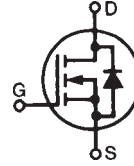


PolarHV™ HiPerFET Power MOSFET

N-Channel Enhancement Mode
Fast Recovery Diode
Avalanche Rated

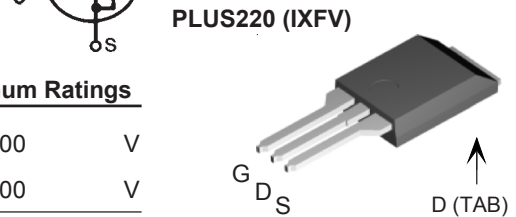
IXFH 30N60P
IXFT 30N60P
IXFV 30N60P
IXFV 30N60PS

$V_{DSS} = 600 \text{ V}$
 $I_{D25} = 30 \text{ A}$
 $R_{DS(on)} \leq 240 \text{ m}\Omega$
 $t_{rr} \leq 200 \text{ ns}$



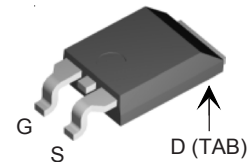
| Symbol | Test Conditions | Maximum Ratings | |
|------------|---|-----------------|------------------|
| | | | |
| V_{DSS} | $T_J = 25^\circ\text{C to } 150^\circ\text{C}$ | 600 | V |
| V_{DGR} | $T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GS} = 1 \text{ M}\Omega$ | 600 | V |
| V_{GSS} | Continuous | ± 30 | V |
| V_{GSM} | Transient | ± 40 | V |
| I_{D25} | $T_C = 25^\circ\text{C}$ | 30 | A |
| I_{DM} | $T_C = 25^\circ\text{C}$, pulse width limited by T_{JM} | 80 | A |
| I_{AR} | $T_C = 25^\circ\text{C}$ | 30 | A |
| E_{AR} | $T_C = 25^\circ\text{C}$ | 50 | mJ |
| E_{AS} | $T_C = 25^\circ\text{C}$ | 1.5 | J |
| dv/dt | $I_s \leq I_{DM}$, $di/dt \leq 100 \text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ\text{C}$, $R_G = 4 \Omega$ | 20 | V/ns |
| P_D | $T_C = 25^\circ\text{C}$ | 500 | 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 | g |
| | TO-268 | 5 | g |
| | PLUS220 | 4 | g |

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, unless otherwise specified) | Characteristic Values | | |
|--------------|--|-----------------------|------|----------------------|
| | | Min. | Typ. | Max. |
| BV_{DSS} | $V_{GS} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$ | 600 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 4 \text{ mA}$ | 2.5 | | 5.0 V |
| I_{GSS} | $V_{GS} = \pm 30 \text{ V}$, $V_{DS} = 0$ | | | $\pm 100 \text{ nA}$ |
| I_{DSS} | $V_{DS} = V_{DSS}$ $V_{GS} = 0 \text{ V}$ $T_J = 125^\circ\text{C}$ | | | 25 μA |
| | | | | 250 μA |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$, $I_D = 0.5 I_{D25}$ Pulse test, $t \leq 300 \mu\text{s}$, duty cycle $d \leq 2 \%$ | | | 240 $\text{m}\Omega$ |

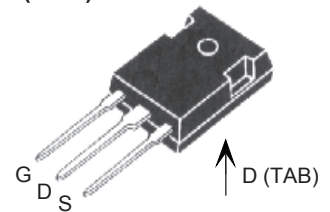


PLUS220 (IXFV)

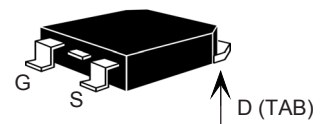
PLUS220 SMD (IXFV...S)



TO-247 (IXFH)



TO-268 (IXFT)



