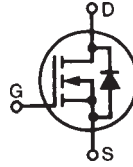


# X3-Class HiPerFET™ Power MOSFET

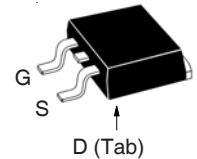
## IXFA80N25X3

$V_{DSS} = 250V$   
 $I_{D25} = 80A$   
 $R_{DS(on)} \leq 16m\Omega$

N-Channel Enhancement Mode  
Avalanche Rated



TO-263



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

| Symbol     | Test Conditions  | Maximum Ratings    |                |
|------------|--|--------------------|----------------|
| $V_{DSS}$  | $T_J = 25^\circ C$ to $150^\circ C$                                | 250                | V              |
| $V_{DGR}$  | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1M\Omega$          | 250                | V              |
| $V_{GSS}$  | Continuous   | $\pm 20$           | V              |
| $V_{GSM}$  | Transient  | $\pm 30$           | V              |
| $I_{D25}$  | $T_C = 25^\circ C$   | 80                 | A              |
| $I_{DM}$   | $T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$               | 220                | A              |
| $I_A$      | $T_C = 25^\circ C$   | 40                 | A              |
| $E_{AS}$   | $T_C = 25^\circ C$   | 1.2                | J              |
| dv/dt      | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ C$ | 20                 | V/ns           |
| $P_D$      | $T_C = 25^\circ C$   | 390                | 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                | $^\circ C$     |
| dT/dt      | Heating / Cooling rate, $175^\circ C - 210^\circ C$                | 50                 | $^\circ C/min$ |
| $T_{SOLD}$ | 1.6 mm (0.062in.) from Case for 10s                                | 260                | $^\circ C$     |
| $F_C$      | Mounting Force   | 10..65 / 2.2..14.6 | N/lb           |
| Weight     |  | 2.5                | g              |

### Features

- International Standard Package
- Low  $R_{DS(ON)}$  and  $Q_G$
- Avalanche Rated
- Low Package Inductance

### Advantages

- High Power Density
- Easy to Mount
- Space Savings

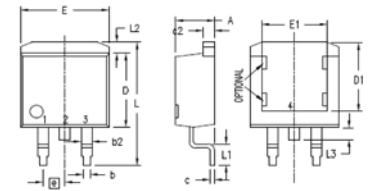
### Applications

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

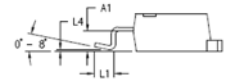
| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ , Unless Otherwise Specified) | Characteristic Values |      |                          |
|--------------|---|-----------------------|------|--------------------------|
|              |   | Min.                  | Typ. | Max.                     |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu A$                                      | 250                   |      | 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>$T_J = 125^\circ C$             |                       |      | 5 $\mu A$<br>350 $\mu A$ |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                   |                       |      | 16 m $\Omega$            |

| Symbol                              | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)  | Characteristic Values                                |      |                         |
|-------------------------------------|--|--|------|-------------------------|
|                                     |  | Min.   | Typ. | Max                     |
| $g_{fs}$                            | $V_{DS} = 10\text{V}$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1   | 38   | 64   | S                       |
| $R_{Gi}$                            | Gate Input Resistance  |  | 1.6  | $\Omega$                |
| $C_{iss}$                           | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$   |  | 5430 | pF                      |
| $C_{oss}$                           |  |  | 890  | pF                      |
| $C_{rss}$                           |  |  | 1.6  | pF                      |
| <b>Effective Output Capacitance</b> |  |  |      |                         |
| $C_{o(er)}$                         | Energy related   | $V_{GS} = 0\text{V}$<br>$V_{DS} = 0.8 \cdot V_{DSS}$ | 320  | pF                      |
| $C_{o(tr)}$                         | Time related   |  | 1410 | 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>$R_G = 5\Omega$ (External) |  | 30   | ns                      |
| $t_r$                               |  |  | 17   | ns                      |
| $t_{d(off)}$                        |  |  | 65   | ns                      |
| $t_f$                               |  |  | 8    | ns                      |
| $Q_{g(on)}$                         | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$   |  | 83   | nC                      |
| $Q_{gs}$                            |  |  | 27   | nC                      |
| $Q_{gd}$                            |  |  | 24   | nC                      |
| $R_{thJC}$                          |  |  |      | 0.32 $^\circ\text{C/W}$ |

