

# Polar3™ HiperFET™ Power MOSFET

## IXFJ26N50P3

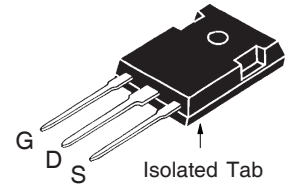
$V_{DSS} = 500V$   
 $I_{D25} = 14A$   
 $R_{DS(on)} \leq 295m\Omega$

(Electrically Isolated Tab)

N-Channel Enhancement Mode  
 Avalanche Rated  
 Fast Intrinsic Rectifier



ISO TO-247™



G = Gate      D = Drain  
 S = Source

| Symbol     | Test Conditions  | Maximum Ratings |            |
|------------|--|-----------------|------------|
| $V_{DSS}$  | $T_J = 25^\circ C$ to $150^\circ C$                                | 500             | V          |
| $V_{DGR}$  | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1M\Omega$          | 500             | V          |
| $V_{GSS}$  | Continuous   | $\pm 30$        | V          |
| $V_{GSM}$  | Transient  | $\pm 40$        | V          |
| $I_{D25}$  | $T_C = 25^\circ C$   | 14              | A          |
| $I_{DM}$   | $T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$               | 78              | A          |
| $I_A$      | $T_C = 25^\circ C$   | 13              | A          |
| $E_{AS}$   | $T_C = 25^\circ C$   | 300             | mJ         |
| dv/dt      | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ C$ | 35              | V/ns       |
| $P_D$      | $T_C = 25^\circ C$   | 180             | 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             | $^\circ C$ |
| $F_C$      | Mounting Torque  | 1.13 / 10       | Nm/lb.in   |
| $V_{ISOL}$ | 50/60 Hz, RM, t = 1min   | 2500            | V~         |
| Weight     |  | 5               | g          |

### Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 2500V~ Electrical Isolation
- Fast Intrinsic Rectifier
- Avalanche Rated
- Low  $R_{DS(ON)}$  and  $Q_G$
- Low Package Inductance

### Advantages

- High Power Density
- Easy to Mount
- Space Savings

### Applications

- Switch-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- Laser Drivers
- 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.                      |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 1mA$   | 500                   |      | V                         |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 4mA$                                     | 3.0                   |      | 5.0 V                     |
| $I_{GSS}$    | $V_{GS} = \pm 30V$ , $V_{DS} = 0V$                                  |                       |      | $\pm 100$ nA              |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 125^\circ C$           |                       |      | 25 $\mu A$<br>750 $\mu A$ |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 13A$ , Note 1                               |                       |      | 295 m $\Omega$            |

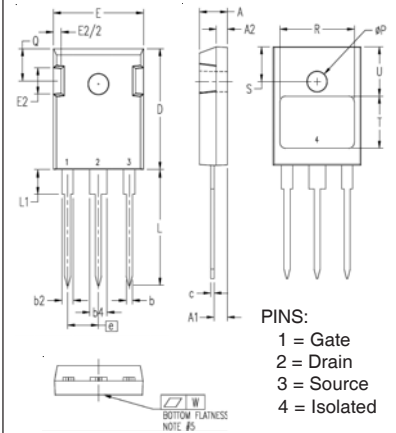
| Symbol                              | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)  | Characteristic Values                                |      |                        |
|-------------------------------------|--|--|------|------------------------|
|                                     |  | Min.   | Typ. | Max                    |
| $g_{fs}$                            | $V_{DS} = 20\text{V}$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1   | 14   | 23   | S                      |
| $R_{Gi}$                            | Gate Input Resistance  |  | 2.1  | $\Omega$               |
| $C_{iss}$                           | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$   |  | 2220 | pF                     |
| $C_{oss}$                           |  |  | 280  | pF                     |
| $C_{rss}$                           |  |  | 8    | pF                     |
| <b>Effective Output Capacitance</b> |  |  |      |                        |
| $C_{o(er)}$                         | Energy related   | $V_{GS} = 0\text{V}$<br>$V_{DS} = 0.8 \cdot V_{DSS}$ | 108  | pF                     |
| $C_{o(tr)}$                         | Time related   |  | 185  | 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>$R_G = 3\Omega$ (External) |  | 21   | ns                     |
| $t_r$                               |  |  | 7    | ns                     |
| $t_{d(off)}$                        |  |  | 38   | ns                     |
| $t_f$                               |  |  | 5    | ns                     |
| $Q_{g(on)}$                         | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$   |  | 42   | nC                     |
| $Q_{gs}$                            |  |  | 11   | nC                     |
| $Q_{gd}$                            |  |  | 15   | nC                     |
| $R_{thJC}$                          |  |  |      | $0.69^\circ\text{C/W}$ |
| $R_{thCS}$                          |  | 0.15   |      | $^\circ\text{C/W}$     |

### Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)    | Characteristic Values |      |        |
|----------|--|-----------------------|------|--------|
|          |  | Min.                  | Typ. | Max    |
| $I_S$    | $V_{GS} = 0\text{V}$   |                       |      | 26 A   |
| $I_{SM}$ | Repetitive, pulse Width Limited by $T_{JM}$                                    |                       |      | 104 A  |
| $V_{SD}$ | $I_F = I_S$ , $V_{GS} = 0\text{V}$ , Note 1                                    |                       |      | 1.4 V  |
| $t_{rr}$ | $I_F = 13\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ |                       |      | 250 ns |
| $Q_{RM}$ |  |                       | 0.9  | nC     |
| $I_{RM}$ |  |                       | 10.2 | A      |

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

### ISO TO-247 (IXFJ) OUTLINE

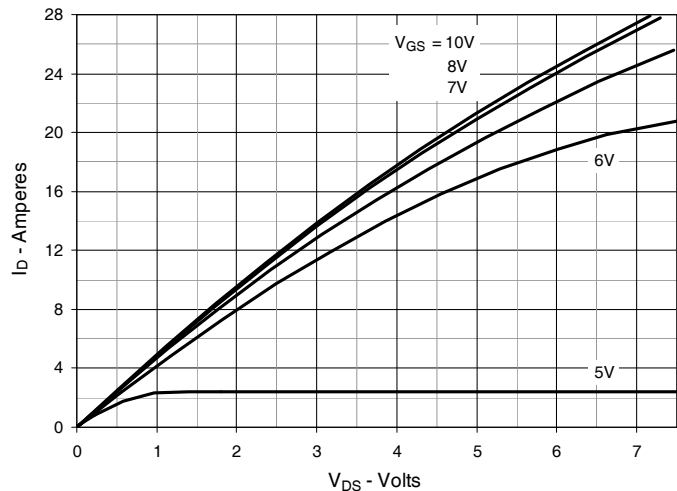
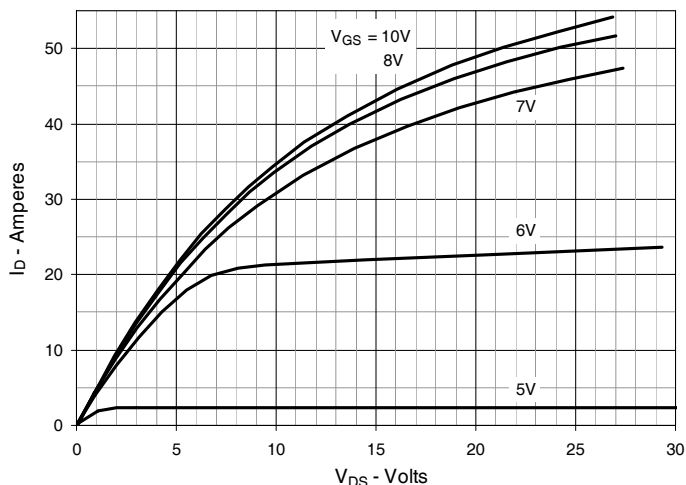
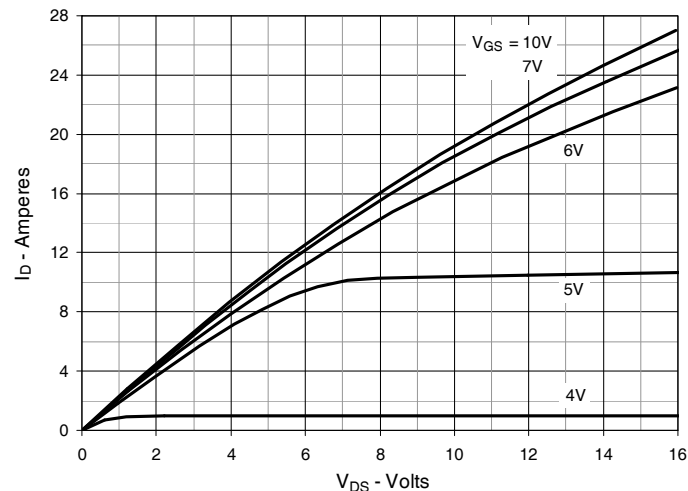
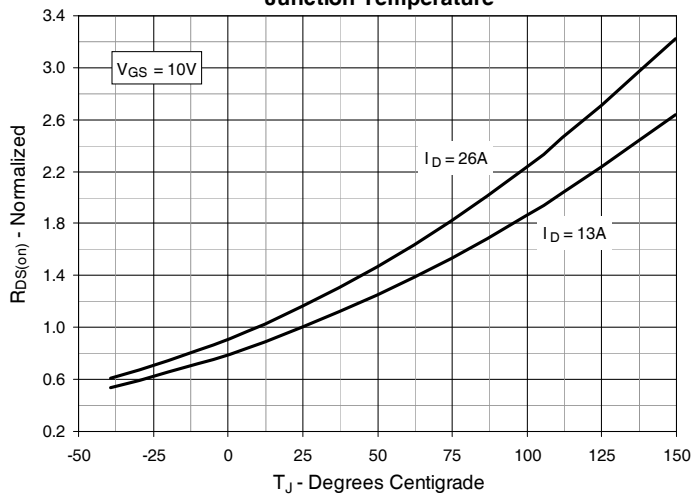
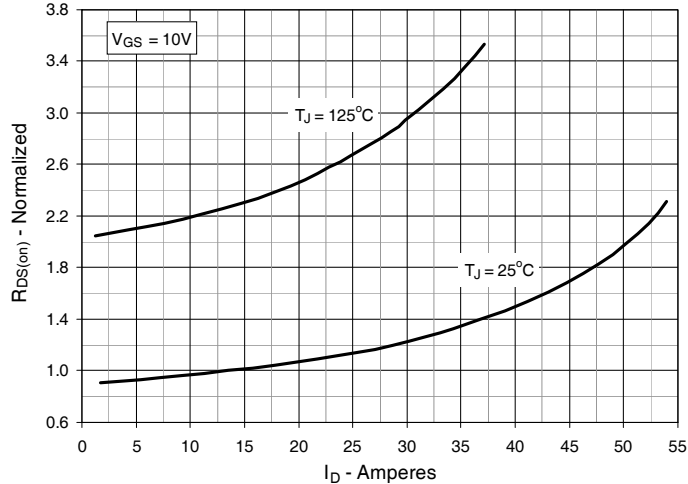
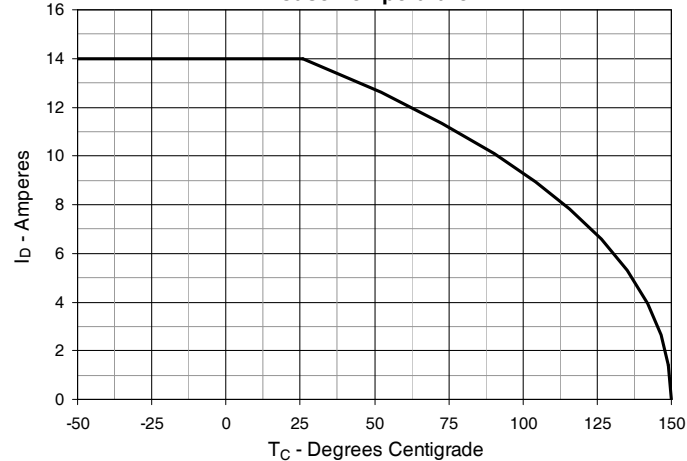


