

# HiPerFET™

## Power MOSFETs

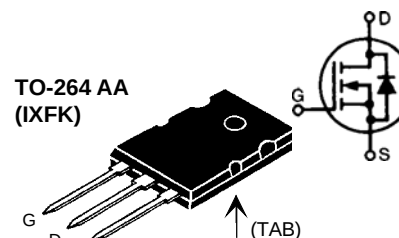
IXFK / IXFN 44 N50  
IXFK / IXFN 48 N50

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

| $V_{DSS}$            | $I_{D25}$ | $R_{DS(on)}$  |
|----------------------|-----------|---------------|
| 500 V                | 44 A      | 0.12 $\Omega$ |
| 500 V                | 48 A      | 0.10 $\Omega$ |
| $t_{rr} \leq 250$ ns |           |               |

| Symbol     | Test Conditions                                                                                                                   | Maximum Ratings |          |                  |
|------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------|----------|------------------|
|            |                                                                                                                                   | IXFK            | IXFN     |                  |
| $V_{DSS}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                                                                                   | 500             | 500      | V                |
| $V_{DGR}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1$ M $\Omega$                                                         | 500             | 500      | V                |
| $V_{GS}$   | Continuous                                                                                                                        | $\pm 20$        | $\pm 20$ | V                |
| $V_{GSM}$  | Transient                                                                                                                         | $\pm 30$        | $\pm 30$ | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                                                                          | 44N50           | 44       | A                |
|            |                                                                                                                                   | 48N50           | 48       | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                        | 44N50           | 176      | A                |
|            |                                                                                                                                   | 48N50           | 192      | A                |
| $I_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                          | 24              | 24       | A                |
| $E_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                          | 30              | 30       | mJ               |
| dv/dt      | $I_S \leq I_{DM}$ , di/dt $\leq 100$ A/ $\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$ , $R_G = 2$ $\Omega$ | 5               | 5        | V/ns             |
| $P_D$      | $T_C = 25^\circ\text{C}$                                                                                                          | 500             | 520      | 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 $t = 1$ min                                                                                                         | -               | 2500     | V~               |
|            | $I_{ISOL} \leq 1$ mA $t = 1$ s                                                                                                    | -               | 3000     | V~               |
| $M_d$      | Mounting torque                                                                                                                   | 0.9/6           | 1.5/13   | Nm/lb.in.        |
|            | Terminal connection torque                                                                                                        | -               | 1.5/13   | Nm/lb.in.        |
| Weight     |                                                                                                                                   | 10              | 30       | g                |

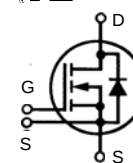
| Symbol                                                           | Test Conditions                                         | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                   |
|------------------------------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------------------------------|------|-------------------|
|                                                                  |                                                         | min.                                                                              | typ. | max.              |
| $V_{DSS}$                                                        | $V_{GS} = 0$ V, $I_D = 1$ mA                            | 500                                                                               |      | V                 |
| $V_{GS(th)}$                                                     | $V_{DS} = V_{GS}$ , $I_D = 8$ mA                        | 2                                                                                 |      | V                 |
| $I_{GSS}$                                                        | $V_{GS} = \pm 20$ V <sub>DC</sub> , $V_{DS} = 0$        |                                                                                   |      | $\pm 200$ nA      |
| $I_{DSS}$                                                        | $V_{DS} = 0.8 \cdot V_{DSS}$ , $T_J = 25^\circ\text{C}$ |                                                                                   |      | 400 $\mu\text{A}$ |
|                                                                  | $V_{GS} = 0$ V, $T_J = 125^\circ\text{C}$               |                                                                                   |      | 2 mA              |
| $R_{DS(on)}$                                                     | $V_{GS} = 10$ V, $I_D = 0.5 \cdot I_{D25}$              | 44N50                                                                             |      | 0.12 $\Omega$     |
|                                                                  |                                                         | 48N50                                                                             |      | 0.10 $\Omega$     |
| Pulse test, $t \leq 300$ $\mu\text{s}$ , duty cycle $d \leq 2$ % |                                                         |                                                                                   |      |                   |



