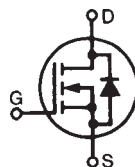


# Polar™ Power MOSFET

## HiPerFET™

# IXFB52N90P

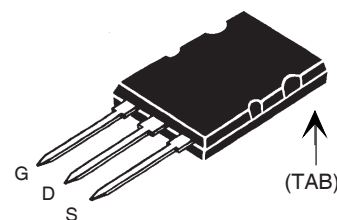
N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode



$$\begin{aligned} V_{DSS} &= 900V \\ I_{D25} &= 52A \\ R_{DS(on)} &\leq 160m\Omega \\ t_{rr} &\leq 300ns \end{aligned}$$

| Symbol     | Test Conditions                                                    | Maximum Ratings |            |
|------------|--------------------------------------------------------------------|-----------------|------------|
| $V_{DSS}$  | $T_J = 25^\circ C$ to $150^\circ C$                                | 900             | V          |
| $V_{DGR}$  | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1M\Omega$          | 900             | V          |
| $V_{GSS}$  | Continuous                                                         | $\pm 30$        | V          |
| $V_{GSM}$  | Transient                                                          | $\pm 40$        | V          |
| $I_{D25}$  | $T_C = 25^\circ C$                                                 | 52              | A          |
| $I_{DM}$   | $T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$               | 104             | A          |
| $I_A$      | $T_C = 25^\circ C$                                                 | 26              | A          |
| $E_{AS}$   | $T_C = 25^\circ C$                                                 | 2               | J          |
| $dV/dt$    | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ C$ | 20              | V/ns       |
| $P_D$      | $T_C = 25^\circ C$                                                 | 1250            | W          |
| $T_J$      |                                                                    | -55 ... +150    | $^\circ C$ |
| $T_{JM}$   |                                                                    | 150             | $^\circ C$ |
| $T_{stg}$  |                                                                    | -55 ... +150    | $^\circ C$ |
| $T_L$      | 1.6mm (0.062 in.) from Case for 10s                                | 300             | $^\circ C$ |
| $T_{SOLD}$ | Plastic Body for 10s                                               | 260             | $^\circ C$ |
| $F_C$      | Mounting Force                                                     | 30..120/6.7..27 | N/lb.      |
| Weight     |                                                                    | 10              | g          |

PLUS264™



G = Gate      D = Drain  
S = Source      TAB = Drain

## Features

- Fast Intrinsic Diode
- Avalanche Rated
- Low Package Inductance

## Advantages

- Plus 264™ Package for Clip or Spring Mounting
- Space Savings
- High Power Density

## Applications

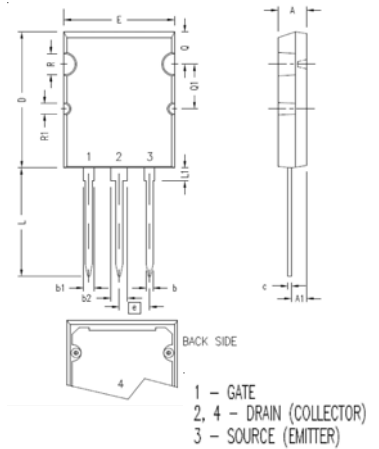
- Switched-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- Laser Drivers
- AC and DC Motor drives
- Robotics and Servo Controls

| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ , 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              |
| $I_{GSS}$    | $V_{GS} = \pm 30V$ , $V_{DS} = 0V$                                    |                       |      | $\pm 200$ nA       |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 125^\circ C$             |                       |      | 50 $\mu A$<br>4 mA |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                   |                       |      | 160 m $\Omega$     |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)                                                                    | Characteristic Values |      |                         |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-------------------------|
|              |                                                                                                                                              | Min.                  | Typ. | Max.                    |
| $g_{fs}$     | $V_{DS} = 20\text{V}, I_D = 0.5 \cdot I_{D25}$ , Note 1                                                                                      | 20                    | 35   | S                       |
| $R_{Gi}$     | Gate Input Resistance                                                                                                                        |                       | 1.56 | $\Omega$                |
| $C_{iss}$    | $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$                                                                                   |                       | 19   | nF                      |
| $C_{oss}$    |                                                                                                                                              |                       | 1180 | pF                      |
| $C_{rss}$    |                                                                                                                                              |                       | 24   | pF                      |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$<br>$R_G = 1\Omega$ (External) |                       | 63   | ns                      |
| $t_r$        |                                                                                                                                              |                       | 80   | ns                      |
| $t_{d(off)}$ |                                                                                                                                              |                       | 95   | ns                      |
| $t_f$        |                                                                                                                                              |                       | 42   | ns                      |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$                                                                   |                       | 308  | nC                      |
| $Q_{gs}$     |                                                                                                                                              |                       | 117  | nC                      |
| $Q_{gd}$     |                                                                                                                                              |                       | 132  | nC                      |
| $R_{thJC}$   |                                                                                                                                              |                       |      | 0.10 $^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                              |                       | 0.13 | $^\circ\text{C/W}$      |

| Source-Drain Diode                                   |                                                                             | Characteristic Values |      |               |
|------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------|------|---------------|
| $T_J = 25^\circ\text{C}$ Unless Otherwise Specified) |                                                                             | Min.                  | Typ. | Max.          |
| $I_S$                                                | $V_{GS} = 0\text{V}$                                                        |                       |      | 52 A          |
| $I_{SM}$                                             | Repetitive, Pulse Width Limited by $T_{JM}$                                 |                       |      | 208 A         |
| $V_{SD}$                                             | $I_F = I_S, V_{GS} = 0\text{V}$ , Note 1                                    |                       |      | 1.5 V         |
| $t_{rr}$                                             | $I_F = 26\text{A}, -di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ |                       |      | 300 ns        |
| $Q_{RM}$                                             |                                                                             |                       | 1.8  | $\mu\text{C}$ |
| $I_{RM}$                                             |                                                                             |                       | 26   | A             |

## PLUS264™ (IXFB) Outline



| SYM | INCHES   |       | MILLIMETERS |       |
|-----|----------|-------|-------------|-------|
|     | MIN      | MAX   | MIN         | MAX   |
| A   | .185     | .209  | 4.70        | 5.31  |
| A1  | .102     | .118  | 2.59        | 3.00  |
| b   | .037     | .055  | 0.94        | 1.40  |
| b1  | .087     | .102  | 2.21        | 2.59  |
| b2  | .110     | .126  | 2.79        | 3.20  |
| c   | .017     | .029  | 0.43        | 0.74  |
| D   | 1.007    | 1.047 | 25.58       | 26.59 |
| E   | .760     | .799  | 19.30       | 20.29 |
| e   | .215 BSC |       | 5.46 BSC    |       |
| L   | .779     | .842  | 19.79       | 21.39 |
| L1  | .087     | .102  | 2.21        | 2.59  |
| Q   | .240     | .256  | 6.10        | 6.50  |
| Q1  | .330     | .346  | 8.38        | 8.79  |
| ØR  | .155     | .187  | 3.94        | 4.75  |
| ØR1 | .085     | .093  | 2.16        | 2.36  |

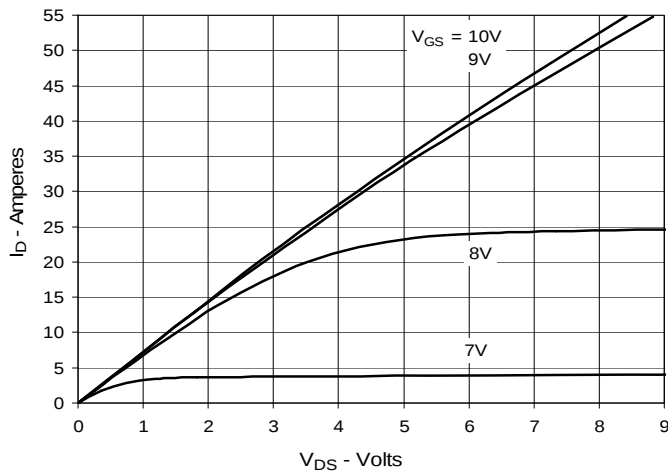
Note 1: Pulse Test,  $t \leq 300\mu\text{s}$ ; Duty Cycle,  $d \leq 2\%$ .

