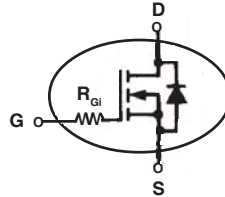


**LinearL2™**  
**Power MOSFET**  
**w/ Extended FBSOA**

**IXTT38N30L2HV**  
**IXTH38N30L2**

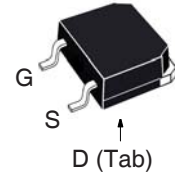
$$\begin{aligned}
 V_{DSS} &= 300V \\
 I_{D25} &= 38A \\
 R_{DS(on)} &\leq 100m\Omega
 \end{aligned}$$

N-Channel Enhancement Mode

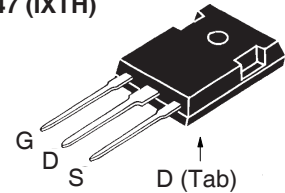


| Symbol     | Test Conditions   | Maximum Ratings |                  |
|------------|---|-----------------|------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                       | 300             | V                |
| $V_{DGR}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ , $R_{GS} = 1M\Omega$ | 300             | V                |
| $V_{GSS}$  | Continuous  | $\pm 20$        | V                |
| $V_{GSM}$  | Transient   | $\pm 30$        | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$  | 38              | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , Pulse Width Limited by $T_{JM}$            | 120             | A                |
| $I_A$      | $T_C = 25^\circ\text{C}$  | 38              | A                |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$  | 2.5             | J                |
| $P_D$      | $T_C = 25^\circ\text{C}$  | 400             | 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             | $^\circ\text{C}$ |
| $T_{SOLD}$ | Plastic Body for 10s  | 260             | $^\circ\text{C}$ |
| $M_d$      | Mounting Torque (TO-247)  | 1.13 / 10       | Nm/lb.in         |
| Weight     | TO-268HV  | 4               | g                |
|            | TO-247  | 6               | g                |

TO-268HV (IXTT..HV)



TO-247 (IXTH)



G = Gate      D = Drain  
 S = Source    Tab = Drain

### Features

- Designed for Linear Operation
- International Standard Packages
- Avalanche Rated
- Guaranteed FBSOA at  $75^\circ\text{C}$

### 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<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified) | Characteristic Values |      |                                       |
|--------------|---|-----------------------|------|---------------------------------------|
|              |   | Min.                  | Typ. | Max.                                  |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu\text{A}$                                    | 300                   |      | V                                     |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250\mu\text{A}$                                | 2.5                   |      | V                                     |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$  |                       |      | $\pm 100$ nA                          |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 125^\circ\text{C}$           |                       |      | 10 $\mu\text{A}$<br>100 $\mu\text{A}$ |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                       |                       |      | 100 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  | 12                    | 16   | 20   | S                  |
| $C_{iss}$    | $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$   |                       | 7200 |      | pF                 |
| $C_{oss}$    |  |                       | 700  |      | pF                 |
| $C_{rss}$    |  |                       | 200  |      | pF                 |
| $R_{Gi}$     | Integrated Gate Input Resistor   |                       | 3.4  |      | $\Omega$           |
| $t_{d(on)}$  | <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>$R_G = 0\Omega$ (External) |                       | 30   |      | ns                 |
| $t_r$        |  |                       | 125  |      | ns                 |
| $t_{d(off)}$ |  |                       | 94   |      | ns                 |
| $t_f$        |  |                       | 36   |      | ns                 |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$   |                       | 260  |      | nC                 |
| $Q_{gs}$     |  |                       | 43   |      | nC                 |
| $Q_{gd}$     |  |                       | 140  |      | nC                 |
| $R_{thJC}$   | TO-247   |                       |      | 0.31 | $^\circ\text{C/W}$ |
| $R_{thCS}$   |  |                       | 0.21 |      | $^\circ\text{C/W}$ |

**Safe Operating Area Specification**

| Symbol | Test Conditions  | Characteristic Values |      |      |   |
|--------|--|-----------------------|------|------|---|
|        |  | Min.                  | Typ. | Max. |   |
| SOA    | $V_{DS} = 300\text{V}, I_D = 0.8\text{A}, T_C = 75^\circ\text{C}, T_p = 2\text{s}$ | 240                   |      |      | W |

