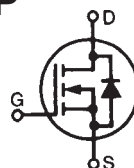


# Polar™ Power MOSFET

## HiPerFET™

**IXFA5N100P**  
**IXFH5N100P**  
**IXFP5N100P**

N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode



| 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                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                     | 5               | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                   | 10              | A                |
| $I_A$      | $T_C = 25^\circ\text{C}$                                                     | 5               | A                |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                                     | 300             | mJ               |
| $dV/dt$    | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$     | 10              | V/ns             |
| $P_D$      | $T_C = 25^\circ\text{C}$                                                     | 250             | W                |
| $T_J$      |                                                                              | -55 ... +150    | $^\circ\text{C}$ |
| $T_{JM}$   |                                                                              | 150             | $^\circ\text{C}$ |
| $T_{stg}$  |                                                                              | -55 ... +150    | $^\circ\text{C}$ |
| $T_L$      | 1.6mm (0.062) from case for 10s                                              | 300             | $^\circ\text{C}$ |
| $T_{SOLD}$ | Plastic body for 10s                                                         | 260             | $^\circ\text{C}$ |
| $M_d$      | Mounting torque (TO-220, TO-247)                                             | 1.13 / 10       | Nm/lb.in.        |
| Weight     | TO-263                                                                       | 2.5             | g                |
|            | TO-220                                                                       | 3.0             | g                |
|            | TO-247                                                                       | 6.0             | g                |

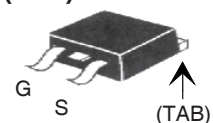
| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) | Characteristic Values |      |                   |
|--------------|-----------------------------------------------------------------------------|-----------------------|------|-------------------|
|              |                                                                             | Min.                  | Typ. | Max.              |
| $BV_{DSS}$   | $V_{GS} = 0\text{V}$ , $I_D = 250\mu\text{A}$                               | 1000                  |      | V                 |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250\mu\text{A}$                                  | 3.0                   |      | 6.0 V             |
| $I_{GSS}$    | $V_{GS} = \pm 30\text{V}$ , $V_{DS} = 0\text{V}$                            |                       |      | $\pm 100$ nA      |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$                                                          |                       |      | 10 $\mu\text{A}$  |
|              | $V_{GS} = 0\text{V}$ $T_J = 125^\circ\text{C}$                              |                       |      | 750 $\mu\text{A}$ |
| $R_{DS(on)}$ | $V_{GS} = 10\text{V}$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                  |                       |      | 2.8 $\Omega$      |

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

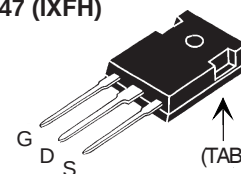
$$I_{D25} = 5\text{A}$$

$$R_{DS(on)} \leq 2.8\Omega$$

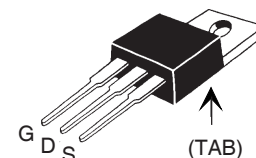
TO-263 (IXFA)



TO-247 (IXFH)



TO-220 (IXFP)



G = Gate      D = Drain  
S = Source      TAB = Drain

### Features

- International standard packages
- Dynamic dv/dt Rating
- Avalanche Rated
- Low  $R_{DS(ON)}$ , rugged Polar™ process
- Low  $Q_G$
- Low Drain-to-Tab capacitance
- Low package inductance

