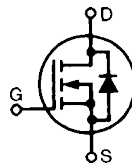


# High Voltage Power MOSFET

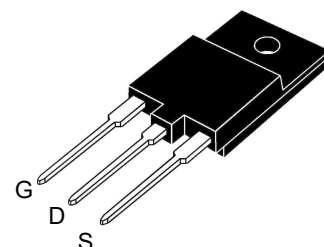
## IXTQ3N150M

$$\begin{aligned} V_{DSS} &= 1500V \\ I_{D25} &= 3A \\ R_{DS(on)} &\leq 7.3\Omega \end{aligned}$$

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.        |
| Weight    |                                                                                | 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                                 |
| $I_{GSS}$    | $V_{GS} = \pm 30V, V_{DS} = 0V$                                             |                       |      | $\pm 100\text{ nA}$                   |
| $I_{DSS}$    | $V_{DS} = V_{DSS}, V_{GS} = 0V$<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 | 7,157,338 B2 |
| 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    |              |

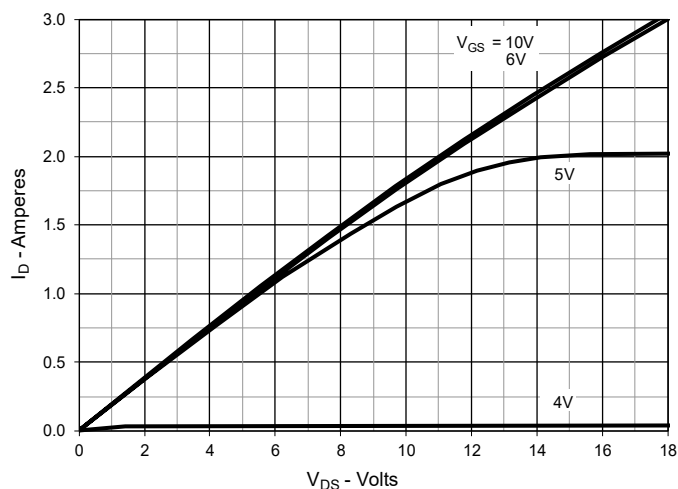
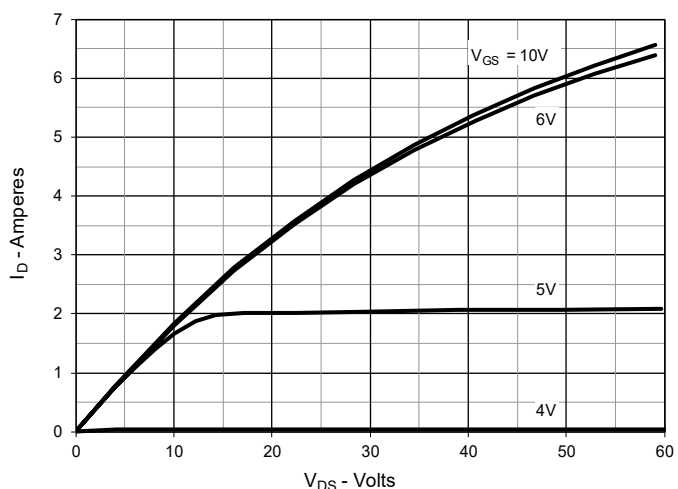
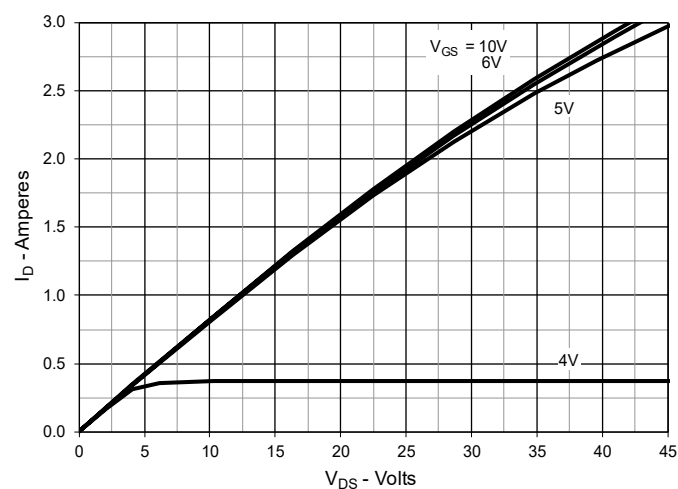
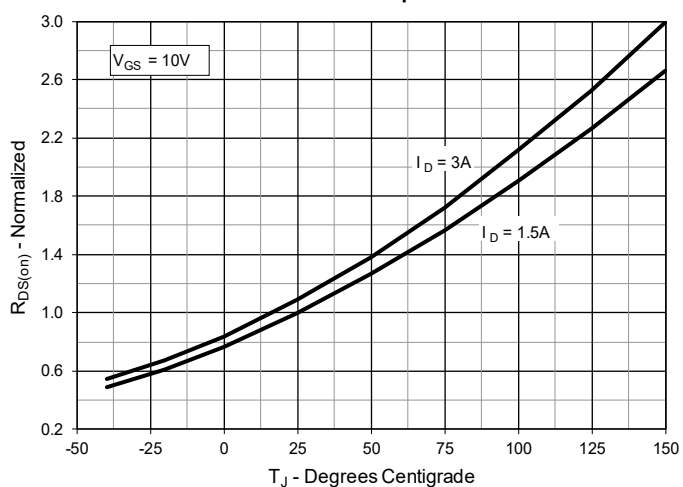
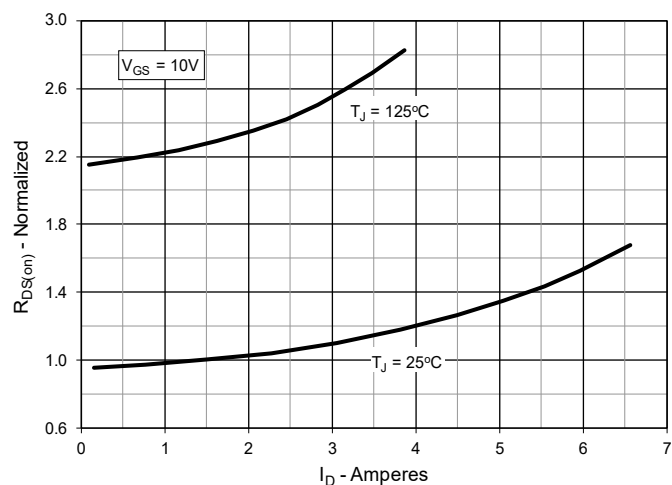
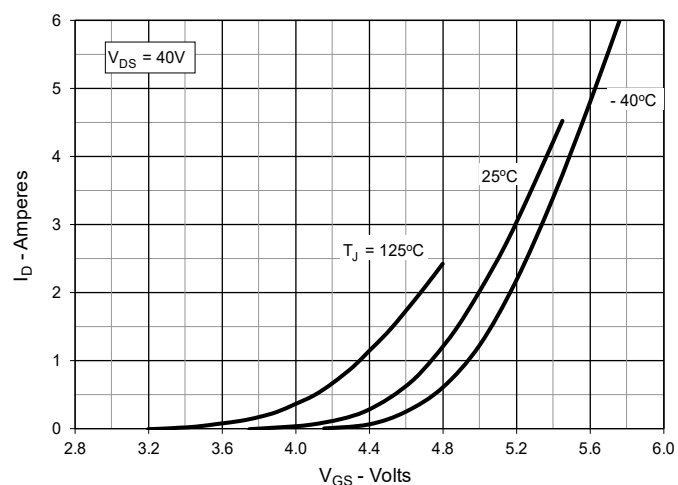
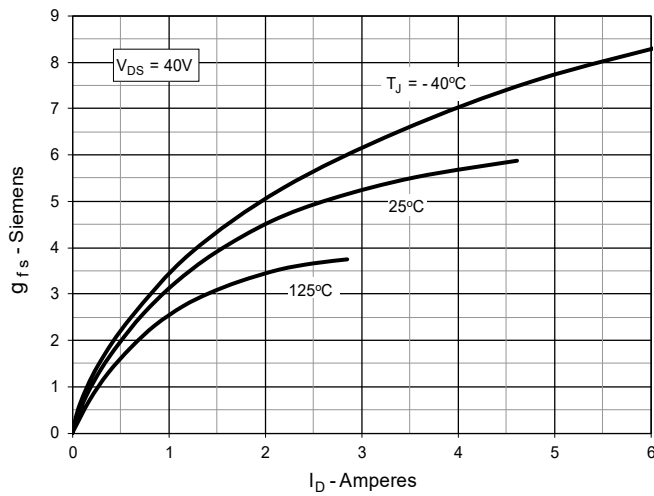
Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$ Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$ Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$ Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 1.5\text{A}$  Value vs. Junction TemperatureFig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 1.5\text{A}$  Value vs. Drain Current

