

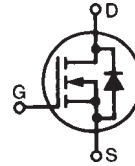
# PolarHV™ HiPerFET IXFR 44N50P

## Power MOSFET

### ISOPLUS247™

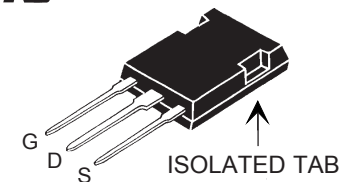
(Electrically Isolated Back Surface)

N-Channel Enhancement  
 Avalanche Rated  
 Fast Intrinsic Diode



$V_{DSS} = 500 \text{ V}$   
 $I_{D25} = 24 \text{ A}$   
 $R_{DS(on)} \leq 150 \text{ m}\Omega$   
 $t_{rr} \leq 200 \text{ ns}$

ISOPLUS247 (IXFR)  
 E153432



G = Gate  
 S = Source  
 D = Drain

| Symbol        | Test Conditions  | Maximum Ratings   |                  |
|---------------|--|-------------------|------------------|
| $V_{DSS}$     | $T_J = 25^\circ\text{C}$ to $175^\circ\text{C}$  | 500               | V                |
| $V_{DGR}$     | $T_J = 25^\circ\text{C}$ to $175^\circ\text{C}$ ; $R_{GS} = 1 \text{ M}\Omega$   | 500               | V                |
| $V_{GSM}$     | Transient  | $\pm 40$          | V                |
| $V_{GSM}$     | Continuous   | $\pm 30$          | V                |
| $I_{D25}$     | $T_C = 25^\circ\text{C}$   | 24                | A                |
| $I_{DM}$      | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$   | 132               | A                |
| $I_{AR}$      | $T_C = 25^\circ\text{C}$   | 44                | A                |
| $E_{AR}$      | $T_C = 25^\circ\text{C}$   | 55                | mJ               |
| $E_{AS}$      | $T_C = 25^\circ\text{C}$   | 1.7               | J                |
| $dv/dt$       | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 10 \Omega$ | 10                | V/ns             |
| $P_D$         | $T_C = 25^\circ\text{C}$   | 208               | W                |
| $T_J$         |  | -55 ... +150      | $^\circ\text{C}$ |
| $T_{JM}$      |  | 150               | $^\circ\text{C}$ |
| $T_{stg}$     |  | -55 ... +150      | $^\circ\text{C}$ |
| $T_L$         | 1.6 mm (0.062 in.) from case for 10 s  | 300               | $^\circ\text{C}$ |
| $V_{ISOL}$    | 50/60 Hz, RMS, 1 minute  | 2500              | V~               |
| $F_c$         | Mounting Force   | 20..120 / 4.5..25 | N/lb             |
| <b>Weight</b> |  | 5                 | g                |

#### Features

- † International standard isolated package
- † UL recognized package
- † Silicon chip on Direct-Copper-Bond substrate
  - High power dissipation
  - Isolated mounting surface
  - 2500V electrical isolation
- † Unclamped Inductive Switching (UIS) rated
- † Low package inductance
  - easy to drive and to protect
- † Fast intrinsic diode

#### Advantages

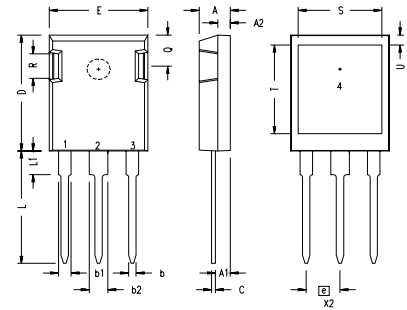
- † Easy to mount
- † Space savings
- † High power density

| Symbol       | Test Conditions                                  | Characteristic Values |      |                                       |
|--------------|--|-----------------------|------|---------------------------------------|
|              |  | Min.                  | Typ. | Max.                                  |
| $BV_{DSS}$   | $V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$ | 500                   |      | V                                     |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 4 \text{ mA}$         | 2.5                   |      | 5.0 V                                 |
| $I_{GSS}$    | $V_{GS} = \pm 30 \text{ V}_{DC}$ , $V_{DS} = 0$  |                       |      | $\pm 100 \text{ nA}$                  |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0 \text{ V}$     |                       |      | 25 $\mu\text{A}$<br>500 $\mu\text{A}$ |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 22 \text{ A}$   |                       |      | 150 $\text{m}\Omega$                  |

