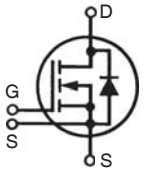
# IXYS

## Polar™ HiperFET™ Power MOSFET

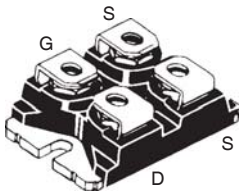
## IXFN44N80P

$V_{DSS}$ = 800V
$I_{D25}$ = 39A
$R_{DS(on)}$ ≤ 190mΩ
$t_{rr}$ ≤ 250ns




N-Channel Enhancement Mode
Fast Intrinsic Rectifier

**miniBLOC**
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 | 800 | V |
| $V_{DGR}$ | $T_J$ = 25°C to 150°C, $R_{GS}$ = 1MΩ | 800 | V |
| $V_{GSS}$ | Continuous | ±30 | V |
| $V_{GSM}$ | Transient | ±40 | V |
| $I_{D25}$ | $T_C$ = 25°C | 39 | A |
| $I_{DM}$ | $T_C$ = 25°C, Pulse Width Limited by $T_{JM}$ | 100 | A |
| $I_A$ | $T_C$ = 25°C | 22 | A |
| $E_{AS}$ | $T_C$ = 25°C | 3.4 | J |
| dv/dt | $I_S \le I_{DM}$, $V_{DD} \le V_{DSS}$, $T_J \le 150°C$ | 10 | V/ns |
| $P_D$ | $T_C$ = 25°C | 694 | W |
| $T_J$ | | -55 ... +150 | °C |
| $T_{JM}$ | | 150 | °C |
| $T_{stg}$ | | -55 ... +150 | °C |
| $V_{ISOL}$ | 50/60 Hz, RMS, t = 1minute | 2500 | V~ |
| | $I_{ISOL} \le$ 1mA, t = 1s | 3000 | V~ |
| $M_d$ | Mounting Torque for Base Plate | 1.5/13 | Nm/lb.in |
| | Terminal Connection Torque | 1.3/11.5 | Nm/lb.in |
| Weight | | 30 | g |

### Features

- International Standard Package
- Low Intrinsic Gate Resistance
- miniBLOC with Aluminum Nitride Isolation
- Low Package Inductance
- Fast Intrinsic Rectifier
- Low $R_{DS(on)}$ and $Q_G$

### Advantages

- High Power Density
- Easy to Mount
- Space Savings

### Applications

- DC-DC Converters
- Battery Chargers
- Switch-Mode and Resonant-Mode Power Supplies
- AC Motor Control
- High Speed Power Switching Appliccation

| Symbol | Test Conditions ($T_J$ = 25°C Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $BV_{DSS}$ | $V_{GS}$ = 0V, $I_D$ = 800μA | 800 | | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D$ = 8mA | 3.0 | | 5.0 | V |
| $I_{GSS}$ | $V_{GS}$ = ±30V, $V_{DS}$ = 0V | | | ±200 | nA |
| $I_{DSS}$ | $V_{DS} = V_{DSS}$, $V_{GS}$ = 0V | | | 50 | μA |
| | $T_J$ = 125°C | | | 1.5 | mA |
| $R_{DS(on)}$ | $V_{GS}$ = 10V, $I_D$ = 22A, Note 1 | | | 190 | mΩ |

