

# HiPerFET™ Power MOSFETs

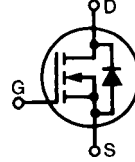
N-Channel Enhancement Mode  
High dv/dt, Low  $t_{rr}$ , HDMOS™ Family

**IXFH14N80**

**IXFH15N80**

| $V_{DSS}$    | $I_{D25}$   | $R_{DS(on)}$                    |
|--------------|-------------|---------------------------------|
| <b>800 V</b> | <b>14 A</b> | <b>0.70 <math>\Omega</math></b> |
| <b>800 V</b> | <b>15 A</b> | <b>0.60 <math>\Omega</math></b> |

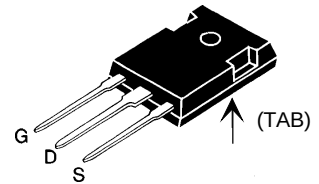
**$t_{rr} \leq 250$  ns**



Preliminary data

| 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                |
| $I_{D25}$ | $T_C = 25^\circ\text{C}$                                                                                                                      | 14N80           | 14 | A                |
|           |                                                                                                                                               | 15N80           | 15 | A                |
| $I_{DM}$  | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                                    | 14N80           | 56 | A                |
|           |                                                                                                                                               | 15N80           | 60 | A                |
| $I_{AR}$  | $T_C = 25^\circ\text{C}$                                                                                                                      | 14N80           | 14 | A                |
|           |                                                                                                                                               | 15N80           | 15 | A                |
| $E_{AR}$  | $T_C = 25^\circ\text{C}$                                                                                                                      | 30              |    | 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             |
| $P_D$     | $T_C = 25^\circ\text{C}$                                                                                                                      | 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 (0.062 in.) from case for 10 s                                                                                                         | 300             |    | $^\circ\text{C}$ |
| $M_d$     | Mounting torque                                                                                                                               | 1.13/10         |    | Nm/lb.in.        |
| Weight    |                                                                                                                                               | 6               |    | g                |

TO-247 AD



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

## 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
- Synchronous rectification
- Battery chargers
- Switched-mode and resonant-mode power supplies
- DC choppers
- AC motor control
- Temperature and lighting controls
- Low voltage relays

## Advantages

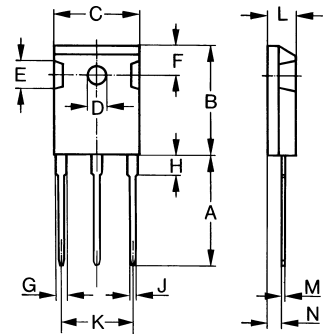
- Easy to mount with 1 screw (isolated mounting screw hole)
- Space savings
- High power density

| Symbol                                                                | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)      | Characteristic Values |        |                   |
|-----------------------------------------------------------------------|----------------------------------------------------------------------------------|-----------------------|--------|-------------------|
|                                                                       |                                                                                  | Min.                  | Typ.   | Max.              |
| $V_{DSS}$                                                             | $V_{GS} = 0\text{ V}$ , $I_D = 3\text{ mA}$<br>$V_{DSS}$ temperature coefficient | 800                   | 0.096  | V<br>%/K          |
| $V_{GS(th)}$                                                          | $V_{DS} = V_{GS}$ , $I_D = 4\text{ mA}$<br>$V_{GS(th)}$ temperature coefficient  | 2.0                   | -0.214 | V<br>%/K          |
| $I_{GSS}$                                                             | $V_{GS} = \pm 20\text{ V}_{DC}$ , $V_{DS} = 0$                                   |                       |        | $\pm 100$ nA      |
| $I_{DSS}$                                                             | $V_{DS} = 0.8\text{ V}_{DSS}$ , $T_J = 25^\circ\text{C}$                         |                       |        | 250 $\mu\text{A}$ |
|                                                                       | $V_{GS} = 0\text{ V}$ , $T_J = 125^\circ\text{C}$                                |                       |        | 1 mA              |
| $R_{DS(on)}$                                                          | $V_{GS} = 10\text{ V}$ , $I_D = 0.5\text{ I}_{D25}$                              | 14N80                 |        | 0.70 $\Omega$     |
|                                                                       |                                                                                  | 15N80                 |        | 0.60 $\Omega$     |
| Pulse test, $t \leq 300\text{ }\mu\text{s}$ , duty cycle $d \leq 2\%$ |                                                                                  |                       |        |                   |

