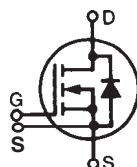


# Polar™ HiPERFET

## Power MOSFET

# IXFN200N10P

N-Channel Enhancement Mode  
Avalanche Rated

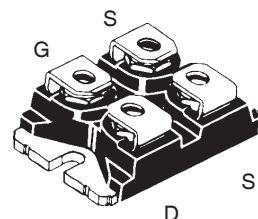


$$V_{DSS} = 100V$$

$$I_{D25} = 200A$$

$$R_{DS(on)} \leq 7.5m\Omega$$

miniBLOC, SOT-227  
E153432



G = Gate  
S = Source  
D = Drain

Either Source Terminal S can be used as the Source Terminal or the Kelvin Source (Gate Return) Terminal.

| Symbol     | Test Conditions                                                    | Maximum Ratings    |                      |
|------------|--------------------------------------------------------------------|--------------------|----------------------|
| $V_{DSS}$  | $T_J = 25^\circ C$ to $175^\circ C$                                | 100                | V                    |
| $V_{DGR}$  | $T_J = 25^\circ C$ to $175^\circ C$ , $R_{GS} = 1M\Omega$          | 100                | V                    |
| $V_{GSS}$  | Continuous                                                         | $\pm 20$           | V                    |
| $V_{GSM}$  | Transient                                                          | $\pm 30$           | V                    |
| $I_{D25}$  | $T_C = 25^\circ C$                                                 | 200                | A                    |
| $I_{DM}$   | $T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$               | 400                | A                    |
| $I_A$      | $T_C = 25^\circ C$                                                 | 60                 | A                    |
| $E_{AS}$   | $T_C = 25^\circ C$                                                 | 4                  | J                    |
| $dv/dt$    | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ C$ | 10                 | V/ns                 |
| $P_D$      | $T_C = 25^\circ C$                                                 | 680                | W                    |
| $T_J$      |                                                                    | -55...+175         | $^\circ C$           |
| $T_{JM}$   |                                                                    | 175                | $^\circ C$           |
| $T_{stg}$  |                                                                    | -55...+175         | $^\circ C$           |
| $V_{ISOL}$ | 50/60 Hz, RMS $t = 1$ minute<br>$I_{ISOL} \leq 1mA$ $t = 1$ second | 2500<br>3000       | V~<br>V~             |
| $M_d$      | Mounting Torque<br>Terminal Connection Torque                      | 1.5/13<br>1.3/11.5 | Nm/lb.in<br>Nm/lb.in |
| Weight     |                                                                    | 30                 | g                    |

## Features

- International Standard Package
- miniBLOC, with Aluminium Nitride Isolation
- Low  $R_{DS(on)}$  and  $Q_G$
- Avalanche Rated
- Low Package Inductance
- Fast Intrinsic Rectifier

## Advantages

- High Power Density
- Easy to Mount
- Space Savings

## Applications

- DC-DC Converters
- Battery Chargers
- Switch-Mode and Resonant-Mode Power Supplies
- DC Choppers
- AC and DC Motor Drives
- Uninterrupted Power Supplies
- High Speed Power Switching Applications

| Symbol       | Test Conditions                                                                               | Characteristic Values |      |                              |
|--------------|-----------------------------------------------------------------------------------------------|-----------------------|------|------------------------------|
|              | $(T_J = 25^\circ C, \text{ Unless Otherwise Specified})$                                      | Min.                  | Typ. | Max.                         |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu A$                                                              | 100                   |      | V                            |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 8mA$                                                               | 2.5                   |      | 5.0 V                        |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$                                                            |                       |      | $\pm 100$ nA                 |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 150^\circ C$                                     |                       |      | 25 $\mu A$<br>500 $\mu A$    |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1<br>$V_{GS} = 15V$ , $I_D = 400A$ , Note 1 |                       | 5.5  | 7.5 m $\Omega$<br>m $\Omega$ |