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

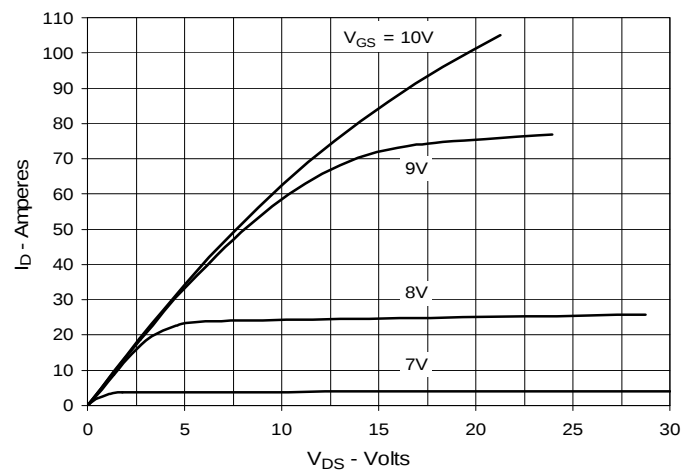
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

|           |           |           |           |              |              |              |              |              |             |
|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 4,835,592 | 4,931,844 | 5,049,961 | 5,237,481 | 6,162,665    | 6,404,065 B1 | 6,683,344    | 6,727,585    | 7,005,734 B2 | 7,157,338B2 |
| 4,850,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123 B1 | 6,534,343    | 6,710,405 B2 | 6,759,692    | 7,063,975 B2 |             |
| 4,881,106 | 5,034,796 | 5,187,117 | 5,486,715 | 6,306,728 B1 | 6,583,505    | 6,710,463    | 6,771,478 B2 | 7,071,537    |             |

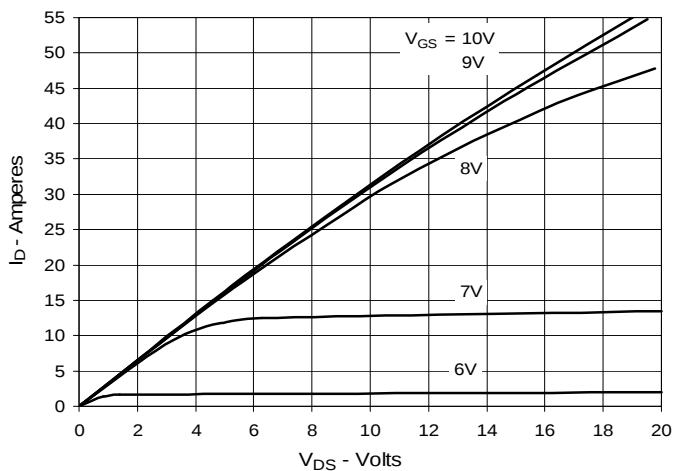
**Fig. 1. Output Characteristics  
@ 25°C**



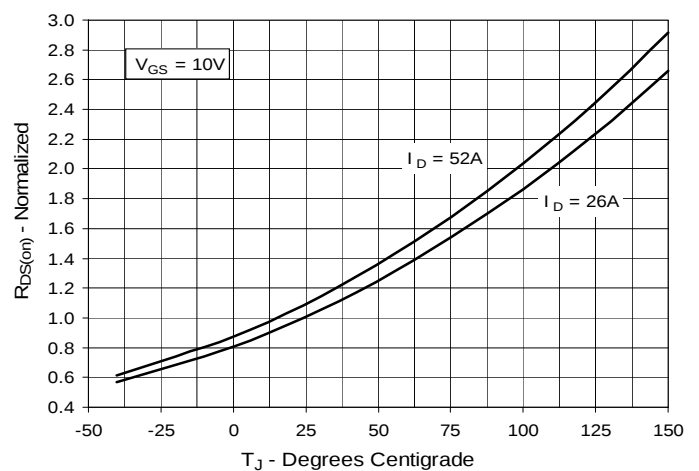
**Fig. 2. Extended Output Characteristics  
@ 25°C**



