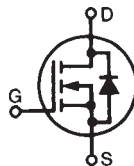


## Polar™ Power MOSFET HiPerFET™

N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode

## IXFR20N100P

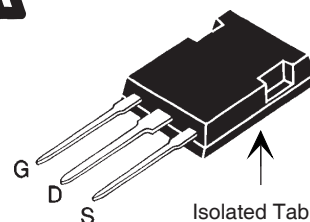


$$\begin{aligned} V_{DSS} &= 1000V \\ I_{D25} &= 11A \\ R_{DS(on)} &\leq 640m\Omega \\ t_{rr} &\leq 300ns \end{aligned}$$

| Symbol     | Test Conditions                                                          | Maximum Ratings |                  |
|------------|--------------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                          | 1000            | V                |
| $V_{DGR}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ , $R_{GS} = 1M\Omega$    | 1000            | V                |
| $V_{GSS}$  | Continuous                                                               | $\pm 30$        | V                |
| $V_{GSM}$  | Transient                                                                | $\pm 40$        | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                 | 11              | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$               | 50              | A                |
| $I_{AR}$   | $T_C = 25^\circ\text{C}$                                                 | 10              | A                |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                                 | 500             | mJ               |
| $dV/dt$    | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$ | 15              | V/ns             |
| $P_D$      | $T_C = 25^\circ\text{C}$                                                 | 230             | W                |
| $T_J$      |                                                                          | -55 ... +150    | $^\circ\text{C}$ |
| $T_{JM}$   |                                                                          | 150             | $^\circ\text{C}$ |
| $T_{stg}$  |                                                                          | -55 ... +150    | $^\circ\text{C}$ |
| $T_L$      | Maximum lead temperature for soldering                                   | 300             | $^\circ\text{C}$ |
| $T_{SOLD}$ | Plastic body for 10s                                                     | 260             | $^\circ\text{C}$ |
| $V_{ISOL}$ | 50/60 Hz, RMS, 1 minute                                                  | 2500            | V~               |
| $F_C$      | Mounting force                                                           | 20..120/4.5..27 | N/lb.            |
| Weight     |                                                                          | 5               | g                |

### ISOPLUS247 (IXFR)

E153432



G = Gate      D = Drain  
S = Source

### Features

- Silicon chip on Direct-Copper-Bond substrate
  - High power dissipation
  - Isolated mounting surface
  - 2500V electrical isolation
- Low drain to tab capacitance(<30pF)
- Rugged polysilicon gate cell structure
- Unclamped Inductive Switching (UIS) rated
- Fast intrinsic Rectifier

### Applications

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

### Advantages

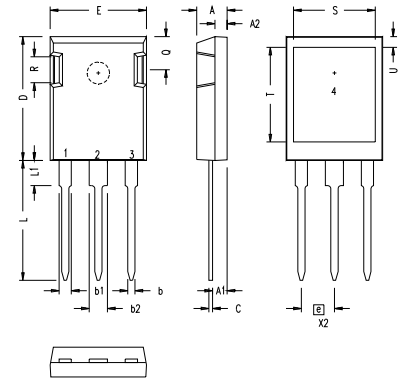
- Easy assembly
- Space savings
- High power density

