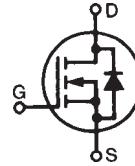


## PolarHV™ HiPerFET Power MOSFET

N-Channel Enhancement Mode

**IXFA 16N50P**  
**IXFP 16N50P**  
**IXFH 16N50P**

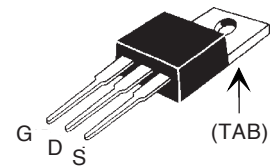
$V_{DSS} = 500 \text{ V}$   
 $I_{D25} = 16 \text{ A}$   
 $R_{DS(on)} = 400 \text{ m}\Omega$   
 $t_{rr} = 200 \text{ ns}$



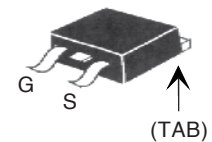
| Symbol    | Test Conditions                                                                                                                          | Maximum Ratings |                                      |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------------------------|
| $V_{DSS}$ | $T_J = 25^\circ\text{C to } 150^\circ\text{C}$                                                                                           | 500             | V                                    |
| $V_{DGR}$ | $T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GS} = 1 \text{ M}\Omega$                                                               | 500             | V                                    |
| $V_{GS}$  | Continuous                                                                                                                               | $\pm 30$        | V                                    |
| $V_{GSM}$ | Transient                                                                                                                                | $\pm 40$        | V                                    |
| $I_{D25}$ | $T_C = 25^\circ\text{C}$                                                                                                                 | 16              | A                                    |
| $I_{DM}$  | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                               | 35              | A                                    |
| $I_{AR}$  | $T_C = 25^\circ\text{C}$                                                                                                                 | 16              | A                                    |
| $E_{AR}$  | $T_C = 25^\circ\text{C}$                                                                                                                 | 25              | mJ                                   |
| $E_{AS}$  | $T_C = 25^\circ\text{C}$                                                                                                                 | 750             | mJ                                   |
| $dv/dt$   | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 10 \Omega$ | 10              | V/ns                                 |
| $P_D$     | $T_C = 25^\circ\text{C}$                                                                                                                 | 300             | 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<br>Maximum tab temperature for soldering<br>TO-263 package for 10s                                 | 300<br>260      | $^\circ\text{C}$<br>$^\circ\text{C}$ |
| $M_d$     | Mounting torque (TO-247 & TO-220)                                                                                                        | 1.13/10         | Nm/lb.in.                            |
| Weight    | TO-220                                                                                                                                   | 4               | g                                    |
|           | TO-263                                                                                                                                   | 3               | g                                    |
|           | TO-247                                                                                                                                   | 5.5             | g                                    |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                                      | Characteristic Values |      |                      |
|--------------|------------------------------------------------------------------------------------------------------------------|-----------------------|------|----------------------|
|              |                                                                                                                  | Min.                  | Typ. | Max.                 |
| $V_{DSS}$    | $V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$                                                                 | 500                   |      | V                    |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 1 \text{ mA}$                                                                         | 3.0                   |      | 5.5 V                |
| $I_{GSS}$    | $V_{GS} = \pm 30 \text{ V}_{DC}$ , $V_{DS} = 0$                                                                  |                       |      | $\pm 100 \text{ nA}$ |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$                                                                                               |                       |      | 5 $\mu\text{A}$      |
|              | $V_{GS} = 0 \text{ V}$ , $T_J = 125^\circ\text{C}$                                                               |                       |      | 50 $\mu\text{A}$     |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 0.5 I_{D25}$<br>Pulse test, $t \leq 300 \mu\text{s}$ , duty cycle $d \leq 2 \%$ |                       |      | 400 $\text{m}\Omega$ |

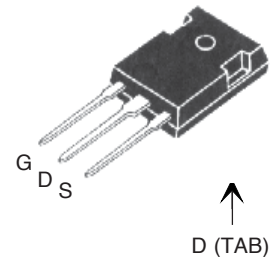
TO-220 (IXTP)



TO-263 (IXTA)



TO-247 (IXFH)



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

### Features

- International standard packages
- Unclamped Inductive Switching (UIS) rated
- Low package inductance  
- easy to drive and to protect

