

# HiPerFET™ Power MOSFETs ISOPLUS247™

(Electrically Isolated Backside)

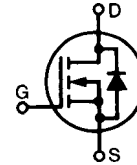
N-Channel Enhancement Mode  
Avalanche Rated, High dv/dt, Low  $t_{rr}$

Preliminary data sheet

IXFR 180N06

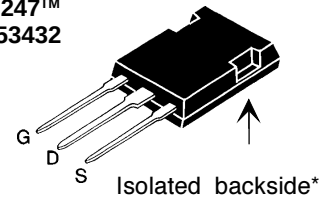
$$\begin{aligned} V_{DSS} &= 60 \text{ V} \\ I_{D25} &= 180 \text{ A} \\ R_{DS(on)} &= 5 \text{ m}\Omega \end{aligned}$$

$$t_{rr} \leq 200 \text{ ns}$$



| Symbol       | Test Conditions                                                                                                                       | Maximum Ratings |                  |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$    | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                                                                                       | 60              | V                |
| $V_{DGR}$    | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1 \text{ M}\Omega$                                                        | 60              | V                |
| $V_{GS}$     | Continuous                                                                                                                            | $\pm 20$        | V                |
| $V_{GSM}$    | Transient                                                                                                                             | $\pm 30$        | V                |
| $I_{D25}$    | $T_C = 25^\circ\text{C}$ (MOSFET chip capability)                                                                                     | 180             | A                |
| $I_{D(RMS)}$ | External lead (current limit)                                                                                                         | 76              | A                |
| $I_{DM}$     | $T_C = 25^\circ\text{C}$ , Note 1                                                                                                     | 720             | A                |
| $I_{AR}$     | $T_C = 25^\circ\text{C}$                                                                                                              | 180             | A                |
| $E_{AR}$     | $T_C = 25^\circ\text{C}$                                                                                                              | 60              | mJ               |
| $E_{AS}$     | $T_C = 25^\circ\text{C}$                                                                                                              | 3               | J                |
| dv/dt        | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 2 \Omega$ | 5               | V/ns             |
| $P_D$        | $T_C = 25^\circ\text{C}$                                                                                                              | 560             | 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             | $^\circ\text{C}$ |
| $V_{ISOL}$   | 50/60 Hz, RMS $t = 1 \text{ min}$                                                                                                     | 2500            | V~               |
| Weight       |                                                                                                                                       | 5               | g                |

ISOPLUS 247™  
E153432



G = Gate D = Drain  
S = Source

\* Patent pending

## Features

- Silicon chip on Direct-Copper-Bond substrate
- High power dissipation
- Isolated mounting surface
- 2500V electrical isolation
- Low drain to tab capacitance (<30pF)
- Low  $R_{DS(on)}$  HDMOS™ process
- Rugged polysilicon gate cell structure
- Rated for Unclamped Inductive Load Switching (UIS)
- Fast intrinsic Rectifier

## Applications

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

## Advantages

- Easy assembly
- Space savings
- High power density

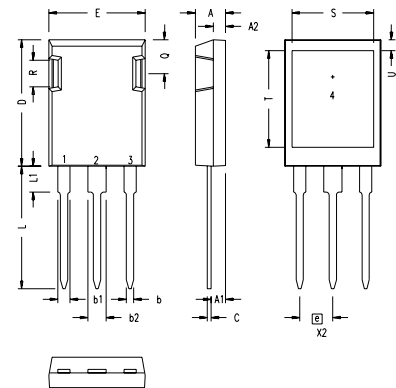
| Symbol       | Test Conditions                                     | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                                     |
|--------------|-----------------------------------------------------|-----------------------------------------------------------------------------------|------|-------------------------------------|
|              |                                                     | min.                                                                              | typ. | max.                                |
| $V_{DSS}$    | $V_{GS} = 0 \text{ V}$ , $I_D = 3 \text{ mA}$       | 60                                                                                |      | V                                   |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 8 \text{ mA}$            | 2.0                                                                               |      | 4.0 V                               |
| $I_{GSS}$    | $V_{GS} = \pm 20 \text{ V}$ , $V_{DS} = 0$          |                                                                                   |      | $\pm 100 \text{ nA}$                |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0 \text{ V}$        |                                                                                   |      | $100 \mu\text{A}$<br>$2 \text{ mA}$ |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = I_T$<br>Notes 2, 3 |                                                                                   |      | 5 mΩ                                |