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) | Characteristic Values |      |                      |
|--------------|-----------------------------------------------------------------------------|-----------------------|------|----------------------|
|              |                                                                             | Min.                  | Typ. | Max.                 |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 1mA$                                                 | 1000                  |      | 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         |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0V$ $T_J = 125^\circ\text{C}$               |                       |      | 25 $\mu A$<br>1.5 mA |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 10A$ , Note 1                                       | 470                   | 640  | m $\Omega$           |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified)                                                             | Characteristic Values |      |                        |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|------------------------|
|              |                                                                                                                                       | Min.                  | Typ. | Max.                   |
| $g_{fs}$     | $V_{DS} = 20\text{V}, I_D = 10\text{A}$ , Note 1                                                                                      | 8                     | 14   | S                      |
| $C_{iss}$    | $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$                                                                            |                       | 7300 | pF                     |
| $C_{oss}$    |                                                                                                                                       |                       | 456  | pF                     |
| $C_{rss}$    |                                                                                                                                       |                       | 55   | pF                     |
| $R_{Gi}$     | Gate input resistance                                                                                                                 |                       | 1.20 | $\Omega$               |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 10\text{A}$<br>$R_G = 2\Omega$ (External) |                       | 40   | ns                     |
| $t_r$        |                                                                                                                                       |                       | 37   | ns                     |
| $t_{d(off)}$ |                                                                                                                                       |                       | 56   | ns                     |
| $t_f$        |                                                                                                                                       |                       | 45   | ns                     |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 10\text{A}$                                                                   |                       | 126  | nC                     |
| $Q_{gs}$     |                                                                                                                                       |                       | 50   | nC                     |
| $Q_{gd}$     |                                                                                                                                       |                       | 55   | nC                     |
| $R_{thJC}$   | (TO-247)                                                                                                                              |                       | 0.15 | $0.54^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                       |                       |      | $^\circ\text{C/W}$     |

| Source-Drain Diode                                   |                                                                                                 | Characteristic Values |      |               |
|------------------------------------------------------|-------------------------------------------------------------------------------------------------|-----------------------|------|---------------|
| $T_J = 25^\circ\text{C}$ unless otherwise specified) |                                                                                                 | Min.                  | Typ. | Max.          |
| $I_S$                                                | $V_{GS} = 0\text{V}$                                                                            |                       |      | 20 A          |
| $I_{SM}$                                             | Repetitive, pulse width limited by $T_{JM}$                                                     |                       |      | 80 A          |
| $V_{SD}$                                             | $I_F = I_S, V_{GS} = 0\text{V}$ , Note 1                                                        |                       |      | 1.5 V         |
| $t_{rr}$                                             | $I_F = 10\text{A}, -di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}, V_{GS} = 0\text{V}$ |                       | 0.9  | 300 ns        |
| $Q_{RM}$                                             |                                                                                                 |                       |      | $\mu\text{C}$ |
| $I_{RM}$                                             |                                                                                                 |                       |      | A             |

## 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

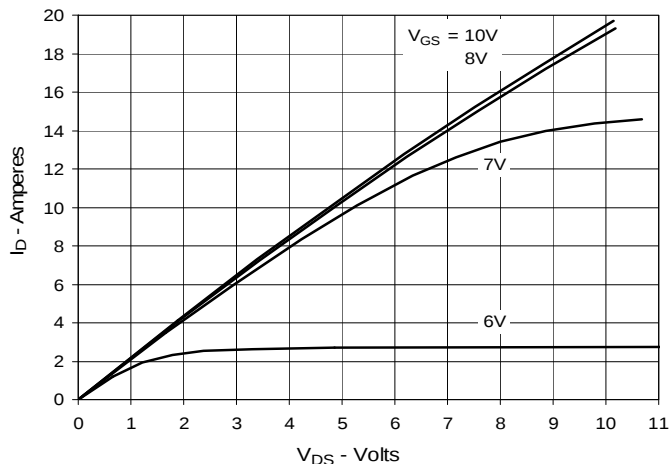
NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-247AD except screw hole.

Note 1: Pulse test,  $t \leq 300\mu\text{s}$ ; duty cycle,  $d \leq 2\%$ .