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

Features

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

| Symbol | Test Conditions | Characteristic Values | | |
|---------------------------|--|---|------|-----------|
| | | (T _J = 25° C unless otherwise specified) | | |
| | | Min. | Typ. | Max. |
| g_{fs} | V _{DS} = 20 V; I _D = 0.5 I _{D25} , pulse test | 15 | 27 | S |
| C_{iss} | V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz | | 4000 | pF |
| C_{oss} | | | 430 | pF |
| C_{rss} | | | 42 | pF |
| t_{d(on)} | V _{GS} = 10 V, V _{DS} = 0.5 I _{D25} R _G = 4 Ω (External) | | 29 | ns |
| t_r | | | 20 | ns |
| t_{d(off)} | | | 80 | ns |
| t_f | | | 25 | ns |
| Q_{g(on)} | V _{GS} = 10 V, V _{DS} = 0.5 V _{DSS} , I _D = 0.5 I _{D25} | | 82 | nC |
| Q_{gs} | | | 28 | nC |
| Q_{gd} | | | 28 | nC |
| R_{thJC} | TO-247, PLUS220 | | | 0.25 °C/W |
| R_{thCS} | | | 0.21 | °C/W |

| Source-Drain Diode | | Characteristic Values | | |
|-----------------------|--|--|------|--------|
| | | (T _J = 25° C, unless otherwise specified) | | |
| Symbol | Test Conditions | Min. | Typ. | Max. |
| I_S | V _{GS} = 0 V | | | 30 A |
| I_{SM} | Repetitive | | | 80 A |
| V_{SD} | I _F = I _S , V _{GS} = 0 V, Pulse test, t ≤ 300 μs, duty cycle d ≤ 2 % | | | 1.5 V |
| t_{rr} | I _F = 25A, -di/dt = 100 A/μs V _R = 100V, V _{GS} = 0 V | | | 200 ns |
| Q_{RM} | | | 0.8 | |

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 |
| 4,850,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123 B1 | 6,534,343 | 6,710,405B2 | 6,759,692 |
| 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 |

