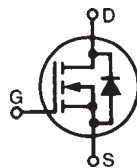


## Polar™ Power MOSFET HiPerFET™

## IXFR64N50P

(Electrically Isolated Back Surface)

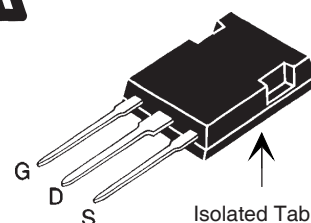
N-Channel Enhancement Mode  
Avalanche Rated



$$\begin{aligned} V_{DSS} &= 500V \\ I_{D25} &= 37A \\ R_{DS(on)} &\leq 95m\Omega \\ t_{rr} &\leq 200ns \end{aligned}$$

| Symbol     | Test Conditions                                                    | Maximum Ratings                  |            |
|------------|--------------------------------------------------------------------|----------------------------------|------------|
| $V_{DSS}$  | $T_J = 25^\circ C$ to $150^\circ C$                                | 500                              | V          |
| $V_{DGR}$  | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1M\Omega$          | 500                              | V          |
| $V_{GSS}$  | Continuous                                                         | $\pm 30$                         | V          |
| $V_{GSM}$  | Transient                                                          | $\pm 40$                         | V          |
| $I_{D25}$  | $T_C = 25^\circ C$                                                 | 37                               | A          |
| $I_{DM}$   | $T_C = 25^\circ C$ , pulse width limited by $T_{JM}$               | 150                              | A          |
| $I_A$      | $T_C = 25^\circ C$                                                 | 64                               | A          |
| $E_{AS}$   | $T_C = 25^\circ C$                                                 | 2.5                              | J          |
| $dV/dt$    | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ C$ | 20                               | V/ns       |
| $P_D$      | $T_C = 25^\circ C$                                                 | 300                              | 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                              | $^\circ C$ |
| $V_{ISOL}$ | 50/60 Hz, RMS<br>$I_{ISOL} \leq 1mA$                               | $t = 1min$ 2500<br>$t = 1s$ 3000 | V~<br>V~   |
| $M_d$      | Mounting Force                                                     | 20..120 / 4.5..27                | N/lb.      |
| Weight     |                                                                    | 5                                | g          |

ISOPLUS247  
E153432



G = Gate      D = Drain  
S = Source

### Features

- International Standard Package
- Fast Intrinsic Rectifier
- Avalanche Rated
- Low  $R_{DS(ON)}$  and  $Q_G$
- Low Package Inductance

### Advantages

- High Power Density
- Easy to Mount
- Space Savings

### 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.               |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu A$                                      | 500                   |      | V                  |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 8mA$                                       | 3.0                   |      | 5.5 V              |
| $I_{GSS}$    | $V_{GS} = \pm 30V$ , $V_{DS} = 0V$                                    |                       |      | $\pm 200$ nA       |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 125^\circ C$             |                       |      | 25 $\mu A$<br>1 mA |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 32A$ , Note 1                                 |                       |      | 95 m $\Omega$      |

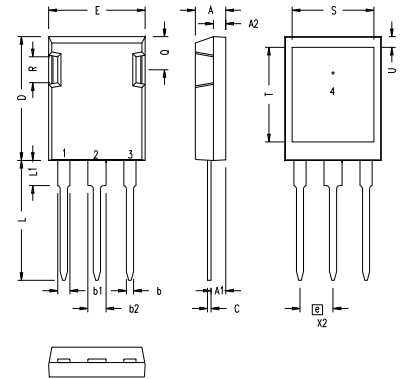
| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                                                                 | Characteristic Values |      |                        |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|------------------------|
|              |                                                                                                                                             | Min.                  | Typ. | Max.                   |
| $g_{fs}$     | $V_{DS} = 20\text{V}$ , $I_D = 32\text{A}$ , Note 1                                                                                         | 30                    | 50   | S                      |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                            |                       | 9700 | nF                     |
| $C_{oss}$    |                                                                                                                                             |                       | 970  | pF                     |
| $C_{rss}$    |                                                                                                                                             |                       | 30   | pF                     |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 32\text{A}$<br>$R_G = 2\Omega$ (External) |                       | 30   | ns                     |
| $t_r$        |                                                                                                                                             |                       | 25   | ns                     |
| $t_{d(off)}$ |                                                                                                                                             |                       | 85   | ns                     |
| $t_f$        |                                                                                                                                             |                       | 22   | ns                     |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 32\text{A}$                                                                   |                       | 150  | nC                     |
| $Q_{gs}$     |                                                                                                                                             |                       | 50   | nC                     |
| $Q_{gd}$     |                                                                                                                                             |                       | 50   | nC                     |
| $R_{thJC}$   |                                                                                                                                             | 0.15                  |      | $0.42^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                             |                       |      | $^\circ\text{C/W}$     |

## Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                           | Characteristic Values |      |               |
|----------|-------------------------------------------------------------------------------------------------------|-----------------------|------|---------------|
|          |                                                                                                       | Min.                  | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{V}$                                                                                  |                       |      | 64 A          |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$                                                           |                       |      | 250 A         |
| $V_{SD}$ | $I_F = 64\text{A}$ , $V_{GS} = 0\text{V}$ , Note 1                                                    |                       |      | 1.5 V         |
| $t_{rr}$ | $I_F = 25\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ , $V_{GS} = 0\text{V}$ |                       | 0.6  | 200 ns        |
| $Q_{RM}$ |                                                                                                       |                       |      | $\mu\text{C}$ |
| $I_{RM}$ |                                                                                                       |                       |      | A             |

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

## ISOPLUS247 (IXFR) Outline



| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .190     | .205 | 4.83        | 5.21  |
| A1  | .090     | .100 | 2.29        | 2.54  |
| A2  | .075     | .085 | 1.91        | 2.16  |
| b   | .045     | .055 | 1.14        | 1.40  |
| b1  | .075     | .084 | 1.91        | 2.13  |
| b2  | .115     | .123 | 2.92        | 3.12  |
| C   | .024     | .031 | 0.61        | 0.80  |
| D   | .819     | .840 | 20.80       | 21.34 |
| E   | .620     | .635 | 15.75       | 16.13 |
| e   | .215 BSC |      | 5.45 BSC    |       |
| L   | .780     | .800 | 19.81       | 20.32 |
| L1  | .150     | .170 | 3.81        | 4.32  |
| Q   | .220     | .244 | 5.59        | 6.20  |
| R   | .170     | .190 | 4.32        | 4.83  |
| S   | .520     | .540 | 13.21       | 13.72 |
| T   | .620     | .640 | 15.75       | 16.26 |
| U   | .065     | .080 | 1.65        | 2.03  |

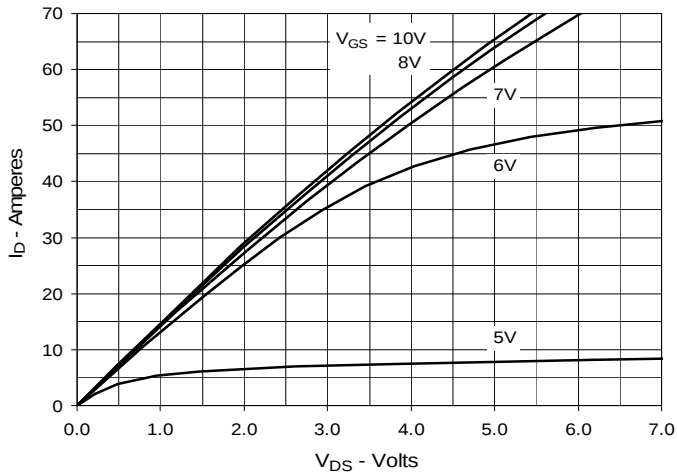
- 1 - GATE
- 2 - DRAIN (COLLECTOR)
- 3 - SOURCE (EMITTER)
- 4 - NO CONNECTION

NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-247AD except screw hole.

