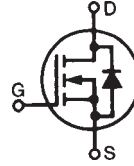


# HiperFET™ Power MOSFETs Q-Class

**IXFA4N100Q**  
**IXFP4N100Q**

**$V_{DSS} = 1000V$**   
 **$I_{D25} = 4A$**   
 **$R_{DS(on)} \leq 3.0\Omega$**

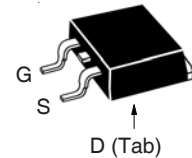
N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode



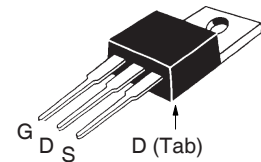
| Symbol     | Test Conditions                                                    | Maximum Ratings  |            |
|------------|--------------------------------------------------------------------|------------------|------------|
| $V_{DSS}$  | $T_J = 25^\circ C$ to $150^\circ C$                                | 1000             | V          |
| $V_{DGR}$  | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1M\Omega$          | 1000             | V          |
| $V_{GSS}$  | Continuous                                                         | $\pm 20$         | V          |
| $V_{GSM}$  | Transient                                                          | $\pm 30$         | V          |
| $I_{D25}$  | $T_C = 25^\circ C$                                                 | 4                | A          |
| $I_{DM}$   | $T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$               | 16               | A          |
| $I_A$      | $T_C = 25^\circ C$                                                 | 4                | A          |
| $E_{AS}$   | $T_C = 25^\circ C$                                                 | 700              | mJ         |
| $dv/dt$    | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ C$ | 5                | V/ns       |
| $P_D$      | $T_C = 25^\circ C$                                                 | 150              | W          |
| $T_J$      |                                                                    | -55 ... +150     | $^\circ C$ |
| $T_{JM}$   |                                                                    | 150              | $^\circ C$ |
| $T_{stg}$  |                                                                    | -55 ... +150     | $^\circ C$ |
| $T_L$      | Maximum Lead Temperature for Soldering                             | 300              | $^\circ C$ |
| $T_{SOLD}$ | Plastic Body for 10s                                               | 260              | $^\circ C$ |
| $M_C$      | Mounting Force (TO-263)                                            | 10..65/2.2..14.6 | Nm/lb.in.  |
| $M_d$      | Mounting Torque (TO-220)                                           | 1.13/10          | Nm/lb.in.  |
| Weight     | TO-263                                                             | 2.5              | g          |
|            | TO-220                                                             | 3.0              | g          |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ , Unless Otherwise Specified) | Characteristic Values |      |                    |
|--------------|-----------------------------------------------------------------------|-----------------------|------|--------------------|
|              |                                                                       | Min.                  | Typ. | Max.               |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 1mA$                                           | 1000                  |      | V                  |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 1.5mA$                                     | 2.5                   |      | 4.5 V              |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$                                    |                       |      | $\pm 100$ nA       |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 125^\circ C$             |                       |      | 50 $\mu A$<br>1 mA |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                   |                       |      | 3.0 $\Omega$       |

TO-263 AA (IXFA)



TO-220AB (IXFP)



G = Gate      D = Drain  
S = Source    Tab = Drain

## Features

- International Standard Packages
- Avalanche Rated
- Fast Intrinsic Diode
- Low  $Q_G$
- Low  $R_{DS(on)}$
- Low Drain-to-Tab Capacitance
- Low Package Inductance

## Advantages

- High Power Density
- Easy to Mount
- Space Savings

## Applications

- DC-DC Converters
- Battery Chargers
- Switch-Mode and Resonant-Mode Power Supplies
- DC Choppers
- Temperature and Lighting Controls

