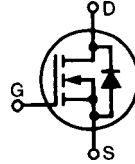


High Voltage Power MOSFETs

IXTA/IXTP 3N120
IXTA/IXTP 3N110

N-Channel Enhancement Mode
Avalanche Rated, High dv/dt

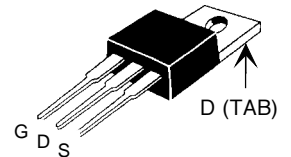
Preliminary Data Sheet



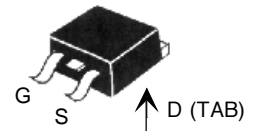
| V_{DSS} | I_{D25} | $R_{DS(on)}$ |
|-----------|-----------|--------------|
| 1200 V | 3 A | 4.5 Ω |
| 1100 V | 3 A | 4.0 Ω |

| Symbol | Test Conditions | Maximum Ratings | | |
|---------------|---|-----------------|-------------|------------------|
| V_{DSS} | $T_J = 25^\circ\text{C}$ to 150°C | 3N120 | 1200 | V |
| | | 3N110 | 1100 | V |
| V_{DGR} | $T_J = 25^\circ\text{C}$ to 150°C ; $R_{GS} = 1\text{ M}\Omega$ | 3N120 | 1200 | V |
| | | 3N110 | 1100 | V |
| V_{GS} | Continuous | | ± 20 | V |
| V_{GSM} | Transient | | ± 30 | V |
| I_{D25} | $T_C = 25^\circ\text{C}$ | | 3 | A |
| I_{DM} | $T_C = 25^\circ\text{C}$, pulse width limited by T_{JM} | | 12 | A |
| I_{AR} | $T_C = 25^\circ\text{C}$ | | 3 | A |
| E_{AR} | $T_C = 25^\circ\text{C}$ | | 20 | mJ |
| E_{AS} | | | 700 | mJ |
| dv/dt | $I_S \leq I_{DM}$, $di/dt \leq 100\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ\text{C}$, $R_G = 2\ \Omega$ | | 5 | V/ns |
| | | | | |
| P_D | $T_C = 25^\circ\text{C}$ | | 150 | W |
| T_J | | | -55 to +150 | $^\circ\text{C}$ |
| T_{JM} | | | 150 | $^\circ\text{C}$ |
| T_{stg} | | | -55 to +150 | $^\circ\text{C}$ |
| T_L | 1.6 mm (0.063 in) from case for 10 s | | 300 | $^\circ\text{C}$ |
| M_d | Mounting torque (TO-220) | | 1.13/10 | Nm/lb.in. |
| Weight | TO-220 | | 4 | g |
| | TO-263 | | 2 | g |

TO-220 (IXTP)



TO-263 (IXTA)



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

Features

- International standard packages
- Low $R_{DS(on)}$
- Rated for unclamped Inductive load Switching (UIS)
- Molding epoxies meet UL 94 V-0 flammability classification

Advantages

- Easy to mount
- Space savings
- High power density

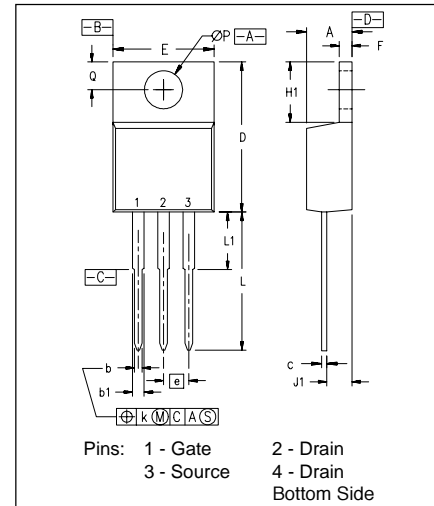
| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | |
|--------------|---|---|------|---------------------|
| | | min. | typ. | max. |
| V_{DSS} | $V_{GS} = 0\text{ V}$, $I_D = 1\text{ mA}$ | 3N120 | 1200 | V |
| | | 3N110 | 1100 | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{A}$ | | 2.5 | V |
| I_{GSS} | $V_{GS} = \pm 20\text{ V}_{DC}$, $V_{DS} = 0$ | | | $\pm 100\text{ nA}$ |
| I_{DSS} | $V_{DS} = 0.8\text{ V}_{DSS}$, $V_{GS} = 0\text{ V}$ | $T_J = 25^\circ\text{C}$ | | 25 μA |
| | | $T_J = 125^\circ\text{C}$ | | 1 mA |
| $R_{DS(on)}$ | $V_{GS} = 10\text{ V}$, $I_D = 0.5\text{ I}_{D25}$ Note 1 | 3N120 | | 4.5 Ω |
| | | 3N110 | | 4.0 Ω |

| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | | |
|--------------|--|---|------|------|----|
| | | min. | typ. | max. | |
| g_{fs} | $V_{DS} = 10\text{ V}; I_D = 0.5 \cdot I_{D25}$, Note 1 | 1.5 | 2.2 | | S |
| C_{iss} | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$ | | 1050 | 1300 | pF |
| C_{oss} | | | 100 | 125 | pF |
| C_{rss} | | | 25 | 50 | pF |
| $t_{d(on)}$ | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$ $R_G = 4.7\ \Omega$ (External), | | 17 | | ns |
| t_r | | | 15 | | ns |
| $t_{d(off)}$ | | | 32 | | ns |
| t_f | | | 18 | | ns |
| $Q_{g(on)}$ | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$ | | 39 | | nC |
| Q_{gs} | | | 9 | | nC |
| Q_{gd} | | | 22 | | nC |
| R_{thJC} | (TO-220) | | | 0.8 | KW |
| R_{thCK} | | | 0.25 | | KW |

| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | | |
|----------|--|---|------|------|----|
| | | min. | typ. | max. | |
| I_S | $V_{GS} = 0\text{ V}$ | | | 3 | A |
| I_{SM} | Repetitive; pulse width limited by T_{JM} | | | 12 | A |
| V_{SD} | $I_F = I_S, V_{GS} = 0\text{ V}$, Note 1 | | | 1.5 | V |
| t_{rr} | $I_F = I_S, -di/dt = 100\text{ A}/\mu\text{s}, V_R = 100\text{ V}$ | | 700 | | ns |

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

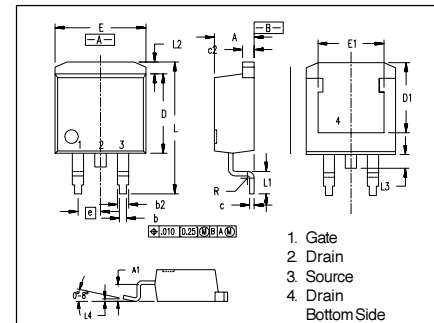
TO-220 (IXTP) Outline



| SYM | INCHES | | MILLIMETERS | |
|-----|----------|------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .170 | .190 | 4.32 | 4.83 |
| b | .025 | .040 | 0.64 | 1.02 |
| b1 | .045 | .065 | 1.15 | 1.65 |
| c | .014 | .022 | 0.35 | 0.56 |
| D | .580 | .630 | 14.73 | 16.00 |
| E | .390 | .420 | 9.91 | 10.66 |
| e | .100 BSC | | 2.54 BSC | |
| F | .045 | .055 | 1.14 | 1.40 |
| H1 | .230 | .270 | 5.85 | 6.85 |
| J1 | .090 | .110 | 2.29 | 2.79 |
| k | 0 | .015 | 0 | 0.38 |
| L | .500 | .550 | 12.70 | 13.97 |
| L1 | .110 | .230 | 2.79 | 5.84 |
| ØP | .139 | .161 | 3.53 | 4.08 |
| Q | .100 | .125 | 2.54 | 3.18 |

NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-220 AB.

TO-263 (IXTA) Outline



| Dim. | Millimeter | | Inches | |
|------|------------|-------|--------|------|
| | Min. | Max. | Min. | Max. |
| A | 4.06 | 4.83 | .160 | .190 |
| A1 | 2.03 | 2.79 | .080 | .110 |
| b | 0.51 | 0.99 | .020 | .039 |
| b2 | 1.14 | 1.40 | .045 | .055 |
| c | 0.46 | 0.74 | .018 | .029 |
| c2 | 1.14 | 1.40 | .045 | .055 |
| D | 8.64 | 9.65 | .340 | .380 |
| D1 | 7.11 | 8.13 | .280 | .320 |
| E | 9.65 | 10.29 | .380 | .405 |
| E1 | 6.86 | 8.13 | .270 | .320 |
| e | 2.54 | BSC | .100 | BSC |
| L | 14.61 | 15.88 | .575 | .625 |
| L1 | 2.29 | 2.79 | .090 | .110 |
| L2 | 1.02 | 1.40 | .040 | .055 |
| L3 | 1.27 | 1.78 | .050 | .070 |
| L4 | 0 | 0.38 | 0 | .015 |
| R | 0.46 | 0.74 | .018 | .029 |

