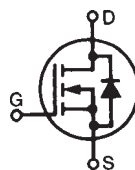


# HiPerFET™ Power MOSFETs

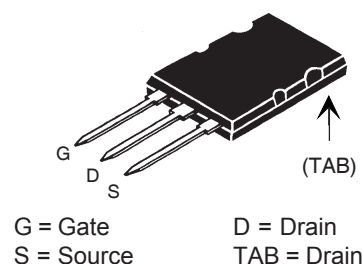
IXFB 80N50Q2

N-Channel Enhancement Mode  
Avalanche Rated, Low  $Q_g$ , Low Intrinsic  $R_G$   
High  $dV/dt$ , Low  $t_{rr}$

$$\begin{aligned} V_{DSS} &= 500 \text{ V} \\ I_{D25} &= 80 \text{ A} \\ R_{DS(on)} &= 60 \text{ m}\Omega \\ t_{rr} &\leq 250 \text{ ns} \end{aligned}$$



PLUS 264™ (IXFB)



| 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                |
| $I_{D25}$ | $T_C = 25^\circ\text{C}$                                                                                                              | 80                     | A                |
| $I_{DM}$  | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                            | 320                    | A                |
| $I_{AR}$  | $T_C = 25^\circ\text{C}$                                                                                                              | 80                     | A                |
| $E_{AR}$  | $T_C = 25^\circ\text{C}$                                                                                                              | 60                     | mJ               |
| $E_{AS}$  | $T_C = 25^\circ\text{C}$                                                                                                              | 5.0                    | J                |
| $dv/dt$   | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 2 \Omega$ | 20                     | V/ns             |
| $P_D$     | $T_C = 25^\circ\text{C}$                                                                                                              | 890                    | 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 (0.063 in.) from case for 10 s                                                                                                 | 300                    | $^\circ\text{C}$ |
| $F_c$     | Mounting Force                                                                                                                        | 30...120/7.5...27 N/lb |                  |
| Weight    |                                                                                                                                       | 10                     | g                |

| Symbol       | Test Conditions                                               | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                           |
|--------------|---------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------------------|
|              |                                                               | min.                                                                              | typ. | max.                      |
| $V_{DSS}$    | $V_{GS} = 0 \text{ V}$ , $I_D = 1 \text{ mA}$                 | 500                                                                               |      | V                         |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 8 \text{ mA}$                      | 2.5                                                                               |      | 5.0 V                     |
| $I_{GSS}$    | $V_{GS} = \pm 30 \text{ V}$ , $V_{DS} = 0$                    |                                                                                   |      | $\pm 200 \text{ nA}$      |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0 \text{ V}$                  |                                                                                   |      | 100 $\mu\text{A}$<br>5 mA |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 0.5 \cdot I_{D25}$<br>Note 1 |                                                                                   |      | 60 m $\Omega$             |

## Features

- Double metal process for low gate resistance
- Unclamped Inductive Switching (UIS) rated
- Low package inductance  
- easy to drive and to protect
- Fast intrinsic rectifier

## Applications

- DC-DC converters
- Switched-mode and resonant-mode power supplies, >500kHz switching
- DC choppers
- Pulse generation
- Laser drivers

## Advantages

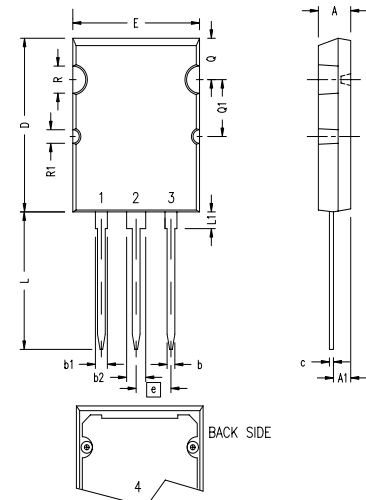
- PLUS 264™ package for clip or spring mounting
- Space savings
- High power density