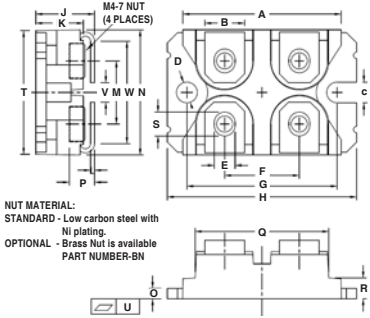
| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                                                                   | Characteristic Values |      |                    |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|--------------------|
|              |                                                                                                                                               | Min.                  | Typ. | Max.               |
| $g_{fs}$     | $V_{DS} = 10\text{V}$ , $I_D = 60\text{A}$ , Note 1                                                                                           | 60                    | 97   | S                  |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                              |                       | 7600 | pF                 |
| $C_{oss}$    |                                                                                                                                               |                       | 2900 | pF                 |
| $C_{rss}$    |                                                                                                                                               |                       | 860  | pF                 |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 60\text{A}$<br>$R_G = 3.3\Omega$ (External) |                       | 30   | ns                 |
| $t_r$        |                                                                                                                                               |                       | 35   | ns                 |
| $t_{d(off)}$ |                                                                                                                                               |                       | 150  | ns                 |
| $t_f$        |                                                                                                                                               |                       | 90   | ns                 |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$                                                              |                       | 235  | nC                 |
| $Q_{gs}$     |                                                                                                                                               |                       | 50   | nC                 |
| $Q_{gd}$     |                                                                                                                                               |                       | 135  | nC                 |
| $R_{thJC}$   |                                                                                                                                               |                       | 0.22 | $^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                               |                       | 0.05 | $^\circ\text{C/W}$ |

## Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                            | Characteristic Values |      |               |
|----------|--------------------------------------------------------------------------------------------------------|-----------------------|------|---------------|
|          |                                                                                                        | Min.                  | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{V}$                                                                                   |                       |      | 200 A         |
| $I_{SM}$ | Repetitive, pulse width limited by $T_{JM}$                                                            |                       |      | 400 A         |
| $V_{SD}$ | $I_F = I_S$ , $V_{GS} = 0\text{V}$ , Note 1                                                            |                       |      | 1.5 V         |
| $t_{rr}$ | $I_F = 25\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$ ,<br>$V_R = 50\text{V}$ , $V_{GS} = 0\text{V}$ |                       |      | 150 ns        |
| $I_{RM}$ |                                                                                                        |                       | 6.0  | A             |
| $Q_{RM}$ |                                                                                                        |                       | 0.4  | $\mu\text{C}$ |

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

## TO-227 Outline

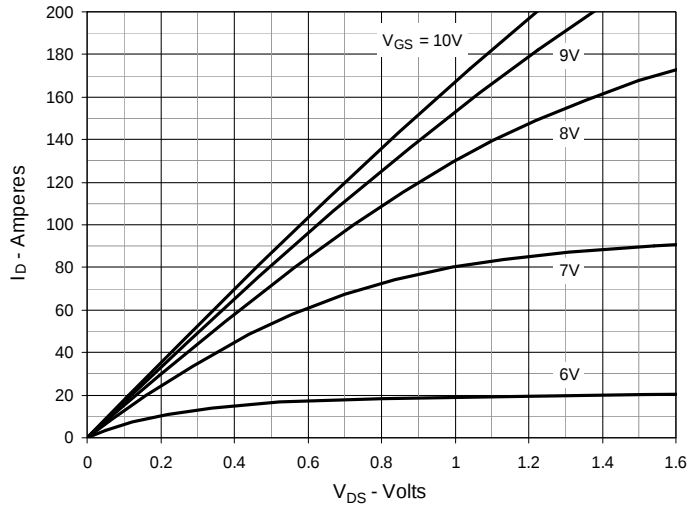


| SYM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 1.240  | 1.255 | 31.50       | 31.88 |
| B   | .307   | .323  | 7.80        | 8.20  |
| C   | .161   | .169  | 4.09        | 4.29  |
| D   | .161   | .169  | 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   | 1.489  | 1.505 | 37.80       | 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   |
| V   | .130   | .180  | 3.30        | 4.57  |
| W   | .780   | .830  | 19.81       | 21.08 |