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 4,881,106 5,017,508 5,049,961 5,187,117 5,486,715
4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025

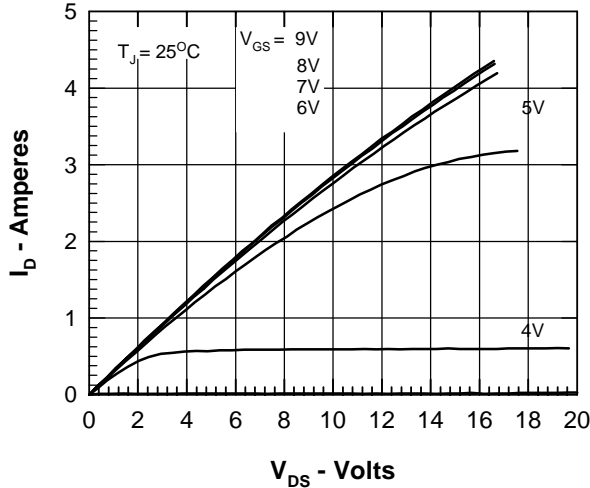


Fig.1 Output Characteristics @ $T_j = 25^\circ\text{C}$

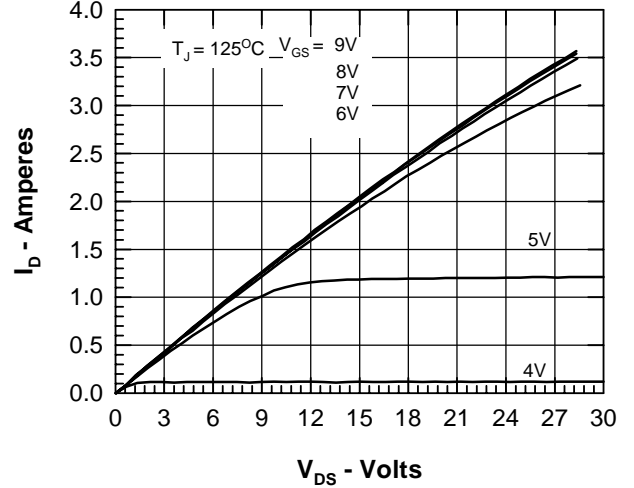


Fig. 2 Output Characteristics @ $T_j = 125^\circ\text{C}$

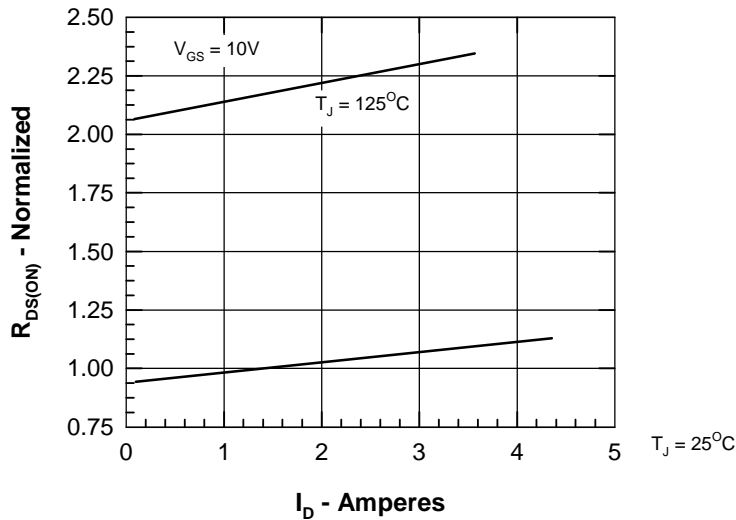


Fig. 3 $R_{DS(on)}$ vs. Drain Current

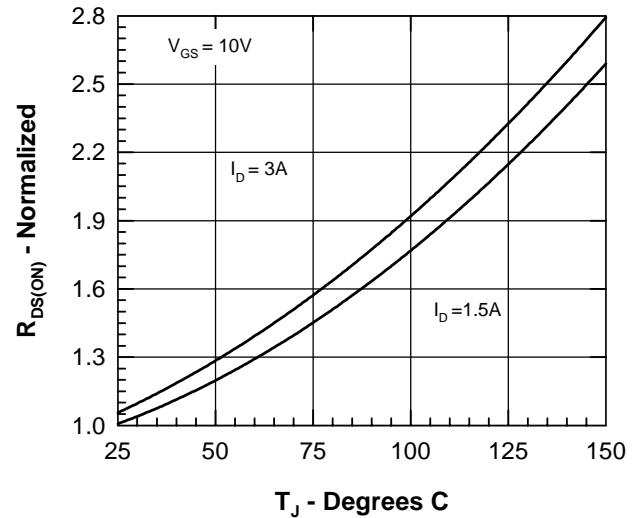