Fig. 1. Output Characteristics
@ 25°C

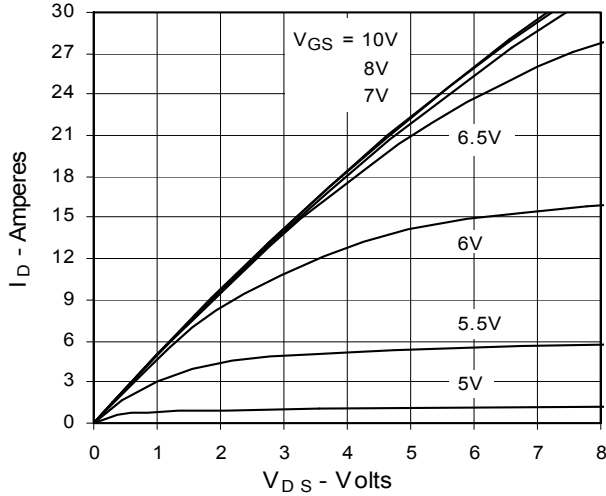


Fig. 2. Extended Output Characteristics
@ 25°C

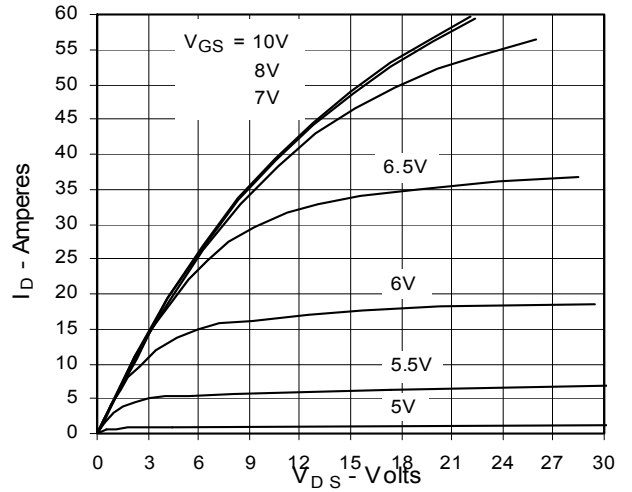


Fig. 3. Output Characteristics
@ 125°C

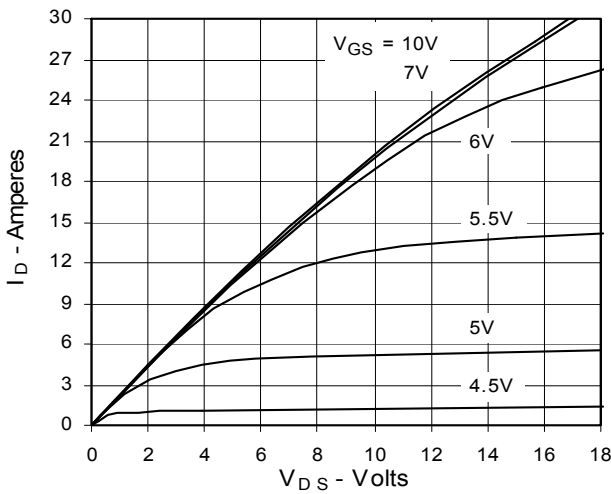


Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 15A$ Value vs. Junction Temperature

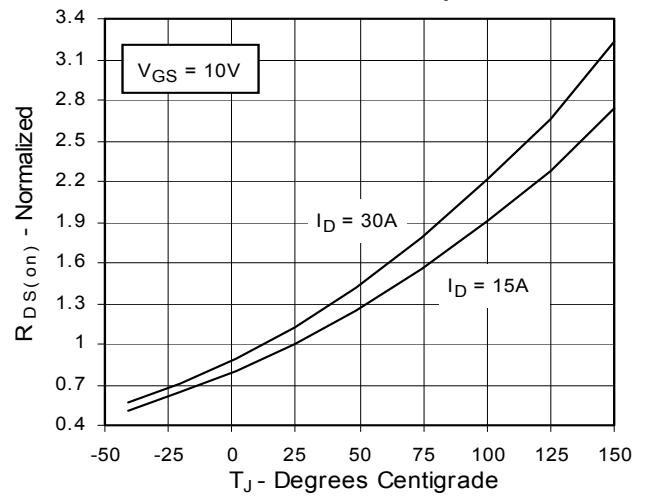


Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 15A$ Value vs. Drain Current

