

# HiPerRF™

## Power MOSFETs

### F-Class: MegaHertz Switching

N-Channel Enhancement Mode  
Avalanche Rated, Low  $Q_g$ , Low Intrinsic  $R_g$   
High  $dV/dt$ , Low  $t_{rr}$

**IXFR 55N50F**

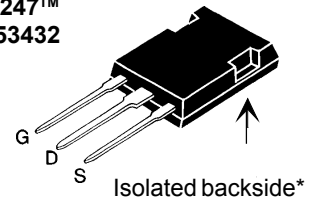
$$\begin{aligned} V_{DSS} &= 500 \text{ V} \\ I_{D25} &= 47 \text{ A} \\ R_{DS(on)} &= 85 \text{ m}\Omega \end{aligned}$$

$$t_{rr} \leq 250 \text{ ns}$$



| 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                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                                                                              | 47              | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                            | 220             | A                |
| $I_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                              | 55              | A                |
| $E_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                              | 60              | mJ               |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                                                                                              | 3.0             | J                |
| $dv/dt$    | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 2 \Omega$ | 10              | V/ns             |
| $P_D$      | $T_C = 25^\circ\text{C}$                                                                                                              | 400             | W                |
| $T_J$      |                                                                                                                                       | -40 ... +150    | $^\circ\text{C}$ |
| $T_{JM}$   |                                                                                                                                       | 150             | $^\circ\text{C}$ |
| $T_{stg}$  |                                                                                                                                       | -40 ... +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 TAB = Electrically Isolated

#### Features

- Silicon chip on Direct-Copper-Bond substrate
  - High power dissipation
  - Isolated mounting surface
  - 2500V electrical isolation
- RF capable Mosfets
- Low gate charge and capacitances
  - easier to drive
  - faster switching
- 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

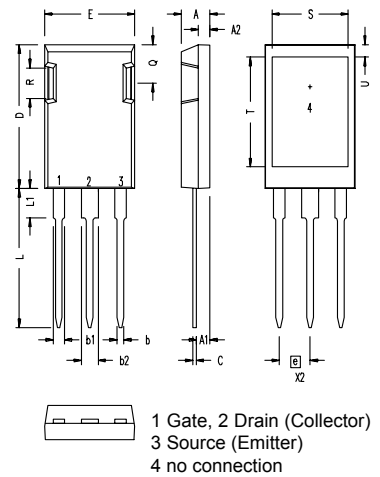
| Symbol       | Test Conditions                                     | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                           |
|--------------|-----------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------------------|
|              |                                                     | min.                                                                              | typ. | max.                      |
| $V_{DSS}$    | $V_{GS} = 0 \text{ V}$ , $I_D = 1 \text{ mA}$       | 500                                                                               |      | V                         |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 8 \text{ mA}$            | 3.0                                                                               |      | 5.5 V                     |
| $I_{GSS}$    | $V_{GS} = \pm 20 \text{ V}$ , $V_{DS} = 0$          |                                                                                   |      | $\pm 200 \text{ nA}$      |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0 \text{ V}$        |                                                                                   |      | 100 $\mu\text{A}$<br>3 mA |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = I_T$<br>Notes 2, 3 |                                                                                   |      | 85 m $\Omega$             |

| Symbol       | Test Conditions                                                                               |            | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |      |
|--------------|-----------------------------------------------------------------------------------------------|------------|-----------------------------------------------------------------------------------|------|------|
|              |                                                                                               |            | min.                                                                              | typ. | max. |
| $g_{fs}$     | $V_{DS} = 10\text{ V}; I_D = I_T$                                                             | Notes 2, 3 | 22                                                                                | 33   | S    |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                 |            |                                                                                   | 6700 | pF   |
| $C_{oss}$    |                                                                                               |            |                                                                                   | 1250 | pF   |
| $C_{rss}$    |                                                                                               |            |                                                                                   | 330  | 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) |            |                                                                                   | 24   | ns   |
| $t_r$        |                                                                                               |            |                                                                                   | 20   | ns   |
| $t_{d(off)}$ |                                                                                               |            |                                                                                   | 45   | ns   |
| $t_f$        |                                                                                               |            |                                                                                   | 9.6  | ns   |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = I_T$                                 |            |                                                                                   | 195  | nC   |
| $Q_{gs}$     |                                                                                               |            |                                                                                   | 50   | nC   |
| $Q_{gd}$     |                                                                                               |            |                                                                                   | 95   | 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.              |
| $I_S$              | $V_{GS} = 0\text{ V}$                                                      |                                                                                   |      | 55 A              |
| $I_{SM}$           | Repetitive;<br>pulse width limited by $T_{JM}$                             |                                                                                   |      | 220 A             |
| $V_{SD}$           | $I_F = I_S, V_{GS} = 0\text{ V}$ , Note 1                                  |                                                                                   |      | 1.5 V             |
| $t_{rr}$           | $I_F = 25\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}, V_R = 100\text{ V}$ |                                                                                   |      | 250 ns            |
| $Q_{RM}$           |                                                                            |                                                                                   |      | 1.0 $\mu\text{C}$ |
| $I_{RM}$           |                                                                            |                                                                                   |      | 10 A              |

Note: 1. Pulse width limited by  $T_{JM}$   
 2. Pulse test,  $t \leq 300\ \mu\text{s}$ , duty cycle  $d \leq 2\%$   
 3.  $I_T = 10.5\text{ A}$

### ISOPLUS 247 OUTLINE



| Dim.           | Millimeter |       | Inches   |      |
|----------------|------------|-------|----------|------|
|                | Min.       | Max.  | Min.     | Max. |
| A              | 4.83       | 5.21  | .190     | .205 |
| A <sub>1</sub> | 2.29       | 2.54  | .090     | .100 |
| A <sub>2</sub> | 1.91       | 2.16  | .075     | .085 |
| b              | 1.14       | 1.40  | .045     | .055 |
| b <sub>1</sub> | 1.91       | 2.13  | .075     | .084 |
| b <sub>2</sub> | 2.92       | 3.12  | .115     | .123 |
| C              | 0.61       | 0.80  | .024     | .031 |
| D              | 20.80      | 21.34 | .819     | .840 |
| E              | 15.75      | 16.13 | .620     | .635 |
| e              | 5.45 BSC   |       | .215 BSC |      |
| L              | 19.81      | 20.32 | .780     | .800 |
| L1             | 3.81       | 4.32  | .150     | .170 |
| Q              | 5.59       | 6.20  | .220     | .244 |
| R              | 4.32       | 4.83  | .170     | .190 |