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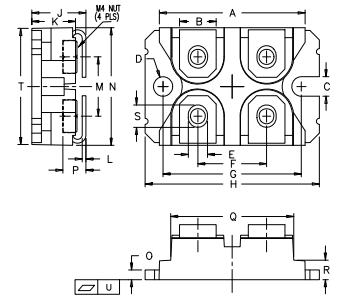
| Symbol | Test Conditions ($T_J$ = 25°C Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $V_{DS}$ = 20V, $I_D$ = 22A, Note 1 | 27 | 43 | | S |
| $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = 25V, f = 1MHz | | 18 | | nF |
| $C_{oss}$ | | | 910 | | pF |
| $C_{rss}$ | | | 30 | | pF |
| $t_{d(on)}$ | **Resistive Switching Times** | | 28 | | ns |
| $t_r$ | $V_{GS}$ = 10V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 22A | | 22 | | ns |
| $t_{d(off)}$ | $R_G$ = 1Ω (External) | | 75 | | ns |
| $t_f$ | | | 27 | | ns |
| $Q_{g(on)}$ | $V_{GS}$ = 10V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 22A | | 200 | | nC |
| $Q_{gs}$ | | | 67 | | nC |
| $Q_{gd}$ | | | 65 | | nC |
| $R_{thJC}$ | | | | 0.18 | °C/W |
| $R_{thCS}$ | | | 0.05 | | °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 | | | 44 | A |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$ | | | 100 | A |
| $V_{SD}$ | $I_F$ = $I_S$, $V_{GS}$ = 0V, Note 1 | | | 1.5 | V |
| $t_{rr}$ | $I_F$ = 22A, -di/dt = 100A/μs | | | 250 | ns |
| $Q_{RM}$ | $V_R$ = 100V, $V_{GS}$ = 0V | | 0.8 | | μC |
| $I_{RM}$ | | | 8.0 | | A |

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

**SOT-227B (IXFN) Outline**




(M4 screws (4x) supplied)

| 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 |

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

IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents: 4,835,592 4,860,072 4,881,106 4,931,844 5,017,508 5,034,796 5,049,961 5,063,307 5,187,117 5,237,481 5,381,025 5,486,715 6,162,665 6,259,123 B1 6,306,728 B1 6,404,065 B1 6,534,343 6,583,505 6,683,344 6,710,405 B2 6,710,463 6,727,585 6,759,692 6,771,478 B2 7,005,734 B2 7,063,975 B2 7,071,537 7,157,338B2