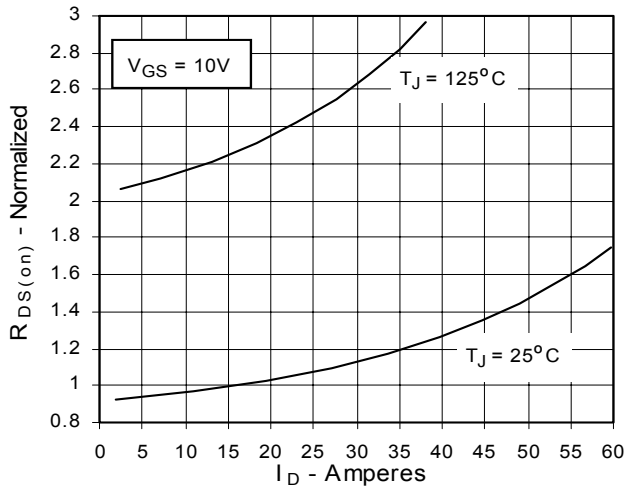


Fig. 6. Drain Current vs. Case Temperature

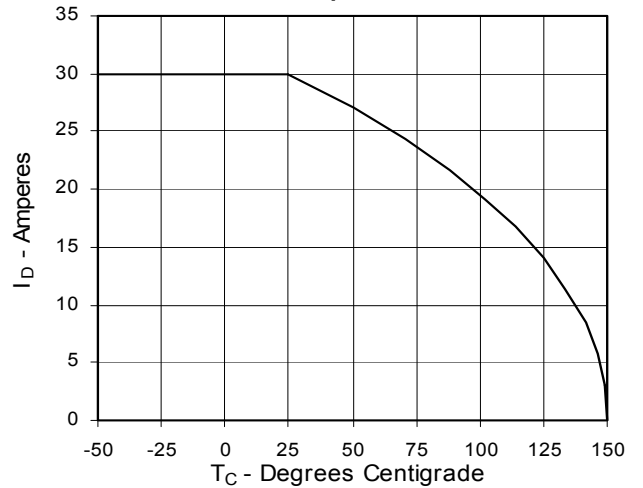


Fig. 7. Input Admittance

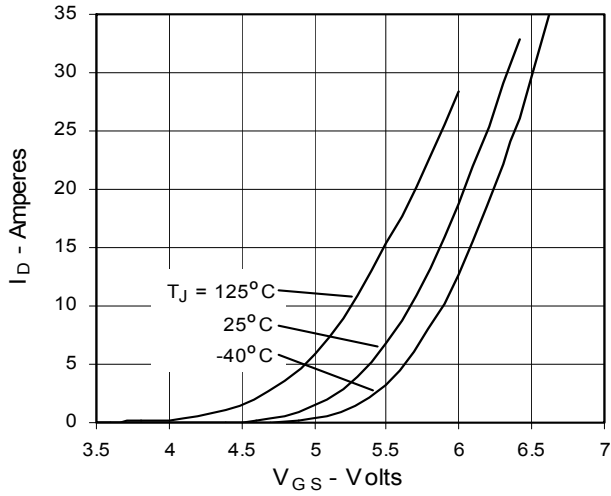


Fig. 8. Transconductance

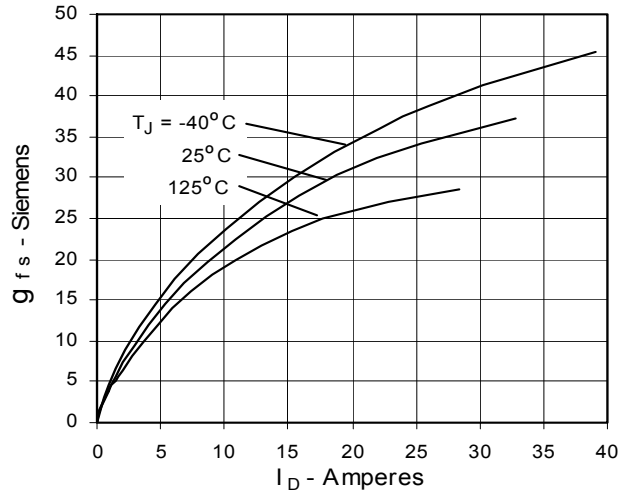


Fig. 9. Source Current vs. Source-To-Drain Voltage

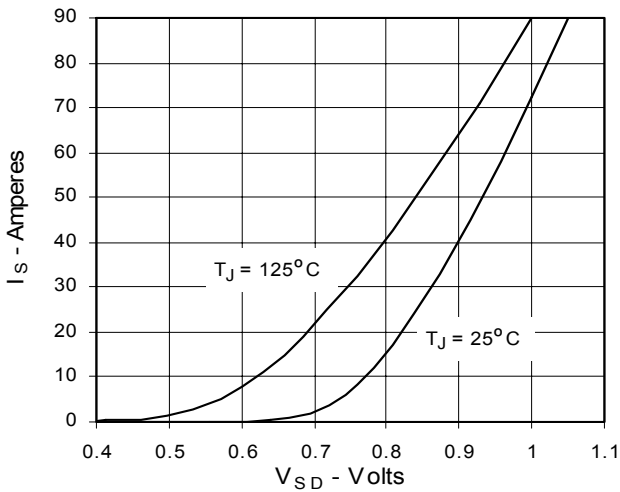


Fig. 10. Gate Charge

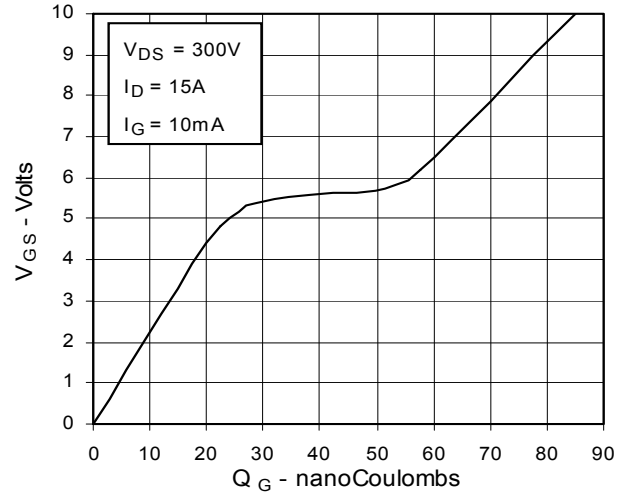


Fig. 11. Capacitance

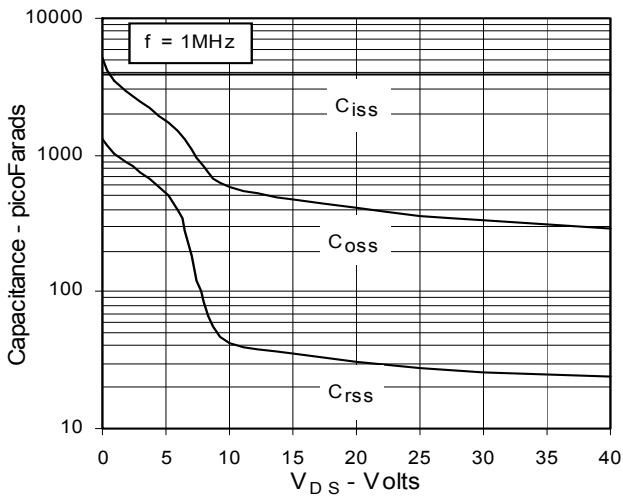
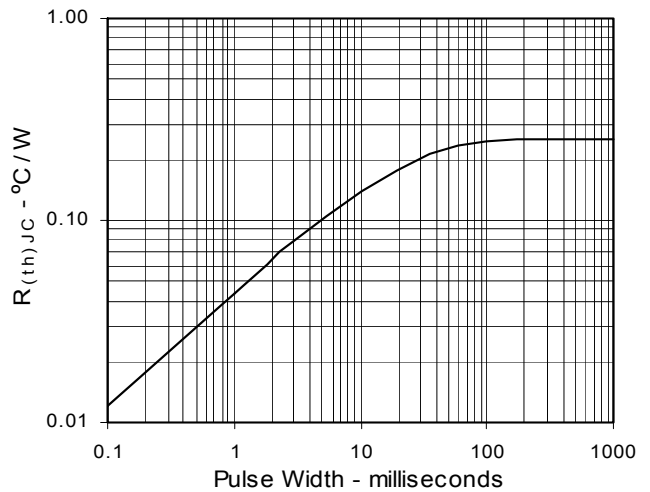
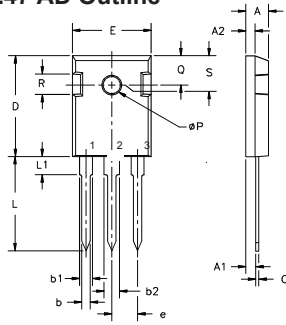


Fig. 12. Maximum Transient Thermal Resistance



