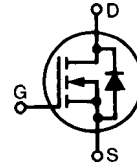


## HiPerFET™ Power MOSFETs

N-Channel Enhancement Mode  
High dv/dt, Low  $t_{rr}$ , HDMOS™ Family

**IXFH8N80**  
**IXFH9N80**

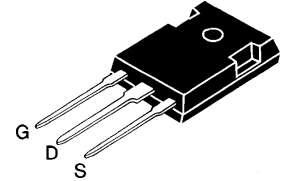
| $V_{DSS}$ | $I_{D25}$ | $R_{DS(on)}$ | $t_{rr}$ |
|-----------|-----------|--------------|----------|
| 800V      | 8A        | 1.1Ω         | 250 ns   |
| 800V      | 9A        | 0.9Ω         | 250 ns   |



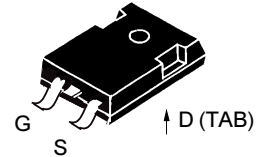
| Symbol                                                                          | Test Conditions                                                                                                                               | Maximum Ratings             |                  |
|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|------------------|
| $V_{DSS}$                                                                       | $T_J = 25^\circ\text{C}$ 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                |
| $I_{D25}$                                                                       | $T_C = 25^\circ\text{C}$                                                                                                                      | 8N80 8<br>9N80 9            | A                |
| $I_{DM}$                                                                        | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                                    | 8N80 32<br>9N80 36          | A                |
| $I_{AR}$                                                                        | $T_C = 25^\circ\text{C}$                                                                                                                      | 8N80 8<br>9N80 9            | A                |
| $E_{AR}$                                                                        | $T_C = 25^\circ\text{C}$                                                                                                                      | 18                          | mJ               |
| $dv/dt$                                                                         | $I_S \leq I_{DM}$ , $di/dt \leq 100\text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 2\text{ }\Omega$ | 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                | $^\circ\text{C}$ |
| $M_d$                                                                           | Mounting torque                                                                                                                               | 1.13/10 Nm/lb.in.           |                  |
| <b>Weight</b>                                                                   |                                                                                                                                               | TO-204 = 18 g, TO-247 = 6 g |                  |
| Maximum lead temperature for soldering<br>1.6 mm (0.062 in.) from case for 10 s |                                                                                                                                               | 300                         | $^\circ\text{C}$ |

| Symbol       | Test Conditions                                                                                                                  | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |        |                              |
|--------------|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------|------------------------------|
|              |                                                                                                                                  | min.                                                                              | typ.   | max.                         |
| $V_{DSS}$    | $V_{GS} = 0\text{ V}$ , $I_D = 3\text{ mA}$<br>$V_{DSS}$ temperature coefficient                                                 | 800                                                                               | 0.088  | V<br>%/K                     |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 2.5\text{ mA}$<br>$V_{GS(th)}$ temperature coefficient                                                | 2                                                                                 | -0.257 | V<br>%/K                     |
| $I_{GSS}$    | $V_{GS} = \pm 20\text{ V}_{DC}$ , $V_{DS} = 0$                                                                                   |                                                                                   |        | $\pm 100$ nA                 |
| $I_{DSS}$    | $V_{DS} = 0.8 \cdot V_{DSS}$ , $T_J = 25^\circ\text{C}$<br>$V_{GS} = 0\text{ V}$ , $T_J = 125^\circ\text{C}$                     |                                                                                   |        | 250 $\mu\text{A}$<br>1 mA    |
| $R_{DS(on)}$ | $V_{GS} = 10\text{ V}$ , $I_D = 0.5 \cdot I_{D25}$<br>Pulse test, $t \leq 300\text{ }\mu\text{s}$ , duty cycle $\delta \leq 2\%$ | 8N80<br>9N80                                                                      |        | 1.1 $\Omega$<br>0.9 $\Omega$ |

TO-247 AD (IXFH)



TO-247 SMD\*



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

\*Add suffix letter "S" for surface mountable package

### Features

- International standard packages
- Low  $R_{DS(on)}$  HDMOS™ process
- Rugged polysilicon gate cell structure
- Unclamped Inductive Switching (UIS) rated
- Low package inductance  
- easy to drive and to protect
- Fast intrinsic Rectifier

