

# HiPerFET™

## Power MOSFETs

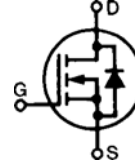
### Q-Class

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

IXFH/IXFT 24N50Q  
IXFH/IXFT 26N50Q

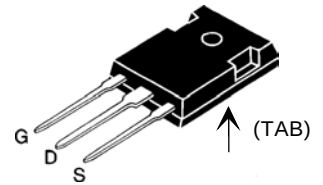
| $V_{DSS}$ | $I_{D25}$ | $R_{DS(on)}$  |
|-----------|-----------|---------------|
| 500 V     | 24 A      | 0.23 $\Omega$ |
| 500 V     | 26 A      | 0.20 $\Omega$ |

$t_{rr} \leq 250$  ns

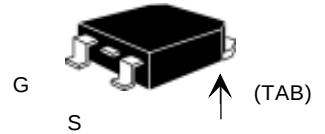


| Symbol    | Test Conditions                                                                                                                      | Maximum Ratings           |                  |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------|------------------|
| $V_{DSS}$ | $T_J = 25^\circ\text{C}$ 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                |
| $I_{D25}$ | $T_C = 25^\circ\text{C}$                                                                                                             | 24N50Q: 24<br>26N50Q: 26  | A                |
| $I_{DM}$  | $T_C = 25^\circ\text{C}$ , Note 1                                                                                                    | 24N50Q: 96<br>26N50Q: 104 | A                |
| $I_{AR}$  | $T_C = 25^\circ\text{C}$                                                                                                             | 24N50Q: 24<br>26N50Q: 26  | A                |
| $E_{AR}$  | $T_C = 25^\circ\text{C}$                                                                                                             | 30                        | mJ               |
| $E_{AS}$  | $T_C = 25^\circ\text{C}$                                                                                                             | 1.5                       | J                |
| $dv/dt$   | $I_S \leq I_{DM}$ , $di/dt \leq 100$ 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<br>TO-268                                                                                                                     | 6<br>4                    | g                |

TO-247 AD (IXFH)



TO-268 (D3) (IXFT) Case Style



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

#### Features

- IXYS advanced low  $Q_g$  process
- International standard packages
- Low  $R_{DS(on)}$
- Unclamped Inductive Switching (UIS) rated
- Fast switching
- Molding epoxies meet UL 94 V-0 flammability classification

#### Advantages

- Easy to mount
- Space savings
- High power density

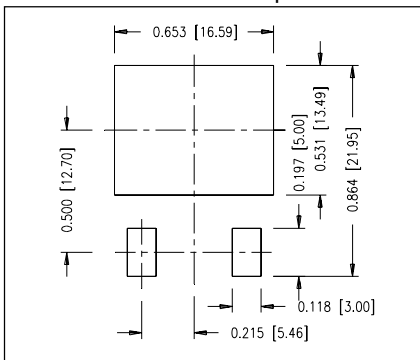
| Symbol       | Test Conditions                                                                              | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                                |
|--------------|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|--------------------------------|
|              |                                                                                              | min.                                                                              | typ. | max.                           |
| $V_{DSS}$    | $V_{GS} = 0$ 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 <sub>DC</sub> , $V_{DS} = 0$                                             |                                                                                   |      | $\pm 100$ nA                   |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0$ V<br>$T_J = 25^\circ\text{C}$<br>$T_J = 125^\circ\text{C}$ |                                                                                   |      | 25 $\mu\text{A}$<br>1 mA       |
| $R_{DS(on)}$ | $V_{GS} = 10$ V, $I_D = 0.5 I_{D25}$<br>Note 2                                               | 24N50Q<br>26N50Q                                                                  |      | 0.23 $\Omega$<br>0.20 $\Omega$ |