**Source-Drain Diode**

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified) | Characteristic Values |      |      |               |
|----------|---|-----------------------|------|------|---------------|
|          |   | Min.                  | Typ. | Max. |               |
| $I_S$    | $V_{GS} = 0\text{V}$  |                       |      | 38   | A             |
| $I_{SM}$ | Repetitive, pulse Width Limited by $T_{JM}$                                 |                       |      | 152  | A             |
| $V_{SD}$ | $I_F = I_S, V_{GS} = 0\text{V}$ , Note 1                                    |                       |      | 1.4  | V             |
| $t_{rr}$ | $I_F = 19\text{A}, -di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ |                       | 420  |      | ns            |
| $Q_{RM}$ |   |                       | 5.4  |      | $\mu\text{C}$ |
| $I_{RM}$ |   |                       | 27   |      | A             |

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

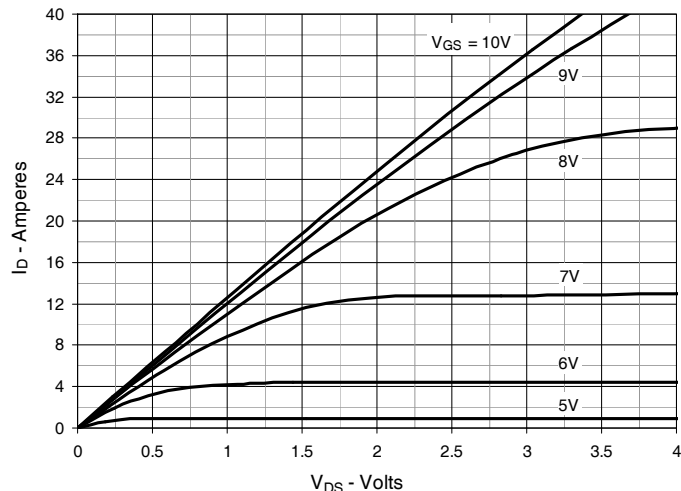
**PRELIMINARY TECHNICAL INFORMATION**

The product presented herein is under development. The Technical Specifications offered are derived from 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.

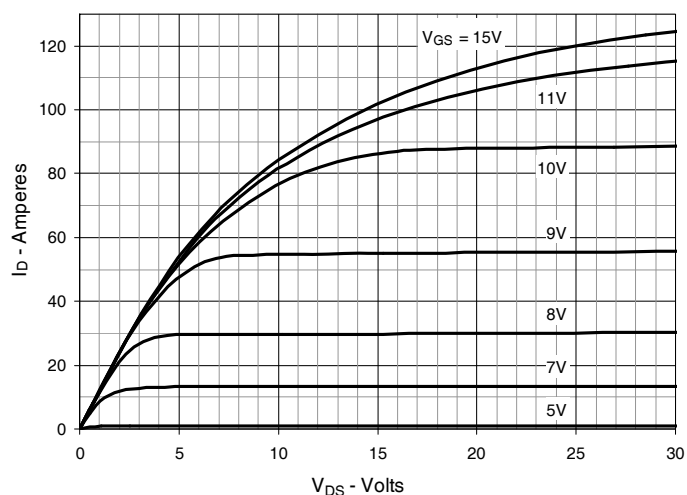
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

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

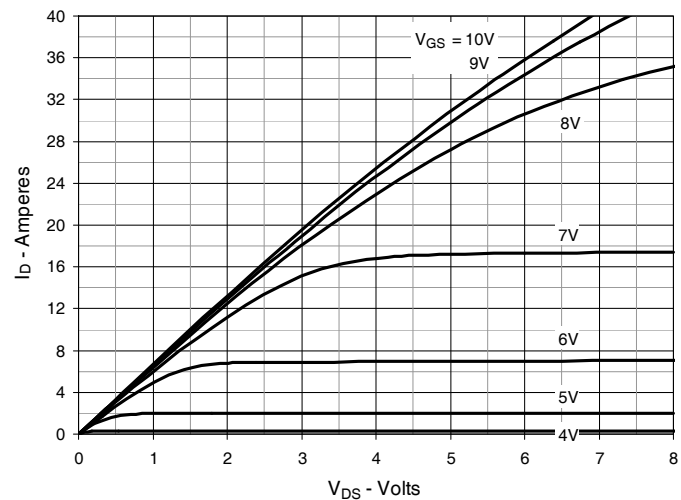
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



