

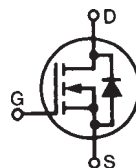
# HiPerFET™ Power MOSFETs Q-Class

**IXFK 32N50Q**  
**IXFX 32N50Q**

| $V_{DSS}$ | $I_{D25}$ | $R_{DS(on)}$  |
|-----------|-----------|---------------|
| 500 V     | 32 A      | 0.16 $\Omega$ |
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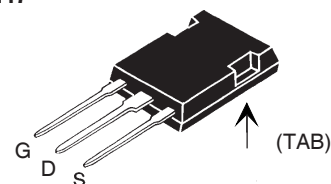
$t_{rr} \leq 250$  ns

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

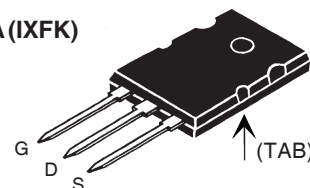


| Symbol    | Test Conditions  | Maximum Ratings |                  |
|-----------|--|-----------------|------------------|
| $V_{DSS}$ | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$  | 500             | V                |
| $V_{DGR}$ | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1$ M $\Omega$  | 500             | V                |
| $V_{GS}$  | Continuous   | $\pm 20$        | V                |
| $V_{GSM}$ | Transient  | $\pm 30$        | V                |
| $I_{D25}$ | $T_C = 25^\circ\text{C}$   | 32              | A                |
| $I_{DM}$  | $T_C = 25^\circ\text{C}$ ,<br>pulse width limited by $T_{JM}$  | 120             | A                |
| $I_{AR}$  | $T_C = 25^\circ\text{C}$   | 32              | A                |
| $E_{AR}$  | $T_C = 25^\circ\text{C}$   | 45              | mJ               |
| $E_{AS}$  |  | 1500            | mJ               |
| $dv/dt$   | $I_S \leq I_{DM}$ , $di/dt \leq 100$ A/ $\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 2$ $\Omega$ | 5               | V/ns             |
| $P_D$     | $T_C = 25^\circ\text{C}$   | 416             | 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             | $^\circ\text{C}$ |
| $M_d$     | Mounting torque  | 1.13/10         | Nm/lb.in.        |
| Weight    | TO-247   | 6               | g                |
|           | TO-268   | 4               | g                |

**PLUS 247™  
(IXFX)**



**TO-264 AA (IXFK)**



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

## Features

- IXYS advanced low  $Q_g$  process
- Low gate charge and capacitances
  - easier to drive
  - faster switching
- International standard packages
- Low  $R_{DS(on)}$
- Unclamped Inductive Switching (UIS) rated
- Molding epoxies meet UL 94 V-0 flammability classification

## Advantages

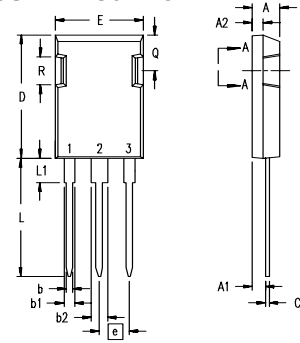
- PLUS 247™ package for clip or spring mounting
- Space savings
- High power density

| Symbol       | Test Conditions                                  | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                   |
|--------------|--|---|------|-------------------|
|              |  | min.  | typ. | max.              |
| $V_{DSS}$    | $V_{GS} = 0$ V, $I_D = 250$ $\mu\text{A}$        | 500   |      | V                 |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 4$ mA                 | 2.5   |      | 4.5 V             |
| $I_{GSS}$    | $V_{GS} = \pm 20$ V $_{DC}$ , $V_{DS} = 0$       |   |      | $\pm 100$ nA      |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0$ V             | $T_J = 25^\circ\text{C}$  |      | 100 $\mu\text{A}$ |
|              |  | $T_J = 125^\circ\text{C}$   |      | 1 mA              |
| $R_{DS(on)}$ | $V_{GS} = 10$ V, $I_D = 0.5$ $I_{D25}$<br>Note 1 |   |      | 0.16 $\Omega$     |