| Symbol       | Test Conditions   | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                         |
|--------------|---|---|------|-------------------------|
|              |   | Min.  | Typ. | Max.                    |
| $g_{fs}$     | $V_{DS} = 20\text{ V}$ ; $I_D = 22\text{ A}$ , Note 1   |   | 32   | S                       |
| $C_{iss}$    | $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                                   |   | 5440 | pF                      |
| $C_{oss}$    |   |   | 639  | pF                      |
| $C_{rss}$    |   |   | 40   | pF                      |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.5 V_{DSS}$ , $I_D = 22\text{ A}$<br>$R_G = 3\ \Omega$ (External) |   | 25   | ns                      |
| $t_r$        |   |   | 27   | ns                      |
| $t_{d(off)}$ |   |   | 70   | ns                      |
| $t_f$        |   |   | 18   | ns                      |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.5 V_{DSS}$ , $I_D = 22\text{ A}$                                 |   | 98   | nC                      |
| $Q_{gs}$     |   |   | 35   | nC                      |
| $Q_{gd}$     |   |   | 30   | nC                      |
| $R_{thJC}$   |   |   |      | $0.6\ ^\circ\text{C/W}$ |
| $R_{thCS}$   |   | 0.15  |      | $^\circ\text{C/W}$      |

| Symbol   | Test Conditions                              | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |               |
|----------|--|---|------|---------------|
|          |  | Min.  | Typ. | Max.          |
| $I_s$    | $V_{GS} = 0\text{ V}$                        |   |      | 30 A          |
| $I_{SM}$ | Repetitive                                   |   |      | 132 A         |
| $V_{SD}$ | $I_F = I_s$ , $V_{GS} = 0\text{ V}$ , Note 1 |   |      | 1.5 V         |
| $t_{rr}$ | $I_F = 22\text{ A}$ ,                        |   |      | 200 ns        |
| $Q_{RM}$ | $-di/dt = 100\text{ A}/\mu\text{s}$          |   | 0.6  | $\mu\text{C}$ |
| $I_{RM}$ | $V_R = 100\text{ V}$                         |   | 6.0  | A             |