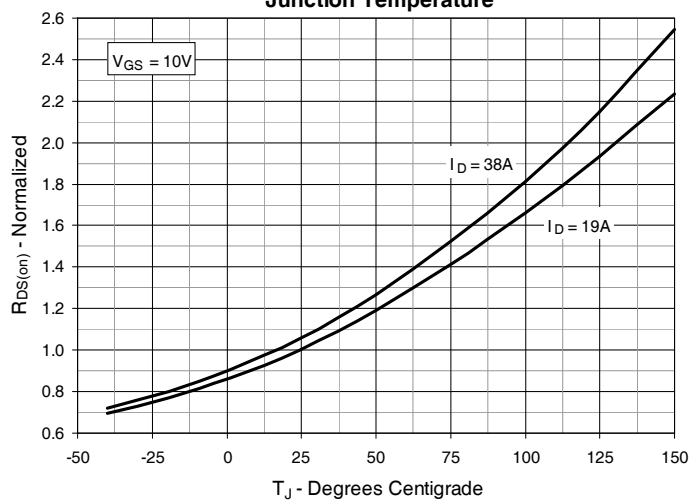
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



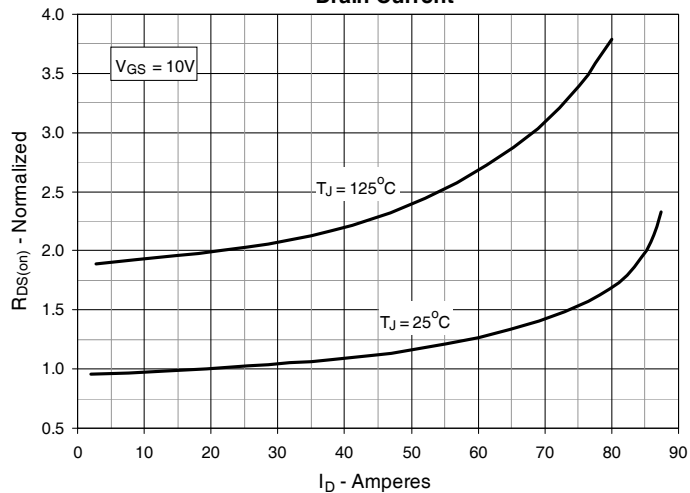
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



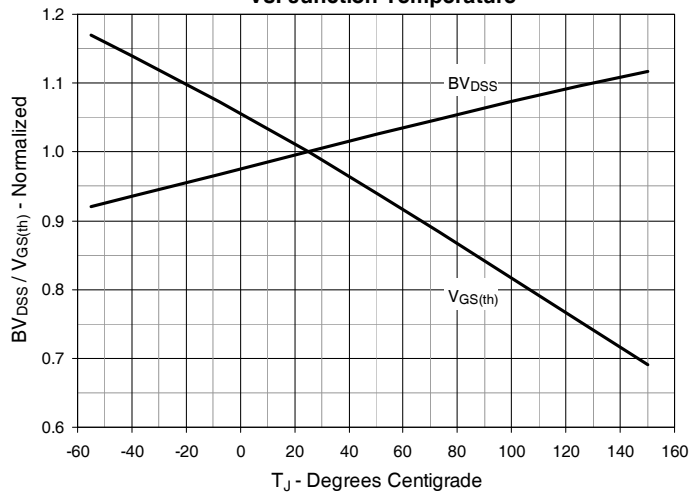
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 19\text{A}$  Value vs. Junction Temperature**