### Advantages

- Easy to mount
- Space savings

### Applications:

- DC-DC converters
- Battery chargers
- Switched-mode and resonant-mode power supplies
- Uninterrupted power supplies
- AC motor control
- High speed power switching applications

| 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                                                                                         | 2.4                   | 4.0  | S                       |
| $R_{Gi}$     | Gate input resistance                                                                                                                              |                       | 1.6  | $\Omega$                |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                                   |                       | 1830 | pF                      |
| $C_{oss}$    |                                                                                                                                                    |                       | 113  | pF                      |
| $C_{rss}$    |                                                                                                                                                    |                       | 20   | 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) |                       | 12   | ns                      |
| $t_r$        |                                                                                                                                                    |                       | 13   | ns                      |
| $t_{d(off)}$ |                                                                                                                                                    |                       | 30   | ns                      |
| $t_f$        |                                                                                                                                                    |                       | 37   | ns                      |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$                                                                   |                       | 33.4 | nC                      |
| $Q_{gs}$     |                                                                                                                                                    |                       | 10.6 | nC                      |
| $Q_{gd}$     |                                                                                                                                                    |                       | 14.4 | nC                      |
| $R_{thJC}$   |                                                                                                                                                    |                       |      | 0.50 $^\circ\text{C/W}$ |
| $R_{thCS}$   | (TO-220)                                                                                                                                           |                       | 0.50 | $^\circ\text{C/W}$      |
| $R_{thCS}$   | (TO-247)                                                                                                                                           |                       | 0.25 | $^\circ\text{C/W}$      |

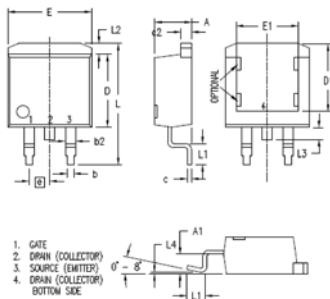
#### Source-Drain Diode

Characteristic Values  
( $T_J = 25^\circ\text{C}$ , unless otherwise specified)

| Symbol   | Test Conditions                                                                                       | Min. | Typ. | Max.          |
|----------|-------------------------------------------------------------------------------------------------------|------|------|---------------|
| $I_S$    | $V_{GS} = 0\text{V}$                                                                                  |      |      | 5 A           |
| $I_{SM}$ | Repetitive, pulse width limited by $T_{JM}$                                                           |      |      | 20 A          |
| $V_{SD}$ | $I_F = I_S$ , $V_{GS} = 0\text{V}$ , Note 1                                                           |      |      | 1.3 V         |
| $t_{rr}$ | $I_F = 5\text{A}$ , $V_{GS} = 0\text{V}$<br>$-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ |      |      | 200 ns        |
| $I_{RM}$ |                                                                                                       |      | 7.4  | A             |
| $Q_{RM}$ |                                                                                                       |      | 0.43 | $\mu\text{C}$ |

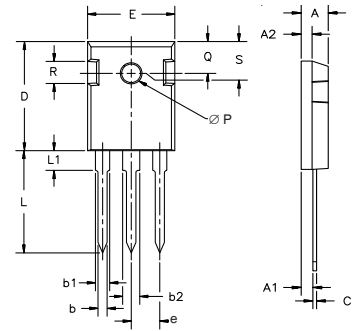
Note 1: Pulse test,  $t \leq 300\mu\text{s}$ ; duty cycle,  $d \leq 2\%$ .

#### TO-263 (IXFA) Outline



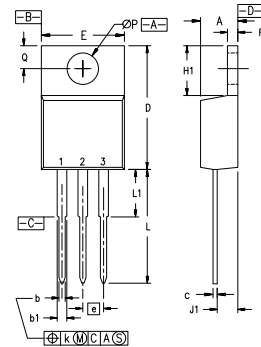
| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .160     | .190 | 4.06        | 4.83  |
| A1  | .080     | .110 | 2.03        | 2.79  |
| b   | .020     | .039 | 0.51        | 0.99  |
| b1  | .045     | .055 | 1.14        | 1.40  |
| c   | .016     | .029 | 0.40        | 0.74  |
| c1  | .045     | .055 | 1.14        | 1.40  |
| D   | .340     | .380 | 8.64        | 9.65  |
| D1  | .315     | .350 | 8.00        | 8.89  |
| E   | .390     | .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  |

