | $I_F$ = 1.5A, -di/dt = 100A/μs | | 0.9 | | μs |
| $Q_{RM}$ | $V_R$ = 100V | | 6.7 | | μC |
| $I_{RM}$ | | | 15 | | 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.

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

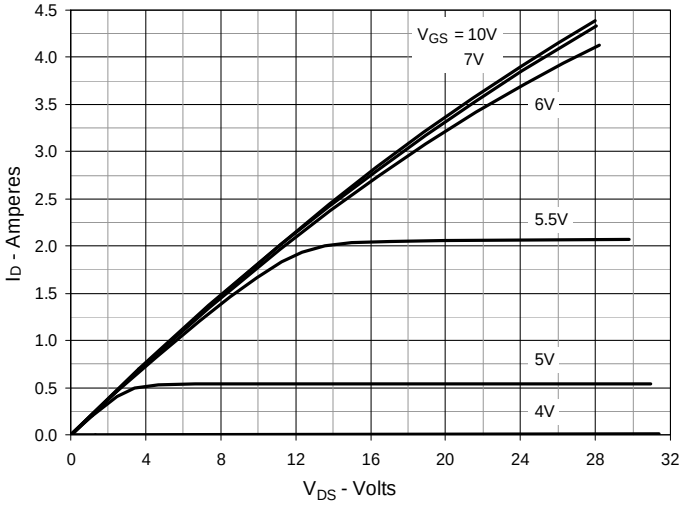



**Fig. 2. Output Characteristics @ $T_J$ = 125ºC**

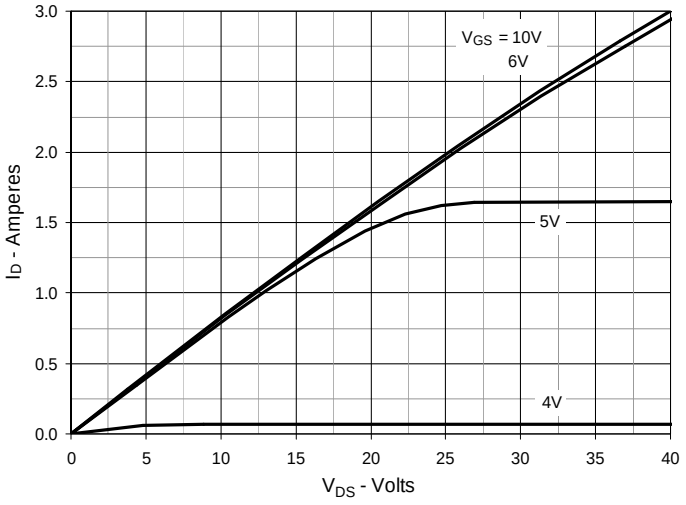



**Fig. 3. $R_{DS(on)}$ Normalized to $I_D$ = 1.5A Value vs. Junction Temperature**

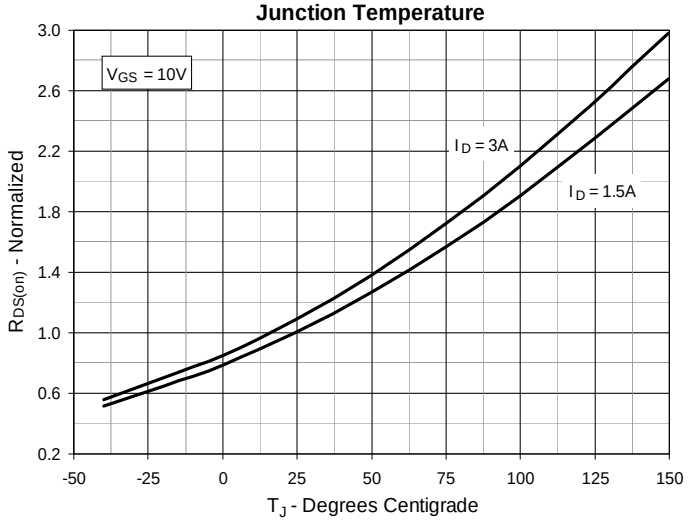