### Applications

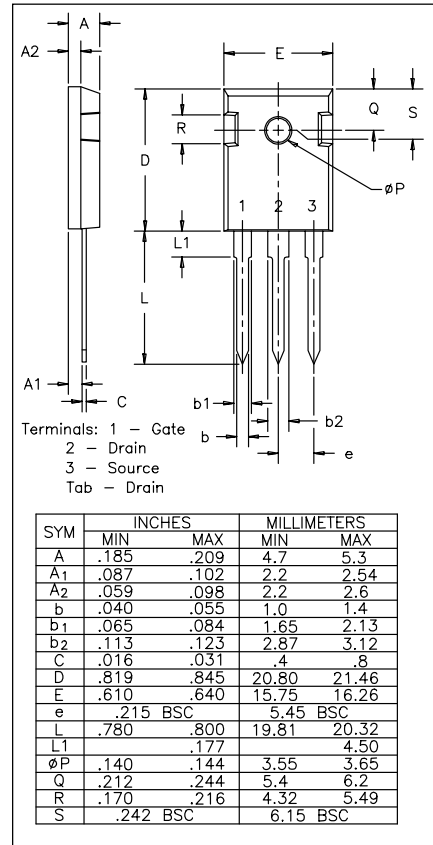
- DC-DC converters
- Battery chargers
- Switched-mode and resonant-mode power supplies
- DC choppers
- AC motor control
- Temperature and lighting controls

### Advantages

- Easy to mount with 1 screw (TO-247) (isolated mounting screw hole)
- 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                                                  | 4                                                                                 | 7    | S       |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                                 |                                                                                   | 2600 | pF      |
| $C_{oss}$    |                                                                                                               |                                                                                   | 240  | pF      |
| $C_{rss}$    |                                                                                                               |                                                                                   | 60   | 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) |                                                                                   | 35   | ns      |
| $t_r$        |                                                                                                               |                                                                                   | 15   | ns      |
| $t_{d(off)}$ |                                                                                                               |                                                                                   | 70   | ns      |
| $t_f$        |                                                                                                               |                                                                                   | 35   | ns      |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$                                   |                                                                                   | 85   | 130 nC  |
| $Q_{gs}$     |                                                                                                               |                                                                                   | 15   | 30 nC   |
| $Q_{gd}$     |                                                                                                               |                                                                                   | 40   | 70 nC   |
| $R_{thJC}$   |                                                                                                               |                                                                                   |      | 0.7 K/W |
| $R_{thCK}$   |                                                                                                               |                                                                                   | 0.25 | K/W     |