Fig. 4 Temperature Dependence of Drain to Source Resistance

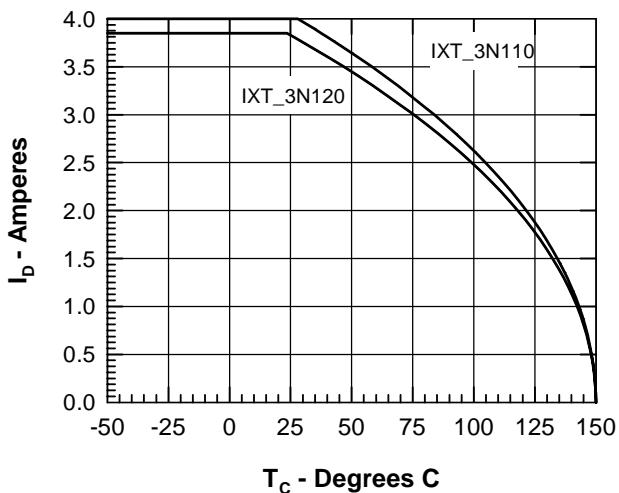


Fig. 5 Drain Current vs. Case Temperature

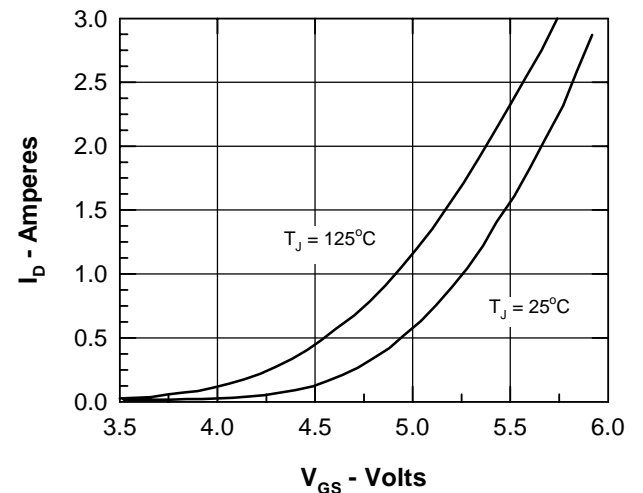


Fig. 6 Drain Current vs. Gate Source Voltage

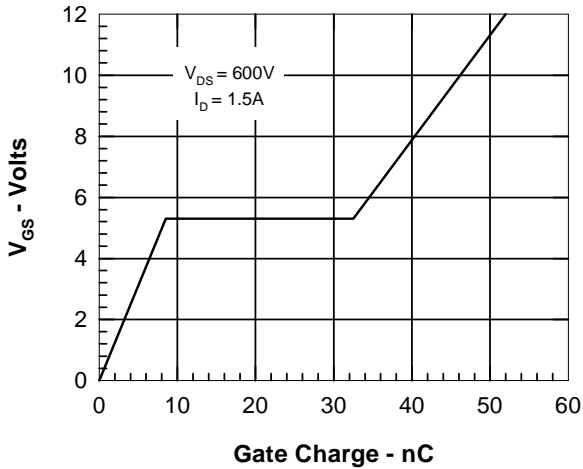


Fig. 7 Gate Charge Characteristic Curve

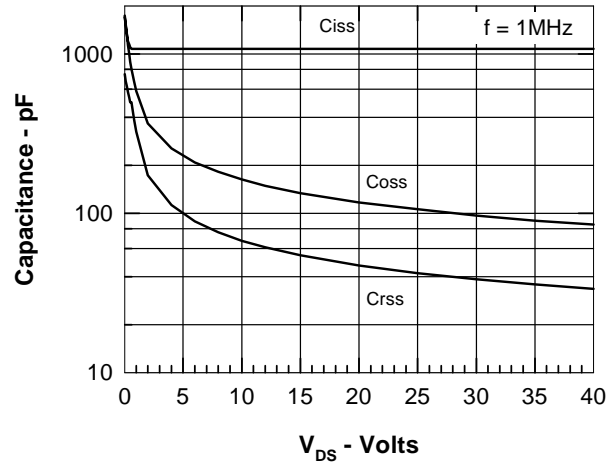


Fig. 8 Capacitance Curves

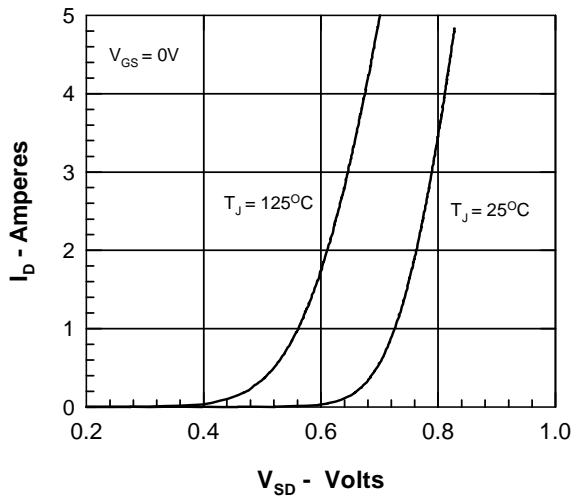


Fig. 9 Drain Current vs Drain to Source Voltage