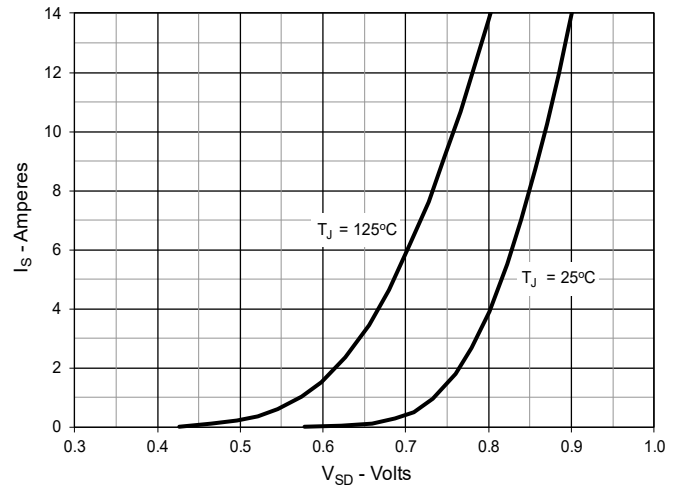
Fig. 6. Input Admittance



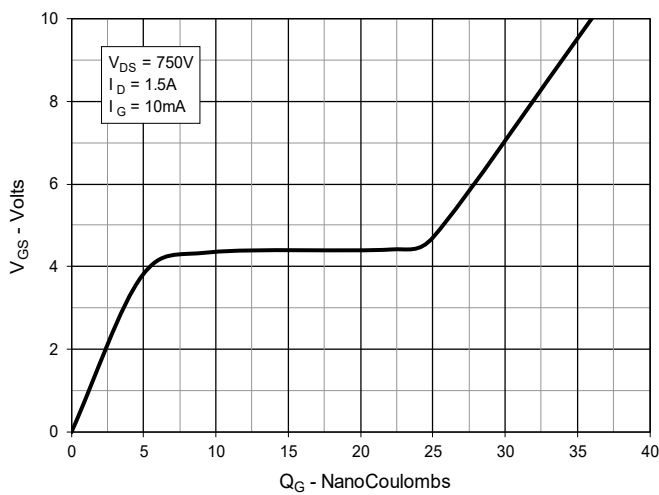
**Fig. 7. Transconductance**



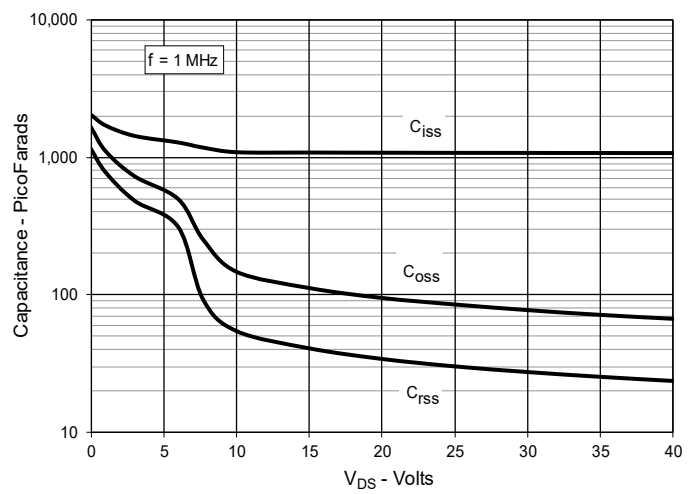
**Fig. 8. Forward Voltage Drop of Intrinsic Diode**



