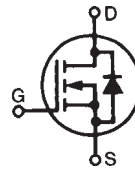


**LinearL2™ Power  
MOSFET w/Extended  
FBSOA**
**IXTK90N25L2  
IXTX90N25L2**

 N-Channel Enhancement Mode  
Avalanche Rated


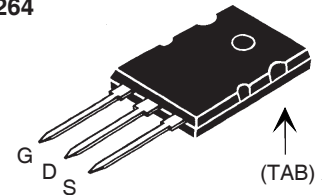
$$V_{DSS} = 250V$$

$$I_{D25} = 90A$$

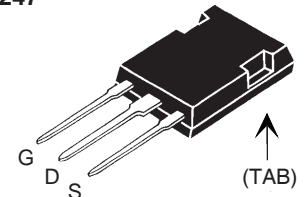
$$R_{DS(on)} \leq 33m\Omega$$

| Symbol        | Test Conditions   | Maximum Ratings   |            |
|---------------|---|-------------------|------------|
| $V_{DSS}$     | $T_J = 25^\circ C$ to $150^\circ C$                       | 250               | V          |
| $V_{DGR}$     | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1M\Omega$ | 250               | V          |
| $V_{GSS}$     | Continuous  | $\pm 20$          | V          |
| $V_{GSM}$     | Transient   | $\pm 30$          | V          |
| $I_{D25}$     | $T_C = 25^\circ C$  | 90                | A          |
| $I_{DM}$      | $T_C = 25^\circ C$ , pulse width limited by $T_{JM}$      | 360               | A          |
| $I_A$         | $T_C = 25^\circ C$  | 45                | A          |
| $E_{AS}$      | $T_C = 25^\circ C$  | 3                 | J          |
| $P_D$         | $T_C = 25^\circ C$  | 960               | W          |
| $T_J$         |   | -55...+150        | $^\circ C$ |
| $T_{JM}$      |   | 150               | $^\circ C$ |
| $T_{stg}$     |   | -55...+150        | $^\circ C$ |
| $T_L$         | 1.6mm (0.063 in.) from case for 10s                       | 300               | $^\circ C$ |
| $T_{SOLD}$    | Plastic body for 10s                                      | 260               | $^\circ C$ |
| $M_d$         | Mounting torque (IXTK)                                    | 1.13/10           | Nm/lb.in.  |
| $F_c$         | Mounting Force (IXTX)                                     | 20..120 / 4.5..27 | N/lb.      |
| <b>Weight</b> | TO-264  | 10                | g          |
|               | PLUS247   | 6                 | g          |

TO-264



PLUS247



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

**Features**

- Designed for linear operation
- International standard packages
- Avalanche rated
- Guaranteed FBSOA at  $75^\circ C$

**Advantages**

- Easy to mount
- Space savings
- High power density

**Applications**

- Solid state circuit breakers
- Soft start controls
- Linear amplifiers
- Programmable loads
- Current regulators

| Symbol       | Test Conditions   | Characteristic Values |      |               |
|--------------|---|-----------------------|------|---------------|
|              |   | Min.                  | Typ. | Max.          |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 1mA$                             | 250                   |      | V             |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 3mA$                         | 2.0                   |      | V             |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$                      |                       |      | $\pm 200$ nA  |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0V$ $T_J = 125^\circ C$ |                       |      | 50 $\mu A$    |
|              |   |                       |      | 2.5 mA        |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1     |                       |      | 33 m $\Omega$ |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)  | Characteristic Values |      |      |                    |
|--------------|--|-----------------------|------|------|--------------------|
|              |  | Min.                  | Typ. | Max. |                    |
| $g_{fs}$     | $V_{DS} = 10\text{V}$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1   | 35                    | 50   | 65   | S                  |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$   |                       | 23   |      | nF                 |
| $C_{oss}$    |  |                       | 2140 |      | pF                 |
| $C_{rss}$    |  |                       | 360  |      | 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>$R_G = 1\Omega$ (External) |                       | 50   |      | ns                 |
| $t_r$        |  |                       | 175  |      | ns                 |
| $t_{d(off)}$ |  |                       | 40   |      | ns                 |
| $t_f$        |  |                       | 160  |      | ns                 |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$   |                       | 640  |      | nC                 |
| $Q_{gs}$     |  |                       | 125  |      | nC                 |
| $Q_{gd}$     |  |                       | 385  |      | nC                 |
| $R_{thJC}$   |  |                       |      | 0.13 | $^\circ\text{C/W}$ |
| $R_{thCS}$   |  |                       |      | 0.15 | $^\circ\text{C/W}$ |