| Symbol       | Test Conditions  | Characteristic Values  |      |      |
|--------------|--|--|------|------|
|              |  | $(T_J = 25^\circ\text{C}, \text{ unless otherwise specified})$ |      |      |
|              |  | min.   | typ. | max. |
| $g_{fs}$     | $V_{DS} = 10\text{ V}; I_D = 0.5 \cdot I_{D25}$ Note 1   | 18   | 28   | S    |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$  |  | 3950 | pF   |
| $C_{oss}$    |  |  | 640  | pF   |
| $C_{rss}$    |  |  | 210  | pF   |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$<br>$R_G = 2\ \Omega$ (External), |  | 35   | ns   |
| $t_r$        |  |  | 42   | ns   |
| $t_{d(off)}$ |  |  | 75   | ns   |
| $t_f$        |  |  | 20   | ns   |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$                                  |  | 150  | nC   |
| $Q_{gs}$     |  |  | 26   | nC   |
| $Q_{gd}$     |  |  | 85   | nC   |
| $R_{thJC}$   |  |  | 0.3  | K/W  |
| $R_{thCK}$   |  | 0.15   |      | K/W  |

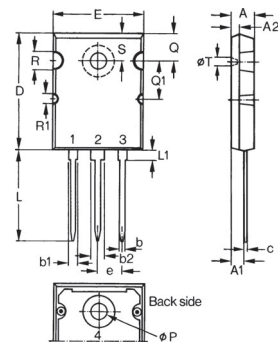
| Symbol   | Test Conditions  | Characteristic Values  |      |               |
|----------|--|--|------|---------------|
|          |  | $(T_J = 25^\circ\text{C}, \text{ unless otherwise specified})$ |      |               |
|          |  | min.   | typ. | max.          |
| $I_S$    | $V_{GS} = 0\text{ V}$  |  |      | 32 A          |
| $I_{SM}$ | Repetitive;<br>pulse width limited by $T_{JM}$                             |  |      | 128 A         |
| $V_{SD}$ | $I_F = I_S, V_{GS} = 0\text{ V}, \text{ Note 1}$                           |  |      | 1.5 V         |
| $t_{rr}$ | $I_F = 25\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}, V_R = 100\text{ V}$ |  |      | 250 ns        |
| $Q_{RM}$ |  |  | 0.75 | $\mu\text{C}$ |
| $I_{RM}$ |  |  | 7.5  | A             |

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

**PLUS247™ Outline**


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

| 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     | 0.244 |
| R              | 4.32       | 4.83  | .170     | .190  |

**TO-264 AA Outline**


| Dim. | Millimeter |       | Inches   |       |
|------|------------|-------|----------|-------|
|      | Min.       | Max.  | Min.     | Max.  |
| A    | 4.82       | 5.13  | .190     | .202  |
| A1   | 2.54       | 2.89  | .100     | .114  |
| A2   | 2.00       | 2.10  | .079     | .083  |
| b    | 1.12       | 1.42  | .044     | .056  |
| b1   | 2.39       | 2.69  | .094     | .106  |
| b2   | 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  |