**Fig. 9. Gate Charge**



**Fig. 10. Capacitance**



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

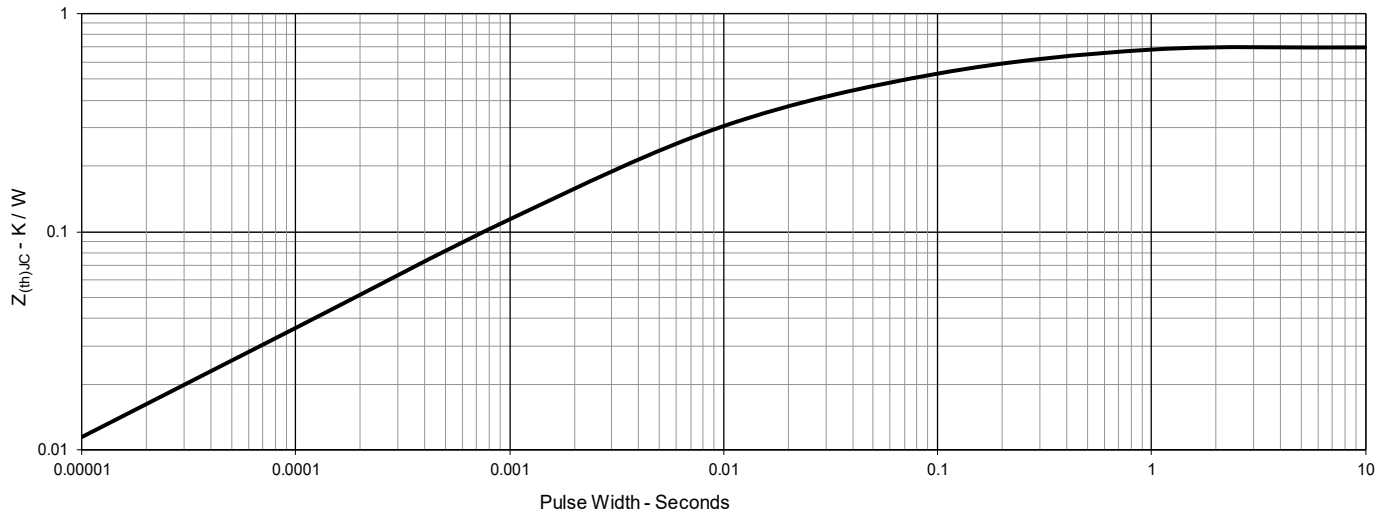


Fig. 12. Forward-Bias Safe Operating Area  
@  $T_C = 25^\circ\text{C}$

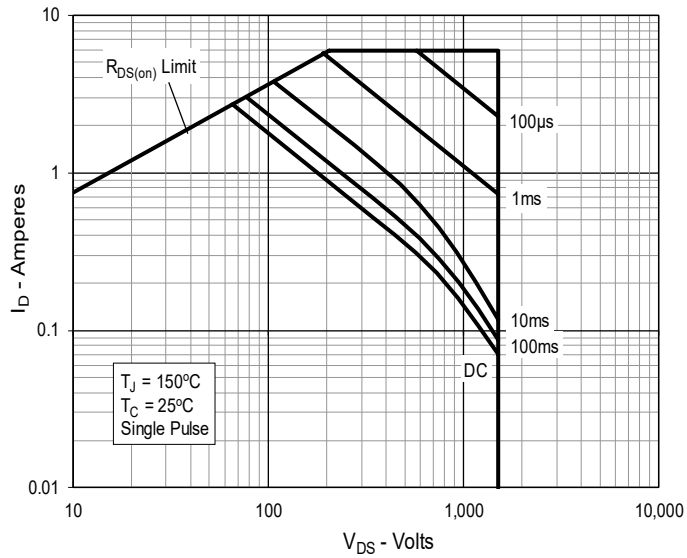
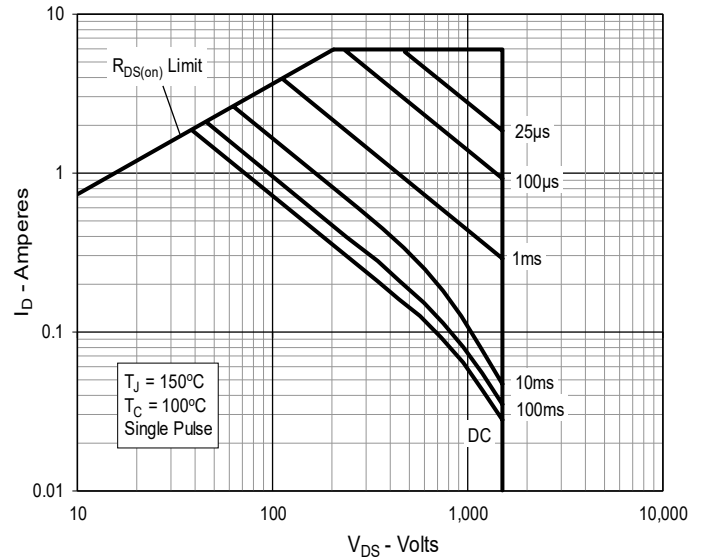
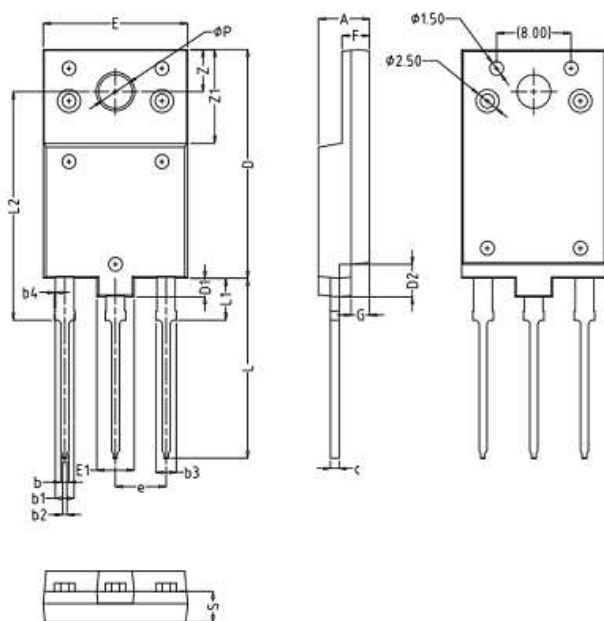


Fig. 13. Forward-Bias Safe Operating Area  
@  $T_C = 100^\circ\text{C}$



**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  |