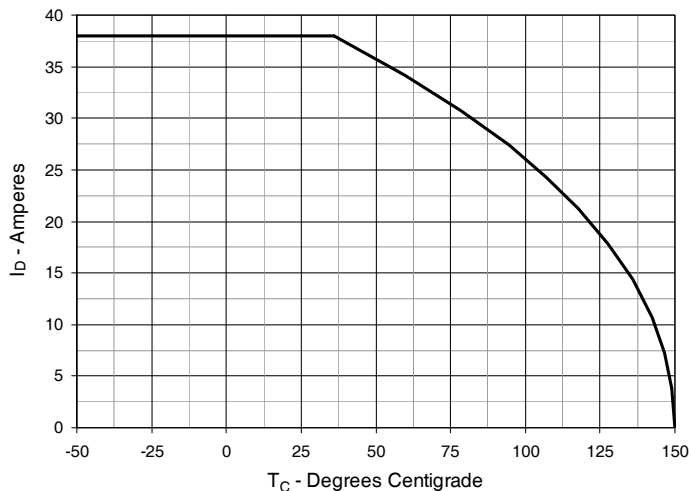
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 19\text{A}$  Value vs. Drain Current**



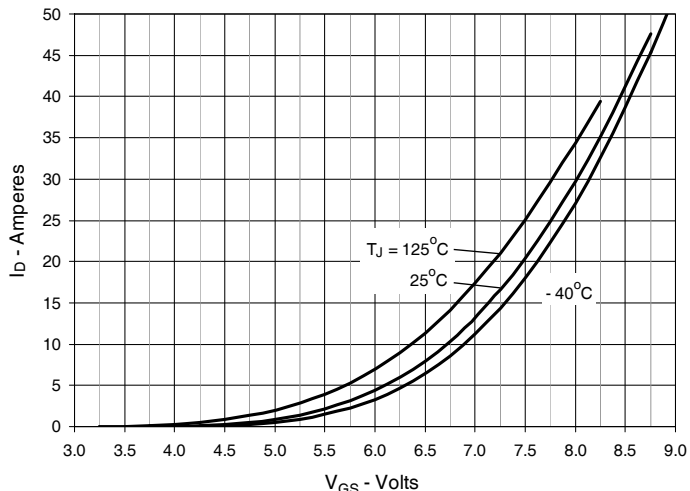
**Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature**



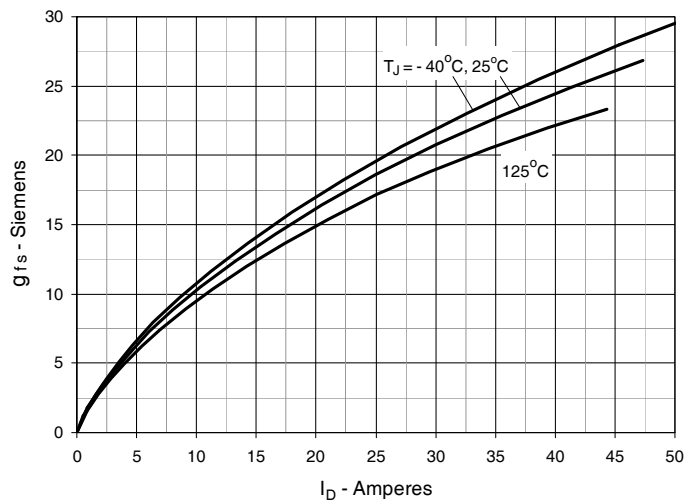
**Fig. 7. Maximum Drain Current vs. Case Temperature**



