

# HiPerFET™

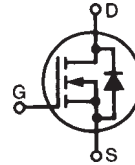
## Power MOSFETs

### Q-Class

IXFE 44N50Q  
IXFE 48N50Q

N-Channel Enhancement Mode  
Avalanche Rated, Low  $Q_g$ , High  $dv/dt$

#### Preliminary data sheet



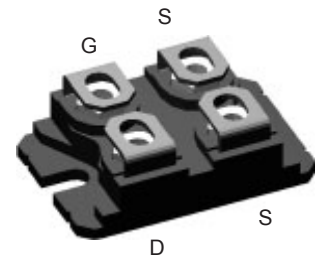
| Symbol     | Test Conditions                                                                                                                         | Maximum Ratings          |                        |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C}$ 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                                                                                                                              | $\pm 20$                 | V                      |
| $V_{GSM}$  | Transient                                                                                                                               | $\pm 30$                 | V                      |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                                                                                | 44N50Q 39<br>48N50Q 41   | A                      |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                              | 44N50Q 176<br>48N50Q 192 | A                      |
| $I_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                                | 48                       | A                      |
| $E_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                                | 60                       | mJ                     |
| $E_{AS}$   |                                                                                                                                         | 2.5                      | mJ                     |
| $dv/dt$    | $I_S \leq I_{DM}$ , $di/dt \leq 100\text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 2\ \Omega$ | 15                       | V/ns                   |
| $P_D$      | $T_C = 25^\circ\text{C}$                                                                                                                | 400                      | W                      |
| $T_J$      |                                                                                                                                         | -40 to +150              | $^\circ\text{C}$       |
| $T_{JM}$   |                                                                                                                                         | 150                      | $^\circ\text{C}$       |
| $T_{stg}$  |                                                                                                                                         | -40 to +150              | $^\circ\text{C}$       |
| $V_{ISOL}$ | 50/60 Hz, RMS $t = 1\text{ min}$<br>$I_{ISOL} \leq 1\text{ mA}$ $t = 1\text{ s}$                                                        | 2500<br>3000             | V~<br>V~               |
| $M_d$      | Mounting torque<br>Terminal connection torque                                                                                           | 1.5/13<br>1.5/13         | Nm/lb.in.<br>Nm/lb.in. |
| Weight     |                                                                                                                                         | 19                       | 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                                |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 4\text{ mA}$        | 2.0                                                                               |      | 4.0 V                            |
| $I_{GSS}$    | $V_{GS} = \pm 20\text{ V}_{DC}$ , $V_{DS} = 0$ |                                                                                   |      | $\pm 100\text{ nA}$              |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0\text{ V}$     | $T_J = 25^\circ\text{C}$<br>$T_J = 125^\circ\text{C}$                             |      | 100 $\mu\text{A}$<br>2 mA        |
| $R_{DS(on)}$ | $V_{GS} = 10\text{ V}$ , $I_D = I_T$           | 44N50Q<br>48N50Q                                                                  |      | 120 m $\Omega$<br>110 m $\Omega$ |
| Notes 1, 2   |                                                |                                                                                   |      |                                  |

|           |           |                |
|-----------|-----------|----------------|
| $V_{DSS}$ | $I_{D25}$ | $R_{DS(on)}$   |
| 500 V     | 39 A      | 120 m $\Omega$ |
| 500 V     | 41 A      | 110 m $\Omega$ |

$t_{rr} \leq 250\text{ ns}$

#### ISOPLUS 227™ (IXFE)



G = Gate  
S = Source  
D = Drain

Either Source terminal at miniBLOC can be used as Main or Kelvin Source

#### Features

- Conforms to SOT-227B outline
- Low  $R_{DS(on)}$  HDMOS™ process
- Rugged polysilicon gate cell structure
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
- Fast intrinsic Rectifier

#### Applications

- DC-DC converters
- Battery chargers
- Switched-mode and resonant-mode power supplies
- DC choppers
- Temperature and lighting controls

