

Depletion Mode MOSFET

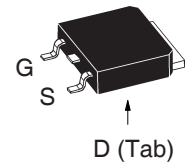
IXTY01N100D
IXTU01N100D
IXTP01N100D

$V_{DSX} = 1000V$
 $R_{DS(on)} \leq 80\Omega$

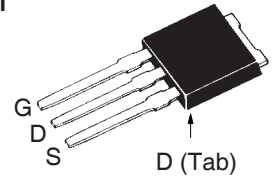
N-Channel



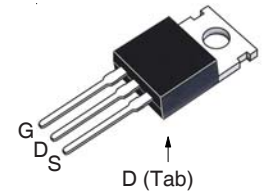
TO-252
(IXTY)



TO-251
(IXTU)



TO-220
(IXTP)



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

| Symbol | Test Conditions | Maximum Ratings | |
|------------|---------------------------------------------------------|-----------------|------------------|
| V_{DSX} | $T_J = 25^\circ\text{C}$ to 150°C | 1000 | V |
| V_{DGX} | $T_J = 25^\circ\text{C}$ to 150°C | 1000 | V |
| V_{GSX} | Continuous | ± 20 | V |
| V_{GSM} | Transient | ± 30 | V |
| I_{DM} | $T_C = 25^\circ\text{C}$, Pulse Width Limited by T_J | 400 | mA |
| P_D | $T_C = 25^\circ\text{C}$ | 25 | W |
| | $T_A = 25^\circ\text{C}$ | 1.1 | 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 | $^\circ\text{C}$ |
| M_d | Mounting Torque (TO-220) | 1.13 / 10 | Nm/lb.in. |
| Weight | TO-252 | 0.35 | g |
| | TO-251 | 0.40 | g |
| | TO-220 | 3.00 | g |

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|----------------|-----------------------------------------------------------------------------|-----------------------|------|---------------------------------------|
| | | Min. | Typ. | Max. |
| BV_{DSX} | $V_{GS} = -10V$, $I_D = 25\mu\text{A}$ | 1000 | | V |
| $V_{GS(off)}$ | $V_{DS} = 25V$, $I_D = 25\mu\text{A}$ | - 2.0 | | - 4.5 V |
| I_{GSX} | $V_{GS} = \pm 20V$, $V_{DS} = 0V$ | | | ± 100 nA |
| $I_{DSX(off)}$ | $V_{DS} = V_{DSX}$, $V_{GS} = -10V$ $T_J = 125^\circ\text{C}$ | | | 10 μA 250 μA |
| $R_{DS(on)}$ | $V_{GS} = 0V$, $I_D = 50\text{mA}$, Note 1 | | 50 | 80 Ω |
| $I_{D(on)}$ | $V_{GS} = 0V$, $V_{DS} = 25V$, Note 1 | | 400 | mA |

Features

- Normally ON Mode
- International Standard Packages
- Low $R_{DS(on)}$ HDMOS™ Process
- Rugged Polysilicon Gate Cell Structure
- Fast Switching Speed

Advantages

- Easy to Mount
- Space Savings
- High Power Density

Applications

- Level Shifting
- Triggers
- Solid State Relays
- Current Regulators

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|------------------------|
| | | Min. | Typ. | Max. |
| g_{fs} | $V_{DS} = 100\text{V}$, $I_D = 100\text{mA}$, Note 1 | 100 | 200 | mS |
| C_{iss} | $V_{GS} = -10\text{V}$, $V_{DS} = 25\text{V}$, $f = 1\text{MHz}$ | | 100 | pF |
| C_{oss} | | | 12 | pF |
| C_{rss} | | | 2 | pF |
| $t_{d(on)}$ | Resistive Switching Times $V_{GS} = \pm 5\text{V}$, $V_{DS} = 50\text{V}$, $I_D = 50\text{mA}$ $R_G = 30\Omega$ (External) | | 7 | ns |
| t_r | | | 10 | ns |
| $t_{d(off)}$ | | | 34 | ns |
| t_f | | | 64 | ns |
| $Q_{g(on)}$ | $V_{GS} = \pm 5\text{V}$, $V_{DS} = 500\text{V}$, $I_D = 50\text{mA}$ | | 5.8 | nC |
| Q_{gs} | | | 3.6 | nC |
| Q_{gd} | | | 0.4 | nC |
| R_{thJC} | TO-220 | | | 5.0 $^\circ\text{C/W}$ |
| R_{thCS} | | | 0.50 | $^\circ\text{C/W}$ |