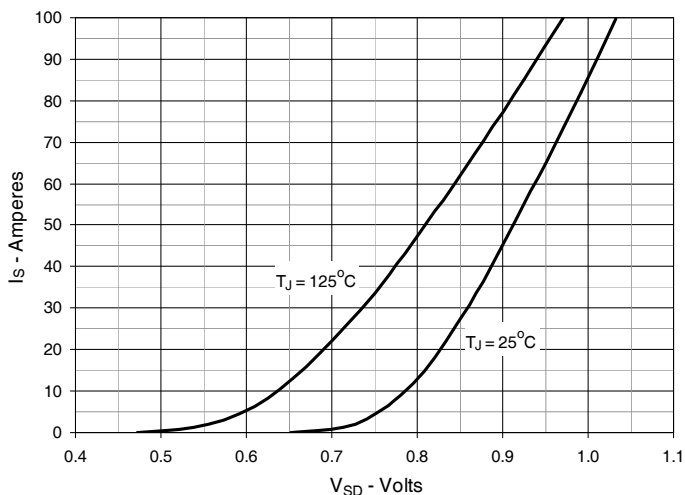
**Fig. 8. Input Admittance**



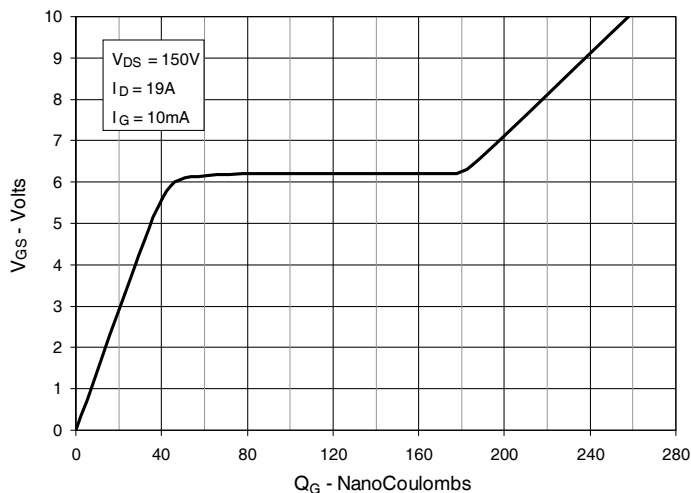
**Fig. 9. Transconductance**



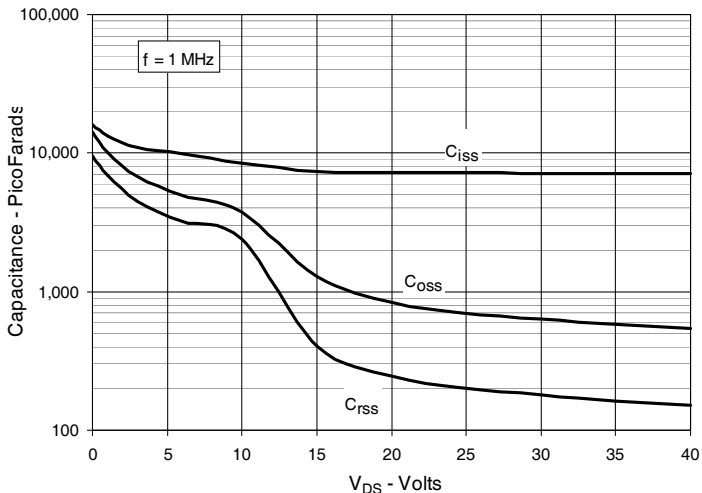
**Fig. 10. Forward Voltage Drop of Intrinsic Diode**