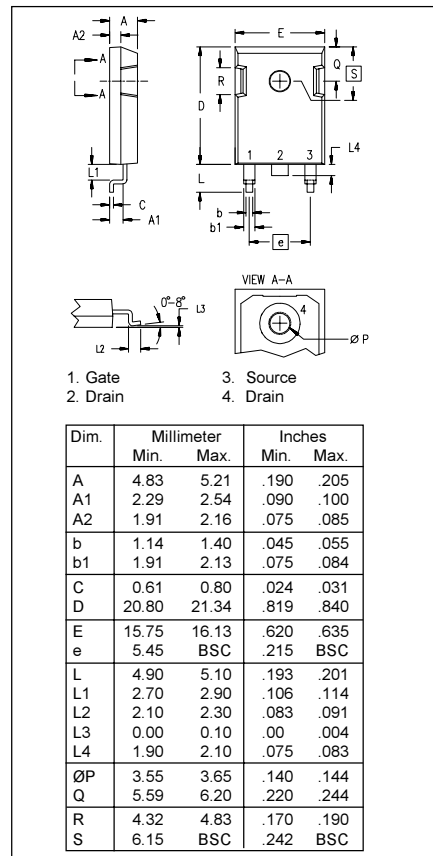
### TO-247 AD (IXFH) Outline



### Source-Drain Diode

| Symbol   | Test Conditions                                                                                            | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |               |
|----------|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------|
|          |                                                                                                            | min.                                                                              | typ. | max.          |
| $I_S$    | $V_{GS} = 0$                                                                                               | 8N80<br>9N80                                                                      |      | 8 A<br>9 A    |
| $I_{SM}$ | Repetitive; pulse width limited by $T_{JM}$                                                                | 8N80<br>9N80                                                                      |      | 32 A<br>36 A  |
| $V_{SD}$ | $I_F = I_S, V_{GS} = 0\text{ V}$ ,<br>Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $\delta \leq 2\%$ |                                                                                   |      | 1.5 V         |
| $t_{rr}$ | $I_F = I_S$<br>$-di/dt = 100\text{ A}/\mu\text{s}$ ,<br>$V_R = 100\text{ V}$                               | $T_J = 25^\circ\text{C}$                                                          |      | 250 ns        |
|          |                                                                                                            | $T_J = 125^\circ\text{C}$                                                         |      | 400 ns        |
| $Q_{RM}$ |                                                                                                            | $T_J = 25^\circ\text{C}$                                                          | 0.5  | $\mu\text{C}$ |
|          |                                                                                                            | $T_J = 125^\circ\text{C}$                                                         | 1.0  | $\mu\text{C}$ |
| $I_{RM}$ |                                                                                                            | $T_J = 25^\circ\text{C}$                                                          | 7.5  | A             |
|          |                                                                                                            | $T_J = 125^\circ\text{C}$                                                         | 9.0  | A             |

### TO-247 SMD Outline



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

Figure 1. Output Characteristics at 25°C

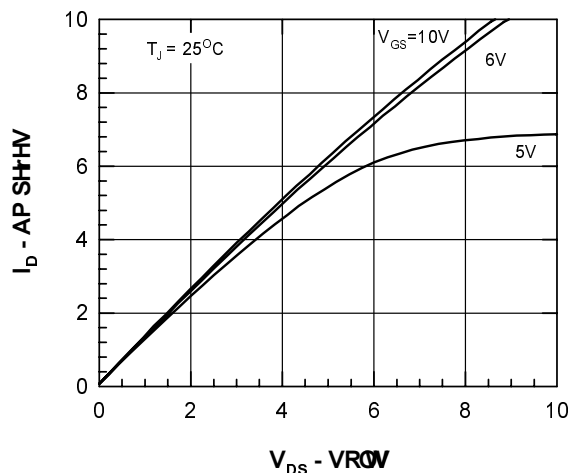


Figure 2. Output Characteristics at 125°C

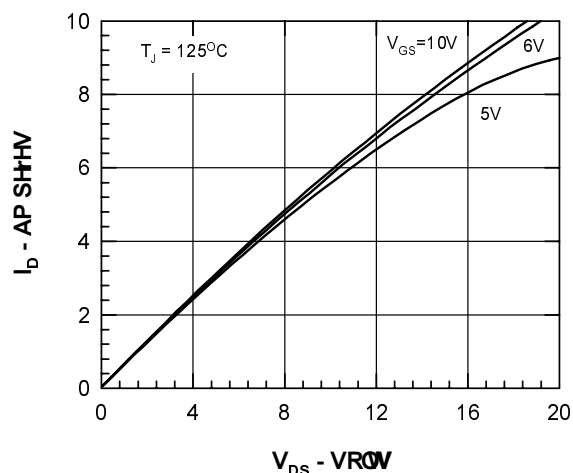
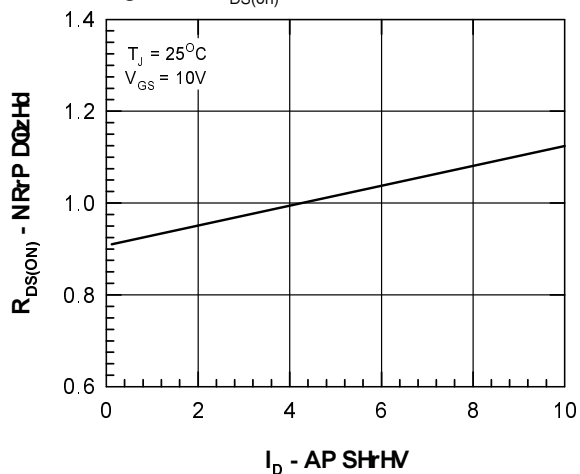
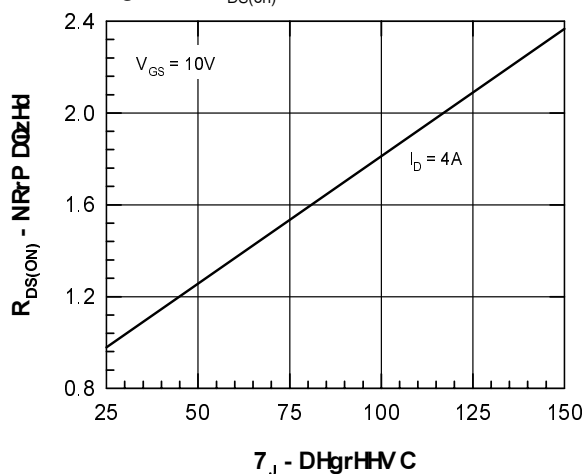