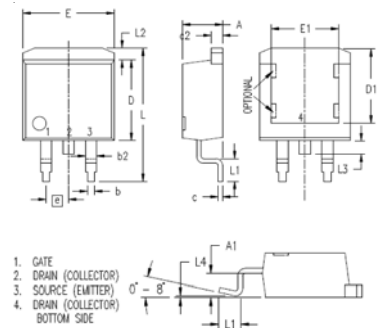
| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)                                                                            | Characteristic Values |      |                        |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|------------------------|
|              |                                                                                                                                                      | Min.                  | Typ. | Max.                   |
| $g_{fs}$     | $V_{DS} = 20\text{V}$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                                                                                           | 1.5                   | 2.5  | S                      |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                                     |                       | 1050 | pF                     |
| $C_{oss}$    |                                                                                                                                                      |                       | 120  | pF                     |
| $C_{rss}$    |                                                                                                                                                      |                       | 30   | pF                     |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$<br>$R_G = 4.7\Omega$ (External) |                       | 17   | ns                     |
| $t_r$        |                                                                                                                                                      |                       | 15   | ns                     |
| $t_{d(off)}$ |                                                                                                                                                      |                       | 32   | ns                     |
| $t_f$        |                                                                                                                                                      |                       | 18   | ns                     |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$                                                                     |                       | 39   | nC                     |
| $Q_{gs}$     |                                                                                                                                                      |                       | 9    | nC                     |
| $Q_{gd}$     |                                                                                                                                                      |                       | 23   | nC                     |
| $R_{thJC}$   | TO-220                                                                                                                                               |                       |      | $0.80^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                                      | 0.50                  |      | $^\circ\text{C/W}$     |

#### Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)                      | Characteristic Values |      |               |
|----------|------------------------------------------------------------------------------------------------|-----------------------|------|---------------|
|          |                                                                                                | Min.                  | Typ. | Max.          |
| $I_s$    | $V_{GS} = 0\text{V}$                                                                           |                       |      | 4 A           |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$                                                    |                       |      | 16 A          |
| $V_{SD}$ | $I_F = I_s$ , $V_{GS} = 0\text{V}$ , Note 1                                                    |                       |      | 1.5 V         |
| $t_{rr}$ | $I_F = I_s$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ , $V_{GS} = 0\text{V}$ |                       |      | 250 ns        |
| $Q_{RM}$ |                                                                                                | 0.52                  |      | $\mu\text{C}$ |
| $I_{RM}$ |                                                                                                | 1.80                  |      | A             |

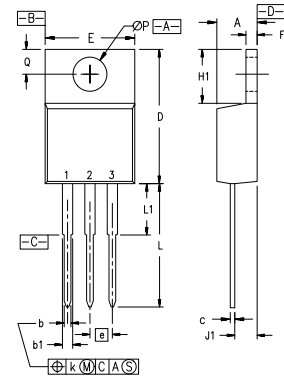
Note 1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .

#### TO-263 Outline



| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .160     | .190 | 4.06        | 4.83  |
| A1  | .080     | .110 | 2.03        | 2.79  |
| b   | .020     | .039 | 0.51        | 0.99  |
| b2  | .045     | .055 | 1.14        | 1.40  |
| c   | .016     | .029 | 0.40        | 0.74  |
| c2  | .045     | .055 | 1.14        | 1.40  |
| D   | .340     | .380 | 8.64        | 9.65  |
| D1  | .315     | .350 | 8.00        | 8.89  |
| E   | .380     | .410 | 9.65        | 10.41 |
| E1  | .245     | .320 | 6.22        | 8.13  |
| e   | .100 BSC |      | 2.54 BSC    |       |
| L   | .575     | .625 | 14.61       | 15.88 |
| L1  | .090     | .110 | 2.29        | 2.79  |
| L2  | .040     | .055 | 1.02        | 1.40  |
| L3  | .050     | .070 | 1.27        | 1.78  |
| L4  | 0        | .005 | 0           | 0.13  |

#### TO-220 Outline



Pins: 1 - Gate 2 - Drain  
3 - Source

| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .170     | .190 | 4.32        | 4.83  |
| b   | .025     | .040 | 0.64        | 1.02  |
| b1  | .045     | .065 | 1.15        | 1.65  |
| c   | .014     | .022 | 0.35        | 0.56  |
| D   | .580     | .630 | 14.73       | 16.00 |
| E   | .390     | .420 | 9.91        | 10.66 |
| e   | .100 BSC |      | 2.54 BSC    |       |
| F   | .045     | .055 | 1.14        | 1.40  |
| H1  | .230     | .270 | 5.85        | 6.85  |
| J1  | .090     | .110 | 2.29        | 2.79  |
| k   | 0        | .015 | 0           | 0.38  |
| L   | .500     | .550 | 12.70       | 13.97 |
| L1  | .110     | .230 | 2.79        | 5.84  |
| ØP  | .139     | .161 | 3.53        | 4.08  |
| Q   | .100     | .125 | 2.54        | 3.18  |

