

High Voltage MOSFET

N-Channel, Depletion Mode

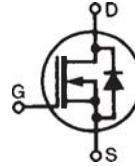
IXTP 02N50D
IXTU 02N50D
IXTY 02N50D

$$V_{DSS} = 500 \text{ V}$$

$$I_{D25} = 200 \text{ mA}$$

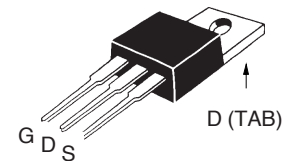
$$R_{DS(on)} = 30 \text{ } \Omega$$

Preliminary Data Sheet

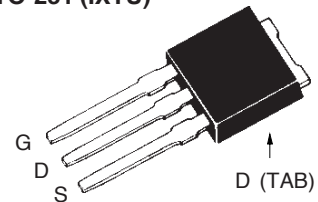


| Symbol | Test Conditions | Maximum Ratings | | |
|------------|--|-----------------|------------------|--------|
| V_{DSX} | $T_J = 25^\circ\text{C}$ to 150°C | 500 | V | |
| V_{DGX} | $T_J = 25^\circ\text{C}$ to 150°C | 500 | V | |
| V_{GS} | Continuous | ± 20 | V | |
| V_{GSM} | Transient | ± 30 | V | |
| I_{DSS} | $T_C = 25^\circ\text{C}$; $T_J = 25^\circ\text{C}$ to 150°C | 200 | mA | |
| I_{DM} | $T_C = 25^\circ\text{C}$, pulse width limited by T_J | 800 | 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 | 1.6 mm (0.063 in.) from case for 10 s | 300 | $^\circ\text{C}$ | |
| T_{ISOL} | Plastic case for 10 s (IXTU) | 300 | $^\circ\text{C}$ | |
| M_d | Mounting torque | TO-220 | 1.3 / 10 | Nm/lb. |
| | | TO-251 | 4 | g |
| | | TO-252 | 0.8 | g |
| Weight | | TO-220 | 4 | g |
| | | TO-251 | 0.8 | g |
| | | TO-252 | 0.8 | g |

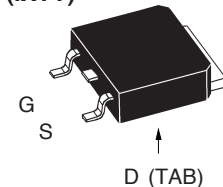
TO-220 (IXTP)



TO-251 (IXTU)



TO-252 (IXTY)



Pins: 1 - Gate 2 - Drain
 3 - Source TAB - Drain

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, unless otherwise specified) | Characteristic Values | | |
|----------------|---|-----------------------|------|----------------------|
| | | min. | typ. | max. |
| V_{DSX} | $V_{GS} = -10 \text{ V}$, $I_D = 25 \text{ } \mu\text{A}$ | 500 | | V |
| $V_{GS(off)}$ | $V_{DS} = 25 \text{ V}$, $I_D = 25 \text{ } \mu\text{A}$ | -2.5 | | -5 V |
| I_{GSS} | $V_{GS} = \pm 20 \text{ V}_{DC}$, $V_{DS} = 0$ | | | $\pm 100 \text{ nA}$ |
| $I_{DSX(off)}$ | $V_{DS} = V_{DSS}$, $V_{GS} = -10 \text{ V}$ $T_J = 125^\circ\text{C}$ | | | 10 μA |
| | | | | 250 μA |
| $R_{DS(on)}$ | $V_{GS} = 0 \text{ V}$, $I_D = 50 \text{ mA}$ Note 1 | | 20 | 30 Ω |
| $I_{D(on)}$ | $V_{GS} = 0 \text{ V}$, $V_{DS} = 25 \text{ V}$ Note 1 | | 250 | mA |

Features

- Normally ON mode
- Low $R_{DS(on)}$ HDMOST™ process
- Rugged polysilicon gate cell structure
- Fast switching speed