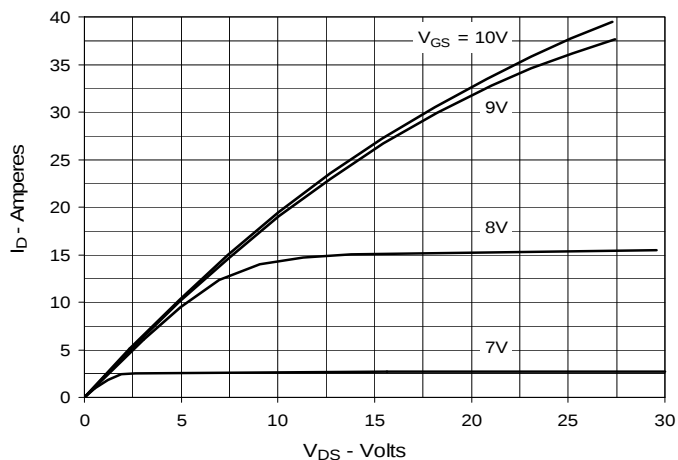
IXYS reserves the right to change limits, test conditions, and dimensions.

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

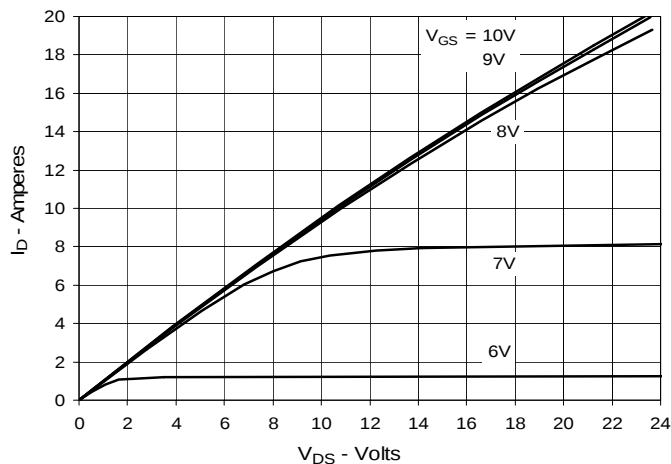
**Fig. 1. Output Characteristics  
@ 25°C**



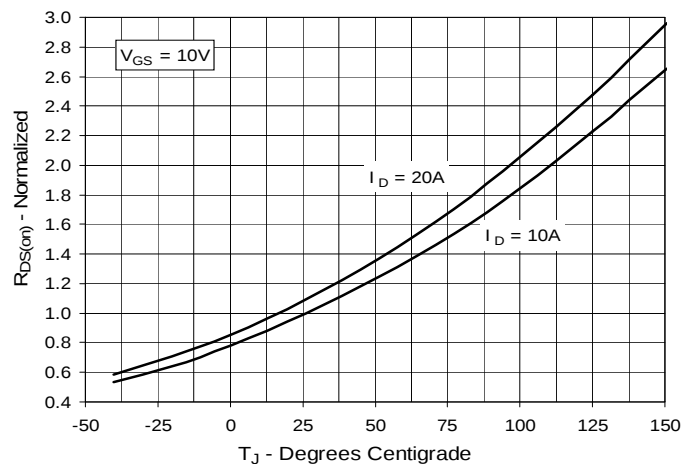
**Fig. 2. Extended Output Characteristics  
@ 25°C**



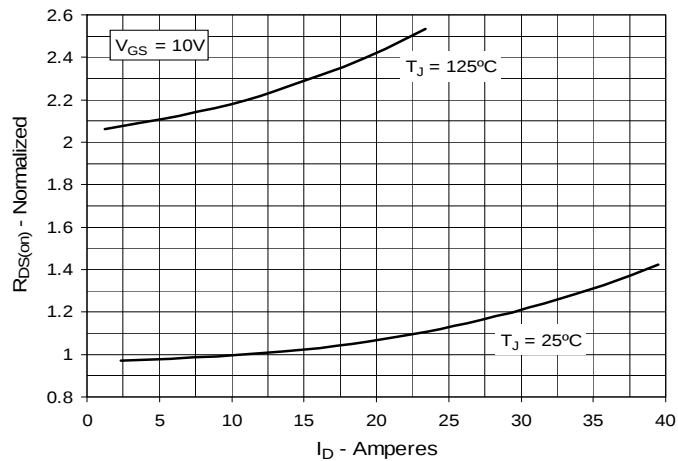
**Fig. 3. Output Characteristics  
@ 125°C**