### TO-263 (IXFA) Outline



- 1 = Gate
- 2 = Drain
- 3 = Source
- 4 = Drain



| 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  |

### Source-Drain Diode

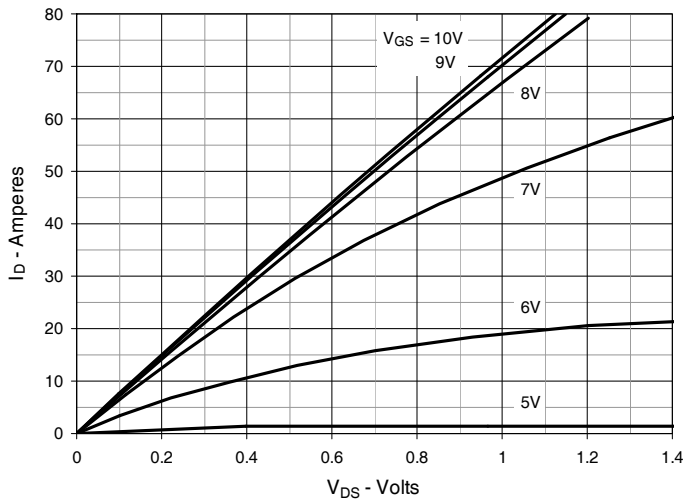
| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)    | Characteristic Values |      |       |
|----------|--|-----------------------|------|-------|
|          |  | Min.                  | Typ. | Max   |
| $I_s$    | $V_{GS} = 0\text{V}$   |                       |      | 80 A  |
| $I_{SM}$ | Repetitive, pulse Width Limited by $T_{JM}$                                    |                       |      | 320 A |
| $V_{SD}$ | $I_F = I_s$ , $V_{GS} = 0\text{V}$ , Note 1                                    |                       |      | 1.4 V |
| $t_{rr}$ | $I_F = 40\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ |                       | 120  | ns    |
| $Q_{RM}$ |  |                       | 600  | nC    |
| $I_{RM}$ |  |                       | 10   | A     |

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

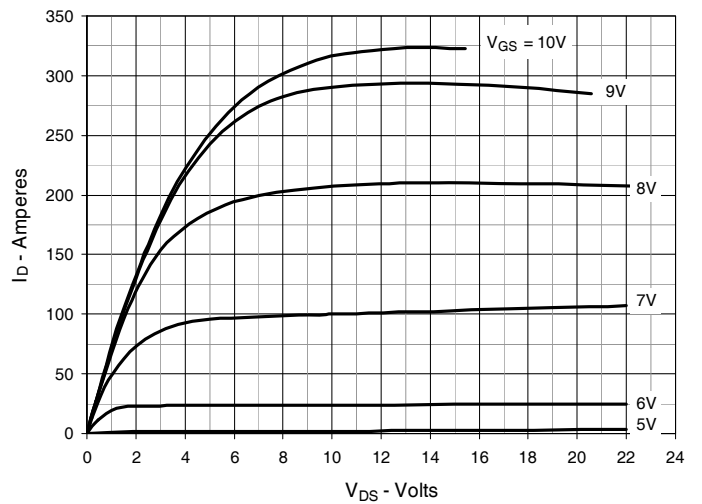
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

|  |           |           |           |           |             |             |             |             |             |             |
|--|-----------|-----------|-----------|-----------|-------------|-------------|-------------|-------------|-------------|-------------|
| 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   | 6,404,065B1 | 6,683,344   | 6,727,585   | 7,005,734B2 | 7,157,338B2 |
|  | 4,860,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123B1 | 6,534,343   | 6,710,405B2 | 6,759,692   | 7,063,975B2 |             |
|  | 4,881,106 | 5,034,796 | 5,187,117 | 5,486,715 | 6,306,728B1 | 6,583,505   | 6,710,463   | 6,771,478B2 | 7,071,537   |             |

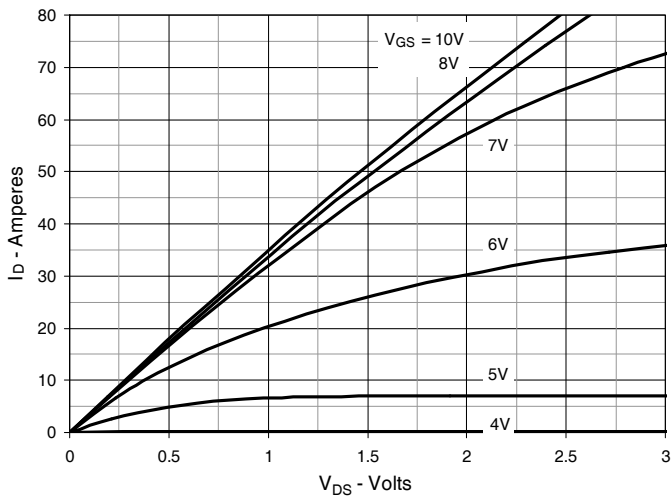
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