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

Figure 1. Output Characteristics at 25°C

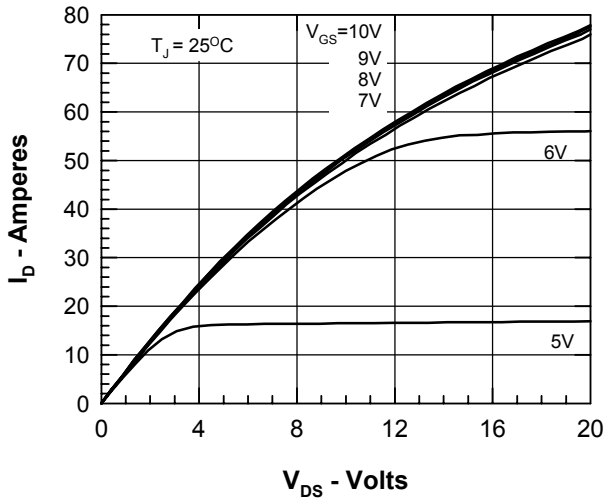


Figure 2. Output Characteristics at 125°C

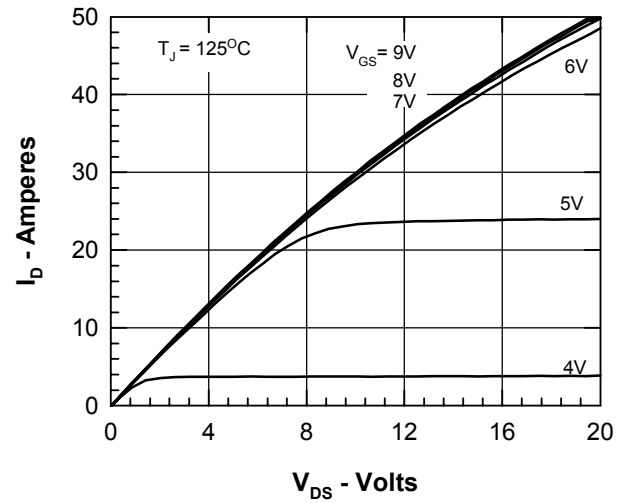


Figure 3.  $R_{DS(on)}$  normalized to 15A/25°C vs.  $I_D$

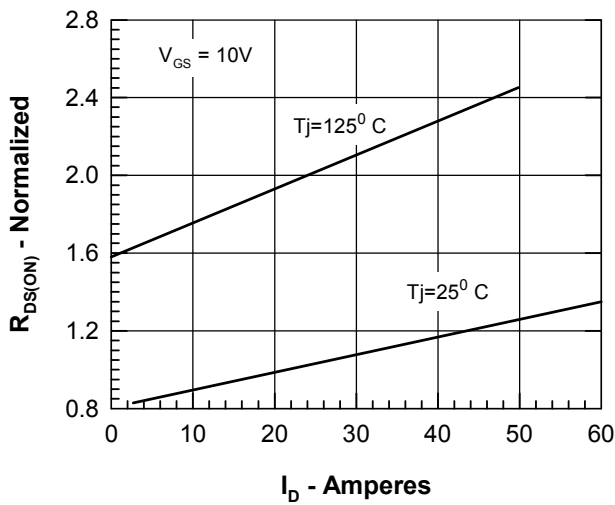


Figure 5. Drain Current vs. Case Temperature

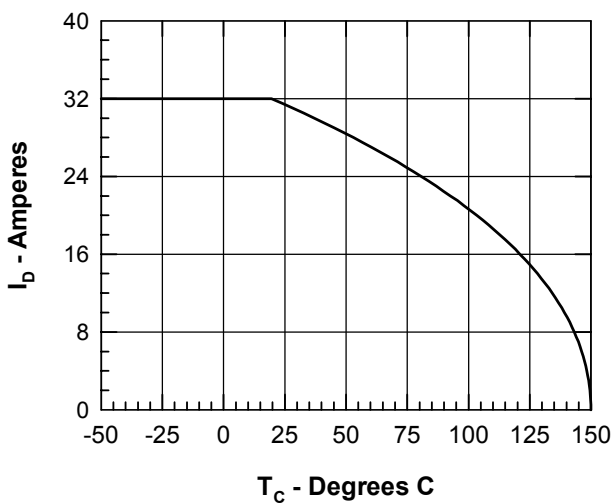