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 | 4,931,844 | 5,049,961 | 5,237,481 | 6,162,665    | 6,404,065 B1 | 6,683,344    | 6,727,585    | 7,005,734 B2 | 7,157,338B2 |
|                                                                                  | 4,850,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123 B1 | 6,534,343    | 6,710,405 B2 | 6,759,692    | 7,063,975 B2 |             |
|                                                                                  | 4,881,106 | 5,034,796 | 5,187,117 | 5,486,715 | 6,306,728 B1 | 6,583,505    | 6,710,463    | 6,771,478 B2 | 7,071,537    |             |

Figure 1. Output Characteristics at 25°C

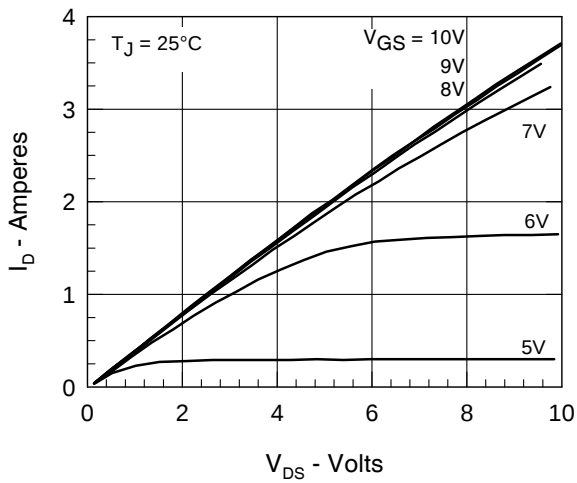


Figure 2. Extended Output Characteristics at 125°C

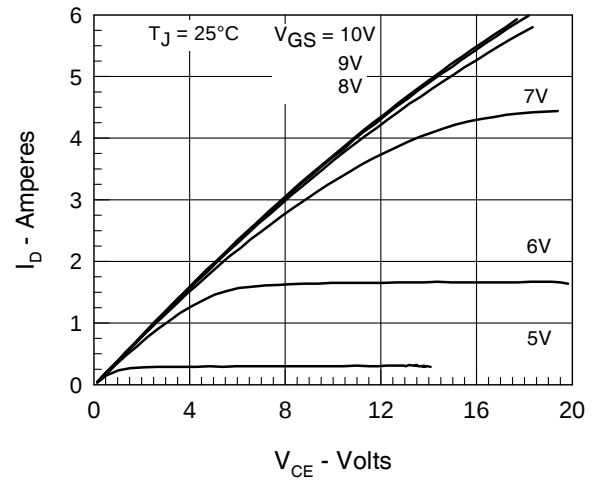


Figure 3. Output characteristics at 125°C

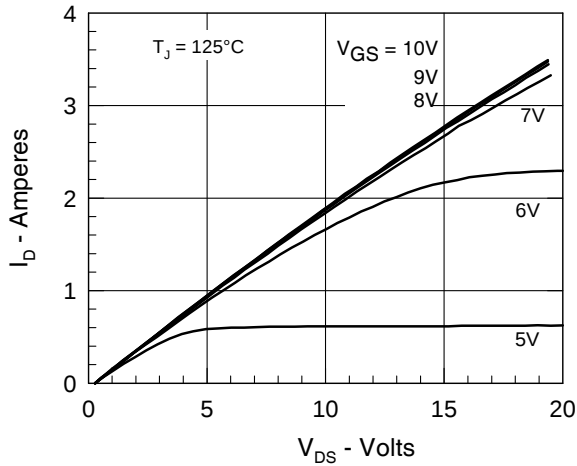


Figure 4. Admittance Curves

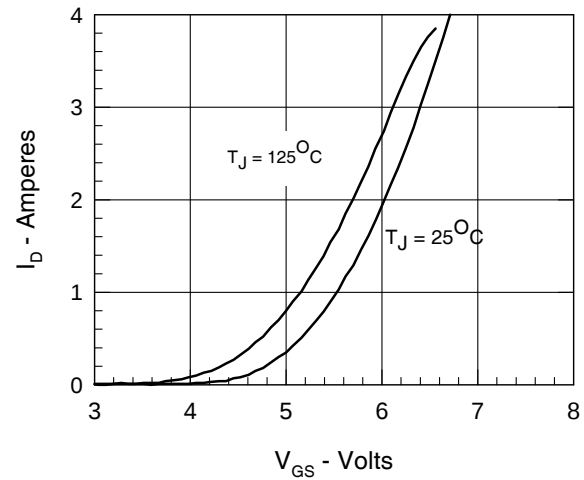
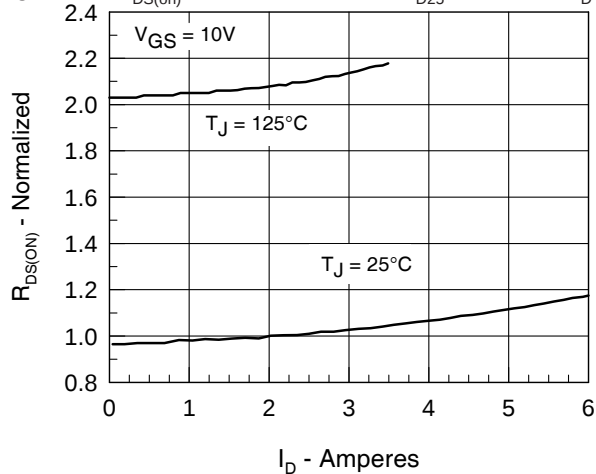
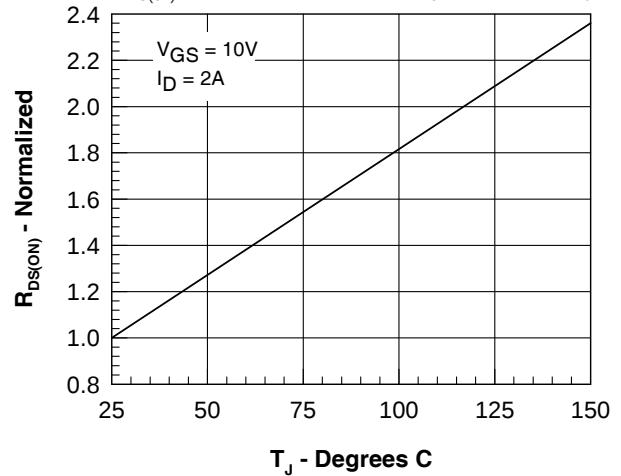