### Safe Operating Area Specification

| Symbol | Test Conditions   | Characteristic Values |      |      |
|--------|---|-----------------------|------|------|
|        |   | Min.                  | Typ. | Max. |
| SOA    | $V_{DS} = 250\text{V}$ , $I_D = 2.3\text{A}$ , $T_C = 75^\circ\text{C}$ , $T_p = 5\text{s}$ | 575                   |      | W    |

### Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                            | Characteristic Values |      |      |               |
|----------|--|-----------------------|------|------|---------------|
|          |  | Min.                  | Typ. | Max. |               |
| $I_S$    | $V_{GS} = 0\text{V}$   |                       |      | 90   | A             |
| $I_{SM}$ | Repetitive, pulse width limited by $T_{JM}$  |                       |      | 360  | A             |
| $V_{SD}$ | $I_F = 45\text{A}$ , $V_{GS} = 0\text{V}$ , Note 1   |                       |      | 1.5  | V             |
| $t_{rr}$ | $I_F = 45\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$ ,<br>$V_R = 80\text{V}$ , $V_{GS} = 0\text{V}$ |                       | 266  |      | ns            |
| $I_{RM}$ |  |                       | 23   |      | A             |
| $Q_{RM}$ |  |                       | 3.0  |      | $\mu\text{C}$ |

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

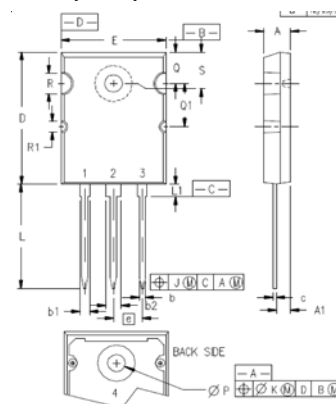
### PRELIMINARY TECHNICAL INFORMATION

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.

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IXYS MOSFETs and IGBTs are covered 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 7,157,338 B2  
by one or more of the following U.S. patents: 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

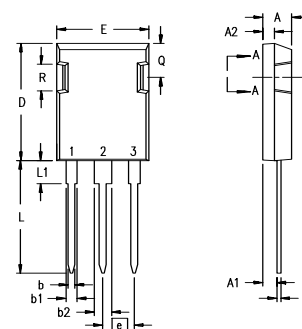
### TO-264 (IXTK) Outline



1 - GATE  
2, 4 - DRAIN (COLLECTOR)  
3 - SOURCE (EMITTER)

| SYM | INCHES   |       | MILLIMETERS |       |
|-----|----------|-------|-------------|-------|
|     | MIN      | MAX   | MIN         | MAX   |
| A   | .185     | .209  | 4.70        | 5.31  |
| A1  | .102     | .118  | 2.59        | 3.00  |
| b   | .037     | .055  | 0.94        | 1.40  |
| b1  | .087     | .102  | 2.21        | 2.59  |
| b2  | .110     | .126  | 2.79        | 3.20  |
| c   | .017     | .029  | 0.43        | 0.74  |
| D   | 1.007    | 1.047 | 25.58       | 26.59 |
| E   | .760     | .799  | 19.30       | 20.29 |
| e   | .215 BSC |       | 5.46 BSC    |       |
| J   | .000     | .010  | 0.00        | 0.25  |
| K   | .000     | .010  | 0.00        | 0.25  |
| L   | .779     | .842  | 19.79       | 21.39 |
| L1  | .087     | .102  | 2.21        | 2.59  |
| ØP  | .122     | .138  | 3.10        | 3.51  |
| Q   | .240     | .256  | 6.10        | 6.50  |
| Q1  | .330     | .346  | 8.38        | 8.79  |
| ØR  | .155     | .187  | 3.94        | 4.75  |
| ØR1 | .085     | .093  | 2.16        | 2.36  |
| S   | .243     | .253  | 6.17        | 6.43  |