#### Advantages

- Low cost
- Easy to mount
- Space savings
- High power density

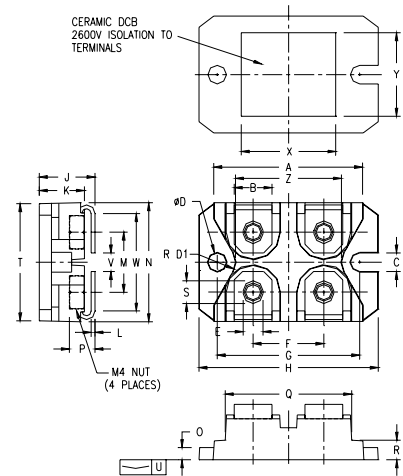
| Symbol       | Test Conditions                                                                                  | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |      |
|--------------|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|------|
|              |                                                                                                  | min.                                                                              | typ. | max. |
| $g_{fs}$     | $V_{DS} = 20\text{ V}; I_D = I_T$ , Notes 1, 2                                                   | 30                                                                                | 42   | S    |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                    |                                                                                   | 7000 | pF   |
| $C_{oss}$    |                                                                                                  |                                                                                   | 960  | pF   |
| $C_{rss}$    |                                                                                                  |                                                                                   | 230  | pF   |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = I_T$<br>$R_G = 4.7\ \Omega$ (External), |                                                                                   | 33   | ns   |
| $t_r$        |                                                                                                  |                                                                                   | 22   | ns   |
| $t_{d(off)}$ |                                                                                                  |                                                                                   | 75   | ns   |
| $t_f$        |                                                                                                  |                                                                                   | 10   | ns   |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = I_T$                                    |                                                                                   | 190  | nC   |
| $Q_{gs}$     |                                                                                                  |                                                                                   | 40   | nC   |
| $Q_{gd}$     |                                                                                                  |                                                                                   | 86   | nC   |
| $R_{thJC}$   |                                                                                                  |                                                                                   | 0.31 | K/W  |
| $R_{thCK}$   |                                                                                                  |                                                                                   | 0.07 | K/W  |

**Source-Drain Diode**

| Symbol   | Test Conditions                                                            | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |               |
|----------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------|
|          |                                                                            | min.                                                                              | typ. | max.          |
| $I_S$    | $V_{GS} = 0\text{ V}$                                                      |                                                                                   |      | 48 A          |
| $I_{SM}$ | Repetitive; pulse width limited by $T_{JM}$                                |                                                                                   |      | 192 A         |
| $V_{SD}$ | $I_F = I_S, V_{GS} = 0\text{ V}$ ,<br>Note:1                               |                                                                                   |      | 1.5 V         |
| $t_{rr}$ | $I_F = 25\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}, V_R = 100\text{ V}$ |                                                                                   | 1.0  | 250 ns        |
| $Q_{RM}$ |                                                                            |                                                                                   |      | $\mu\text{C}$ |
| $I_{RM}$ |                                                                            |                                                                                   |      | A             |

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

2.  $I_T$  Test current:  
 44N50Q:  $I_T = 22\text{ A}$   
 48N50Q:  $I_T = 24\text{ A}$

**ISOPLUS-227 B**


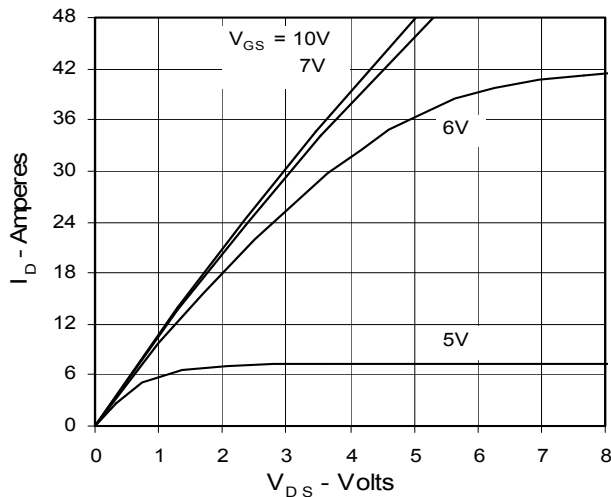
| SYM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 1.240  | 1.270 | 31.50       | 32.26 |
| B   | .310   | .330  | 7.87        | 8.38  |
| C   | .155   | .165  | 3.94        | 4.19  |
| D   | .155   | .165  | 3.94        | 4.19  |
| D1  | .150   | .157  | 3.81        | 3.98  |
| E   | .160   | .168  | 4.06        | 4.27  |
| F   | .587   | .595  | 14.91       | 15.11 |
| G   | 1.186  | 1.193 | 30.12       | 30.30 |
| H   | 1.489  | 1.505 | 37.80       | 38.23 |
| J   | .465   | .481  | 11.81       | 12.22 |
| K   | .370   | .380  | 9.40        | 9.65  |
| L   | .030   | .033  | 0.76        | 0.84  |
| M   | .496   | .506  | 12.60       | 12.85 |
| N   | .990   | 1.001 | 25.15       | 25.42 |
| O   | .100   | .105  | 2.54        | 2.67  |
| P   | .195   | .235  | 4.95        | 5.97  |
| Q   | 1.045  | 1.059 | 26.54       | 26.90 |
| R   | .160   | .170  | 4.06        | 4.32  |
| S   | .186   | .191  | 4.72        | 4.85  |
| T   | .968   | .987  | 24.59       | 25.07 |
| U   | -.001  | .002  | -0.03       | 0.05  |
| V   | .130   | .160  | 3.30        | 4.06  |
| W   | .780   | .830  | 19.81       | 21.08 |
| X   | .770   | .810  | 19.56       | 20.57 |
| Y   | .680   | .720  | 17.27       | 18.29 |
| Z   | .885   | .892  | 22.48       | 22.66 |