Source-Drain Diode

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|----------|----------------------------------------------------------------------------------------------------------|-----------------------|------|-------------------|
| | | Min. | Typ. | Max. |
| V_{SD} | $I_F = 100\text{mA}$, $V_{GS} = -10\text{V}$, Note 1 | | | 1.5 V |
| t_{rr} | $I_F = 750\text{mA}$, $-di/dt = 100\text{A}/\mu\text{s}$ $V_R = 25\text{V}$, $V_{GS} = -10\text{V}$ | | | 1.5 μs |

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 |
| 4,860,072 | 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 @ $T_J = 25^\circ\text{C}$

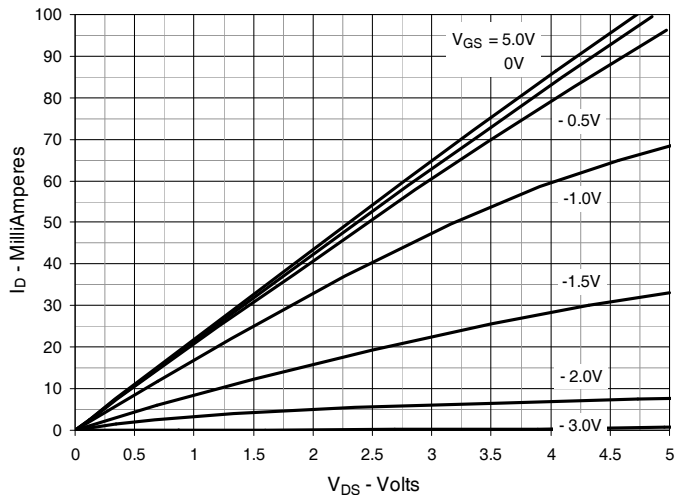


Fig. 2. Output Characteristics @ $T_J = 125^\circ\text{C}$

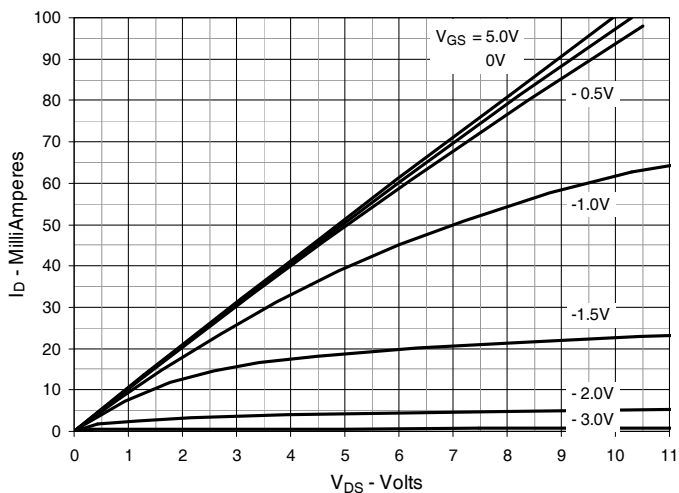