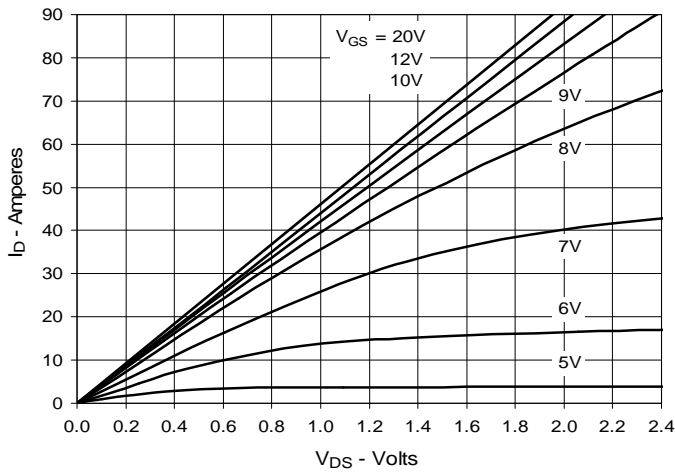
### PLUS 247™ (IXTX) Outline



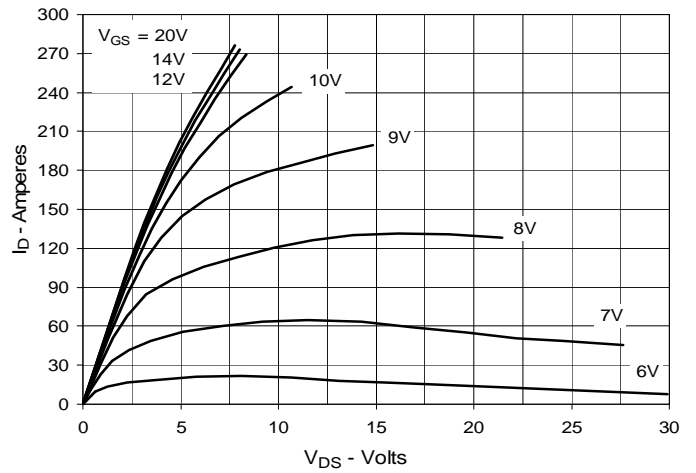
Terminals: 1 - Gate  
2 - Drain (Collector)  
3 - Source (Emitter)  
4 - Drain (Collector)

| Dim.           | Millimeter |       | Inches   |       |
|----------------|------------|-------|----------|-------|
|                | Min.       | Max.  | Min.     | Max.  |
| A              | 4.83       | 5.21  | .190     | .205  |
| A <sub>1</sub> | 2.29       | 2.54  | .090     | .100  |
| A <sub>2</sub> | 1.91       | 2.16  | .075     | .085  |
| b              | 1.14       | 1.40  | .045     | .055  |
| b <sub>1</sub> | 1.91       | 2.13  | .075     | .084  |
| b <sub>2</sub> | 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     | 0.244 |
| R              | 4.32       | 4.83  | .170     | .190  |

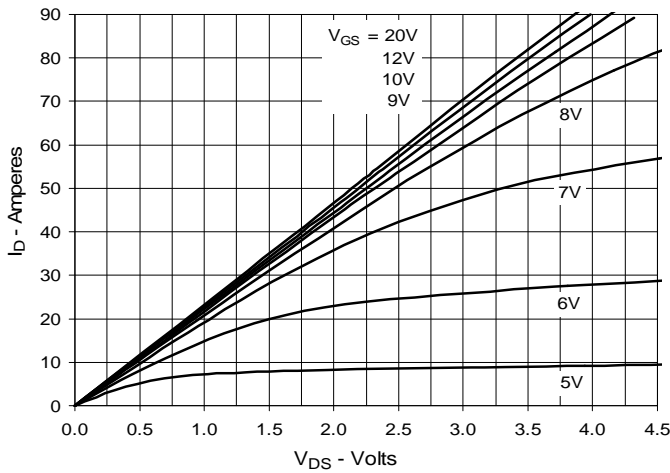
**Fig. 1. Output Characteristics @ 25°C**