| 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 2                                                     | 14                                                                                | 24   | S        |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                                |                                                                                   | 3900 | pF       |
| $C_{oss}$    |                                                                                                              |                                                                                   | 500  | pF       |
| $C_{rss}$    |                                                                                                              |                                                                                   | 130  | 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), |                                                                                   | 28   | ns       |
| $t_r$        |                                                                                                              |                                                                                   | 30   | ns       |
| $t_{d(off)}$ |                                                                                                              |                                                                                   | 55   | ns       |
| $t_f$        |                                                                                                              |                                                                                   | 16   | ns       |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$                                  |                                                                                   | 95   | nC       |
| $Q_{gs}$     |                                                                                                              |                                                                                   | 27   | nC       |
| $Q_{gd}$     |                                                                                                              |                                                                                   | 40   | nC       |
| $R_{thJC}$   | (TO-247)                                                                                                     |                                                                                   |      | 0.42 K/W |
| $R_{thCK}$   |                                                                                                              |                                                                                   | 0.25 | K/W      |

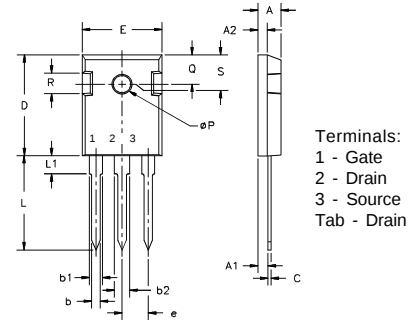
| Source-Drain Diode |                                                                                                      | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |               |
|--------------------|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------|
| Symbol             | Test Conditions                                                                                      | min.                                                                              | typ. | max.          |
| $I_S$              | $V_{GS} = 0\text{ V}$                                                                                | 24N50Q<br>26N50Q                                                                  |      | 24 A<br>26 A  |
| $I_{SM}$           | Repetitive; Note1                                                                                    | 24N50Q<br>26N50Q                                                                  |      | 96 A<br>104 A |
| $V_{SD}$           | $I_F = I_S, V_{GS} = 0\text{ V},$<br>Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$ |                                                                                   |      | 1.3 V         |
| $t_{rr}$           | $I_F = I_S, -di/dt = 100\text{ A}/\mu\text{s}, V_R = 100\text{ V}$                                   |                                                                                   | 0.85 | 250 ns        |
| $Q_{RM}$           |                                                                                                      |                                                                                   |      | $\mu\text{C}$ |
| $I_{RM}$           |                                                                                                      |                                                                                   | 8    | A             |

Note 1. Pulse width limited by  $T_{JM}$   
2. Pulse test,  $t \leq 300\ \mu\text{s}$ , duty cycle  $d \leq 2\%$

## Min Recommended Footprint



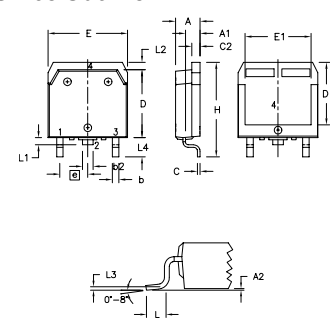
## TO-247 AD Outline



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

| Dim.           | Millimeter<br>Min. Max. | Inches<br>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                 | .059 .098           |
| 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           |
| L1             | 4.50                    | .177                |
| ØP             | 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



| Dim.           | Millimeter<br>Min. Max. | Inches<br>Min. Max. |
|----------------|-------------------------|---------------------|
| A              | 4.9 5.1                 | .193 .201           |
| A <sub>1</sub> | 2.7 2.9                 | .106 .114           |
| A <sub>2</sub> | .02 .25                 | .001 .010           |
| b              | 1.15 1.45               | .045 .057           |
| b <sub>2</sub> | 1.9 2.1                 | .075 .083           |
| C              | .4 .65                  | .016 .026           |
| D              | 13.80 14.00             | .543 .551           |
| E              | 15.85 16.05             | .624 .632           |
| E <sub>1</sub> | 13.3 13.6               | .524 .535           |
| e              | 5.45 BSC                | .215 BSC            |
| H              | 18.70 19.10             | .736 .752           |
| L              | 2.40 2.70               | .094 .106           |
| L1             | 1.20 1.40               | .047 .055           |
| L2             | 1.00 1.15               | .039 .045           |
| L3             | 0.25 BSC                | .010 BSC            |
| L4             | 3.80 4.10               | .150 .161           |

