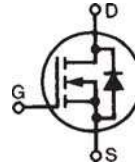


# HiPerFET™ Power MOSFET

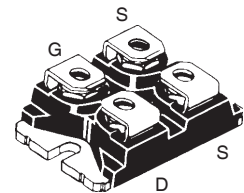
IXFN38N100Q2

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

$$\begin{aligned} V_{DSS} &= 1000V \\ I_{D25} &= 38A \\ R_{DS(on)} &\leq 250m\Omega \\ t_{rr} &\leq 300ns \end{aligned}$$



miniBLOC, SOT-227 B (IXFN)  
E153432



G = Gate                      D = Drain  
S = Source

Either Source terminal at miniBLOC can be used as Main or Kelvin Source

| Symbol     | Test Conditions                                                               | Maximum Ratings |                  |
|------------|-------------------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                               | 1000            | V                |
| $V_{DGR}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ , $R_{GS} = 1\text{ M}\Omega$ | 1000            | V                |
| $V_{GSS}$  | Continuous                                                                    | $\pm 30$        | V                |
| $V_{GSM}$  | Transient                                                                     | $\pm 40$        | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                      | 38              | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                    | 152             | A                |
| $I_{AR}$   | $T_C = 25^\circ\text{C}$                                                      | 38              | A                |
| $E_{AR}$   | $T_C = 25^\circ\text{C}$                                                      | 60              | mJ               |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                                      | 5               | J                |
| $dv/dt$    | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$      | 20              | V/ns             |
| $P_D$      | $T_C = 25^\circ\text{C}$                                                      | 890             | W                |
| $T_J$      |                                                                               | -55 ... +150    | $^\circ\text{C}$ |
| $T_{JM}$   |                                                                               | 150             | $^\circ\text{C}$ |
| $T_{stg}$  |                                                                               | -55 ... +150    | $^\circ\text{C}$ |
| $V_{ISOL}$ | 50/60 Hz, RMS, $t = 1$ minute                                                 | 2500            | V                |
| $M_d$      | Mounting torque                                                               | 1.5/13          | Nm/lb.in.        |
|            | Terminal connection torque                                                    | 1.5/11.5        | Nm/lb.in.        |
| Weight     |                                                                               | 30              | g                |

| Symbol       | Test Conditions                                                  | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                          |
|--------------|------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|--------------------------|
|              |                                                                  | Min.                                                                              | Typ. | Max.                     |
| $V_{DSS}$    | $V_{GS} = 0V$ , $I_D = 1mA$                                      | 1000                                                                              |      | V                        |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 8mA$                                  | 3.0                                                                               |      | 5.5 V                    |
| $I_{GSS}$    | $V_{GS} = \pm 30V$ , $V_{DS} = 0V$                               |                                                                                   |      | $\pm 200$ nA             |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0V$<br>$T_J = 125^\circ\text{C}$ |                                                                                   |      | 50 $\mu\text{A}$<br>3 mA |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1              |                                                                                   |      | 250 m $\Omega$           |

## Features

- Double metal process for low gate resistance
- miniBLOC, with Aluminium nitride isolation
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
- Fast intrinsic Rectifier

## Applications

- DC-DC converters
- Switched-mode and resonant-mode power supplies
- DC choppers
- Pulse generators

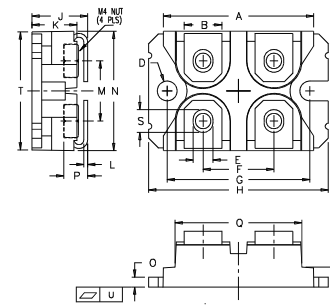
## Advantages

- 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.                    |
| $g_{fs}$     | $V_{DS} = 20\text{V}$ , $I_D = 0.5 \cdot I_{D25}$ Note 1                                                                                          | 24                                                                                | 40   | S                       |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                                  |                                                                                   | 13.5 | nF                      |
| $C_{oss}$    |                                                                                                                                                   |                                                                                   | 1035 | pF                      |
| $C_{rss}$    |                                                                                                                                                   |                                                                                   | 180  | pF                      |
| $t_{d(on)}$  | <b>Resistive Switching Time</b><br>$V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$<br>$R_G = 1\Omega$ (External) |                                                                                   | 25   | ns                      |
| $t_r$        |                                                                                                                                                   |                                                                                   | 28   | ns                      |
| $t_{d(off)}$ |                                                                                                                                                   |                                                                                   | 57   | ns                      |
| $t_f$        |                                                                                                                                                   |                                                                                   | 15   | ns                      |
| $Q_{G(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$                                                                  |                                                                                   | 250  | nC                      |
| $Q_{GS}$     |                                                                                                                                                   |                                                                                   | 60   | nC                      |
| $Q_{GD}$     |                                                                                                                                                   |                                                                                   | 105  | nC                      |
| $R_{thJC}$   |                                                                                                                                                   |                                                                                   |      | 0.14 $^\circ\text{C/W}$ |
| $R_{thCK}$   |                                                                                                                                                   | 0.05                                                                              |      | $^\circ\text{C/W}$      |