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

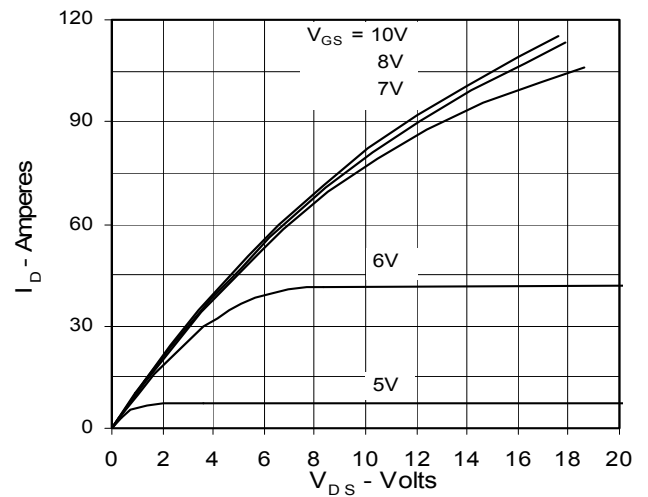
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

4,835,592 4,881,106 5,017,508 5,049,961 5,187,117 5,486,715 6,306,728B1 6,259,123B1 6,306,728B1  
 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

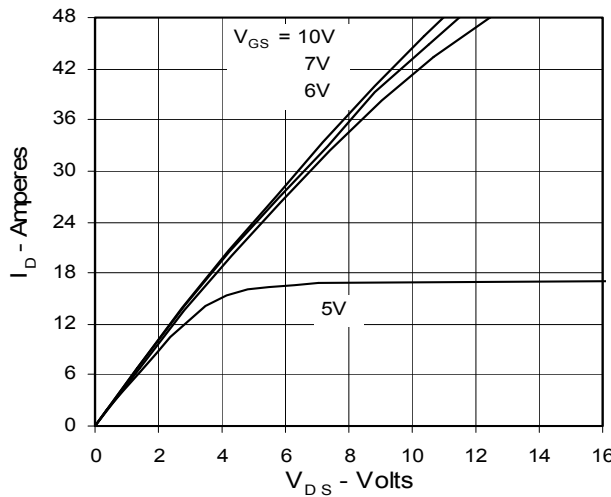
**Fig. 1. Output Characteristics  
@ 25 Deg. C**



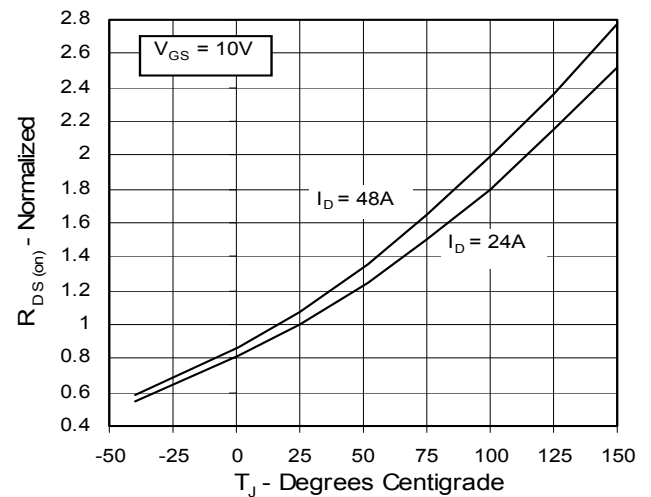
**Fig. 2. Extended Output Characteristics  
@ 25 deg. C**



