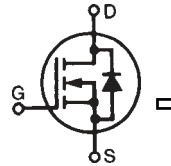


**Polar™ HiPerFET™**  
**Power MOSFETs**

N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode

**IXFH18N90P**  
**IXFT18N90P**  
**IXFV18N90P**  
**IXFV18N90PS**

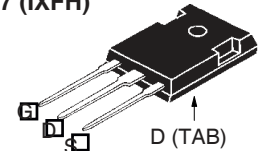


$V_{DSS} = 900V$   
 $I_{D25} = 18A$   
 $R_{DS(on)} \leq 600m\Omega$   
 $t_{rr} \leq 300ns$

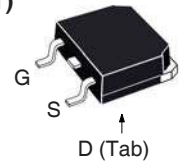
| Symbol        | Test Conditions  | Maximum Ratings  |            |
|---------------|--|------------------|------------|
| $V_{DSS}$     | $T_J = 25^\circ C$ to $150^\circ C$                                | 900              | V          |
| $V_{DGR}$     | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1M\Omega$          | 900              | V          |
| $V_{GSS}$     | Continuous   | $\pm 30$         | V          |
| $V_{GSM}$     | Transient  | $\pm 40$         | V          |
| $I_{D25}$     | $T_C = 25^\circ C$   | 18               | A          |
| $I_{DM}$      | $T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$               | 36               | A          |
| $I_A$         | $T_C = 25^\circ C$   | 9                | A          |
| $E_{AS}$      | $T_C = 25^\circ C$   | 800              | mJ         |
| $dv/dt$       | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ C$ | 15               | V/ns       |
| $P_D$         | $T_C = 25^\circ C$   | 540              | W          |
| $T_J$         |  | -55 ... +150     | $^\circ C$ |
| $T_{JM}$      |  | 150              | $^\circ C$ |
| $T_{stg}$     |  | -55 ... +150     | $^\circ C$ |
| $T_L$         | Maximum Lead Temperature for Soldering                             | 300              | $^\circ C$ |
| $T_{SOLD}$    | Plastic Body for 10s   | 260              | $^\circ C$ |
| $M_d$         | Mounting Torque (TO-247)   | 1.13/10          | Nm/lb.in.  |
| $F_C$         | Mounting Force (PLUS220)   | 11..65/2.5..14.6 | N/lb.      |
| <b>Weight</b> | TO-247   | 6                | g          |
|               | TO-268   | 4                | g          |
|               | PLUS220 Types  | 4                | g          |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ , Unless Otherwise Specified) | Characteristic Values |      |                      |
|--------------|---|-----------------------|------|----------------------|
|              |   | Min.                  | Typ. | Max.                 |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 1mA$   | 900                   |      | V                    |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 1mA$                                       | 3.5                   |      | 6.5 V                |
| $I_{GSS}$    | $V_{GS} = \pm 30V$ , $V_{DS} = 0V$                                    |                       |      | $\pm 100$ nA         |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 125^\circ C$             |                       |      | 25 $\mu A$<br>1.5 mA |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                   |                       |      | 600 m $\Omega$       |

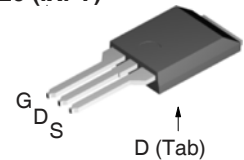
TO-247 (IXFH)



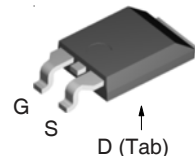
TO-268 (IXFT)



PLUS220 (IXFV)



PLUS220SMD (IXFV\_S)



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

**Features**

- International Standard Packages
- Avalanche Rated
- Low Package Inductance
- Fast Intrinsic Diode

**Advantages**

- High Power Density
- Easy to Mount
- Space Savings

**Applications**

- Switch-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- Laser Drivers
- AC and DC Motor Drives
- Robotics and Servo Controls