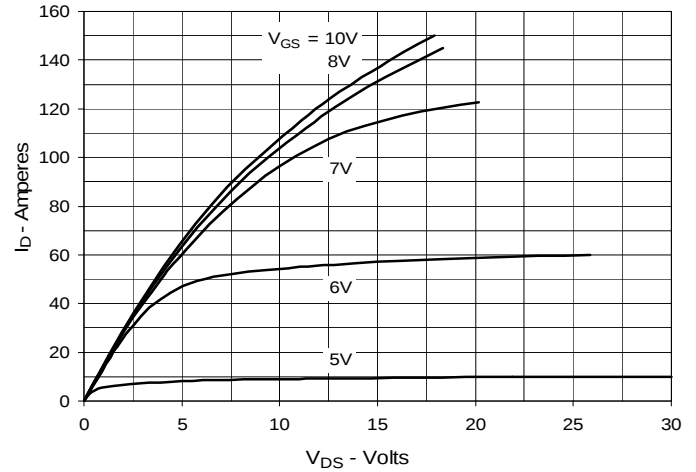
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

|                                                                                  |           |           |           |           |              |              |              |              |              |             |
|----------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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    |             |

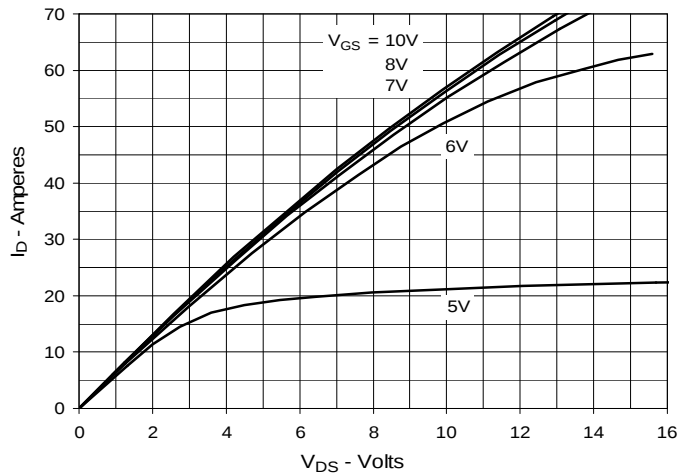
**Fig. 1. Output Characteristics  
@ 25°C**



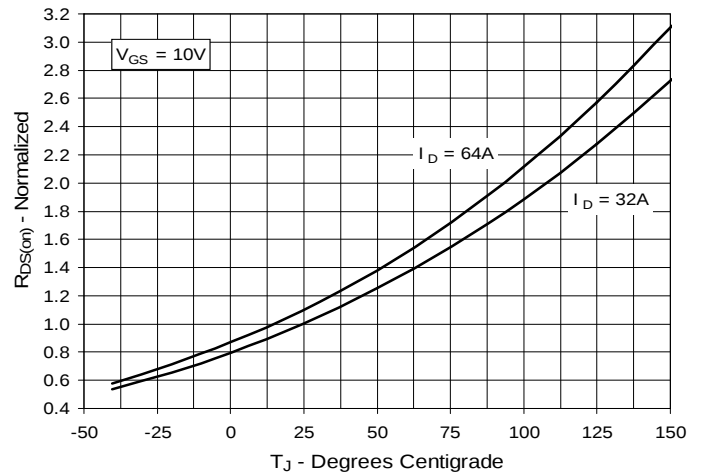
**Fig. 2. Extended Output Characteristics  
@ 25°C**



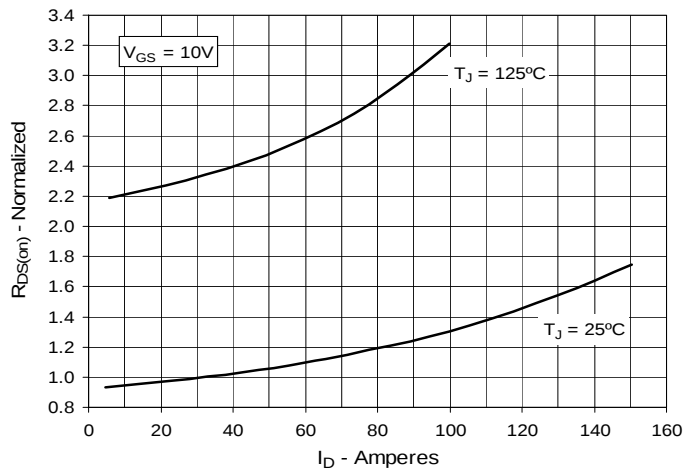
**Fig. 3. Output Characteristics  
@ 125°C**