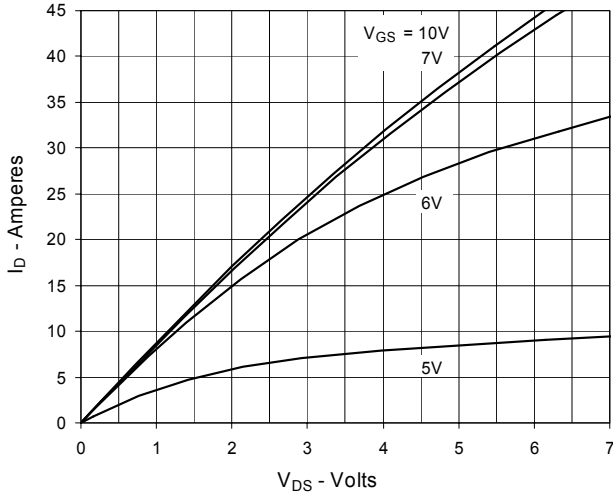
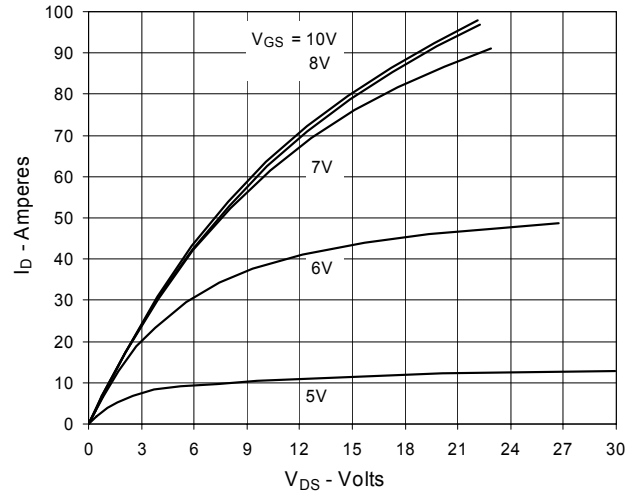
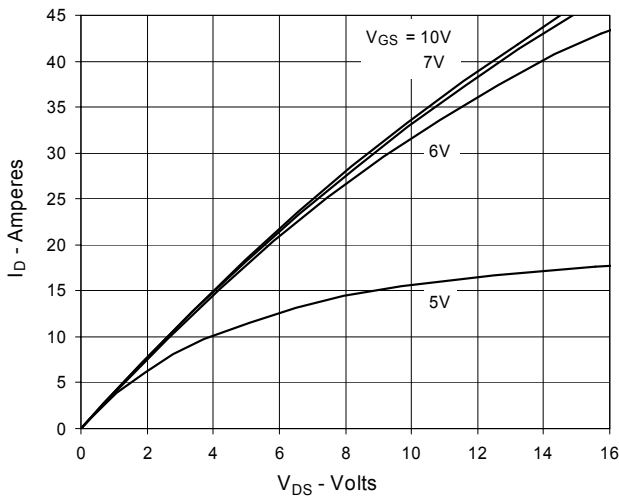
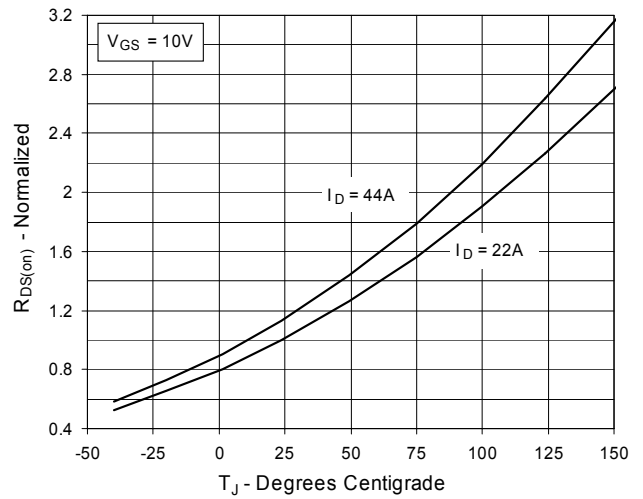
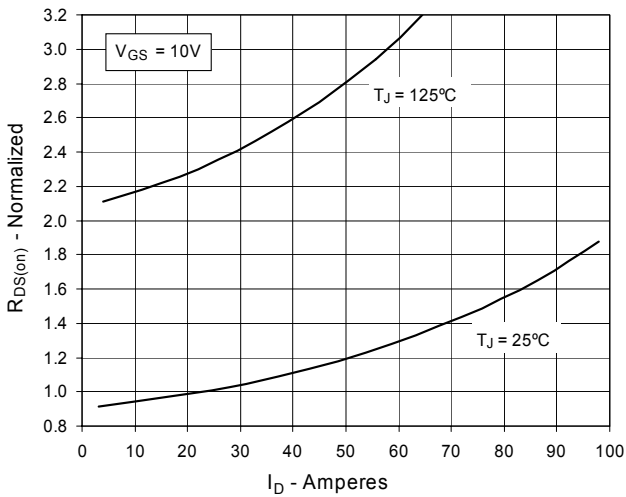
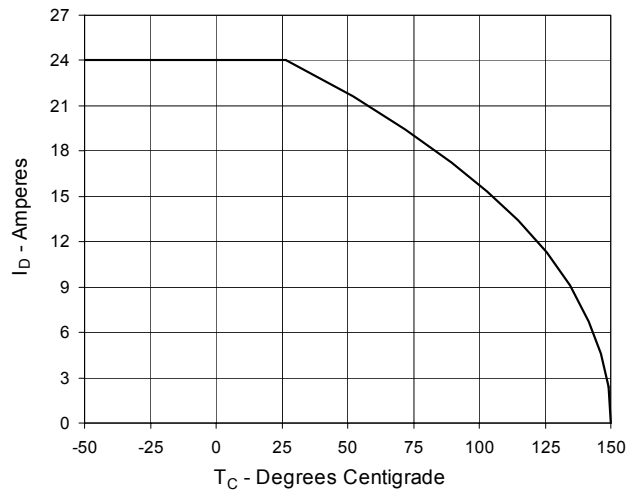
Notes: 1. Pulse test,  $t \leq 300\text{ ms}$ , duty cycle  $d \leq 2\%$