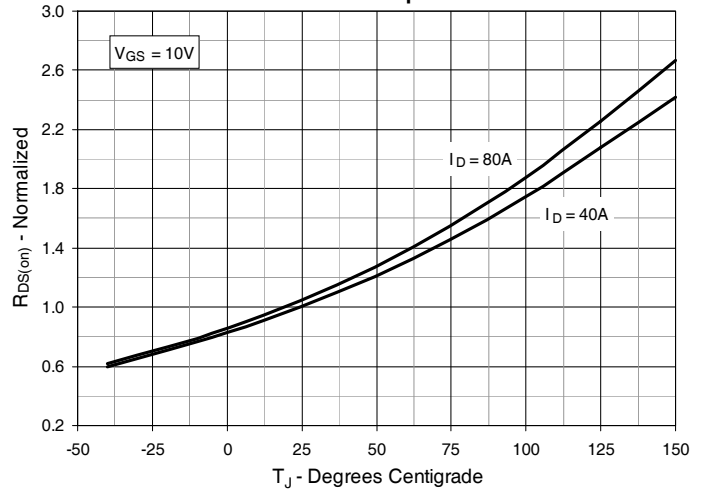
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



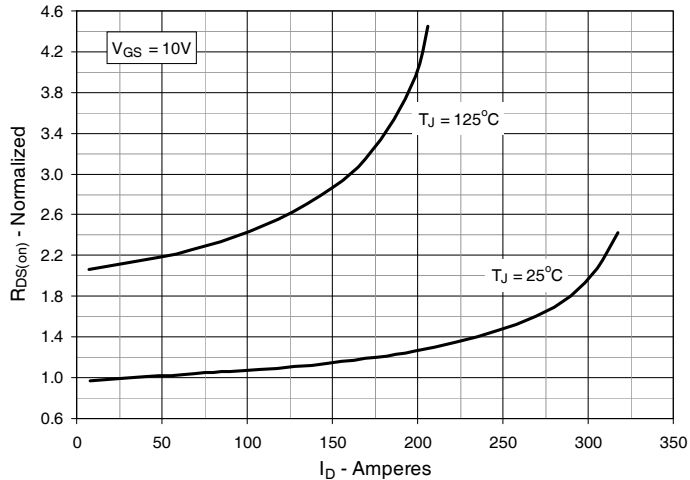
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



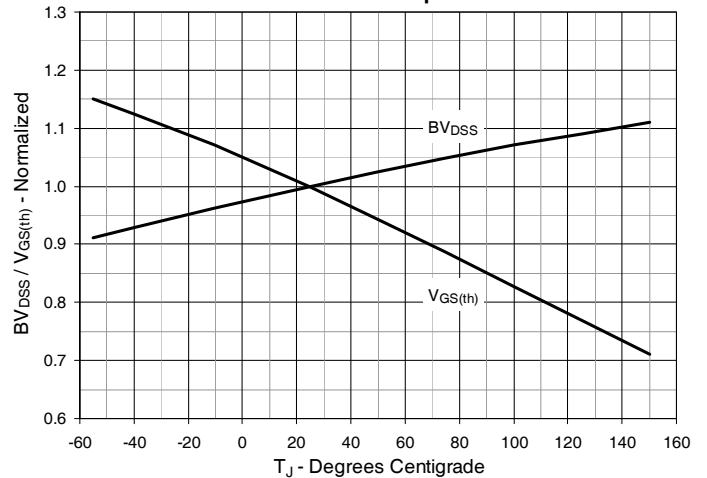
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 40\text{A}$  Value vs. Junction Temperature**



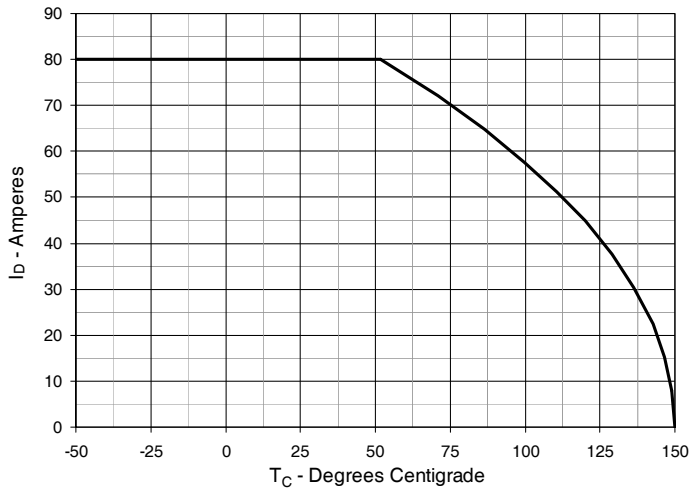
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 40\text{A}$  Value vs. Drain Current**



