

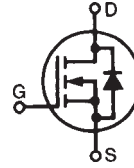
# PolarHV™ HiPerFET IXFP7N80PM

## Power MOSFET

(Electrically Isolated Tab)

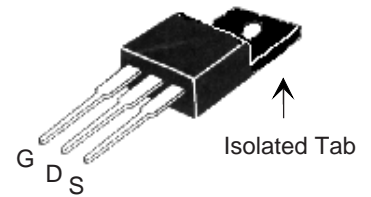
$V_{DSS} = 800 \text{ V}$   
 $I_{D25} = 3.5 \text{ A}$   
 $R_{DS(on)} \leq 1.44 \text{ } \Omega$   
 $t_{rr} \leq 250 \text{ ns}$

N-Channel Enhancement Mode  
 Avalanche Rated  
 Fast Intrinsic Diode



| Symbol        | Test Conditions   | Maximum Ratings |                  |
|---------------|---|-----------------|------------------|
| $V_{DSS}$     | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$   | 800             | V                |
| $V_{DGR}$     | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1 \text{ M}\Omega$  | 800             | V                |
| $V_{GSS}$     | Continuous  | $\pm 30$        | V                |
| $V_{GSM}$     | Transient   | $\pm 40$        | V                |
| $I_{D25}$     | $T_C = 25^\circ\text{C}$  | 3.5             | A                |
| $I_{DM}$      | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$  | 18              | A                |
| $I_{AR}$      | $T_C = 25^\circ\text{C}$  | 4               | A                |
| $E_{AR}$      | $T_C = 25^\circ\text{C}$  | 20              | mJ               |
| $E_{AS}$      | $T_C = 25^\circ\text{C}$  | 300             | mJ               |
| $dv/dt$       | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 10 \text{ } \Omega$ | 10              | V/ns             |
| $P_D$         | $T_C = 25^\circ\text{C}$  | 50              | 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             | $^\circ\text{C}$ |
| $T_{SOLD}$    | Plastic body for 10 s   | 260             | $^\circ\text{C}$ |
| $M_d$         | Mounting torque   | 1.13/10         | Nm/lb.in.        |
| <b>Weight</b> |   | 3.0             | g                |

### OVERMOLDED TO-220 (IXTP...M) OUTLINE



G = Gate      D = Drain  
 S = Source

### Features

- Plastic overmolded tab for electrical isolation
- Fast intrinsic diode
- International standard package
- Unclamped Inductive Switching (UIS) rated
- Low package inductance  
- easy to drive and to protect

### Advantages

- Easy to mount
- Space savings
- High power density

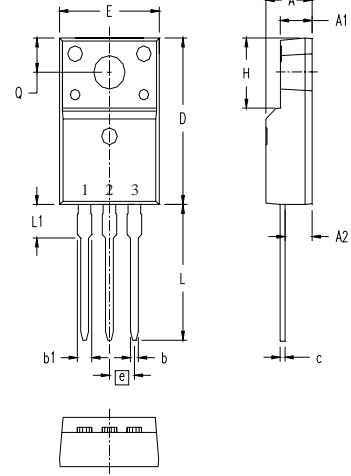
| Symbol       | Test Conditions   | Characteristic Values |      |                                       |
|--------------|---|-----------------------|------|---------------------------------------|
|              |   | Min.                  | Typ. | Max.                                  |
| $BV_{DSS}$   | $V_{GS} = 0 \text{ V}$ , $I_D = 250 \text{ } \mu\text{A}$ | 800                   |      | V                                     |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 1 \text{ mA}$                  | 3.0                   |      | 5.0 V                                 |
| $I_{GSS}$    | $V_{GS} = \pm 30 \text{ V}$ , $V_{DS} = 0 \text{ V}$      |                       |      | $\pm 100 \text{ nA}$                  |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0 \text{ V}$              |                       |      | 25 $\mu\text{A}$<br>500 $\mu\text{A}$ |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 3.5 \text{ A}$<br>Note 1 |                       |      | 1.44 $\Omega$                         |

