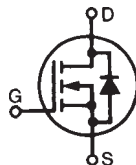


### GigaMOS™ Power MOSFET

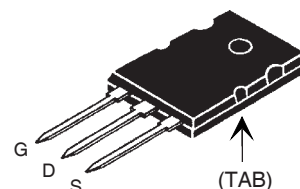
### IXFK120N30T IXFX120N30T

N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode

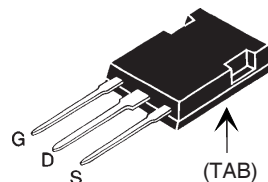


$$\begin{aligned} V_{DSS} &= 300V \\ I_{D25} &= 120A \\ R_{DS(on)} &\leq 24m\Omega \\ t_{rr} &\leq 200ns \end{aligned}$$

TO-264 (IXFK)



PLUS247 (IXFX)



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

| Symbol        | Test Conditions                                                          | Maximum Ratings   |                  |
|---------------|--------------------------------------------------------------------------|-------------------|------------------|
| $V_{DSS}$     | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                          | 300               | V                |
| $V_{DGR}$     | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ , $R_{GS} = 1M\Omega$    | 300               | V                |
| $V_{GSS}$     | Continuous                                                               | $\pm 20$          | V                |
| $V_{GSM}$     | Transient                                                                | $\pm 30$          | V                |
| $I_{D25}$     | $T_C = 25^\circ\text{C}$                                                 | 120               | A                |
| $I_{DM}$      | $T_C = 25^\circ\text{C}$ , Pulse Width Limited by $T_{JM}$               | 330               | A                |
| $I_A$         | $T_C = 25^\circ\text{C}$                                                 | 30                | A                |
| $E_{AS}$      | $T_C = 25^\circ\text{C}$                                                 | 2.5               | J                |
| $dV/dt$       | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$ | 20                | V/ns             |
| $P_D$         | $T_C = 25^\circ\text{C}$                                                 | 960               | 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 in.) from Case for 10s                                      | 300               | $^\circ\text{C}$ |
| $T_{SOLD}$    | Plastic Body for 10s                                                     | 260               | $^\circ\text{C}$ |
| $M_d$         | Mounting Torque (TO-264)                                                 | 1.13/10           | Nm/lb.in.        |
| $F_c$         | Mounting Force (PLUS247)                                                 | 20..120 / 4.5..27 | N/lb.            |
| <b>Weight</b> | TO-264                                                                   | 10                | g                |
|               | PLUS247                                                                  | 6                 | g                |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified) | Characteristic Values |      |                          |
|--------------|---------------------------------------------------------------------------|-----------------------|------|--------------------------|
|              |                                                                           | Min.                  | Typ. | Max.                     |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 3mA$                                               | 300                   |      | V                        |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 4mA$                                           | 2.5                   |      | 5.0 V                    |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$                                        |                       |      | $\pm 200$ nA             |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 125^\circ\text{C}$           |                       |      | 50 $\mu\text{A}$<br>3 mA |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 60A$ , Note 1                                     |                       |      | 24 m $\Omega$            |

#### Features

- International Standard Packages
- High Current Handling Capability
- Fast Intrinsic Diode
- Avalanche Rated
- Low  $R_{DS(on)}$

#### Advantages

- Easy to Mount
- Space Savings
- High Power Density

#### Applications

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

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)                                                                          | Characteristic Values |      |                    |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|--------------------|
|              |                                                                                                                                                    | Min.                  | Typ. | Max.               |
| $g_{fs}$     | $V_{DS} = 10\text{V}$ , $I_D = 60\text{A}$ , Note 1                                                                                                | 70                    | 120  | S                  |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                                   |                       | 20   | nF                 |
| $C_{oss}$    |                                                                                                                                                    |                       | 1380 | pF                 |
| $C_{rss}$    |                                                                                                                                                    |                       | 135  | pF                 |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 15\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$<br>$R_G = 1\Omega$ (External) |                       | 32   | ns                 |
| $t_r$        |                                                                                                                                                    |                       | 31   | ns                 |
| $t_{d(off)}$ |                                                                                                                                                    |                       | 87   | ns                 |
| $t_f$        |                                                                                                                                                    |                       | 23   | ns                 |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$                                                                   |                       | 265  | nC                 |
| $Q_{gs}$     |                                                                                                                                                    |                       | 87   | nC                 |
| $Q_{gd}$     |                                                                                                                                                    |                       | 60   | nC                 |
| $R_{thJC}$   |                                                                                                                                                    |                       | 0.13 | $^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                                    | 0.15                  |      | $^\circ\text{C/W}$ |