#### TO-247 (IXFH) Outline



| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | Min.       | Max.  | Min.   | Max.  |
| A    | 4.7        | 5.3   | .185   | .209  |
| A1   | 2.2        | 2.54  | .087   | .102  |
| A2   | 2.2        | 2.6   | .059   | .098  |
| b    | 1.0        | 1.4   | .040   | .055  |
| b1   | 1.65       | 2.13  | .065   | .084  |
| b2   | 2.87       | 3.12  | .113   | .123  |
| C    | .4         | .8    | .016   | .031  |
| D    | 20.80      | 21.46 | .819   | .845  |
| E    | 15.75      | 16.26 | .610   | .640  |
| e    | 5.20       | 5.72  | 0.205  | 0.225 |
| L    | 19.81      | 20.32 | .780   | .800  |
| L1   |            | 4.50  |        | .177  |
| ØP   | 3.55       | 3.65  | .140   | .144  |
| Q    | 5.89       | 6.40  | 0.232  | 0.252 |
| R    | 4.32       | 5.49  | .170   | .216  |
| S    | 6.15       | BSC   | .242   | BSC   |

#### TO-220 (IXFP) Outline



Pins: 1 - Gate 2 - Drain

| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .170     | .190 | 4.32        | 4.83  |
| b   | .025     | .040 | 0.64        | 1.02  |
| b1  | .045     | .065 | 1.15        | 1.65  |
| c   | .014     | .022 | 0.35        | 0.56  |
| D   | .580     | .630 | 14.73       | 16.00 |
| E   | .390     | .420 | 9.91        | 10.66 |
| e   | .100 BSC |      | 2.54 BSC    |       |
| F   | .045     | .055 | 1.14        | 1.40  |
| H1  | .230     | .270 | 5.85        | 6.85  |
| J1  | .090     | .110 | 2.29        | 2.79  |
| k   | 0        | .015 | 0           | 0.38  |
| L   | .500     | .550 | 12.70       | 13.97 |
| L1  | .110     | .230 | 2.79        | 5.84  |
| ØP  | .139     | .161 | 3.53        | 4.08  |
| Q   | .100     | .125 | 2.54        | 3.18  |

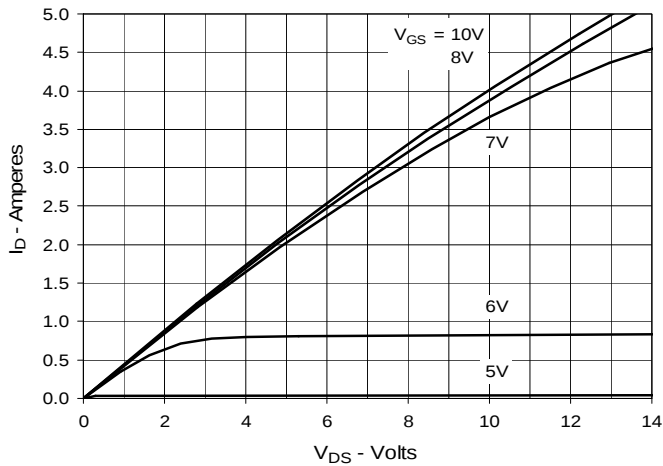
#### PRELIMINARY TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

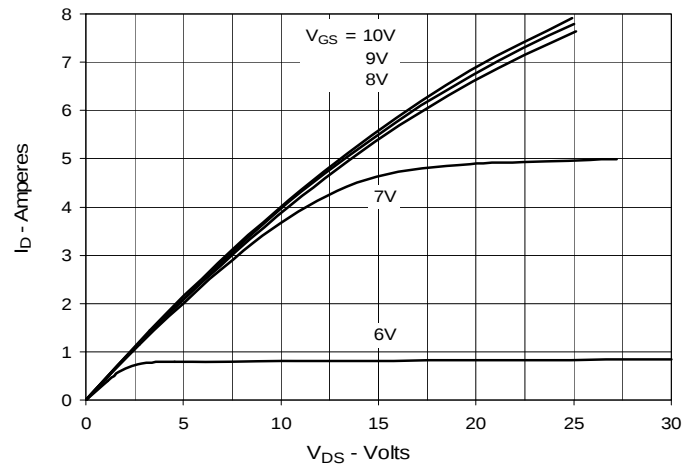
IXYS reserves the right to change limits, test conditions, and dimensions.