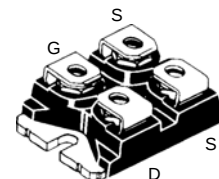
miniBLOC, SOT-227 B (IXFN)



E153432



G = Gate  
S = Source



D = Drain  
TAB = Drain

Either Source terminal at miniBLOC can be used as Main or Kelvin Source

### Features

- International standard packages
- Molding epoxies meet UL 94 V-0 flammability classification
- SOT-227B miniBLOC with aluminium nitride isolation
- Low  $R_{DS(on)}$  HDMOS™ process
- Unclamped Inductive Switching (UIS) rated
- Fast intrinsic rectifier

### Applications

- DC-DC converters
- Synchronous rectification
- Battery chargers
- Switched-mode and resonant-mode power supplies
- DC choppers
- Temperature and lighting controls

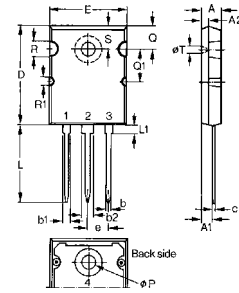
### Advantages

- Easy to mount
- Space savings
- High power density

| Symbol                                        | Test Conditions                                                                                              | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |                       |                      |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------|----------------------|
|                                               |                                                                                                              | min.                                                                              | typ.                  | max.                 |
| $g_{fs}$                                      | $V_{DS} = 10\text{ V}; I_D = 0.5 \cdot I_{D25}$ , pulse test                                                 | 22                                                                                | 42                    | S                    |
| $C_{iss}$<br>$C_{oss}$<br>$C_{rss}$           | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                                |                                                                                   | 8400<br>900<br>280    | pF<br>pF<br>pF       |
| $t_{d(on)}$<br>$t_r$<br>$t_{d(off)}$<br>$t_f$ | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$<br>$R_G = 1\ \Omega$ (External), |                                                                                   | 30<br>60<br>100<br>30 | ns<br>ns<br>ns<br>ns |
| $Q_{g(on)}$<br>$Q_{gs}$<br>$Q_{gd}$           | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$                                  |                                                                                   | 270<br>60<br>135      | nC<br>nC<br>nC       |
| $R_{thJC}$<br>$R_{thCK}$                      | TO-264 AA<br>TO-264 AA                                                                                       |                                                                                   | 0.15                  | 0.25 K/W<br>K/W      |
| $R_{thJC}$<br>$R_{thCK}$                      | miniBLOC, SOT-227 B<br>miniBLOC, SOT-227 B                                                                   |                                                                                   | 0.05                  | 0.24 K/W<br>K/W      |

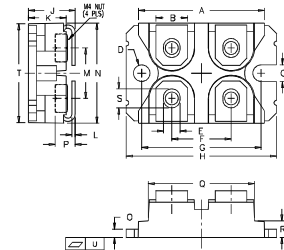
| Symbol                           | Test Conditions                                                                                                | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |           |                              |
|----------------------------------|----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------|------------------------------|
|                                  |                                                                                                                | min.                                                                              | typ.      | max.                         |
| $I_S$                            | $V_{GS} = 0\text{ V}$                                                                                          |                                                                                   |           | 48 A                         |
| $I_{SM}$                         | Repetitive; pulse width limited by $T_{JM}$                                                                    |                                                                                   |           | 192 A                        |
| $V_{SD}$                         | $I_F = 100\text{ A}, V_{GS} = 0\text{ V}$ ,<br>Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$ |                                                                                   |           | 1.5 V                        |
| $t_{rr}$<br>$Q_{RM}$<br>$I_{RM}$ | $I_F = I_S, -di/dt = 100\text{ A}/\mu\text{s}, V_R = 100\text{ V}$                                             |                                                                                   | TBD<br>20 | 250 ns<br>$\mu\text{C}$<br>A |

