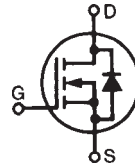


## Polar™ HiPerFET™ Power MOSFETs

N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode

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

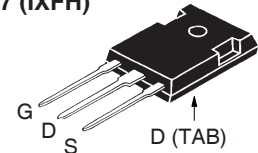


$V_{DSS} = 900V$   
 $I_{D25} = 18A$   
 $R_{DS(on)} \leq 600m\Omega$   
 $t_{rr} \leq 300ns$

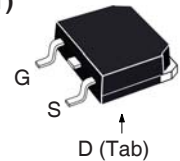
| Symbol        | Test Conditions  | Maximum Ratings  |            |
|---------------|--|------------------|------------|
| $V_{DSS}$     | $T_J = 25^\circ C$ to $150^\circ C$                                | 900              | V          |
| $V_{DGR}$     | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1M\Omega$          | 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 $\Omega$       |

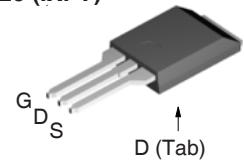
TO-247 (IXFH)



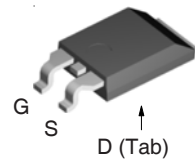
TO-268 (IXFT)



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

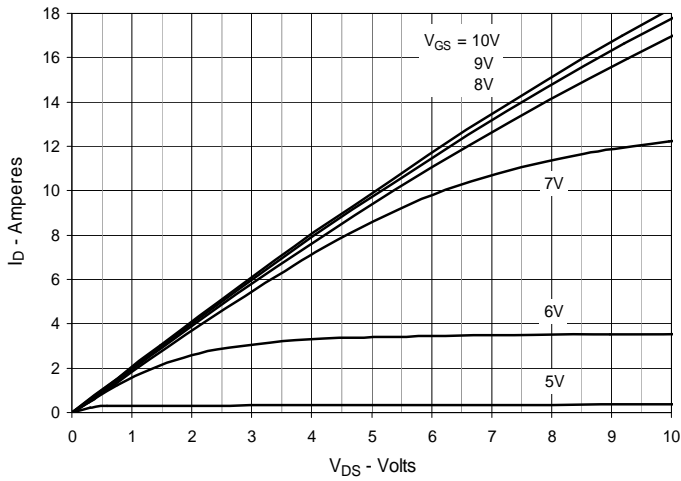


Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$

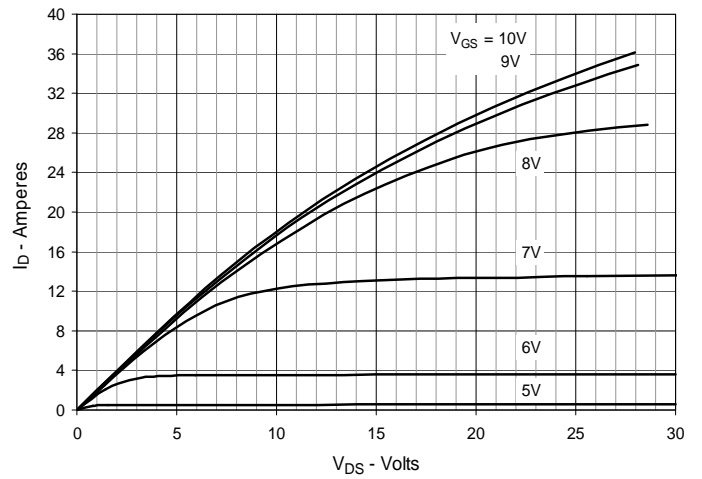


Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$

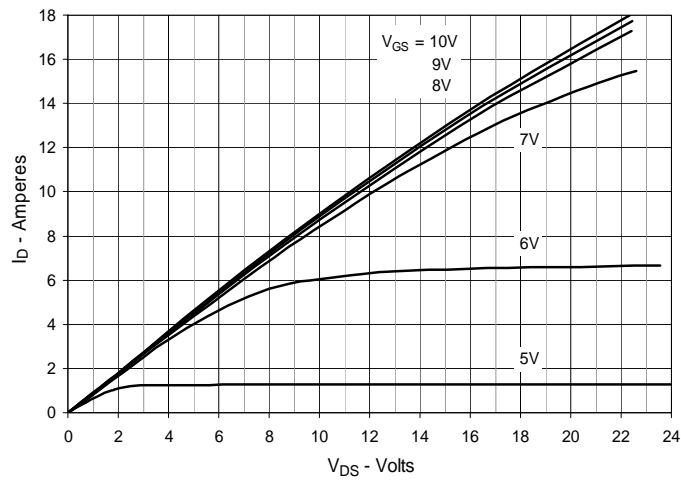


Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 9\text{A}$  Value vs. Junction Temperature