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)  | Characteristic Values |      |                         |
|--------------|--|-----------------------|------|-------------------------|
|              |  | Min.                  | Typ. | Max.                    |
| $g_{fs}$     | $V_{DS} = 20\text{V}, I_D = 0.5 \cdot I_{D25}$ , Note 1  | 6                     | 10   | S                       |
| $R_{Gi}$     | Gate Input Resistance  |                       | 1.2  | $\Omega$                |
| $C_{iss}$    | } $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$   |                       | 5230 | pF                      |
| $C_{oss}$    |  |                       | 366  | pF                      |
| $C_{rss}$    |  |                       | 53   | 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>$R_G = 2\Omega$ (External) |                       | 40   | ns                      |
| $t_r$        |  |                       | 33   | ns                      |
| $t_{d(off)}$ |  |                       | 60   | ns                      |
| $t_f$        |  |                       | 44   | ns                      |
| $Q_{g(on)}$  | } $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$   |                       | 97   | nC                      |
| $Q_{gs}$     |  |                       | 30   | nC                      |
| $Q_{gd}$     |  |                       | 40   | nC                      |
| $R_{thJC}$   |  |                       |      | 0.23 $^\circ\text{C/W}$ |
| $R_{thCS}$   | (TO-247 & PLUS220)   | 0.25                  |      | $^\circ\text{C/W}$      |

#### Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)                        | Characteristic Values |      |               |
|----------|--|-----------------------|------|---------------|
|          |  | Min.                  | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{V}$   |                       |      | 18 A          |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$  |                       |      | 72 A          |
| $V_{SD}$ | $I_F = I_S, V_{GS} = 0\text{V}$ , Note 1   |                       |      | 1.5 V         |
| $t_{rr}$ | } $I_F = 9\text{A}, -di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}, V_{GS} = 0\text{V}$ |                       |      | 300 ns        |
| $Q_{RM}$ |  |                       | 1.0  | $\mu\text{C}$ |
| $I_{RM}$ |  |                       | 10.8 | A             |

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

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 @  $T_J = 25^\circ\text{C}$