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 |             |

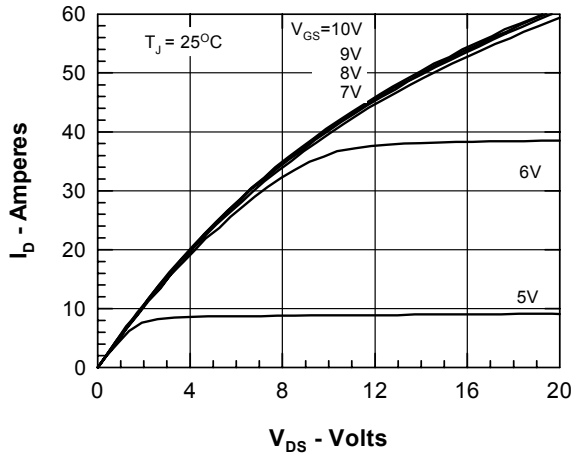


Fig.1 Output Characteristics @  $T_J = 25^\circ\text{C}$

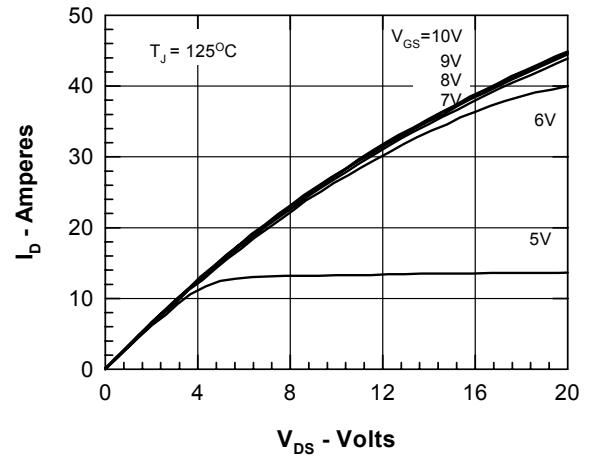


Fig.2 Output Characteristics @  $T_J = 125^\circ\text{C}$

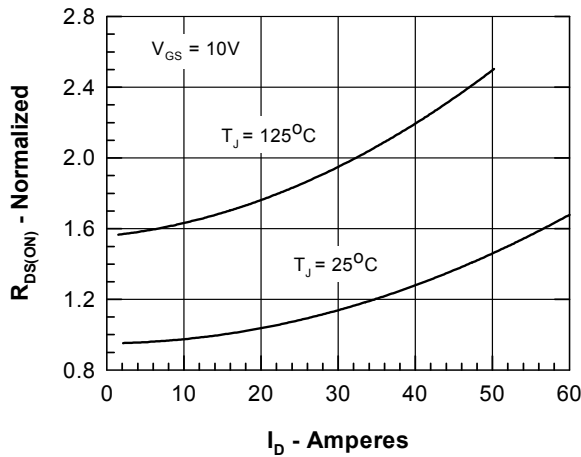


