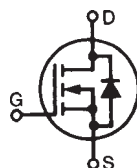


# High Voltage Power MOSFET

## IXTJ4N150

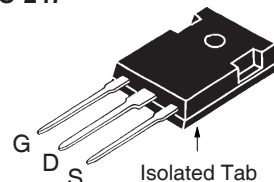
(Electrically Isolated Tab)

N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode



$$\begin{aligned} V_{DSS} &= 1500V \\ I_{D25} &= 2.5A \\ R_{DS(on)} &\leq 6\Omega \end{aligned}$$

ISO TO-247™



G = Gate      D = Drain  
S = Source

| Symbol     | Test Conditions                                                          | Maximum Ratings |                  |
|------------|--------------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                          | 1500            | V                |
| $V_{DGR}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ , $R_{GS} = 1M\Omega$    | 1500            | V                |
| $V_{GSS}$  | Continuous                                                               | $\pm 30$        | V                |
| $V_{GSM}$  | Transient                                                                | $\pm 40$        | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                 | 2.5             | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , Pulse Width Limited by $T_{JM}$               | 12              | A                |
| $I_A$      | $T_C = 25^\circ\text{C}$                                                 | 4               | A                |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                                 | 350             | mJ               |
| $dv/dt$    | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$ | 5               | V/ns             |
| $P_D$      | $T_C = 25^\circ\text{C}$                                                 | 110             | W                |
| $T_J$      |                                                                          | - 55 ... +150   | $^\circ\text{C}$ |
| $T_{JM}$   |                                                                          | 150             | $^\circ\text{C}$ |
| $T_{stg}$  |                                                                          | - 55 ... +150   | $^\circ\text{C}$ |
| $T_L$      | Maximum Lead Temperature for Soldering                                   | 300             | $^\circ\text{C}$ |
| $T_{SOLD}$ | 1.6 mm (0.062in.) from Case for 10s                                      | 260             | $^\circ\text{C}$ |
| $M_d$      | Mounting Torque                                                          | 1.13/10         | Nm/lb.in         |
| Weight     |                                                                          | 5               | g                |

### Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 2500V~ Electrical Isolation
- Fast Intrinsic Diode
- Avalanche Rated
- Molding Epoxies meet UL 94 V-0 Flammability Classification

### Advantages

- Easy to Mount
- Space Savings
- High Power Density

### Applications

- High Voltage Power Supplies
- Capacitor Discharge Applications
- Pulse Circuits

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified) | Characteristic Values |      |                           |
|--------------|-----------------------------------------------------------------------------|-----------------------|------|---------------------------|
|              |                                                                             | Min.                  | Typ. | Max.                      |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu A$                                            | 1500                  |      | V                         |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250\mu A$                                        | 2.5                   |      | 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>$T_J = 125^\circ\text{C}$             |                       |      | 10 $\mu A$<br>100 $\mu A$ |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 2A$ , Note 1                                        |                       |      | 6 $\Omega$                |

