

# HiPerFET™ Power MOSFETs

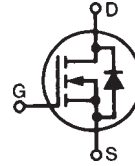
N-Channel Enhancement Mode  
Avalanche Rated, Low  $Q_g$   
Low  $R_g$ , High  $dv/dt$ , Low  $t_{rr}$

## Preliminary Data Sheet

**IXFH36N55Q2**

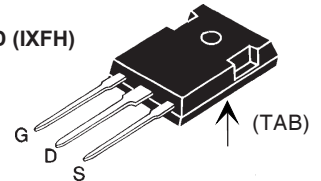
$$\begin{aligned} V_{DSS} &= 550 \text{ V} \\ I_{D25} &= 36 \text{ A} \\ R_{DS(on)} &= 0.18 \Omega \end{aligned}$$

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



| Symbol    | Test Conditions                                                                                                                         | Maximum Ratings                      |                  |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|------------------|
| $V_{DSS}$ | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                                                                                         | 550                                  | V                |
| $V_{DGR}$ | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1 \text{ M}\Omega$                                                          | 550                                  | V                |
| $V_{GS}$  | Continuous                                                                                                                              | $\pm 30$                             | V                |
| $V_{GSM}$ | Transient                                                                                                                               | $\pm 40$                             | V                |
| $I_{D25}$ | $T_C = 25^\circ\text{C}$                                                                                                                | 36                                   | A                |
| $I_{DM}$  | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                              | 144                                  | A                |
| $I_{AR}$  | $T_C = 25^\circ\text{C}$                                                                                                                | 36                                   | A                |
| $E_{AR}$  | $T_C = 25^\circ\text{C}$                                                                                                                | 50                                   | mJ               |
| $E_{AS}$  | $T_C = 25^\circ\text{C}$                                                                                                                | 2.5                                  | J                |
| $dv/dt$   | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 2 \Omega$ | 20                                   | V/ns             |
| $P_D$     | $T_C = 25^\circ\text{C}$                                                                                                                | 560                                  | 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.<br>0.9/6 Nm/lb.in. |                  |
| Weight    |                                                                                                                                         | 6                                    | g                |

TO-247 AD (IXFH)



G = Gate  
S = Source

TAB = Drain

## Features

- Double metal process for low gate resistance
- International standard packages
- Epoxy meet UL 94 V-0, flammability classification
- Low  $R_{DS(on)}$ , low  $Q_g$
- Avalanche energy and current rated
- Fast intrinsic rectifier

## Applications

- DC-DC converters
- Switched-mode and resonant-mode power supplies, >500kHz switching
- DC choppers
- Pulse generation
- Laser drivers

## Advantages

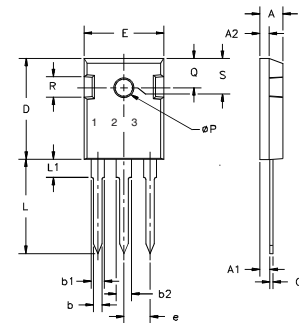
- Easy to mount
- Space savings
- High power density

| Symbol       | Test Conditions                                                                                                        | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                          |
|--------------|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|--------------------------|
|              |                                                                                                                        | min.                                                                              | typ. | max.                     |
| $V_{DSS}$    | $V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$                                                                       | 550                                                                               |      | V                        |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 4 \text{ mA}$                                                                               | 2.5                                                                               |      | 5.0 V                    |
| $I_{GSS}$    | $V_{GS} = \pm 30 \text{ V}_{DC}$ , $V_{DS} = 0$                                                                        |                                                                                   |      | $\pm 100 \text{ nA}$     |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0 \text{ V}$                                                                            |                                                                                   |      | 25 $\mu\text{A}$<br>1 mA |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 0.5 \cdot I_{D25}$<br>Pulse test, $t \leq 300 \mu\text{s}$ , duty cycle $d \leq 2 \%$ |                                                                                   |      | 0.18 $\Omega$            |