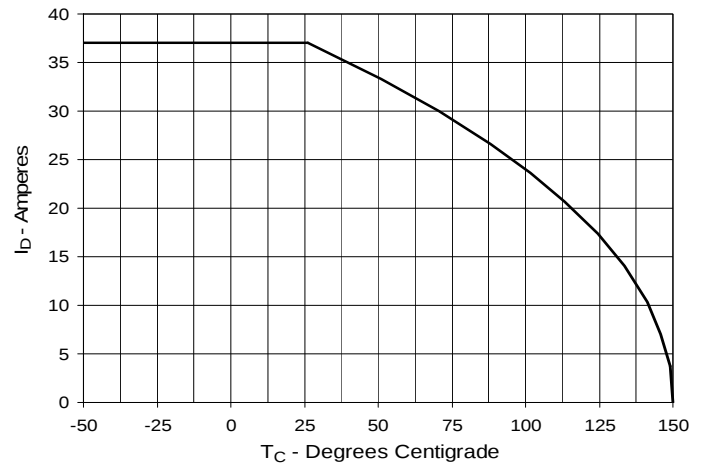
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 32A$  Value  
vs. Junction Temperature**

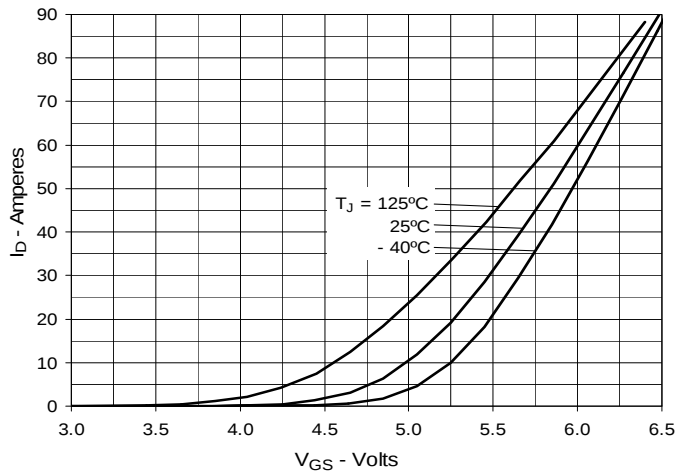
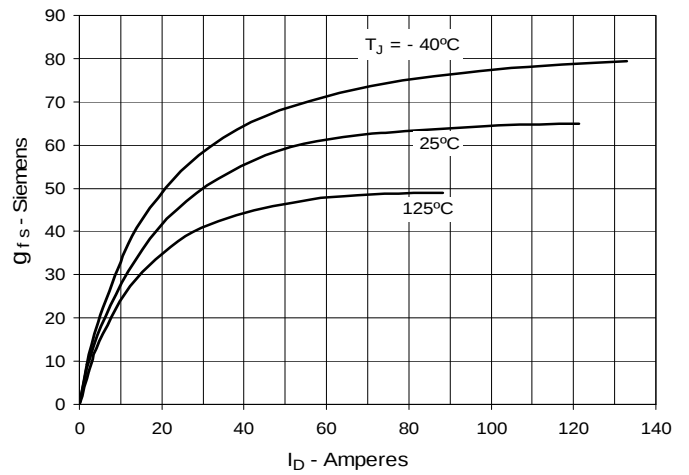
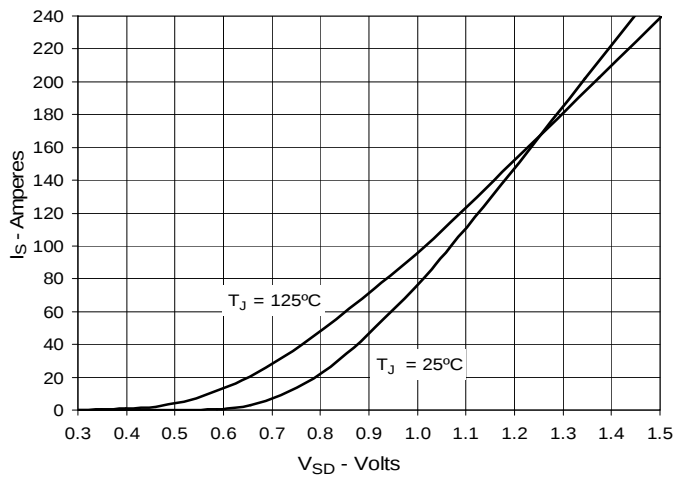
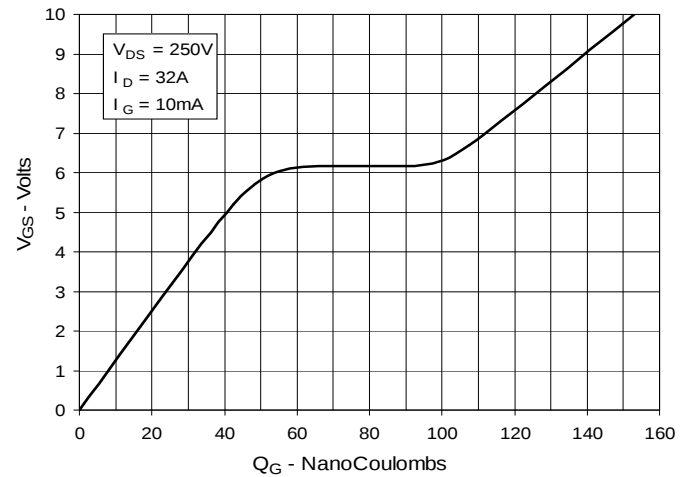