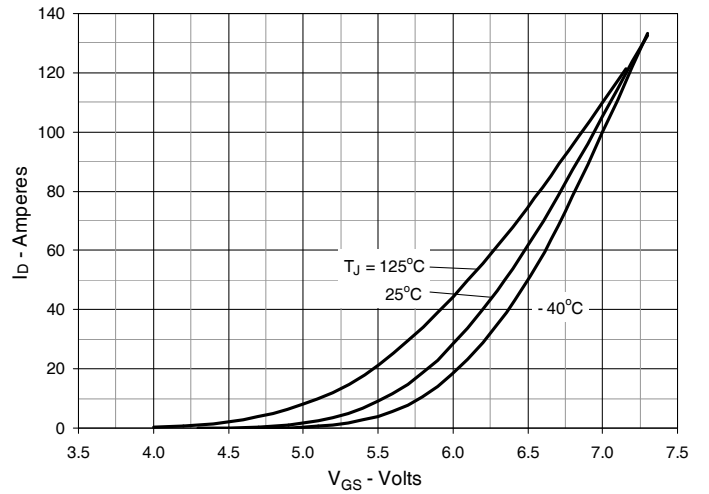
**Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature**



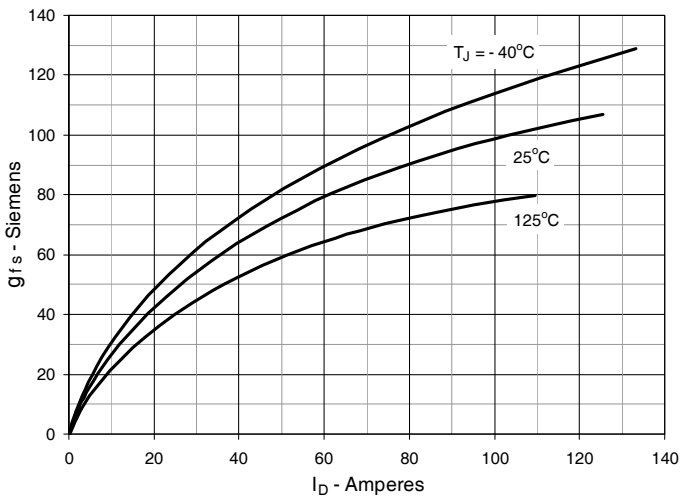
**Fig. 7. Maximum Drain Current vs. Case Temperature**