**Source-Drain Diode**

| Symbol   | Test Conditions                                                                 | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |               |
|----------|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------|
|          |                                                                                 | Min.                                                                              | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{V}$                                                            |                                                                                   |      | 38 A          |
| $I_{SM}$ | Repetitive, pulse width limited by $T_{JM}$                                     |                                                                                   |      | 152 A         |
| $V_{SD}$ | $I_F = I_S$ , $V_{GS} = 0\text{V}$ , Note 1                                     |                                                                                   |      | 1.5 V         |
| $t_{rr}$ | $I_F = 25\text{A}$<br>$-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ |                                                                                   |      | 300 ns        |
| $Q_{RM}$ |                                                                                 |                                                                                   | 1.4  | $\mu\text{C}$ |
| $I_{RM}$ |                                                                                 |                                                                                   | 9    | A             |

**miniBLOC, SOT-227 B Outline**


M4 screws (4x) supplied

| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | Min.       | Max.  | Min.   | Max.  |
| A    | 31.50      | 31.88 | 1.240  | 1.255 |
| B    | 7.80       | 8.20  | 0.307  | 0.323 |
| C    | 4.09       | 4.29  | 0.161  | 0.169 |
| D    | 4.09       | 4.29  | 0.161  | 0.169 |
| E    | 4.09       | 4.29  | 0.161  | 0.169 |
| F    | 14.91      | 15.11 | 0.587  | 0.595 |
| G    | 30.12      | 30.30 | 1.186  | 1.193 |
| H    | 38.00      | 38.23 | 1.496  | 1.505 |
| J    | 11.68      | 12.22 | 0.460  | 0.481 |
| K    | 8.92       | 9.60  | 0.351  | 0.378 |
| L    | 0.76       | 0.84  | 0.030  | 0.033 |
| M    | 12.60      | 12.85 | 0.496  | 0.506 |
| N    | 25.15      | 25.42 | 0.990  | 1.001 |
| O    | 1.98       | 2.13  | 0.078  | 0.084 |
| P    | 4.95       | 5.97  | 0.195  | 0.235 |
| Q    | 26.54      | 26.90 | 1.045  | 1.059 |
| R    | 3.94       | 4.42  | 0.155  | 0.174 |
| S    | 4.72       | 4.85  | 0.186  | 0.191 |
| T    | 24.59      | 25.07 | 0.968  | 0.987 |
| U    | -0.05      | 0.1   | -0.002 | 0.004 |

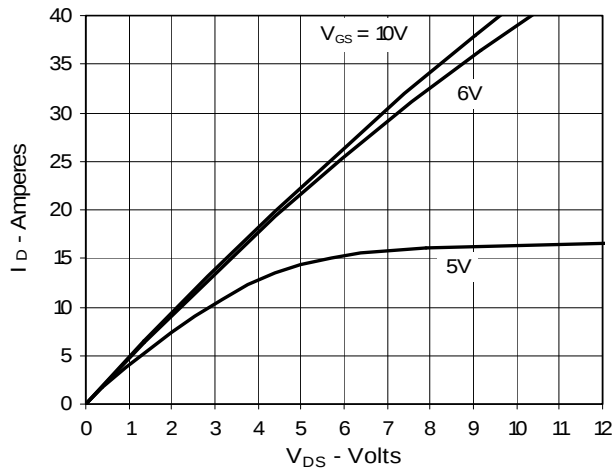
Note: 1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle  $d \leq 2\%$ 

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

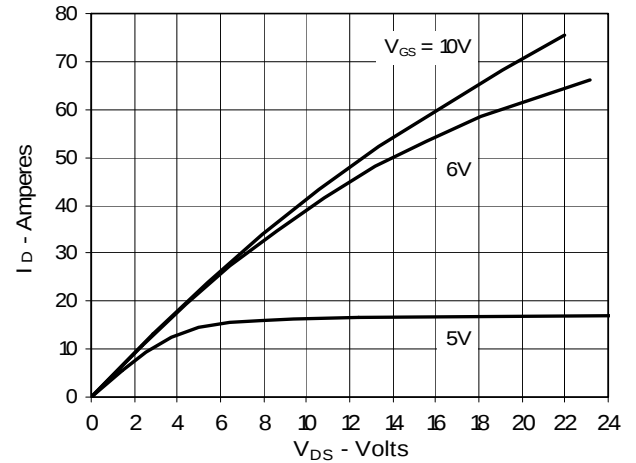
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

|           |           |           |           |           |           |    |           |           |             |             |           |    |
|-----------|-----------|-----------|-----------|-----------|-----------|----|-----------|-----------|-------------|-------------|-----------|----|
| 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          | 7,157,338 | B2 |
|           | 4,850,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123 | B1 | 6,534,343 | 6,710,405 | B26,759,692 |             | 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   | B27,071,537 |           |    |