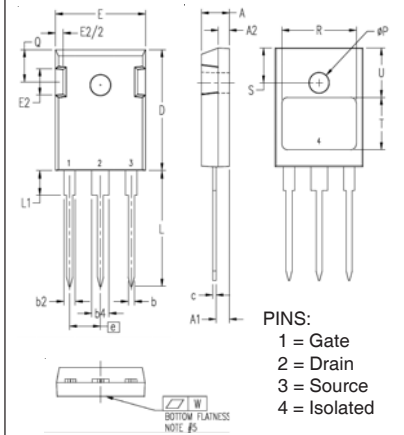
| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                                                                | Characteristic Values |      |                        |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|------------------------|
|              |                                                                                                                                            | Min.                  | Typ. | Max.                   |
| $g_{fs}$     | $V_{DS} = 20\text{V}$ , $I_D = 2\text{A}$ , Note 1                                                                                         | 2.8                   | 4.6  | S                      |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                           |                       | 1576 | pF                     |
| $C_{oss}$    |                                                                                                                                            |                       | 105  | pF                     |
| $C_{rss}$    |                                                                                                                                            |                       | 35   | pF                     |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 2\text{A}$<br>$R_G = 5\Omega$ (External) |                       | 19   | ns                     |
| $t_r$        |                                                                                                                                            |                       | 23   | ns                     |
| $t_{d(off)}$ |                                                                                                                                            |                       | 42   | ns                     |
| $t_f$        |                                                                                                                                            |                       | 22   | ns                     |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 2\text{A}$                                                                   |                       | 44.5 | nC                     |
| $Q_{gs}$     |                                                                                                                                            |                       | 7.7  | nC                     |
| $Q_{gd}$     |                                                                                                                                            |                       | 12.7 | nC                     |
| $R_{thJC}$   |                                                                                                                                            | 0.30                  |      | $1.13^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                            |                       |      | $^\circ\text{C/W}$     |

## Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                          | Characteristic Values |      |               |
|----------|------------------------------------------------------------------------------------------------------|-----------------------|------|---------------|
|          |                                                                                                      | Min.                  | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{V}$                                                                                 |                       |      | 4 A           |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$                                                          |                       |      | 1.6 A         |
| $V_{SD}$ | $I_F = 4\text{A}$ , $V_{GS} = 0\text{V}$ , Note 1                                                    |                       |      | 1.3 V         |
| $t_{rr}$ | $I_F = 2\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ , $V_{GS} = 0\text{V}$ |                       | 0.9  | $\mu\text{s}$ |
| $I_{RM}$ |                                                                                                      |                       | 15.0 | A             |
| $Q_{RM}$ |                                                                                                      |                       | 6.7  | $\mu\text{C}$ |

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

## ISO TO-247 (IXTJ) OUTLINE



| 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  |
| ØP  | .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    |             |