**PINS:**  
 1 = Gate  
 2 = Drain  
 3 = Source  
 4 = Isolated

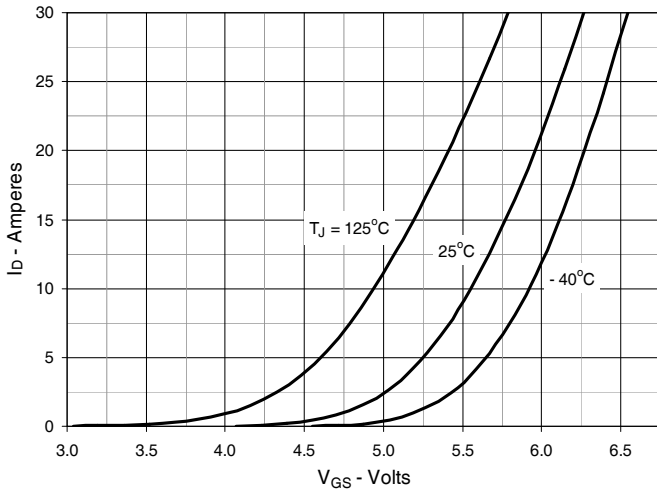
| SYM      | INCHES   |      | MILLIMETERS |       |
|----------|----------|------|-------------|-------|
|          | MIN      | MAX  | MIN         | MAX   |
| A        | .190     | .205 | 4.83        | 5.21  |
| A1       | .087     | .100 | 2.21        | 2.54  |
| A2       | .075     | .085 | 1.91        | 2.16  |
| b        | .045     | .055 | 1.14        | 1.40  |
| b2       | .075     | .085 | 1.91        | 2.16  |
| b4       | .115     | .126 | 2.92        | 3.20  |
| c        | .023     | .033 | 0.58        | 0.84  |
| D        | .820     | .840 | 20.83       | 21.34 |
| E        | .620     | .635 | 15.75       | 16.13 |
| E2       | .175     | .195 | 4.44        | 4.95  |
| e        | .215 BSC |      | 5.45 BSC    |       |
| L        | .780     | .810 | 19.81       | 20.57 |
| L1       | .160     | .177 | 4.06        | 4.50  |
| Q        | .220     | .240 | 5.59        | 6.10  |
| R        | .520     | .540 | 13.21       | 13.72 |
| S        | .242 BSC |      | 6.15 BSC    |       |
| T        | .355     | .375 | 9.02        | 9.53  |
| U        | .345     | .370 | 8.76        | 9.40  |
| $\phi P$ | .140     | .144 | 3.55        | 3.66  |
| W        | .000     | .004 | 0.00        | 0.10  |

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

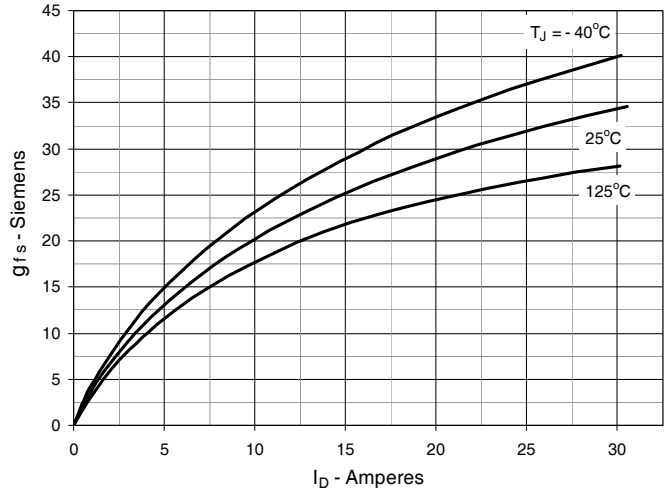
|  |           |           |           |           |              |              |              |              |              |             |
|--|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| IXYS MOSFETs and 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  $I_D = 13\text{A}$  Value vs. Junction Temperature**