| Symbol       | Test Conditions                                                                                              | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |      |
|--------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|------|
|              |                                                                                                              | min.                                                                              | typ. | max. |
| $g_{fs}$     | $V_{DS} = 10\text{ V}; I_D = 0.5 \cdot I_{D25}$ , pulse test                                                 | 15                                                                                | 26   | S    |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                                |                                                                                   | 4100 | pF   |
| $C_{oss}$    |                                                                                                              |                                                                                   | 660  | pF   |
| $C_{rss}$    |                                                                                                              |                                                                                   | 160  | 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), |                                                                                   | 17   | ns   |
| $t_r$        |                                                                                                              |                                                                                   | 13   | ns   |
| $t_{d(off)}$ |                                                                                                              |                                                                                   | 42   | ns   |
| $t_f$        |                                                                                                              |                                                                                   | 8    | ns   |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$                                  |                                                                                   | 110  | nC   |
| $Q_{gs}$     |                                                                                                              |                                                                                   | 23   | nC   |
| $Q_{gd}$     |                                                                                                              |                                                                                   | 52   | nC   |
| $R_{thJC}$   |                                                                                                              |                                                                                   | 0.22 | 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.          |
| $I_S$              | $V_{GS} = 0\text{ V}$                                                                                 |                                                                                   |      | 36 A          |
| $I_{SM}$           | Repetitive; pulse width limited by $T_{JM}$                                                           |                                                                                   |      | 144 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         |
| $t_{rr}$           | $I_F = 25\text{ A}$ -di/dt = 100 A/ $\mu\text{s}$ , $V_R = 100\text{ V}$                              |                                                                                   |      | 250 ns        |
| $Q_{RM}$           |                                                                                                       |                                                                                   | 1    | $\mu\text{C}$ |
| $I_{RM}$           |                                                                                                       |                                                                                   | 9    | A             |

## TO-247 AD (IXFH) Outline



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

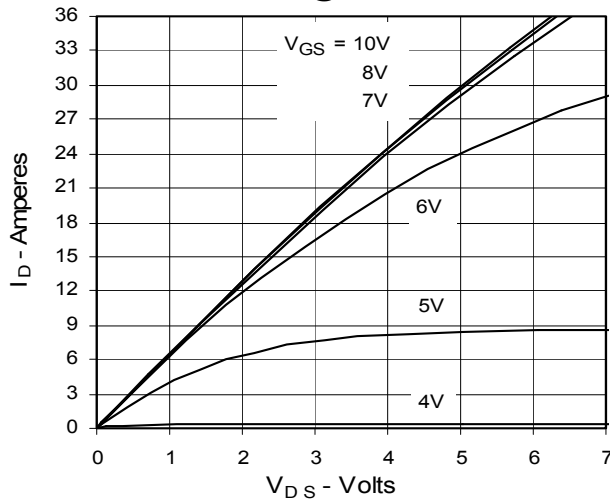
| Dim.           | Millimeter |       | Inches |       |
|----------------|------------|-------|--------|-------|
|                | Min.       | Max.  | Min.   | Max.  |
| A              | 4.7        | 5.3   | .185   | .209  |
| A <sub>1</sub> | 2.2        | 2.54  | .087   | .102  |
| A <sub>2</sub> | 2.2        | 2.6   | .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   |

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

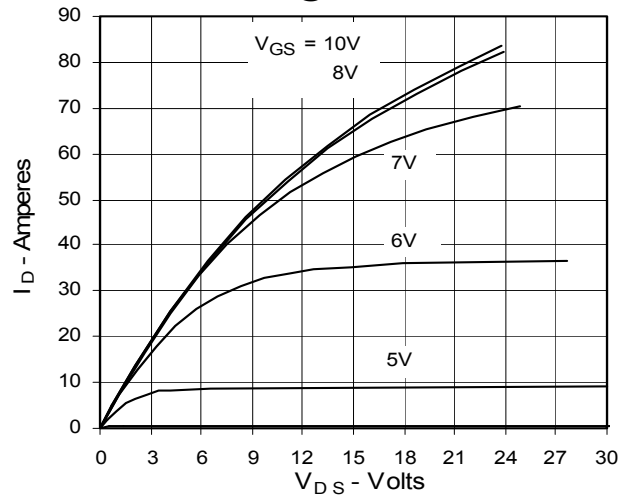
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

|           |           |           |           |           |           |             |             |             |           |
|-----------|-----------|-----------|-----------|-----------|-----------|-------------|-------------|-------------|-----------|
| 4,850,072 | 4,931,844 | 5,034,796 | 5,063,307 | 5,237,481 | 5,381,025 | 6,404,065B1 | 6,162,665   | 6,534,343   | 6,583,505 |
| 4,835,592 | 4,881,106 | 5,017,508 | 5,049,961 | 5,187,117 | 5,486,715 | 6,306,728B1 | 6,259,123B1 | 6,306,728B1 | 6,683,344 |

