

# HiPerFET™

## Power MOSFETs

### Q-Class

Single MOSFET Die

N-Channel Enhancement Mode  
Avalanche Rated, Low  $Q_g$ , High  $dv/dt$

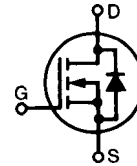
## IXFN 21N100Q

$V_{DSS} = 1000 \text{ V}$

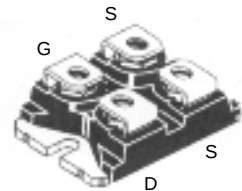
$I_{D25} = 21 \text{ A}$

$R_{DS(on)} = 0.50 \Omega$

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



miniBLOC, SOT-227 B (IXFN)  
E153432



G = Gate  
S = Source  
D = Drain

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                      |
| $V_{GS}$   | Continuous                                                                                                                              | $\pm 20$         | V                      |
| $V_{GSM}$  | Transient                                                                                                                               | $\pm 30$         | V                      |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                                                                                | 21               | A                      |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                              | 84               | A                      |
| $I_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                                | 21               | A                      |
| $E_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                                | 60               | mJ                     |
| $E_{AS}$   |                                                                                                                                         | 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>$T_J \leq 150^\circ\text{C}$ , $R_G = 2 \Omega$ | 5                | V/ns                   |
| $P_D$      | $T_C = 25^\circ\text{C}$                                                                                                                | 520              | W                      |
| $T_J$      |                                                                                                                                         | -55 to +150      | $^\circ\text{C}$       |
| $T_{JM}$   |                                                                                                                                         | 150              | $^\circ\text{C}$       |
| $T_{stg}$  |                                                                                                                                         | -55 to +150      | $^\circ\text{C}$       |
| $V_{ISOL}$ | 50/60 Hz, RMS $t = 1 \text{ min}$<br>$I_{ISOL} \leq 1 \text{ mA}$ $t = 1 \text{ s}$                                                     | 2500<br>3000     | V~<br>V~               |
| $M_d$      | Mounting torque<br>Terminal connection torque                                                                                           | 1.5/13<br>1.5/13 | Nm/lb.in.<br>Nm/lb.in. |
| Weight     |                                                                                                                                         | 30               | g                      |

#### Features

- IXYS advanced low  $Q_g$  process
- Low gate charge and capacitances
  - easier to drive
  - faster switching
- Unclamped Inductive Switching (UIS) rated
- Low  $R_{DS(on)}$
- Fast intrinsic diode
- International standard package
- miniBLOC with Aluminium nitride isolation for low thermal resistance
- Low terminal inductance (<10 nH) and stray capacitance to heatsink (<35 pF)
- Molding epoxies meet UL 94 V-0 flammability classification

#### Applications

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

#### Advantages

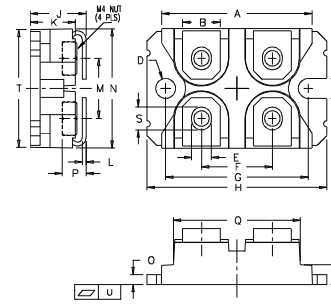
- Easy to mount
- Space savings
- High power density

| Symbol       | Test Conditions                                                                                                  | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                           |
|--------------|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------------------|
|              |                                                                                                                  | min.                                                                              | typ. | max.                      |
| $V_{DSS}$    | $V_{GS} = 0 \text{ V}$ , $I_D = 1 \text{ mA}$                                                                    | 1000                                                                              |      | V                         |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 1.5 \text{ mA}$                                                                       | 2.5                                                                               |      | 4.5 V                     |
| $I_{GSS}$    | $V_{GS} = \pm 20 \text{ V}_{DC}$ , $V_{DS} = 0$                                                                  |                                                                                   |      | $\pm 100 \text{ nA}$      |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0 \text{ V}$<br>$T_J = 125^\circ\text{C}$                                        |                                                                                   |      | 100 $\mu\text{A}$<br>2 mA |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 0.5 I_{D25}$<br>Pulse test, $t \leq 300 \mu\text{s}$ , duty cycle $d \leq 2 \%$ |                                                                                   |      | 0.50 $\Omega$             |

