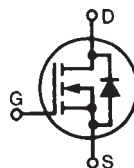


## PolarHV™ Power MOSFET

N-Channel Enhancement Mode  
Fast Recovery Diode  
Avalanche Rated

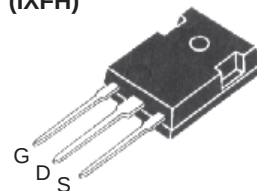
**IXFH 16N80P**  
**IXFT 16N80P**  
**IXFV 16N80P**  
**IXFV 16N80PS**

$V_{DSS} = 800 \text{ V}$   
 $I_{D25} = 16 \text{ A}$   
 $R_{DS(on)} \leq 600 \text{ m}\Omega$   
 $t_{rr} \leq 250 \text{ ns}$

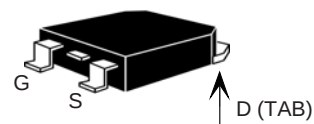


| Symbol     | Test Conditions                                                                                                                       | Maximum Ratings |                  |
|------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                                                                                       | 800             | V                |
| $V_{DGR}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1 \text{ M}\Omega$                                                        | 800             | V                |
| $V_{GSS}$  | Continuous                                                                                                                            | $\pm 30$        | V                |
| $V_{GSM}$  | Transient                                                                                                                             | $\pm 40$        | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                                                                              | 16              | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                            | 40              | A                |
| $I_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                              | 8               | A                |
| $E_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                              | 30              | mJ               |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                                                                                              | 1.0             | J                |
| $dv/dt$    | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 5 \Omega$ | 10              | V/ns             |
| $P_D$      | $T_C = 25^\circ\text{C}$                                                                                                              | 460             | W                |
| $T_J$      |                                                                                                                                       | -55 ... +150    | $^\circ\text{C}$ |
| $T_{JM}$   |                                                                                                                                       | 150             | $^\circ\text{C}$ |
| $T_{stg}$  |                                                                                                                                       | -55 ... +150    | $^\circ\text{C}$ |
| $T_L$      | 1.6 mm (0.062 in.) from case for 10 s                                                                                                 | 300             | $^\circ\text{C}$ |
| $T_{SOLD}$ | Plastic body for 10 s                                                                                                                 | 260             | $^\circ\text{C}$ |
| $M_d$      | Mounting torque (TO-247)                                                                                                              | 1.13/10         | Nm/lb.in.        |
| $F_c$      | Mounting force (PLUS220)                                                                                                              | 11..65/2.5..15  | N/lb             |
| Weight     | TO-247                                                                                                                                | 6.0             | g                |
|            | TO-268                                                                                                                                | 5.0             | g                |
|            | PLUS220 & PLUS220SMD                                                                                                                  | 4.0             | g                |

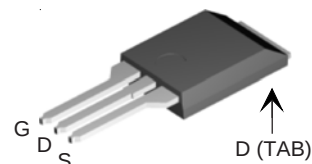
TO-247 (IXFH)



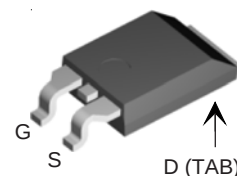
TO-268 (IXFT)



PLUS220 (IXFV)



PLUS220SMD (IXFV...S)



G = Gate      D = Drain  
S = Source      TAB = Drain

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                                     | Characteristic Values |      |                      |
|--------------|-----------------------------------------------------------------------------------------------------------------|-----------------------|------|----------------------|
|              |                                                                                                                 | Min.                  | Typ. | Max.                 |
| $BV_{DSS}$   | $V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$                                                                | 800                   |      | V                    |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 4 \text{ mA}$                                                                        | 3.0                   |      | 5.0 V                |
| $I_{GSS}$    | $V_{GS} = \pm 30 \text{ V}$ , $V_{DS} = 0 \text{ V}$                                                            |                       |      | $\pm 100 \text{ nA}$ |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0 \text{ V}$                                                                    |                       |      | 25 $\mu\text{A}$     |
|              | $T_J = 125^\circ\text{C}$                                                                                       |                       |      | 250 $\mu\text{A}$    |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 0.5 I_{D25}$<br>Pulse test, $t \leq 300 \mu\text{s}$ , duty cycle $d \leq 2\%$ |                       |      | 600 $\text{m}\Omega$ |

### Features

- Fast Recovery diode
- Unclamped Inductive Switching (UIS) rated
- International standard packages
- Low package inductance
  - easy to drive and to protect