Fig. 3. Drain Current @ $T_J = 25^\circ\text{C}$

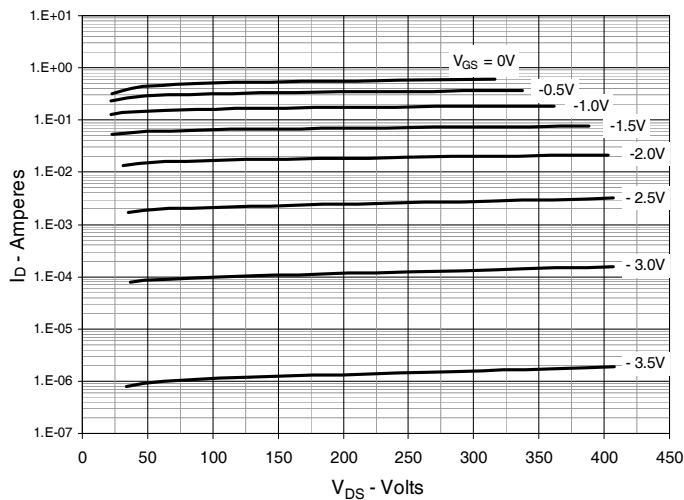


Fig. 4. Drain Current @ $T_J = 100^\circ\text{C}$

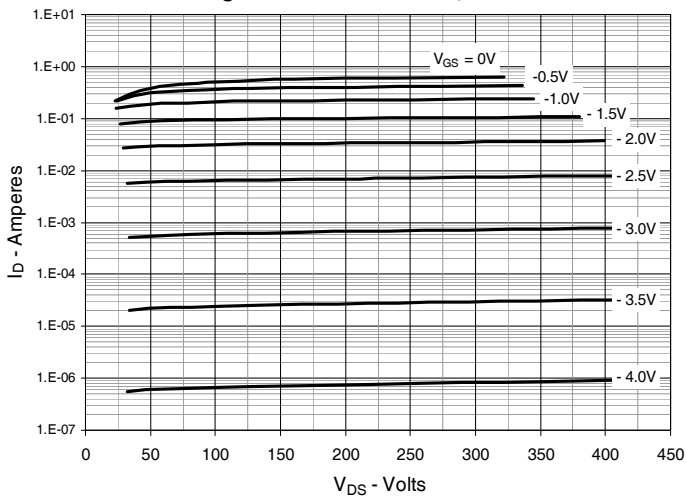


Fig. 5. Dynamic Resistance vs. Gate Voltage

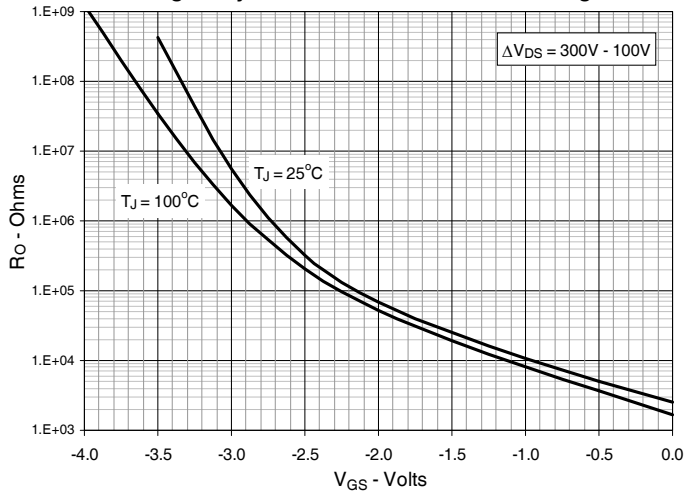


Fig. 6. Normalized $R_{DS(on)}$ vs. Junction Temperature

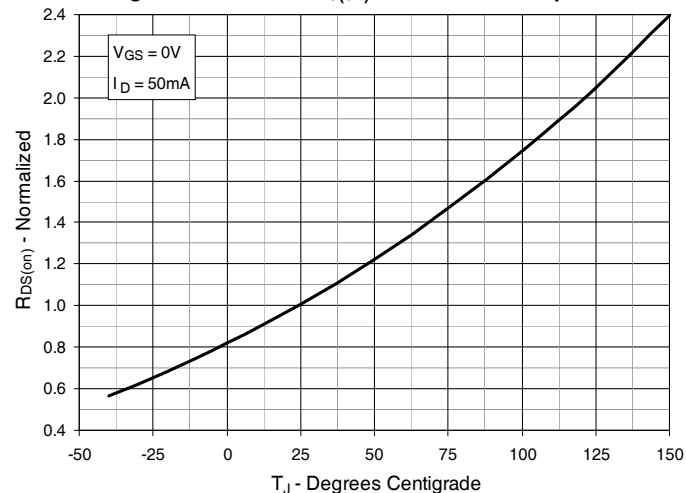