IXYS MOSFETs and IGBTs are covered 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  
by one or more of the following U.S. patents: 4,850,072 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

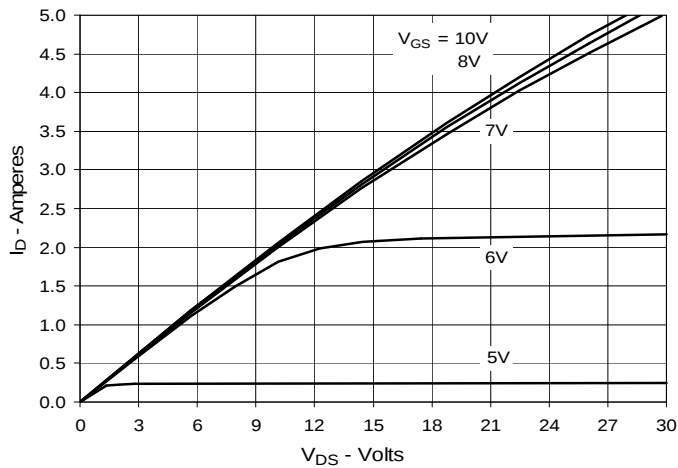
**Fig. 1. Output Characteristics**  
@ 25°C



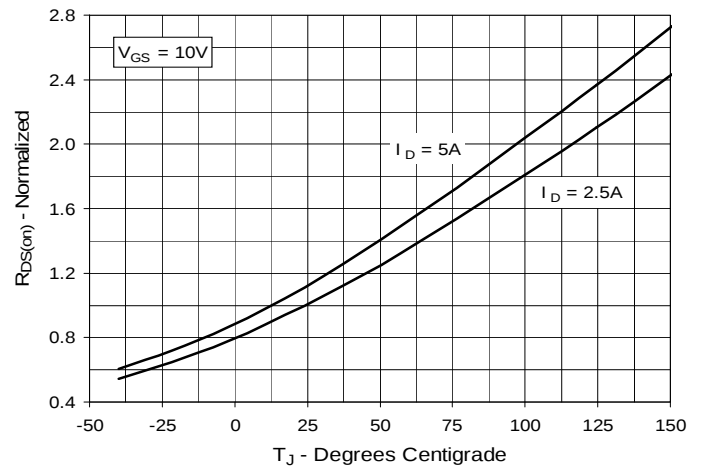
**Fig. 2. Extended Output Characteristics**  
@ 25°C



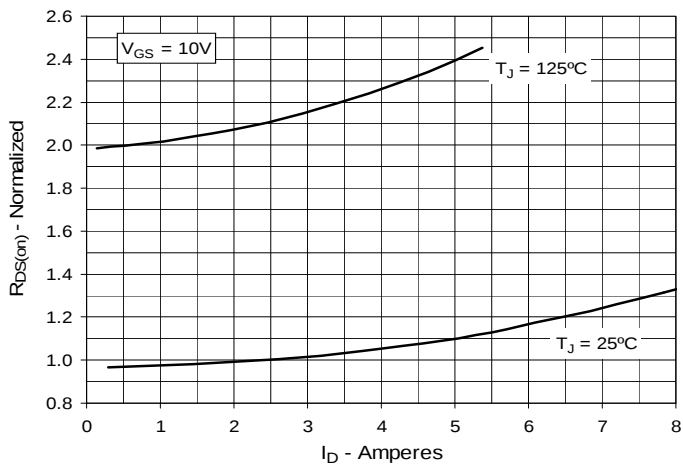
**Fig. 3. Output Characteristics**  
@ 125°C