 Figure 5.  $R_{DS(on)}$  normalized to 0.5  $I_{D25}$  value vs.  $I_D$ 

 Figure 6.  $R_{DS(on)}$  normalized to 0.5  $I_{D25}$  value vs.  $T_J$ 


Figure 7. Gate Charge

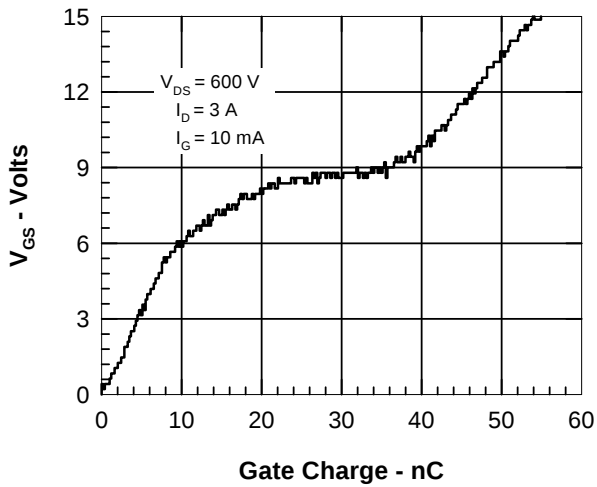


Figure 8. Capacitance Curves

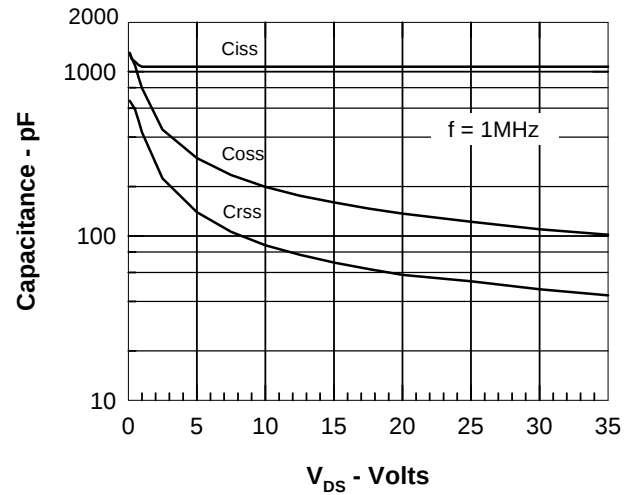