Figure 3.  $R_{DS(on)}$  normalized to 15A/25°C vs.  $I_D$ 

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


Figure 5. Drain Current vs. Case Temperature

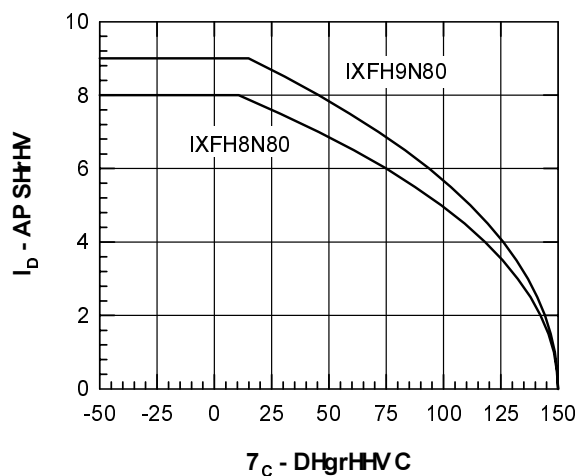


Figure 6. Admittance Curves

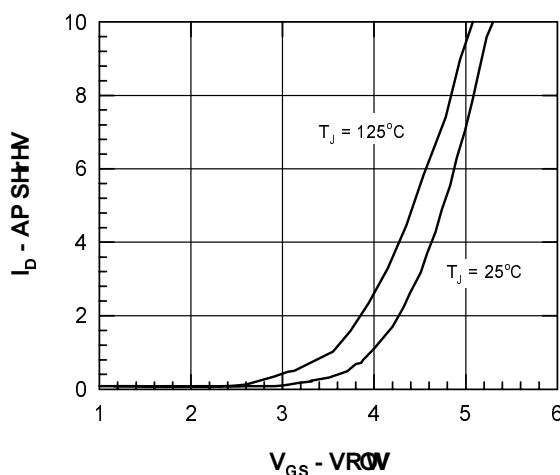


Figure 7. Gate Charge

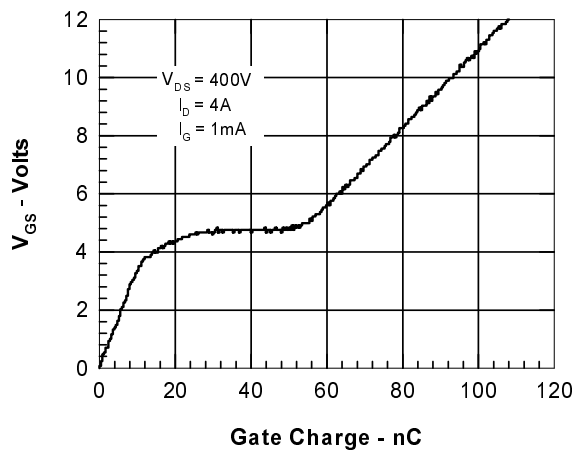


Figure 8. Capacitance Curves

