IXYS

# Power MOSFET ISOPLUS220™

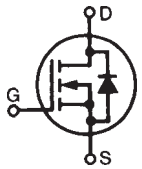
## IXTC 13N50

$V_{DSS}$ = 500 V
$I_{D25}$ = 12 A
$R_{DS(on)}$ = 0.4 Ω

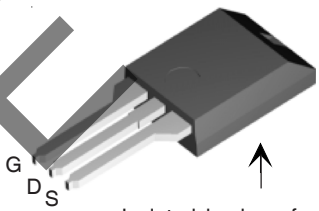
### Electrically Isolated Back Surface

N-Channel Enhancement Mode
High dv/dt, Low $t_{rr}$, HDMOS™ Family

Preliminary Data Sheet




ISOPLUS220™




Isolated back surface*

G = Gate D = Drain
S = Source

| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{DSS}$ | $T_J$ = 25°C to 150°C | 500 | V |
| $V_{DGR}$ | $T_J$ = 25°C to 150°C; $R_{GS}$ = 1 MΩ | 500 | V |
| $V_{GS}$ | Continuous | ±20 | V |
| $V_{GSM}$ | Transient | ±30 | V |
| $I_{D25}$ | $T_C$ = 25°C | 12 | A |
| $I_{DM}$ | $T_C$ = 25°C, pulse width limited by $T_{JM}$ | 48 | A |
| $I_{AR}$ | $T_C$ = 25°C | 13 | A |
| $E_{AR}$ | $T_C$ = 25°C | 18 | mJ |
| dv/dt | $I_S \le I_{DM}$, di/dt ≤ 100 A/μs, $V_{DD} \le V_{DSS}$, $T_J \le 150°C$, $R_G$ = 2 Ω | 5 | V/ns |
| $P_D$ | $T_C$ = 25°C | 140 | W |
| $T_J$ | | -55 ... +150 | °C |
| $T_{JM}$ | | 150 | °C |
| $T_{stg}$ | | -55 ... +150 | °C |
| $T_L$ | 1.6 mm (0.062 in.) from case for 10 s | 300 | °C |
| Weight | | 3 | g |

| Symbol | Test Conditions | | Characteristic Values ($T_J$ = 25°C, unless otherwise specified) min. | typ. | max. | |
|---|---|---|---|---|---|---|
| $V_{DSS}$ | $V_{GS}$ = 0 V, $I_D$ = 250 μA | | 500 | | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D$ = 2.5 mA | | 2 | | 4 | V |
| $I_{GSS}$ | $V_{GS}$ = ±20 $V_{DC}$, $V_{DS}$ = 0 | | | | ±100 | nA |
| $I_{DSS}$ | $V_{DS}$ = 0.8 • $V_{DSS}$ | $T_J$ = 25°C | | | 200 | μA |
| | $V_{GS}$ = 0 V | $T_J$ = 125°C | | | 1 | mA |
| $R_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D = I_T$ Notes 1, 2 | | | | 0.4 | Ω |

### Features

- Silicon chip on Direct-Copper-Bond substrate
  - High power dissipation
  - Isolated mounting surface
  - 2500V electrical isolation
- Low drain to tab capacitance(<35pF)
- Low $R_{DS(on)}$ HDMOS™ process
- Rugged polysilicon gate cell structure
- Unclamped Inductive Switching (UIS) rated

### Applications

- DC-DC converters
- Battery chargers
- Switched-mode and resonant-mode power supplies
- DC choppers
- AC motor control

### Advantages

- Easy assembly: no screws or isolation foils required
- Space savings
- High power density
- Low collector capacitance to ground (low EMI)