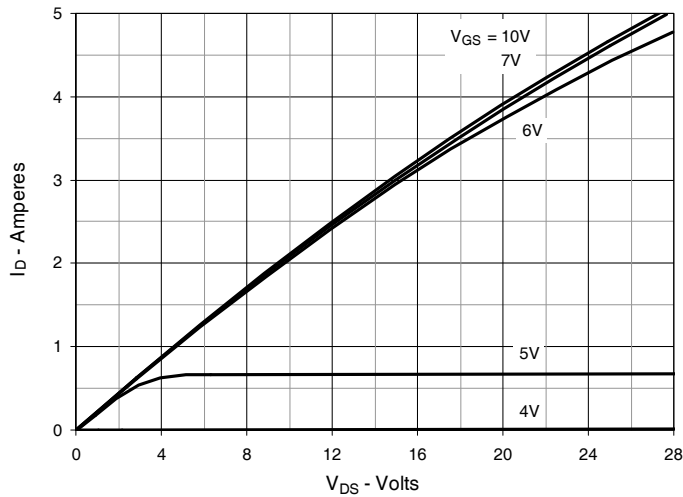
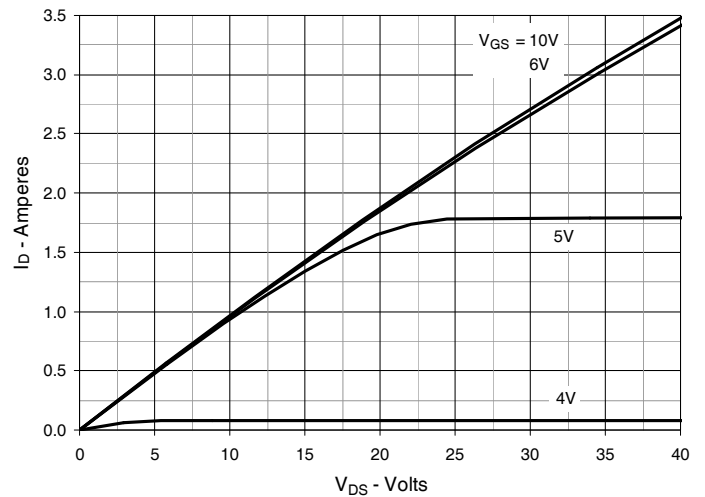
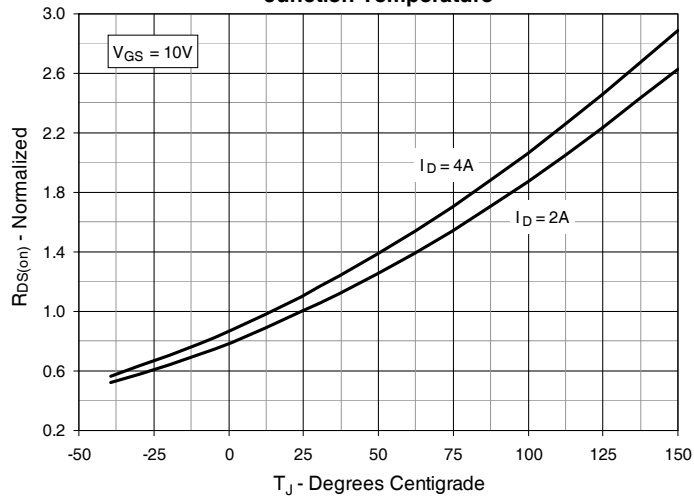
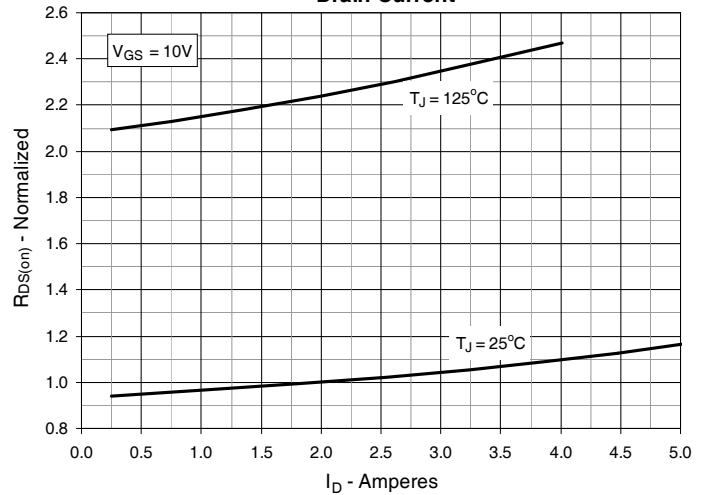