| Symbol                    | Test Conditions   | Characteristic Values                               |      |          |
|---------------------------|---|---|------|----------|
|                           |   | (T <sub>J</sub> = 25°C, unless otherwise specified) |      |          |
|                           |   | Min.  | Typ. | Max.     |
| <b>g<sub>fs</sub></b>     | V <sub>DS</sub> = 20 V; I <sub>D</sub> = 3.5 A, Note 1  | 5   | 9.5  | S        |
| <b>C<sub>iss</sub></b>    | V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz  |   | 1890 | pF       |
| <b>C<sub>oss</sub></b>    |   |   | 133  | pF       |
| <b>C<sub>rss</sub></b>    |   |   | 13   | pF       |
| <b>t<sub>d(on)</sub></b>  | V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 0.5 V <sub>DSS</sub> , I <sub>D</sub> = 4 A<br>R <sub>G</sub> = 10 Ω (External) |   | 28   | ns       |
| <b>t<sub>r</sub></b>      |   |   | 32   | ns       |
| <b>t<sub>d(off)</sub></b> |   |   | 55   | ns       |
| <b>t<sub>f</sub></b>      |   |   | 24   | ns       |
| <b>Q<sub>g(on)</sub></b>  | V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 0.5 V <sub>DSS</sub> , I <sub>D</sub> = 6 A                                     |   | 32   | nC       |
| <b>Q<sub>gs</sub></b>     |   |   | 12   | nC       |
| <b>Q<sub>gd</sub></b>     |   |   | 9    | nC       |
| <b>R<sub>thJC</sub></b>   |   |   |      | 2.5 °C/W |

**Source-Drain Diode**

| Symbol                | Test Conditions   | Characteristic Values                              |      |        |
|-----------------------|---|--|------|--------|
|                       |   | (T <sub>J</sub> = 25°C unless otherwise specified) |      |        |
|                       |   | Min.   | Typ. | Max.   |
| <b>I<sub>S</sub></b>  | V <sub>GS</sub> = 0 V   |  |      | 7 A    |
| <b>I<sub>SM</sub></b> | Repetitive  |  |      | 18 A   |
| <b>V<sub>SD</sub></b> | I <sub>F</sub> = I <sub>S</sub> , V <sub>GS</sub> = 0 V, Note 1                           |  |      | 1.5 V  |
| <b>t<sub>rr</sub></b> | I <sub>F</sub> = 7 A, -di/dt = 100 A/μs,<br>V <sub>R</sub> = 100 V, V <sub>GS</sub> = 0 V |  |      | 250 ns |
| <b>Q<sub>RM</sub></b> |   |  | 0.3  | μC     |
| <b>I<sub>RM</sub></b> |   |  | 3    | A      |

Notes: 1) Pulse test, t ≤ 300 μs, duty cycle d ≤ 2 %

**ISOLATED TO-220 (IXFP...M)**


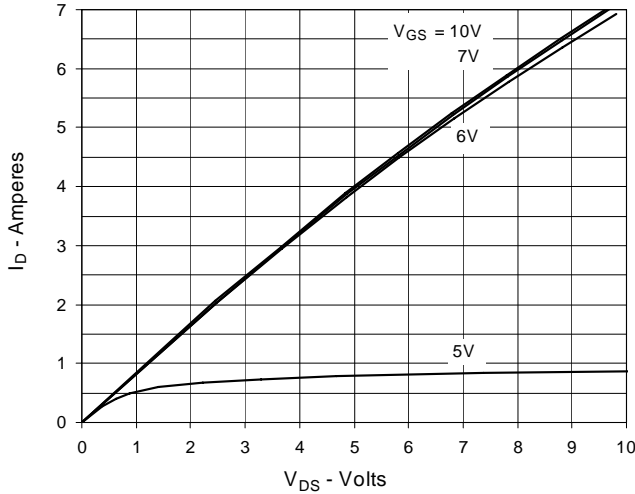
Terminals: 1 - Gate  
2 - Drain (Collector)  
3 - Source (Emitter)

| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .177     | .193 | 4.50        | 4.90  |
| A1  | .092     | .108 | 2.34        | 2.74  |
| A2  | .101     | .117 | 2.56        | 2.96  |
| b   | .028     | .035 | 0.70        | 0.90  |
| b1  | .050     | .058 | 1.27        | 1.47  |
| c   | .018     | .024 | 0.45        | 0.60  |
| D   | .617     | .633 | 15.67       | 16.07 |
| E   | .392     | .408 | 9.96        | 10.36 |
| e   | .100 BSC |      | 2.54 BSC    |       |
| H   | .255     | .271 | 6.48        | 6.88  |
| L   | .499     | .523 | 12.68       | 13.28 |
| L1  | .119     | .135 | 3.03        | 3.43  |
| ∅P  | .121     | .129 | 3.08        | 3.28  |
| Q   | .126     | .134 | 3.20        | 3.40  |