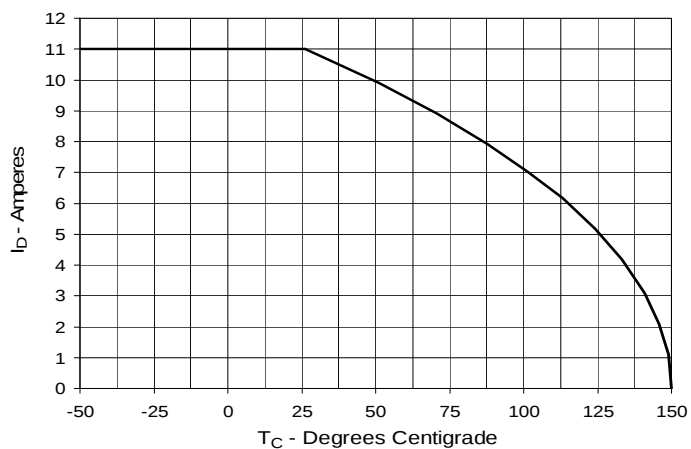
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 10A$  Value  
vs. Junction Temperature**

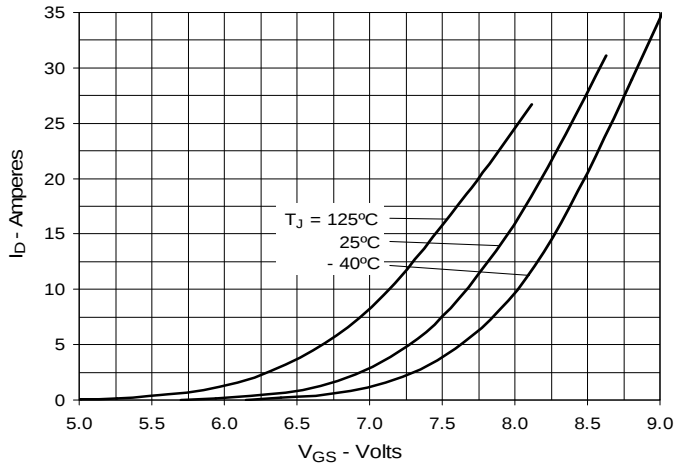
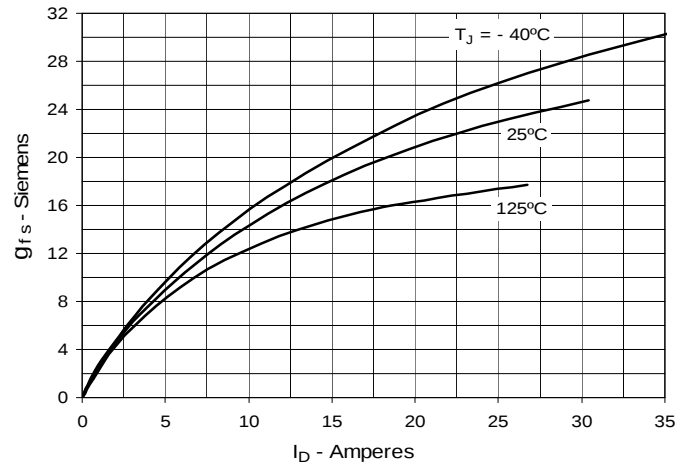
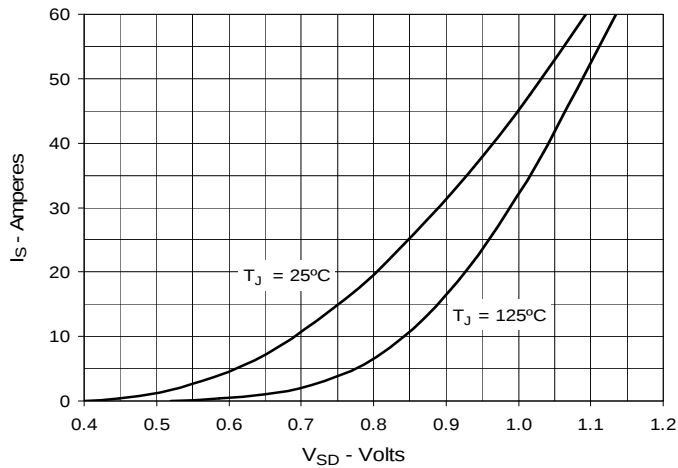
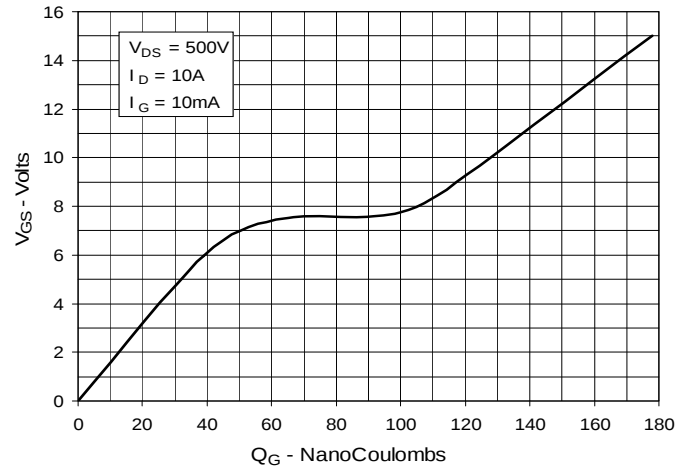
