

# High Voltage Power MOSFET

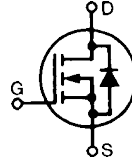
## IXTQ3N150M

$$V_{DSS} = 1500V$$

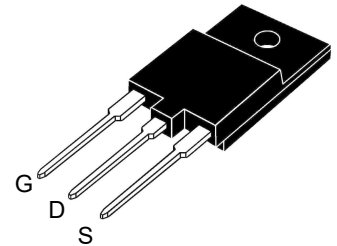
$$I_{D25} = 3A$$

$$R_{DS(on)} \leq 7.3\Omega$$

N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode



**OVERMOLDED  
(IXTQ...M)**



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 $150^\circ\text{C}$ , $R_{GS} = 1\text{ M}\Omega$  | 1500            | V                |
| $V_{GSS}$     | Continuous   | $\pm 30$        | V                |
| $V_{GSM}$     | Transient  | $\pm 40$        | V                |
| $I_{D25}$     | $T_C = 25^\circ\text{C}$ , Limited by $T_{JM}$                                 | 3               | A                |
| $I_{DM}$      | $T_C = 25^\circ\text{C}$ , Pulse Width Limited by $T_{JM}$                     | 9               | A                |
| $I_A$         | $T_C = 25^\circ\text{C}$   | 3               | A                |
| $E_{AS}$      | $T_C = 25^\circ\text{C}$   | 250             | mJ               |
| $dv/dt$       | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J = 150^\circ\text{C}$          | 5               | V/ns             |
| $P_D$         | $T_C = 25^\circ\text{C}$   | 73              | 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<br>1.6 mm (0.062 in.) from Case for 10s | 300             | $^\circ\text{C}$ |
| $M_d$         | Mounting Torque  | 1.13/10         | Nm/lb.in.        |
| <b>Weight</b> |  | 6               | g                |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified) | Characteristic Values |      |                                       |
|--------------|---|-----------------------|------|---------------------------------------|
|              |   | Min.                  | Typ. | Max.                                  |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu\text{A}$                                      | 1500                  |      | V                                     |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250\mu\text{A}$                                  | 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 $\mu\text{A}$<br>100 $\mu\text{A}$ |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 1.5A$ , Note 1                                      |                       |      | 7.3 $\Omega$                          |

### Features

- Plastic Overmolded Tab for Electrical Isolation
- Avalanche Rated
- Fast Intrinsic Diode
- Low Package Inductance

### Advantages

- High Power Density
- Easy to Mount
- Space Savings

### 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.                   |
| $g_{fs}$     | $V_{DS} = 20\text{V}, I_D = 1.5\text{A}$ , Note 1  | 2.2                   | 3.6  | S                      |
| $C_{iss}$    | $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$   |                       | 1375 | pF                     |
| $C_{oss}$    |  |                       | 90   | pF                     |
| $C_{rss}$    |  |                       | 30   | pF                     |
| $R_{GI}$     | Gate Input Resistance  |                       | 3.0  | $\Omega$               |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 1.5\text{A}$<br>$R_G = 5\Omega$ (External) |                       | 19   | ns                     |
| $t_r$        |  |                       | 21   | ns                     |
| $t_{d(off)}$ |  |                       | 42   | ns                     |
| $t_f$        |  |                       | 25   | ns                     |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 1.5\text{A}$   |                       | 38.6 | nC                     |
| $Q_{gs}$     |  |                       | 6.5  | nC                     |
| $Q_{gd}$     |  |                       | 19.0 | nC                     |
| $R_{thJC}$   |  |                       |      | 1.7 $^\circ\text{C/W}$ |
| $R_{thCS}$   |  | 0.21                  |      | $^\circ\text{C/W}$     |

