

# HiPerFET™

## Power MOSFETs

### Q Class

IXFH/IXFT12N100Q  
IXFH/IXFT10N100Q

| $V_{DSS}$ | $I_{D25}$ | $R_{DS(on)}$  |
|-----------|-----------|---------------|
| 1000 V    | 12 A      | 1.05 $\Omega$ |
| 1000 V    | 10 A      | 1.20 $\Omega$ |

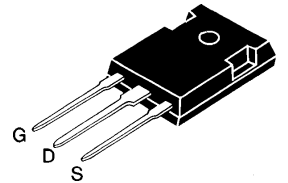
$t_{rr} \leq 250$  ns

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

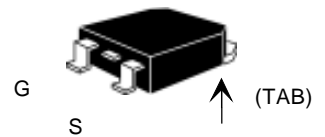


| Symbol    | Test Conditions  | Maximum Ratings |                  |
|-----------|--|-----------------|------------------|
| $V_{DSS}$ | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$  | 1000            | V                |
| $V_{DGR}$ | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1$ M $\Omega$  | 1000            | V                |
| $V_{GS}$  | Continuous   | $\pm 20$        | V                |
| $V_{GSM}$ | Transient  | $\pm 30$        | V                |
| $I_{D25}$ | $T_C = 25^\circ\text{C}$   | 12N100Q         | 12 A             |
|           |  | 10N100Q         | 10 A             |
| $I_{DM}$  | $T_C = 25^\circ\text{C}$ ,<br>pulse width limited by $T_{JM}$  | 12N100Q         | 48 A             |
|           |  | 10N100Q         | 40 A             |
| $I_{AR}$  | $T_C = 25^\circ\text{C}$   | 12N100Q         | 12 A             |
|           |  | 10N100Q         | 10 A             |
| $E_{AR}$  | $T_C = 25^\circ\text{C}$   | 30              | 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             |
| $P_D$     | $T_C = 25^\circ\text{C}$   | 300             | 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 AD       | 6 g              |
|           |  | TO-268          | 4 g              |

TO-247 AD (IXFH)



TO-268 (D3) (IXFT)



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

| Symbol       | Test Conditions  | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                  |
|--------------|--|---|------|------------------|
|              |  | min.  | typ. | max.             |
| $V_{DSS}$    | $V_{GS} = 0$ V, $I_D = 3$ mA   | 1000  |      | V                |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 4$ mA   | 2.5   |      | 5.5 V            |
| $I_{GSS}$    | $V_{GS} = \pm 20$ V $_{DC}$ , $V_{DS} = 0$   |   |      | $\pm 100$ nA     |
| $I_{DSS}$    | $V_{DS} = 0.8 \cdot V_{DSS}$<br>$V_{GS} = 0$ V   | $T_J = 25^\circ\text{C}$  |      | 50 $\mu\text{A}$ |
|              |  | $T_J = 125^\circ\text{C}$   |      | 1 mA             |
| $R_{DS(on)}$ | $V_{GS} = 10$ V, $I_D = 0.5 I_{D25}$<br>Pulse test, $t \leq 300$ $\mu\text{s}$ , duty cycle $d \leq 2$ % | 12N100Q   |      | 1.05 $\Omega$    |
|              |  | 10N100Q   |      | 1.20 $\Omega$    |

#### 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

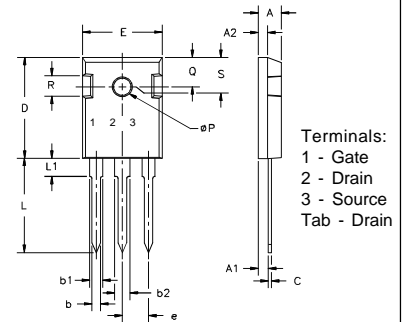
- Easy to mount
- Space savings
- High power density

| Symbol       | Test Conditions  | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |      |
|--------------|--|---|------|------|
|              |  | min.  | typ. | max. |
| $g_{fs}$     | $V_{DS} = 15\text{ V}; I_D = 0.5 \cdot I_{D25}$ , pulse test   | 4   | 10   | S    |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$  |   | 2900 | pF   |
| $C_{oss}$    |  |   | 315  | pF   |
| $C_{rss}$    |  |   | 50   | 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), |   | 20   | ns   |
| $t_r$        |  |   | 23   | ns   |
| $t_{d(off)}$ |  |   | 40   | ns   |
| $t_f$        |  |   | 15   | ns   |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$                                  |   | 90   | nC   |
| $Q_{gs}$     |  |   | 30   | nC   |
| $Q_{gd}$     |  |   | 40   | nC   |
| $R_{thJC}$   | (TO-247)   |   | 0.42 | K/W  |
| $R_{thCK}$   |  |   | 0.25 | K/W  |