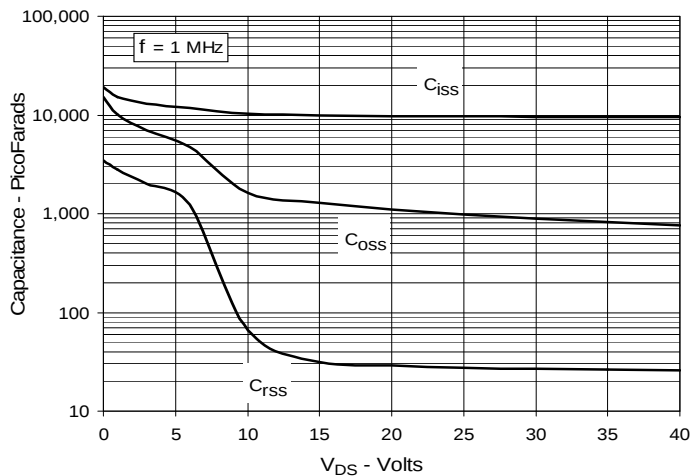
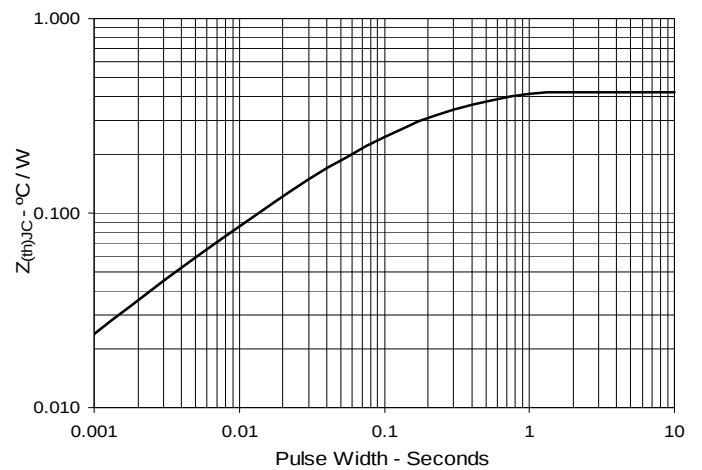


**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 32A$  Value  
vs. Drain Current**



**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**




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