### Source-Drain Diode

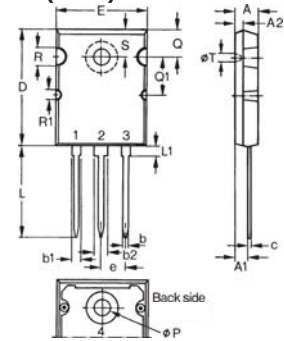
| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                          | Characteristic Values |      |               |
|----------|------------------------------------------------------------------------------------------------------|-----------------------|------|---------------|
|          |                                                                                                      | Min.                  | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{V}$                                                                                 |                       |      | 120 A         |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$                                                          |                       |      | 480 A         |
| $V_{SD}$ | $I_F = 60\text{A}$ , $V_{GS} = 0\text{V}$ , Note 1                                                   |                       |      | 1.5 V         |
| $t_{rr}$ | $I_F = 60\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 75\text{V}$ , $V_{GS} = 0\text{V}$ |                       | 0.8  | ns            |
| $Q_{RM}$ |                                                                                                      |                       | 10.4 | $\mu\text{C}$ |
| $I_{RM}$ |                                                                                                      |                       |      | A             |

Note 1: Pulse Test,  $t \leq 300\mu\text{s}$ ; Duty Cycle,  $d \leq 2\%$ .

### ADVANCE TECHNICAL INFORMATION

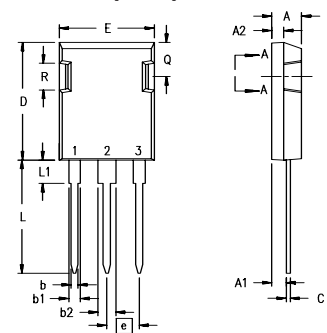
The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

### TO-264 (IXFK) Outline



| Dim. | Millimeter |       | Inches   |       |
|------|------------|-------|----------|-------|
|      | Min.       | Max.  | Min.     | Max.  |
| A    | 4.82       | 5.13  | .190     | .202  |
| A1   | 2.54       | 2.89  | .100     | .114  |
| A2   | 2.00       | 2.10  | .079     | .083  |
| b    | 1.12       | 1.42  | .044     | .056  |
| b1   | 2.39       | 2.69  | .094     | .106  |
| b2   | 2.90       | 3.09  | .114     | .122  |
| c    | 0.53       | 0.83  | .021     | .033  |
| D    | 25.91      | 26.16 | 1.020    | 1.030 |
| E    | 19.81      | 19.96 | .780     | .786  |
| e    | 5.46 BSC   |       | .215 BSC |       |
| J    | 0.00       | 0.25  | .000     | .010  |
| K    | 0.00       | 0.25  | .000     | .010  |
| L    | 20.32      | 20.83 | .800     | .820  |
| L1   | 2.29       | 2.59  | .090     | .102  |
| P    | 3.17       | 3.66  | .125     | .144  |
| Q    | 6.07       | 6.27  | .239     | .247  |
| Q1   | 8.38       | 8.69  | .330     | .342  |
| R    | 3.81       | 4.32  | .150     | .170  |
| R1   | 1.78       | 2.29  | .070     | .090  |
| S    | 6.04       | 6.30  | .238     | .248  |
| T    | 1.57       | 1.83  | .062     | .072  |

### PLUS 247™ (IXFX) Outline



Terminals: 1 - Gate  
2 - Drain (Collector)  
3 - Source (Emitter)  
4 - Drain (Collector)