### Source-Drain Diode

| Symbol   | Test Conditions   | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |               |
|----------|---|---|------|---------------|
|          |   | min.  | typ. | max.          |
| $I_S$    | $V_{GS} = 0\text{ V}$   |   |      | 12 A          |
| $I_{SM}$ | Repetitive; pulse width limited by $T_{JM}$   |   |      | 48 A          |
| $V_{SD}$ | $I_F = I_S, V_{GS} = 0\text{ V}$ ,<br>Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$ |   |      | 1.5 V         |
| $t_{TR}$ | $I_F = I_S, -di/dt = 100\text{ A}/\mu\text{s}, V_R = 100\text{ V}$                                    |   | 200  | ns            |
| $Q_{RM}$ |   |   | 0.6  | $\mu\text{C}$ |
| $I_{RM}$ |   |   | 7    | A             |

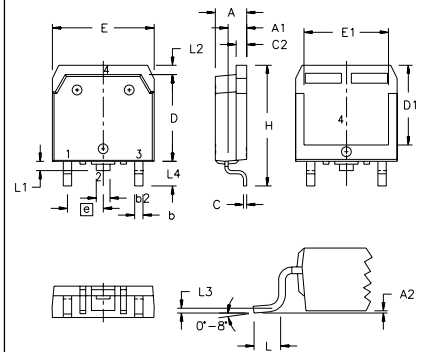
### TO-247 AD (IXFH) Outline



Terminals:  
1 - Gate  
2 - Drain  
3 - Source  
Tab - Drain

| Dim.           | Millimeter |       | Inches |       |
|----------------|------------|-------|--------|-------|
|                | Min.       | Max.  | Min.   | Max.  |
| A              | 4.7        | 5.3   | .185   | .209  |
| A <sub>1</sub> | 2.2        | 2.54  | .087   | .102  |
| A <sub>2</sub> | 2.2        | 2.6   | .087   | .102  |
| b              | 1.0        | 1.4   | .040   | .055  |
| b <sub>1</sub> | 1.65       | 2.13  | .065   | .084  |
| b <sub>2</sub> | 2.87       | 3.12  | .113   | .123  |
| C              | .4         | .8    | .016   | .031  |
| D              | 20.80      | 21.46 | .819   | .845  |
| E              | 15.75      | 16.26 | .610   | .640  |
| e              | 5.20       | 5.72  | 0.205  | 0.225 |
| L              | 19.81      | 20.32 | .780   | .800  |
| L <sub>1</sub> |            | 4.50  |        | .177  |
| ∅P             | 3.55       | 3.65  | .140   | .144  |
| Q              | 5.89       | 6.40  | 0.232  | 0.252 |
| R              | 4.32       | 5.49  | .170   | .216  |
| S              | 6.15       | BSC   | .242   | BSC   |

### TO-268 Outline



| SYM            | INCHES |      | MILLIMETERS |       |
|----------------|--------|------|-------------|-------|
|                | MIN    | MAX  | MIN         | MAX   |
| A              | .193   | .201 | 4.90        | 5.10  |
| A <sub>1</sub> | .106   | .114 | 2.70        | 2.90  |
| A <sub>2</sub> | .001   | .010 | 0.02        | 0.25  |
| b              | .045   | .057 | 1.15        | 1.45  |
| b <sub>2</sub> | .075   | .083 | 1.90        | 2.10  |
| C              | .016   | .026 | 0.40        | 0.65  |
| C <sub>2</sub> | .057   | .063 | 1.45        | 1.60  |
| D              | .543   | .551 | 13.80       | 14.00 |
| D <sub>1</sub> | .488   | .500 | 12.40       | 12.70 |
| E              | .624   | .632 | 15.85       | 16.05 |
| E <sub>1</sub> | .524   | .535 | 13.30       | 13.60 |
| e              | .215   | BSC  | 5.45        | BSC   |
| H              | .736   | .752 | 18.70       | 19.10 |
| L              | .094   | .106 | 2.40        | 2.70  |
| L <sub>1</sub> | .047   | .055 | 1.20        | 1.40  |
| L <sub>2</sub> | .039   | .045 | 1.00        | 1.15  |
| L <sub>3</sub> | .010   | BSC  | 0.25        | BSC   |
| L <sub>4</sub> | .150   | .161 | 3.80        | 4.10  |

