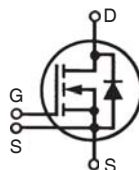


# X-Class HiPerFET™ Power MOSFET

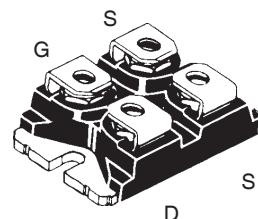
## IXFN70N100X

N-Channel Enhancement Mode  
Avalanche Rated



$$\begin{aligned} V_{DSS} &= 1000V \\ I_{D25} &= 65A \\ R_{DS(on)} &\leq 89m\Omega \end{aligned}$$

miniBLOC, SOT-227  
 E153432



G = Gate  
S = Source  
D = Drain

| Symbol     | Test Conditions                                                    | Maximum Ratings |                  |
|------------|--------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C to } 150^\circ\text{C}$                     | 1000            | V                |
| $V_{DGR}$  | $T_J = 25^\circ\text{C to } 150^\circ\text{C}, R_{GS} = 1M\Omega$  | 1000            | V                |
| $V_{GSS}$  | Continuous                                                         | $\pm 30$        | V                |
| $V_{GSM}$  | Transient                                                          | $\pm 40$        | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                           | 65              | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , Pulse Width Limited by $T_{JM}$         | 150             | A                |
| $I_A$      | $T_C = 25^\circ\text{C}$                                           | 25              | A                |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                           | 2.5             | J                |
| $P_D$      | $T_C = 25^\circ\text{C}$                                           | 1200            | W                |
| $dv/dt$    | $I_S \leq I_{DM}, V_{DD} \leq V_{DSS}, T_J \leq 150^\circ\text{C}$ | 50              | V/ns             |
| $T_J$      |                                                                    | -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~          |
|            | $I_{ISOL} \leq 1\text{mA}$                                         | t = 1 second    | 3000 V~          |
| $M_d$      | Mounting Torque                                                    | 1.5/13          | Nm/lb.in         |
|            | Terminal Connection Torque                                         | 1.3/11.5        | Nm/lb.in         |
| Weight     |                                                                    | 30              | g                |

### Features

- International Standard Package
- miniBLOC, with Aluminium Nitride Isolation
- Isolation Voltage 2500V~
- High Current Handling Capability
- Avalanche Rated
- Low  $R_{DS(on)}$

### Advantages

- High Power Density
- Easy to Mount
- Space Savings

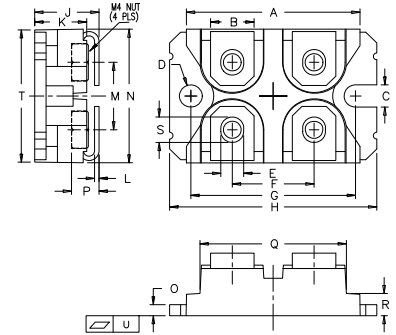
### Applications

- Switch-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- PFC Circuits
- AC and DC Motor Drives
- Robotics and Servo Controls

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified) | Characteristic Values |      |                            |
|--------------|---------------------------------------------------------------------------|-----------------------|------|----------------------------|
|              |                                                                           | Min.                  | Typ. | Max.                       |
| $BV_{DSS}$   | $V_{GS} = 0V, I_D = 1\text{mA}$                                           | 1000                  |      | V                          |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 8\text{mA}$                                       | 3.5                   |      | 6.0 V                      |
| $I_{GSS}$    | $V_{GS} = \pm 30V, V_{DS} = 0V$                                           |                       |      | $\pm 200$ nA               |
| $I_{DSS}$    | $V_{DS} = V_{DSS}, V_{GS} = 0V$<br>$T_J = 125^\circ\text{C}$              |                       |      | 50 $\mu\text{A}$<br>7.5 mA |
| $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 35A$ , Note 1                                        |                       |      | 89 m $\Omega$              |

