

# HiPerFET™

## Power MOSFETs

### Q-CLASS

Single MOSFET Die

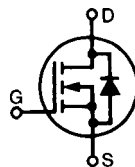
N-Channel Enhancement Mode  
Avalanche Rated, Low Q<sub>g</sub>  
High dV/dt, Low t<sub>rr</sub>

Preliminary data

IXFK/IXFX 48N50Q  
IXFK/IXFX 44N50Q

| V <sub>DSS</sub> | I <sub>D25</sub> | R <sub>DS(on)</sub> |
|------------------|------------------|---------------------|
| 500 V            | 48 A             | 100 mΩ              |
| 500 V            | 44 A             | 120 mΩ              |

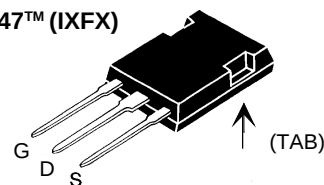
t<sub>rr</sub> ≤ 250 ns



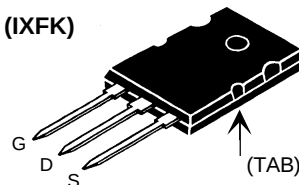
| Symbol           | Test Conditions                                                                                                                         | Maximum Ratings |            |           |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------|-----------|
| V <sub>DSS</sub> | T <sub>J</sub> = 25°C to 150°C                                                                                                          | 500             | V          |           |
| V <sub>DGR</sub> | T <sub>J</sub> = 25°C to 150°C; R <sub>GS</sub> = 1 MΩ                                                                                  | 500             | V          |           |
| V <sub>GS</sub>  | Continuous                                                                                                                              | ±20             | V          |           |
| V <sub>GSM</sub> | Transient                                                                                                                               | ±30             | V          |           |
| I <sub>D25</sub> | T <sub>C</sub> = 25°C                                                                                                                   | 44N50<br>48N50  | 44<br>48   | A         |
| I <sub>DM</sub>  | T <sub>C</sub> = 25°C, pulse width limited by T <sub>JM</sub>                                                                           | 44N50<br>48N50  | 176<br>192 | A         |
| I <sub>AR</sub>  | T <sub>C</sub> = 25°C                                                                                                                   |                 | 48         | A         |
| E <sub>AR</sub>  | T <sub>C</sub> = 25°C                                                                                                                   |                 | 60         | mJ        |
| E <sub>AS</sub>  | T <sub>C</sub> = 25°C                                                                                                                   |                 | 2.5        | J         |
| dv/dt            | I <sub>S</sub> ≤ I <sub>DM</sub> , di/dt ≤ 100 A/μs, V <sub>DD</sub> ≤ V <sub>DSS</sub><br>T <sub>J</sub> ≤ 150°C, R <sub>G</sub> = 2 Ω |                 | 5          | V/ns      |
| P <sub>D</sub>   | T <sub>C</sub> = 25°C                                                                                                                   |                 | 500        | W         |
| T <sub>J</sub>   |                                                                                                                                         | -55 ... +150    | °C         |           |
| T <sub>JM</sub>  |                                                                                                                                         | 150             | °C         |           |
| T <sub>stg</sub> |                                                                                                                                         | -55 ... +150    | °C         |           |
| T <sub>L</sub>   | 1.6 mm (0.063 in.) from case for 10 s                                                                                                   |                 | 300        | °C        |
| M <sub>d</sub>   | Mounting torque                                                                                                                         | TO-264          | 0.4/6      | Nm/lb.in. |
| Weight           |                                                                                                                                         | PLUS 247        | 6          | g         |
|                  |                                                                                                                                         | TO-264          | 10         | g         |

| Symbol              | Test Conditions                                                                       | Characteristic Values<br>(T <sub>J</sub> = 25°C, unless otherwise specified) |      |                  |
|---------------------|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------|------|------------------|
|                     |                                                                                       | min.                                                                         | typ. | max.             |
| V <sub>DSS</sub>    | V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA                                        | 500                                                                          |      | V                |
| V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 4 mA                             | 2.0                                                                          |      | 4.0 V            |
| I <sub>GSS</sub>    | V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0                                          |                                                                              |      | ±100 nA          |
| I <sub>DSS</sub>    | V <sub>DS</sub> = V <sub>DSS</sub><br>V <sub>GS</sub> = 0 V<br>T <sub>J</sub> = 125°C |                                                                              |      | 100 μA<br>2 mA   |
| R <sub>DS(on)</sub> | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.5 • I <sub>D25</sub><br>Note 1             | 44N50<br>48N50                                                               |      | 120 mΩ<br>100 mΩ |

PLUS 247™ (IXFX)



TO-264 AA (IXFK)



G = Gate  
S = Source

D = Drain  
TAB = Drain

#### Features

- IXYS advanced low Q<sub>g</sub> process
- Low gate charge and capacitances
  - easier to drive
  - faster switching
- International standard packages
- Low R<sub>DS(on)</sub>
- Rated for unclamped Inductive load switching (UIS) rated
- Molding epoxies meet UL 94 V-0 flammability classification

#### Applications

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

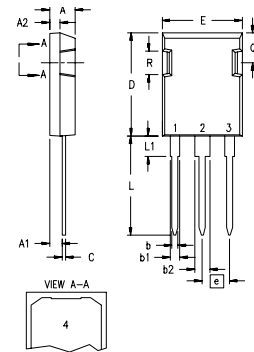
#### Advantages

- PLUS 247™ package for clip or spring mounting
- Space savings
- High power density