**Fig. 4. $R_{DS(on)}$ Normalized to $I_D$ = 1.5A Value vs. Drain Current**

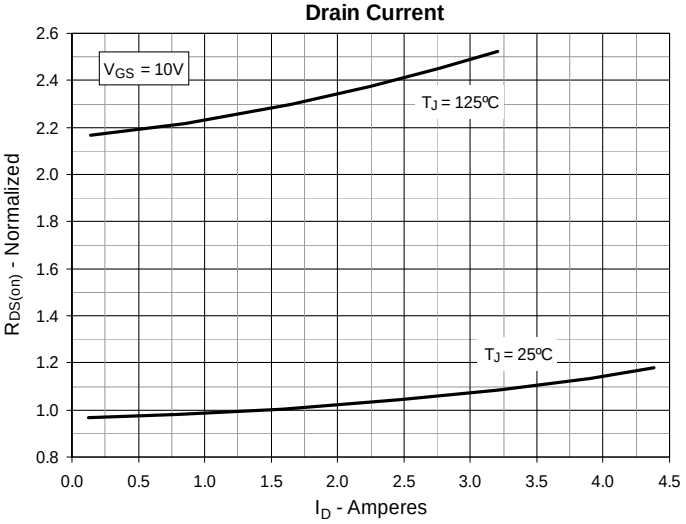



**Fig. 5. Maximum Drain Current vs. Case Temperature**

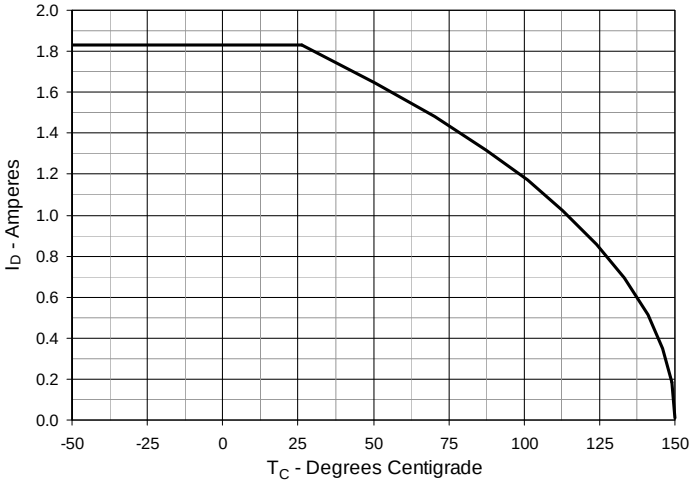



**Fig. 6. Input Admittance**

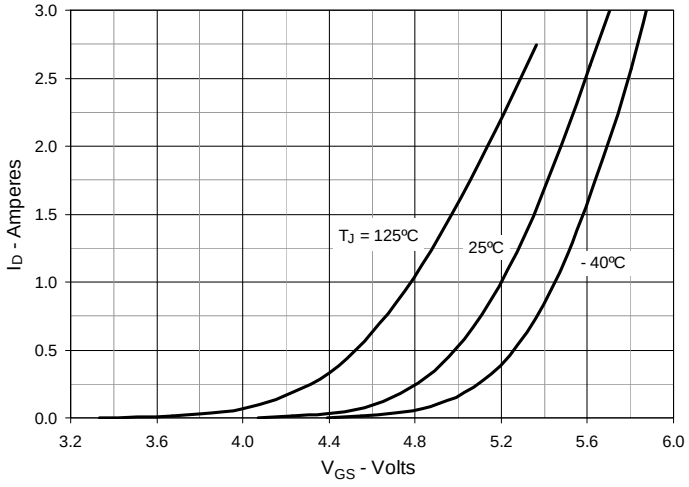


**Fig. 7. Transconductance**

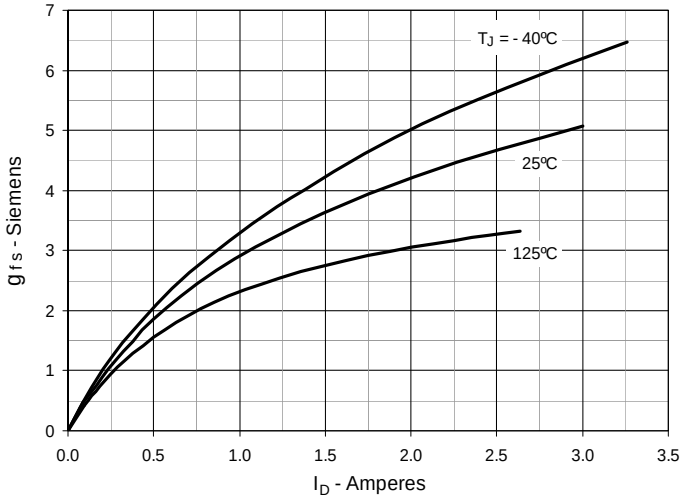



**Fig. 8. Forward Voltage Drop of Intrinsic Diode**

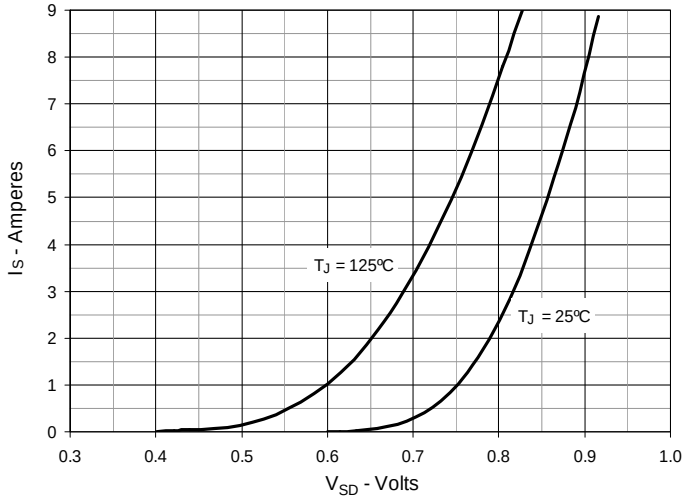



**Fig. 9. Gate Charge**

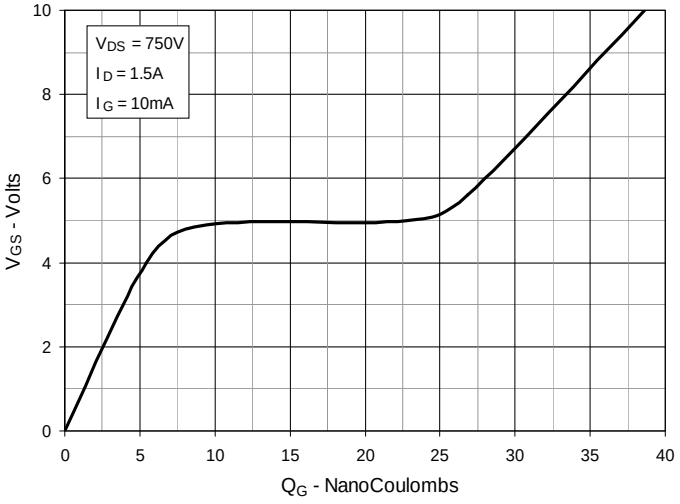