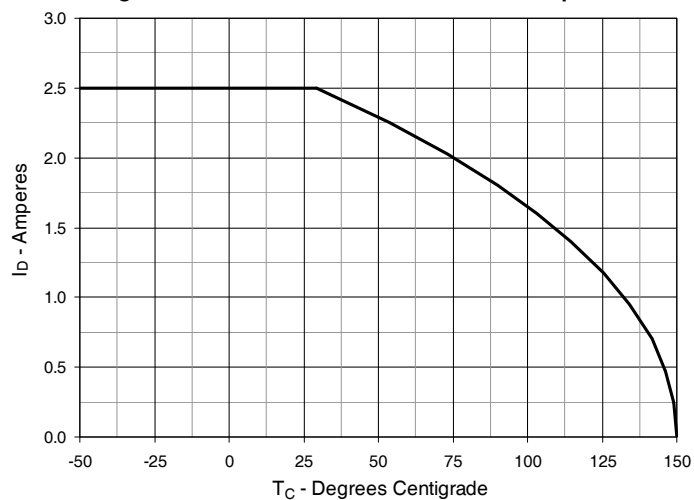
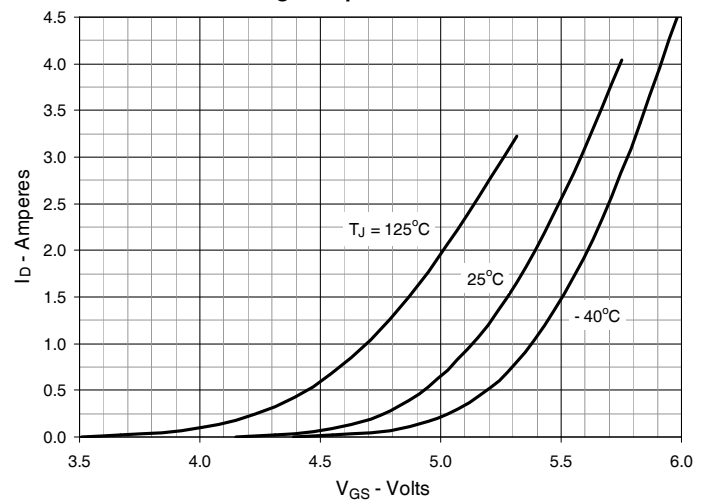
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$** 