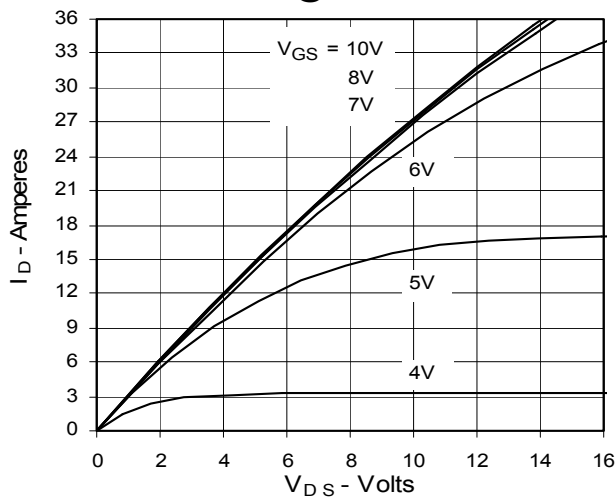
**Fig. 1. Output Characteristics  
@ 25°C**



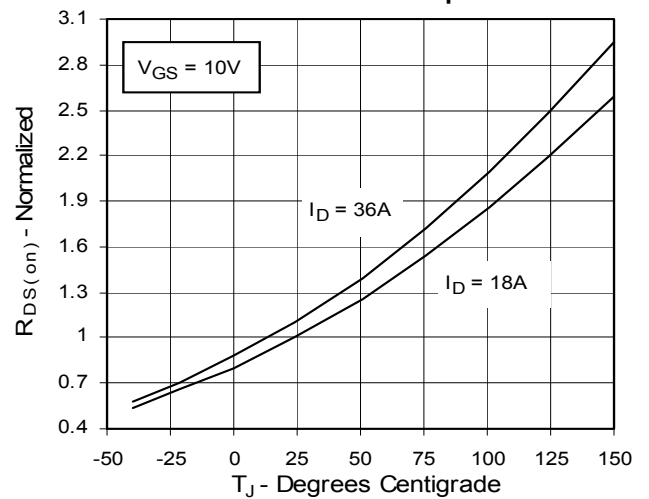
**Fig. 2. Extended Output Characteristics  
@ 25°C**



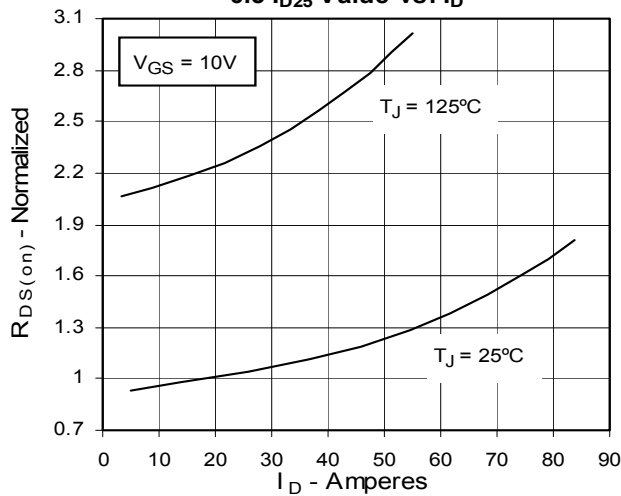
**Fig. 3. Output Characteristics  
@ 125°C**



