IXYS

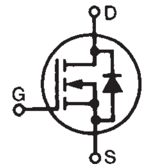
Preliminary Technical Information

# Polar™ Power MOSFET HiPerFET™

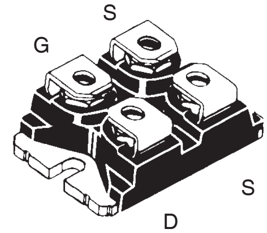
# IXFN52N90P

$V_{DSS}$ = 900V
$I_{D25}$ = 43A
$R_{DS(on)}$ ≤ 160mΩ
$t_{rr}$ ≤ 300ns

N-Channel Enhancement Mode
Avalanche Rated
Fast Intrinsic Diode




**miniBLOC, SOT-227**
E153432




G = Gate D = Drain
S = Source

Either Source terminal S can be used as the Source terminal or the Kelvin Source (gate return) terminal.

| Symbol | Test Conditions | | Maximum Ratings | |
|---|---|---|---|---|
| $V_{DSS}$ | $T_J$ = 25°C to 150°C | | 900 | V |
| $V_{DGR}$ | $T_J$ = 25°C to 150°C, $R_{GS}$ = 1MΩ | | 900 | V |
| $V_{GSS}$ | Continuous | | ± 30 | V |
| $V_{GSM}$ | Transient | | ± 40 | V |
| $I_{D25}$ | $T_C$ = 25°C | | 43 | A |
| $I_{DM}$ | $T_C$ = 25°C, pulse width limited by $T_{JM}$ | | 104 | A |
| $I_A$ | $T_C$ = 25°C | | 26 | A |
| $E_{AS}$ | $T_C$ = 25°C | | 2 | J |
| dV/dt | $I_S \le I_{DM}$, $V_{DD} \le V_{DSS}$, $T_J \le 150°C$ | | 20 | V/ns |
| $P_D$ | $T_C$ = 25°C | | 890 | 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 |
| $V_{ISOL}$ | 50/60 Hz, RMS | t = 1min | 2500 | V~ |
| | $I_{ISOL} \le 1mA$ | t = 1s | 3000 | V~ |
| $M_d$ | Mounting torque | | 1.5/13 | Nm/lb.in. |
| | Terminal connection torque | | 1.3/11.5 | Nm/lb.in. |
| Weight | | | 30 | g |

## Features

- International standard package
- miniBLOC, with Aluminium nitride isolation
- Avalanche Rated
- Low package inductance
- Fast intrinsic diode

## Advantages

- Low gate drive requirement
- High power density

## Applications:

- Switched-mode and resonant-mode power supplies
- DC-DC Converters
- Laser Drivers
- AC and DC motor drives
- Robotics and servo controls

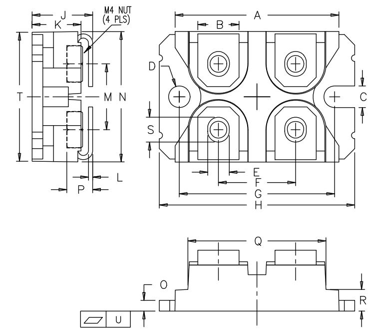
| Symbol | Test Conditions ($T_J$ = 25°C, unless otherwise specified) | | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | $V_{GS}$ = 0V, $I_D$ = 3mA | | 900 | | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D$ = 1mA | | 3.5 | | 6.5 | V |
| $I_{GSS}$ | $V_{GS}$ = ± 30V, $V_{DS}$ = 0V | | | | ± 200 | nA |
| $I_{DSS}$ | $V_{DS} = V_{DSS}$ | | | | 50 | µA |
| | $V_{GS}$ = 0V | $T_J$ = 125°C | | | 4 | mA |
| $R_{DS(on)}$ | $V_{GS}$ = 10V, $I_D$ = 26A, Note 1 | | | | 160 | mΩ |