**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 2.5A$  Value**  
vs. Junction Temperature



**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 2.5A$  Value**  
vs. Drain Current



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

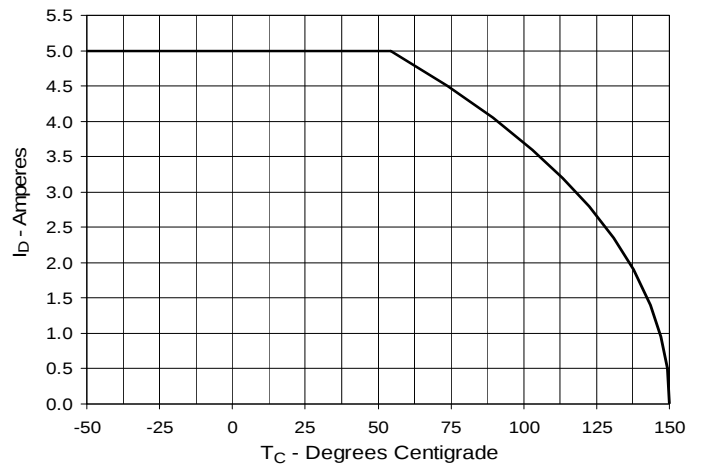


Fig. 7. Input Admittance

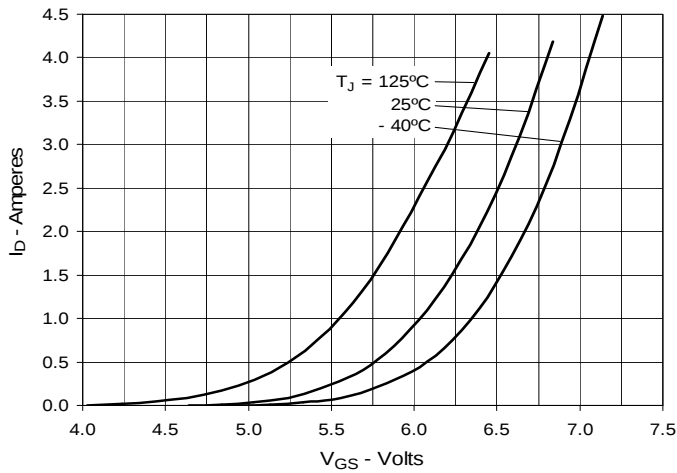


Fig. 8. Transconductance