| Symbol       | Test Conditions                                                                                       | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |      |     |
|--------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|------|-----|
|              |                                                                                                       | Min.                                                                              | Typ. | Max. |     |
| $g_{fs}$     | $V_{DS} = 10\text{ V}$ ; $I_D = 0.5 I_{D25}$ , pulse test                                             | 8                                                                                 | 14   |      | S   |
| $C_{iss}$    | $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                                   | 3965                                                                              |      | 4870 | pF  |
| $C_{oss}$    |                                                                                                       | 315                                                                               |      | 395  | pF  |
| $C_{rss}$    |                                                                                                       | 73                                                                                |      | 120  | pF  |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.5 V_{DSS}$ , $I_D = 0.5 I_{D25}$<br>$R_G = 2\ \Omega$ (External) |                                                                                   | 20   | 50   | ns  |
| $t_r$        |                                                                                                       |                                                                                   | 33   | 50   | ns  |
| $t_{d(off)}$ |                                                                                                       |                                                                                   | 63   | 100  | ns  |
| $t_f$        |                                                                                                       |                                                                                   | 32   | 50   | ns  |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.5 V_{DSS}$ , $I_D = 0.5 I_{D25}$                                 |                                                                                   | 128  | 155  | nC  |
| $Q_{gs}$     |                                                                                                       |                                                                                   | 30   | 45   | nC  |
| $Q_{gd}$     |                                                                                                       |                                                                                   | 55   | 80   | nC  |
| $R_{thJC}$   |                                                                                                       |                                                                                   |      | 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.     |               |
| $I_S$              | $V_{GS} = 0\text{ V}$                                                                                    | 14N80<br>15N80                                                                    |      | 14<br>15 | A<br>A        |
| $I_{SM}$           | Repetitive;                                                                                              | 14N80<br>15N80                                                                    |      | 56<br>60 | A<br>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             |
| $t_{rr}$           | $I_F = I_S$<br>$-di/dt = 100\text{ A}/\mu\text{s}$ ,<br>$V_R = 100\text{ V}$                             | $T_J = 25^\circ\text{C}$<br>$T_J = 125^\circ\text{C}$                             |      | 250      | ns            |
| $Q_{RM}$           |                                                                                                          |                                                                                   | 1    | 400      | ns            |
| $I_{RM}$           |                                                                                                          |                                                                                   | 8.5  |          | $\mu\text{C}$ |
|                    |                                                                                                          |                                                                                   |      |          | A             |

TO-247 AD Outline



| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | Min.       | Max.  | Min.   | Max.  |
| A    | 19.81      | 20.32 | 0.780  | 0.800 |
| B    | 20.80      | 21.46 | 0.819  | 0.845 |
| C    | 15.75      | 16.26 | 0.610  | 0.640 |
| D    | 3.55       | 3.65  | 0.140  | 0.144 |
| E    | 4.32       | 5.49  | 0.170  | 0.216 |
| F    | 5.4        | 6.2   | 0.212  | 0.244 |
| G    | 1.65       | 2.13  | 0.065  | 0.084 |
| H    | -          | 4.5   | -      | 0.177 |
| J    | 1.0        | 1.4   | 0.040  | 0.055 |
| K    | 10.8       | 11.0  | 0.426  | 0.433 |
| L    | 4.7        | 5.3   | 0.185  | 0.209 |
| M    | 0.4        | 0.8   | 0.016  | 0.031 |
| N    | 1.5        | 2.49  | 0.087  | 0.102 |