### TO-264 AA Outline



| Dim. | Millimeter<br>Min. | Max.  | Inches<br>Min. | Max.  |
|------|--------------------|-------|----------------|-------|
| A    | 4.82               | 5.13  | .190           | .202  |
| A1   | 2.54               | 2.89  | .100           | .114  |
| A2   | 2.00               | 2.10  | .079           | .083  |
| b    | 1.12               | 1.42  | .044           | .056  |
| b1   | 2.39               | 2.69  | .094           | .106  |
| b2   | 2.90               | 3.09  | .114           | .122  |
| c    | 0.53               | 0.83  | .021           | .033  |
| D    | 25.91              | 26.16 | 1.020          | 1.030 |
| E    | 19.81              | 19.96 | .780           | .786  |
| e    | 5.46               | BSC   | .215           | BSC   |
| J    | 0.00               | 0.25  | .000           | .010  |
| K    | 0.00               | 0.25  | .000           | .010  |
| L    | 20.32              | 20.83 | .800           | .820  |
| L1   | 2.29               | 2.59  | .090           | .102  |
| P    | 3.17               | 3.66  | .125           | .144  |
| Q    | 6.07               | 6.27  | .239           | .247  |
| Q1   | 8.38               | 8.69  | .330           | .342  |
| R    | 3.81               | 4.32  | .150           | .170  |
| R1   | 1.78               | 2.29  | .070           | .090  |
| S    | 6.04               | 6.30  | .238           | .248  |
| T    | 1.57               | 1.83  | .062           | .072  |

### miniBLOC, SOT-227 B



M4 screws (4x) supplied

| Dim. | Millimeter<br>Min. | Max.  | Inches<br>Min. | Max.  |
|------|--------------------|-------|----------------|-------|
| A    | 31.50              | 31.88 | 1.240          | 1.255 |
| B    | 7.80               | 8.20  | 0.307          | 0.323 |
| C    | 4.09               | 4.29  | 0.161          | 0.169 |
| D    | 4.09               | 4.29  | 0.161          | 0.169 |
| E    | 4.09               | 4.29  | 0.161          | 0.169 |
| F    | 14.91              | 15.11 | 0.587          | 0.595 |
| G    | 30.12              | 30.30 | 1.186          | 1.193 |
| H    | 38.00              | 38.23 | 1.496          | 1.505 |
| J    | 11.68              | 12.22 | 0.460          | 0.481 |
| K    | 8.92               | 9.60  | 0.351          | 0.378 |
| L    | 0.76               | 0.84  | 0.030          | 0.033 |
| M    | 12.60              | 12.85 | 0.496          | 0.506 |
| N    | 25.15              | 25.42 | 0.990          | 1.001 |
| O    | 1.98               | 2.13  | 0.078          | 0.084 |
| P    | 4.95               | 5.97  | 0.195          | 0.235 |
| Q    | 26.54              | 26.90 | 1.045          | 1.059 |
| R    | 3.94               | 4.42  | 0.155          | 0.174 |
| S    | 4.72               | 4.85  | 0.186          | 0.191 |
| T    | 24.59              | 25.07 | 0.968          | 0.987 |
| U    | -0.05              | 0.1   | -0.002         | 0.004 |