Fig. 7. $R_{DS(on)}$ Normalized to $I_D = 50mA$ Value vs. Drain Current

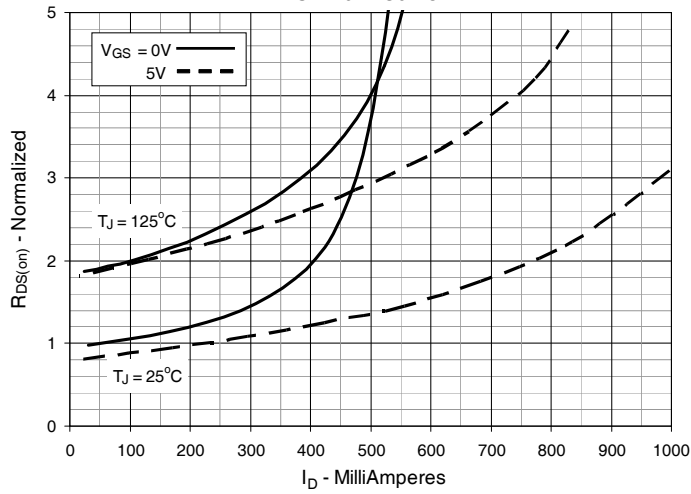


Fig. 8. Input Admittance

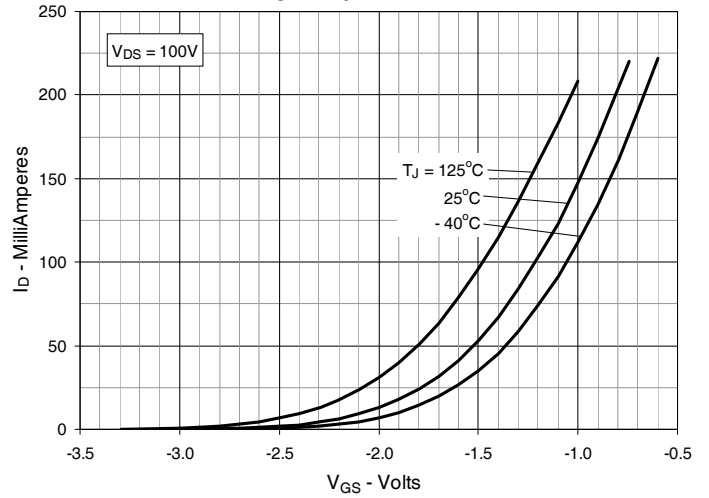


Fig. 9. Transconductance

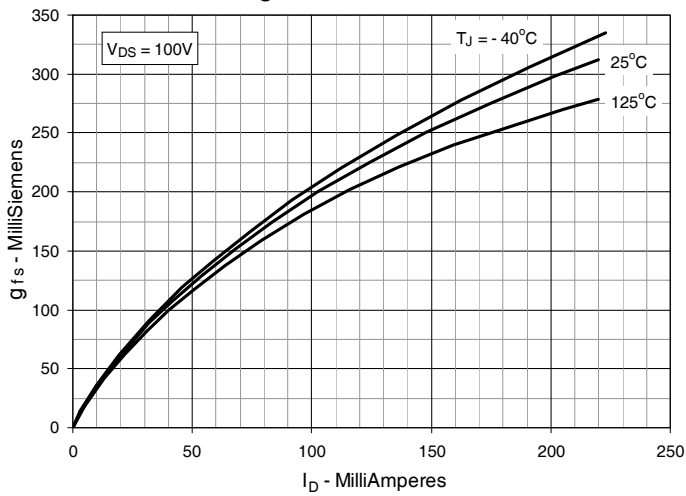


Fig. 10. Forward Voltage Drop of Intrinsic Diode

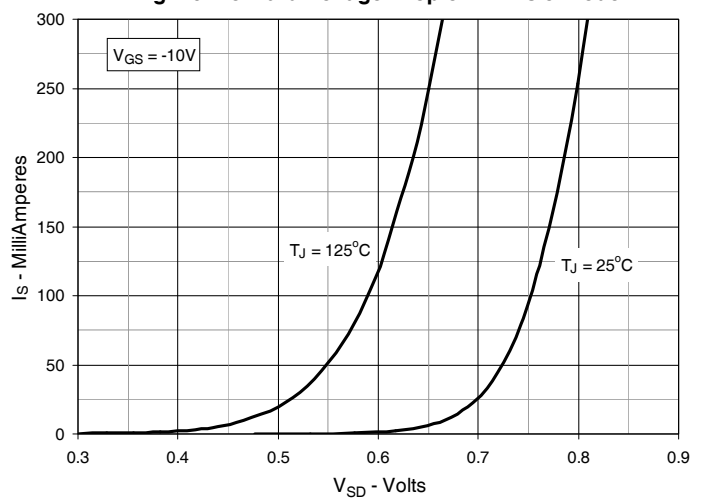


Fig. 11. Capacitance

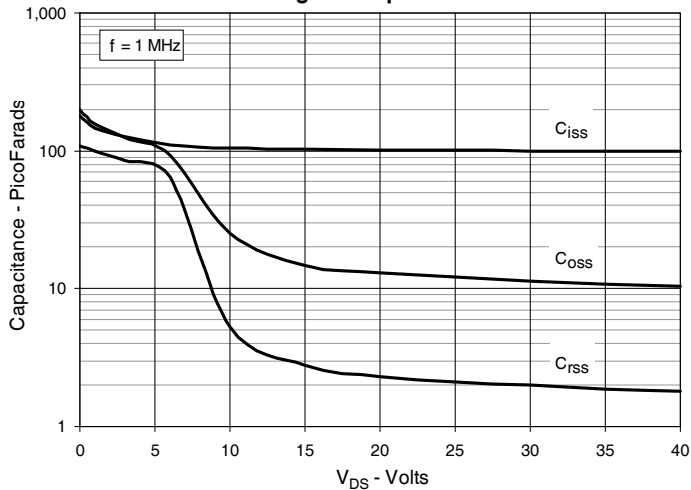


