

HiPerFET™ Power MOSFET

Single Die MOSFET

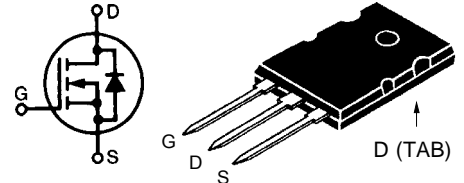
Preliminary data sheet

IXFN 55N50
IXFN 50N50
IXFK 55N50
IXFK 50N50

| V_{DSS} | I_{D25} | $R_{DS(on)}$ | t_{rr} |
|-----------|-----------|--------------|----------|
| 500V | 55A | 80mΩ | 250ns |
| 500V | 50A | 100mΩ | 250ns |
| 500V | 55A | 80mΩ | 250ns |
| 500V | 50A | 100mΩ | 250ns |

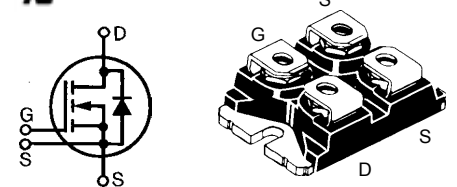
| Symbol | Test Conditions | Maximum Ratings | | | |
|---------------|--|-----------------|---------------|---------------|---------------|
| | | IXFK 55N50 | IXFK 50N50 | IXFN 55N50 | IXFN 50N50 |
| V_{DSS} | $T_J = 25^\circ\text{C}$ to 150°C | 500 | | 500 | V |
| V_{DGR} | $T_J = 25^\circ\text{C}$ to 150°C | 500 | | 500 | V |
| V_{GS} | Continuous | ±20 | | ±20 | V |
| V_{GSM} | Transient | ±30 | | ±30 | V |
| I_{D25} | $T_C = 25^\circ\text{C}$ | 55 | 50 | 55 | 50 A |
| I_{DM} | $T_C = 25^\circ\text{C}$ | 220 | 200 | 220 | 200 A |
| I_{AR} | $T_C = 25^\circ\text{C}$ | 55 | 50 | 55 | 50 A |
| E_{AR} | $T_C = 25^\circ\text{C}$ | 60 | | 60 | mJ |
| dv/dt | $I_S \leq I_{DM}$, $di/dt \leq 100 \text{ A}/\infty\text{s}$, $V_{DD} \leq V_{DSS}$ $T_J \leq 150^\circ\text{C}$, $R_G = 2 \Omega$ | 5 | | 5 | V/ns |
| P_D | $T_C = 25^\circ\text{C}$ | 560 | | 600 | W |
| T_J | | | -55 ... +150 | | °C |
| T_{JM} | | | 150 | | °C |
| T_{stg} | | | -55 ... +150 | | °C |
| T_L | 1.6 mm (0.063 in) from case for 10 s | 300 | | N/A | °C |
| V_{ISOL} | 50/60 Hz, RMS $t = 1 \text{ min}$ $I_{ISOL} \leq 1 \text{ mA}$ $t = 1 \text{ s}$ | | N/A | 2500 | V~ |
| | | | N/A | 3000 | V~ |
| M_d | Mounting torque | | 0.9/6 | 1.5/13 | Nm/lb.in. |
| | Terminal connection torque | | N/A | 1.5/13 | Nm/lb.in. |
| Weight | | 10 | | 30 | g |

TO-264 AA (IXFK)



miniBLOC, SOT-227 B (IXFN)

E153432



G = Gate D = Drain
S = Source TAB = Drain

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

Features

- International standard packages
- Encapsulating epoxy meets UL 94 V-0, flammability classification
- miniBLOC with Aluminium nitride isolation
- Low $R_{DS(on)}$ HDMOS™ process
- Rugged polysilicon gate cell structure
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
- Fast intrinsic Rectifier

Applications

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

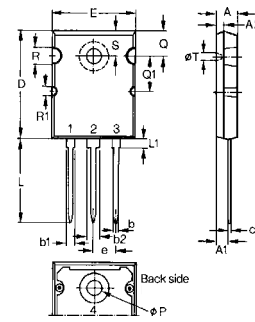
Advantages

- Easy to mount
- Space savings
- High power density

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, unless otherwise specified) | Characteristic Values | | |
|--------------|---|-----------------------|---|-----------------------------|
| | | Min. | Typ. | Max. |
| V_{DSS} | $V_{GS} = 0 \text{ V}$, $I_D = 1 \text{ mA}$ | 500 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 8 \text{ mA}$ | 2.5 | | 4.5 V |
| I_{GSS} | $V_{GS} = \pm 20 \text{ V}$; $V_{DS} = 0 \text{ V}$ | | | ±200 nA |
| I_{DSS} | $V_{DS} = V_{DSS}$, $V_{GS} = 0 \text{ V}$ | | $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ | 25 ∞A 2 mA |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$, $I_D = 0.5 \cdot I_{D25}$ Note 1 | 55N50 50N50 | | 80 mΩ 100 mΩ |