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

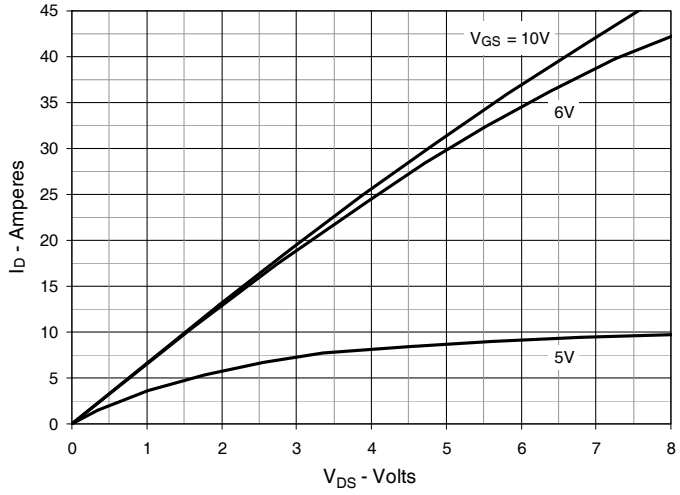



**Fig. 2. Extended Output Characteristics @ $T_J = 25^oC$**

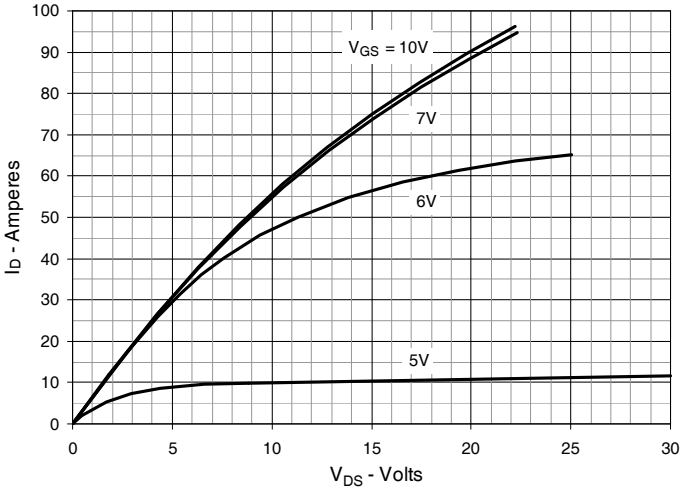



**Fig. 3. Output Characteristics @ $T_J = 125^oC$**

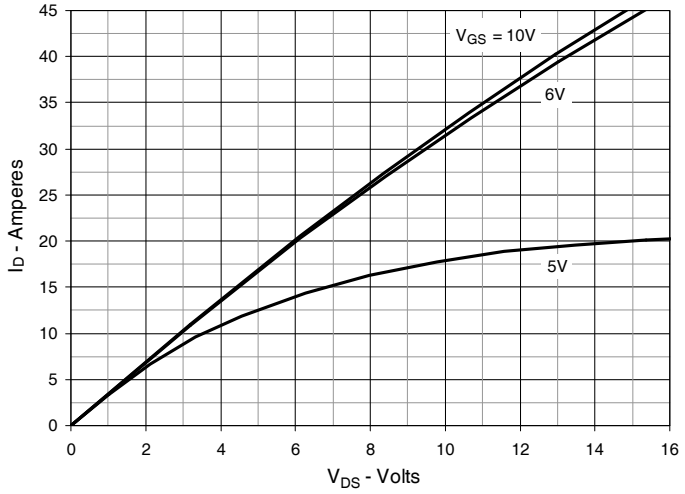



**Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 22A$ Value vs. Junction