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

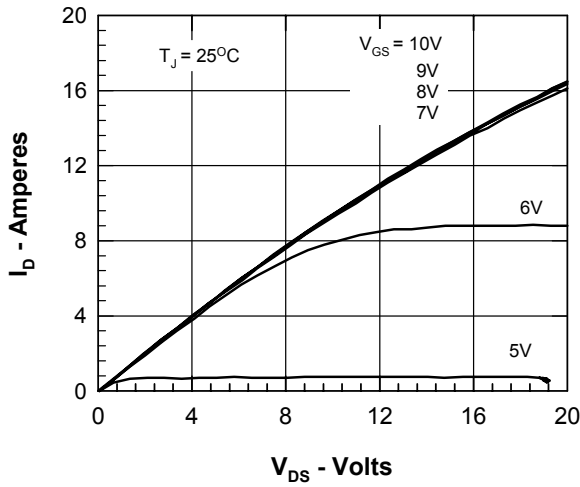


Figure 1. Output Characteristics at 25°C

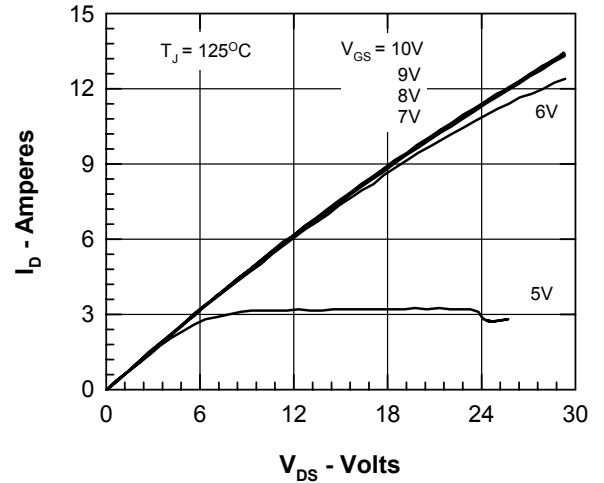


Figure 2. Output Characteristics at 125°C

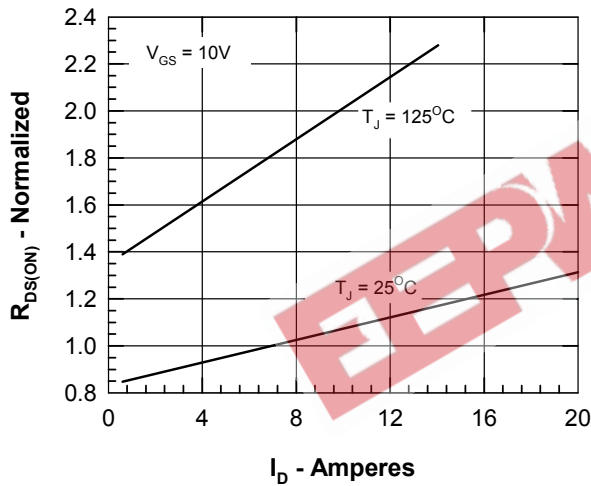


Figure 3.  $R_{DS(on)}$  normalized to value at  $I_D = 12A$

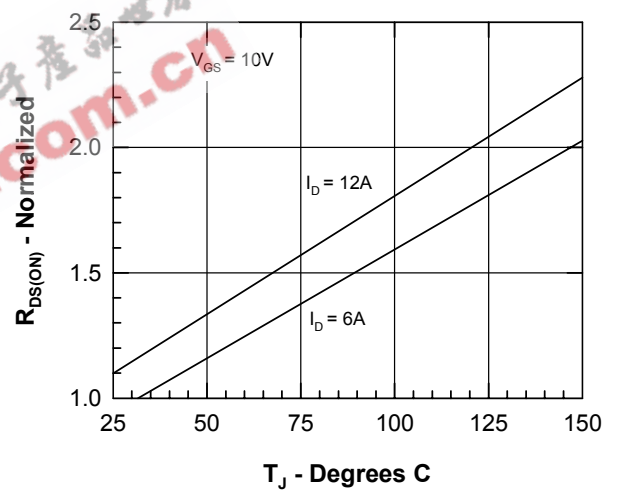