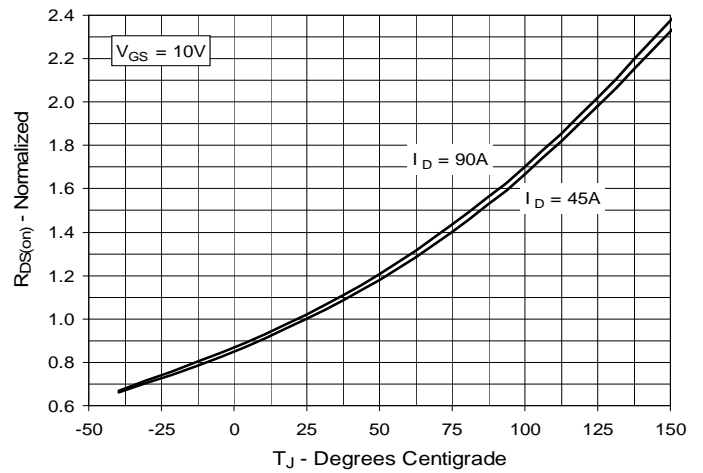
**Fig. 2. Extended Output Characteristics @ 25°C**



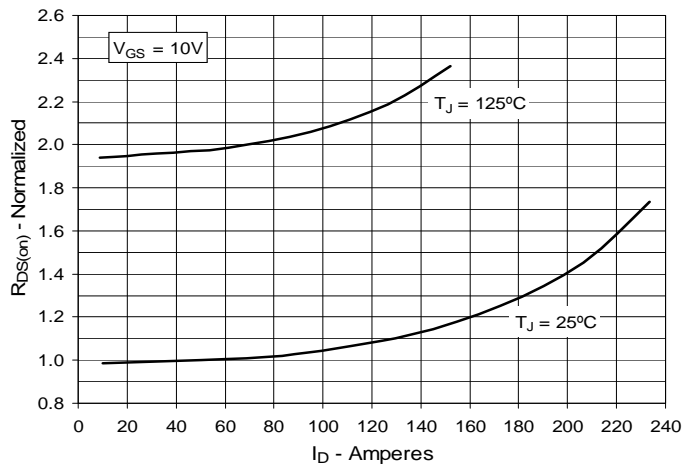
**Fig. 3. Output Characteristics @ 125°C**



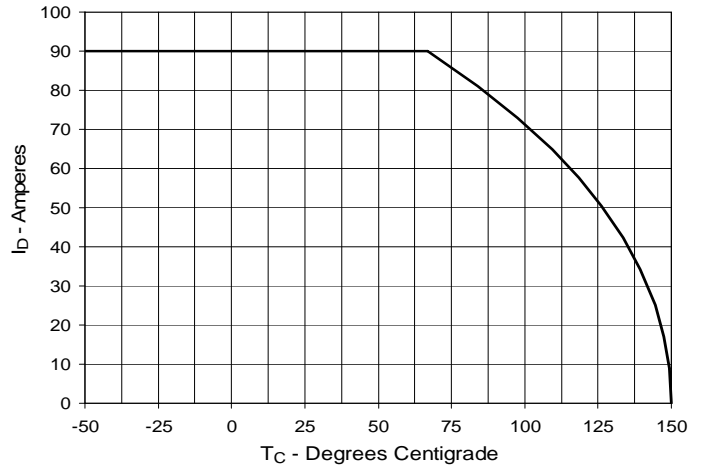
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 45A$  Value vs. Junction Temperature**