| Symbol       | Test Conditions                                                                                             | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |       |      |
|--------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------|------|
|              |                                                                                                             | min.                                                                              | typ.  | max. |
| $g_{fs}$     | $V_{DS} = 10\text{ V}; I_D = 0.5 \cdot I_{D25}$ Note 1                                                      | 50                                                                                | 65    | S    |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                               |                                                                                   | 10500 | pF   |
| $C_{oss}$    |                                                                                                             |                                                                                   | 1610  | pF   |
| $C_{rss}$    |                                                                                                             |                                                                                   | 300   | pF   |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$<br>$R_G = 1\ \Omega$ (External) |                                                                                   | 29    | ns   |
| $t_r$        |                                                                                                             |                                                                                   | 25    | ns   |
| $t_{d(off)}$ |                                                                                                             |                                                                                   | 60    | ns   |
| $t_f$        |                                                                                                             |                                                                                   | 11    | ns   |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$                                 |                                                                                   | 260   | nC   |
| $Q_{gs}$     |                                                                                                             |                                                                                   | 65    | nC   |
| $Q_{gd}$     |                                                                                                             |                                                                                   | 125   | nC   |
| $R_{thJC}$   |                                                                                                             |                                                                                   | 0.14  | K/W  |
| $R_{thCK}$   |                                                                                                             |                                                                                   | 0.13  | K/W  |

**Source-Drain Diode**

| Symbol   | Test Conditions                                                                    | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |               |
|----------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------|
|          |                                                                                    | min.                                                                              | typ. | max.          |
| $I_S$    | $V_{GS} = 0\text{ V}$                                                              |                                                                                   |      | 80 A          |
| $I_{SM}$ | Repetitive;<br>pulse width limited by $T_{JM}$                                     |                                                                                   |      | 320 A         |
| $V_{SD}$ | $I_F = I_S, V_{GS} = 0\text{ V}$ , Note 1                                          |                                                                                   |      | 1.5 V         |
| $t_{rr}$ | $I_F = 25\text{ A}$<br>$-di/dt = 100\text{ A}/\mu\text{s}$<br>$V_R = 100\text{ V}$ |                                                                                   | 1.2  | 250 ns        |
| $Q_{RM}$ |                                                                                    |                                                                                   |      | $\mu\text{C}$ |
| $I_{RM}$ |                                                                                    |                                                                                   |      | A             |

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

**PLUS 264™ Outline**


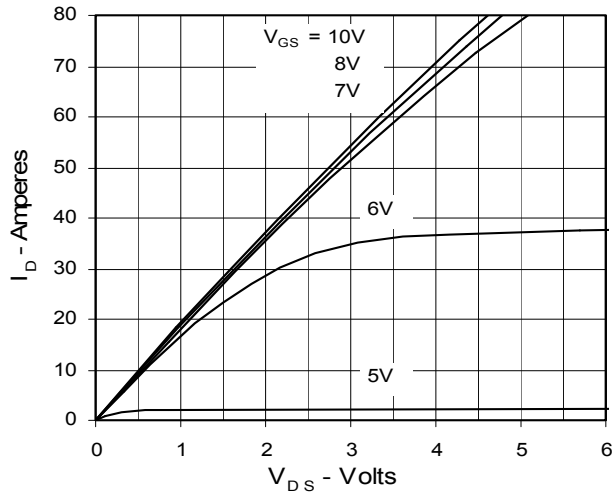
Terminals: 1 - Gate  
2 - Drain (Collector)  
3 - Source (Emitter)  
4 - Drain (Collector)

| SYM | INCHES |       |
|-----|--------|-------|
|     | MIN    | MAX   |
| A   | .185   | .209  |
| A1  | .102   | .118  |
| b   | .037   | .055  |
| b1  | .087   | .102  |
| b2  | .110   | .126  |
| c   | .017   | .029  |
| D   | 1.007  | 1.047 |
| E   | .760   | .799  |
| e   | .215   | BSC   |
| L   | .779   | .842  |
| L1  | .087   | .102  |
| Q   | .240   | .256  |
| Q1  | .330   | .346  |
| ØR  | .155   | .187  |
| ØR1 | .085   | .093  |

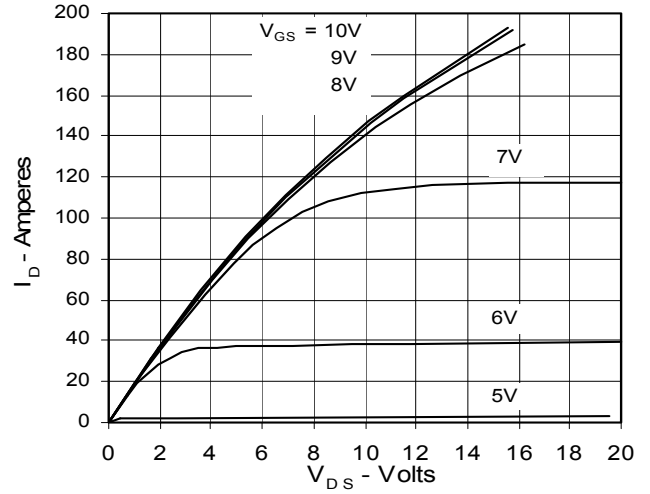
IXYS reserves the right to change limits, test conditions, and dimensions.