Figure 1. Output Characteristics at 25°C

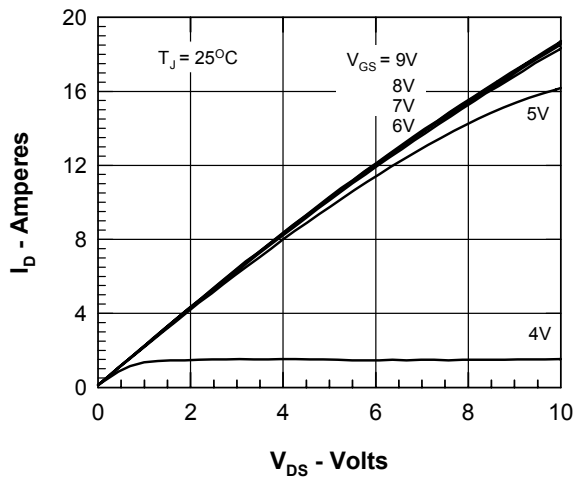


Figure 2. Output Characteristics at 125°C

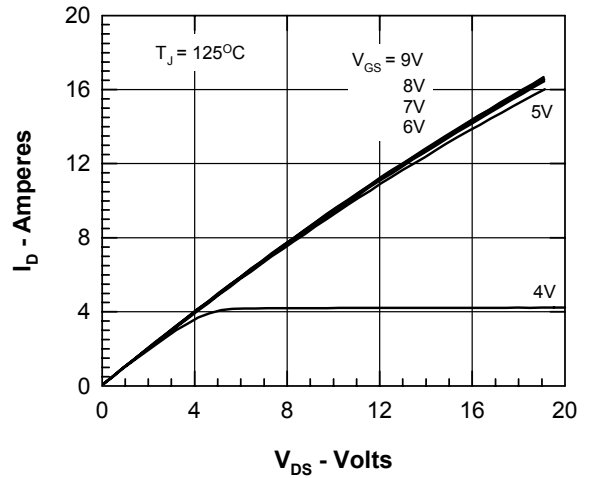
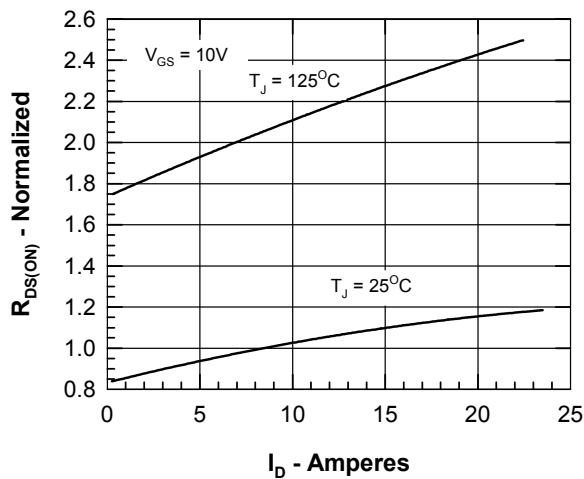
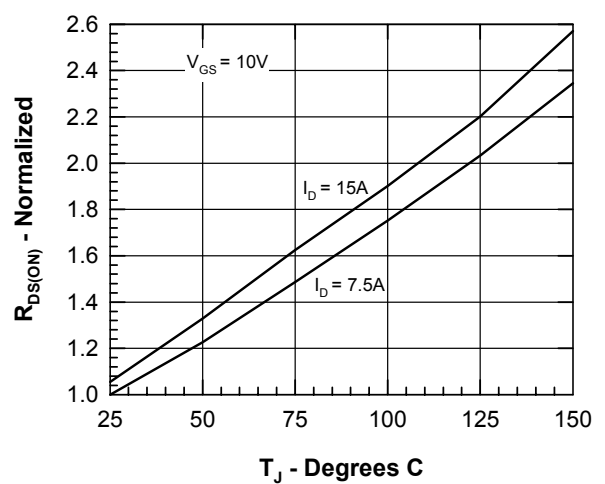