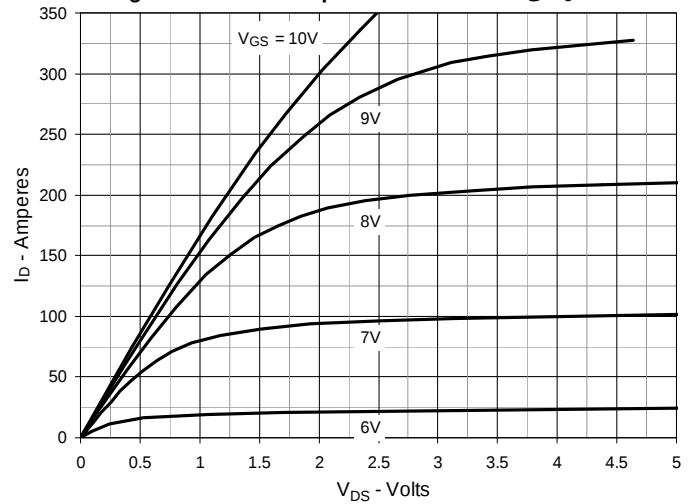
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

|                                                                                  |           |           |           |           |              |              |              |              |              |             |
|----------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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    |             |

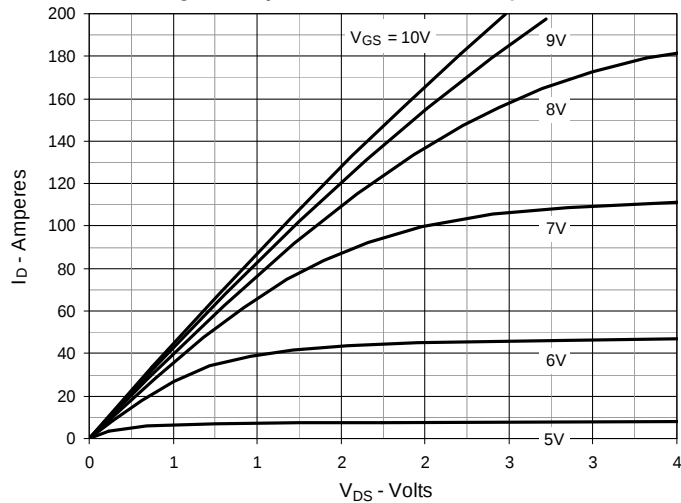
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



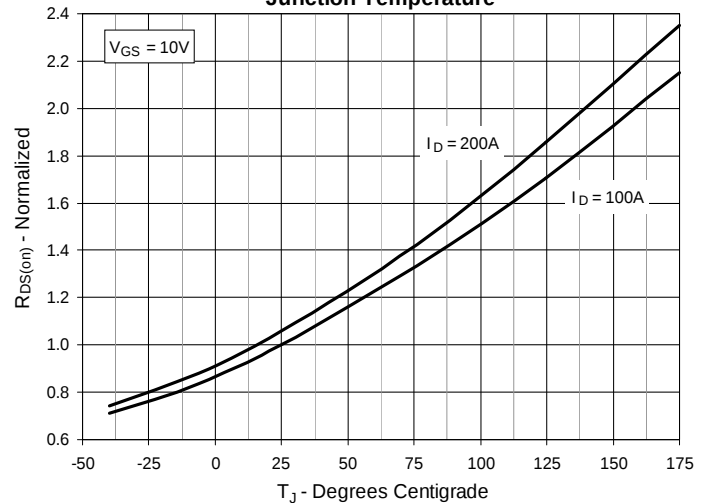
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