| Symbol | Test Conditions (T$_J$ = 25°C unless otherwise specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $V_{DS}$ = 20V, $I_D$ = 26A, Note 1 | 20 | 35 | | S |
| $R_{Gi}$ | Gate input resistance | | 1.56 | | Ω |
| $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = 25V, f = 1MHz | | 19 | | nF |
| $C_{oss}$ | | | 1180 | | pF |
| $C_{rss}$ | | | 24 | | pF |
| $t_{d(on)}$ | **Resistive Switching Times** | | 63 | | ns |
| $t_r$ | $V_{GS}$ = 10V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 26A | | 80 | | ns |
| $t_{d(off)}$ | $R_G$ = 1Ω (External) | | 95 | | ns |
| $t_f$ | | | 42 | | ns |
| $Q_{g(on)}$ | $V_{GS}$ = 10V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 26A | | 308 | | nC |
| $Q_{gs}$ | | | 117 | | nC |
| $Q_{gd}$ | | | 132 | | nC |
| $R_{thJC}$ | | | | 0.14 | °C/W |
| $R_{thCS}$ | | | 0.05 | | °C/W |

| Source-Drain Diode T$_J$ = 25°C unless otherwise specified) | | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $I_S$ | $V_{GS}$ = 0V | | | 56 | A |
| $I_{SM}$ | Repetitive, pulse width limited by $T_{JM}$ | | | 208 | A |
| $V_{SD}$ | $I_F$ = $I_S$, $V_{GS}$ = 0V, Note 1 | | | 1.5 | V |
| $t_{rr}$ | $I_F$ = 26A, -di/dt = 100A/μs | | | 300 | ns |
| $Q_{RM}$ | $V_R$ = 100V | | 1.8 | | μC |
| $I_{RM}$ | | | 26 | | A |

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

**SOT-227B Outline**




| SYM | INCHES MIN | INCHES MAX | MILLIMETERS MIN | MILLIMETERS MAX |
|---|---|---|---|---|
| A | 1.240 | 1.255 | 31.50 | 31.88 |
| B | .307 | .323 | 7.80 | 8.20 |
| C | .161 | .169 | 4.09 | 4.29 |
| D | .161 | .169 | 4.09 | 4.29 |
| E | .161 | .169 | 4.09 | 4.29 |
| F | .587 | .595 | 14.91 | 15.11 |
| G | 1.186 | 1.193 | 30.12 | 30.30 |
| H | 1.496 | 1.505 | 38.00 | 38.23 |
| J | .460 | .481 | 11.68 | 12.22 |
| K | .351 | .378 | 8.92 | 9.60 |
| L | .030 | .033 | 0.76 | 0.84 |
| M | .496 | .506 | 12.60 | 12.85 |
| N | .990 | 1.001 | 25.15 | 25.42 |
| O | .078 | .084 | 1.98 | 2.13 |
| P | .195 | .235 | 4.95 | 5.97 |
| Q | 1.045 | 1.059 | 26.54 | 26.90 |
| R | .155 | .174 | 3.94 | 4.42 |
| S | .186 | .191 | 4.72 | 4.85 |
| T | .968 | .987 | 24.59 | 25.07 |
| U | -.002 | .004 | -0.05 | 0.1 |