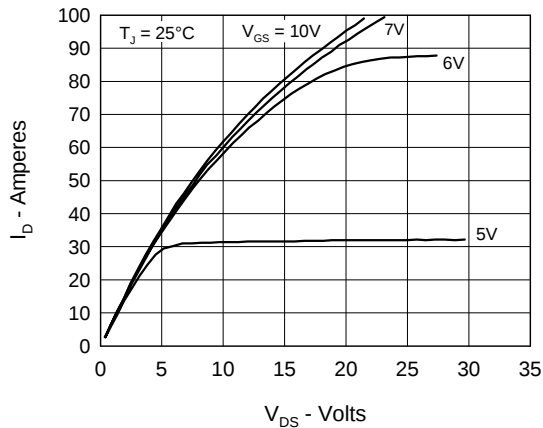
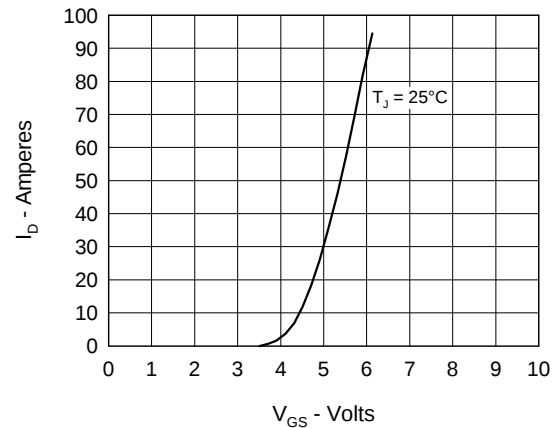
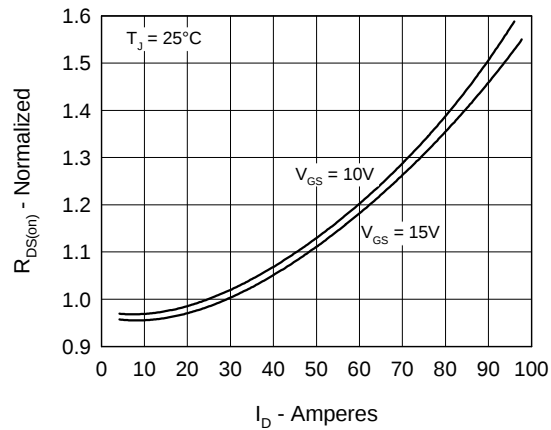
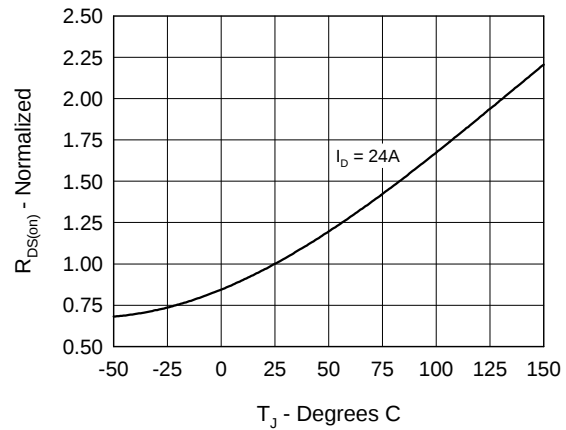
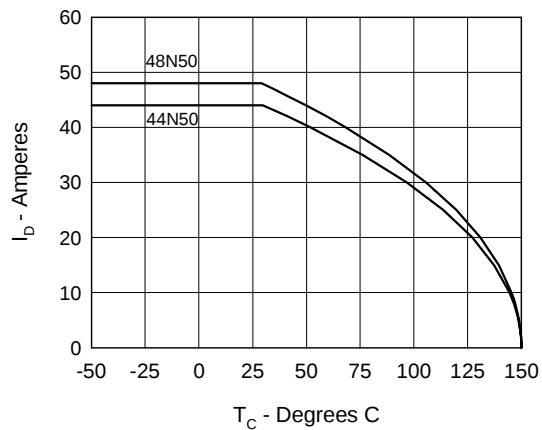
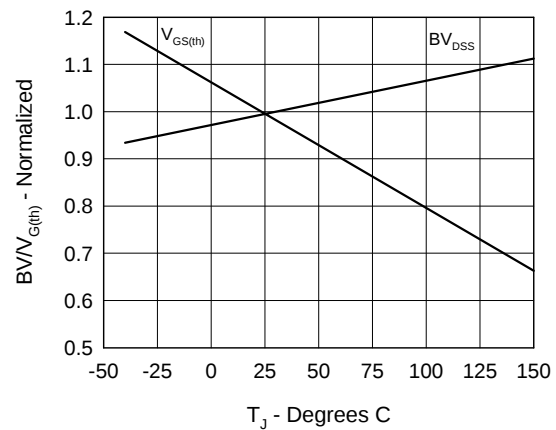
**Fig. 1 Output Characteristics**