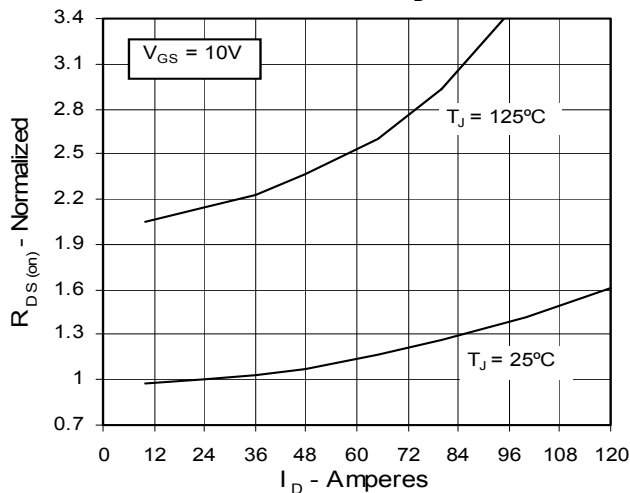
**Fig. 3. Output Characteristics  
@ 125 Deg. C**



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



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



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

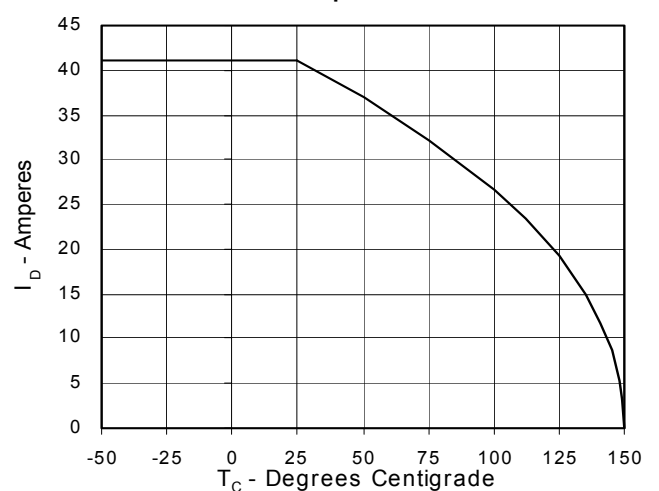


Fig. 7. Input Admittance

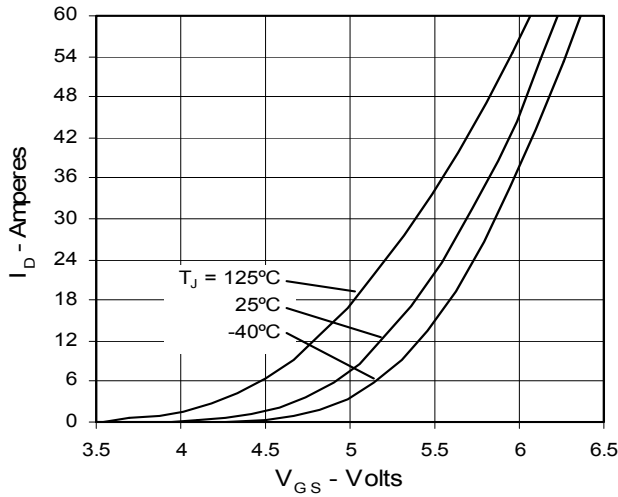


Fig. 8. Transconductance