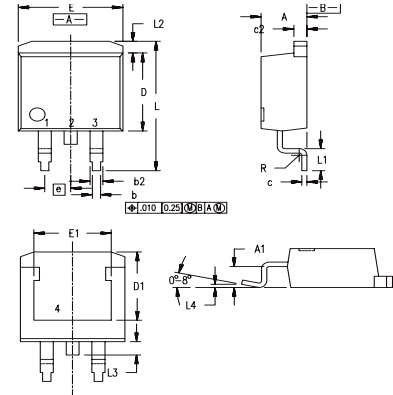
### Advantages

- Easy to mount
- Space savings
- High power density

| Symbol       | Test Conditions                                                                                    | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |              |          |
|--------------|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------|----------|
|              |                                                                                                    | Min.                                                                              | Typ.         | Max.     |
| $g_{fs}$     | $V_{DS} = 20\text{ V}$ ; $I_D = 0.5 I_{D25}$ , pulse test                                          | 8                                                                                 | 16           | S        |
| $C_{iss}$    | $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                                |                                                                                   | 2250         | pF       |
| $C_{oss}$    |                                                                                                    |                                                                                   | 240          | pF       |
| $C_{rss}$    |                                                                                                    |                                                                                   | 12           | pF       |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.5 V_{DSS}$ , $I_D = I_{D25}$<br>$R_G = 18\ \Omega$ (External) |                                                                                   | 23           | ns       |
| $t_r$        |                                                                                                    |                                                                                   | 25           | ns       |
| $t_{d(off)}$ |                                                                                                    |                                                                                   | 70           | ns       |
| $t_f$        |                                                                                                    |                                                                                   | 22           | ns       |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.5 V_{DSS}$ , $I_D = 0.5 I_{D25}$                              |                                                                                   | 43           | nC       |
| $Q_{gs}$     |                                                                                                    |                                                                                   | 15           | nC       |
| $Q_{gd}$     |                                                                                                    |                                                                                   | 12           | nC       |
| $R_{thJC}$   | (TO-220)<br>(TO-247)                                                                               |                                                                                   | 0.25<br>0.21 | 0.42 K/W |
| $R_{thCK}$   |                                                                                                    |                                                                                   |              | K/W      |
| $R_{thCK}$   |                                                                                                    |                                                                                   |              | K/W      |

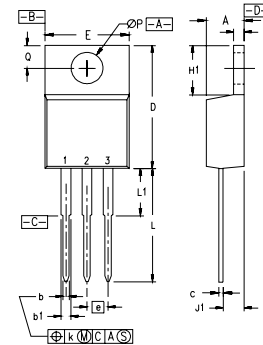
| Source-Drain Diode |                                                                                                          | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |               |
|--------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------|
| Symbol             | Test Conditions                                                                                          | Min.                                                                              | typ. | Max.          |
| $I_S$              | $V_{GS} = 0\text{ V}$                                                                                    |                                                                                   |      | 16 A          |
| $I_{SM}$           | Repetitive                                                                                               |                                                                                   |      | 35 A          |
| $V_{SD}$           | $I_F = I_S$ , $V_{GS} = 0\text{ V}$ ,<br>Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$ |                                                                                   |      | 1.5 V         |
| $t_{rr}$           | $I_F = 16\text{ A}$ , $-di/dt = 100\text{ A}/\mu\text{s}$                                                | 130                                                                               | 200  | ns            |
| $I_{RM}$           | $V_R = 100\text{ V}$                                                                                     | 6                                                                                 |      | A             |
| $Q_{RM}$           |                                                                                                          | 0.6                                                                               |      | $\mu\text{C}$ |