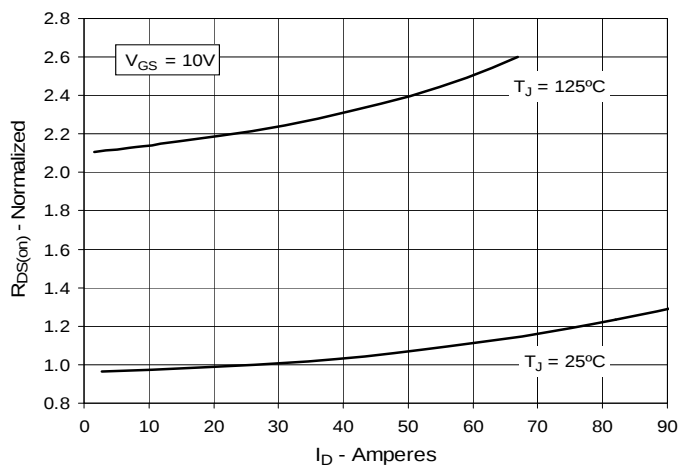
**Fig. 3. Output Characteristics  
@ 125°C**



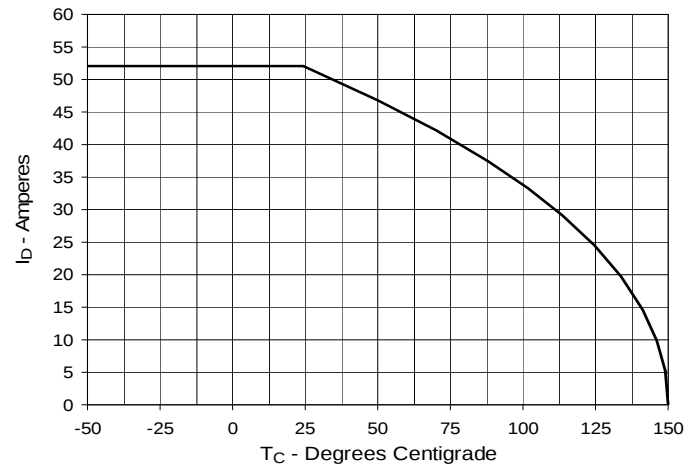
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 26A$  Value  
vs. Junction Temperature**

