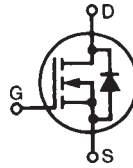


**Polar™
Power MOSFET**

 N-Channel Enhancement Mode
Avalanche Rated

**IXTU1N80P
IXTY1N80P
IXTA1N80P
IXTP1N80P**


| Symbol | Test Conditions | Maximum Ratings | |
|---------------|--|--------------------|------------------|
| V_{DSS} | $T_J = 25^\circ\text{C}$ to 150°C | 800 | V |
| V_{DGR} | $T_J = 25^\circ\text{C}$ to 150°C , $R_{GS} = 1\text{M}\Omega$ | 800 | V |
| V_{GSS} | Continuous | ± 30 | V |
| V_{GSM} | Transient | ± 40 | V |
| I_{D25} | $T_C = 25^\circ\text{C}$ | 1 | A |
| I_{DM} | $T_C = 25^\circ\text{C}$, Pulse Width Limited by T_{JM} | 2 | A |
| I_A | $T_C = 25^\circ\text{C}$ | 1 | A |
| E_{AS} | $T_C = 25^\circ\text{C}$ | 75 | mJ |
| dv/dt | $I_S \leq I_{DM}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ\text{C}$ | 5 | V/ns |
| P_D | $T_C = 25^\circ\text{C}$ | 42 | 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 | 300 | $^\circ\text{C}$ |
| T_{SOLD} | 1.6 mm (0.062in.) from Case for 10s | 260 | $^\circ\text{C}$ |
| F_C | Mounting Force (TO-263 & TO-251) | 10..65 / 2.2..14.6 | N/lb |
| M_d | Mounting Torque (TO-220) | 1.13 / 10 | Nm/lb.in |
| Weight | TO-251 | 0.40 | g |
| | TO-252 | 0.35 | g |
| | TO-263 | 2.50 | g |
| | TO-220 | 3.00 | g |

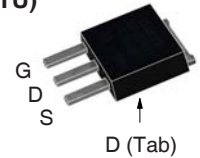
| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|--------------|---|-----------------------|------|-------------------------------------|
| | | Min. | Typ. | Max. |
| BV_{DSS} | $V_{GS} = 0\text{V}$, $I_D = 250\mu\text{A}$ | 800 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 50\mu\text{A}$ | 2.0 | | V |
| I_{GSS} | $V_{GS} = \pm 30\text{V}$, $V_{DS} = 0\text{V}$ | | | ± 100 nA |
| I_{DSS} | $V_{DS} = V_{DSS}$, $V_{GS} = 0\text{V}$ $T_J = 125^\circ\text{C}$ | | | 3 μA 30 μA |
| $R_{DS(on)}$ | $V_{GS} = 10\text{V}$, $I_D = 0.5 \cdot I_{D25}$, Note 1 | 10 | 14 | Ω |

$$V_{DSS} = 800\text{V}$$

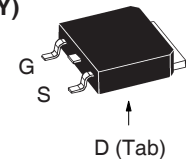
$$I_{D25} = 1\text{A}$$

$$R_{DS(on)} \leq 14\Omega$$

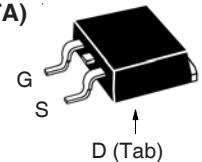
TO-251 (IXTU)



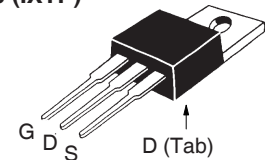
TO-252 (IXTY)



TO-263 (IXTA)



TO-220 (IXTP)


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

Features

- International Standard Packages
- Low Q_G
- Avalanche Rated
- Low Package Inductance
- Fast Intrinsic Rectifier

Advantages

- High Power Density
- Easy to Mount
- Space Savings

Applications

- DC-DC Converters
- Switch-Mode and Resonant-Mode Power Supplies
- AC and DC Motor Drives
- Discharge Circuits in Lasers, Spark Igniters, RF Generators
- High Voltage Pulse Power Applications