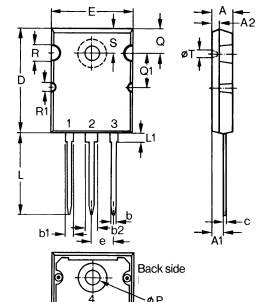
| Symbol       | Test Conditions                                                                                              | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |      |
|--------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|------|
|              |                                                                                                              | min.                                                                              | typ. | max. |
| $g_{fs}$     | $V_{DS} = 10\text{ V}; I_D = 0.5 \cdot I_{D25}$ Note 1                                                       | 30                                                                                | 45   | S    |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                                |                                                                                   | 6400 | pF   |
| $C_{oss}$    |                                                                                                              |                                                                                   | 930  | pF   |
| $C_{rss}$    |                                                                                                              |                                                                                   | 220  | 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), |                                                                                   | 33   | ns   |
| $t_r$        |                                                                                                              |                                                                                   | 22   | ns   |
| $t_{d(off)}$ |                                                                                                              |                                                                                   | 75   | ns   |
| $t_f$        |                                                                                                              |                                                                                   | 10   | ns   |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$                                  |                                                                                   | 190  | nC   |
| $Q_{gs}$     |                                                                                                              |                                                                                   | 40   | nC   |
| $Q_{gd}$     |                                                                                                              |                                                                                   | 86   | nC   |
| $R_{thJC}$   |                                                                                                              |                                                                                   | 0.26 | K/W  |
| $R_{thCK}$   |                                                                                                              | 0.15                                                                              |      | K/W  |

| Source-Drain Diode |                                                                    | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |               |
|--------------------|--------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------|
| Symbol             | Test Conditions                                                    | min.                                                                              | typ. | max.          |
| $I_S$              | $V_{GS} = 0\text{ V}$                                              |                                                                                   |      | 48 A          |
| $I_{SM}$           | Repetitive;<br>pulse width limited by $T_{JM}$                     |                                                                                   |      | 192 A         |
| $V_{SD}$           | $I_F = I_S, V_{GS} = 0\text{ V}$ , Note 1                          |                                                                                   |      | 1.5 V         |
| $t_{rr}$           | $I_F = I_S, -di/dt = 100\text{ A}/\mu\text{s}, V_R = 100\text{ V}$ |                                                                                   |      | 250 ns        |
| $Q_{RM}$           |                                                                    |                                                                                   | 1.4  | $\mu\text{C}$ |
| $I_{RM}$           |                                                                    |                                                                                   | 10   | A             |

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

**PLUS247™ (IXFX) Outline**


| Dim.           | Millimeter |       | Inches   |      |
|----------------|------------|-------|----------|------|
|                | Min.       | Max.  | Min.     | Max. |
| A              | 4.83       | 5.21  | .190     | .205 |
| A <sub>1</sub> | 2.29       | 2.54  | .090     | .100 |
| A <sub>2</sub> | 1.91       | 2.16  | .075     | .085 |
| b              | 1.14       | 1.40  | .045     | .055 |
| b <sub>1</sub> | 1.91       | 2.13  | .075     | .084 |
| b <sub>2</sub> | 2.92       | 3.12  | .115     | .123 |
| C              | 0.61       | 0.80  | .024     | .031 |
| D              | 20.80      | 21.34 | .819     | .840 |
| E              | 15.75      | 16.13 | .620     | .635 |
| e              | 5.45 BSC   |       | .215 BSC |      |
| L              | 19.81      | 20.32 | .780     | .800 |
| L1             | 3.81       | 4.32  | .150     | .170 |
| Q              | 5.59       | 6.20  | .220     | .244 |
| R              | 4.32       | 4.83  | .170     | .190 |

**TO-264 AA (IXFK) Outline**


| Dim.           | Millimeter |       | Inches   |       |
|----------------|------------|-------|----------|-------|
|                | Min.       | Max.  | Min.     | Max.  |
| A              | 4.82       | 5.13  | .190     | .202  |
| A <sub>1</sub> | 2.54       | 2.89  | .100     | .114  |
| A <sub>2</sub> | 2.00       | 2.10  | .079     | .083  |
| b              | 1.12       | 1.42  | .044     | .056  |
| b <sub>1</sub> | 2.39       | 2.69  | .094     | .106  |
| b <sub>2</sub> | 2.90       | 3.09  | .114     | .122  |
| c              | 0.53       | 0.83  | .021     | .033  |
| D              | 25.91      | 26.16 | 1.020    | 1.030 |
| E              | 19.81      | 19.96 | .780     | .786  |
| e              | 5.46 BSC   |       | .215 BSC |       |
| J              | 0.00       | 0.25  | .000     | .010  |
| K              | 0.00       | 0.25  | .000     | .010  |
| L              | 20.32      | 20.83 | .800     | .820  |
| L1             | 2.29       | 2.59  | .090     | .102  |
| P              | 3.17       | 3.66  | .125     | .144  |
| Q              | 6.07       | 6.27  | .239     | .247  |
| Q1             | 8.38       | 8.69  | .330     | .342  |
| R              | 3.81       | 4.32  | .150     | .170  |
| R1             | 1.78       | 2.29  | .070     | .090  |
| S              | 6.04       | 6.30  | .238     | .248  |
| T              | 1.57       | 1.83  | .062     | .072  |