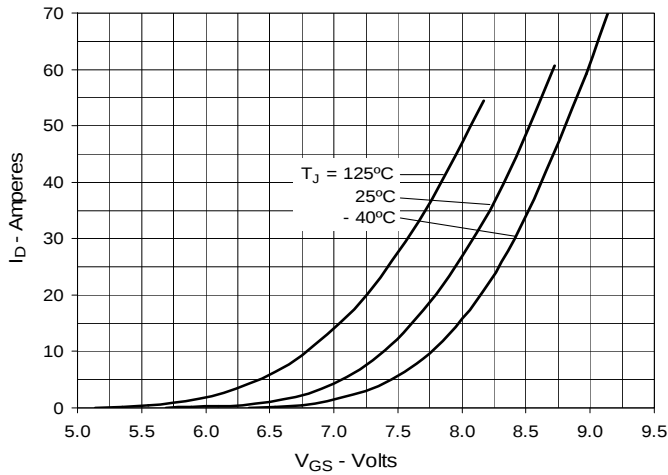
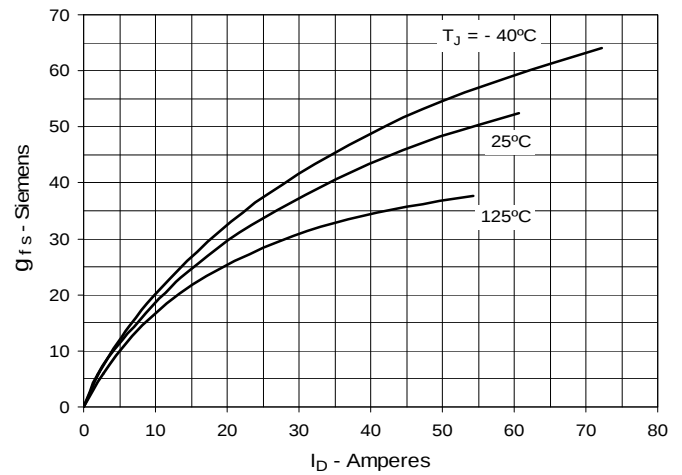
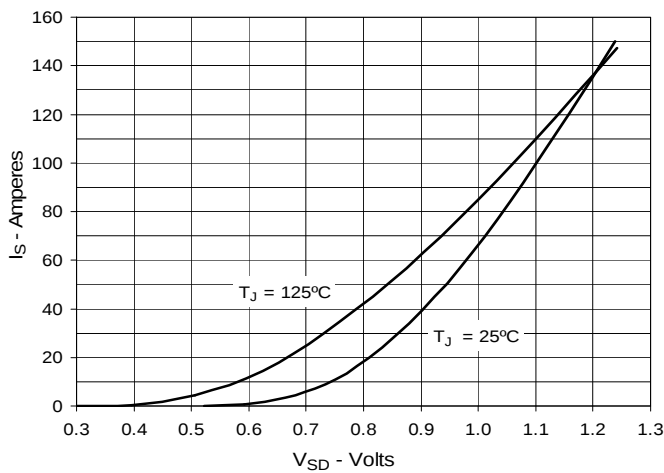
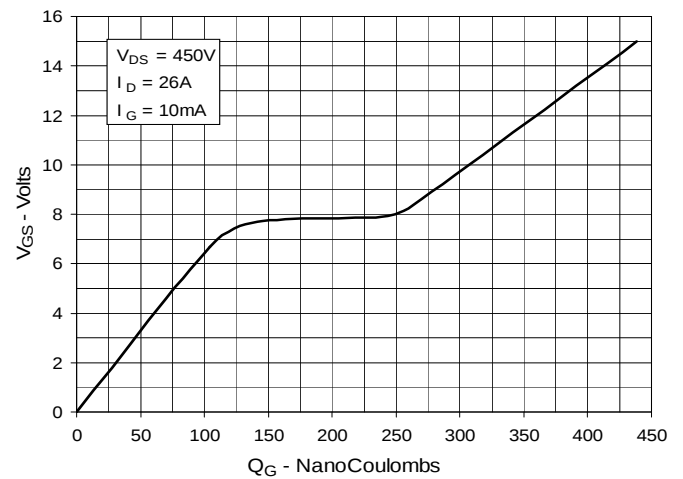
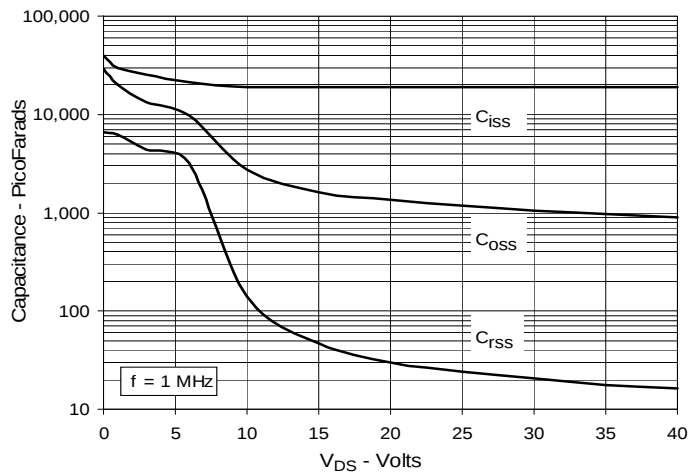


**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 26A$  Value  
vs. Drain Current**



**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**