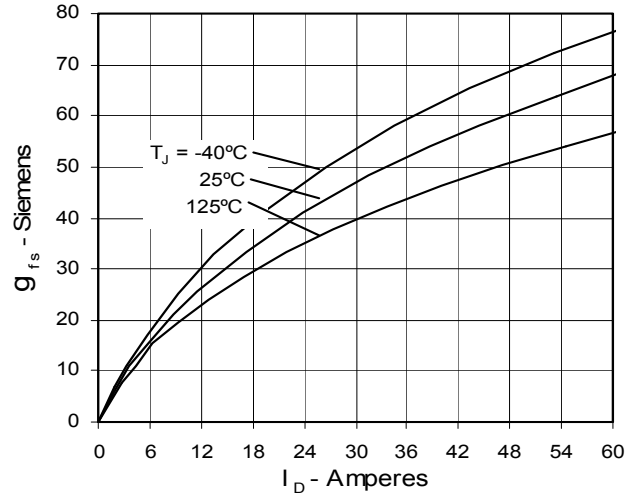


Fig. 9. Source Current vs. Source-To-Drain Voltage

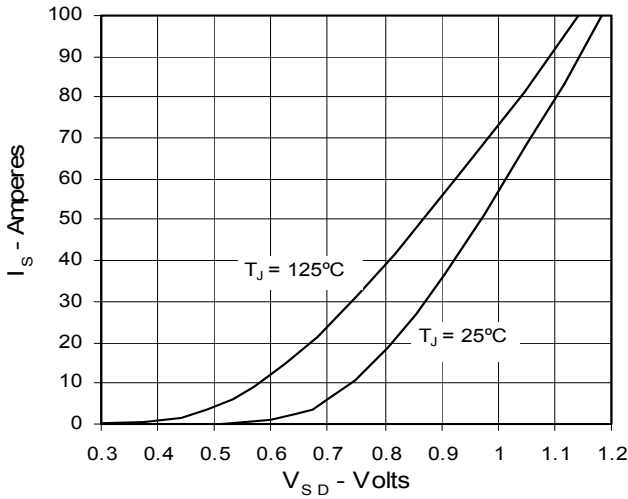


Fig. 10. Gate Charge

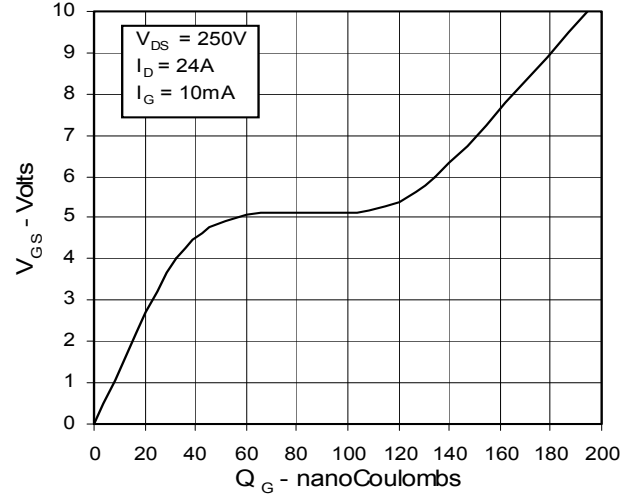


Fig. 11. Capacitance

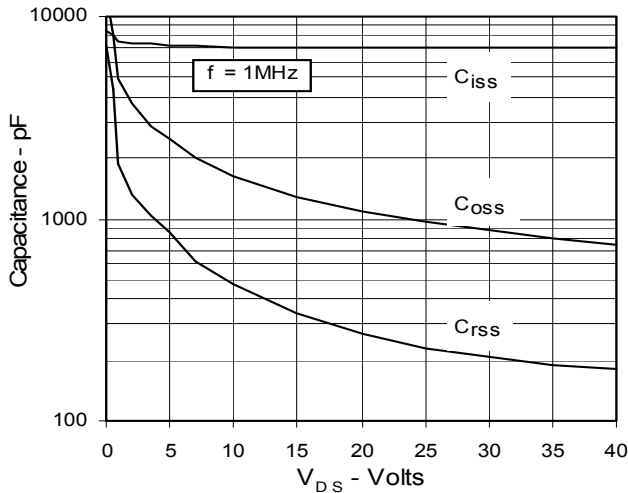
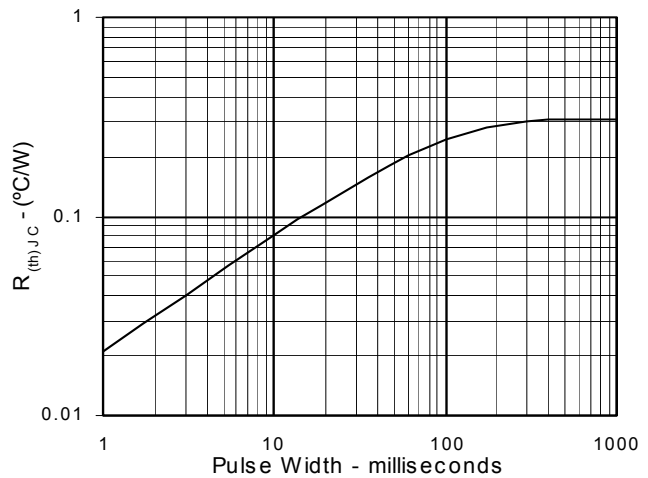


Fig. 12. Maximum Transient Thermal Resistance



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