Package Outline Drawings

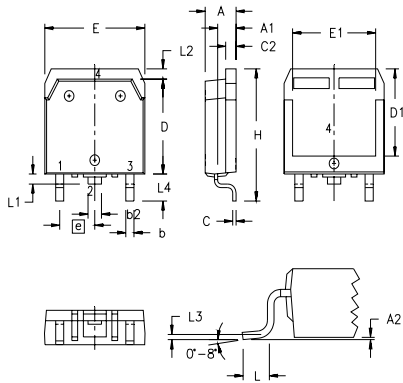
TO-247 AD Outline



Terminals: 1 - Gate
2 - Drain
3 - Source
Tab - Drain

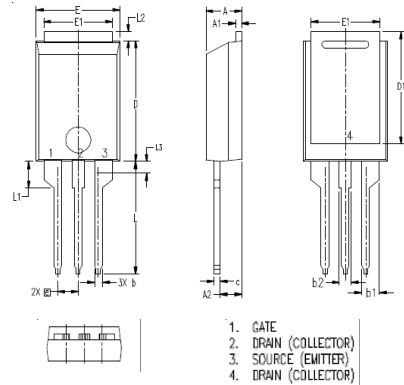
| Dim. | Millimeter | | Inches | |
|----------------|------------|-------|--------|-------|
| | Min. | Max. | Min. | Max. |
| A | 4.7 | 5.3 | .185 | .209 |
| A ₁ | 2.2 | 2.54 | .087 | .102 |
| A ₂ | 2.2 | 2.6 | .059 | .098 |
| b | 1.0 | 1.4 | .040 | .055 |
| b ₁ | 1.65 | 2.13 | .065 | .084 |
| b ₂ | 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 ₁ | | 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 |