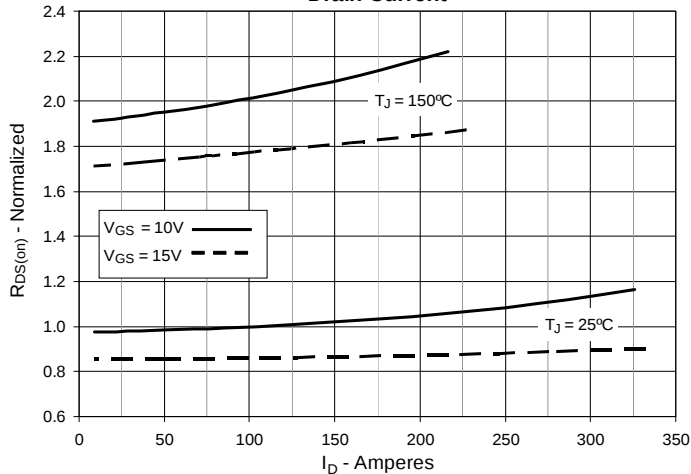
**Fig. 3. Output Characteristics @  $T_J = 150^\circ\text{C}$**



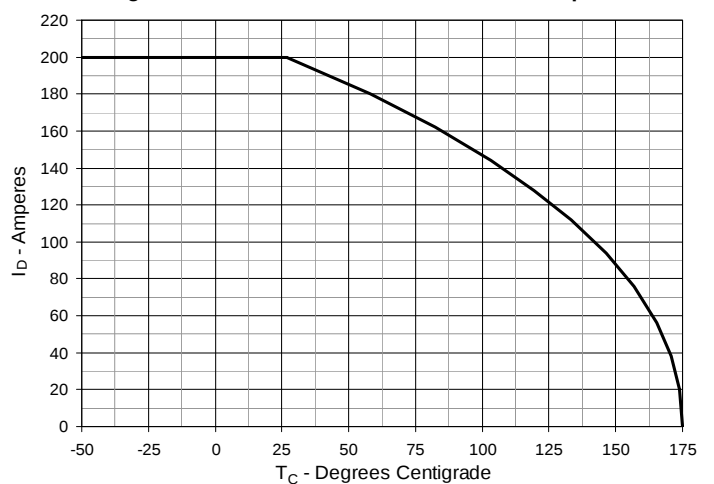
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 100\text{A}$  Value vs. Junction Temperature**



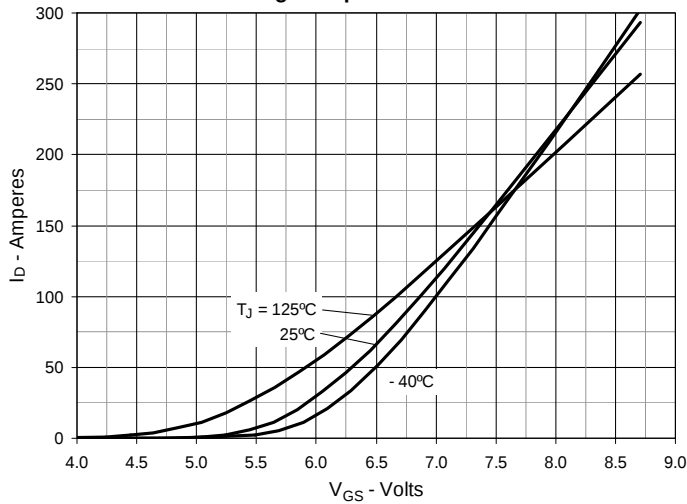
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 100\text{A}$  Value vs. Drain Current**



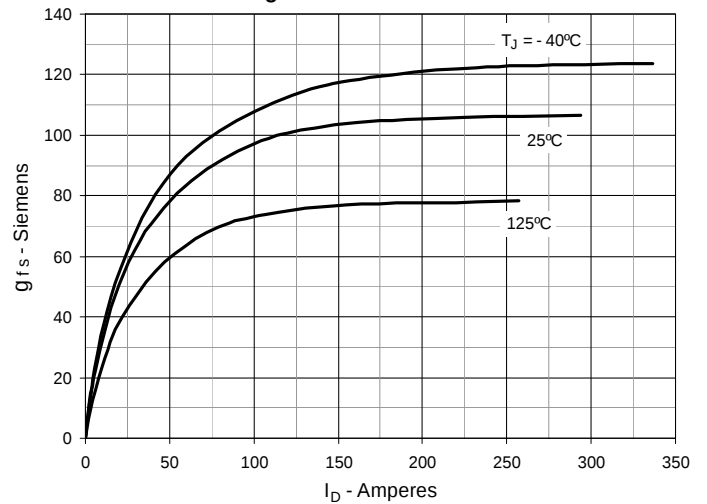
**Fig. 6. Maximum Drain Current vs. Case Temperature**