Fig.3  $R_{DS(on)}$  vs. Drain Current

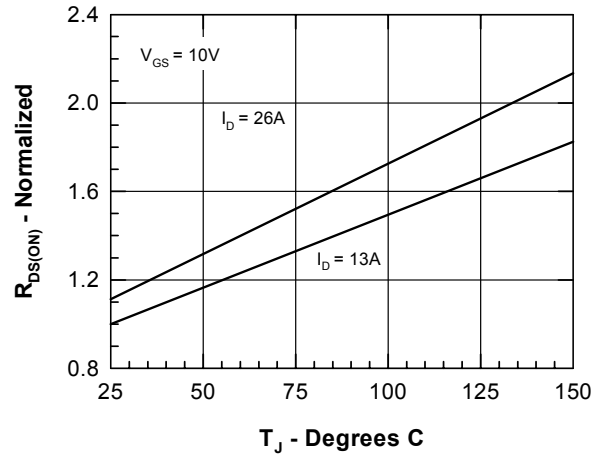


Fig.4 Temperature Dependence of Drain to Source Resistance

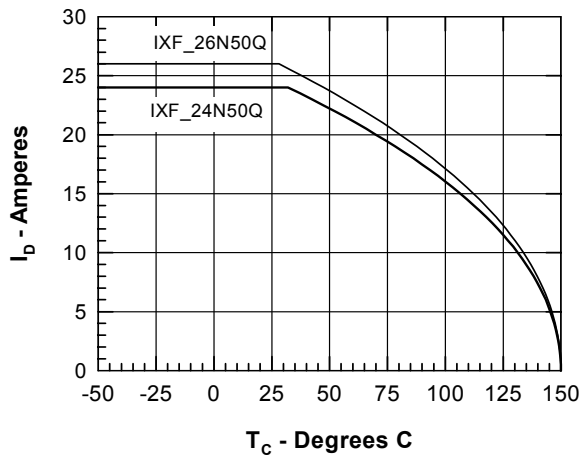


Fig.5 Drain Current vs. Case Temperature

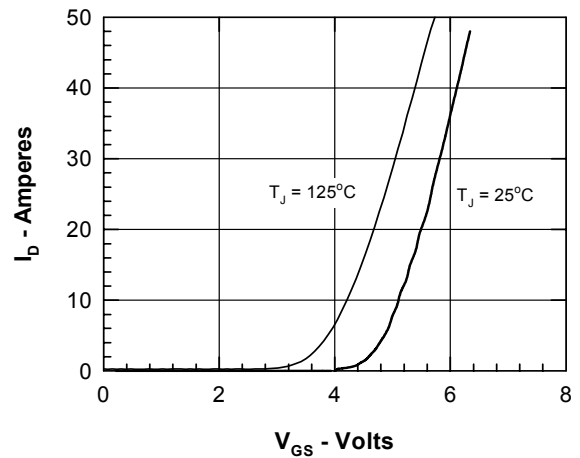


Fig.6 Drain Current vs Gate Source Voltage

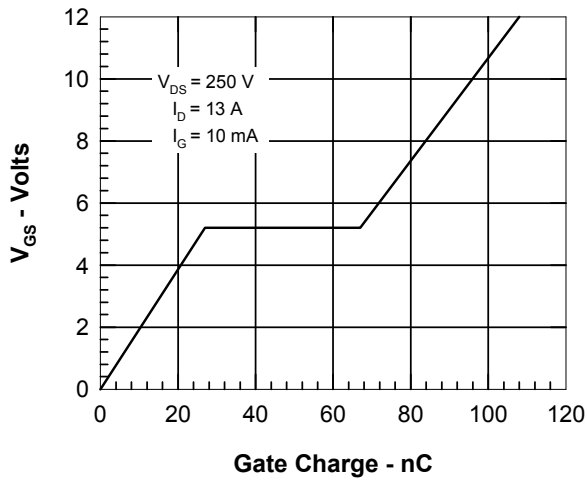