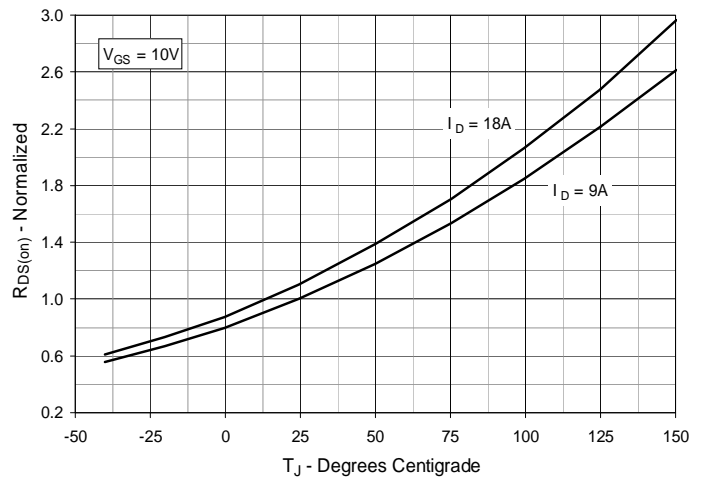


Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 9\text{A}$  Value vs. Drain Current

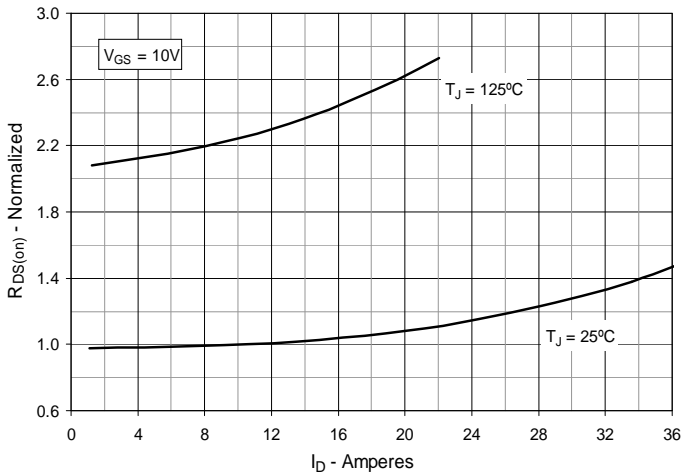
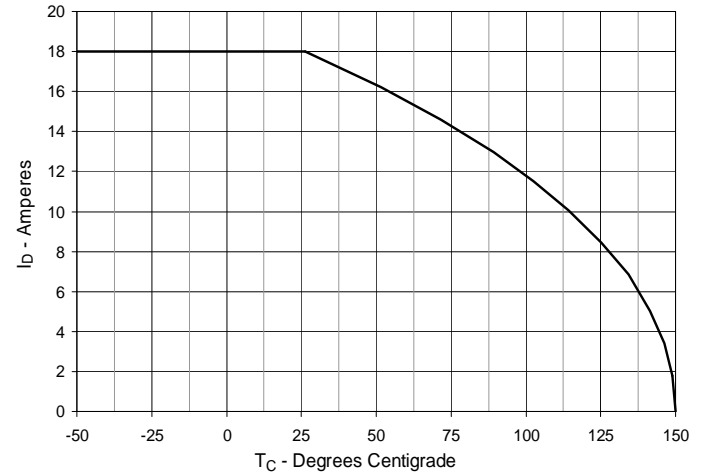
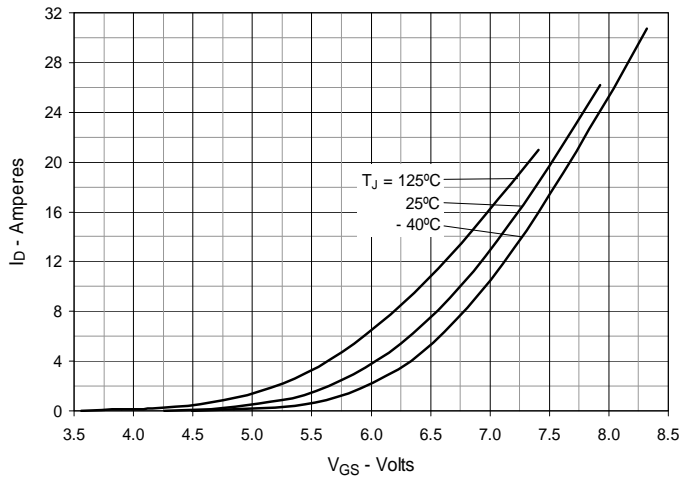


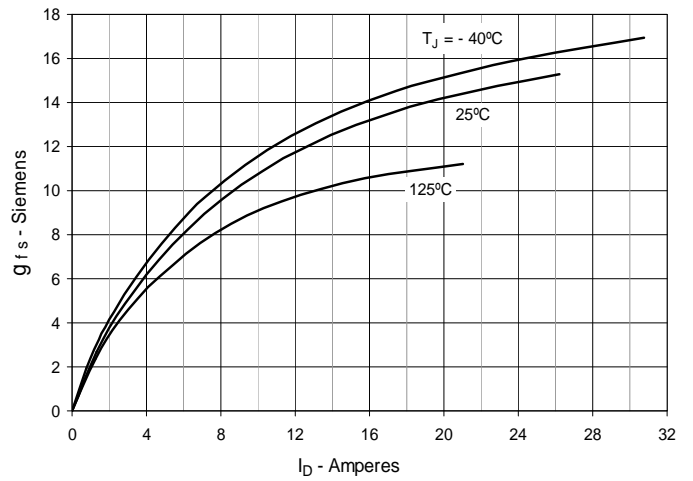
Fig. 6. Maximum Drain Current vs. Case Temperature