|                                                                                  |           |           |           |           |           |           |             |             |             |           |
|----------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|-------------|-------------|-----------|
| IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents: | 4,850,072 | 4,931,844 | 5,034,796 | 5,063,307 | 5,237,481 | 5,381,025 | 6,404,065B1 | 6,162,665   | 6,534,343   | 6,583,505 |
|                                                                                  | 4,835,592 | 4,881,106 | 5,017,508 | 5,049,961 | 5,187,117 | 5,486,715 | 6,306,728B1 | 6,259,123B1 | 6,306,728B1 | 6,683,344 |

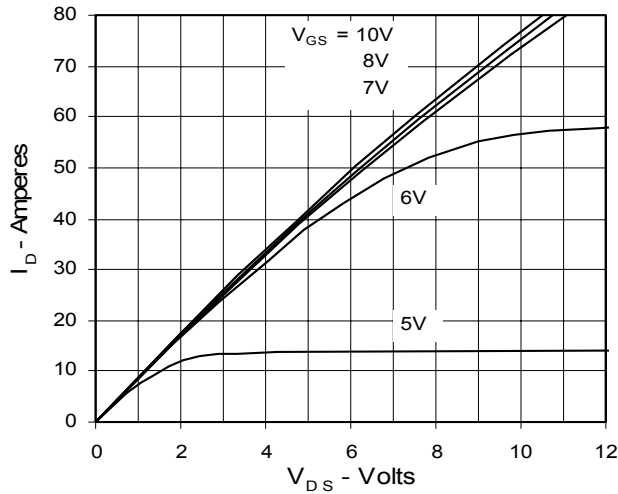
**Fig. 1. Output Characteristics  
@ 25 Deg. C**



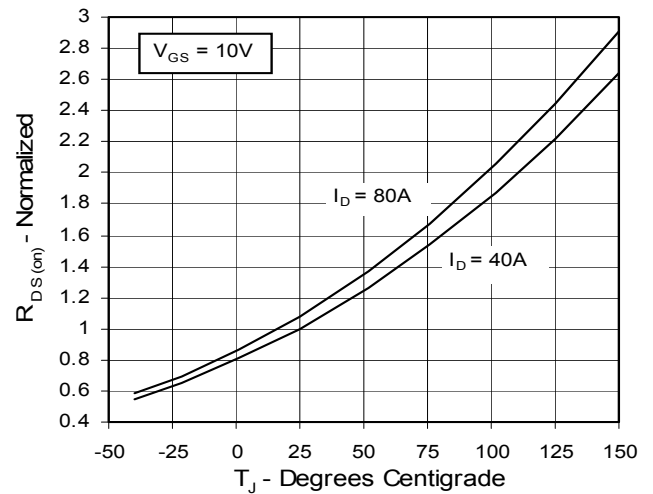
**Fig. 2. Extended Output Characteristics  
@ 25 deg. C**



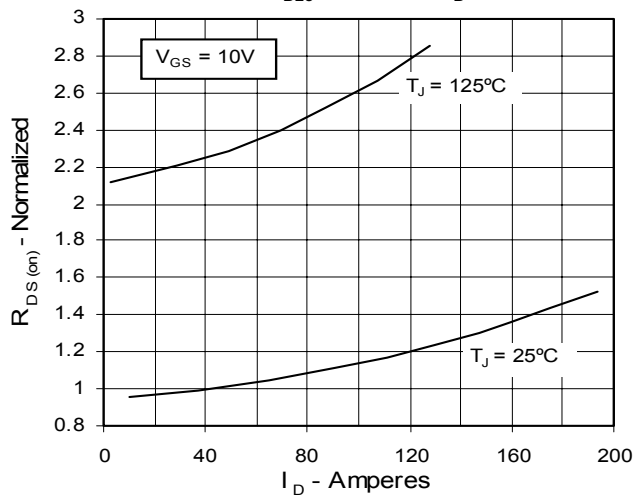
**Fig. 3. Output Characteristics  
@ 125 Deg. C**