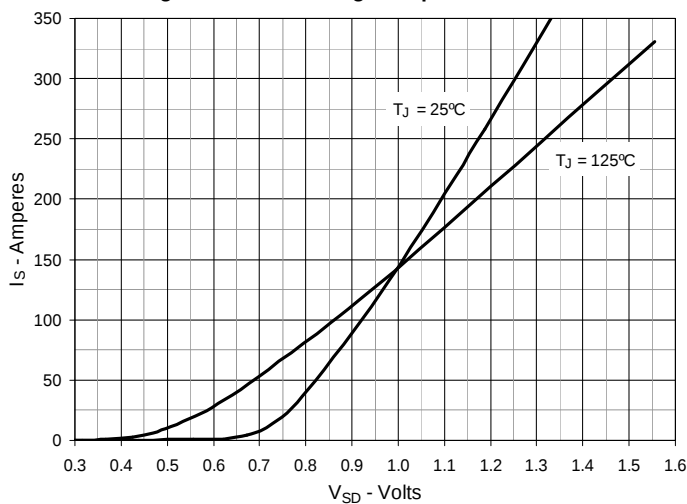
**Fig. 7. Input Admittance**



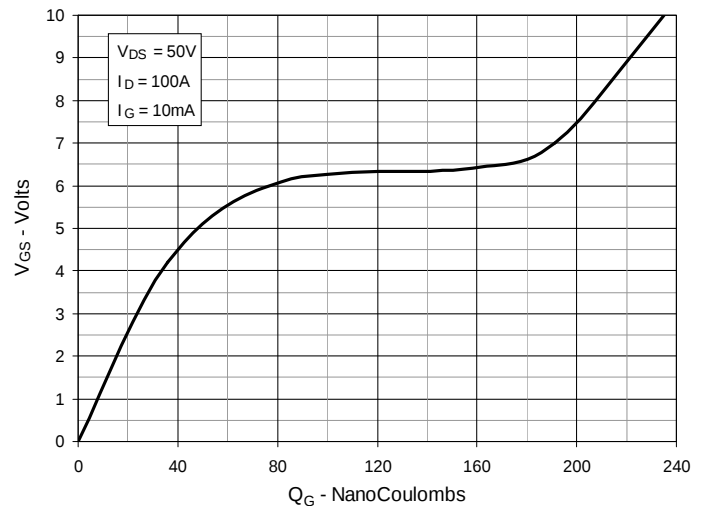
**Fig. 8. Transconductance**



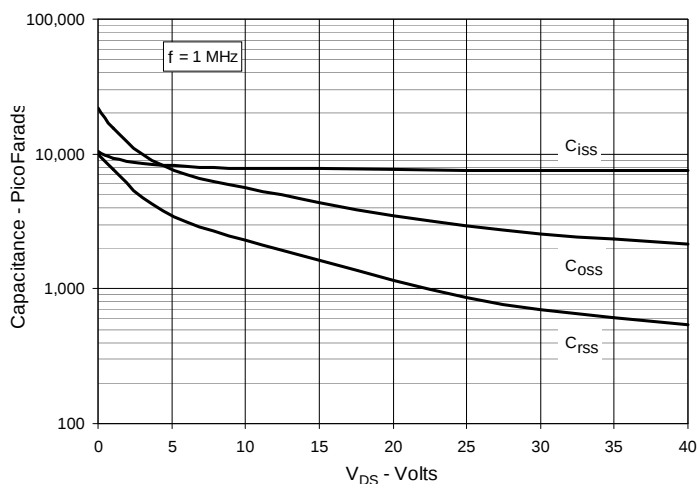
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