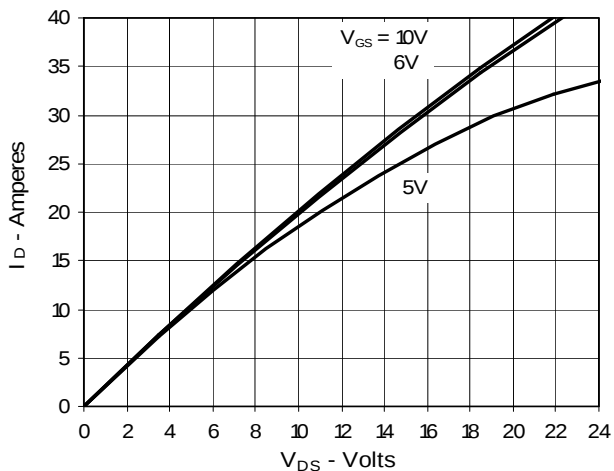
**Fig. 1. Output Characteristics  
@ 25°C**



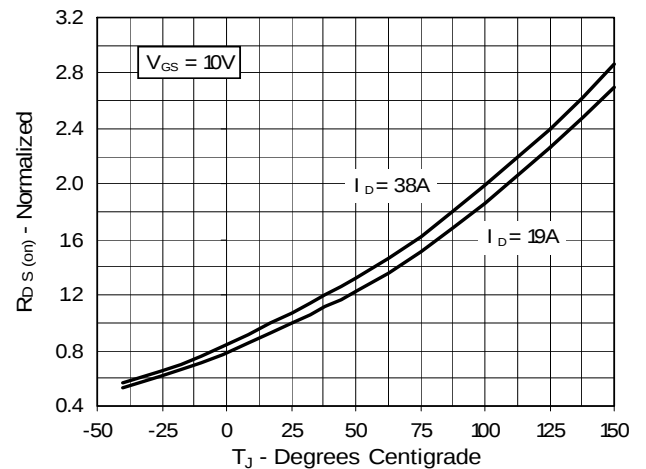
**Fig. 2. Extended Output Characteristics  
@ 25°C**



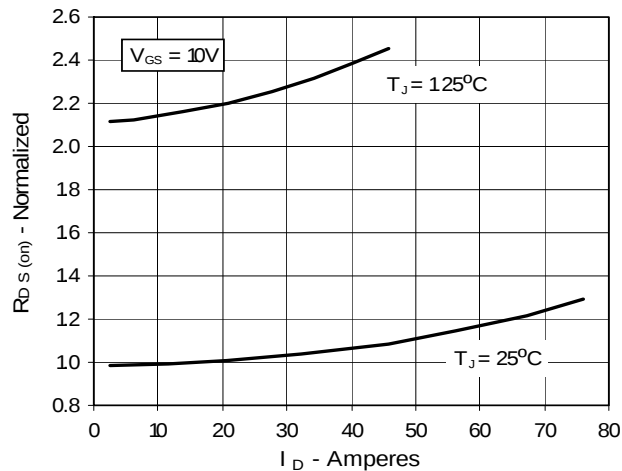
**Fig. 3. Output Characteristics  
@ 125°C**



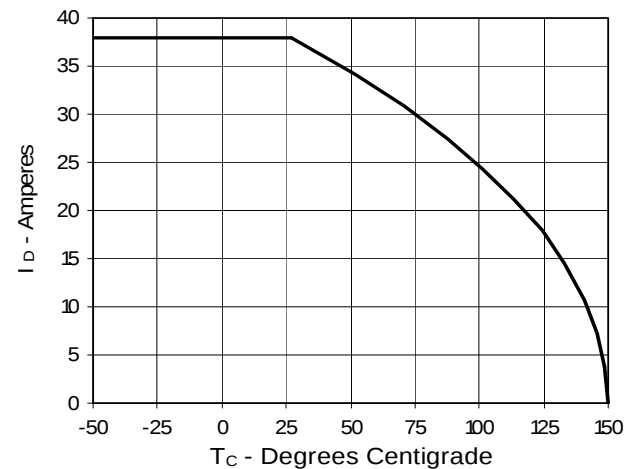
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 19A$   
Value vs. Junction Temperature**