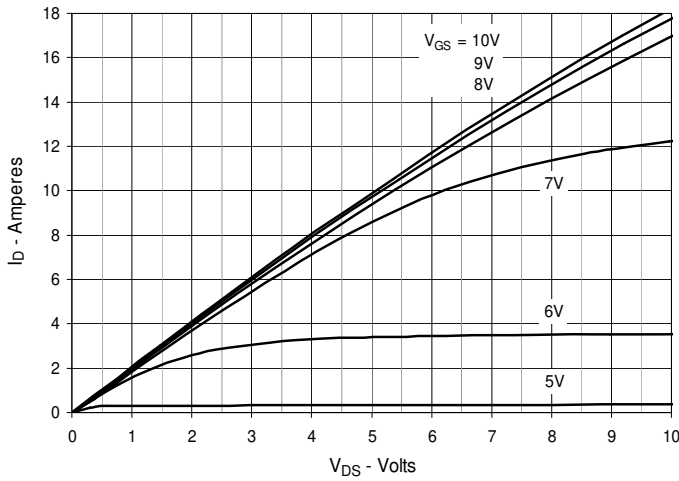


Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$

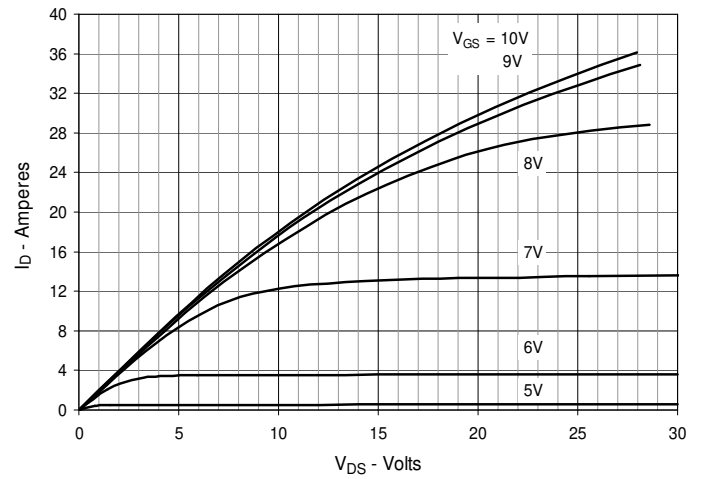


Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$

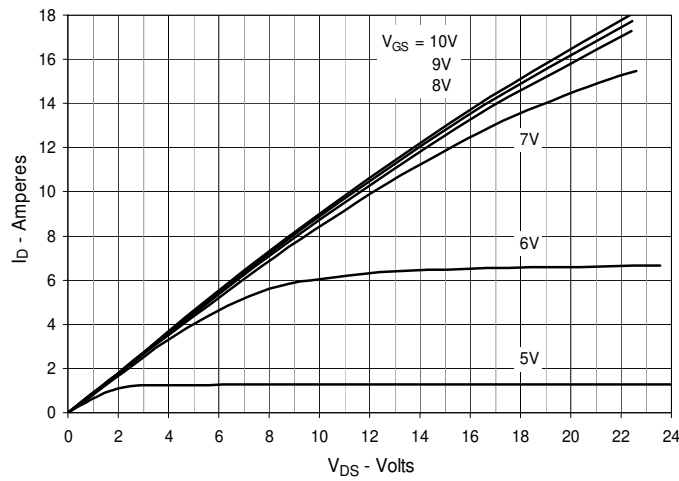


Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 9\text{A}$  Value vs. Junction Temperature

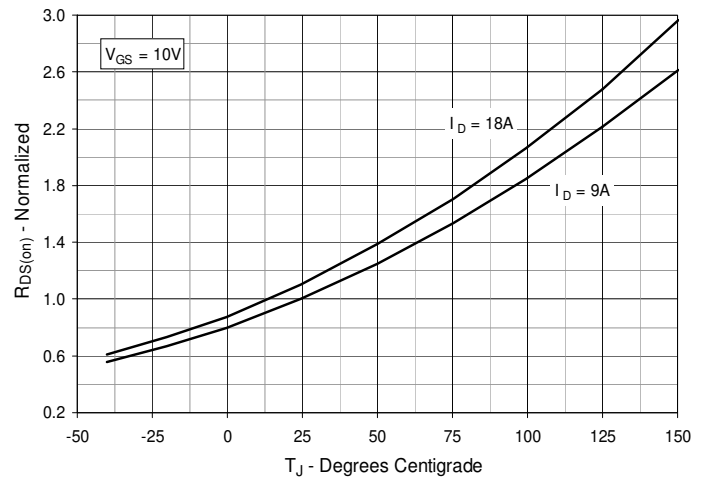


Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 9\text{A}$  Value vs. Drain Current