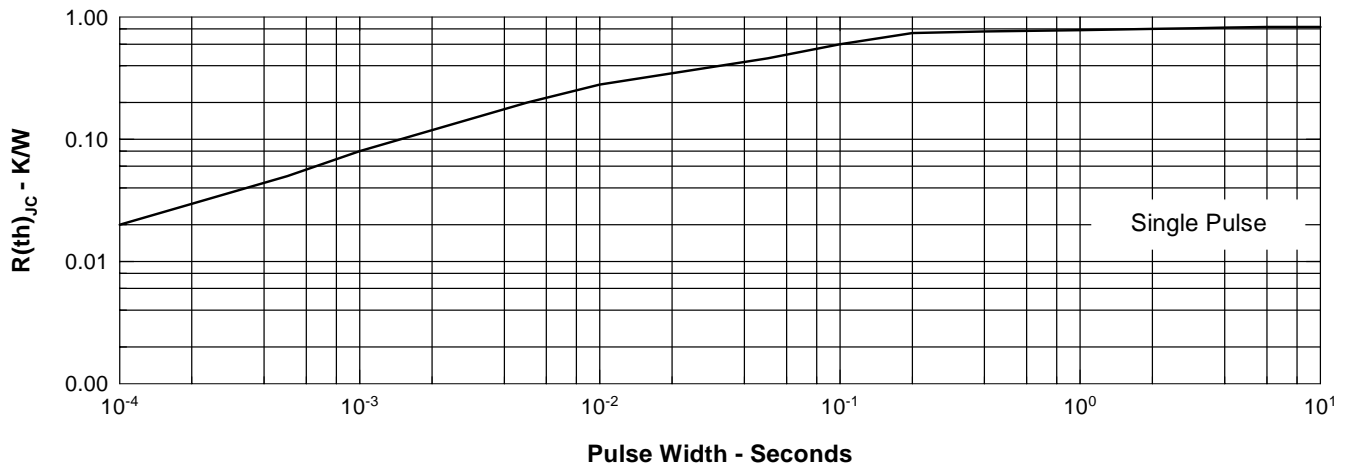


Fig. 10 Transient Thermal Impedance

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IXYS MOSFETS and IGBTs are covered by one or more of the following U.S. patents:

| | | | | | |
|-----------|-----------|-----------|-----------|-----------|-----------|
| 4,835,592 | 4,881,106 | 5,017,508 | 5,049,961 | 5,187,117 | 5,486,715 |
| 4,850,072 | 4,931,844 | 5,034,796 | 5,063,307 | 5,237,481 | 5,381,025 |