Fig. 12. Gate Charge

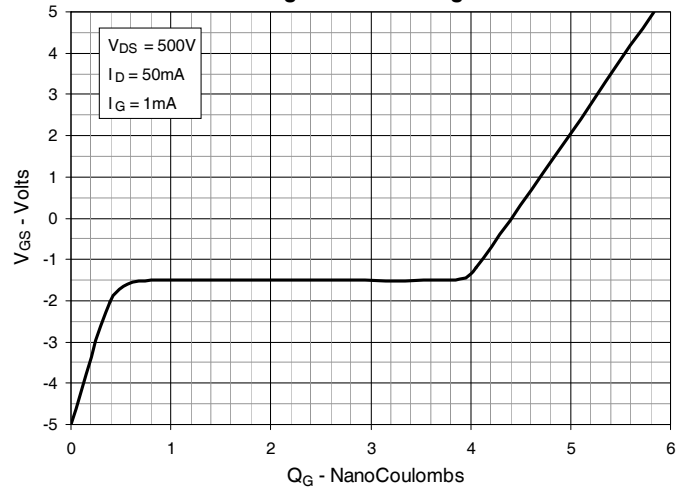


Fig. 13. Forward-Bias Safe Operating Area
@ $T_C = 25^\circ\text{C}$

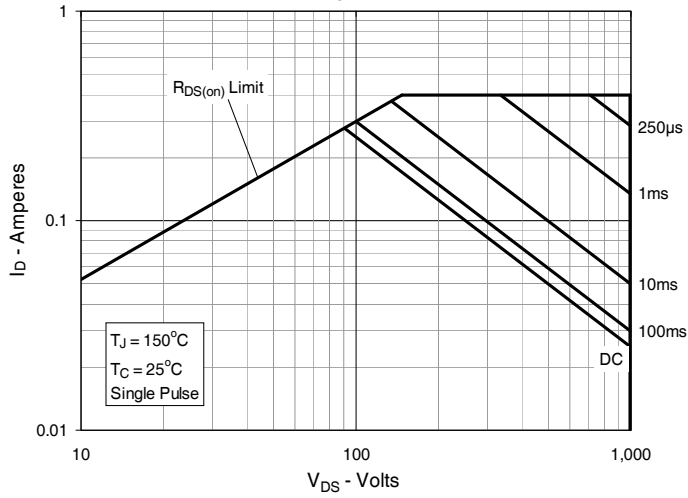


Fig. 14. Forward-Bias Safe Operating Area
@ $T_C = 75^\circ\text{C}$

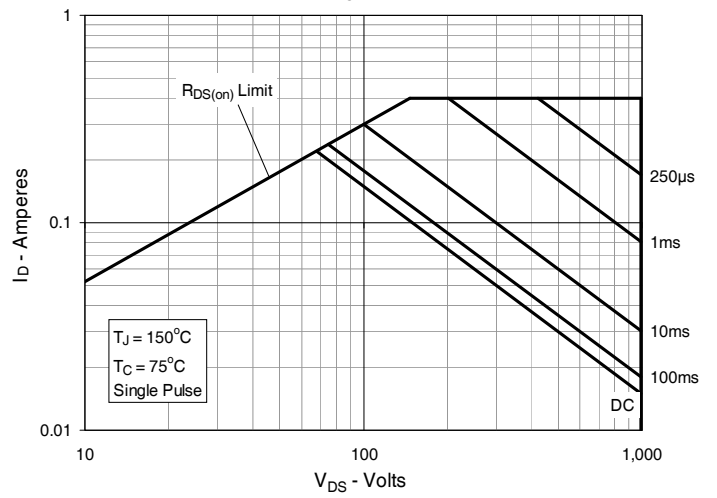
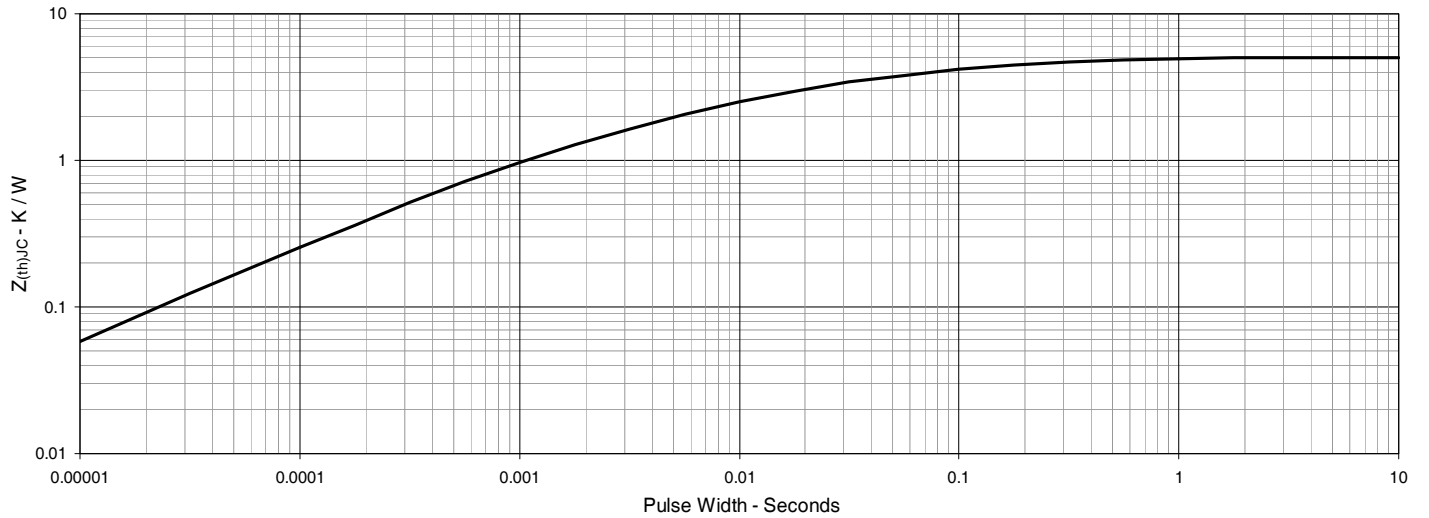
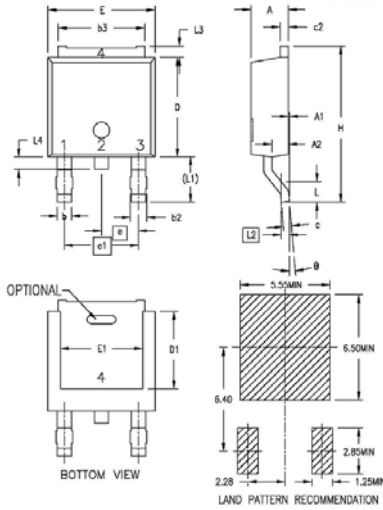