## TO-263 (IXTA) Outline

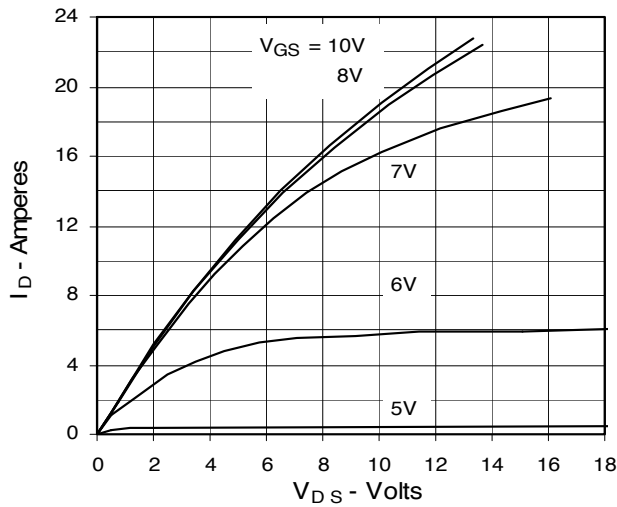


| Dim. | Millimeter |       | Inches |      |
|------|------------|-------|--------|------|
|      | Min.       | Max.  | Min.   | Max. |
| A    | 4.06       | 4.83  | .160   | .190 |
| A1   | 2.03       | 2.79  | .080   | .110 |
| b    | 0.51       | 0.99  | .020   | .039 |
| b2   | 1.14       | 1.40  | .045   | .055 |
| c    | 0.46       | 0.74  | .018   | .029 |
| c2   | 1.14       | 1.40  | .045   | .055 |
| D    | 8.64       | 9.65  | .340   | .380 |
| D1   | 7.11       | 8.13  | .280   | .320 |
| E    | 9.65       | 10.29 | .380   | .405 |
| E1   | 6.86       | 8.13  | .270   | .320 |
| e    | 2.54       | BSC   | .100   | BSC  |
| L    | 14.61      | 15.88 | .575   | .625 |
| L1   | 2.29       | 2.79  | .090   | .110 |
| L2   | 1.02       | 1.40  | .040   | .055 |
| L3   | 1.27       | 1.78  | .050   | .070 |
| L4   | 0          | 0.38  | 0      | .015 |
| R    | 0.46       | 0.74  | .018   | .029 |

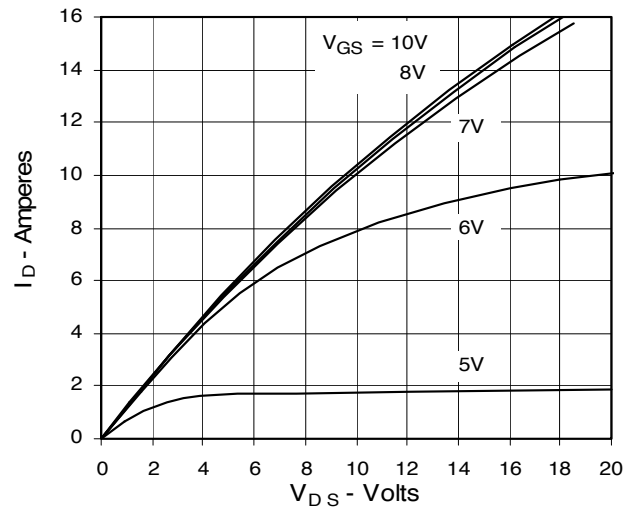
## TO-220 (IXTP) Outline



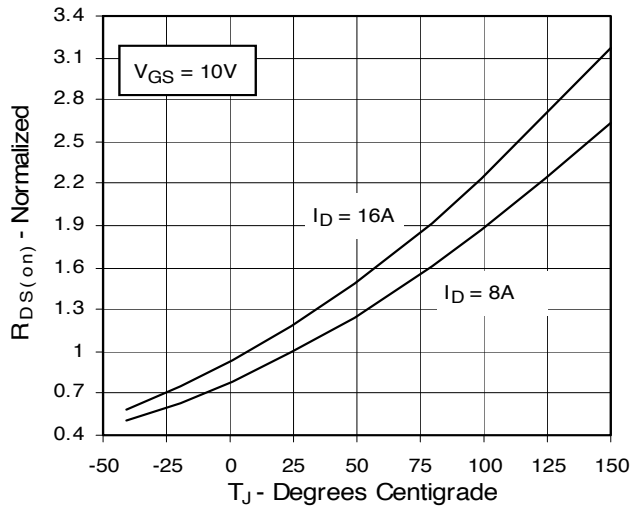
**Fig. 1. Output Characteristics**  
**@ 25°C**