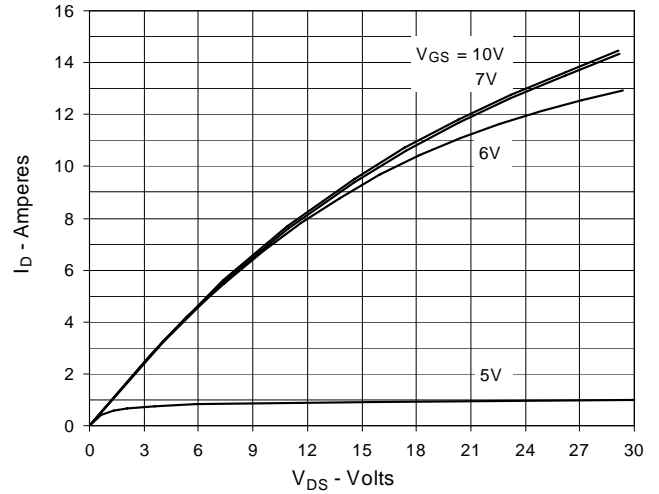
IXYS reserves the right to change limits, test conditions, and dimensions.

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

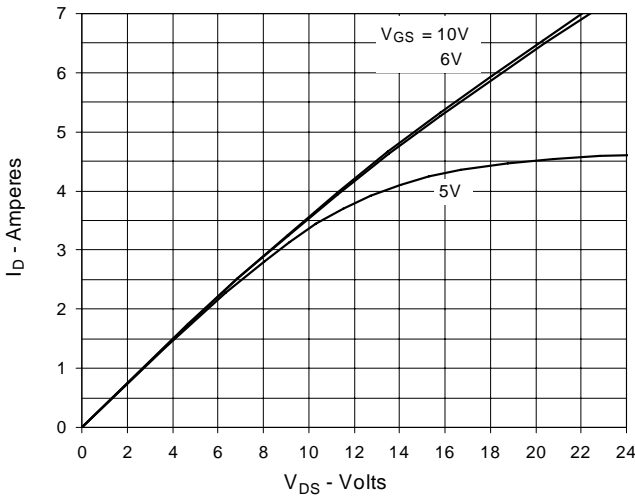
**Fig. 1. Output Characteristics @ 25°C**



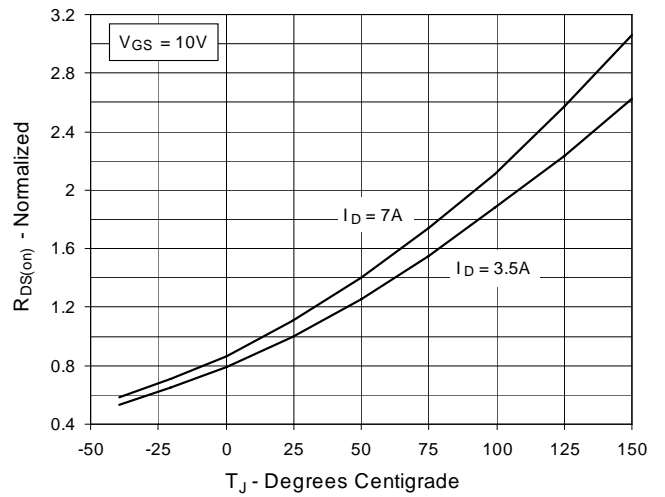
**Fig. 2. Extended Output Characteristics @ 25°C**