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|--------------|---|-----------------------|------|----------|
| | | Min. | Typ. | Max |
| g_{fs} | $V_{DS} = 20\text{V}$, $I_D = 0.5 \cdot I_{D25}$, Note 1 | 0.30 | 0.55 | S |
| C_{iss} | $V_{GS} = 0\text{V}$, $V_{DS} = 25\text{V}$, $f = 1\text{MHz}$ | | 250 | pF |
| C_{oss} | | | 22 | pF |
| C_{rss} | | | 5.3 | pF |
| $Q_{g(on)}$ | $V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 0.5 \cdot I_{D25}$ | | 9.0 | nC |
| Q_{gs} | | | 1.4 | nC |
| Q_{gd} | | | 5.5 | nC |
| $t_{d(on)}$ | Resistive Switching Times $V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 0.5 \cdot I_{D25}$ $R_G = 50\Omega$ (External) | | 20 | ns |
| t_r | | | 18 | ns |
| $t_{d(off)}$ | | | 58 | ns |
| t_f | | | 42 | ns |
| R_{thJC} | | | | 3.0 °C/W |
| R_{thCS} | TO-220 | 0.50 | | °C/W |

Source-Drain Diode

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|----------|--|-----------------------|------|-------|
| | | Min. | Typ. | Max |
| I_S | $V_{GS} = 0\text{V}$ | | | 1 A |
| I_{SM} | Repetitive, Pulse Width Limited by T_{JM} | | | 4 A |
| V_{SD} | $I_F = I_S$, $V_{GS} = 0\text{V}$, Note 1 | | | 1.3 V |
| t_{rr} | $I_F = 1\text{A}$, $-di/dt = 100\text{A}/\mu\text{s}$, $V_R = 100\text{V}$ | | 700 | ns |

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

PRELIMINARY TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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 | 6,404,065B1 | 6,683,344 | 6,727,585 | 7,005,734B2 | 7,157,338B2 |
| | 4,860,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123B1 | 6,534,343 | 6,710,405B2 | 6,759,692 | 7,063,975B2 | |
| | 4,881,106 | 5,034,796 | 5,187,117 | 5,486,715 | 6,306,728B1 | 6,583,505 | 6,710,463 | 6,771,478B2 | 7,071,537 | |

Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

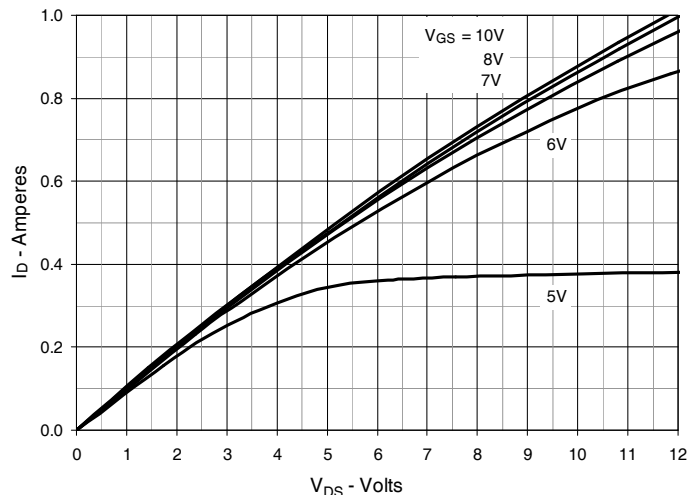


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

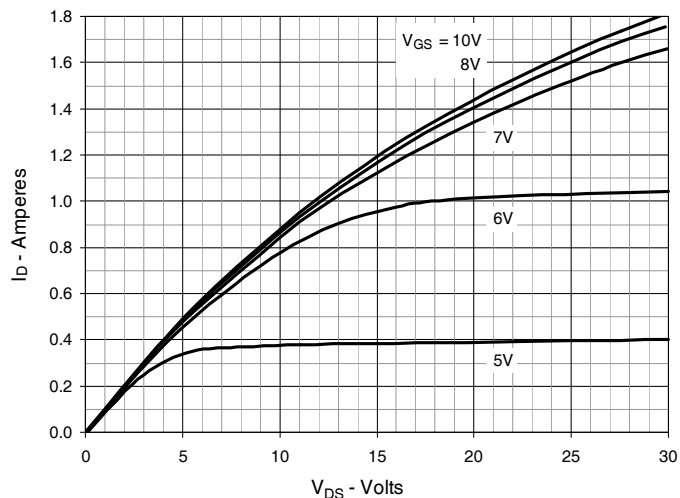


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

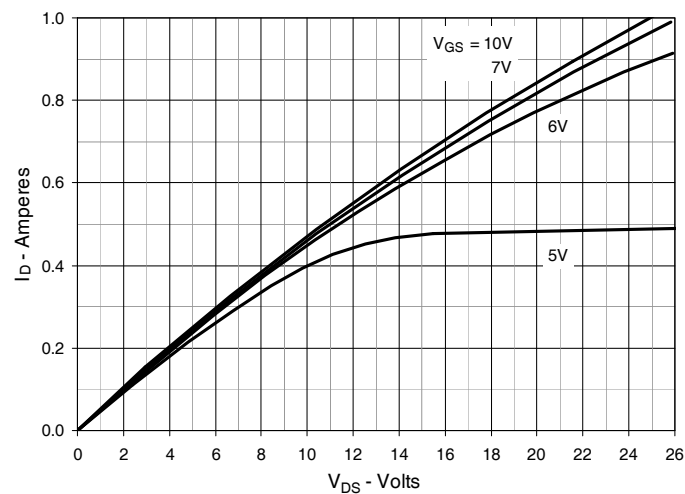


Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 0.5\text{A}$ Value vs. Junction Temperature

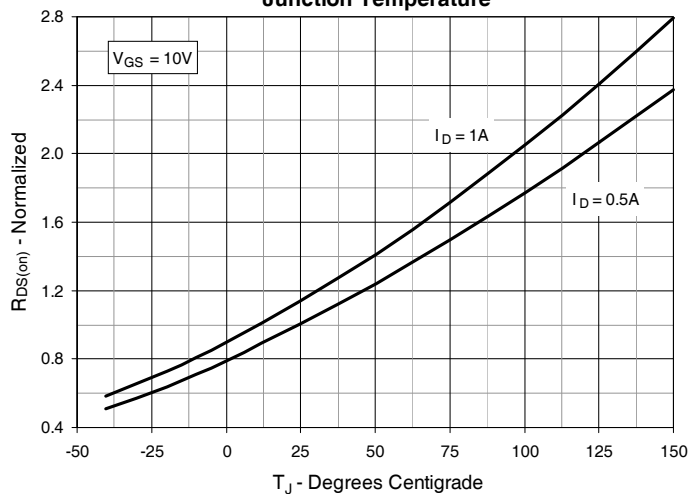


Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 0.5\text{A}$ Value vs. Drain Current