| Symbol       | Test Conditions                                                                                             | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |          |
|--------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|----------|
|              |                                                                                                             | min.                                                                              | typ. | max.     |
| $g_{fs}$     | $V_{DS} = 20\text{ V}; I_D = 0.5 \cdot I_{D25}$ , pulse test                                                | 16                                                                                | 22   | S        |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                               |                                                                                   | 5900 | pF       |
| $C_{oss}$    |                                                                                                             |                                                                                   | 550  | pF       |
| $C_{rss}$    |                                                                                                             |                                                                                   | 90   | pF       |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$<br>$R_G = 1\ \Omega$ (External) |                                                                                   | 21   | ns       |
| $t_{18}$     |                                                                                                             |                                                                                   | 18   | ns       |
| $t_{d(off)}$ |                                                                                                             |                                                                                   | 60   | ns       |
| $t_f$        |                                                                                                             |                                                                                   | 12   | ns       |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$                                 |                                                                                   | 170  | nC       |
| $Q_{gs}$     |                                                                                                             |                                                                                   | 38   | nC       |
| $Q_{gd}$     |                                                                                                             |                                                                                   | 75   | nC       |
| $R_{thJC}$   |                                                                                                             |                                                                                   | 0.05 | 0.24 K/W |
| $R_{thCK}$   |                                                                                                             |                                                                                   |      | K/W      |

| Symbol   | Test Conditions                                                                                       | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |               |
|----------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------|
|          |                                                                                                       | min.                                                                              | typ. | max.          |
| $I_S$    | $V_{GS} = 0\text{ V}$                                                                                 |                                                                                   | 21   | A             |
| $I_{SM}$ | Repetitive; pulse width limited by $T_{JM}$                                                           |                                                                                   | 84   | 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             |
| $t_{rr}$ | $I_F = I_S, -di/dt = 100\text{ A}/\mu\text{s}, V_R = 100\text{ V}$                                    |                                                                                   | 1.4  | 250 ns        |
| $Q_{RM}$ |                                                                                                       |                                                                                   |      | $\mu\text{C}$ |
| $I_{RM}$ |                                                                                                       |                                                                                   |      | A             |