**Source-Drain Diode**

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)  | Characteristic Values |      |               |
|----------|--|-----------------------|------|---------------|
|          |  | Min.                  | Typ. | Max           |
| $I_S$    | $V_{GS} = 0\text{V}$ , Note 1  |                       |      | 3 A           |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$                                  |                       |      | 12 A          |
| $V_{SD}$ | $I_F = I_S, V_{GS} = 0\text{V}$ , Note 1                                     |                       |      | 1.3 V         |
| $t_{rr}$ | $I_F = 1.5\text{A}, -di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ |                       | 0.9  | $\mu\text{s}$ |
| $Q_{RM}$ |  |                       | 6.7  | $\mu\text{C}$ |
| $I_{RM}$ |  |                       | 15   | A             |

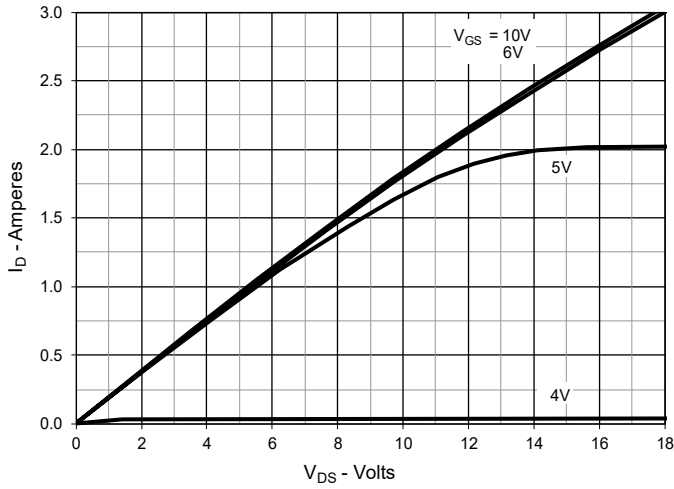
Note 1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .

Littelfuse reserves the right to change limits, test conditions, and dimensions.

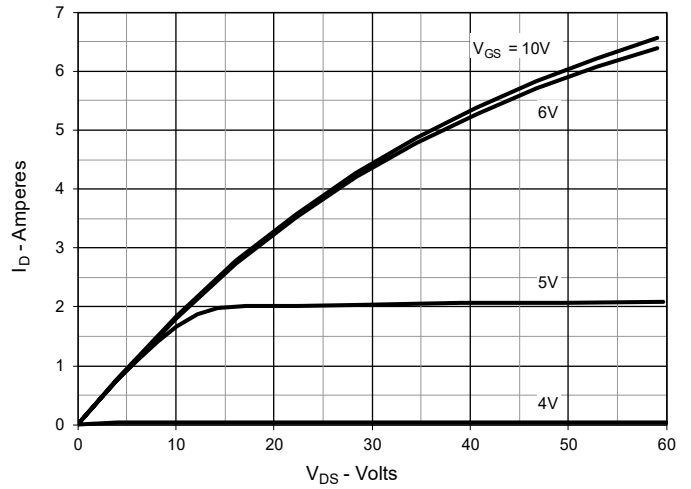
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

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

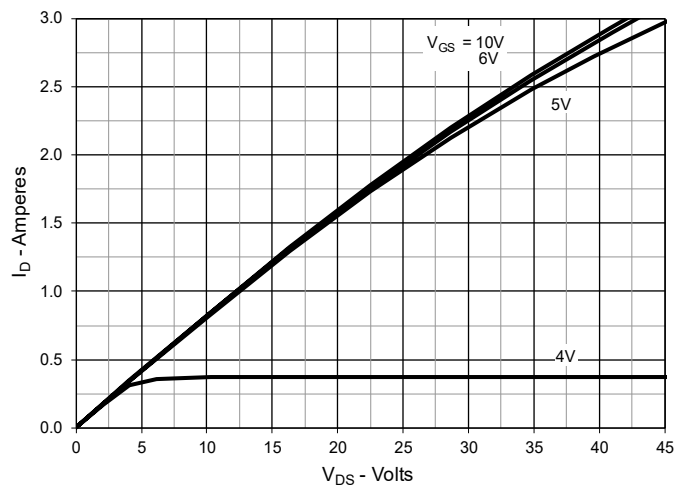
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