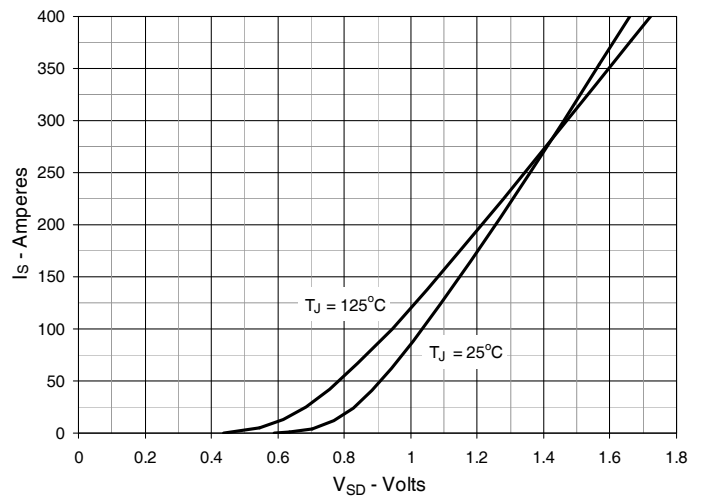
**Fig. 8. Input Admittance**



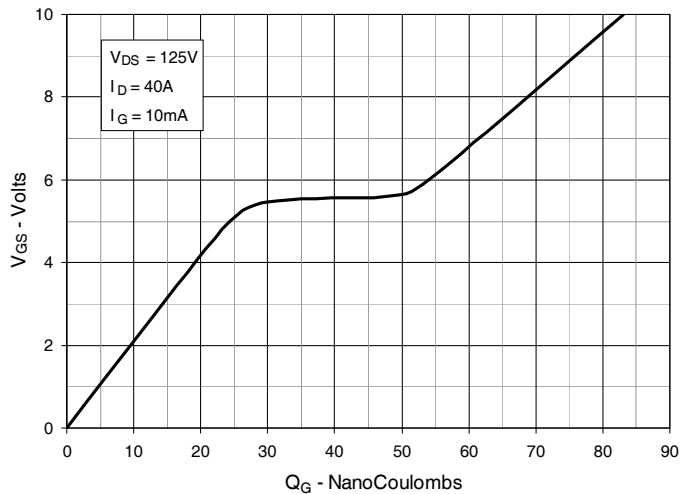
**Fig. 9. Transconductance**



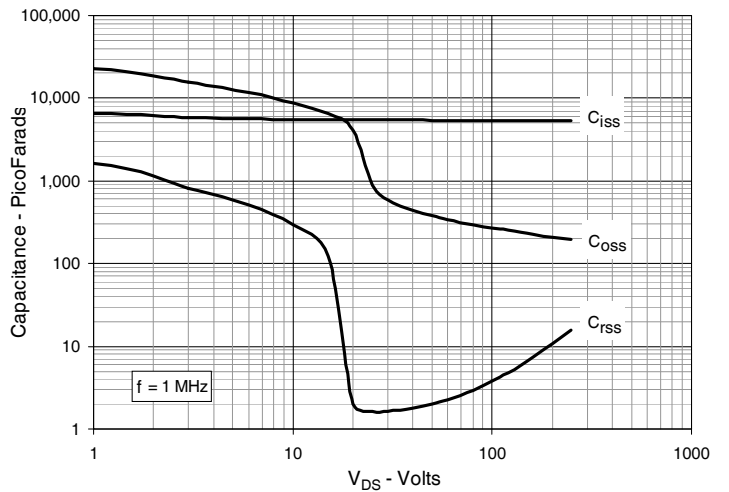
**Fig. 10. Forward Voltage Drop of Intrinsic Diode**



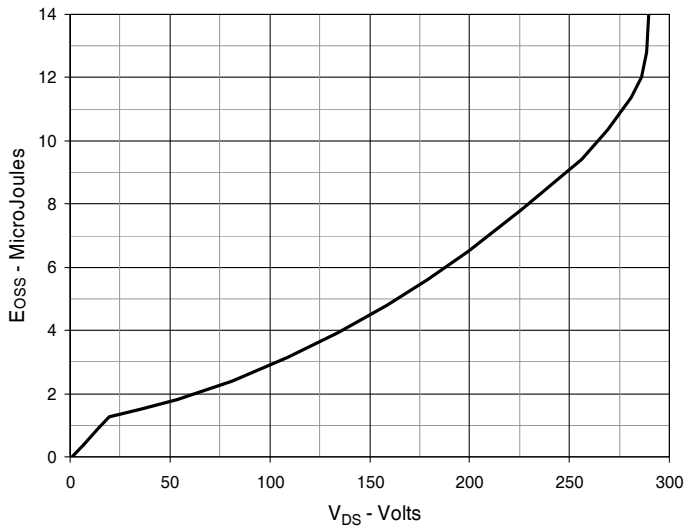
**Fig. 11. Gate Charge**



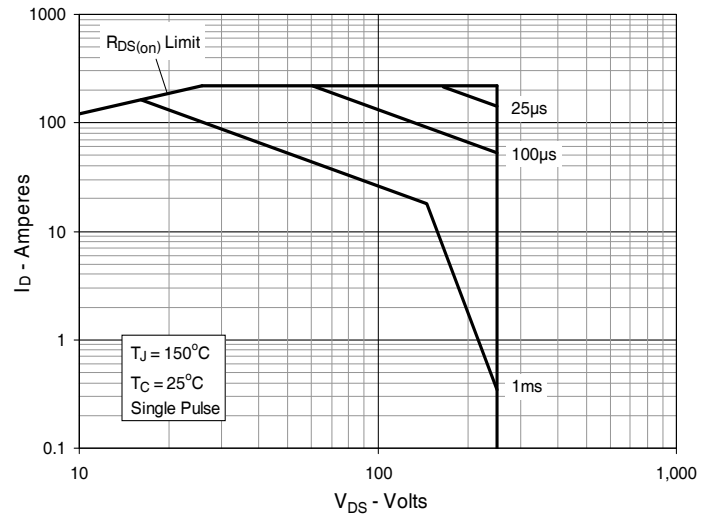
**Fig. 12. Capacitance**



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



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



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