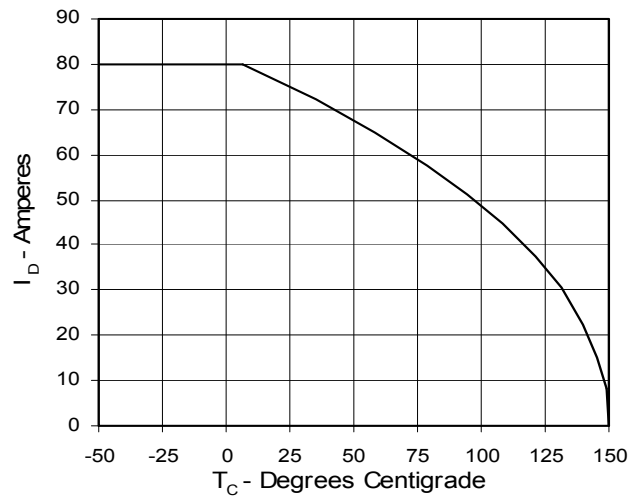
**Fig. 4.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value  
vs. Junction Temperature**



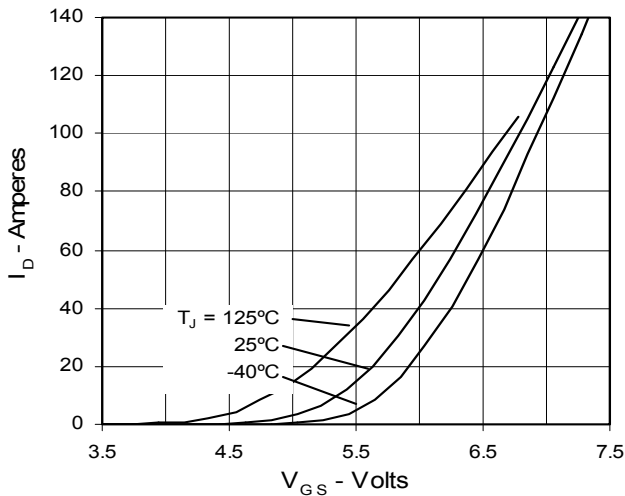
**Fig. 5.  $R_{DS(on)}$  Normalized to  
0.5  $I_{D25}$  Value vs.  $I_D$**



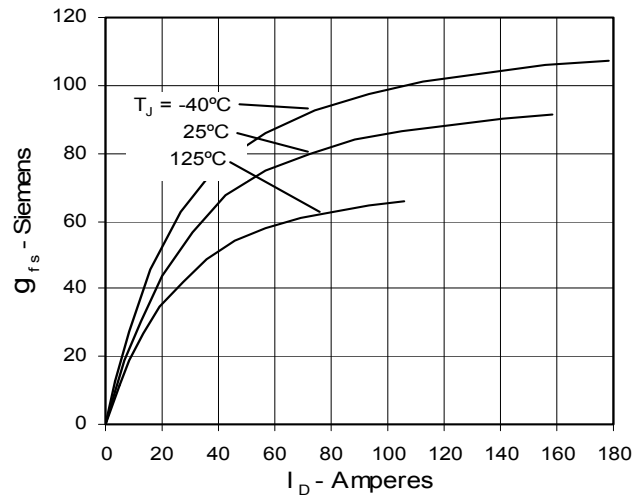
**Fig. 6. Drain Current vs. Case  
Temperature**