Figure 4.  $R_{DS(on)}$  normalized to 15A/25°C vs.  $T_J$

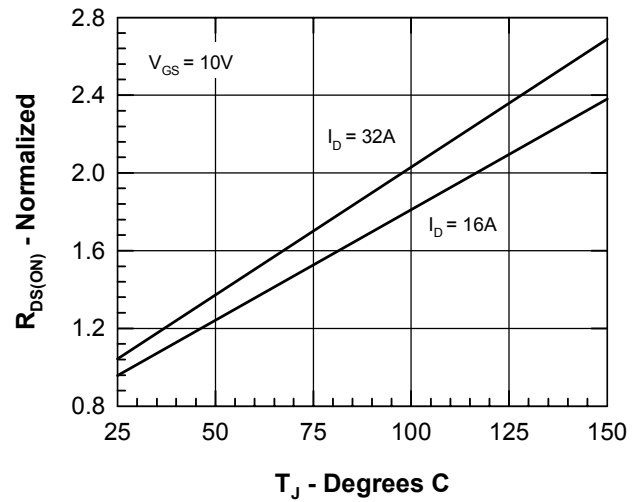


Figure 6. Admittance Curves

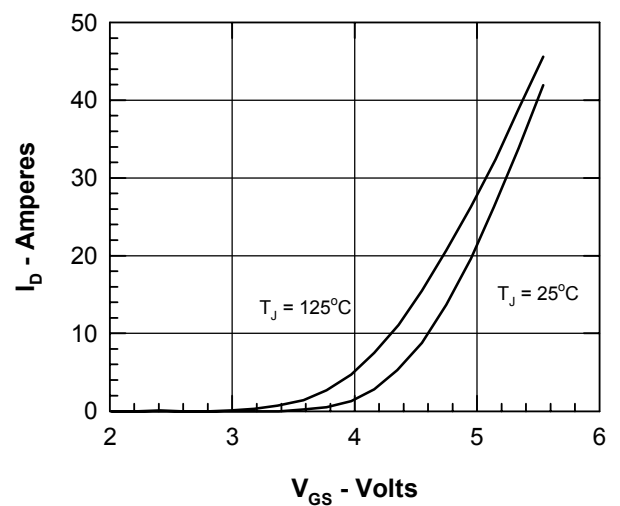


Figure 7. Gate Charge

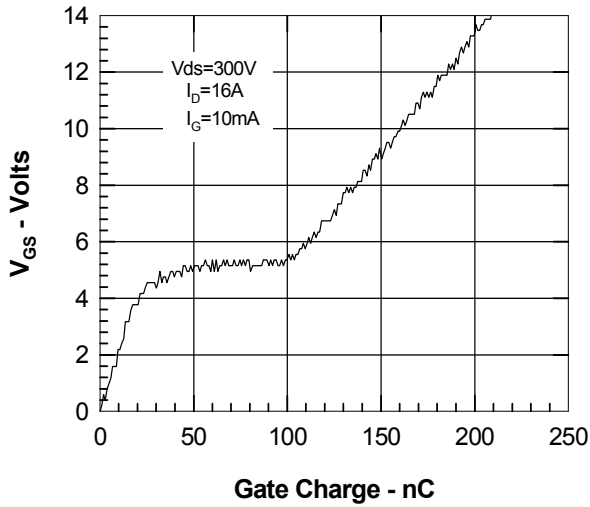


Figure 8. Capacitance Curves

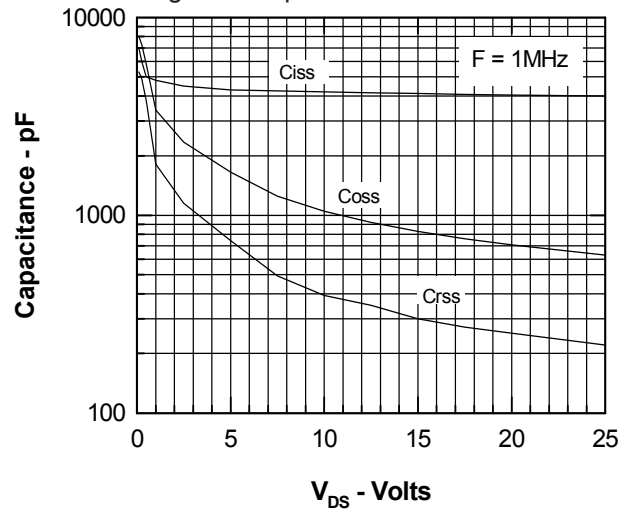


Figure 9. Forward Voltage Drop of the Intrinsic Diode

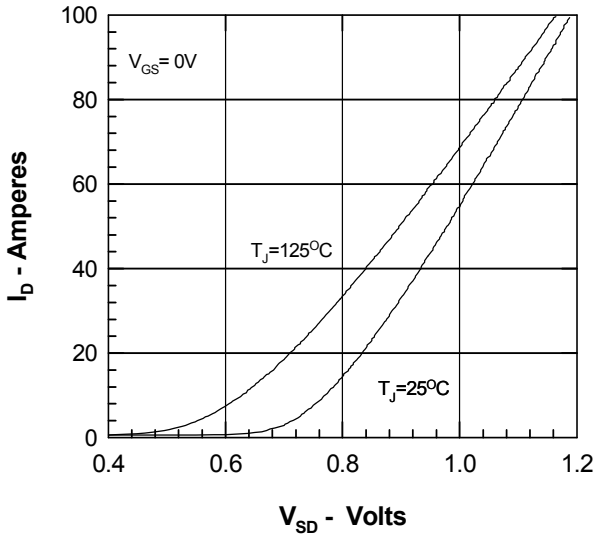


Figure 10. Transient Thermal Resistance