| Symbol                              | Test Conditions<br>(T <sub>J</sub> = 25°C, Unless Otherwise Specified)                                                                                       | Characteristic Values                                              |      |            |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|------|------------|
|                                     |                                                                                                                                                              | Min.                                                               | Typ. | Max        |
| <b>g<sub>fs</sub></b>               | V <sub>DS</sub> = 20V, I <sub>D</sub> = 35A, Note 1                                                                                                          | 34                                                                 | 57   | S          |
| <b>R<sub>Gi</sub></b>               | Gate Input Resistance                                                                                                                                        |                                                                    | 0.30 | Ω          |
| <b>C<sub>iss</sub></b>              | } V <sub>GS</sub> = 0V, V <sub>DS</sub> = 25V, f = 1MHz                                                                                                      |                                                                    | 9150 | pF         |
| <b>C<sub>oss</sub></b>              |                                                                                                                                                              |                                                                    | 2650 | pF         |
| <b>C<sub>rss</sub></b>              |                                                                                                                                                              |                                                                    | 72   | pF         |
| <b>Effective Output Capacitance</b> |                                                                                                                                                              |                                                                    |      |            |
| <b>C<sub>o(er)</sub></b>            | Energy related                                                                                                                                               | } V <sub>GS</sub> = 0V<br>V <sub>DS</sub> = 0.8 • V <sub>DSS</sub> | 390  | pF         |
| <b>C<sub>o(tr)</sub></b>            | Time related                                                                                                                                                 |                                                                    | 1500 | pF         |
| <b>t<sub>d(on)</sub></b>            | <b>Resistive Switching Times</b><br>V <sub>GS</sub> = 10V, V <sub>DS</sub> = 0.5 • V <sub>DSS</sub> , I <sub>D</sub> = 35A<br>R <sub>G</sub> = 1Ω (External) |                                                                    | 48   | ns         |
| <b>t<sub>r</sub></b>                |                                                                                                                                                              |                                                                    | 20   | ns         |
| <b>t<sub>d(off)</sub></b>           |                                                                                                                                                              |                                                                    | 127  | ns         |
| <b>t<sub>f</sub></b>                |                                                                                                                                                              |                                                                    | 9    | ns         |
| <b>Q<sub>g(on)</sub></b>            | } V <sub>GS</sub> = 10V, V <sub>DS</sub> = 0.5 • V <sub>DSS</sub> , I <sub>D</sub> = 35A                                                                     |                                                                    | 350  | nC         |
| <b>Q<sub>gs</sub></b>               |                                                                                                                                                              |                                                                    | 84   | nC         |
| <b>Q<sub>gd</sub></b>               |                                                                                                                                                              |                                                                    | 190  | nC         |
| <b>R<sub>thJC</sub></b>             |                                                                                                                                                              |                                                                    |      | 0.104 °C/W |
| <b>R<sub>thCS</sub></b>             |                                                                                                                                                              |                                                                    | 0.05 | °C/W       |

## SOT-227B (IXFN) Outline



(M4 screws (4x) supplied)

| SYM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 1.240  | 1.255 | 31.50       | 31.88 |
| B   | .307   | .323  | 7.80        | 8.20  |
| C   | .161   | .169  | 4.09        | 4.29  |
| D   | .161   | .169  | 4.09        | 4.29  |
| E   | .161   | .169  | 4.09        | 4.29  |
| F   | .587   | .595  | 14.91       | 15.11 |
| G   | 1.186  | 1.193 | 30.12       | 30.30 |
| H   | 1.496  | 1.505 | 38.00       | 38.23 |
| J   | .460   | .481  | 11.68       | 12.22 |
| K   | .351   | .378  | 8.92        | 9.60  |
| L   | .030   | .033  | 0.76        | 0.84  |
| M   | .496   | .506  | 12.60       | 12.85 |
| N   | .990   | 1.001 | 25.15       | 25.42 |
| O   | .078   | .084  | 1.98        | 2.13  |
| P   | .195   | .235  | 4.95        | 5.97  |
| Q   | 1.045  | 1.059 | 26.54       | 26.90 |
| R   | .155   | .174  | 3.94        | 4.42  |
| S   | .186   | .191  | 4.72        | 4.85  |
| T   | .968   | .987  | 24.59       | 25.07 |
| U   | -.002  | .004  | -0.05       | 0.1   |

## Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                           | Characteristic Values |      |               |
|----------|-------------------------------------------------------------------------------------------------------|-----------------------|------|---------------|
|          |                                                                                                       | Min.                  | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{V}$                                                                                  |                       |      | 70 A          |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$                                                           |                       |      | 280 A         |
| $V_{SD}$ | $I_F = I_S$ , $V_{GS} = 0\text{V}$ , Note 1                                                           |                       |      | 1.4 V         |
| $t_{rr}$ | $I_F = 35\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ , $V_{GS} = 0\text{V}$ |                       | 310  | ns            |
| $Q_{RM}$ |                                                                                                       |                       | 3.5  | $\mu\text{C}$ |
| $I_{RM}$ |                                                                                                       |                       | 22.6 | A             |