**ISOPLUS247 Outline**


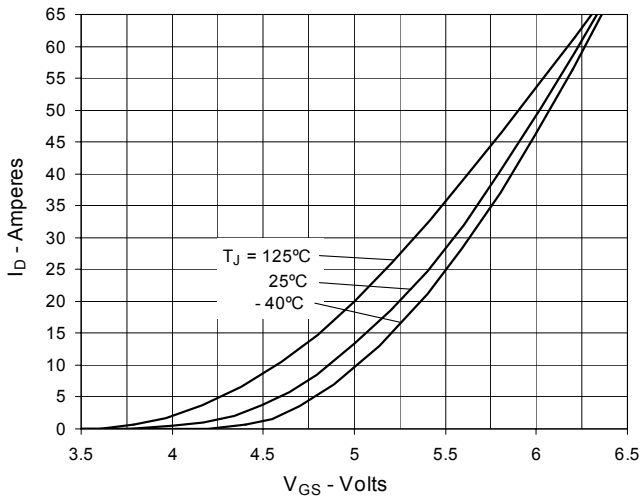
| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .190     | .205 | 4.83        | 5.21  |
| A1  | .090     | .100 | 2.29        | 2.54  |
| A2  | .075     | .085 | 1.91        | 2.16  |
| b   | .045     | .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

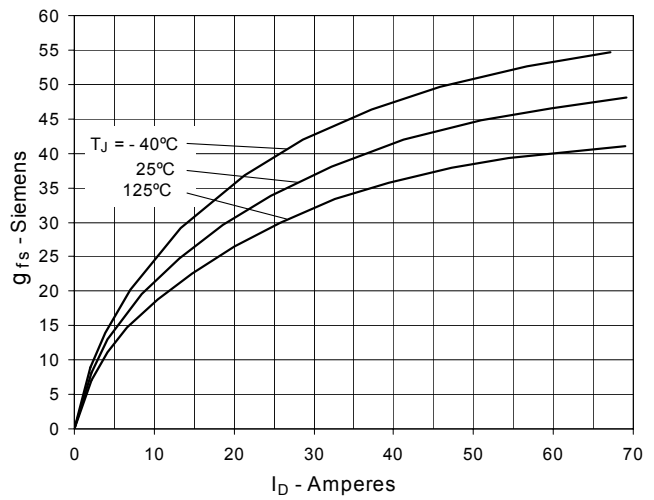
NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-247AD except screw hole.

**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  $I_D = 22A$  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**