**PRELIMINARY TECHNICAL INFORMATION**

The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

**Fig. 1. Output Characteristics @ 25ºC**

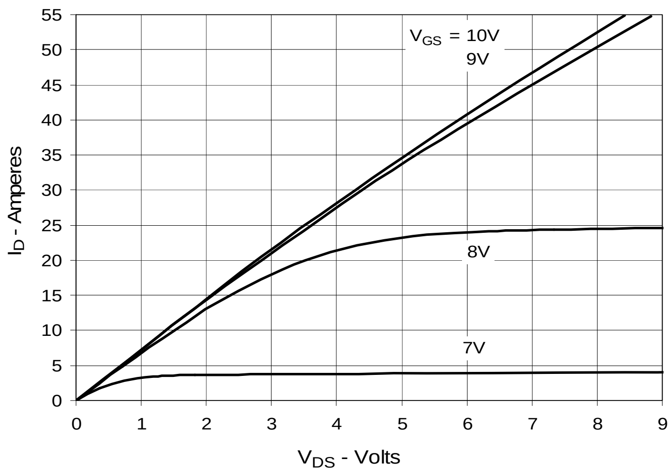



**Fig. 2. Extended Output Characteristics @ 25ºC**

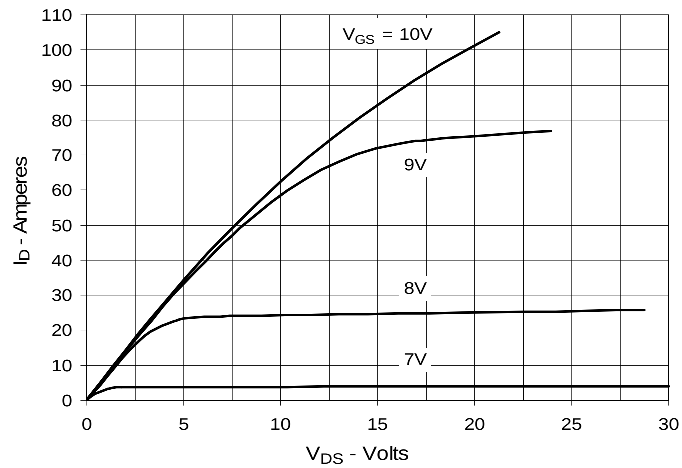



**Fig. 3. Output Characteristics @ 125ºC**

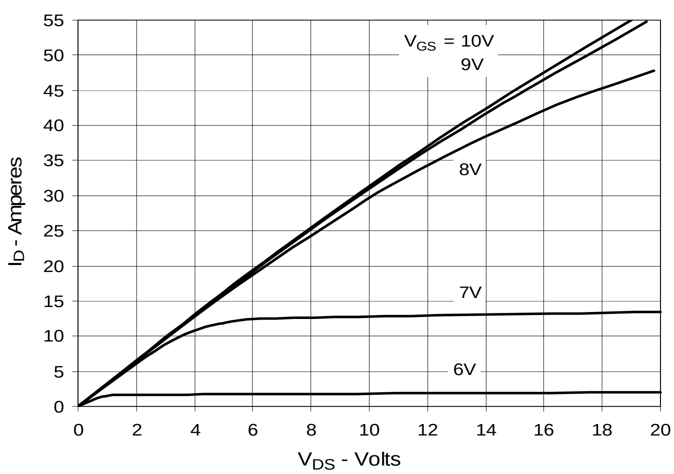