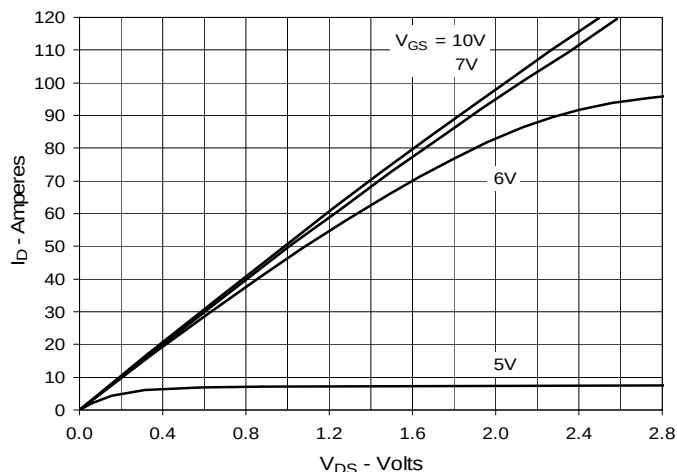
| Dim. | Millimeter |       | Inches   |      |
|------|------------|-------|----------|------|
|      | Min.       | Max.  | Min.     | Max. |
| A    | 4.83       | 5.21  | .190     | .205 |
| A1   | 2.29       | 2.54  | .090     | .100 |
| A2   | 1.91       | 2.16  | .075     | .085 |
| b    | 1.14       | 1.40  | .045     | .055 |
| b1   | 1.91       | 2.13  | .075     | .084 |
| b2   | 2.92       | 3.12  | .115     | .123 |
| C    | 0.61       | 0.80  | .024     | .031 |
| D    | 20.80      | 21.34 | .819     | .840 |
| E    | 15.75      | 16.13 | .620     | .635 |
| e    | 5.45 BSC   |       | .215 BSC |      |
| L    | 19.81      | 20.32 | .780     | .800 |
| L1   | 3.81       | 4.32  | .150     | .170 |
| Q    | 5.59       | 6.20  | .220     | .244 |
| R    | 4.32       | 4.83  | .170     | .190 |

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

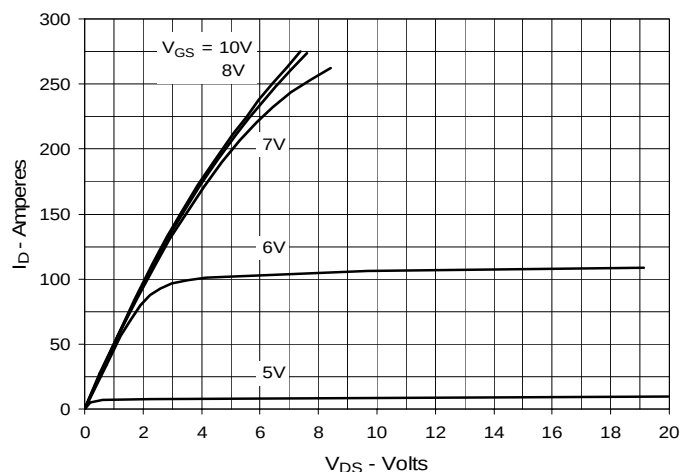
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

|           |           |           |           |              |              |              |              |              |             |
|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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 |
| 4,850,072 | 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    |             |

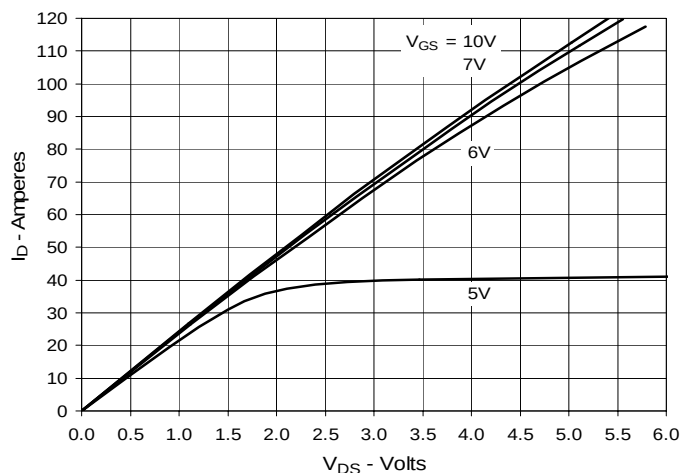
**Fig. 1. Output Characteristics**  
**@ 25°C**