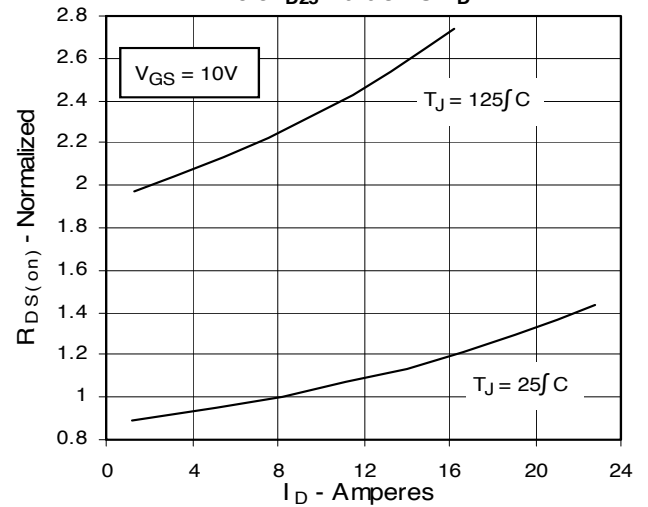
**Fig. 2. Output Characteristics**  
**@ 125°C**



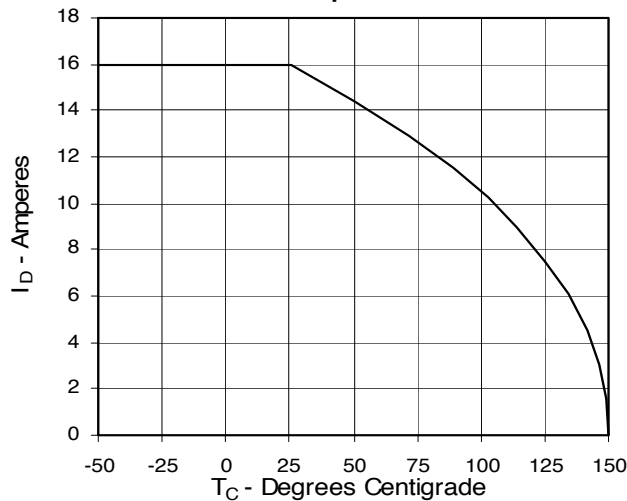
**Fig. 3.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value vs. Junction Temperature**