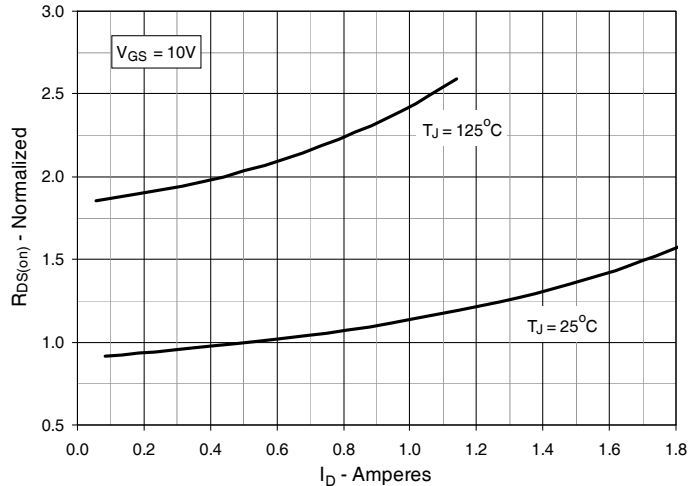


Fig. 6. Maximum Drain Current vs. Case Temperature

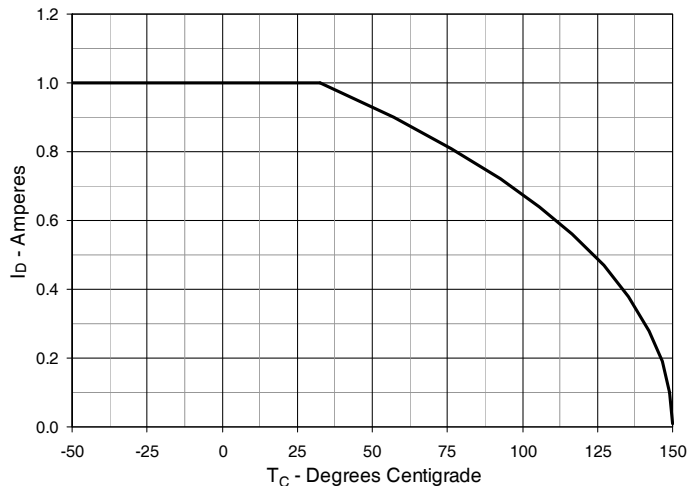


Fig. 7. Input Admittance

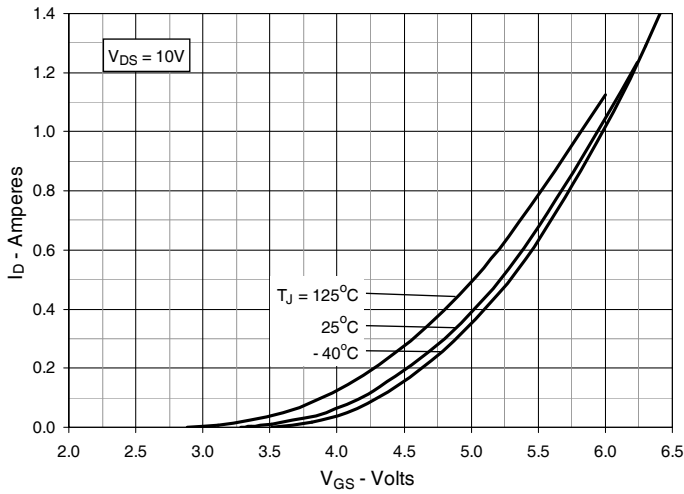


Fig. 8. Transconductance

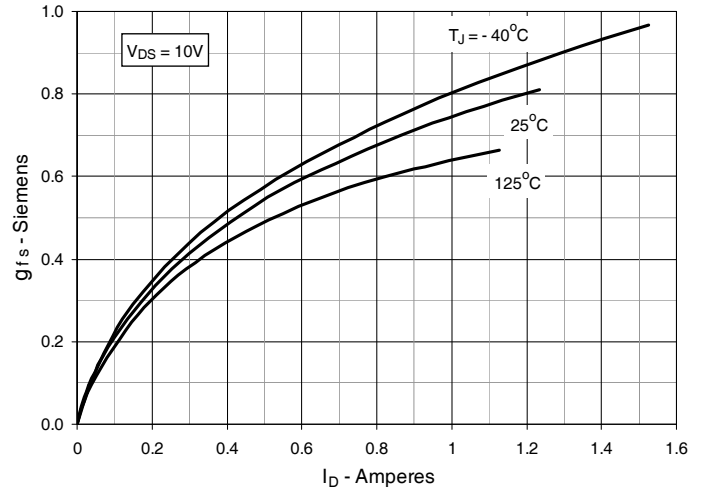