Figure 4.  $R_{DS(on)}$  normalized to value at  $I_D = 12A$

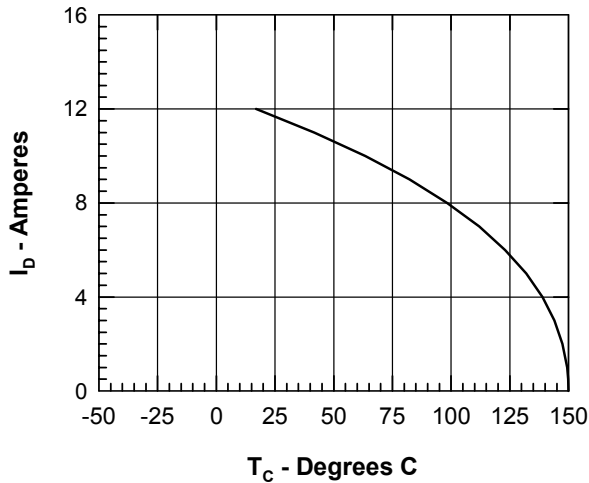


Figure 5. Drain Current vs. Case Temperature

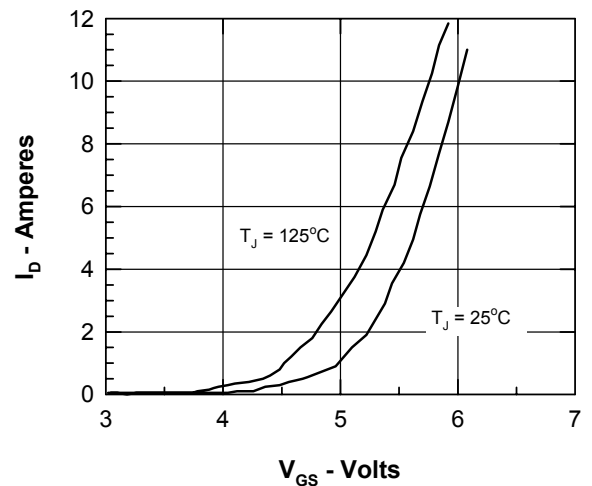


Figure 6. Admittance Curves

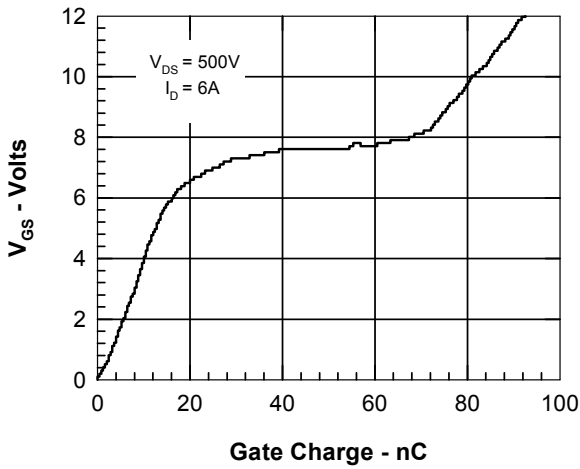


Figure 7. Gate Charge

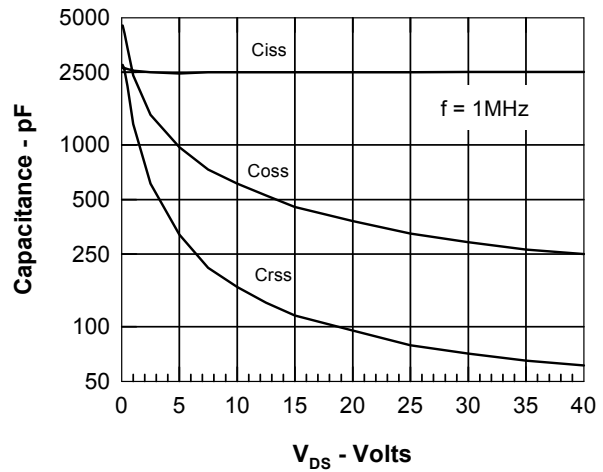


Figure 8. Capacitance Curves

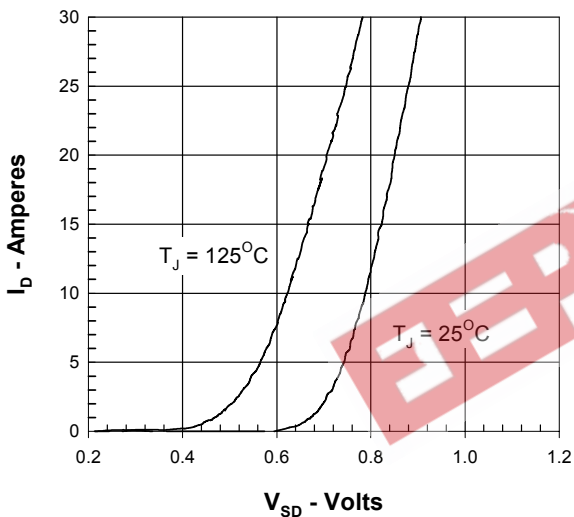