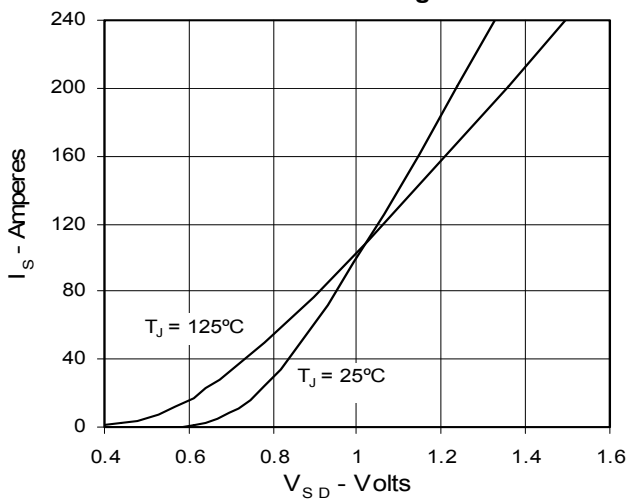
**Fig. 7. Input Admittance**



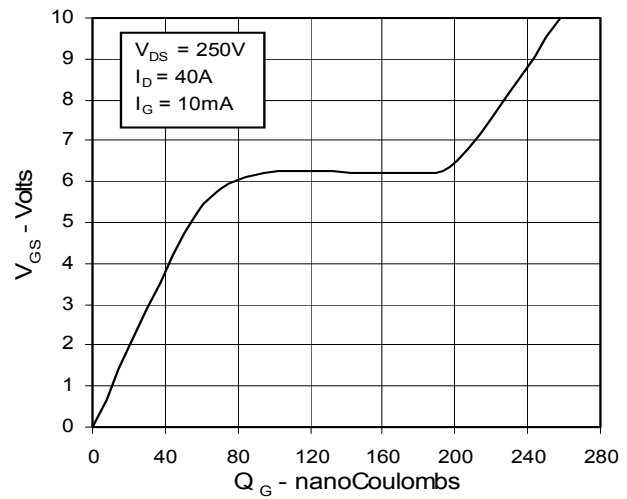
**Fig. 8. Transconductance**



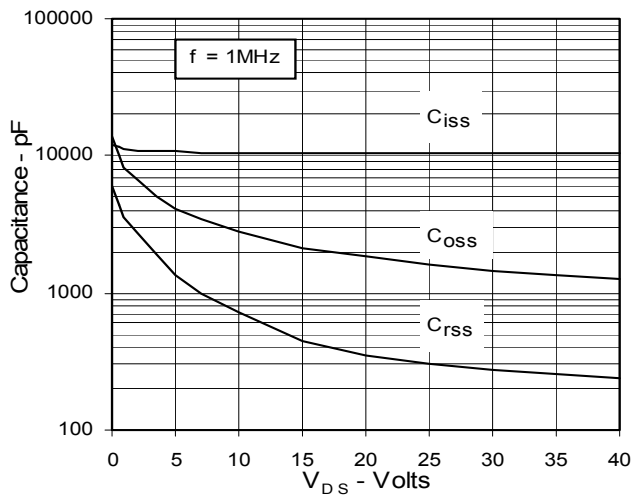
**Fig. 9. Source Current vs. Source-To-Drain Voltage**



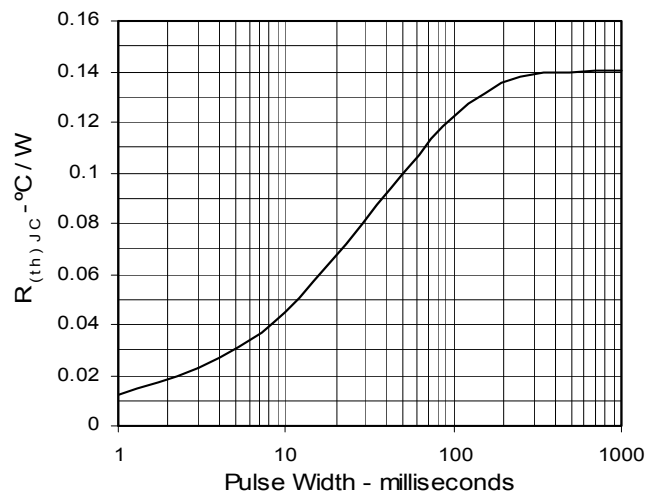
**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



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



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|           |           |           |           |           |           |             |             |             |           |
|-----------|-----------|-----------|-----------|-----------|-----------|-------------|-------------|-------------|-----------|
| 4,850,072 | 4,931,844 | 5,034,796 | 5,063,307 | 5,237,481 | 5,381,025 | 6,404,065B1 | 6,162,665   | 6,534,343   | 6,583,505 |
| 4,835,592 | 4,881,106 | 5,017,508 | 5,049,961 | 5,187,117 | 5,486,715 | 6,306,728B1 | 6,259,123B1 | 6,306,728B1 | 6,683,344 |