

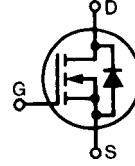
# HiPerFET™ Power MOSFETs Q-Class

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

IXFH 9N80Q  
IXFT 9N80Q

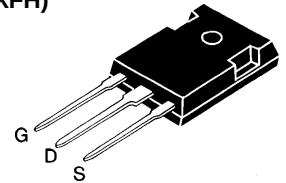
$V_{DSS} = 800\text{ V}$   
 $I_{D25} = 9\text{ A}$   
 $R_{DS(on)} = 1.1\ \Omega$

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

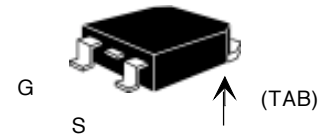


| Symbol    | Test Conditions                                                                                                                         | Maximum Ratings |                  |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$ | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                                                                                         | 800             | V                |
| $V_{DGR}$ | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1\text{ M}\Omega$                                                           | 800             | V                |
| $V_{GS}$  | Continuous                                                                                                                              | $\pm 20$        | V                |
| $V_{GSM}$ | Transient                                                                                                                               | $\pm 30$        | V                |
| $I_{D25}$ | $T_C = 25^\circ\text{C}$                                                                                                                | 9               | A                |
| $I_{DM}$  | $T_C = 25^\circ\text{C}$ ,<br>pulse width limited by $T_{JM}$                                                                           | 36              | A                |
| $I_{AR}$  | $T_C = 25^\circ\text{C}$                                                                                                                | 9               | A                |
| $E_{AR}$  | $T_C = 25^\circ\text{C}$                                                                                                                | 20              | mJ               |
| $E_{AS}$  |                                                                                                                                         | 700             | mJ               |
| $dv/dt$   | $I_S \leq I_{DM}$ , $di/dt \leq 100\text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 2\ \Omega$ | 5               | V/ns             |
| $P_D$     | $T_C = 25^\circ\text{C}$                                                                                                                | 180             | 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                |

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.                |
| $V_{DSS}$    | $V_{GS} = 0\text{ V}$ , $I_D = 1\text{ mA}$                                                                            | 800                                                                               |      | V                   |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 2.5\text{ mA}$                                                                              | 3.0                                                                               |      | 5.0 V               |
| $I_{GSS}$    | $V_{GS} = \pm 20\text{ V}_{DC}$ , $V_{DS} = 0$                                                                         |                                                                                   |      | $\pm 100\text{ nA}$ |
| $I_{DSS}$    | $V_{DS} = 0.8\text{ V}_{DSS}$                                                                                          |                                                                                   |      | 50 $\mu\text{A}$    |
|              | $V_{GS} = 0\text{ V}$                                                                                                  |                                                                                   |      | 1 mA                |
| $R_{DS(on)}$ | $V_{GS} = 10\text{ V}$ , $I_D = 0.5\text{ I}_{D25}$<br>Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$ |                                                                                   |      | 1.1 $\Omega$        |

## 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

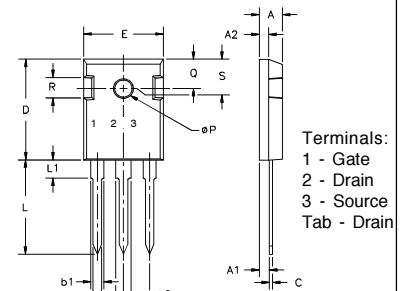
## Advantages

- 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.    |
| $g_{fs}$     | $V_{DS} = 10\text{ V}; I_D = 0.5 \cdot I_{D25}$ , pulse test                                                   | 3                                                                                 | 5    | S       |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                                  |                                                                                   | 2200 | pF      |
| $C_{oss}$    |                                                                                                                |                                                                                   | 240  | pF      |
| $C_{rss}$    |                                                                                                                |                                                                                   | 41   | pF      |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$<br>$R_G = 4.7\ \Omega$ (External), |                                                                                   | 20   | ns      |
| $t_r$        |                                                                                                                |                                                                                   | 20   | ns      |
| $t_{d(off)}$ |                                                                                                                |                                                                                   | 42   | ns      |
| $t_f$        |                                                                                                                |                                                                                   | 13   | ns      |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$                                    |                                                                                   | 56   | nC      |
| $Q_{gs}$     |                                                                                                                |                                                                                   | 17   | nC      |
| $Q_{gd}$     |                                                                                                                |                                                                                   | 22   | nC      |
| $R_{thJC}$   | (TO-247)                                                                                                       |                                                                                   | 0.25 | 0.7 K/W |
| $R_{thCK}$   |                                                                                                                |                                                                                   |      | K/W     |

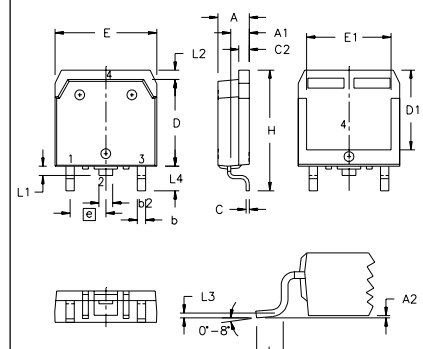
| Source-Drain Diode |                                                                                                       | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |               |
|--------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------|
| Symbol             | Test Conditions                                                                                       | min.                                                                              | typ. | max.          |
| $I_S$              | $V_{GS} = 0\text{ V}$                                                                                 |                                                                                   |      | 9 A           |
| $I_{SM}$           | Repetitive; pulse width limited by $T_{JM}$                                                           |                                                                                   |      | 36 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         |
| $t_{rr}$           | $I_F = I_S, -di/dt = 100\text{ A}/\mu\text{s}, V_R = 100\text{ V}$                                    |                                                                                   | 0.75 | 250 ns        |
| $Q_{RM}$           |                                                                                                       |                                                                                   | 7.5  | $\mu\text{C}$ |
| $I_{RM}$           |                                                                                                       |                                                                                   |      | A             |

## TO-247 AD (IXFH) Outline



| 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



| SYM | INCHES |      | MILLIMETERS |       |
|-----|--------|------|-------------|-------|
|     | MIN    | MAX  | MIN         | MAX   |
| A   | .193   | .201 | 4.90        | 5.10  |
| A1  | .106   | .114 | 2.70        | 2.90  |
| A2  | .001   | .010 | 0.02        | 0.25  |
| b   | .045   | .057 | 1.15        | 1.45  |
| b2  | .075   | .083 | 1.90        | 2.10  |
| C   | .016   | .026 | 0.40        | 0.65  |
| C2  | .057   | .063 | 1.45        | 1.60  |
| D   | .543   | .551 | 13.80       | 14.00 |
| D1  | .488   | .500 | 12.40       | 12.70 |
| E   | .624   | .632 | 15.85       | 16.05 |
| E1  | .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  |
| L1  | .047   | .055 | 1.20        | 1.40  |
| L2  | .039   | .045 | 1.00        | 1.15  |
| L3  | .010   | BSC  | 0.25        | BSC   |
| L4  | .150   | .161 | 3.80        | 4.10  |

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