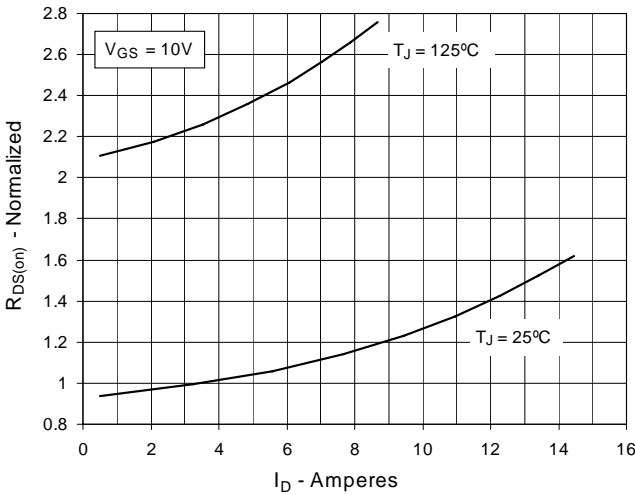
**Fig. 3. Output Characteristics @ 125°C**



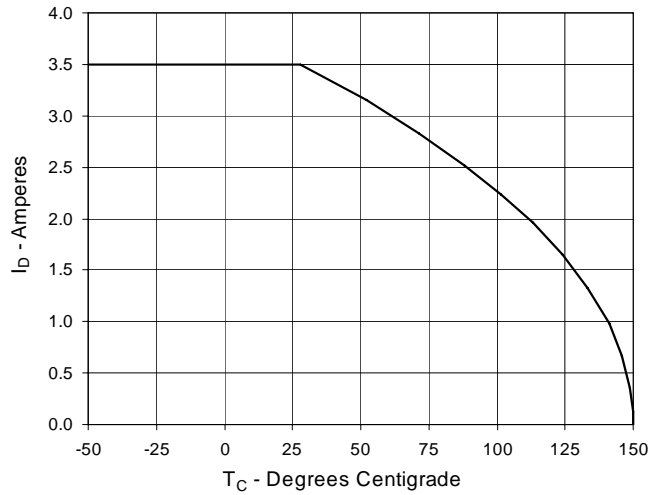
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 3.5A$  Value vs. Junction Temperature**



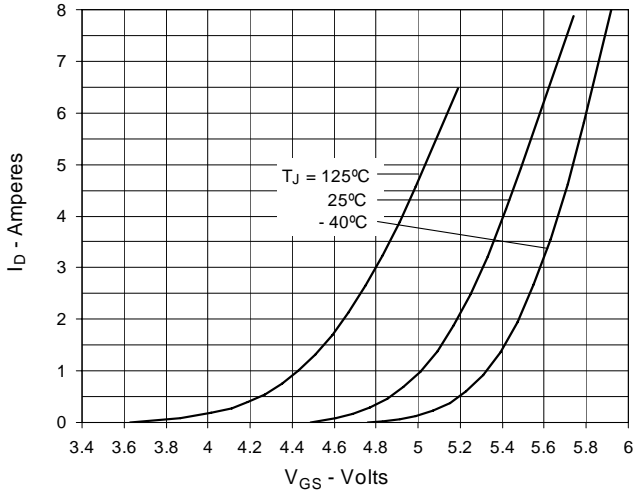
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 3.5A$  Value vs. Drain Current**



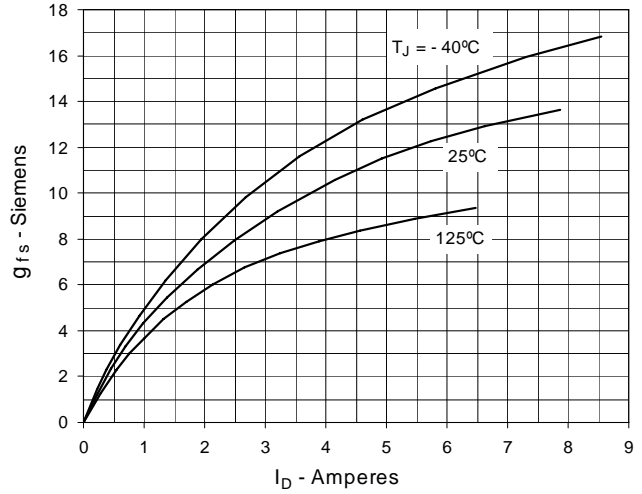
**Fig. 6. Maximum Drain Current vs. Case Temperature**