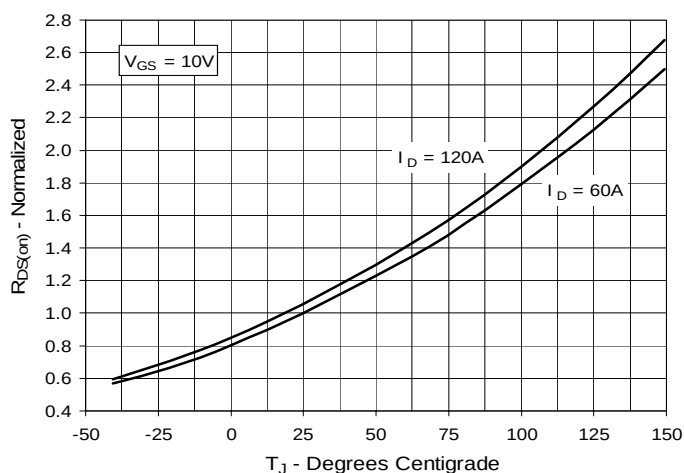
**Fig. 2. Extended Output Characteristics**  
**@ 25°C**



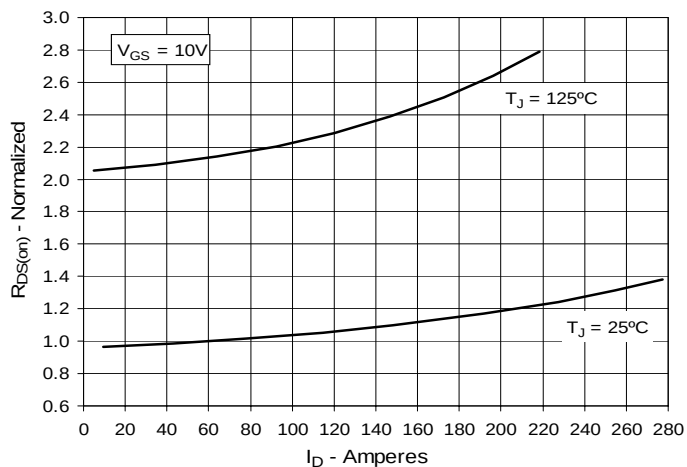
**Fig. 3. Output Characteristics**  
**@ 125°C**