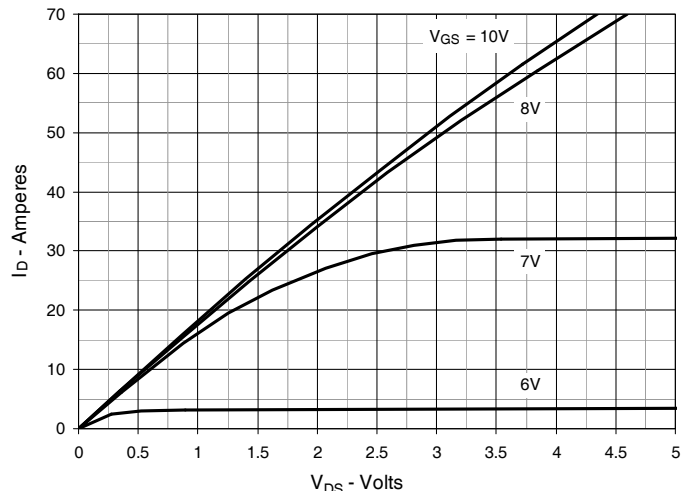
Note 1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .

IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

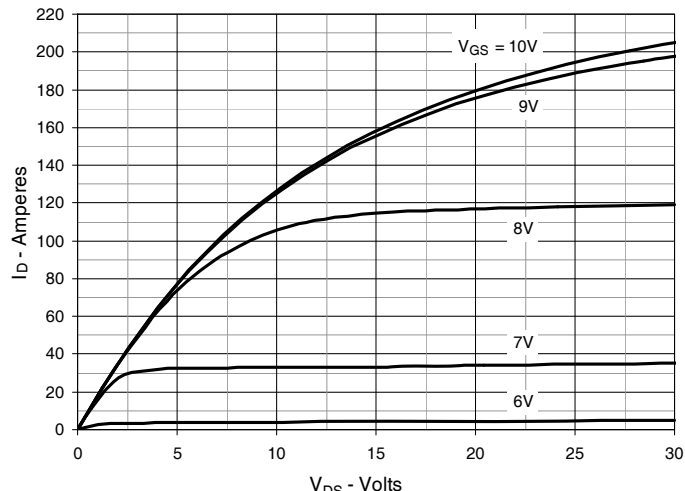
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

|           |           |           |           |              |              |              |              |              |             |
|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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 | 7,157,338B2 |
| 4,860,072 | 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    |             |

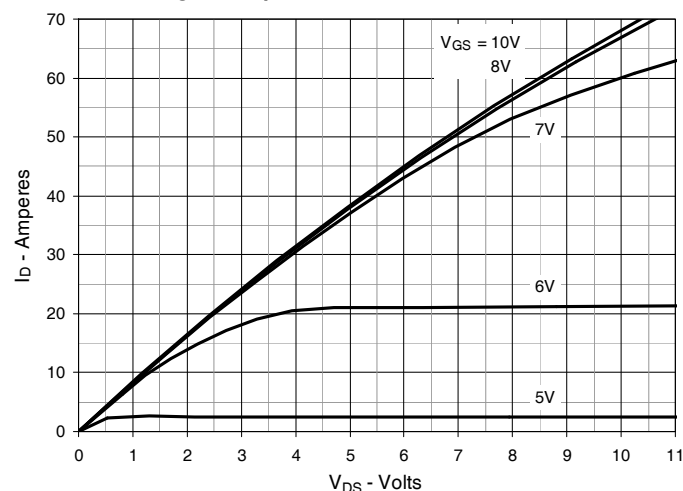
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