**Fig. 2 Input Admittance**

**Fig. 3  $R_{DS(on)}$  vs. Drain Current**

**Fig. 4 Temperature Dependence of Drain to Source Resistance**

**Fig. 5 Drain Current vs. Case Temperature**

**Fig. 6 Temperature Dependence of Breakdown and Threshold Voltage**


Fig.7 Gate Charge Characteristic Curve

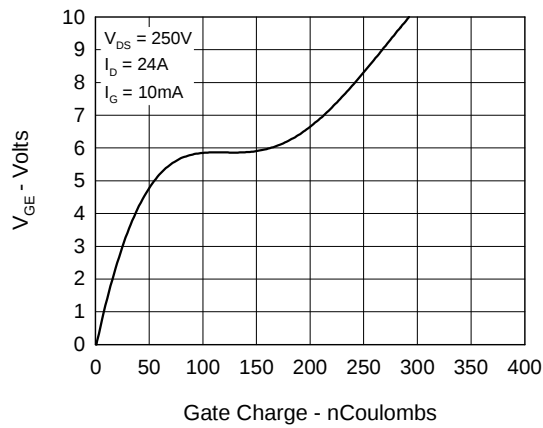


Fig.8 Capacitance Curves

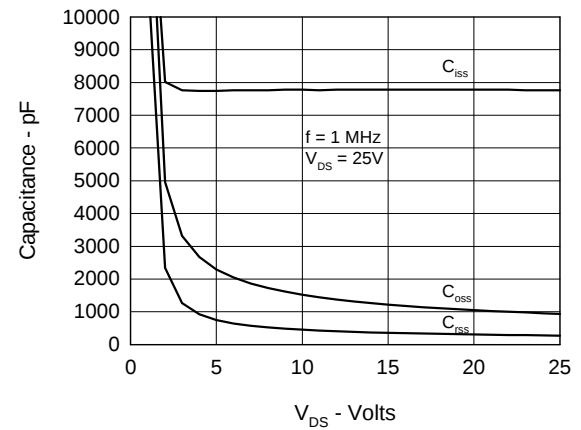


Fig.9 Source Current vs. Source to Drain Voltage

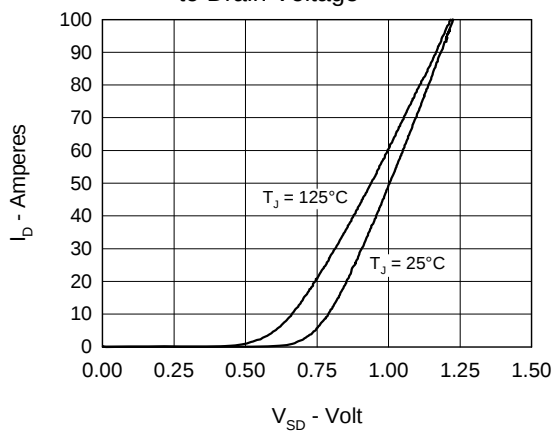
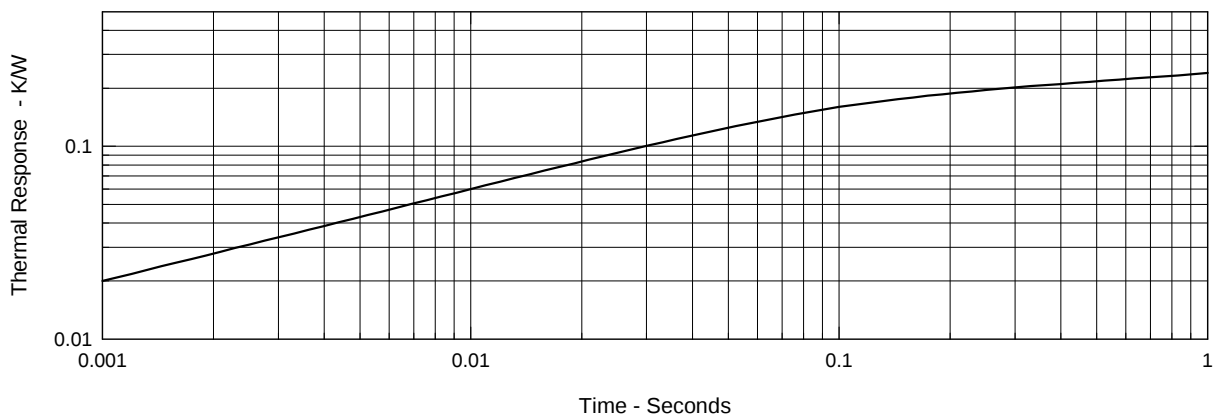


Fig.10 Transient Thermal Impedance





---

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).