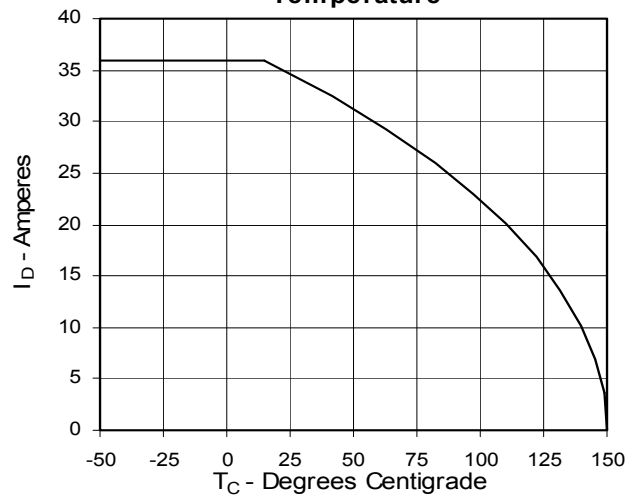
**Fig. 4.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$   
Value vs. Junction Temperature**



**Fig. 5.  $R_{DS(on)}$  Normalized to  
0.5  $I_{D25}$  Value vs.  $I_D$**



**Fig. 6. Drain Current vs. Case  
Temperature**



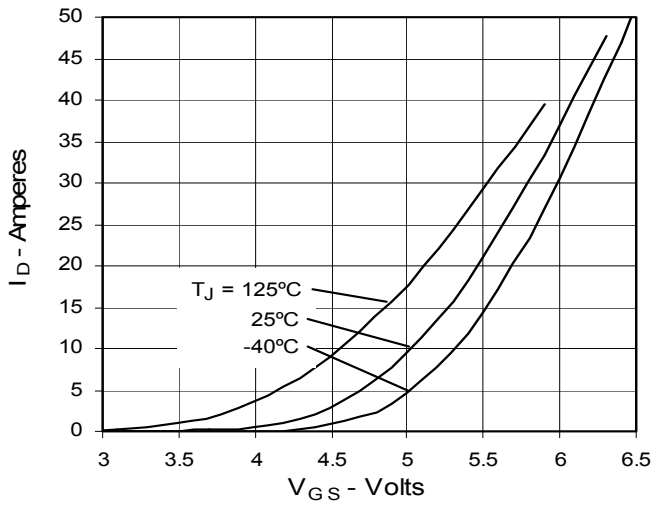
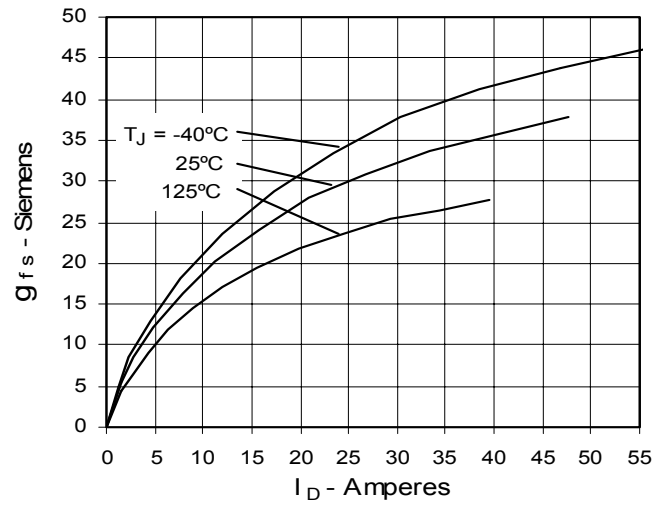
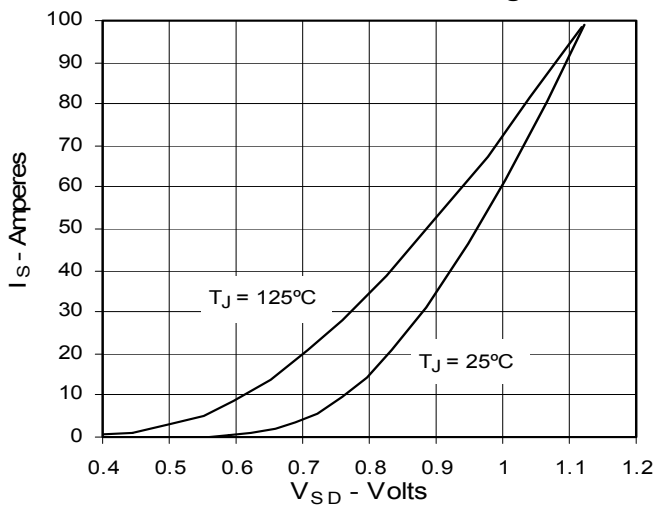