**Fig. 2. Output Characteristics @  $T_J = 125^\circ\text{C}$** 

**Fig. 3.  $R_{DS(on)}$  Normalized to  $I_D = 2\text{A}$  Value vs. Junction Temperature**

**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 2\text{A}$  Value vs. Drain Current**

**Fig. 5. Maximum Drain Current vs. Case Temperature**

**Fig. 6. Input Admittance**


**Fig. 7. Transconductance**

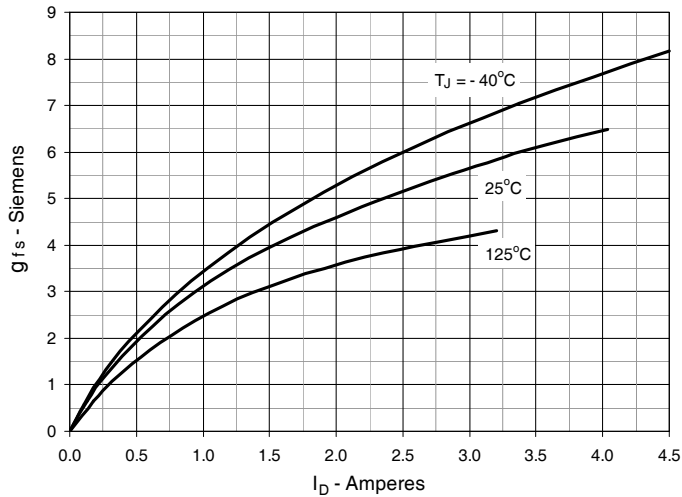


**Fig. 8. Forward Voltage Drop of Intrinsic Diode**

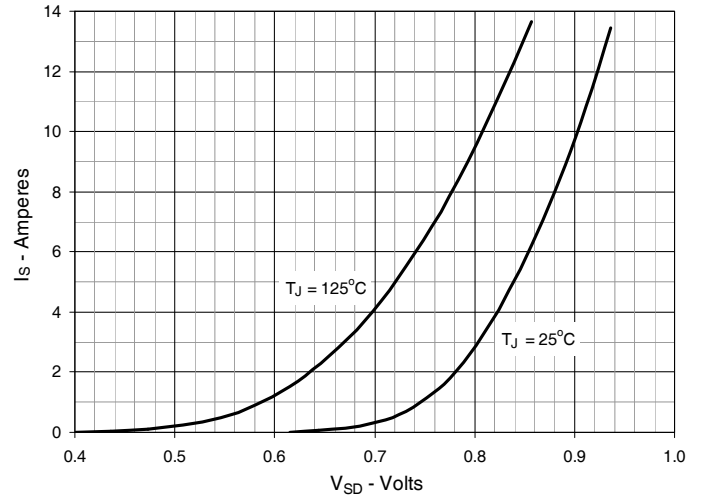