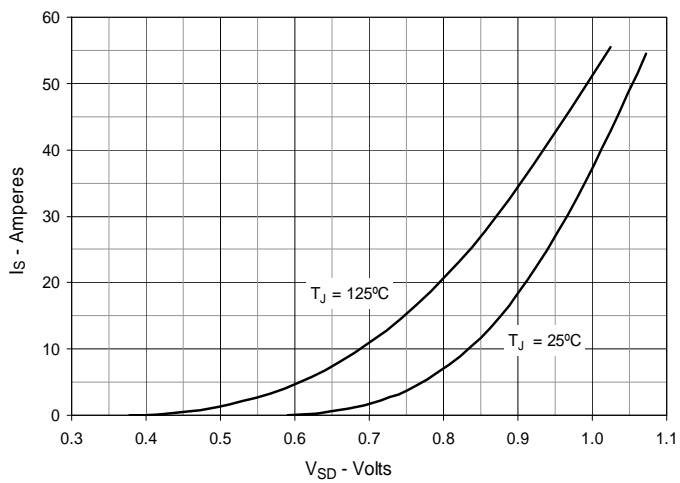
**Fig. 7. Input Admittance**



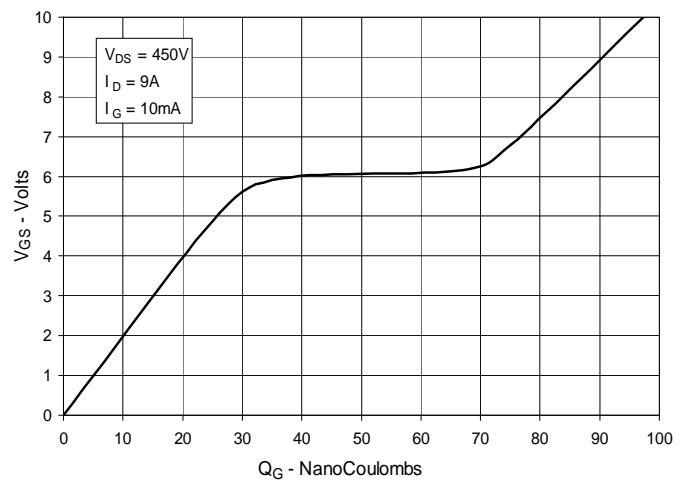
**Fig. 8. Transconductance**



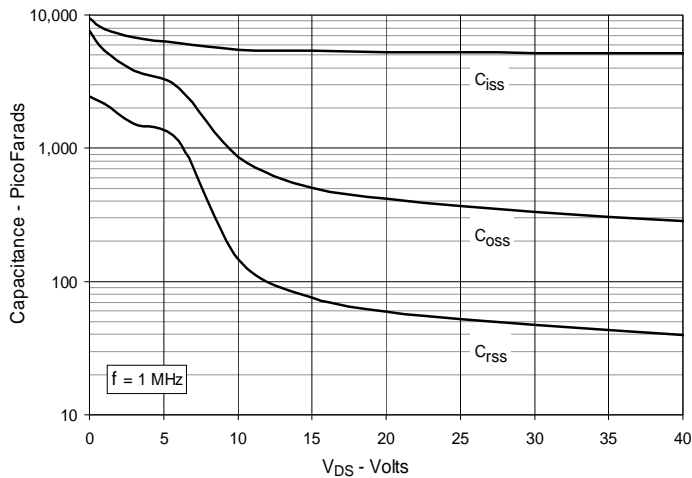
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



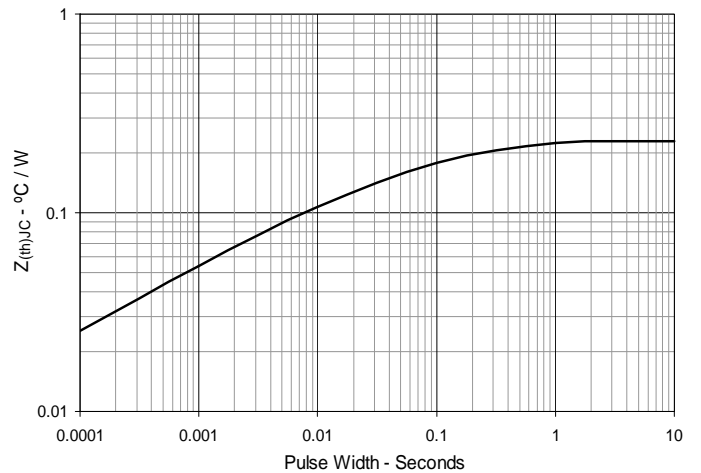
**Fig. 10. Gate Charge**



**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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