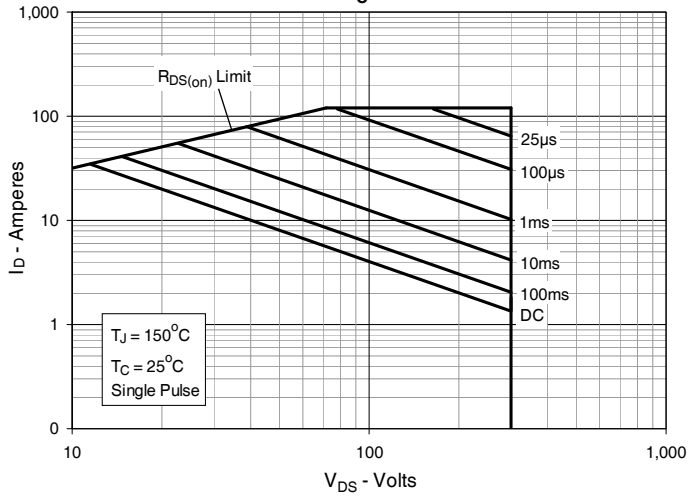
**Fig. 11. Gate Charge**



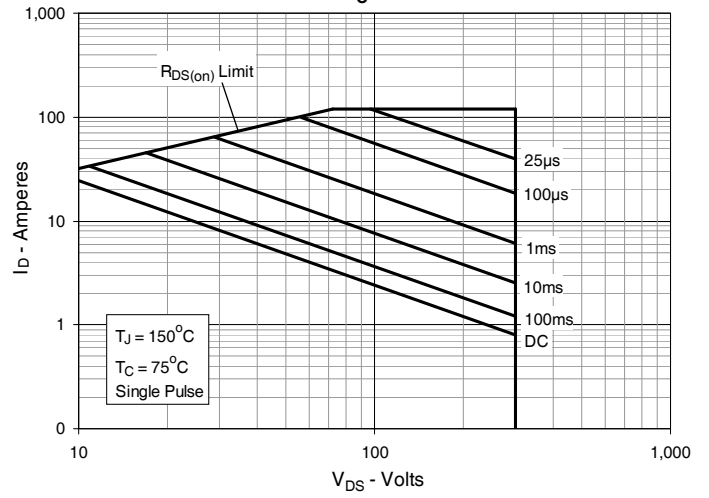
**Fig. 12. Capacitance**



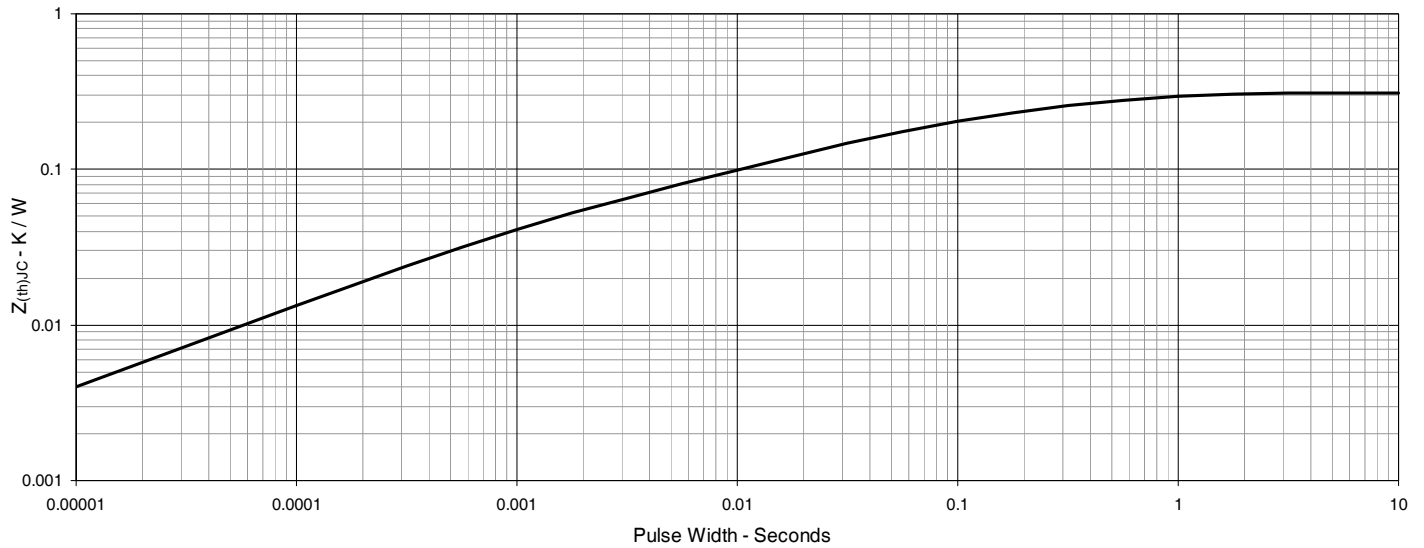
**Fig. 13. Forward-Bias Safe Operating Area**  
@  $T_C = 25^\circ\text{C}$