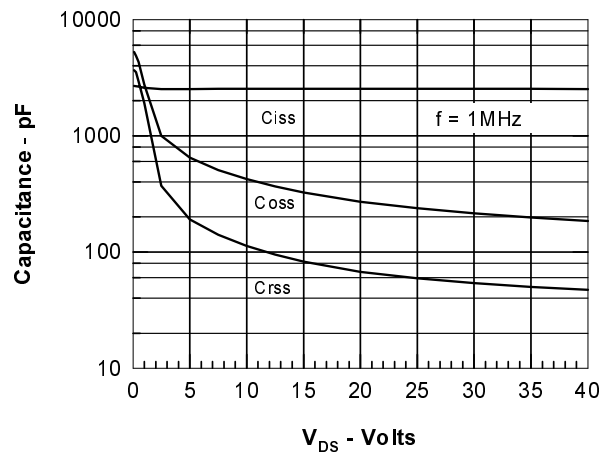


Figure 9. Forward Voltage Drop of the Intrinsic Diode

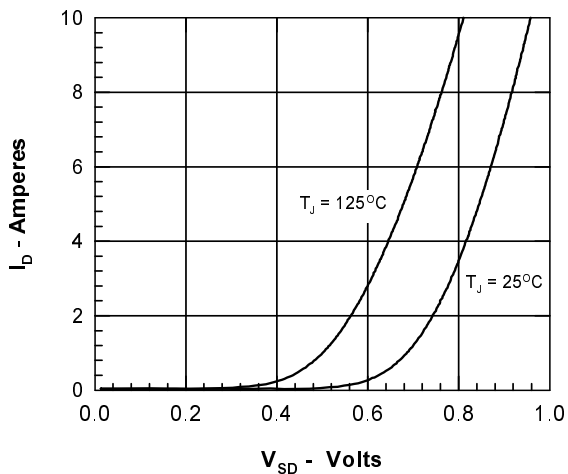


Figure 10. Forward Bias Safe Operating Area

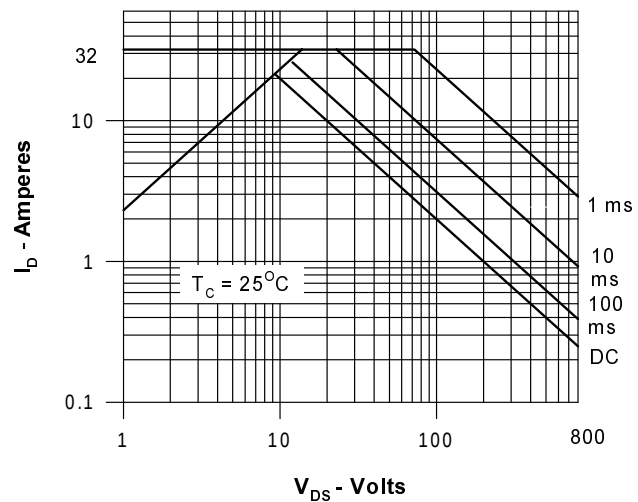
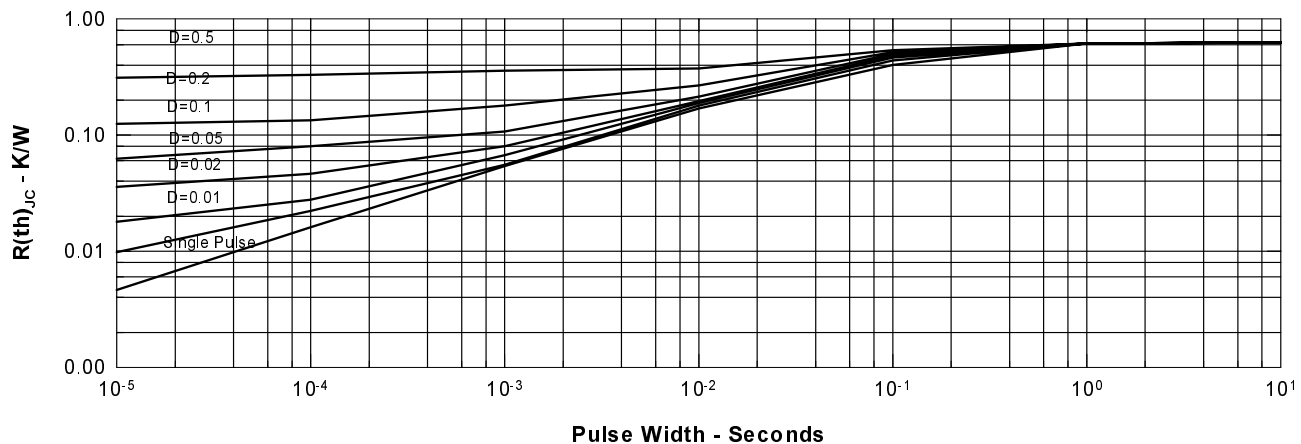


Figure 11. Transient Thermal Resistance





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