Fig.7 Gate Charge Characteristic Curve

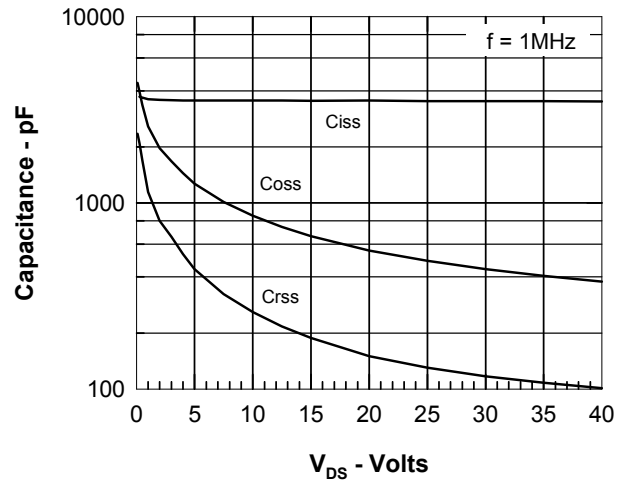


Fig.8 Capacitance Curves

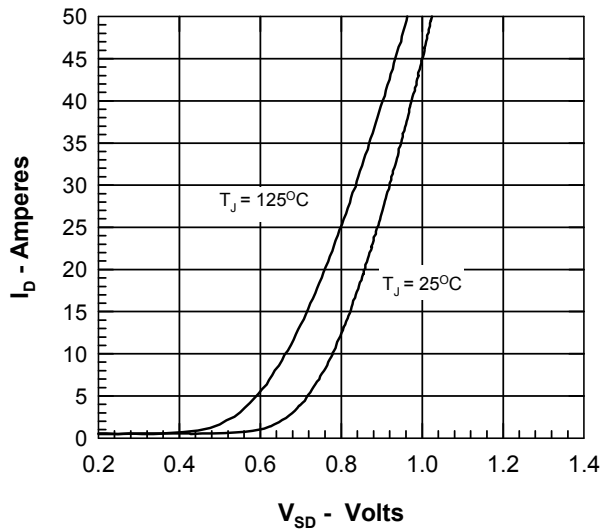


Fig.9 Drain Current vs Drain to Source Voltage

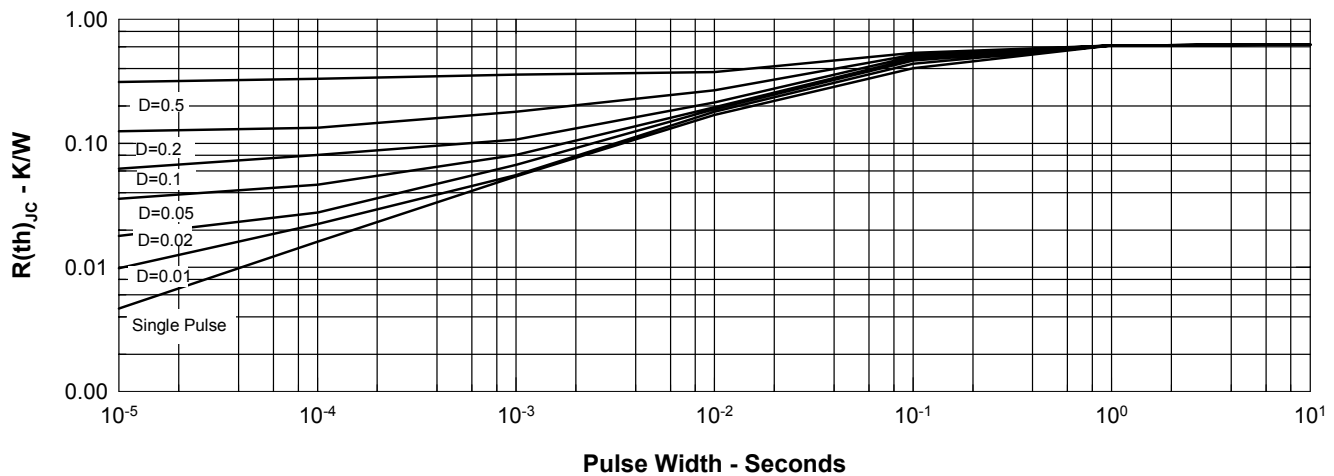


Fig.10 Transient Thermal Impedance

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