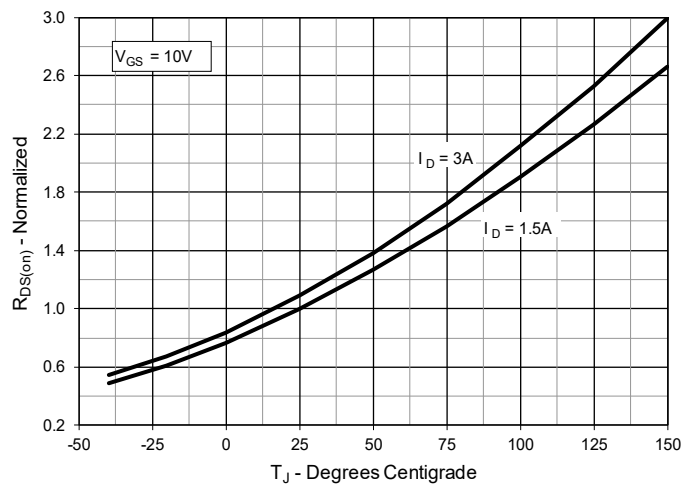
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



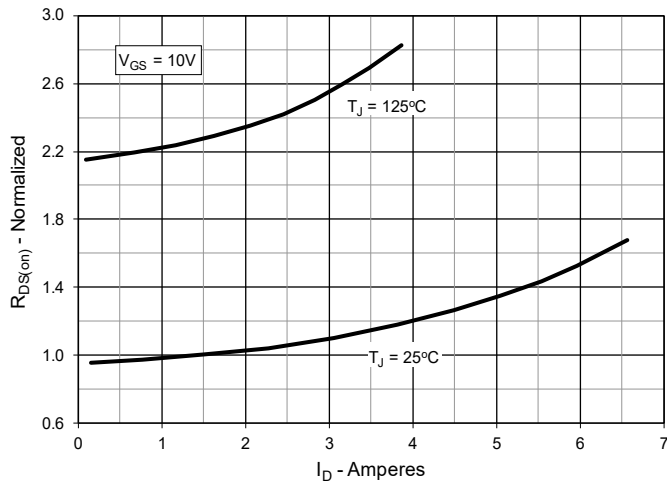
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



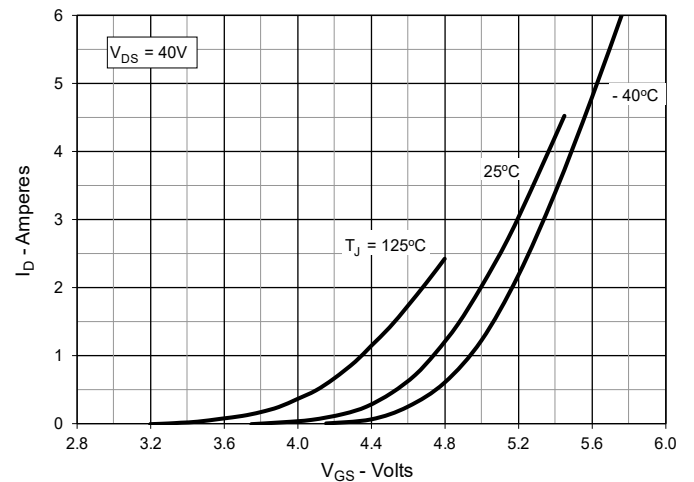
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 1.5\text{A}$  Value vs. Junction Temperature**