| Symbol       | Test Conditions                                                                                           |        | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |      |
|--------------|-----------------------------------------------------------------------------------------------------------|--------|-----------------------------------------------------------------------------------|------|------|
|              |                                                                                                           |        | min.                                                                              | typ. | max. |
| $g_{fs}$     | $V_{DS} = 10\text{ V}; I_D = 60\text{ A}$                                                                 | Note 2 | 55                                                                                | 90   | S    |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                             |        |                                                                                   | 7650 | pF   |
| $C_{oss}$    |                                                                                                           |        |                                                                                   | 4600 | pF   |
| $C_{rss}$    |                                                                                                           |        |                                                                                   | 2700 | pF   |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = I_T$<br>$R_G = 1\ \Omega$ (External), Notes 2, 3 |        |                                                                                   | 63   | ns   |
| $t_r$        |                                                                                                           |        |                                                                                   | 100  | ns   |
| $t_{d(off)}$ |                                                                                                           |        |                                                                                   | 130  | ns   |
| $t_f$        |                                                                                                           |        |                                                                                   | 55   | ns   |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = I_T$<br>Notes 2, 3                               |        |                                                                                   | 420  | nC   |
| $Q_{gs}$     |                                                                                                           |        |                                                                                   | 65   | nC   |
| $Q_{gd}$     |                                                                                                           |        |                                                                                   | 220  | nC   |
| $R_{thJC}$   |                                                                                                           |        |                                                                                   | 0.30 | K/W  |
| $R_{thCK}$   |                                                                                                           |        |                                                                                   | 0.15 | K/W  |

| Source-Drain Diode |                                                                            | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |               |
|--------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------|
| Symbol             | Test Conditions                                                            | min.                                                                              | typ. | max.          |
| $I_S$              | $V_{GS} = 0\text{ V}$                                                      |                                                                                   |      | 180 A         |
| $I_{SM}$           | Repetitive; Note 1                                                         |                                                                                   |      | 720 A         |
| $V_{SD}$           | $I_F = I_T, V_{GS} = 0\text{ V}$ , Notes 2, 3                              |                                                                                   |      | 1.3 V         |
| $t_{rr}$           | $I_F = 50\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}, V_R = 100\text{ V}$ |                                                                                   | 0.5  | 200 ns        |
| $Q_{RM}$           |                                                                            |                                                                                   |      | $\mu\text{C}$ |
| $I_{RM}$           |                                                                            |                                                                                   |      | 4 A           |

Note: 1. Pulse width limited by  $T_{JM}$   
 2. Pulse test,  $t \leq 300\ \mu\text{s}$ , duty cycle  $d \leq 2\%$   
 3.  $I_T = 90\text{ A}$

### ISOPLUS 247 OUTLINE



| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .190     | .205 | 4.83        | 5.21  |
| A1  | .090     | .100 | 2.29        | 2.54  |
| A2  | .075     | .085 | 1.91        | 2.16  |
| b   | .045     | .055 | 1.14        | 1.40  |
| b1  | .075     | .084 | 1.91        | 2.13  |
| b2  | .115     | .123 | 2.92        | 3.12  |
| C   | .024     | .031 | 0.61        | 0.80  |
| D   | .819     | .840 | 20.80       | 21.34 |
| E   | .620     | .635 | 15.75       | 16.13 |
| e   | .215 BSC |      | 5.45 BSC    |       |
| L   | .780     | .800 | 19.81       | 20.32 |
| L1  | .150     | .170 | 3.81        | 4.32  |
| Q   | .220     | .244 | 5.59        | 6.20  |
| R   | .170     | .190 | 4.32        | 4.83  |
| S   | .520     | .540 | 13.21       | 13.72 |
| T   | .620     | .640 | 15.75       | 16.26 |
| U   | .065     | .080 | 1.65        | 2.03  |

- 1 - GATE
- 2 - DRAIN (COLLECTOR)
- 3 - SOURCE (EMITTER)
- 4 - NO CONNECTION

NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-247AD except screw hole.