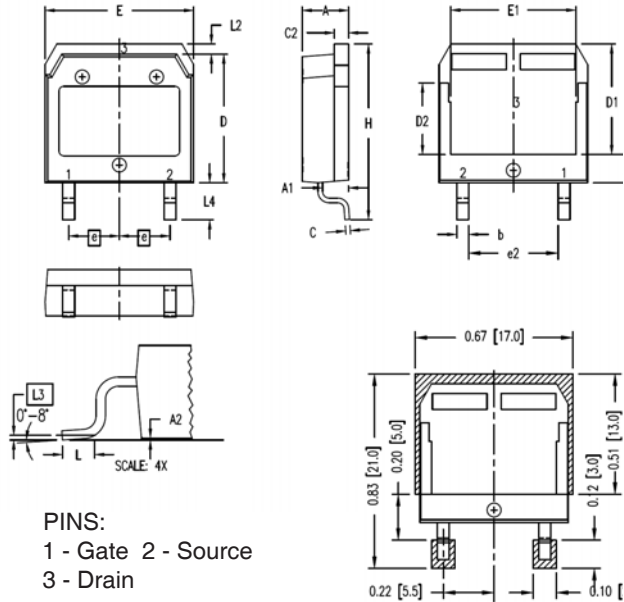
**Fig. 14. Forward-Bias Safe Operating Area**  
@  $T_C = 75^\circ\text{C}$



**Fig. 15. Maximum Transient Thermal Impedance**

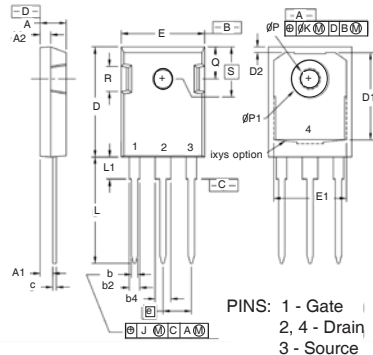


### TO-268HV Outline



| SYM  | INCHES   |      | MILLIMETER |       |
|------|----------|------|------------|-------|
|      | MIN      | MAX  | MIN        | MAX   |
| A    | .193     | .201 | 4.90       | 5.10  |
| A1   | .106     | .114 | 2.70       | 2.90  |
| A2   | .001     | .010 | 0.02       | 0.25  |
| b    | .045     | .057 | 1.15       | 1.45  |
| C    | .016     | .026 | 0.40       | 0.65  |
| C2   | .057     | .063 | 1.45       | 1.60  |
| D    | .543     | .551 | 13.80      | 14.00 |
| D1   | .465     | .476 | 11.80      | 12.10 |
| D2   | .295     | .307 | 7.50       | 7.80  |
| D3   | .114     | .126 | 2.90       | 3.20  |
| E    | .624     | .632 | 15.85      | 16.05 |
| E1   | .524     | .535 | 13.30      | 13.60 |
| e    | .215 BSC |      | 5.45 BSC   |       |
| (e2) | .374     | .386 | 9.50       | 9.80  |
| H    | .736     | .752 | 18.70      | 19.10 |
| L    | .067     | .079 | 1.70       | 2.00  |
| L2   | .039     | .045 | 1.00       | 1.15  |
| L3   | .010 BSC |      | 0.25 BSC   |       |
| L4   | .150     | .161 | 3.80       | 4.10  |

### TO-247 Outline



| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .190     | .205 | 4.83        | 5.21  |
| A1  | .090     | .100 | 2.29        | 2.54  |
| A2  | .075     | .085 | 1.91        | 2.16  |
| b   | .045     | .055 | 1.14        | 1.40  |
| b2  | .075     | .087 | 1.91        | 2.20  |
| b4  | .115     | .126 | 2.92        | 3.20  |
| C   | .024     | .031 | 0.61        | 0.80  |
| D   | .819     | .840 | 20.80       | 21.34 |
| D1  | .650     | .690 | 16.51       | 17.53 |
| D2  | .035     | .050 | 0.89        | 1.27  |
| E   | .620     | .635 | 15.75       | 16.13 |
| E1  | .545     | .565 | 13.84       | 14.35 |
| e   | .215 BSC |      | 5.45 BSC    |       |
| J   | --       | .010 | --          | 0.25  |
| K   | --       | .025 | --          | 0.64  |
| L   | .780     | .810 | 19.81       | 20.57 |
| L1  | .150     | .170 | 3.81        | 4.32  |
| øP  | .140     | .144 | 3.55        | 3.65  |
| øP1 | .275     | .290 | 6.99        | 7.37  |
| Q   | .220     | .244 | 5.59        | 6.20  |
| R   | .170     | .190 | 4.32        | 4.83  |
| S   | .242 BSC |      | 6.15 BSC    |       |