

# Power MOSFET ISOPLUS220™

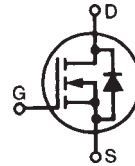
## IXTC 13N50

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

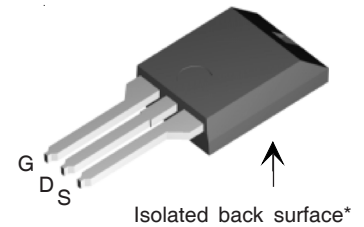
### Electrically Isolated Back Surface

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

### Preliminary Data Sheet



ISOPLUS220™



G = Gate      D = Drain  
 S = Source

| Symbol    | Test Conditions  | Maximum Ratings |                  |
|-----------|--|-----------------|------------------|
| $V_{DSS}$ | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$  | 500             | V                |
| $V_{DGR}$ | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1 \text{ M}\Omega$   | 500             | V                |
| $V_{GS}$  | Continuous   | $\pm 20$        | V                |
| $V_{GSM}$ | Transient  | $\pm 30$        | V                |
| $I_{D25}$ | $T_C = 25^\circ\text{C}$   | 12              | A                |
| $I_{DM}$  | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$   | 48              | A                |
| $I_{AR}$  | $T_C = 25^\circ\text{C}$   | 13              | A                |
| $E_{AR}$  | $T_C = 25^\circ\text{C}$   | 18              | mJ               |
| dv/dt     | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 2 \text{ } \Omega$ | 5               | V/ns             |
| $P_D$     | $T_C = 25^\circ\text{C}$   | 140             | 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 (0.062 in.) from case for 10 s  | 300             | $^\circ\text{C}$ |
| Weight    |  | 3               | g                |

### 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

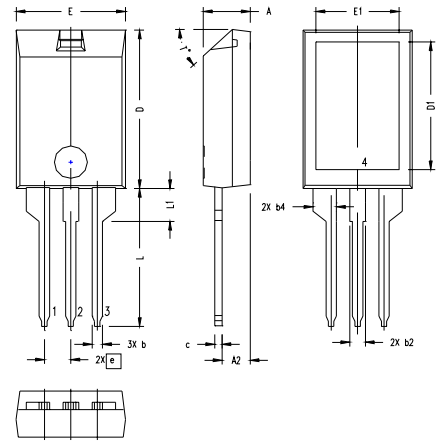
| Symbol       | Test Conditions   | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                           |
|--------------|---|---|------|---------------------------|
|              |   | min.  | typ. | max.                      |
| $V_{DSS}$    | $V_{GS} = 0 \text{ V}$ , $I_D = 250 \text{ } \mu\text{A}$   | 500   |      | V                         |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 2.5 \text{ mA}$  | 2   |      | V                         |
| $I_{GSS}$    | $V_{GS} = \pm 20 \text{ V}_{DC}$ , $V_{DS} = 0$   |   |      | $\pm 100 \text{ nA}$      |
| $I_{DSS}$    | $V_{DS} = 0.8 \cdot V_{DSS}$ , $T_J = 25^\circ\text{C}$<br>$V_{GS} = 0 \text{ V}$ , $T_J = 125^\circ\text{C}$ |   |      | 200 $\mu\text{A}$<br>1 mA |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = I_T$<br>Notes 1, 2   |   |      | 0.4 $\Omega$              |

| Symbol       | Test Conditions   | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |      |     |
|--------------|---|---|------|------|-----|
|              |   | min.  | typ. | max. |     |
| $g_{fs}$     | $V_{DS} = 10\text{ V}; I_D = 0; I_T$ Notes 1, 2   | 7.5   | 9.0  | S    |     |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$   |   | 2800 | pF   |     |
| $C_{oss}$    |   |   | 300  | pF   |     |
| $C_{rss}$    |   |   | 70   | 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) |   | 18   | 30   | ns  |
| $t_r$        |   |   | 27   | 40   | ns  |
| $t_{d(off)}$ |   |   | 76   | 100  | ns  |
| $t_f$        |   |   | 32   | 60   | ns  |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = I_T$   |   | 110  | 120  | nC  |
| $Q_{gs}$     |   |   | 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<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |      |    |
|----------|--|---|------|------|----|
|          |  | min.  | typ. | max. |    |
| $I_S$    | $V_{GS} = 0\text{ V}$  |   |      | 13   | A  |
| $I_{SM}$ | Repetitive; pulse width limited by $T_{JM}$                                  |   |      | 52   | A  |
| $V_{SD}$ | $I_F = I_S, V_{GS} = 0\text{ V}$ ,<br>Note 1                                 |   |      | 1.5  | V  |
| $t_{rr}$ | $I_F = I_S$<br>$-di/dt = 100\text{ A}/\mu\text{s}$ ,<br>$V_R = 100\text{ V}$ |   | 600  |      | ns |

Note: 1. Pulse test,  $t \leq 300\ \mu\text{s}$ , duty cycle  $d \leq 2\%$   
 2.  $I_T$  test current:  $I_T = 6.5\text{ A}$

**ISOPLUS220 Outline**


| SYM | INCHES     |      | MILLIMETERS |       |
|-----|------------|------|-------------|-------|
|     | MIN        | MAX  | MIN         | 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 10-273 except D and D1 dimension.