**See IXFH13N50 data sheet for characteristic curves**

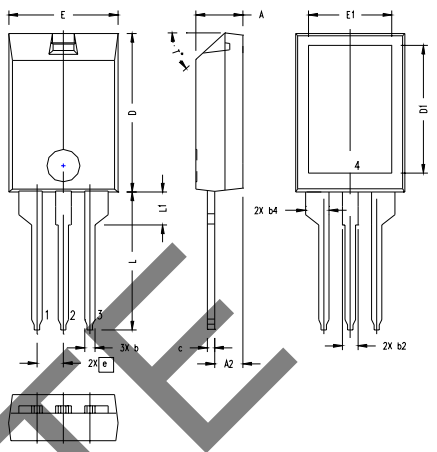
| Symbol | Test Conditions | Characteristic Values ($T_J$ = 25°C, unless otherwise specified) min. | typ. | max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $V_{DS}$ = 10 V; $I_D$ = 0; $I_T$ Notes 1, 2 | 7.5 | 9.0 | | S |
| $C_{iss}$ | | | 2800 | | pF |
| $C_{oss}$ | $V_{GS}$ = 0 V, $V_{DS}$ = 25 V, f = 1 MHz | | 300 | | pF |
| $C_{rss}$ | | | 70 | | pF |
| $t_{d(on)}$ | | | 18 | 30 | ns |
| $t_r$ | $V_{GS}$ = 10 V, $V_{DS}$ = 0.5 • $V_{DSS}$, | | 27 | 40 | ns |
| $t_{d(off)}$ | $I_D$ = 0.5 • $I_{D25}$, $R_G$ = 4.7 Ω (External) | | 76 | 100 | ns |
| $t_f$ | | | 32 | 60 | ns |
| $Q_{g(on)}$ | | | 110 | 120 | nC |
| $Q_{gs}$ | $V_{GS}$ = 10 V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = $I_T$ | | 15 | 25 | nC |
| $Q_{gd}$ | | | 40 | 50 | nC |
| $R_{thJC}$ | | | | 0.90 | K/W |
| $R_{thCK}$ | | | 0.30 | | K/W |

**Source-Drain Diode**

| Symbol | Test Conditions | Characteristic Values ($T_J$ = 25°C, unless otherwise specified) min. | typ. | max. | |
|---|---|---|---|---|---|
| $I_S$ | $V_{GS}$ = 0 V | | | 13 | A |
| $I_{SM}$ | Repetitive; pulse width limited by $T_{JM}$ | | | 52 | A |
| $V_{SD}$ | $I_F$ = $I_S$, $V_{GS}$ = 0 V, Note 1 | | | 1.5 | V |
| $t_{rr}$ | $I_F$ = $I_S$ -di/dt = 100 A/µs, $V_R$ = 100 V | | 600 | | ns |

Note: 1. Pulse test, t ≤ 300 µs, duty cycle d ≤ 2 %
2. $I_T$ test current: $I_T$ = 6.5A

**ISOPLUS220 Outline**




| SYM | INCHES MIN | INCHES MAX | MILLIMETERS MIN | MILLIMETERS MAX |
|---|---|---|---|---|
| A | .157 | .197 | 4.00 | 5.00 |
| A2 | .098 | .118 | 2.50 | 3.00 |
| b | .035 | .051 | 0.90 | 1.30 |
| b2 | .049 | .065 | 1.25 | 1.65 |
| b4 | .093 | .100 | 2.35 | 2.55 |
| c | .028 | .039 | 0.70 | 1.00 |
| D | .591 | .630 | 15.00 | 16.00 |
| D1 | .472 | .512 | 12.00 | 13.00 |
| E | .394 | .433 | 10.00 | 11.00 |
| E1 | .295 | .335 | 7.50 | 8.50 |
| e | .100 BASIC | | 2.55 BASIC | |
| L | .512 | .571 | 13.00 | 14.50 |
| L1 | .118 | .138 | 3.00 | 3.50 |
| T° | | | 42.5° | 47.5° |

NOTE:
1. Bottom heatsink (Pin 4) is electrically isolated from Pin 1, 2, or 3.
2. This drawing will meet dimensional requirement of JEDEC SS Product Outline TO-273 except D and D1 dimension.



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 6,306,728B1 6,259,123B1 6,306,728B1 4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025 6,404,065B1 6,162,665 6,534,343