**Fig. 9. Gate Charge**

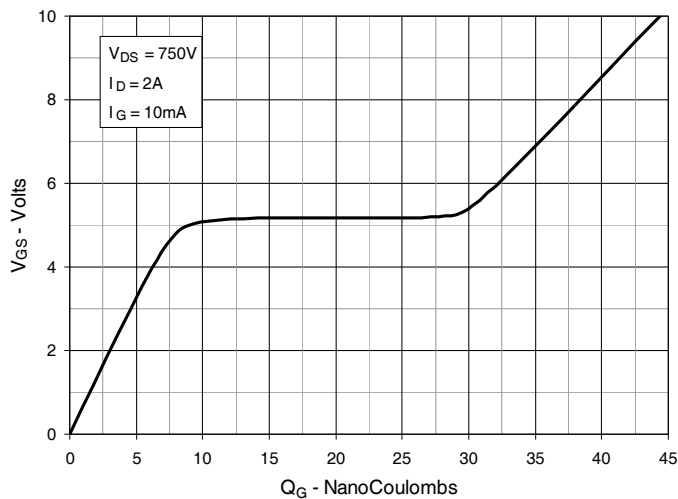


**Fig. 10. Capacitance**

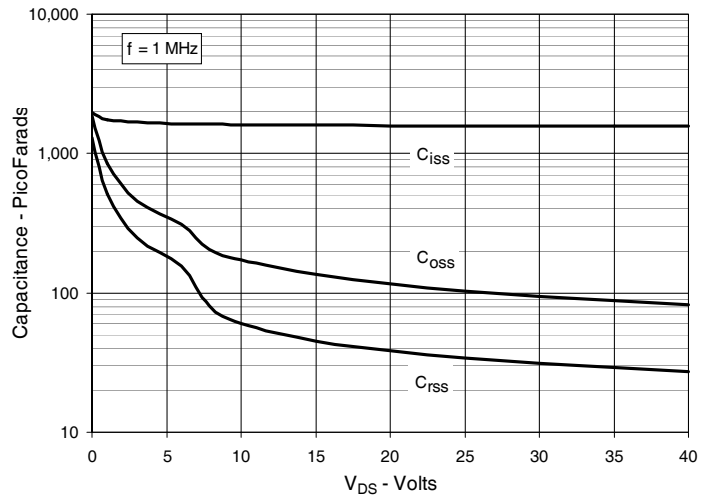


**Fig. 11. Breakdown and Threshold Voltages vs. Junction Temperature**

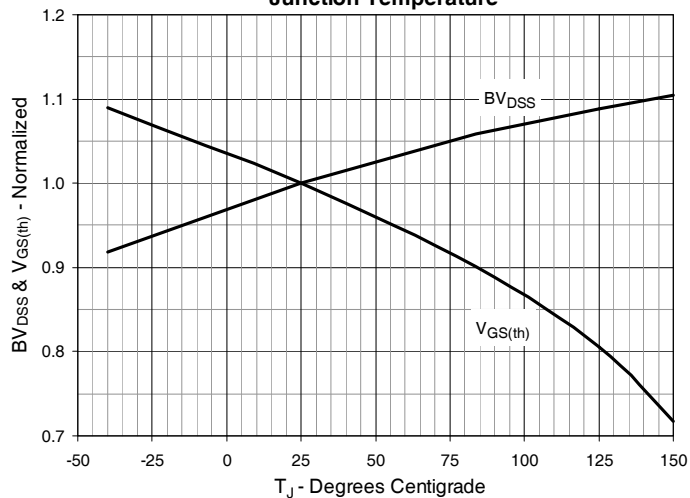


**Fig. 12. Forward-Bias Safe Operating Area**

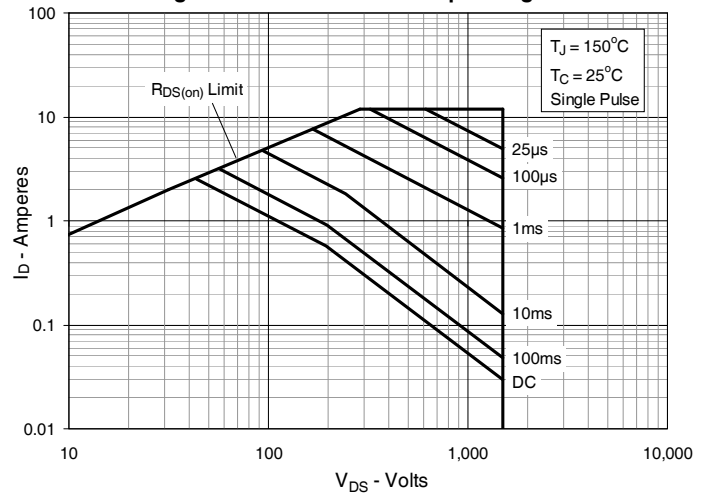
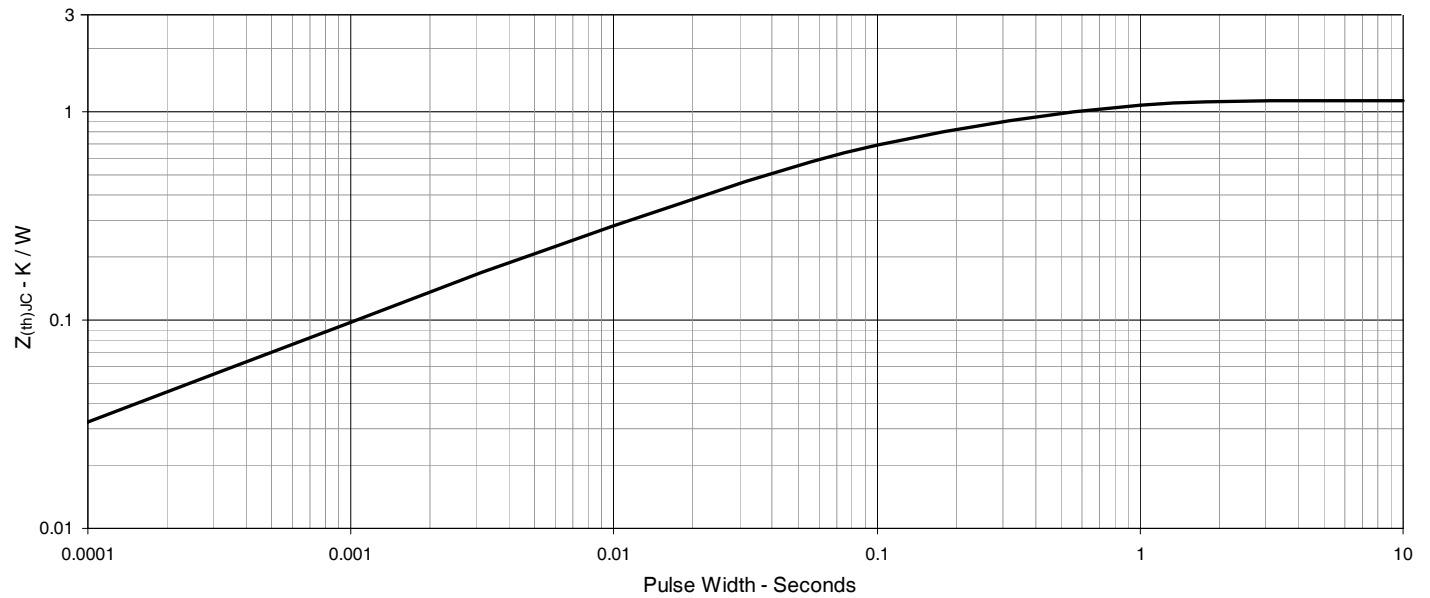


Fig. 13. Maximum Transient Thermal Impedance





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