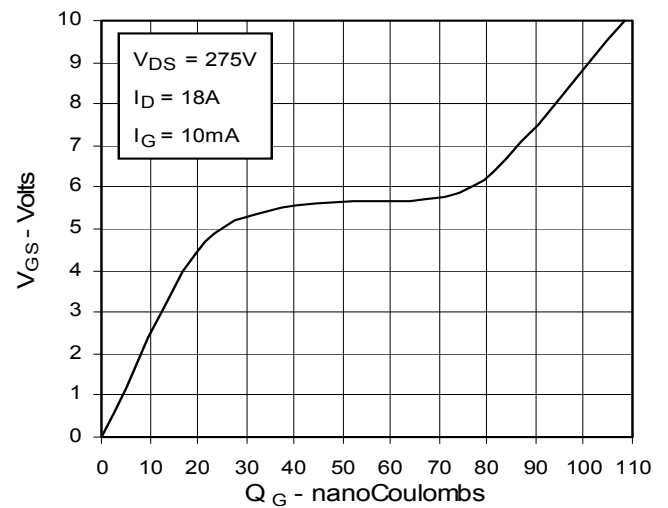
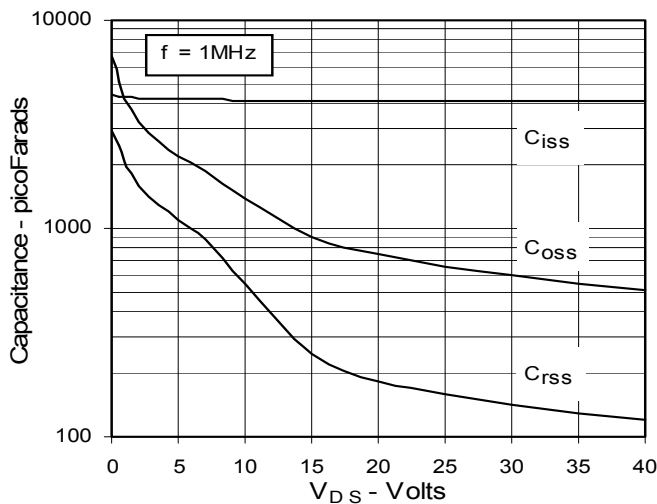
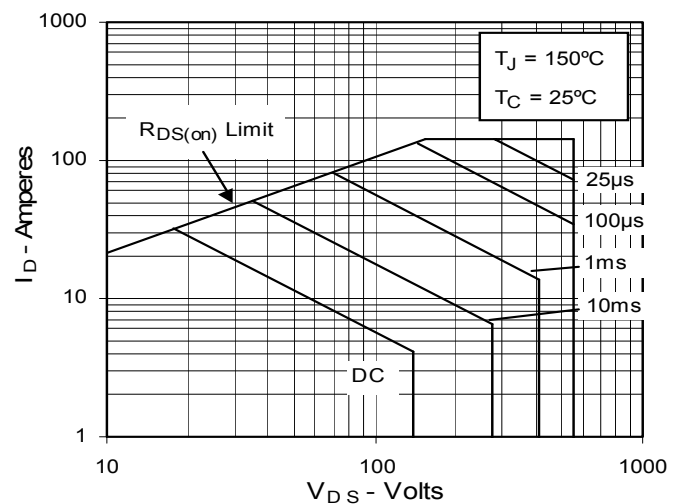
**Fig. 7. Input Admittance**

**Fig. 8. Transconductance**

**Fig. 9. Source Current vs. Source-To-Drain Voltage**

**Fig. 10. Gate Charge**

**Fig. 11. Capacitance**

**Fig. 12. Forward-Bias Safe Operating Area**


Fig. 13. Maximum Transient Thermal Resistance