### miniBLOC, SOT-227 B



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 |

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 |

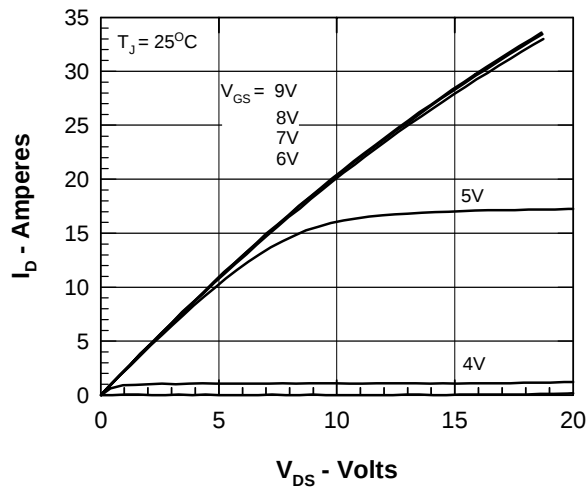


Fig.1 Output Characteristics @  $T_J = 25^\circ\text{C}$

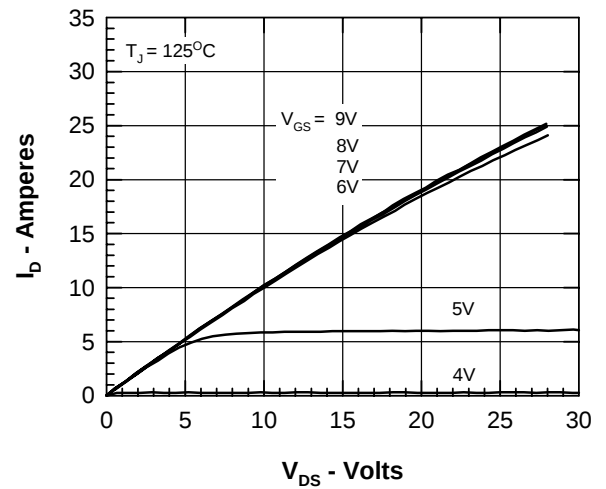


Fig.2 Output Characteristics @  $T_J = 125^\circ\text{C}$

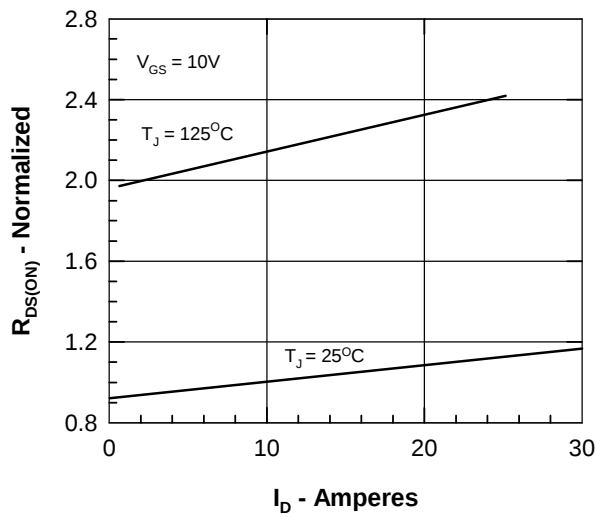


Fig.3  $R_{DS(on)}$  vs. Drain Current

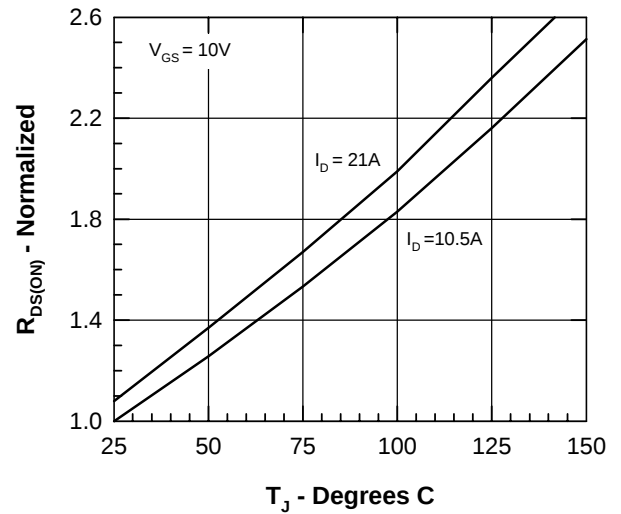


Fig.4 Temperature Dependence of Drain to Source Resistance