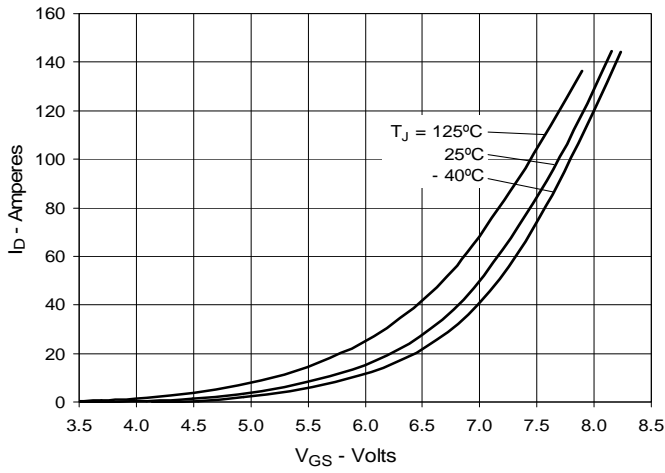
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 45A$  Value vs. Drain Current**



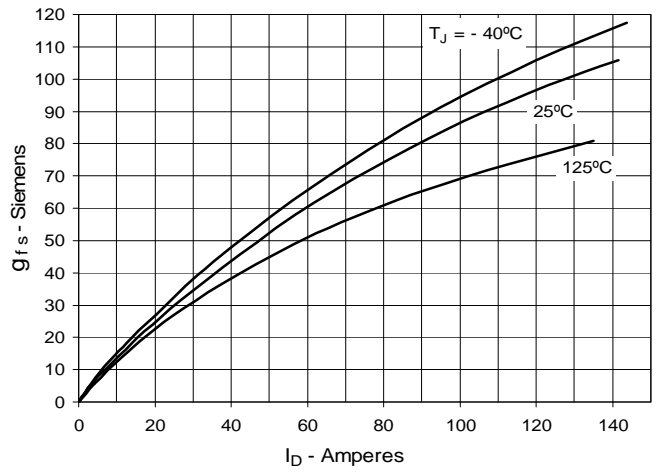
**Fig. 6. Maximum Drain Current vs. Case Temperature**