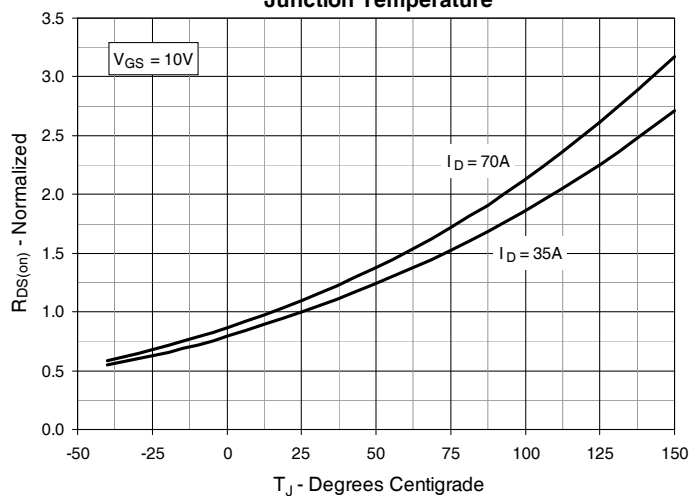
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



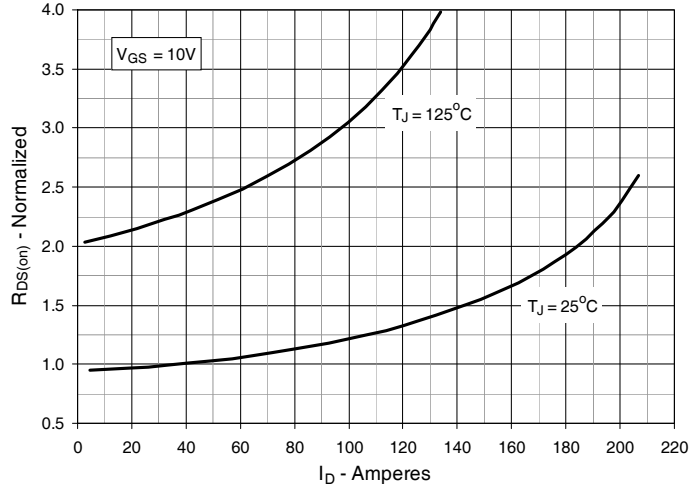
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



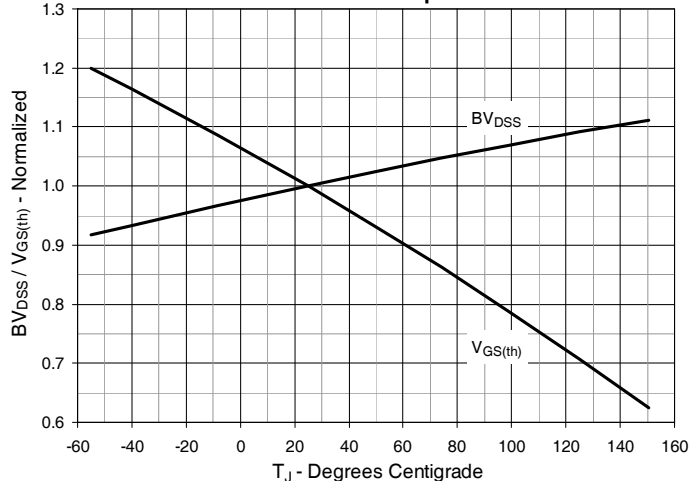
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 35\text{A}$  Value vs. Junction Temperature**