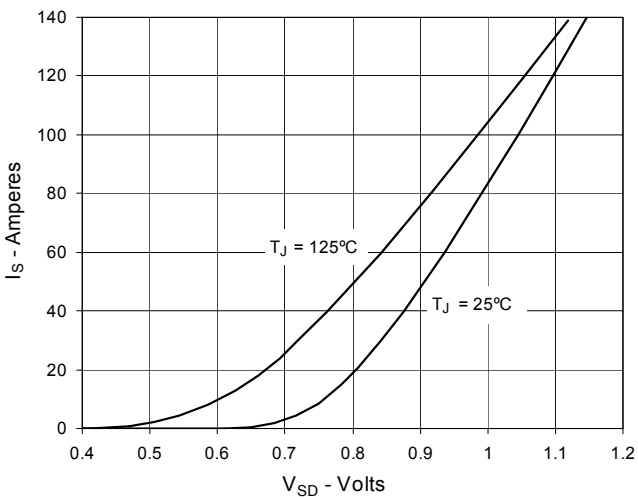
**Fig. 7. Input Admittance**



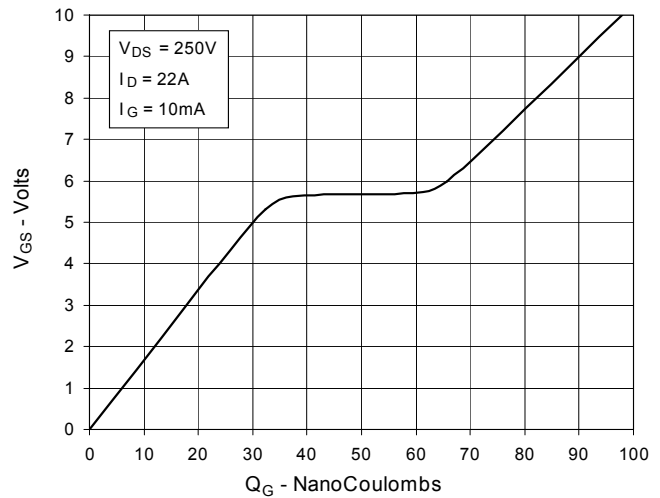
**Fig. 8. Transconductance**



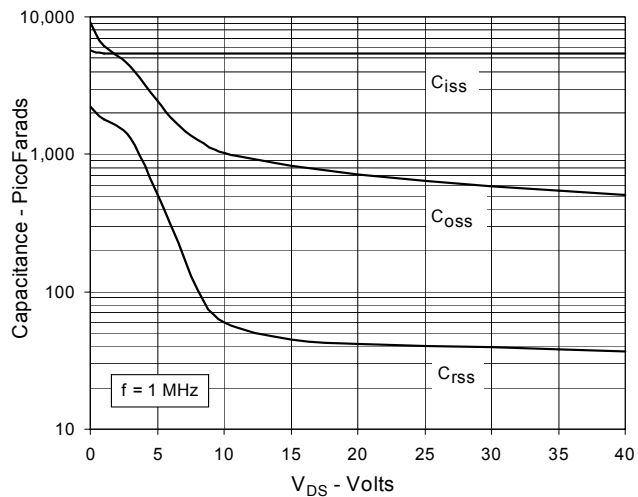
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



**Fig. 12. Forward-Bias Safe Operating Area**

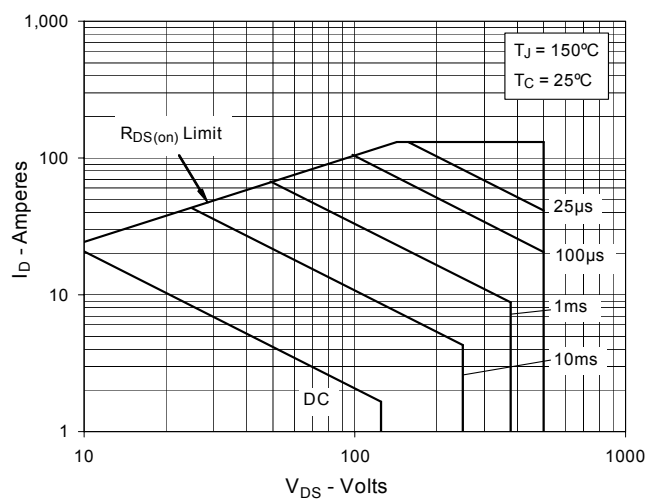
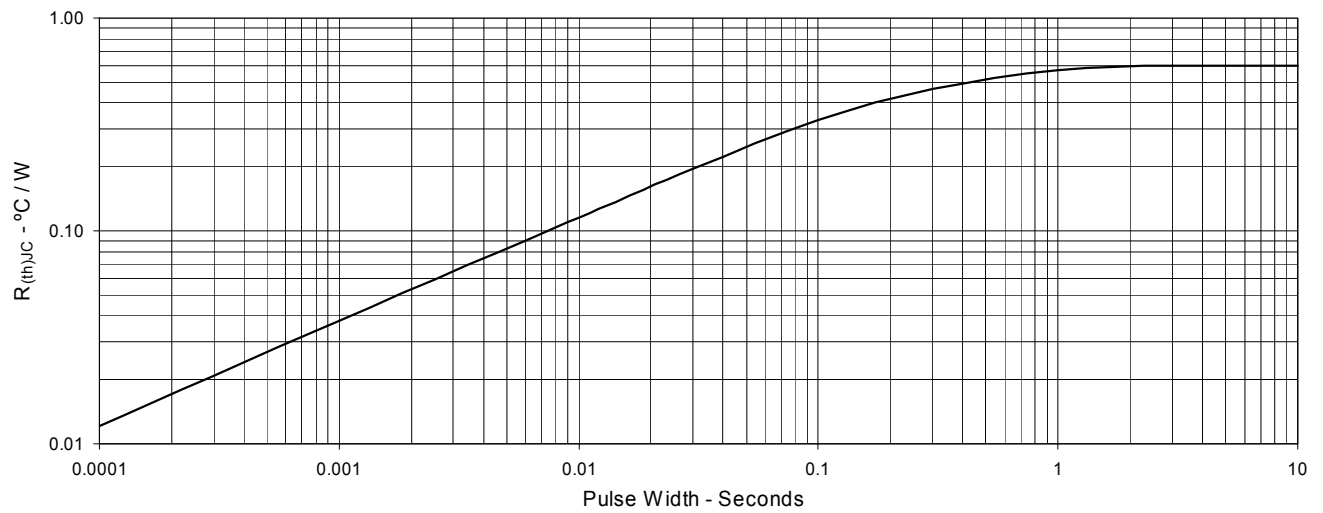


Fig. 13. Maximum Transient Thermal Resistance





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