**Fig. 4.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value vs.  $I_D$**



**Fig. 5. Drain Current vs. Case Temperature**



**Fig. 6. Input Admittance**

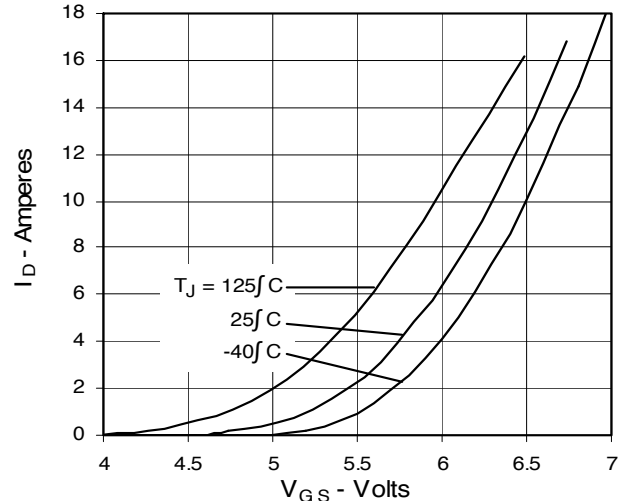


Fig. 7. Transconductance

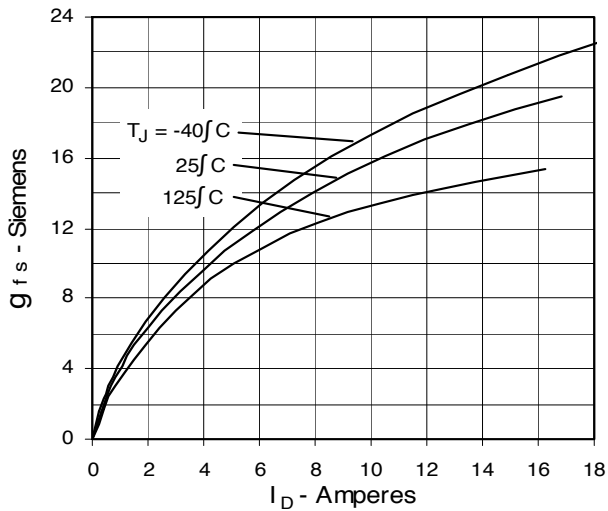


Fig. 8. Source Current vs. Source-To-Drain Voltage

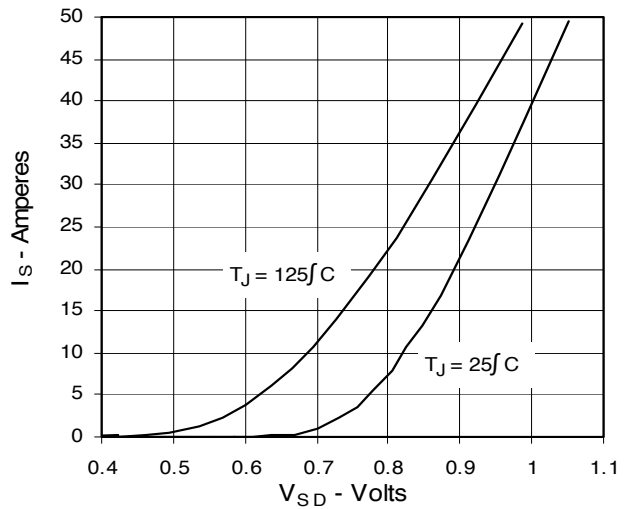


Fig. 10. Gate Charge

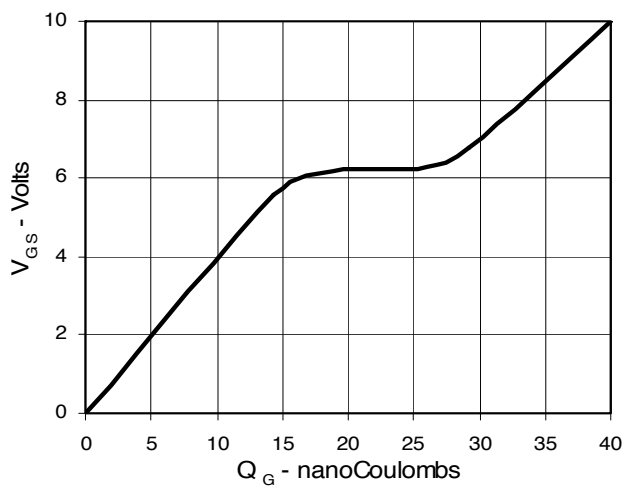


Fig. 10. Capacitance

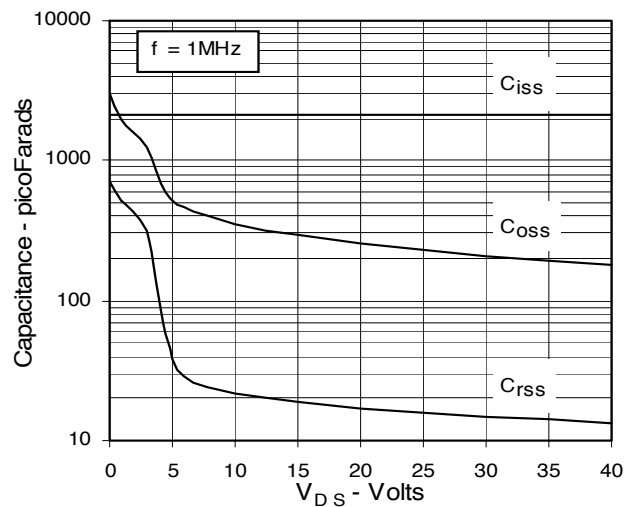


Fig. 11. Forward-Bias Safe Operating Area

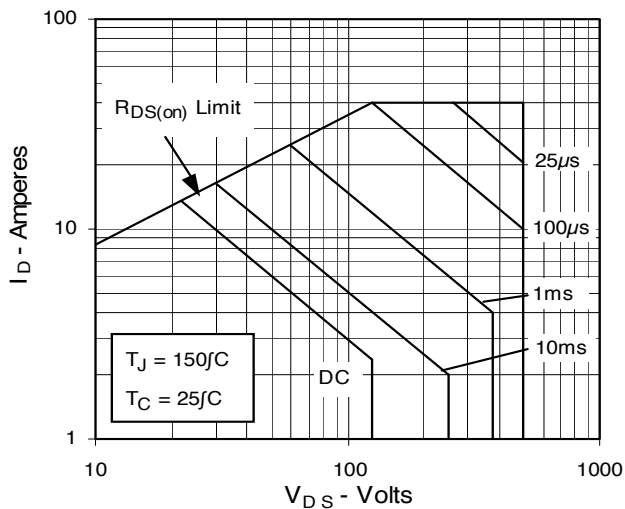


Fig. 12. Maximum Transient Thermal Resistance