Figure 9. Source Current vs. Source to Drain Voltage

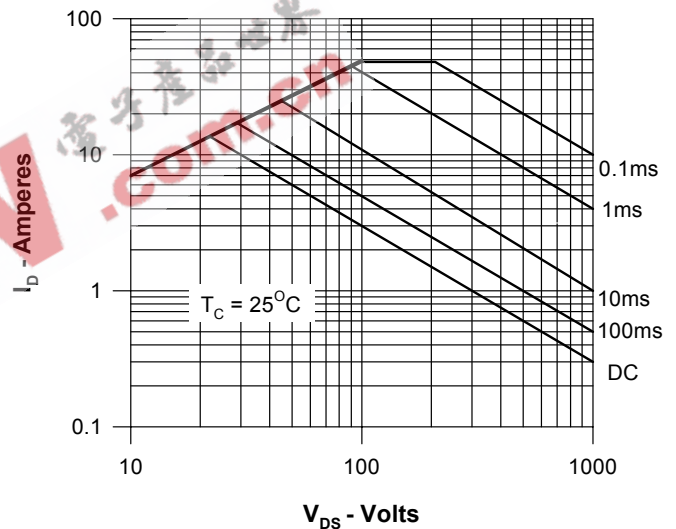


Figure 10. Forward Bias Safe Operating Area

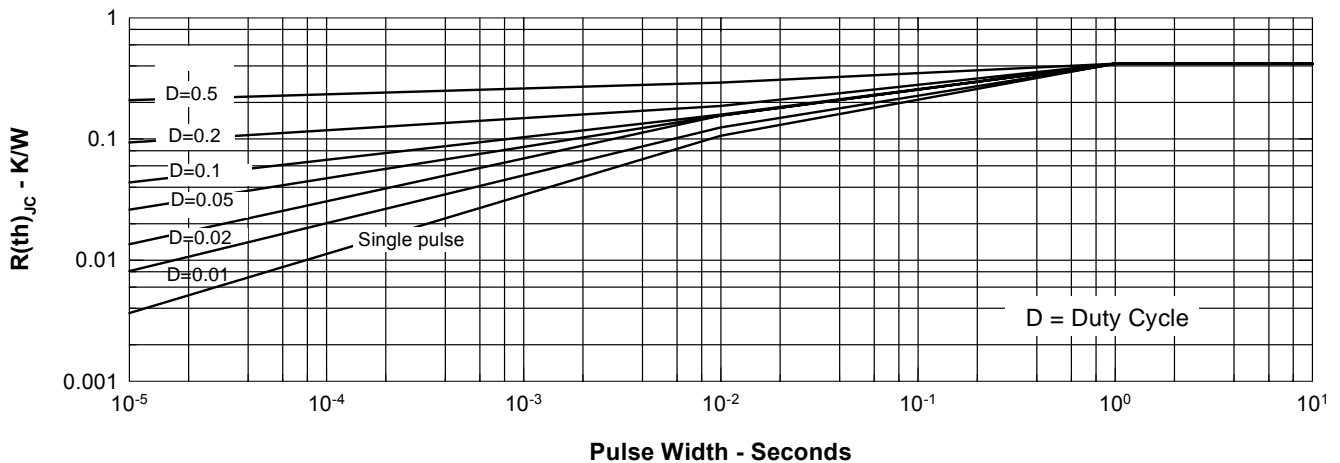


Figure 11. Transient Thermal Resistance

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 |
| 4,850,072 | 4,931,844 | 5,034,796 | 5,063,307 | 5,237,481 | 5,381,025 |             |