Fig. 15. Maximum Transient Thermal Impedance



TO-252 Outline

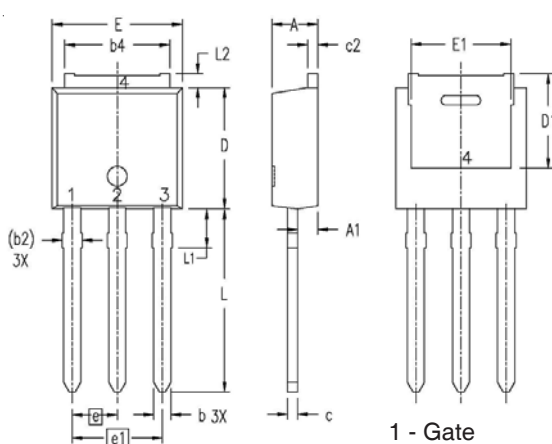


1 - Gate
2,4 - Drain
3 - Source

| 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° | |

NOTE: 1. This drawing comply JEDEC TO-252AA value except L3 dimension.
2. All metal surface are tin plated except trimmed area.

TO-251 Outline

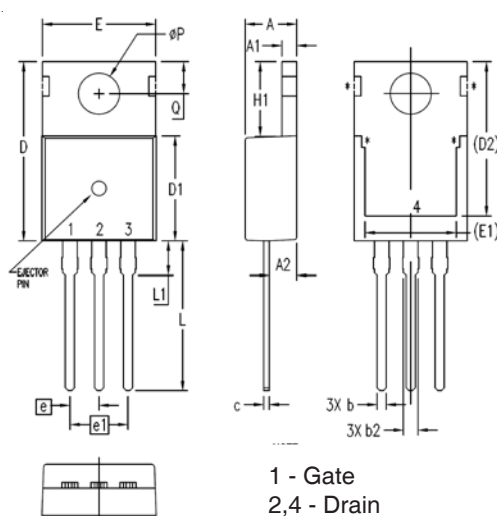


1 - Gate
2,4 - Drain
3 - Source

| 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 | .038 | 0.76 | 0.96 |
| 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 | .358 | .374 | 9.10 | 9.50 |
| L1 | .063 | .079 | 1.60 | 2.00 |
| L2 | .020 | .035 | 0.50 | 0.90 |

NOTE: 1. ALL METAL AREA ARE MATTE PURE TIN PLATED EXCEPT TRIMMED AREA.
2. THESE DIMENSIONS DO NOT INCLUDE PROTRUSIONS OF THE MOLD.
3. THE () MARK IS THE REFERENCE ONLY.

TO-220 Outline



1 - Gate
2,4 - Drain
3 - Source

| 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 |
| ØP | .134 | .150 | 3.40 | 3.80 |
| Q | .106 | .126 | 2.70 | 3.20 |

NOTE: 1. All metal surface are matte pure tin plated except trimmed area.



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