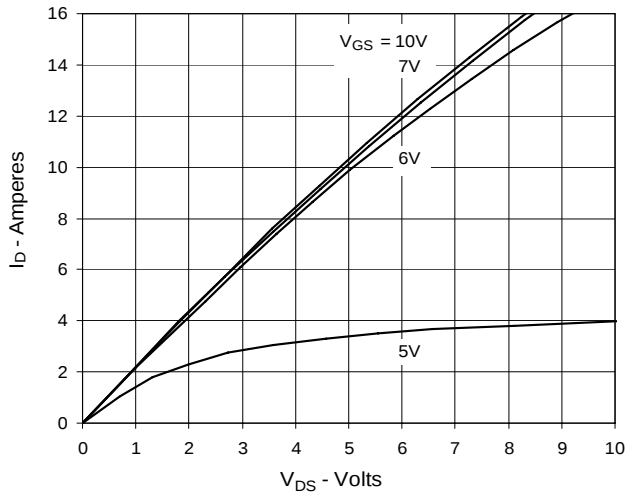
### Advantages

- Easy to mount
- Space savings
- High power density

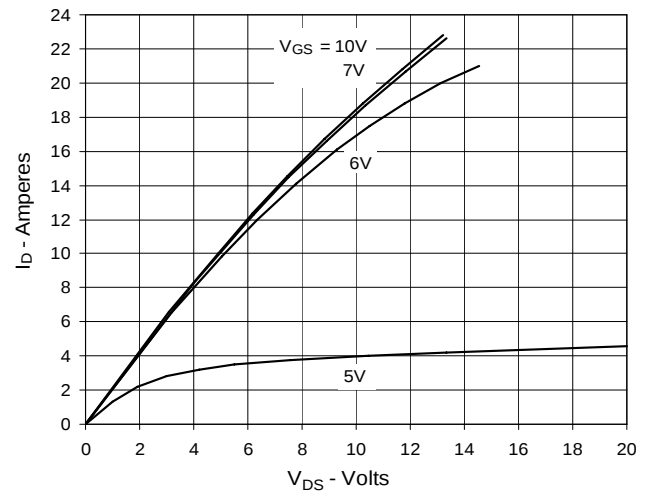
| Symbol       | Test Conditions                                                                             | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                         |
|--------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-------------------------|
|              |                                                                                             | Min.                                                                              | Typ. | Max.                    |
| $g_{fs}$     | $V_{DS} = 20\text{ V}; I_D = 0.5 I_{D25}$ , pulse test                                      | 9                                                                                 | 16   | S                       |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                               |                                                                                   | 4600 | pF                      |
| $C_{oss}$    |                                                                                             |                                                                                   | 330  | pF                      |
| $C_{rss}$    |                                                                                             |                                                                                   | 23   | pF                      |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = V_{DSS}, I_D = 0.5 I_{D25}$<br>$R_G = 5\ \Omega$ (External) |                                                                                   | 27   | ns                      |
| $t_r$        |                                                                                             |                                                                                   | 32   | ns                      |
| $t_{d(off)}$ |                                                                                             |                                                                                   | 75   | ns                      |
| $t_f$        |                                                                                             |                                                                                   | 29   | ns                      |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}$                             |                                                                                   | 71   | nC                      |
| $Q_{gs}$     |                                                                                             |                                                                                   | 21   | nC                      |
| $Q_{gd}$     |                                                                                             |                                                                                   | 23   | nC                      |
| $R_{thJC}$   | (TO-247)                                                                                    |                                                                                   |      | 0.27 $^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                             |                                                                                   | 0.21 | $^\circ\text{C/W}$      |

| Source-Drain Diode |                                                                                                     | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |               |
|--------------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------|
| Symbol             | Test Conditions                                                                                     | Min.                                                                              | Typ. | Max.          |
| $I_S$              | $V_{GS} = 0\text{ V}$                                                                               |                                                                                   |      | 16 A          |
| $I_{SM}$           | Repetitive                                                                                          |                                                                                   |      | 48 A          |
| $V_{SD}$           | $I_F = I_S, V_{GS} = 0\text{ V}$ , pulse test                                                       |                                                                                   |      | 1.5 V         |
| $t_{rr}$           | $I_F = 25\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}$<br>$V_R = 100\text{ V}; V_{GS} = 0\text{ V}$ |                                                                                   | 150  | 250 ns        |
| $I_{RM}$           |                                                                                                     |                                                                                   | 7    | A             |
| $Q_{RM}$           |                                                                                                     |                                                                                   | 0.7  | $\mu\text{C}$ |