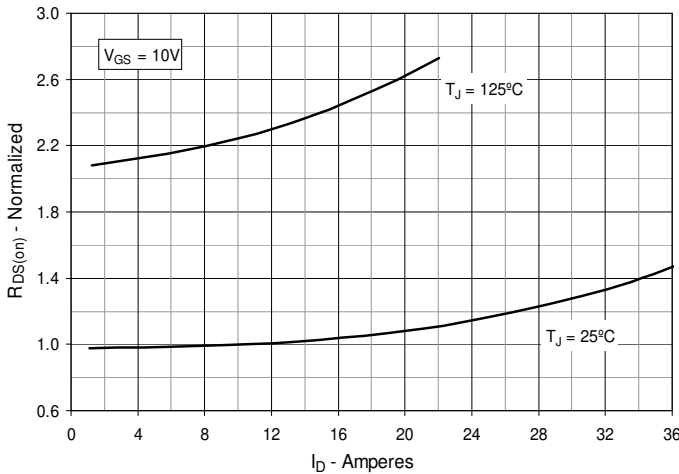


Fig. 6. Maximum Drain Current vs. Case Temperature

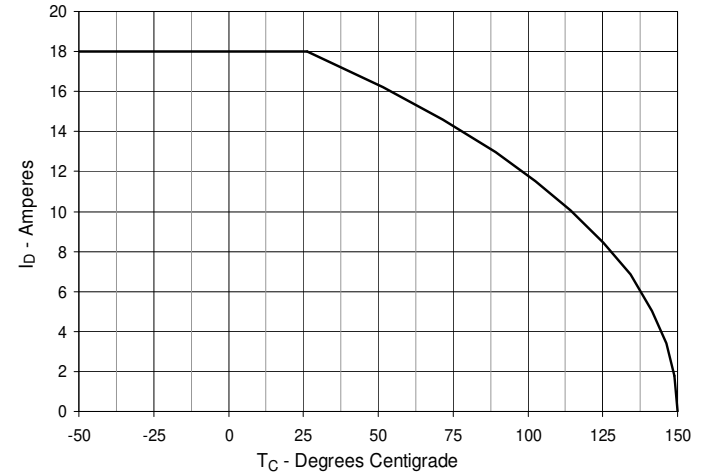


Fig. 7. Input Admittance

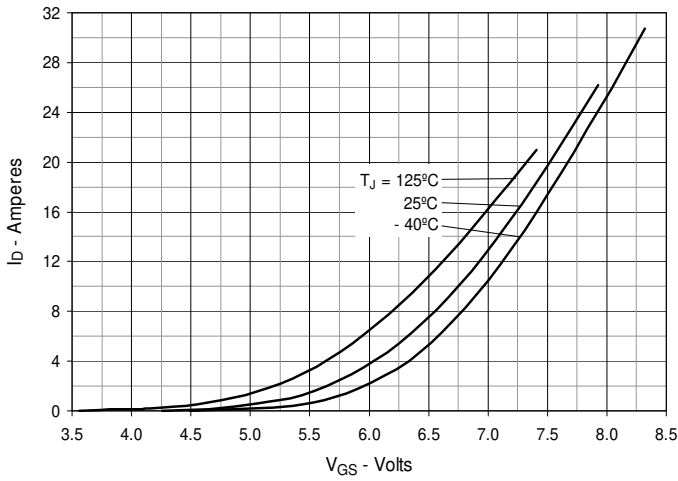


Fig. 8. Transconductance

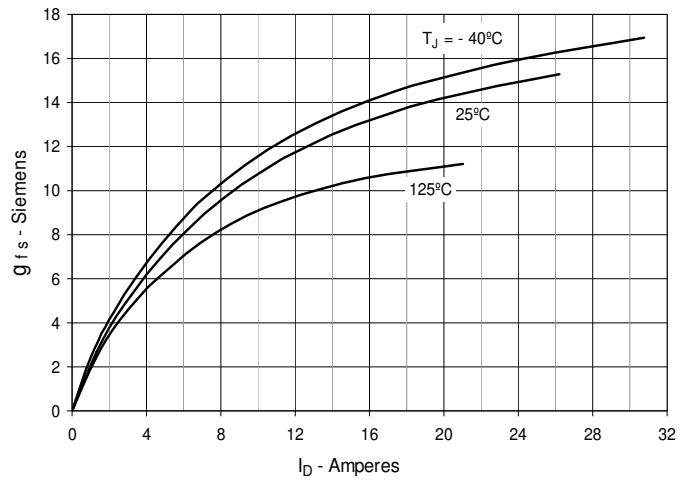


Fig. 9. Forward Voltage Drop of Intrinsic Diode

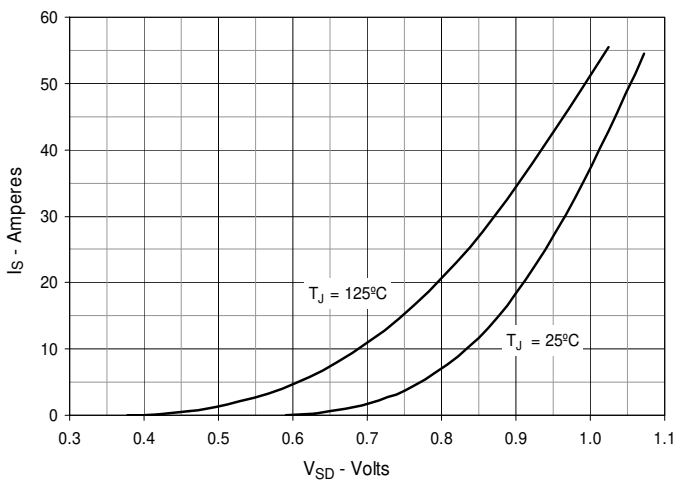


Fig. 10. Gate Charge

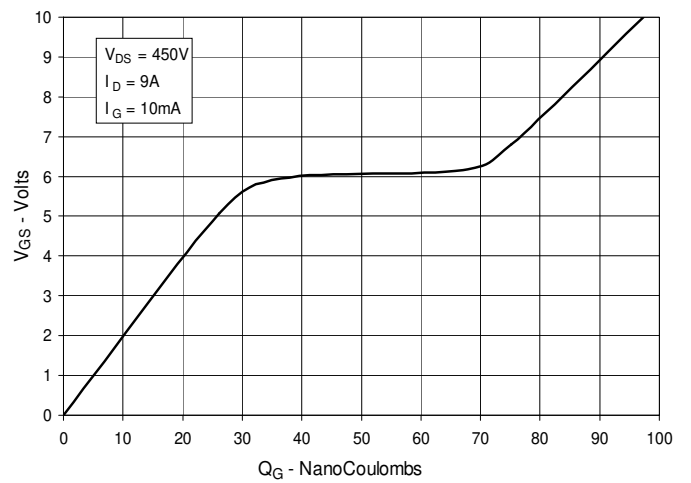


Fig. 11. Capacitance

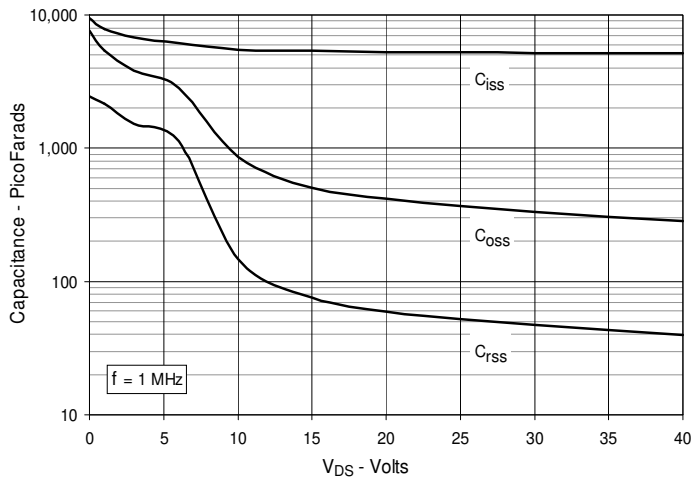
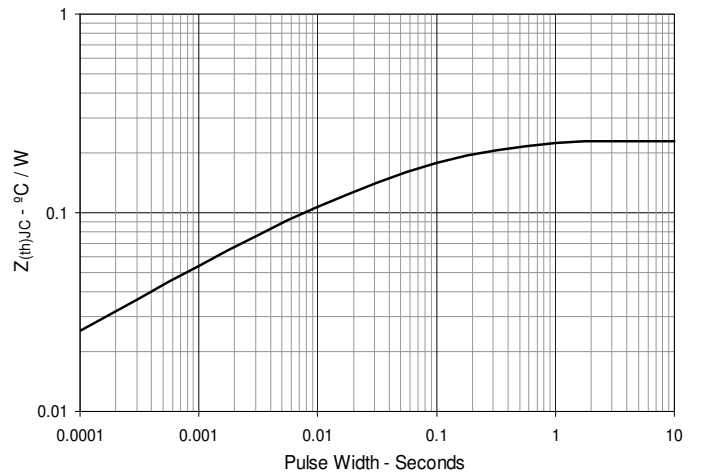


Fig. 12. Maximum Transient Thermal Impedance



### TO-247 Outline

Terminals: 1 - Gate 2 - Drain 3 - Source

| Dim.           | Millimeter |          | Inches |         |
|----------------|------------|----------|--------|---------|
|                | Min.       | Max.     | Min.   | Max.    |
| A              | 4.7        | 5.3      | .185   | .209    |
| A <sub>1</sub> | 2.2        | 2.54     | .087   | .102    |
| A <sub>2</sub> | 2.2        | 2.6      | .059   | .098    |
| b              | 1.0        | 1.4      | .040   | .055    |
| b <sub>1</sub> | 1.65       | 2.13     | .065   | .084    |
| b <sub>2</sub> | 2.87       | 3.12     | .113   | .123    |
| C              | .4         | .8       | .016   | .031    |
| D              | 20.80      | 21.46    | .819   | .845    |
| E              | 15.75      | 16.26    | .610   | .640    |
| e              | 5.20       | 5.72     | 0.205  | 0.225   |
| L              | 19.81      | 20.32    | .780   | .800    |
| L <sub>1</sub> |            | 4.50     |        | .177    |
| ∅P             | 3.55       | 3.65     | .140   | .144    |
| Q              | 5.89       | 6.40     | 0.232  | 0.252   |
| R              | 4.32       | 5.49     | .170   | .216    |
| S              |            | 6.15 BSC |        | 242 BSC |