**Fig. 12. Forward-Bias Safe Operating Area**

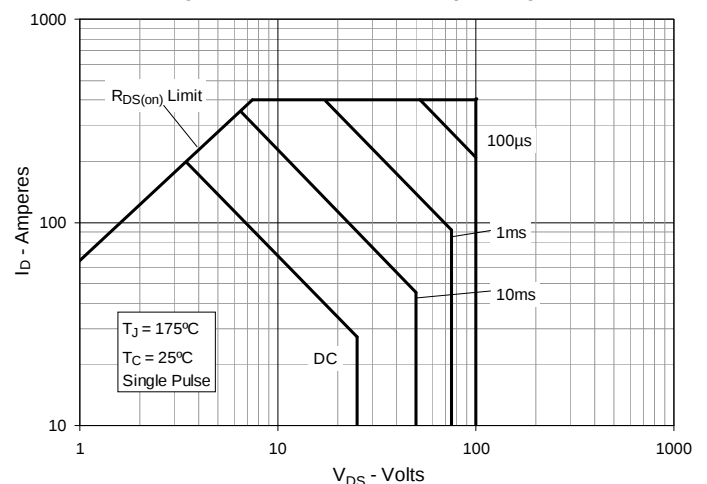
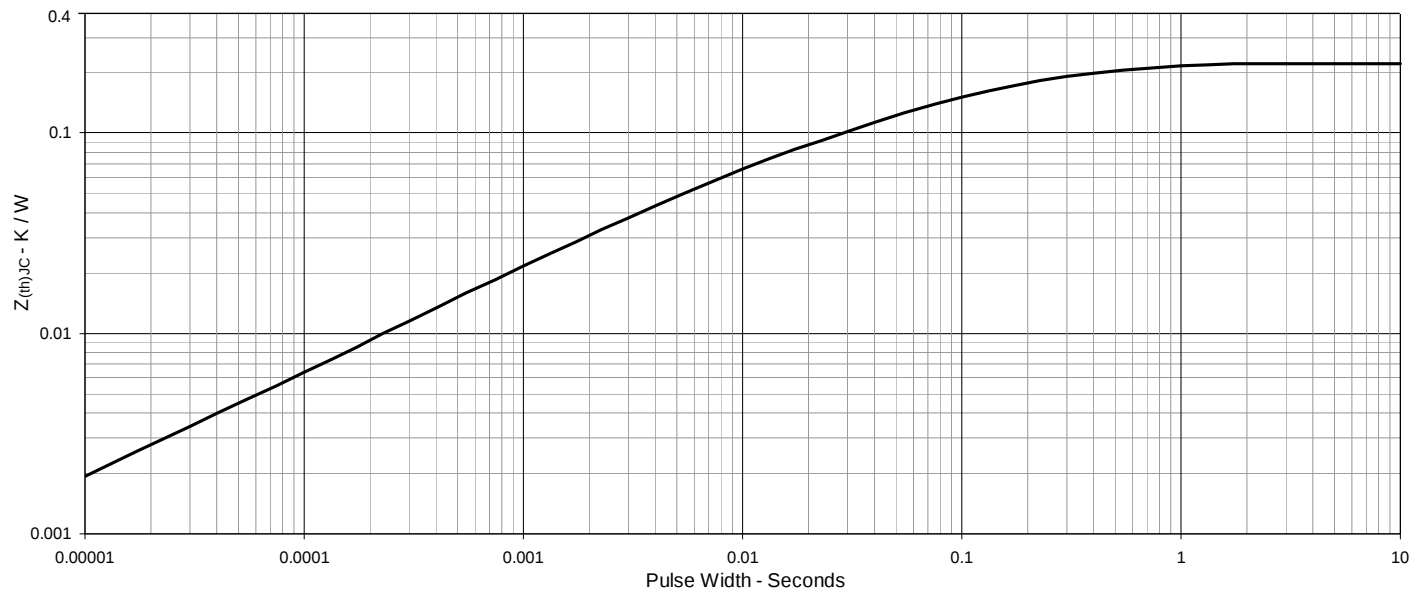


Fig. 13 Maximum Transient Thermal Impedance





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