**Fig. 4. $R_{DS(on)}$ Normalized to $I_D$ = 26A Value vs. Junction Temperature**

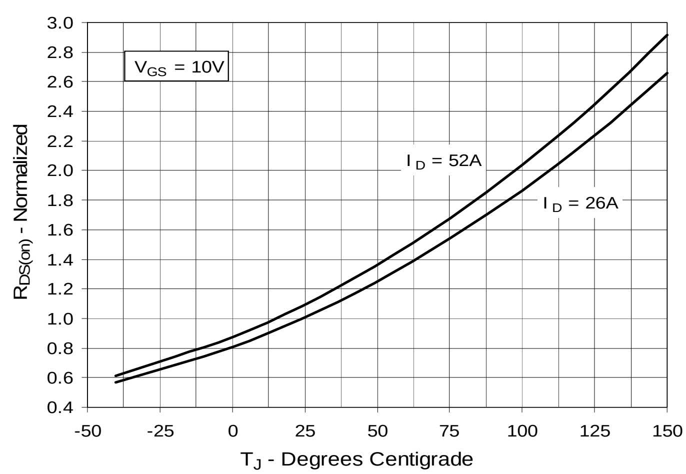



**Fig. 5. $R_{DS(on)}$ Normalized to $I_D$ = 26A Value vs. Drain Current**

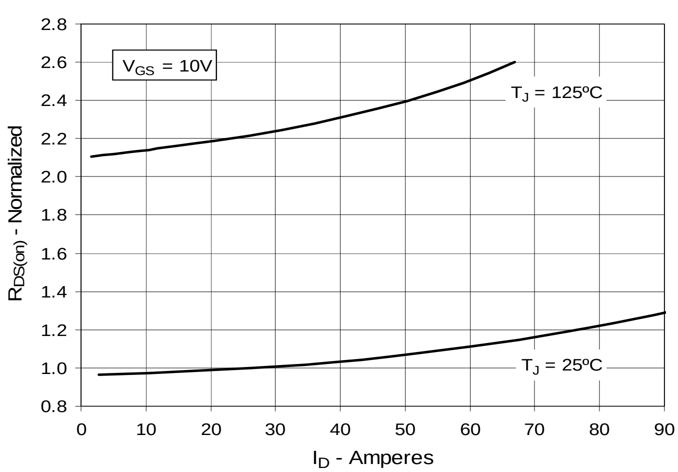



**Fig. 6. Maximum Drain Current vs. Case Temperature**

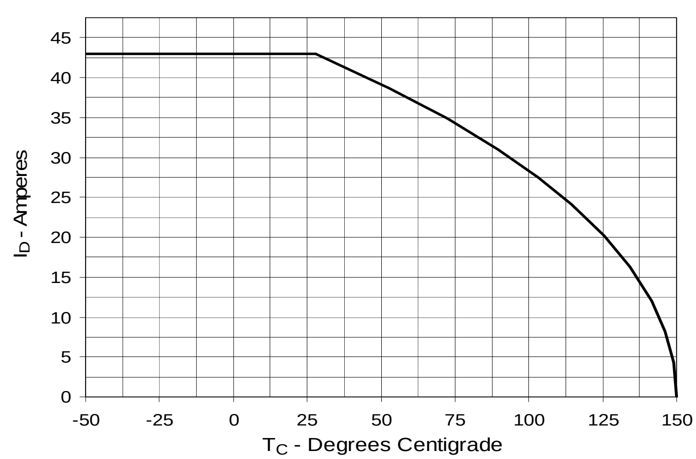


**Fig. 7. Input Admittance**

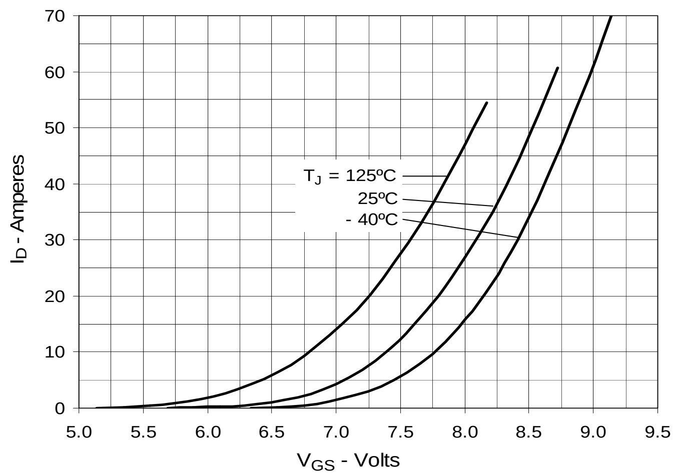



**Fig. 8. Transconductance**

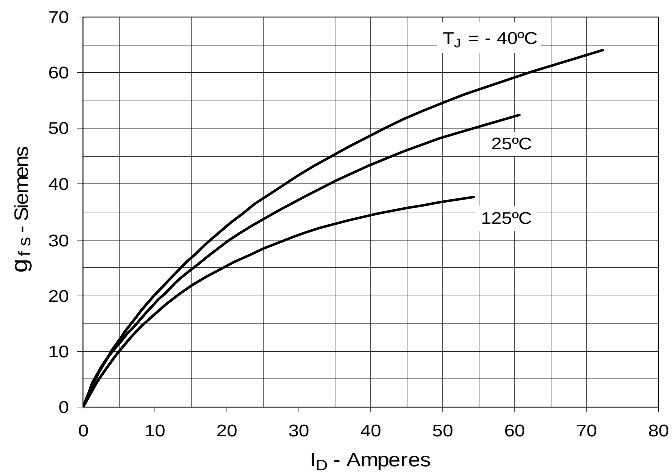