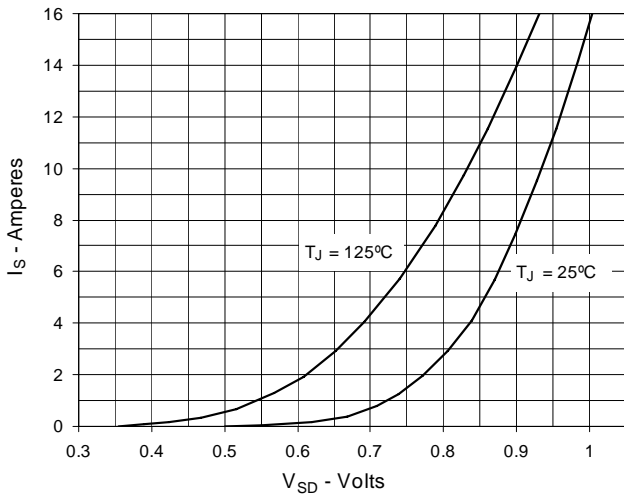
**Fig. 7. Input Admittance**



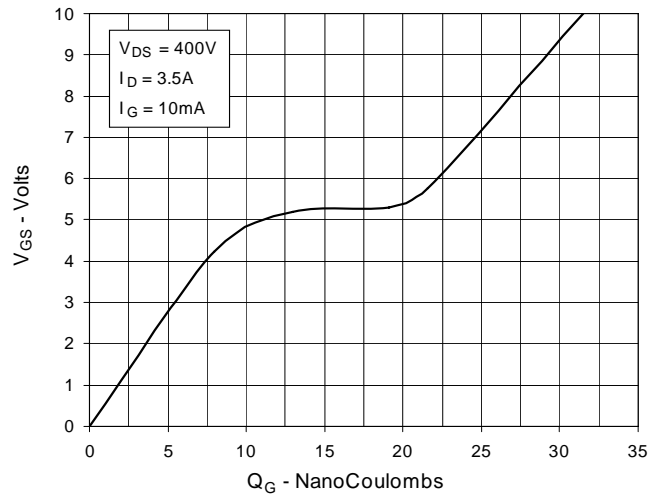
**Fig. 8. Transconductance**



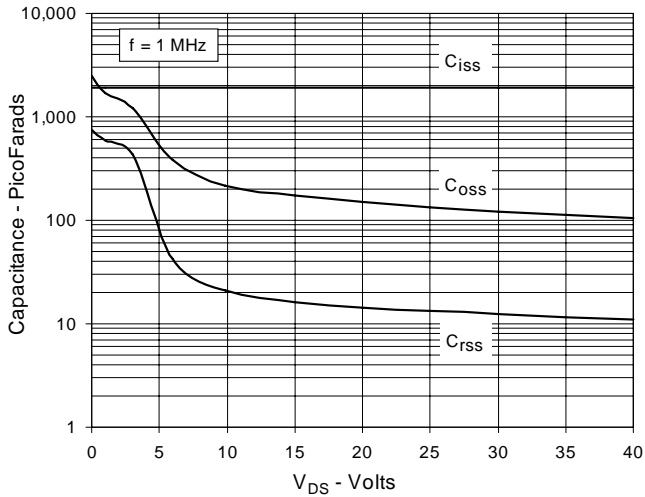
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



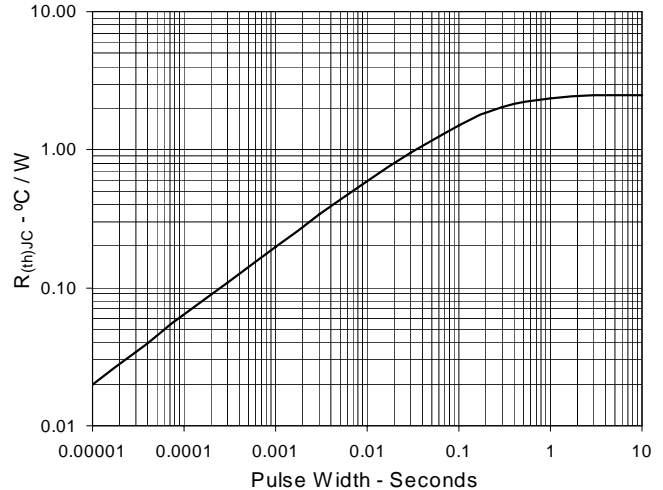
**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



**Fig. 12. Maximum Transient Thermal Resistance**





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