 Figure 3.  $R_{DS(on)}$  normalized to 0.5  $I_{D25}$  value vs.  $I_D$ 

 Figure 4.  $R_{DS(on)}$  normalized to 0.5  $I_{D25}$  value vs.  $T_J$ 


Figure 5. Drain Current vs. Case Temperature

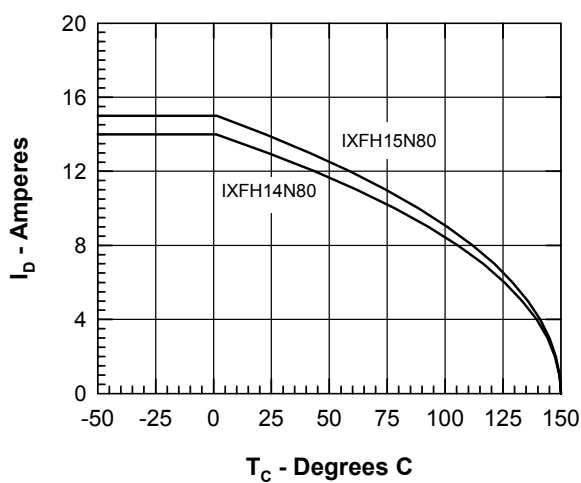


Figure 6. Admittance Curves

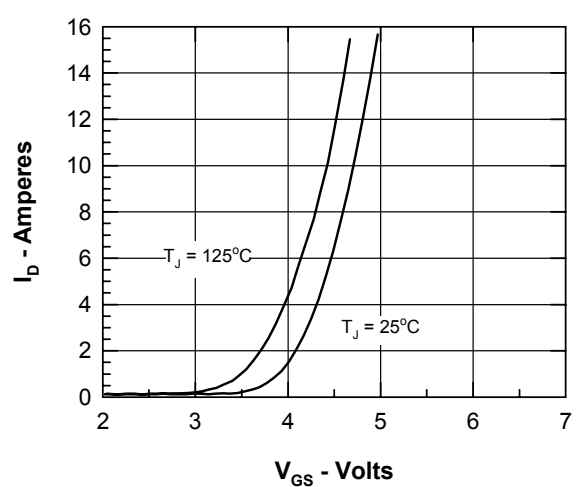


Figure 7. Gate Charge

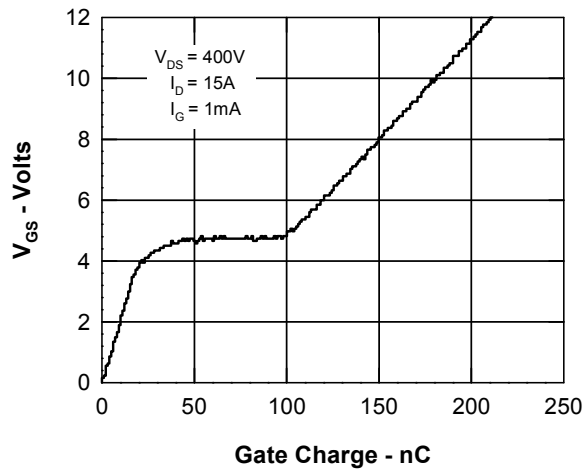


Figure 8. Capacitance Curves

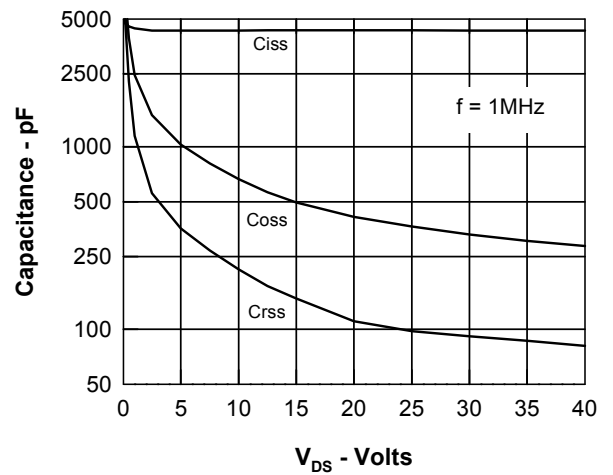


Figure 9. Source Current vs. Source to Drain Voltage

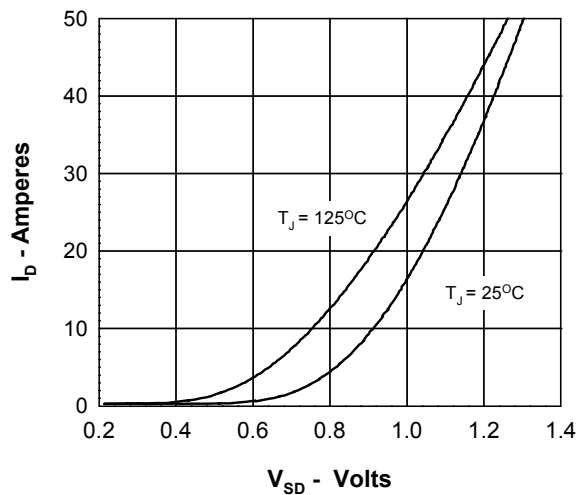


Figure 10. Forward Bias Safe Operating Area

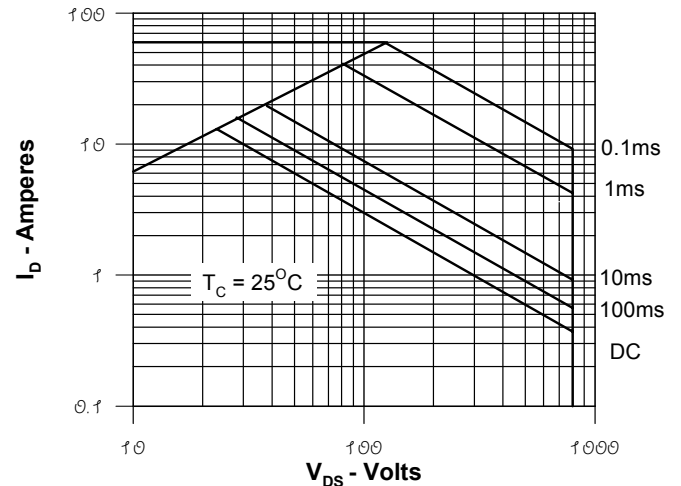


Figure 11. Transient Thermal Resistance