**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 60A$  Value**  
**vs. Junction Temperature**



**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 60A$  Value**  
**vs. Drain Current**



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

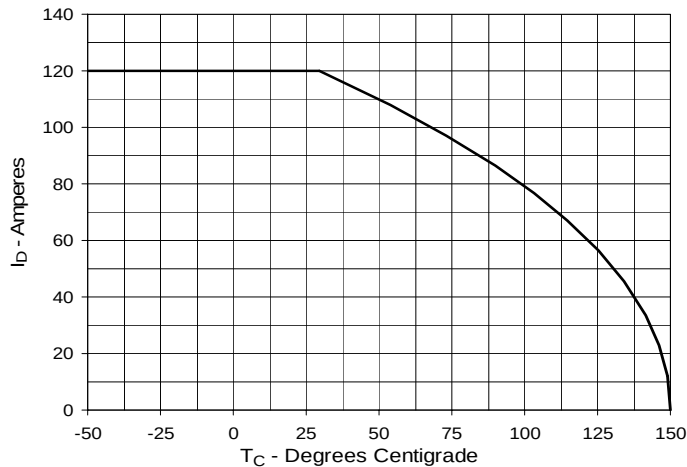


Fig. 7. Input Admittance

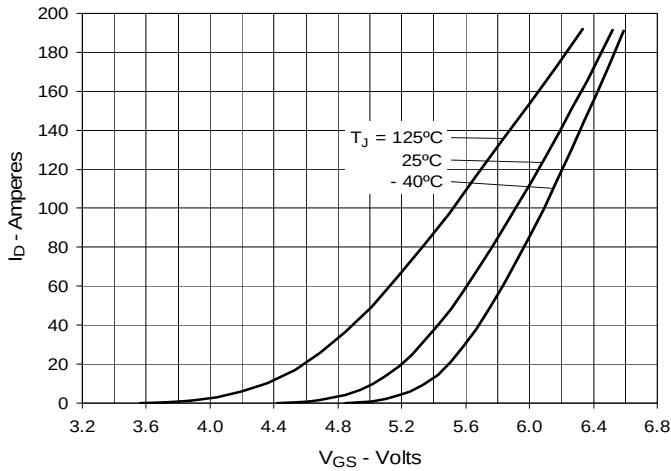


Fig. 8. Transconductance

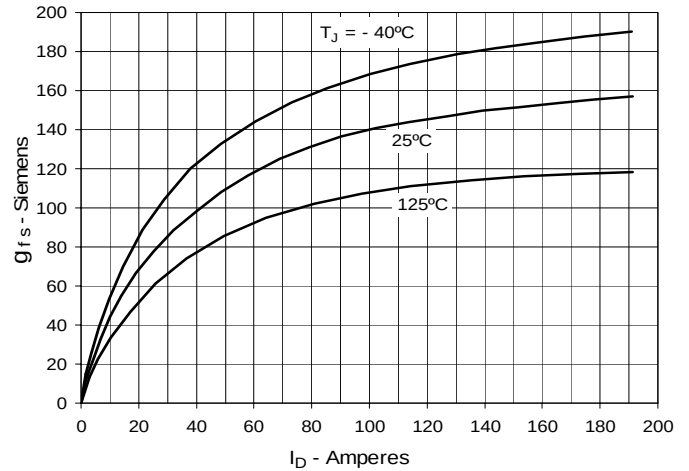