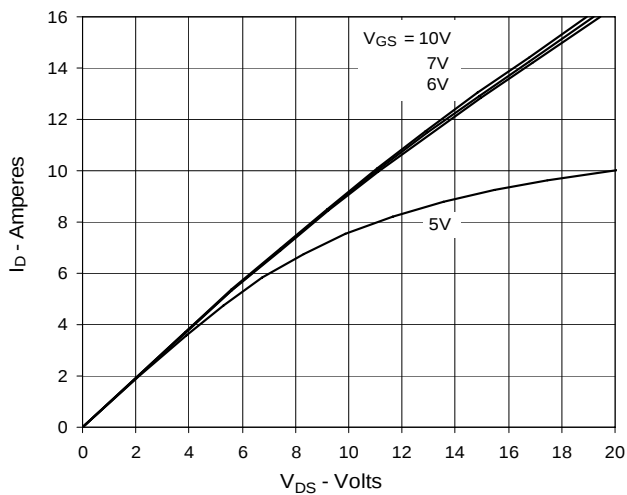
**Fig. 1. Output Characteristics**  
@ 25°C



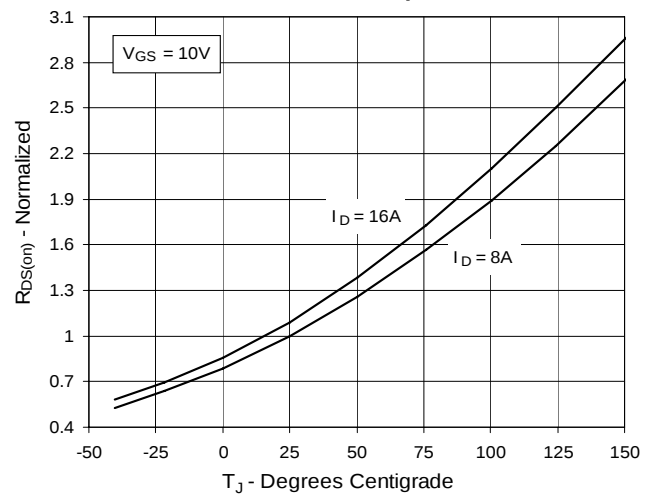
**Fig. 2. Extended Output Characteristics**  
@ 25°C



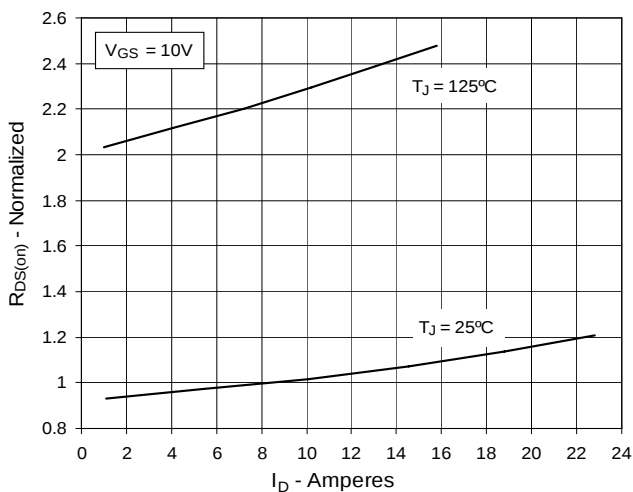
**Fig. 3. Output Characteristics**  
@ 125°C