Fig. 9. Forward Voltage Drop of Intrinsic Diode

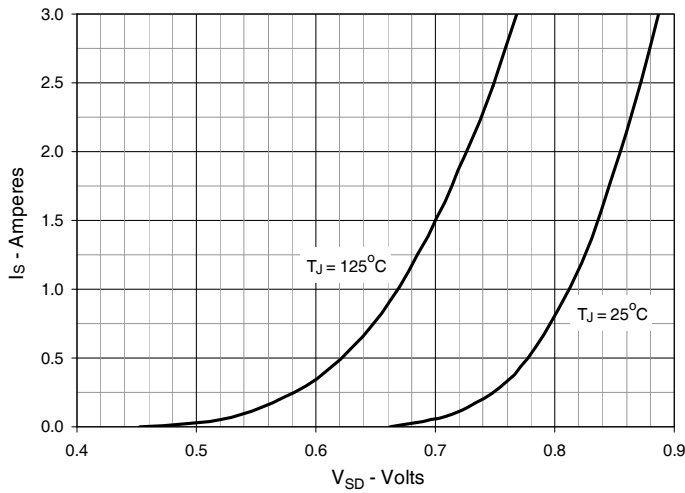


Fig. 10. Gate Charge

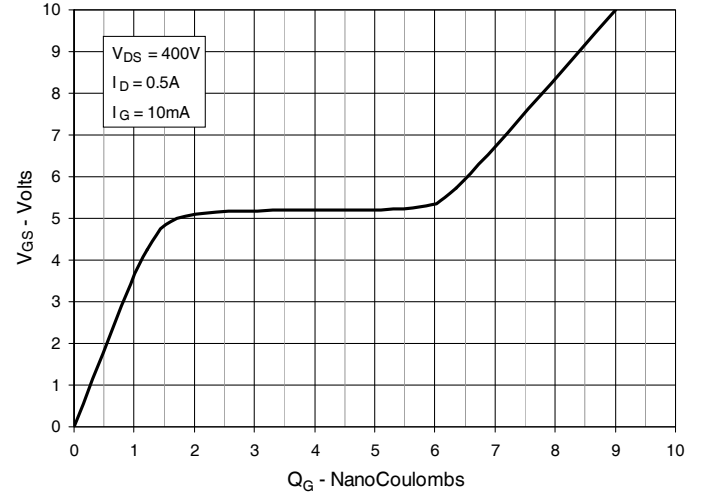


Fig. 11. Capacitance

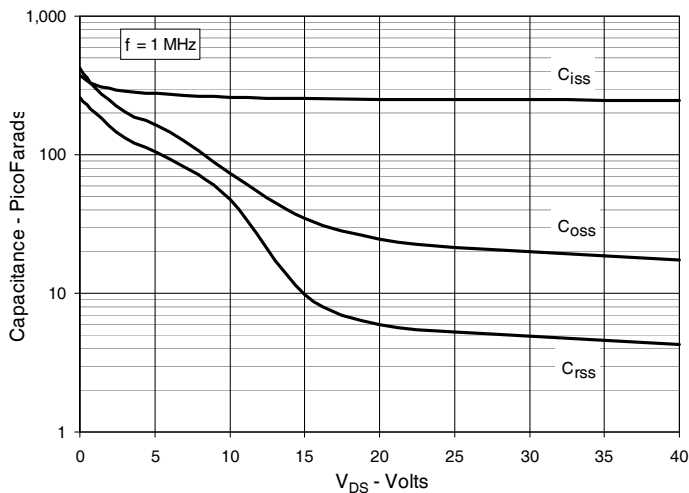
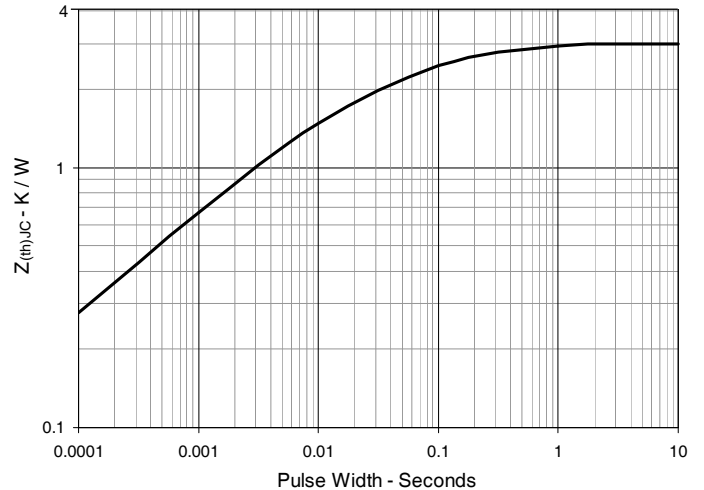
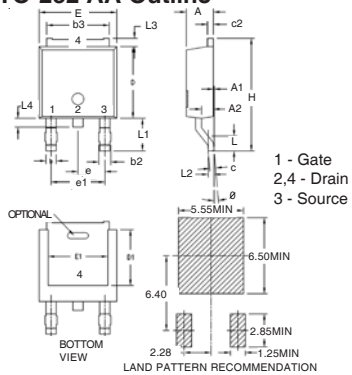