**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 13\text{A}$  Value vs. Drain Current**

**Fig. 6. Maximum Drain Current vs. Case Temperature**


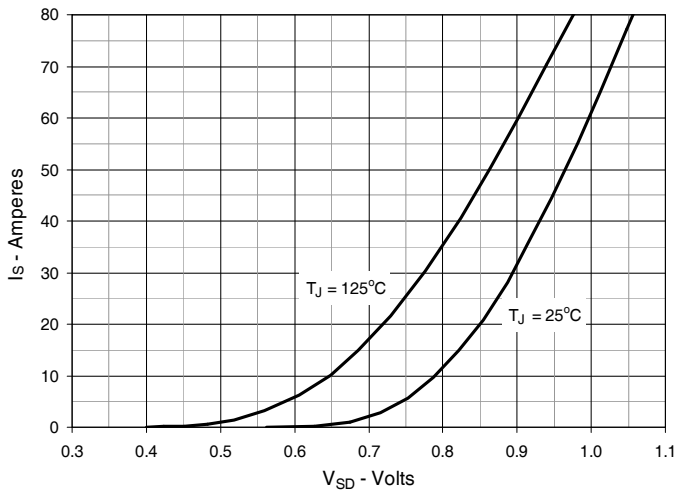
**Fig. 7. Input Admittance**



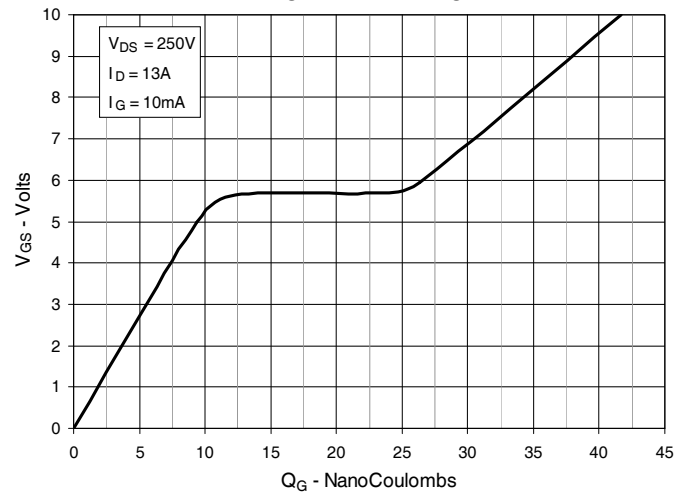
**Fig. 8. Transconductance**



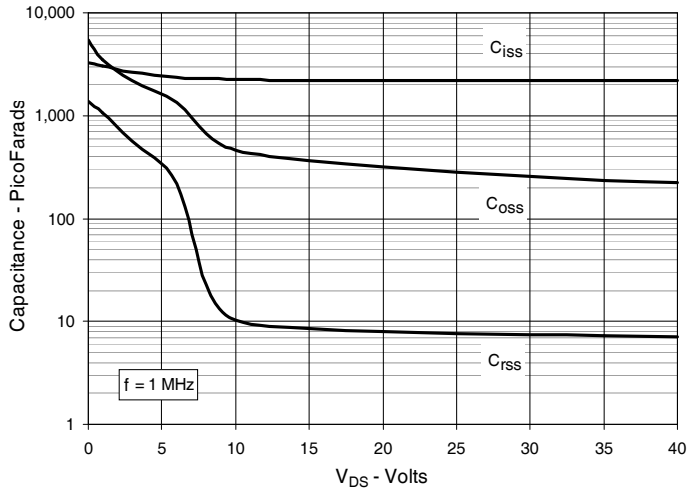
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