Fig. 9. Forward Voltage Drop of Intrinsic Diode

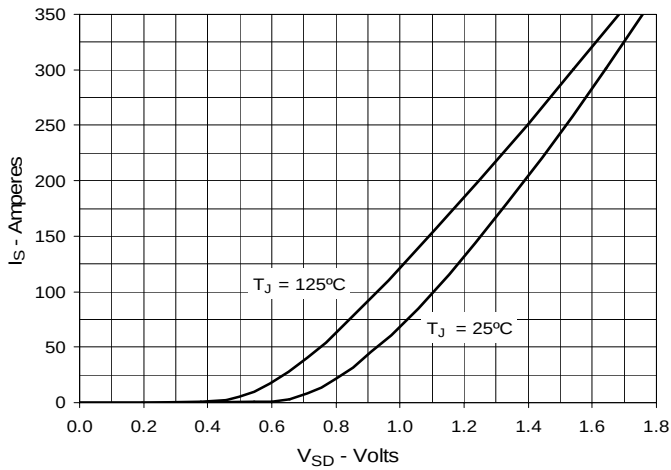


Fig. 10. Gate Charge

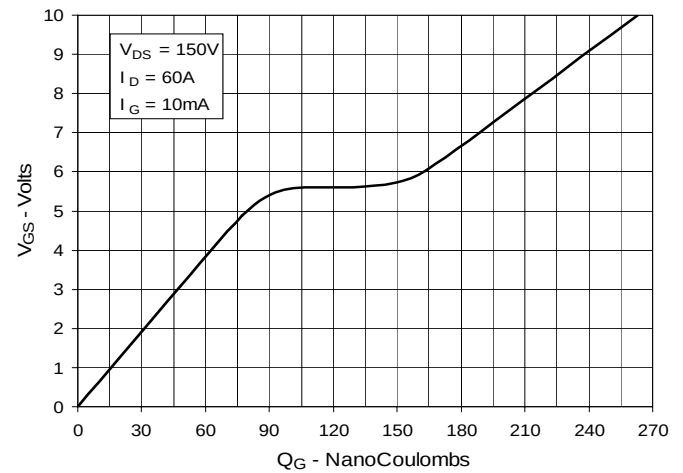


Fig. 11. Capacitance

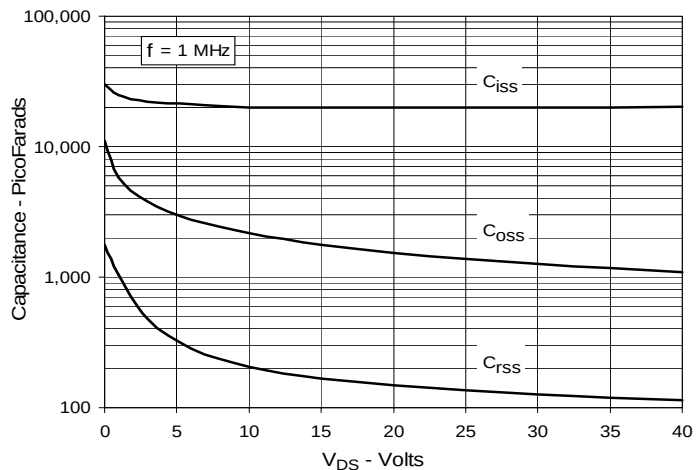


Fig. 12. Forward-Bias Safe Operating Area

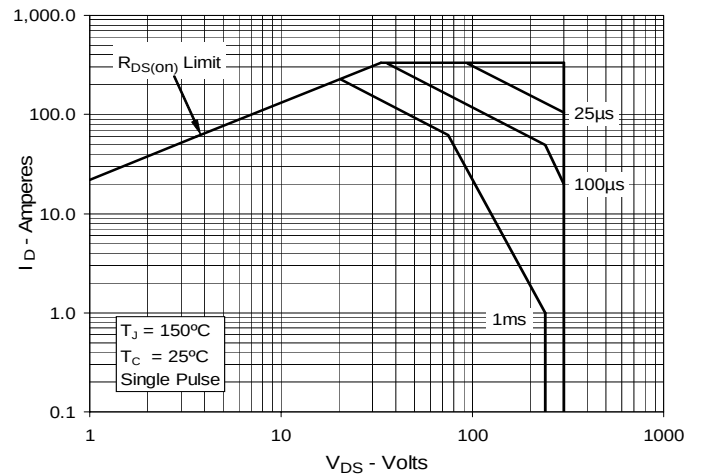
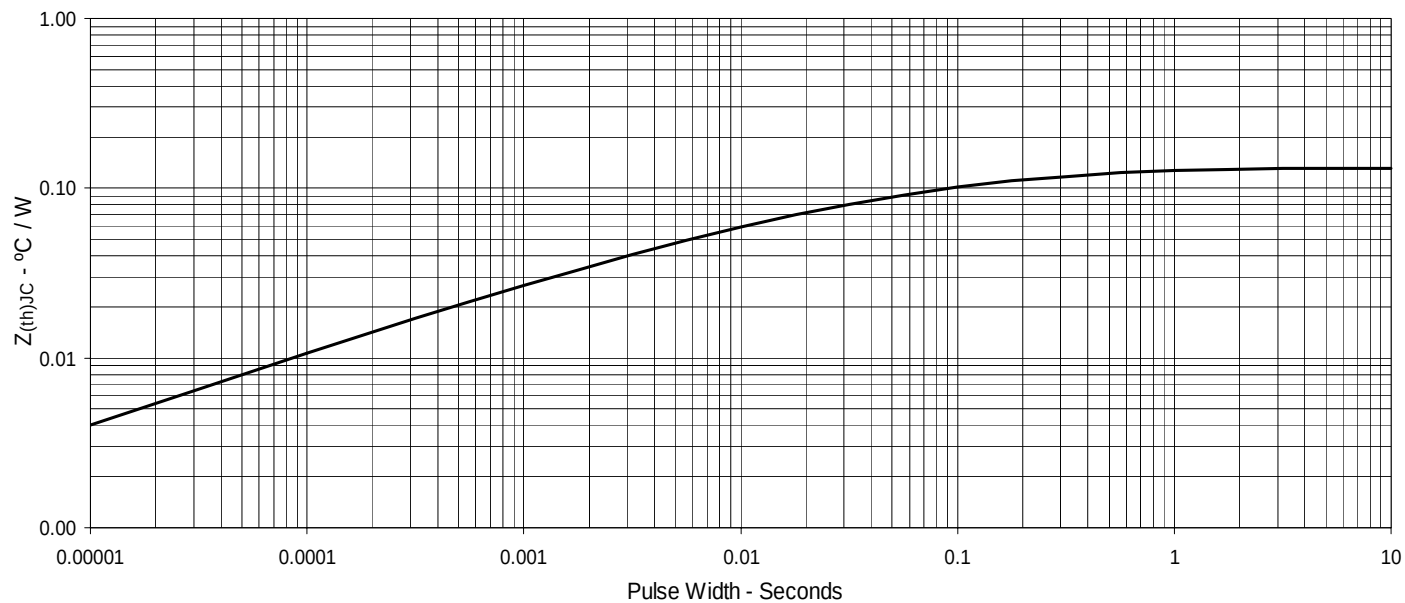


Fig. 13. Maximum Transient Thermal Impedance





---

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).