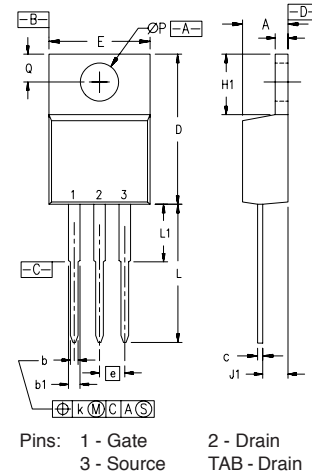
Applications

- Level shifting
- Triggers
- Solid state relays
- Current regulators

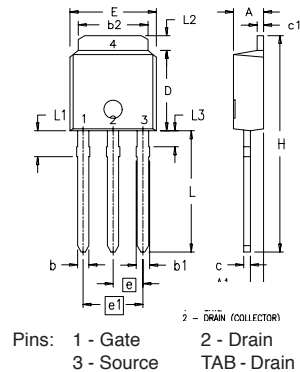
| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | min. typ. max. | | | | |
|--------------|---|---|----------------|---|-----|------|-----|
| | | | g_{fs} | $V_{DS} = 50\text{ V}; I_D = 200\text{ mA}$ Note1 | 100 | 150 | |
| C_{iss} | $V_{GS} = -10\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$ | | | 120 | pF | | |
| C_{oss} | | | | | | 25 | pF |
| C_{rss} | | | | | | 5 | pF |
| $t_{d(on)}$ | $V_{ds} = 100\text{ V V}, I_D = 50\text{ mA}$ $V_{gs} = 0\text{ V to } -10$ $R_G = 30\Omega$ (External) | | | 9 | ns | | |
| t_r | | | | | | 4 | ns |
| $t_{d(off)}$ | | | | | | 28 | ns |
| t_f | | | | | | 45 | ns |
| R_{thJC} | TO-220 | | | 5 | K/W | | |
| R_{thCS} | | | | | | 0.25 | K/W |

| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | min. typ. max. | | |
|----------|---|---|----------------|--|-----|
| | | | V_{SD} | $V_{GS} = -10\text{ V}, I_F = 200\text{ mA}$ Note1 | 0.7 |
| t_{rr} | $I_F = 0.75\text{ A}, -di/dt = 10\text{ A}/\mu\text{s},$ $V_{DS} = 25\text{ V}, V_{GS} = -10\text{ V}$ | | 1.0 | μs | |

Note1: Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $d \leq 2\%$

TO-220 AD 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 |
| ϕP | .139 | .161 | 3.53 | 4.08 |
| Q | .100 | .125 | 2.54 | 3.18 |

TO-251 AA Outline


| Dim. | Millimeter | | Inches | |
|------|------------|-------|----------|-------|
| | Min. | Max. | Min. | Max. |
| A | 2.19 | 2.38 | .086 | .094 |
| A1 | 0.89 | 1.14 | 0.35 | .045 |
| b | 0.64 | 0.89 | .025 | .035 |
| b1 | 0.76 | 1.14 | .030 | .045 |
| b2 | 5.21 | 5.46 | .205 | .215 |
| c | 0.46 | 0.58 | .018 | .023 |
| c1 | 0.46 | 0.58 | .018 | .023 |
| D | 5.97 | 6.22 | .235 | .245 |
| E | 6.35 | 6.73 | .250 | .265 |
| e | 2.28 BSC | | .090 BSC | |
| e1 | 4.57 BSC | | .180 BSC | |
| H | 9.40 | 10.42 | 0.370 | 0.410 |
| L | 0.51 | 1.02 | 0.020 | 0.040 |
| L1 | 0.64 | 1.02 | 0.025 | 0.040 |
| L2 | 0.89 | 1.27 | 0.035 | 0.050 |
| L3 | 2.54 | 2.92 | 0.100 | 0.115 |

TO-252 AA Outline

Pins: 1 - Gate 2 - Drain
3 - Source TAB - Drain

| Dim. | Millimeter | | Inches | |
|------|------------|-------|-----------|-------|
| | Min. | Max. | Min. | Max. |
| A | 2.19 | 2.38 | 0.086 | 0.094 |
| A1 | 0.89 | 1.14 | 0.035 | 0.045 |
| A2 | 0 | 0.13 | 0 | 0.005 |
| b | 0.64 | 0.89 | 0.025 | 0.035 |
| b1 | 0.76 | 1.14 | 0.030 | 0.045 |
| b2 | 5.21 | 5.46 | 0.205 | 0.215 |
| c | 0.46 | 0.58 | 0.018 | 0.023 |
| c1 | 0.46 | 0.58 | 0.018 | 0.023 |
| D | 5.97 | 6.22 | 0.235 | 0.245 |
| D1 | 4.32 | 5.21 | 0.170 | 0.205 |
| E | 6.35 | 6.73 | 0.250 | 0.265 |
| E1 | 4.32 | 5.21 | 0.170 | 0.205 |
| e | 2.28 BSC | | 0.090 BSC | |
| e1 | 4.57 BSC | | 0.180 BSC | |
| H | 9.40 | 10.42 | 0.370 | 0.410 |
| L | 0.51 | 1.02 | 0.020 | 0.040 |
| L1 | 0.64 | 1.02 | 0.025 | 0.040 |
| L2 | 0.89 | 1.27 | 0.035 | 0.050 |
| L3 | 2.54 | 2.92 | 0.100 | 0.115 |

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 | 6,710,405 B2 | 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 | |