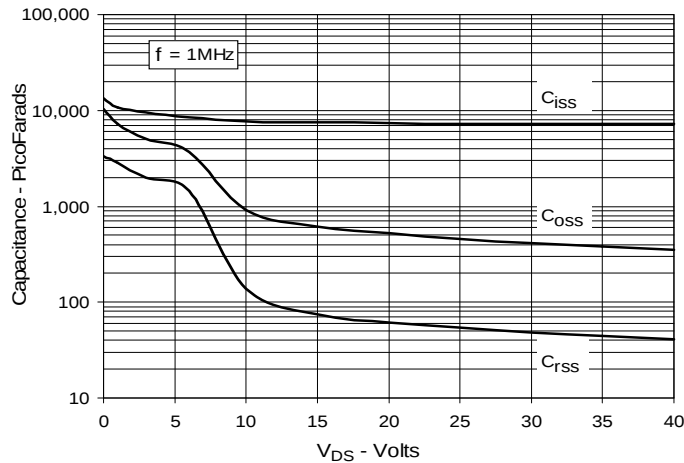
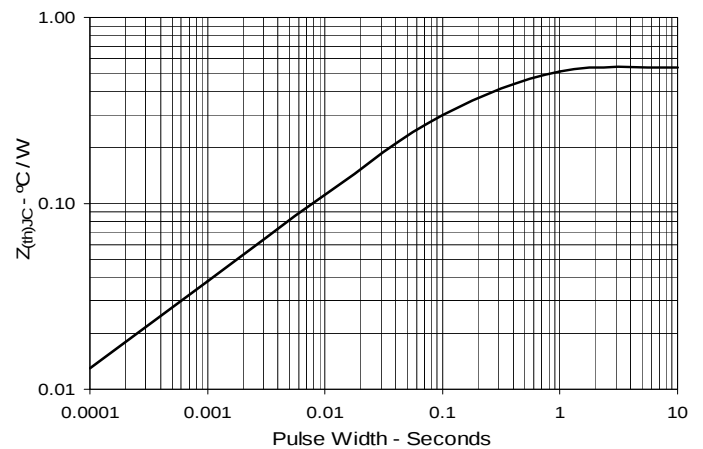


**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 10A$  Value  
vs. Drain Current**



**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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