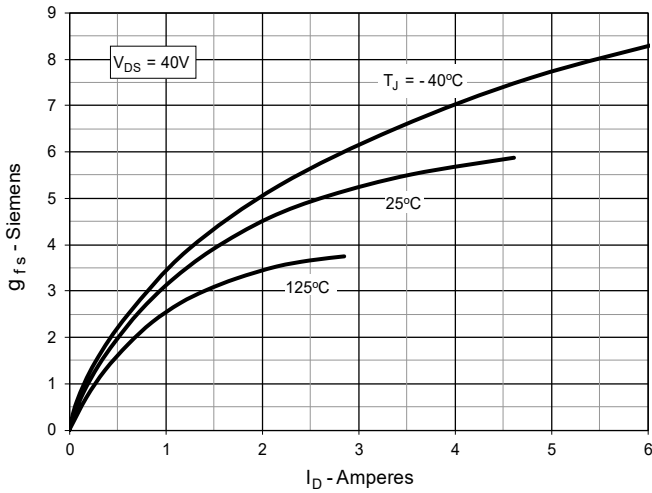
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 1.5\text{A}$  Value vs. Drain Current**



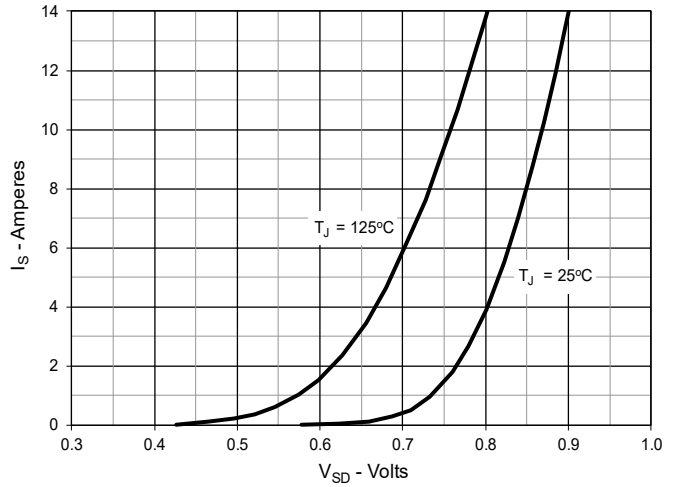
**Fig. 6. Input Admittance**



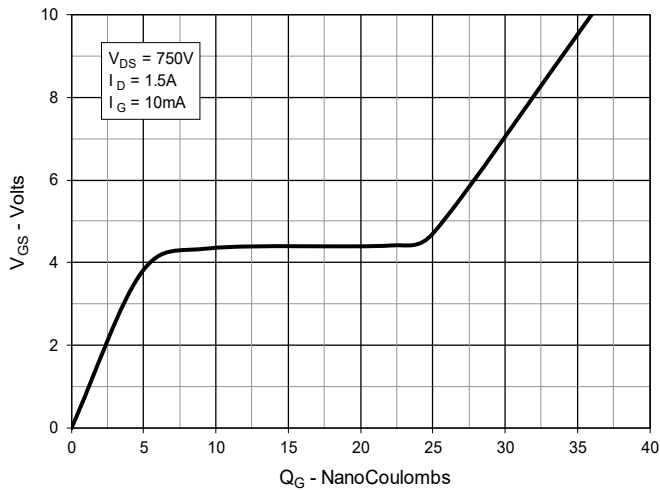
**Fig. 7. Transconductance**



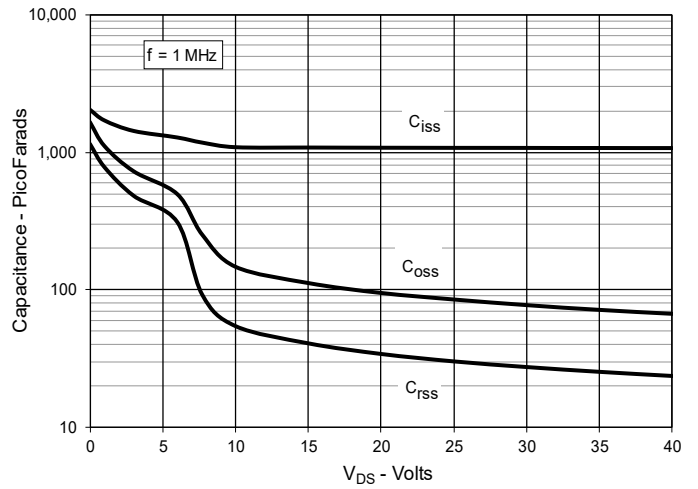
**Fig. 8. Forward Voltage Drop of Intrinsic Diode**