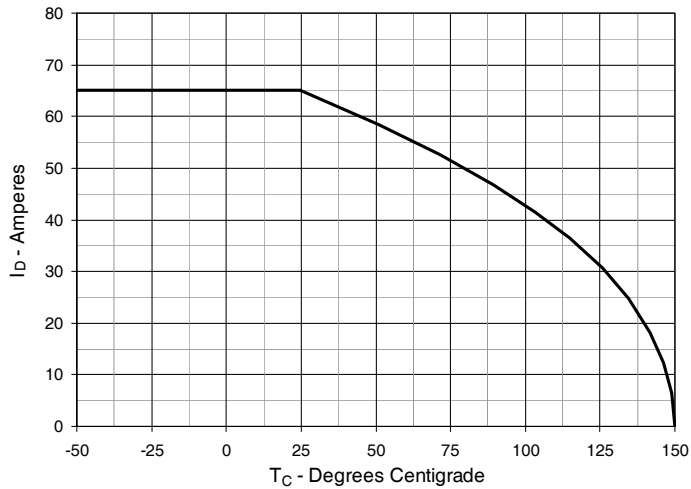
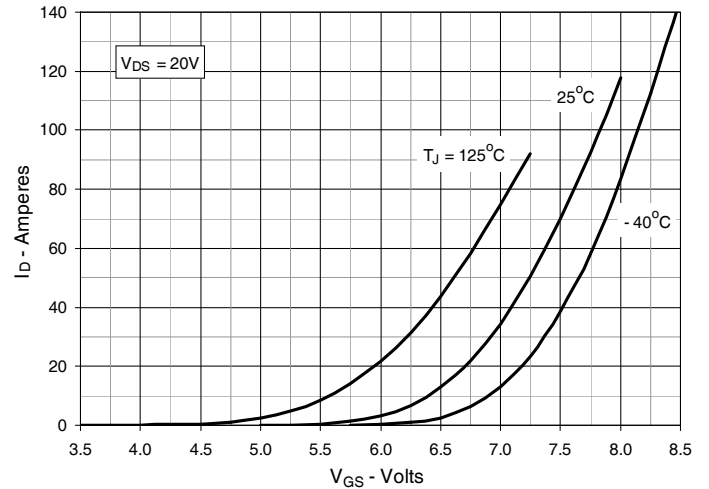
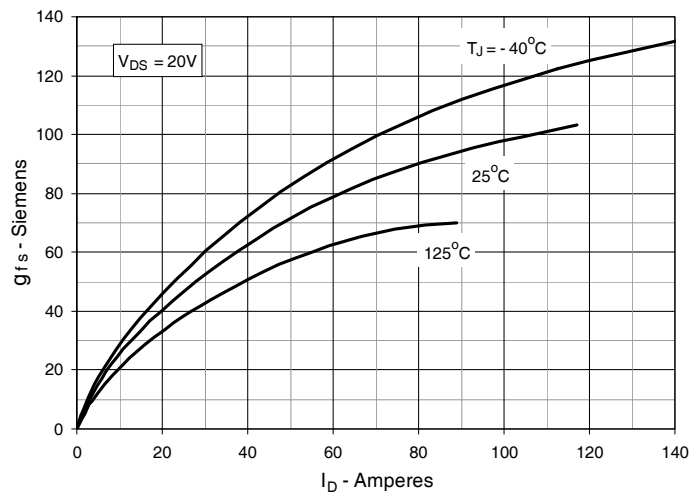
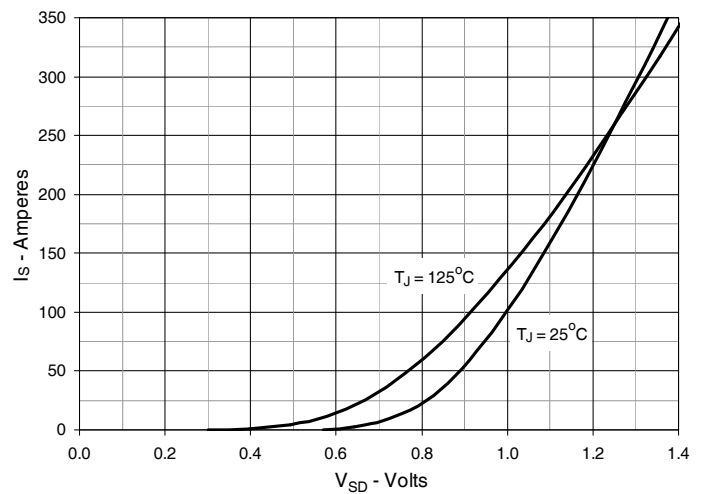
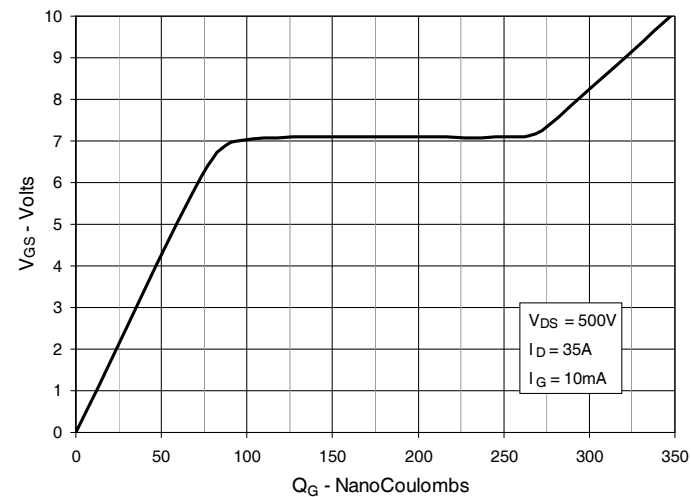
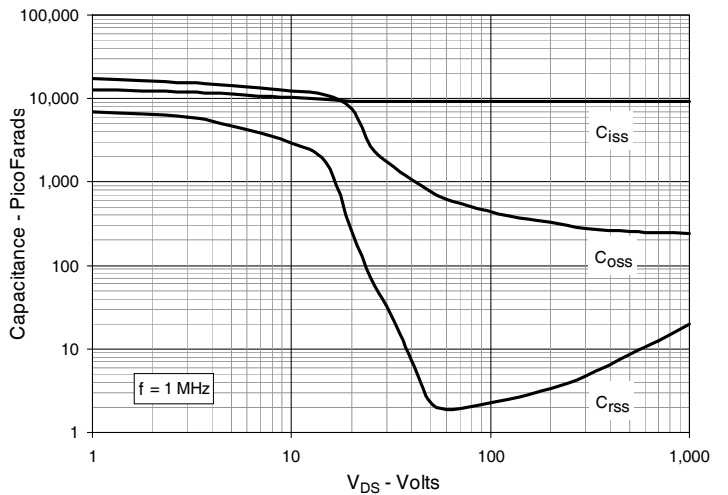