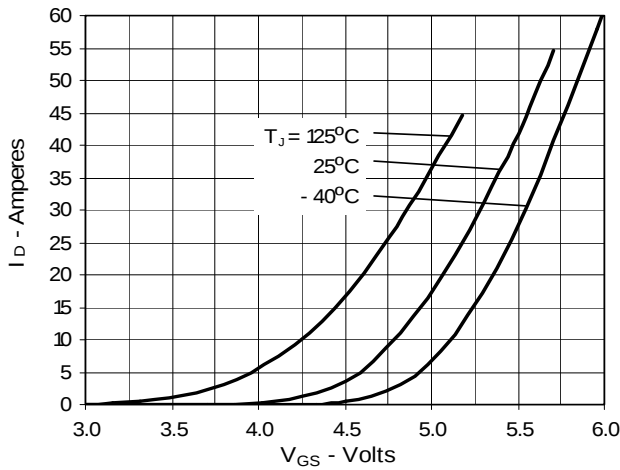
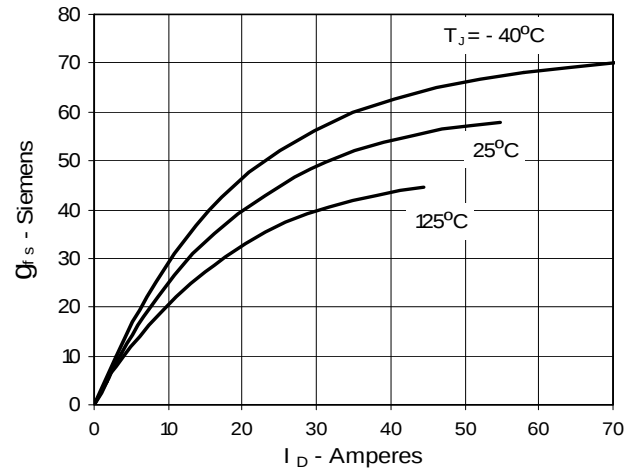
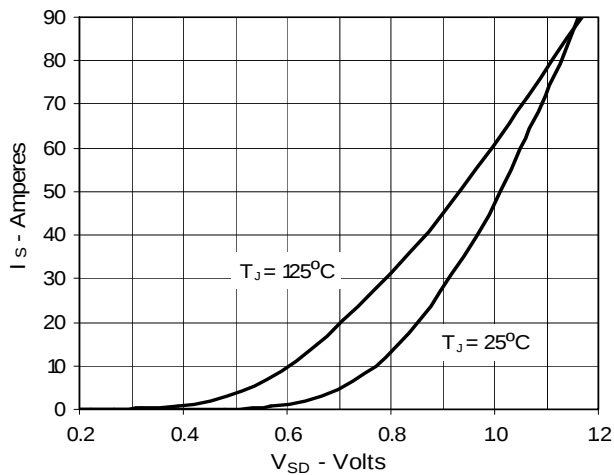
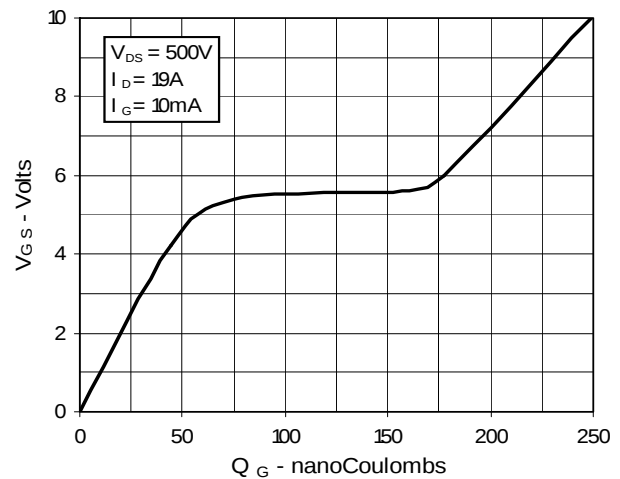
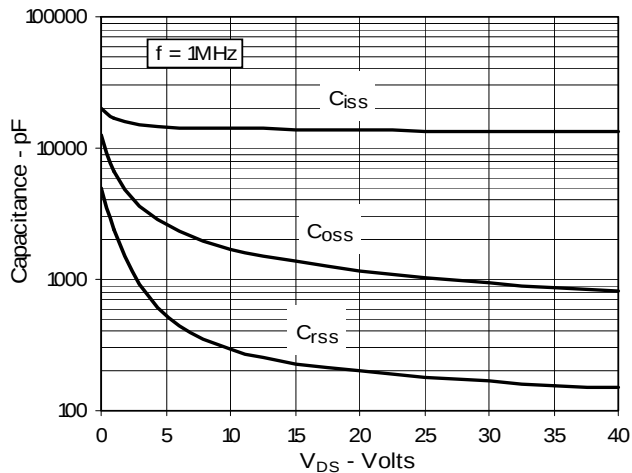


**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 19A$   
Value vs. Drain Current**



**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. Maximum Transient Thermal Impedance**