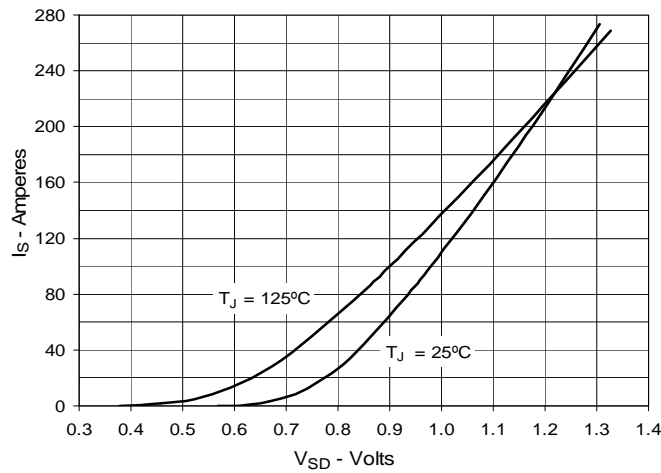
**Fig. 7. Input Admittance**



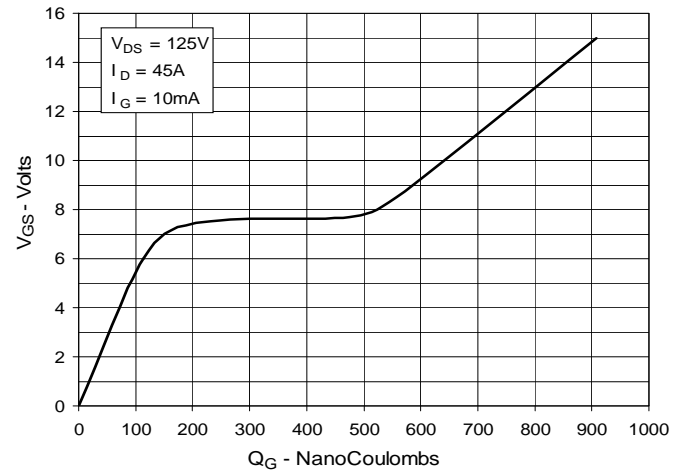
**Fig. 8. Transconductance**



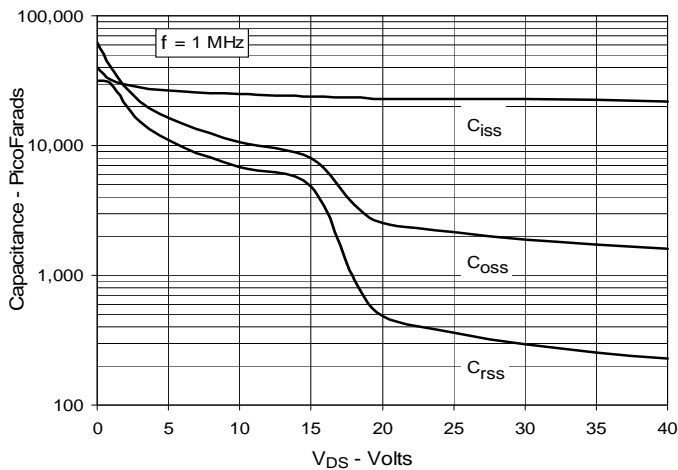
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



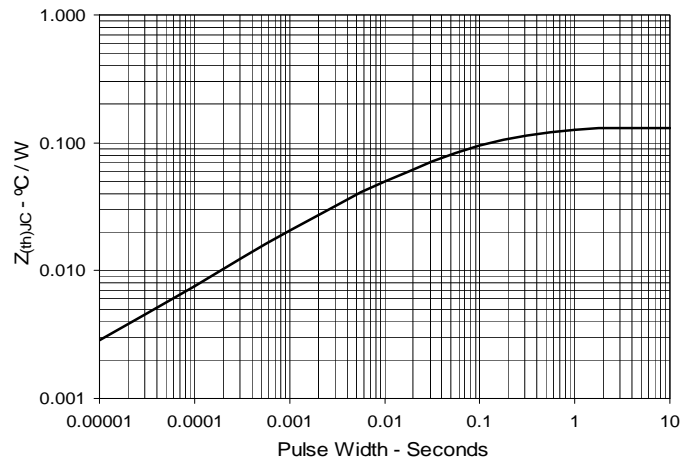
**Fig. 10. Gate Charge**



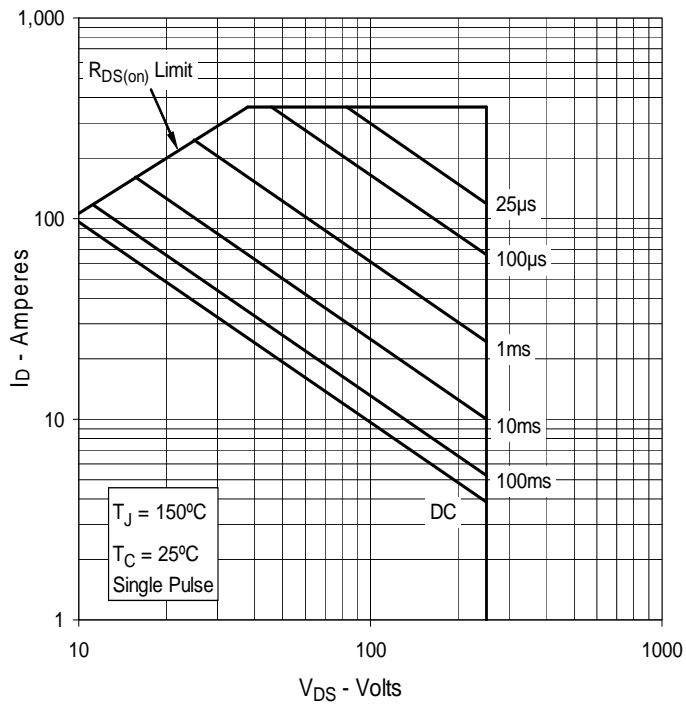
**Fig. 11. Capacitance**



**Fig. 12. Maximum Transient Thermal Impedance**



**Fig. 13. Forward-Bias Safe Operating Area  
@  $T_C = 25^\circ\text{C}$**



**Fig. 14. Forward-Bias Safe Operating Area  
@  $T_C = 75^\circ\text{C}$**