Fig. 12. Maximum Transient Thermal Impedance

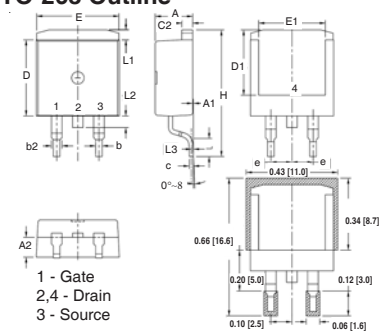


TO-252 AA Outline



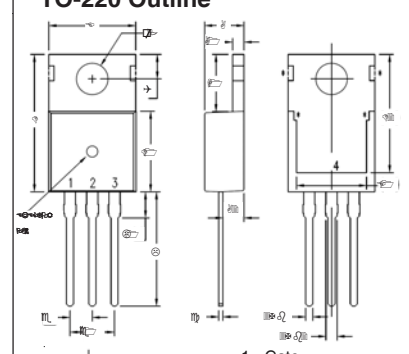
| SYM | INCHES | | MILLIMETERS | |
|-----|----------|------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .086 | .094 | 2.19 | 2.38 |
| A1 | 0 | .005 | 0 | 0.12 |
| A2 | .038 | .046 | 0.97 | 1.17 |
| b | .025 | .035 | 0.64 | 0.89 |
| b2 | .030 | .045 | 0.76 | 1.14 |
| b3 | .200 | .215 | 5.08 | 5.46 |
| c | .018 | .024 | 0.46 | 0.61 |
| c2 | .018 | .023 | 0.46 | 0.58 |
| D | .235 | .245 | 5.97 | 6.22 |
| D1 | .180 | .205 | 4.57 | 5.21 |
| E | .250 | .265 | 6.35 | 6.73 |
| E1 | .170 | .205 | 4.32 | 5.21 |
| e | .090 BSC | | 2.28 BSC | |
| e1 | .180 BSC | | 4.57 BSC | |
| H | .370 | .410 | 9.40 | 10.42 |
| L | .055 | .070 | 1.40 | 1.78 |
| L1 | .100 | .115 | 2.54 | 2.92 |
| L2 | .020 BSC | | 0.50 BSC | |
| L3 | .025 | .040 | 0.64 | 1.02 |
| L4 | .025 | .040 | 0.64 | 1.02 |
| θ | 0° - 10° | | 0° - 10° | |