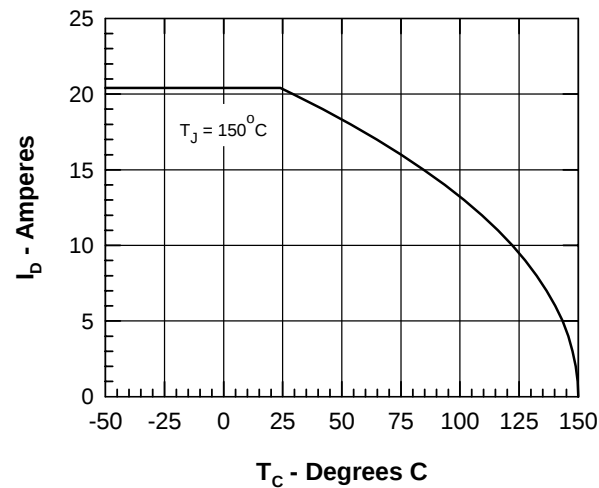


Fig.5 Drain Current vs. Case Temperature

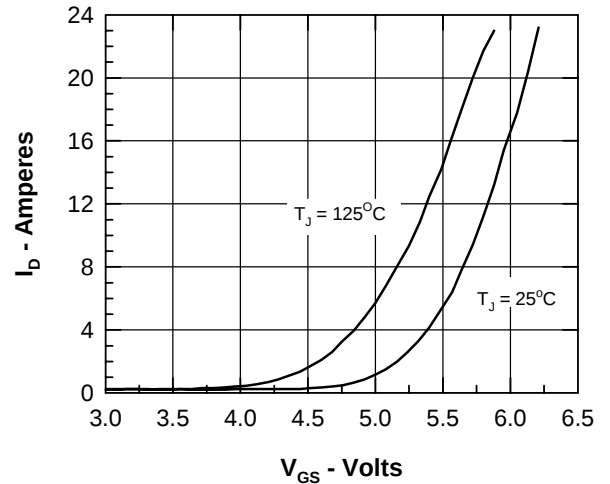


Fig.6 Drain Current vs Gate Source Voltage

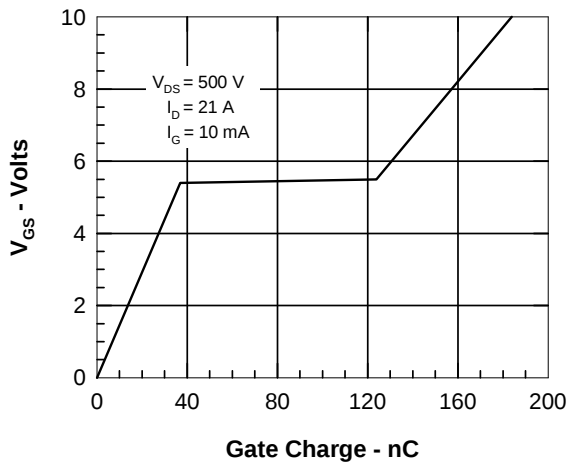


Fig.7 Gate Charge Characteristic Curve

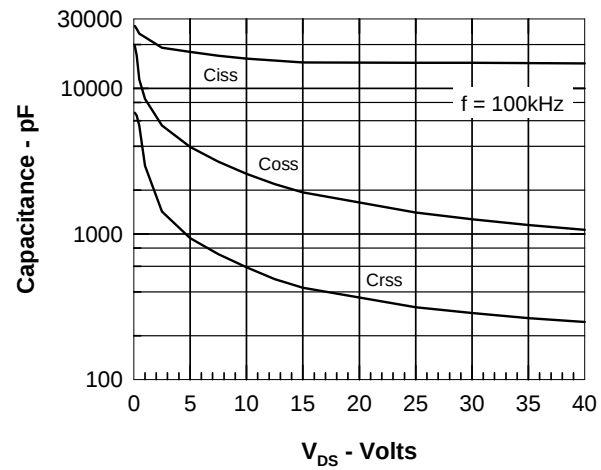


Fig.8 Capacitance Curves

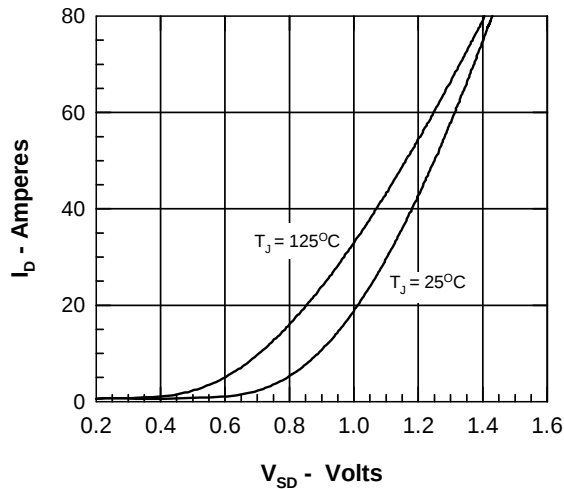


Fig.9 Drain Current vs Drain to Source Voltage

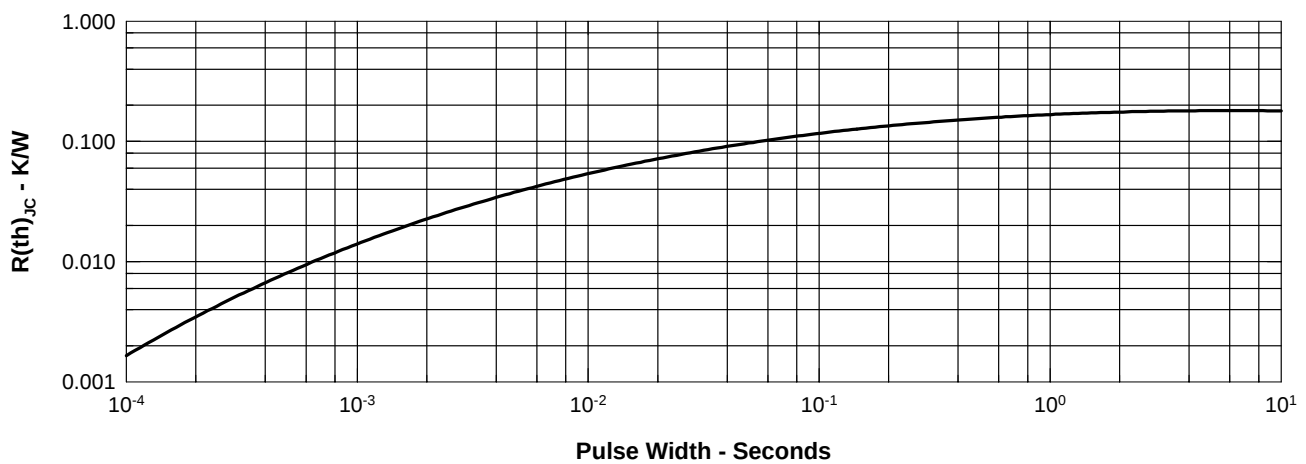


Fig.10 Transient Thermal Impedance