**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 8A$  Value**  
vs. Junction Temperature



**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 8A$  Value**  
vs. Drain Current



**Fig. 6. Maximum Drain Current vs.**  
Case Temperature

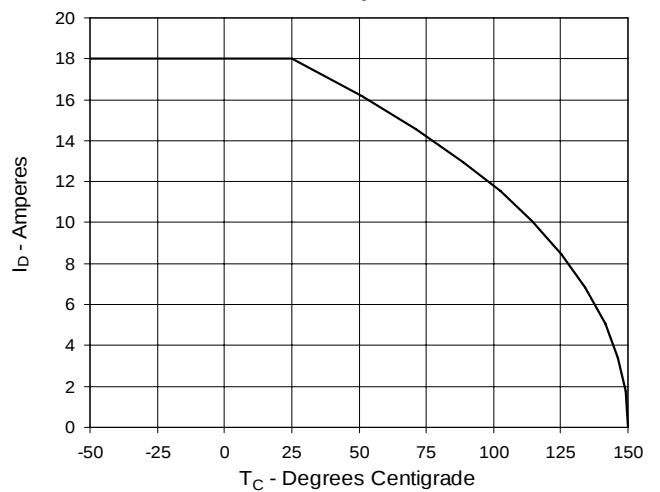


Fig. 7. Input Admittance

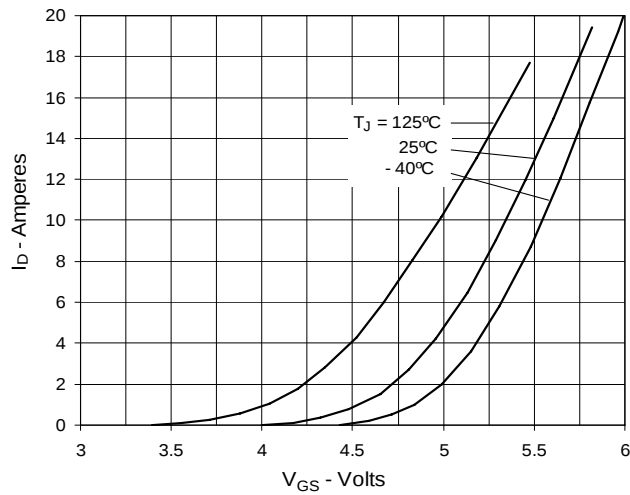


Fig. 8. Transconductance

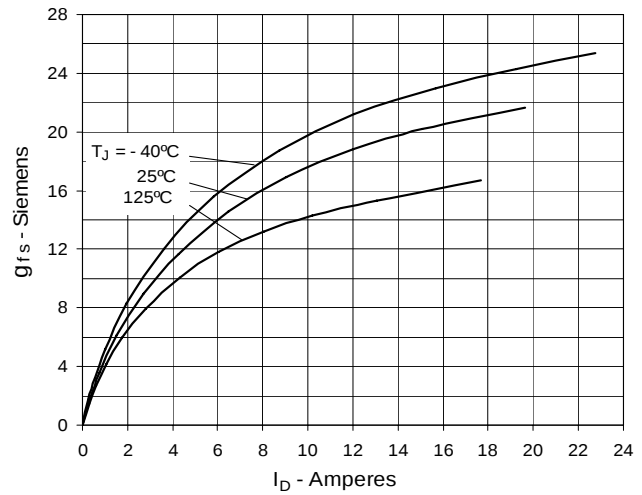


Fig. 9. Forward Voltage Drop of Intrinsic Diode

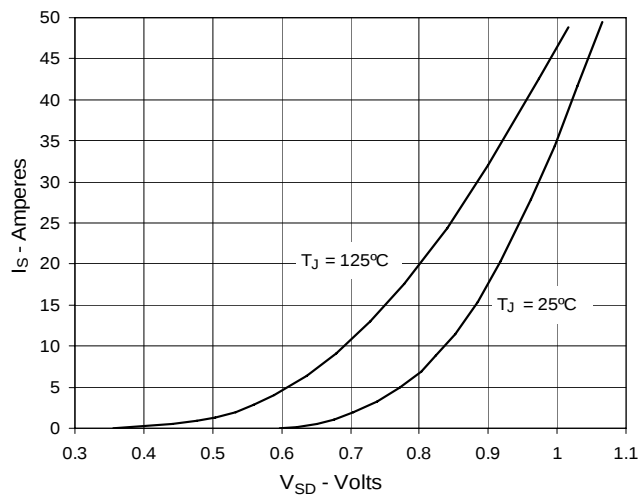


Fig. 10. Gate Charge

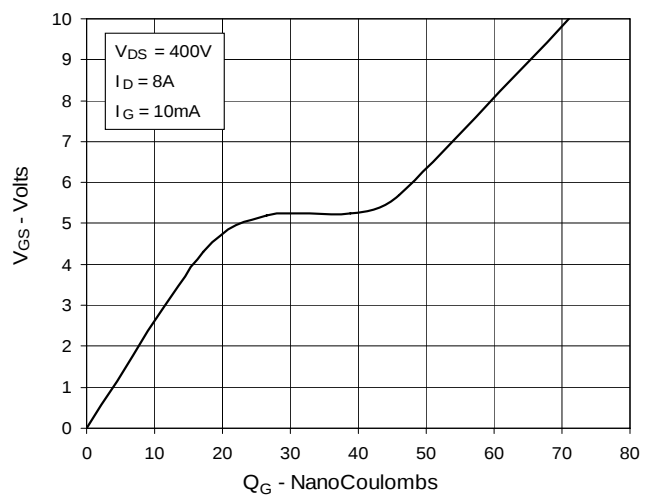


Fig. 11. Capacitance

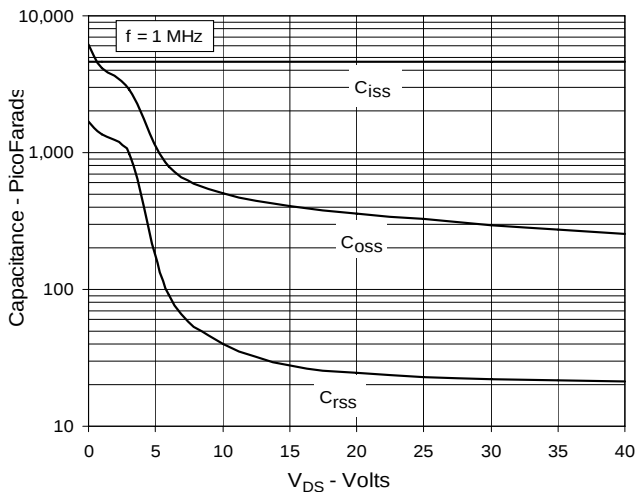
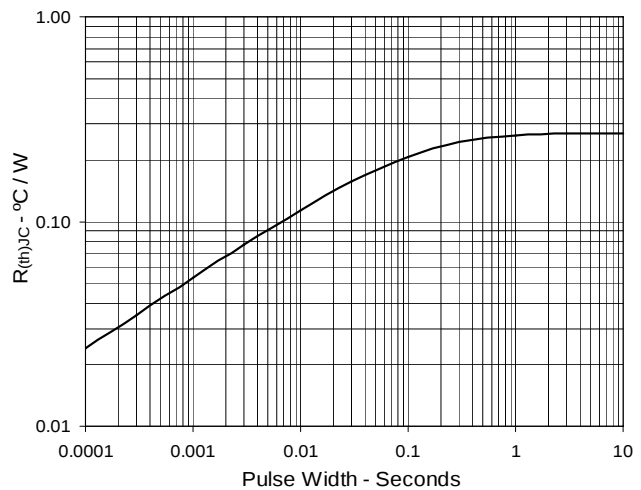
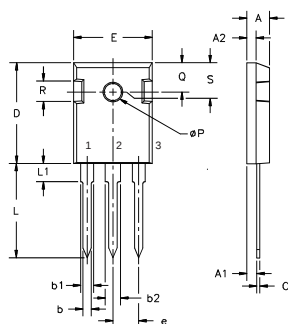
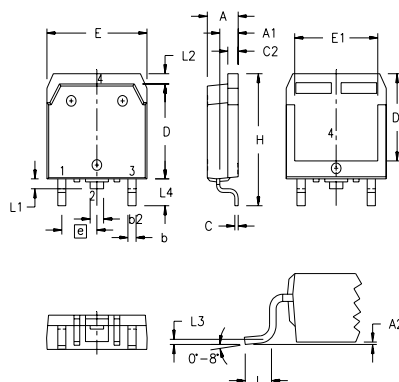


Fig. 12. Maximum Transient Thermal Resistance

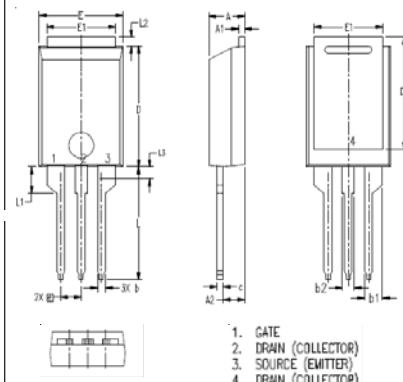


**TO-247 AD (IXFH) Outline**


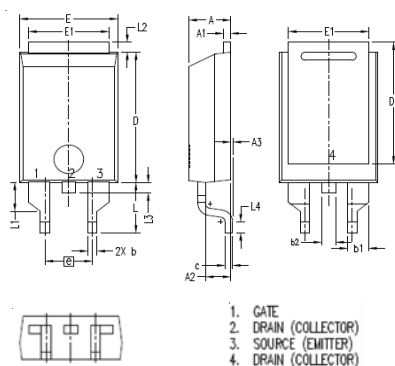
| Dim.           | Millimeter |       | Inches |       |
|----------------|------------|-------|--------|-------|
|                | Min.       | Max.  | Min.   | Max.  |
| A              | 4.7        | 5.3   | .185   | .209  |
| A <sub>1</sub> | 2.2        | 2.54  | .087   | .102  |
| A <sub>2</sub> | 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  |
| L1             |            | 4.50  |        | .177  |
| ØP             | 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   |

**TO-268 (IXFT) Outline**


| 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  |

**PLUS220 (IXFV) Outline**


| 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  |
| 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              | .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  |

**PLUS220SMD (IXFV\_S) Outline**


| 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  |