TO-268 (IXTT) Outline



| SYM | INCHES | | MILLIMETERS | |
|----------------|--------|----------|-------------|----------|
| | MIN | MAX | MIN | MAX |
| A | .193 | .201 | 4.90 | 5.10 |
| A ₁ | .106 | .114 | 2.70 | 2.90 |
| A ₂ | .001 | .010 | 0.02 | 0.25 |
| b | .045 | .057 | 1.15 | 1.45 |
| b ₂ | .075 | .083 | 1.90 | 2.10 |
| C | .016 | .026 | 0.40 | 0.65 |
| C ₂ | .057 | .063 | 1.45 | 1.60 |
| D | .543 | .551 | 13.80 | 14.00 |
| D ₁ | .488 | .500 | 12.40 | 12.70 |
| E | .624 | .632 | 15.85 | 16.05 |
| E ₁ | .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 ₁ | .047 | .055 | 1.20 | 1.40 |
| L ₂ | .039 | .045 | 1.00 | 1.15 |
| L ₃ | | .010 BSC | | 0.25 BSC |
| L ₄ | .150 | .161 | 3.80 | 4.10 |

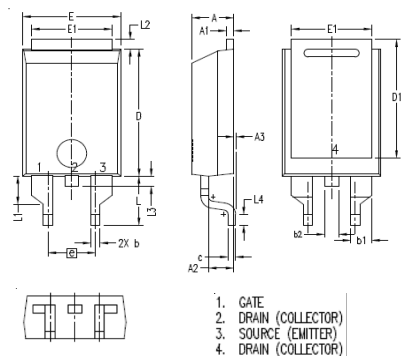
PLUS220 (IXFV) Outline



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 ₁ | .028 | .035 | 0.70 | 0.90 |
| A ₂ | .098 | .118 | 2.50 | 3.00 |
| b | .035 | .047 | 0.90 | 1.20 |
| b ₁ | .080 | .095 | 2.03 | 2.41 |
| b ₂ | .054 | .064 | 1.37 | 1.63 |
| c | .028 | .035 | 0.70 | 0.90 |
| D | .551 | .591 | 14.00 | 15.00 |
| D ₁ | .512 | .539 | 13.00 | 13.70 |
| E | .394 | .433 | 10.00 | 11.00 |
| E ₁ | .331 | .346 | 8.40 | 8.80 |
| e | | .100 BSC | | 2.54 BSC |
| L | .512 | .551 | 13.00 | 14.00 |
| L ₁ | .118 | .138 | 3.00 | 3.50 |
| L ₂ | .035 | .051 | 0.90 | 1.30 |
| L ₃ | .047 | .059 | 1.20 | 1.50 |

PLUS220SMD (IXFV_S) 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 ₁ | .028 | .035 | 0.70 | 0.90 |
| A ₂ | .098 | .118 | 2.50 | 3.00 |
| A ₃ | .000 | .010 | 0.00 | 0.25 |
| b | .035 | .047 | 0.90 | 1.20 |
| b ₁ | .080 | .095 | 2.03 | 2.41 |
| b ₂ | .054 | .064 | 1.37 | 1.63 |
| c | .028 | .035 | 0.70 | 0.90 |
| D | .551 | .591 | 14.00 | 15.00 |
| D ₁ | .512 | .539 | 13.00 | 13.70 |
| E | .394 | .433 | 10.00 | 11.00 |
| E ₁ | .331 | .346 | 8.40 | 8.80 |
| e | | .200 BSC | | 5.08 BSC |
| L | .209 | .228 | 5.30 | 5.80 |
| L ₁ | .118 | .138 | 3.00 | 3.50 |
| L ₂ | .035 | .051 | 0.90 | 1.30 |
| L ₃ | .047 | .059 | 1.20 | 1.50 |
| L ₄ | .039 | .059 | 1.00 | 1.50 |