Temperature**

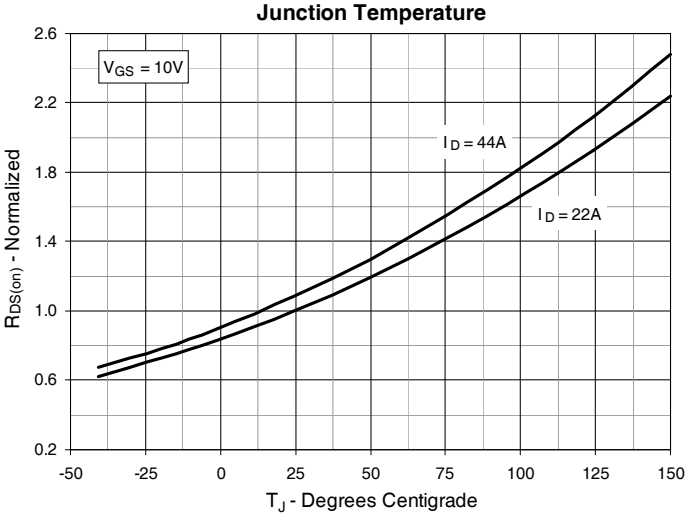



**Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 22A$ Value vs. Drain Current**

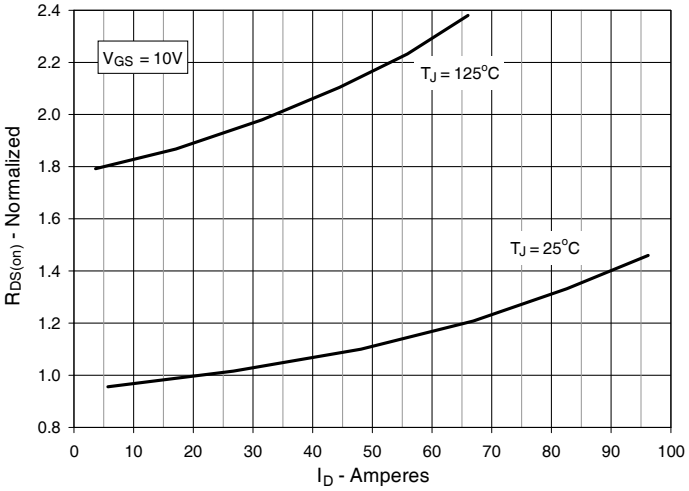



**Fig. 6. Maximum Drain Current vs. Case Temperature**

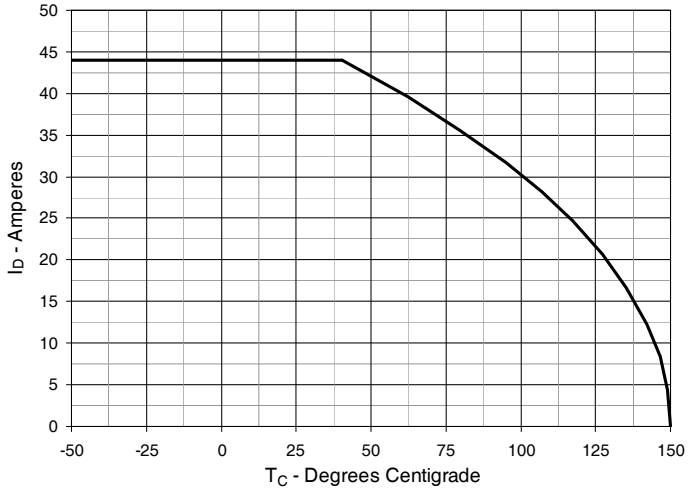



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**Fig. 7. Input Admittance**