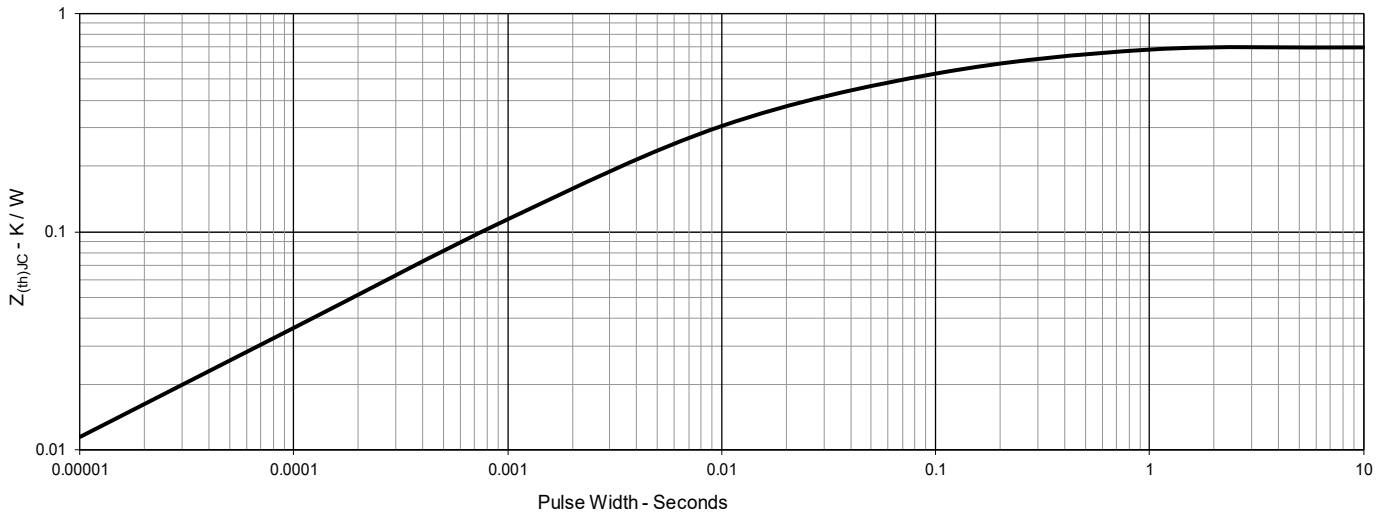
**Fig. 9. Gate Charge**



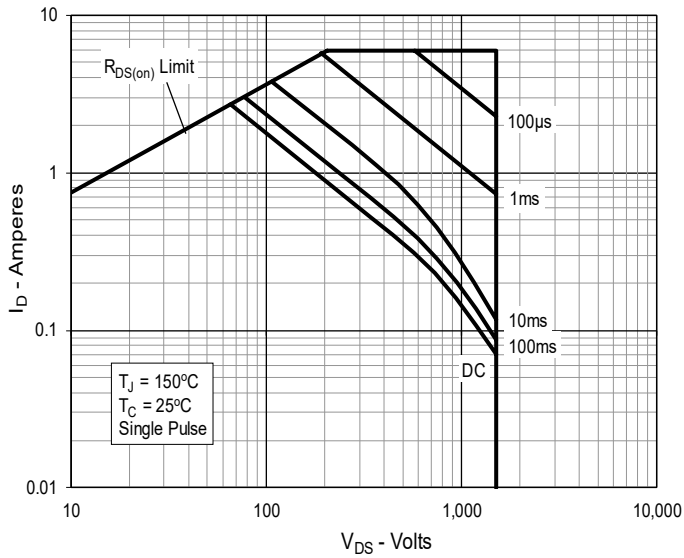
**Fig. 10. Capacitance**



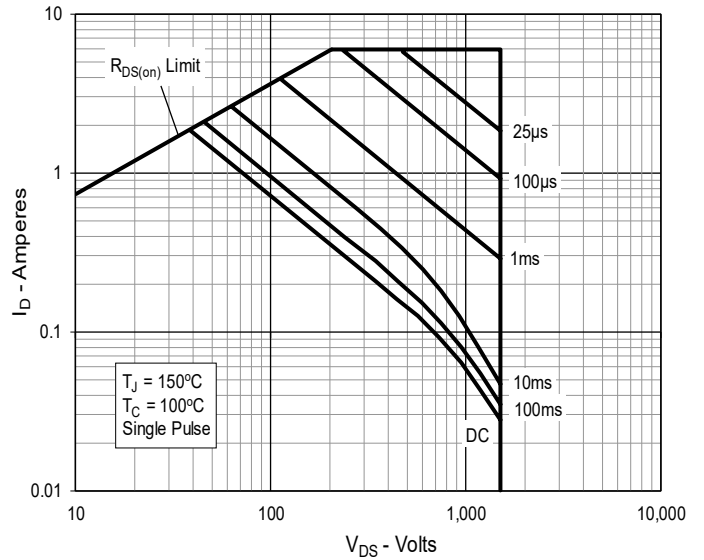
**Fig. 12. Maximum Transient Thermal Impedance**

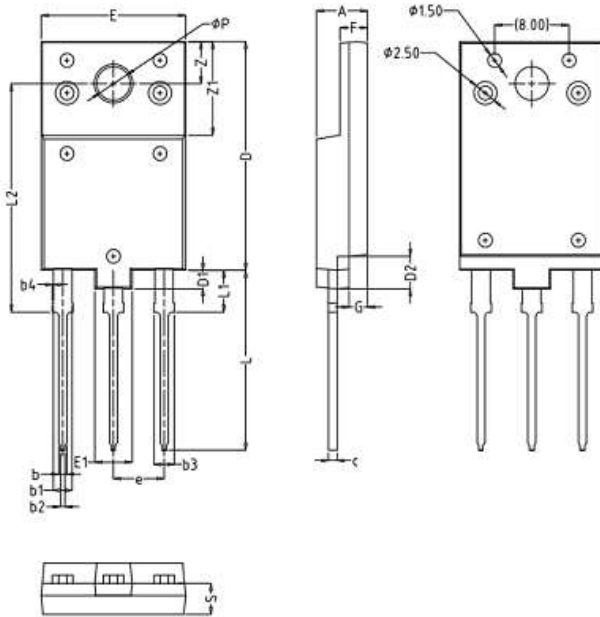


**Fig. 12. Forward-Bias Safe Operating Area  
@  $T_C = 25^\circ\text{C}$**



**Fig. 13. Forward-Bias Safe Operating Area  
@  $T_C = 100^\circ\text{C}$**



**TO-3PFP Outline**


| SYMBOL | MIN      | MAX   |
|--------|----------|-------|
| A      | 5.30     | 5.70  |
| b      | 0.65     | 0.95  |
| b1     | 1.81     | 2.19  |
| b2     | 0.30     | 0.70  |
| b3     | 1.81     | 2.40  |
| b4     | -        | 0.20  |
| c      | 0.80     | 1.00  |
| D      | 24.20    | 24.80 |
| D1     | 1.80     | 2.20  |
| D2     | 3.30     | 3.70  |
| E      | 15.30    | 15.70 |
| E1     | 3.80     | 4.20  |
| F      | 2.80     | 3.20  |
| e      | 5.45 BSC |       |
| L      | 19.00    | 19.60 |
| L1     | 4.20     | 4.80  |
| L2     | 24.20    | 24.80 |
| P      | 3.40     | 3.80  |
| Z      | 4.30     | 4.70  |
| Z1     | 9.70     | 10.30 |
| G      | 1.80     | 2.20  |
| S      | 3.10     | 3.50  |