**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 35\text{A}$  Value vs. Drain Current**

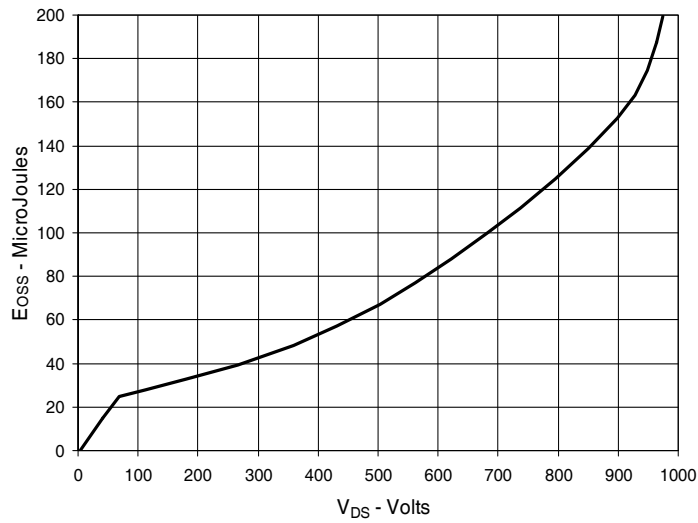


**Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature**

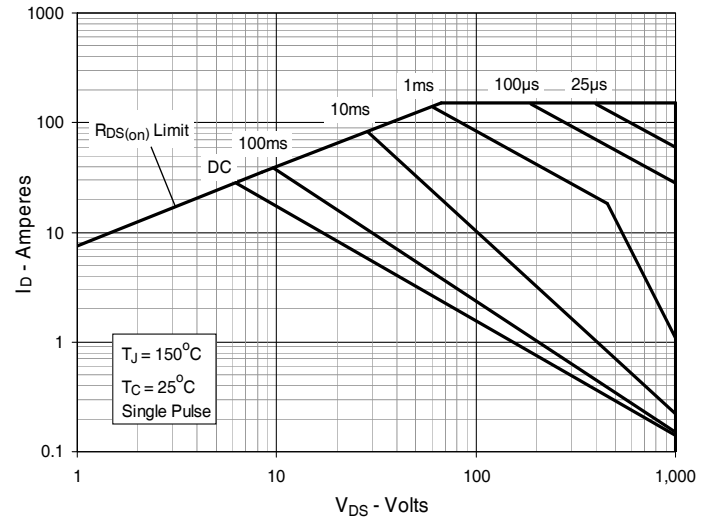


**Fig. 7. Maximum Drain Current vs. Case Temperature**

**Fig. 8. Input Admittance**

**Fig. 9. Transconductance**

**Fig. 10. Forward Voltage Drop of Intrinsic Diode**

**Fig. 11. Gate Charge**

**Fig. 12. Capacitance**


**Fig. 13. Output Capacitance Stored Energy**



**Fig. 14. Forward-Bias Safe Operating Area**



**Fig. 15. Maximum Transient Thermal Impedance**