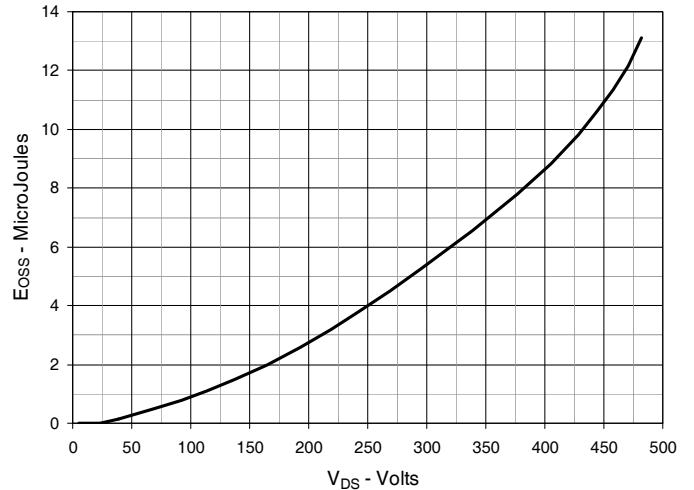
**Fig. 10. Gate Charge**



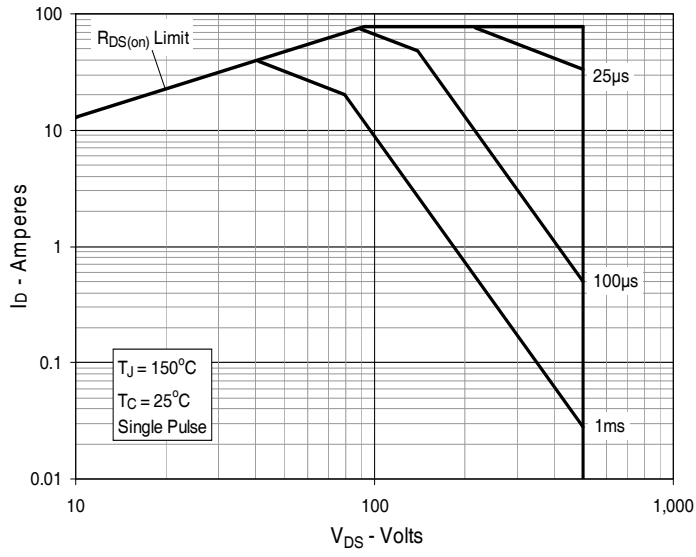
**Fig. 11. Capacitance**



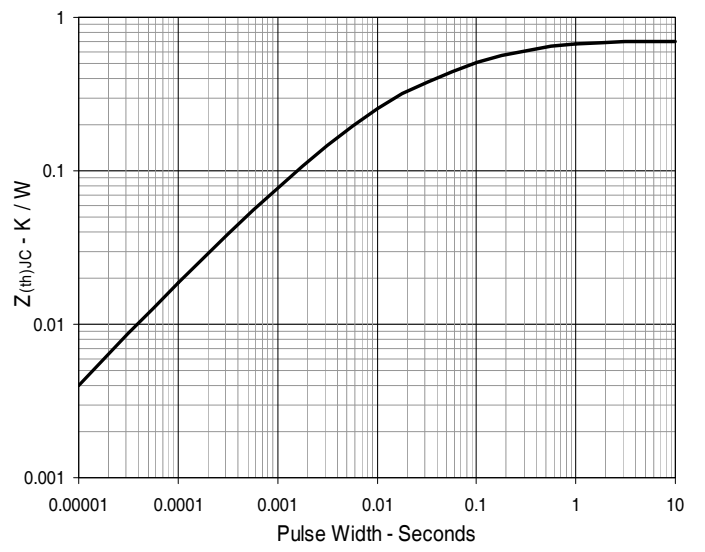
**Fig. 12. Output Capacitance Stored Energy**



**Fig. 13. Forward-Bias Safe Operating Area**



**Fig. 14. Maximum Transient Thermal Impedance**





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