**Fig. 9. Forward Voltage Drop of Intrinsic Diode**

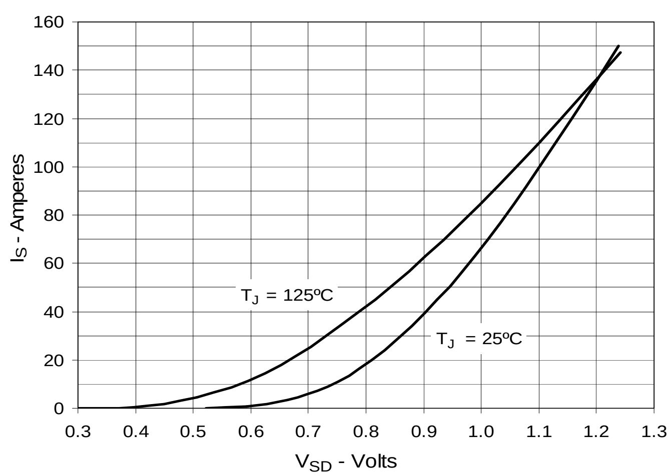



**Fig. 10. Gate Charge**

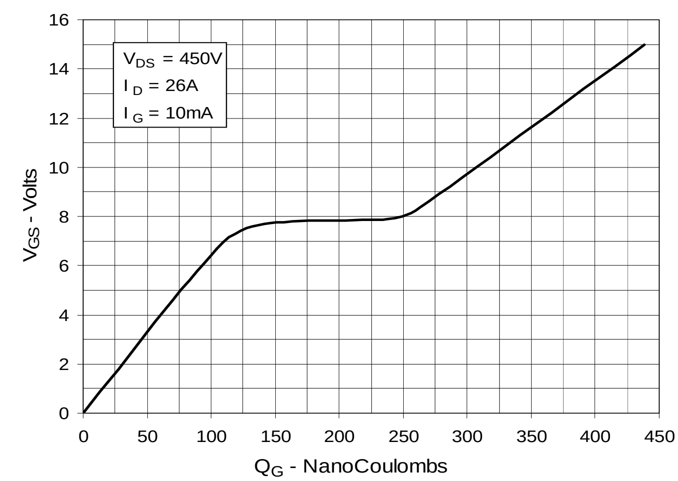



**Fig. 11. Capacitance**

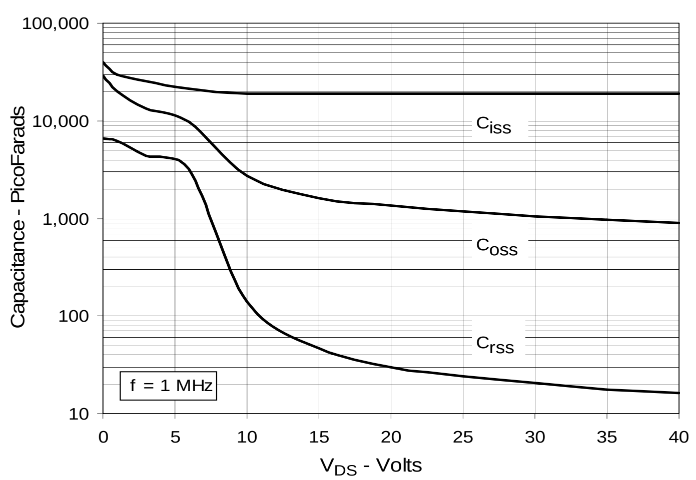
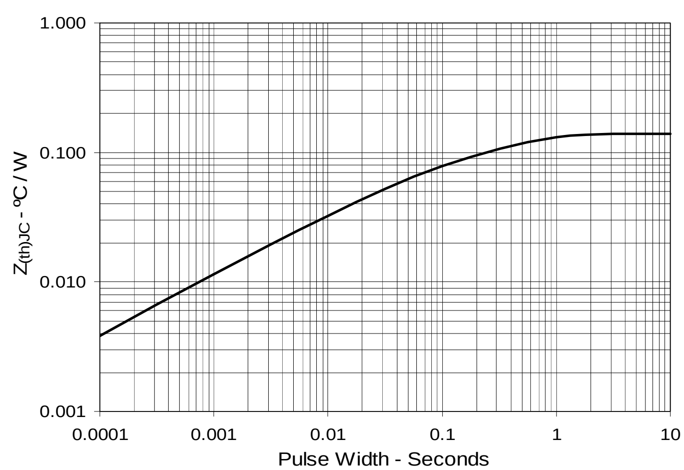



**Fig. 12. Maximum Transient Thermal Impedance**




IXYS reserves the right to change limits, test conditions, and dimensions.