Figure 9. Forward Voltage Drop of the Intrinsic Diode

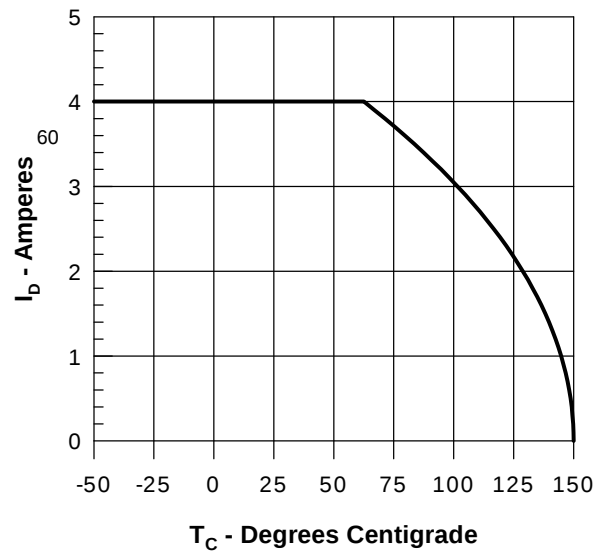
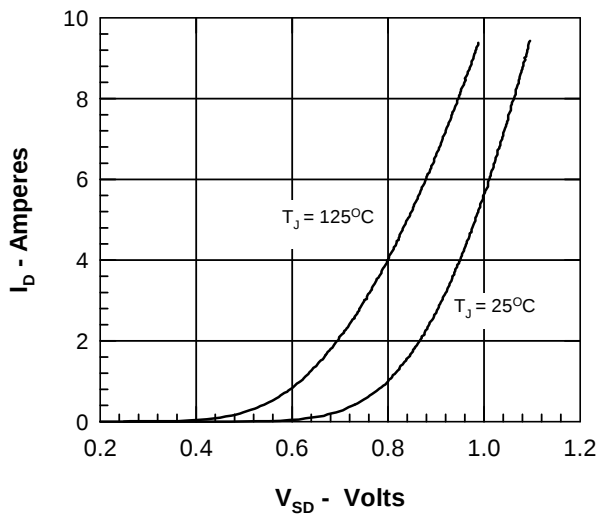
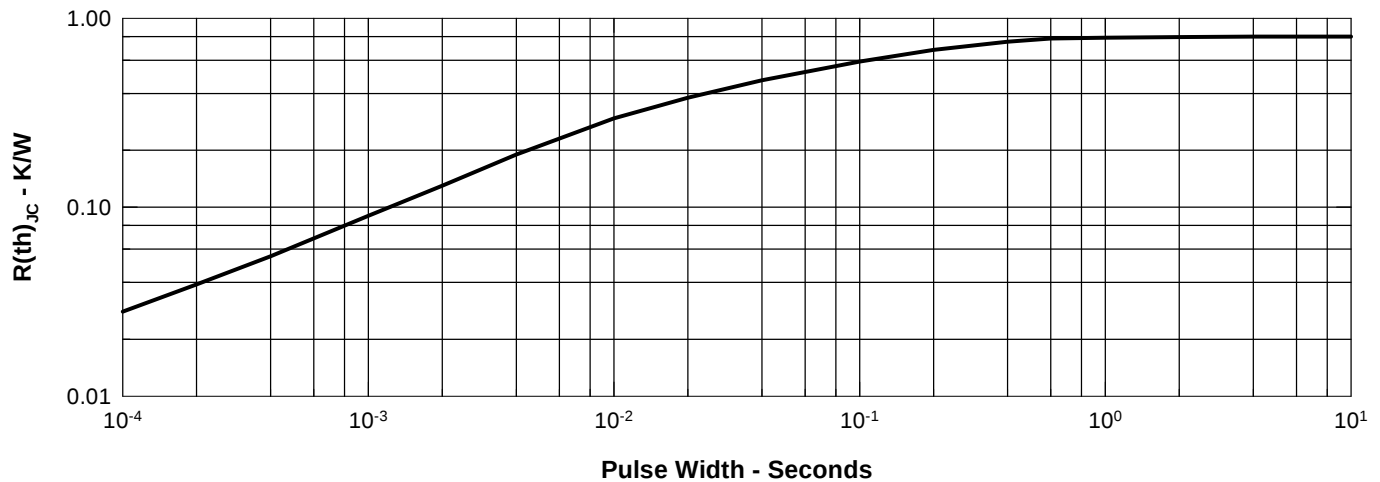


Figure 11. Transient Thermal Resistance





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