**Fig. 10. Capacitance**

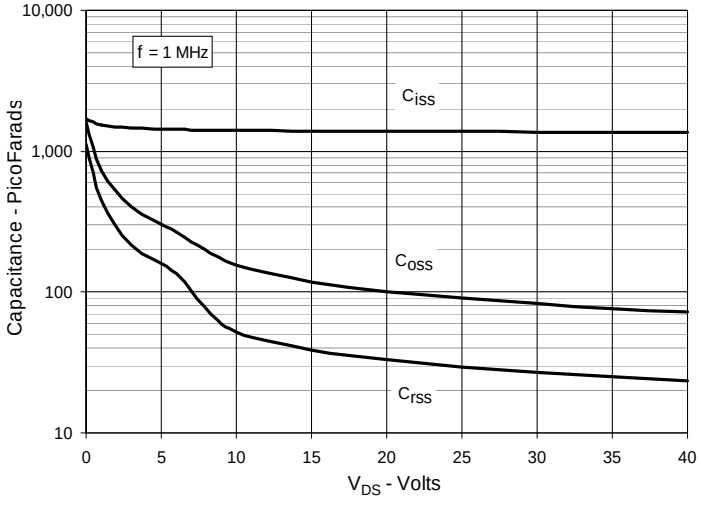



**Fig. 11. Maximum Transient Thermal Impedance**

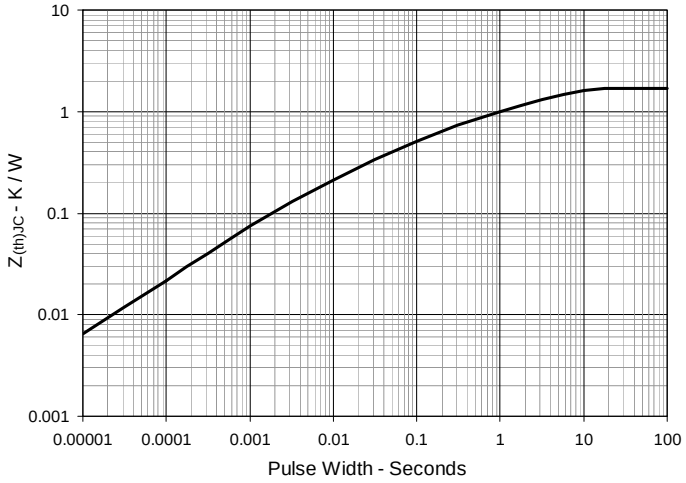
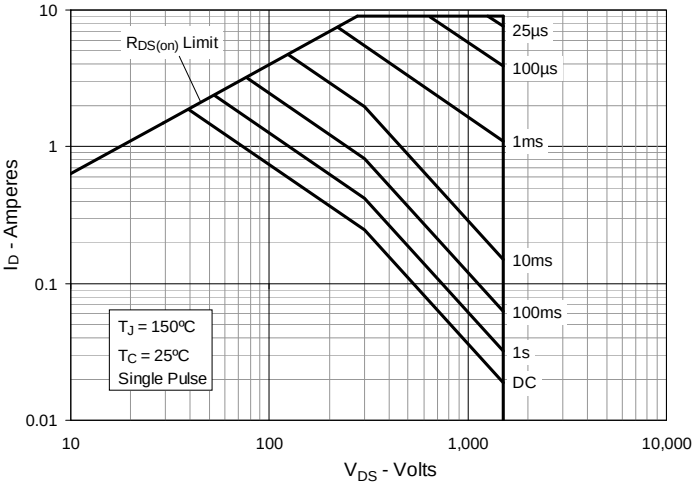
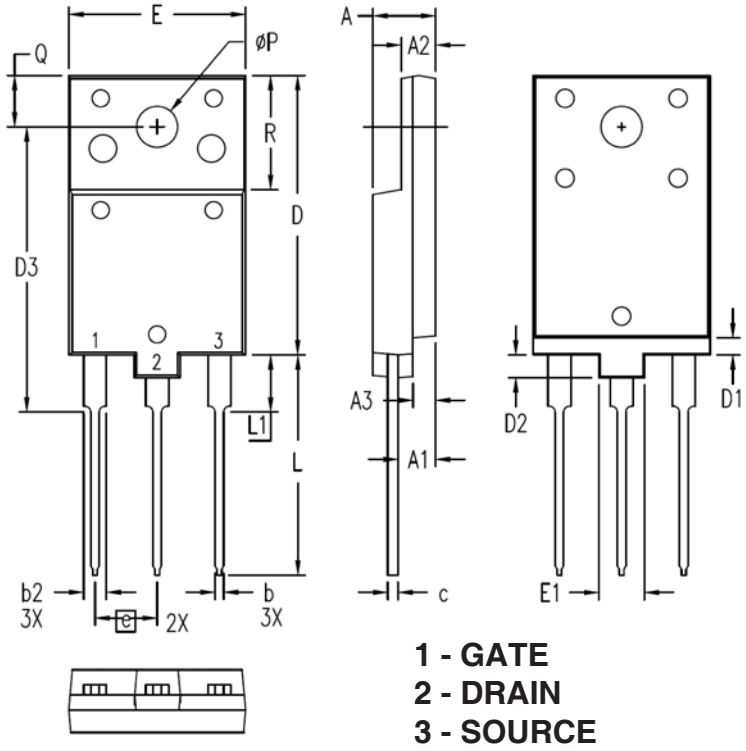



**Fig. 12. Forward-Bias Safe Operating Area**



## OVERMOLDED (IXTQ...M) OUTLINE




**1 - GATE**
**2 - DRAIN**
**3 - SOURCE**

| SYM | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | .208 | .224 | 5.30 | 5.70 |
| A1 | .122 | .138 | 3.10 | 3.50 |
| A2 | .110 | .126 | 2.80 | 3.20 |
| A3 | .071 | .087 | 1.80 | 2.20 |
| b | .026 | .037 | 0.65 | 0.95 |
| b2 | .071 | .087 | 1.80 | 2.20 |
| c | .031 | .043 | 0.80 | 1.10 |
| D | .957 | .972 | 24.30 | 24.70 |
| D1 | .051 | .067 | 1.30 | 1.70 |
| D2 | .071 | .087 | 1.80 | 2.20 |
| D3 | .972 | .996 | 24.70 | 25.30 |
| E | .602 | .618 | 15.30 | 15.70 |
| E1 | .150 | .165 | 3.80 | 4.20 |
| e | .215 BSC | | 5.45 BSC | |
| L | .744 | .772 | 18.90 | 19.60 |
| L1 | .189 | .205 | 4.80 | 5.20 |
| øP | .134 | .150 | 3.40 | 3.80 |
| Q | .169 | .185 | 4.30 | 4.70 |
| R | .386 | .401 | 9.80 | 10.20 |