### PLUS220 Outline

Terminals: 1 - Gate 2 - Drain 3 - Source

| SYM            | INCHES |          | MILLIMETER |          |
|----------------|--------|----------|------------|----------|
|                | MIN    | MAX      | MIN        | MAX      |
| A              | .169   | .185     | 4.30       | 4.70     |
| A <sub>1</sub> | .028   | .035     | 0.70       | 0.90     |
| A <sub>2</sub> | .098   | .118     | 2.50       | 3.00     |
| b              | .035   | .047     | 0.90       | 1.20     |
| c              | .028   | .035     | 0.70       | 0.90     |
| D              | .551   | .591     | 14.00      | 15.00    |
| D <sub>1</sub> | .512   | .539     | 13.00      | 13.70    |
| E              | .394   | .433     | 10.00      | 11.00    |
| E <sub>1</sub> | .331   | .346     | 8.40       | 8.80     |
| e              |        | .100 BSC |            | 2.54 BSC |
| L              | .512   | .551     | 13.00      | 14.00    |
| L <sub>1</sub> | .118   | .138     | 3.00       | 3.50     |
| L <sub>2</sub> | .035   | .051     | 0.90       | 1.30     |
| L <sub>3</sub> | .047   | .059     | 1.20       | 1.50     |

### TO-268 Outline

Terminals: 1 - Gate 2,4 - Drain 3 - Source

| SYM            | INCHES |          | MILLIMETERS |          |
|----------------|--------|----------|-------------|----------|
|                | MIN    | MAX      | MIN         | MAX      |
| A              | .193   | .201     | 4.90        | 5.10     |
| A <sub>1</sub> | .106   | .114     | 2.70        | 2.90     |
| A <sub>2</sub> | .001   | .010     | 0.02        | 0.25     |
| b              | .045   | .057     | 1.15        | 1.45     |
| b <sub>2</sub> | .075   | .083     | 1.90        | 2.10     |
| C              | .016   | .026     | 0.40        | 0.65     |
| C <sub>2</sub> | .057   | .063     | 1.45        | 1.60     |
| D              | .543   | .551     | 13.80       | 14.00    |
| D <sub>1</sub> | .488   | .500     | 12.40       | 12.70    |
| E              | .624   | .632     | 15.85       | 16.05    |
| E <sub>1</sub> | .524   | .535     | 13.30       | 13.60    |
| e              |        | .215 BSC |             | 5.45 BSC |
| H              | .736   | .752     | 18.70       | 19.10    |
| L              | .094   | .106     | 2.40        | 2.70     |
| L <sub>1</sub> | .047   | .055     | 1.20        | 1.40     |
| L <sub>2</sub> | .039   | .045     | 1.00        | 1.15     |
| L <sub>3</sub> |        | .010 BSC |             | 0.25 BSC |
| L <sub>4</sub> | .150   | .161     | 3.80        | 4.10     |

### PLUS220SMD Outline

1. GATE 2. DRAIN (COLLECTOR) 3. SOURCE (EMITTER) 4. DRAIN (COLLECTOR)

| SYM            | INCHES |          | MILLIMETER |          |
|----------------|--------|----------|------------|----------|
|                | MIN    | MAX      | MIN        | MAX      |
| A              | .169   | .185     | 4.30       | 4.70     |
| A <sub>1</sub> | .028   | .035     | 0.70       | 0.90     |
| A <sub>2</sub> | .098   | .118     | 2.50       | 3.00     |
| A <sub>3</sub> | .000   | .010     | 0.00       | 0.25     |
| b              | .035   | .047     | 0.90       | 1.20     |
| b <sub>1</sub> | .080   | .095     | 2.03       | 2.41     |
| b <sub>2</sub> | .054   | .064     | 1.37       | 1.63     |
| c              | .028   | .035     | 0.70       | 0.90     |
| D              | .551   | .591     | 14.00      | 15.00    |
| D <sub>1</sub> | .512   | .539     | 13.00      | 13.70    |
| E              | .394   | .433     | 10.00      | 11.00    |
| E <sub>1</sub> | .331   | .346     | 8.40       | 8.80     |
| e              |        | .200 BSC |            | 5.08 BSC |
| L              | .209   | .228     | 5.30       | 5.80     |
| L <sub>1</sub> | .118   | .138     | 3.00       | 3.50     |
| L <sub>2</sub> | .035   | .051     | 0.90       | 1.30     |
| L <sub>3</sub> | .047   | .059     | 1.20       | 1.50     |
| L <sub>4</sub> | .039   | .059     | 1.00       | 1.50     |



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