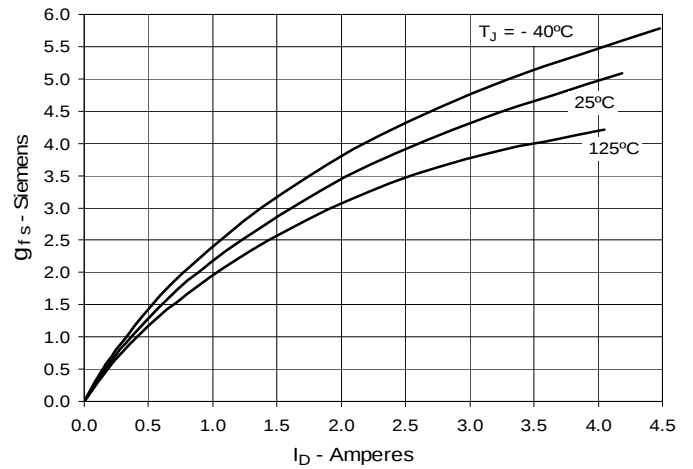


Fig. 9. Forward Voltage Drop of Intrinsic Diode

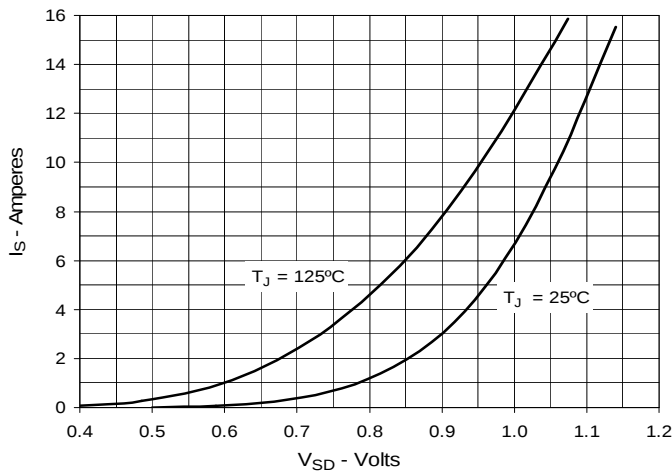


Fig. 10. Gate Charge

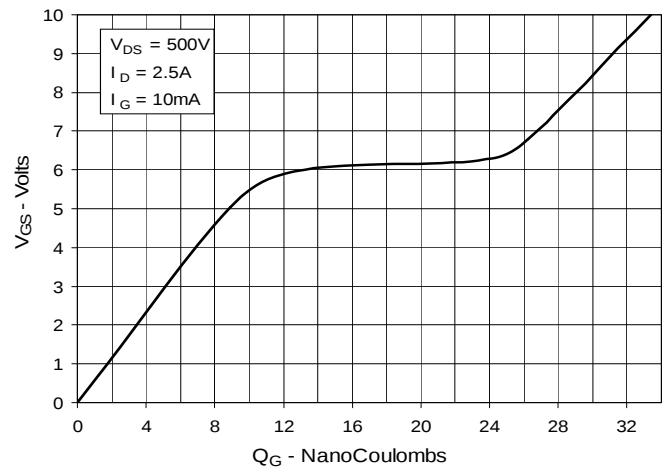


Fig. 11. Capacitance

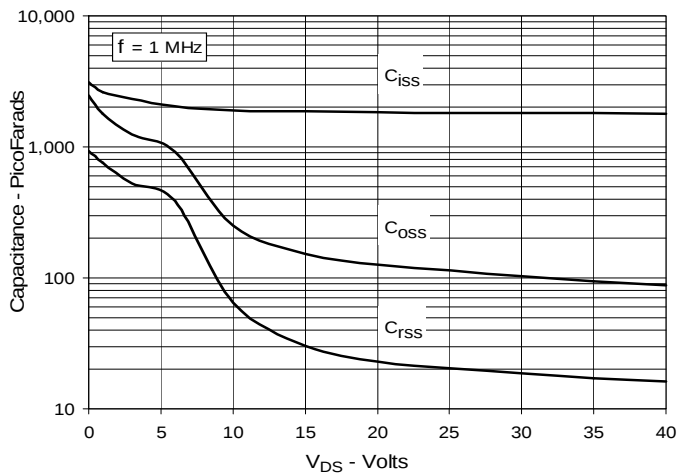
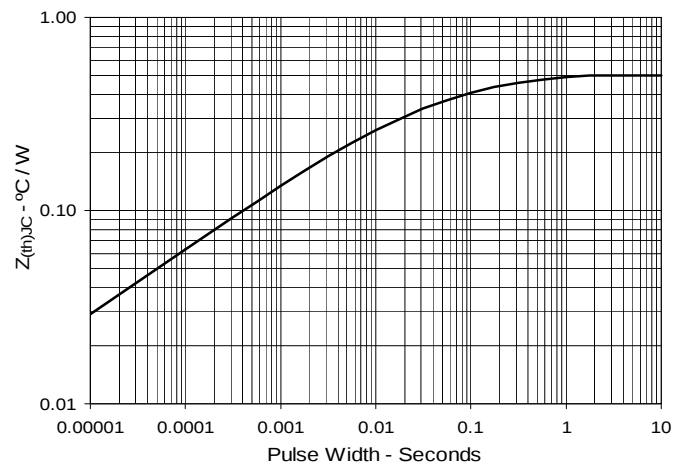


Fig. 12. Maximum Transient Thermal Impedance





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