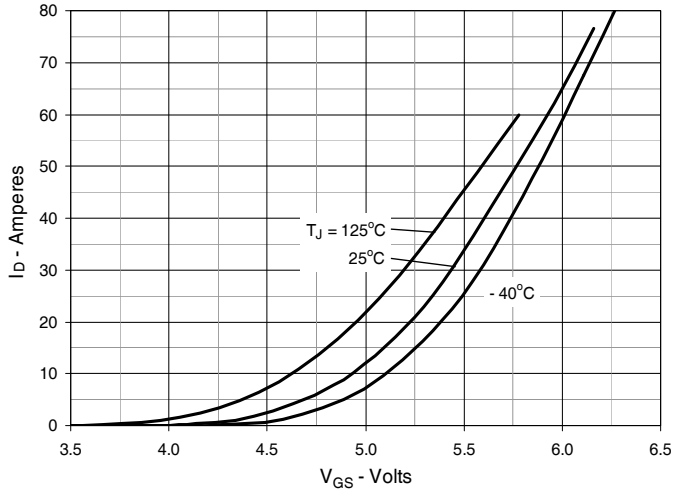



**Fig. 8. Transconductance**

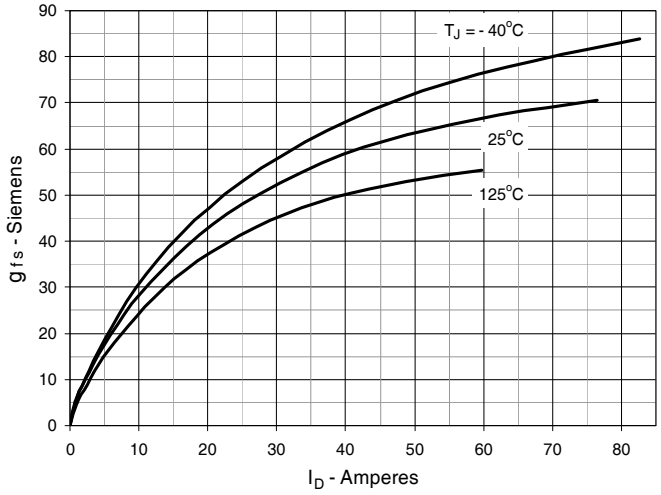



**Fig. 9. Forward Voltage Drop of Intrinsic Diode**

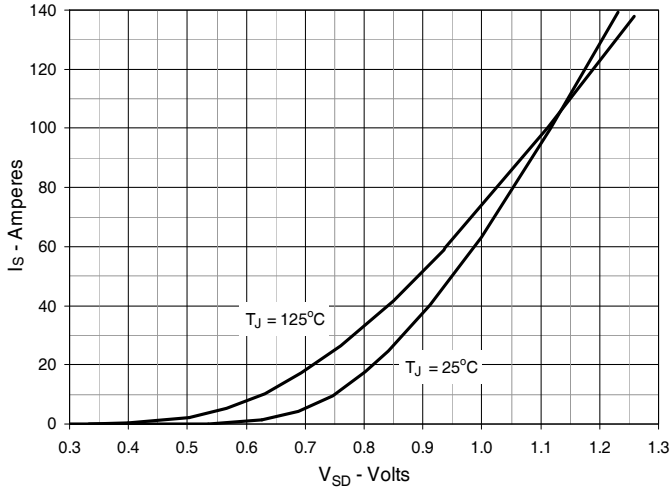



**Fig. 10. Gate Charge**

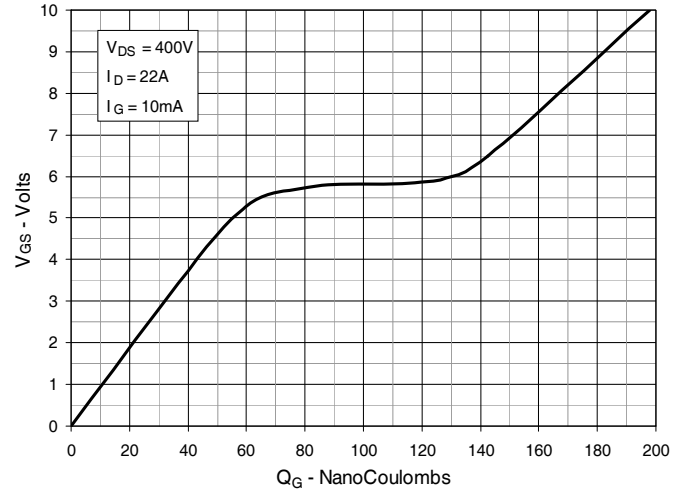



**Fig. 11. Capacitance**

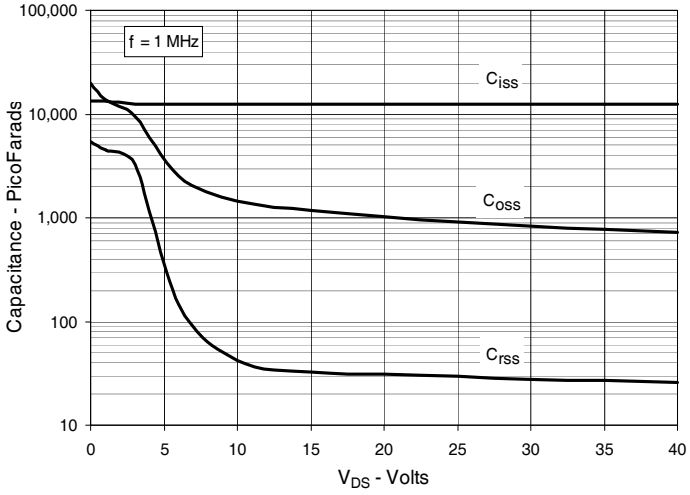
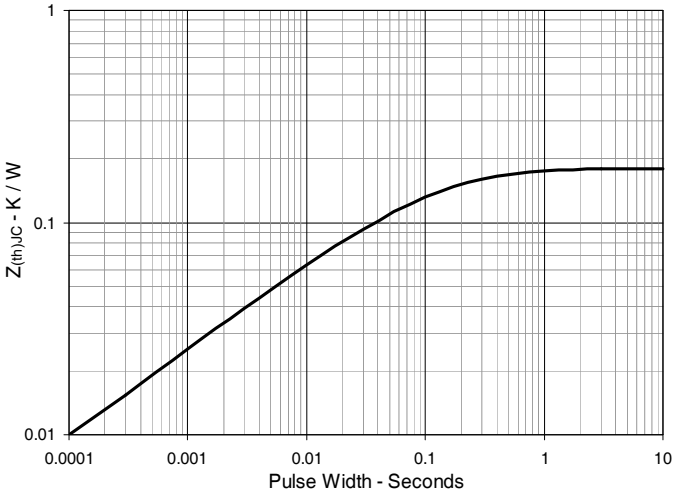



**Fig. 12. Maximum Transient Thermal Impedance**

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