TO-263 Outline



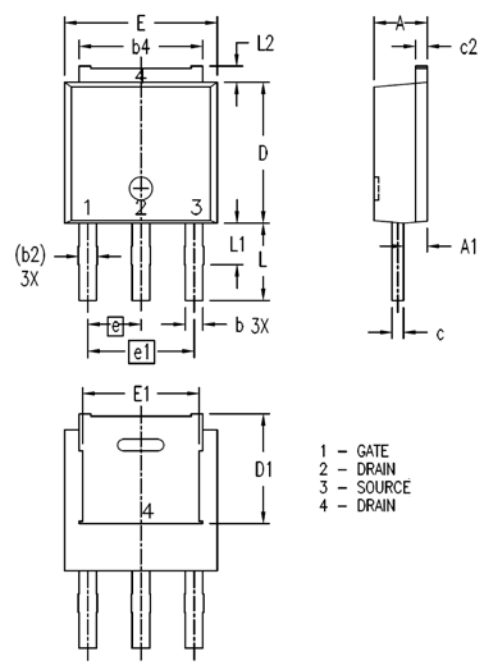
| SYM | INCHES | | MILLIMETER | |
|-----|----------|------|------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .170 | .185 | 4.30 | 4.70 |
| A1 | .000 | .008 | 0.00 | 0.20 |
| A2 | .091 | .098 | 2.30 | 2.50 |
| b | .028 | .035 | 0.70 | 0.90 |
| b2 | .046 | .060 | 1.18 | 1.52 |
| C | .018 | .024 | 0.45 | 0.60 |
| C2 | .049 | .060 | 1.25 | 1.52 |
| D | .340 | .370 | 8.63 | 9.40 |
| D1 | .300 | .327 | 7.62 | 8.30 |
| E | .380 | .410 | 9.65 | 10.41 |
| E1 | .270 | .330 | 6.86 | 8.38 |
| e | .100 BSC | | 2.54 BSC | |
| H | .580 | .620 | 14.73 | 15.75 |
| L | .075 | .105 | 1.91 | 2.67 |
| L1 | .039 | .060 | 1.00 | 1.52 |
| L2 | — | .070 | — | 1.77 |
| L3 | .010 BSC | | 0.254 BSC | |

TO-220 Outline



| SYM | INCHES | | MILLIMETERS | |
|------|----------|------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .169 | .185 | 4.30 | 4.70 |
| A1 | .047 | .055 | 1.20 | 1.40 |
| A2 | .079 | .106 | 2.00 | 2.70 |
| b | .024 | .039 | 0.60 | 1.00 |
| b2 | .045 | .057 | 1.15 | 1.45 |
| c | .014 | .026 | 0.35 | 0.65 |
| D | .587 | .626 | 14.90 | 15.90 |
| D1 | .335 | .370 | 8.50 | 9.40 |
| (D2) | .500 | .531 | 12.70 | 13.50 |
| E | .382 | .406 | 9.70 | 10.30 |
| (E1) | .283 | .323 | 7.20 | 8.20 |
| e | .100 BSC | | 2.54 BSC | |
| e1 | .200 BSC | | 5.08 BSC | |
| H1 | .244 | .268 | 6.20 | 6.80 |
| L | .492 | .547 | 12.50 | 13.90 |
| L1 | .110 | .154 | 2.80 | 3.90 |
| ∅P | .134 | .150 | 3.40 | 3.80 |
| Q | .106 | .126 | 2.70 | 3.20 |

TO-251 OUTLINE



| SYM | INCHES | | MILLIMETERS | |
|------|----------|------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | .087 | .094 | 2.20 | 2.40 |
| A1 | .032 | .048 | 0.82 | 1.22 |
| b | .026 | .034 | 0.66 | 0.86 |
| (b2) | .030 | .035 | 0.76 | 0.88 |
| b4 | .198 | .222 | 5.04 | 5.64 |
| c | .018 | .024 | 0.45 | 0.60 |
| c2 | .016 | .024 | 0.40 | 0.60 |
| D | .232 | .248 | 5.90 | 6.30 |
| (D1) | .179 | .195 | 4.55 | 4.95 |
| E | .252 | .268 | 6.40 | 6.80 |
| (E1) | .191 | .207 | 4.85 | 5.25 |
| e | .090 BSC | | 2.28 BSC | |
| e1 | .180 BSC | | 4.57 BSC | |
| L | .126 | .138 | 3.20 | 3.50 |
| L1 | .063 | .079 | 1.60 | 2.00 |
| L2 | .020 | .035 | 0.50 | 0.90 |