| Symbol | Test Conditions | Characteristic Values | | |
|--------------|--|-----------------------|------|------|
| | | Min. | Typ. | Max. |
| g_{fs} | $V_{DS} = 10\text{ V}; I_D = 0.5 \cdot I_{D25}$ Note 1 | | 45 | S |
| C_{iss} | | | 9400 | pF |
| C_{oss} | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$ | | 1280 | pF |
| C_{rss} | | | 460 | pF |
| $t_{d(on)}$ | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$ $R_G = 1\ \Omega$ (External), | | 45 | ns |
| t_r | | | 60 | ns |
| $t_{d(off)}$ | | | 120 | ns |
| t_f | | | 45 | ns |
| $Q_{g(on)}$ | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$ | | 330 | nC |
| Q_{gs} | | | 55 | nC |
| Q_{gd} | | | 155 | nC |
| R_{thJC} | TO-264 AA | | 0.22 | K/W |
| R_{thCK} | TO-264 AA | | 0.15 | K/W |
| R_{thJC} | miniBLOC, SOT-227 B | | 0.21 | K/W |
| R_{thCK} | miniBLOC, SOT-227 B | | 0.05 | K/W |

TO-264 AA Outline



| Dim. | Millimeter | | Inches | |
|------|------------|-------|----------|-------|
| | Min. | Max. | 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 |

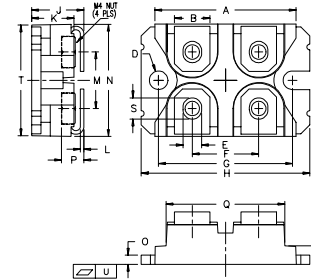
Source-Drain Diode

($T_J = 25^\circ\text{C}$, unless otherwise specified)

| Symbol | Test Conditions | Characteristic Values | | | |
|----------|---|-----------------------|------|------------|--------|
| | | Min. | Typ. | Max. | |
| I_S | $V_{GS} = 0$ | 55N50 50N50 | | 55 50 | A A |
| I_{SM} | Repetitive; pulse width limited by T_{JM} | 55N50 50N50 | | 220 200 | A A |
| V_{SD} | $I_F = 100\text{ A}, V_{GS} = 0\text{ V}$ | Note 1 | | 1.5 | V |
| t_{rr} | $I_F = 25\text{ A}, -di/dt = 100\text{ A}/\infty\text{s}, V_R = 100\text{ V}$ | | | 250 | ns |
| Q_{RM} | | | 1.0 | ∞ C | |
| I_{RM} | | | 10 | A | |

Notes: 1. Pulse test, $t \leq 300\ \infty\text{s}$, duty cycle $d \leq 2\%$

miniBLOC, SOT-227 B



M4 screws (4x) supplied

| Dim. | Millimeter | | Inches | |
|------|------------|-------|--------|-------|
| | Min. | Max. | 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 |

IXYS reserves the right to change limits, test conditions, and dimensions.

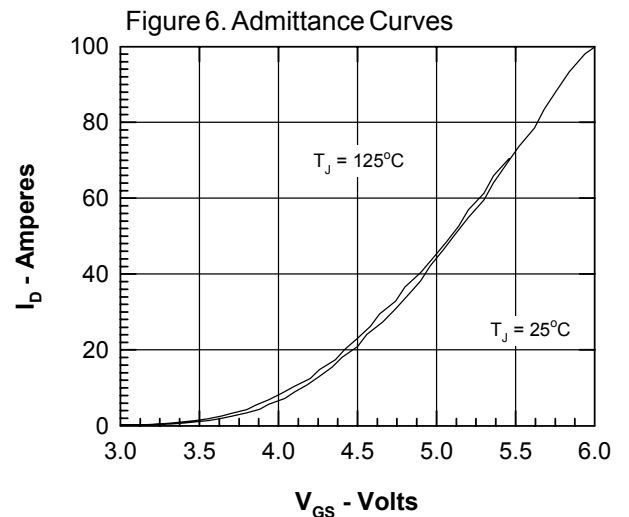
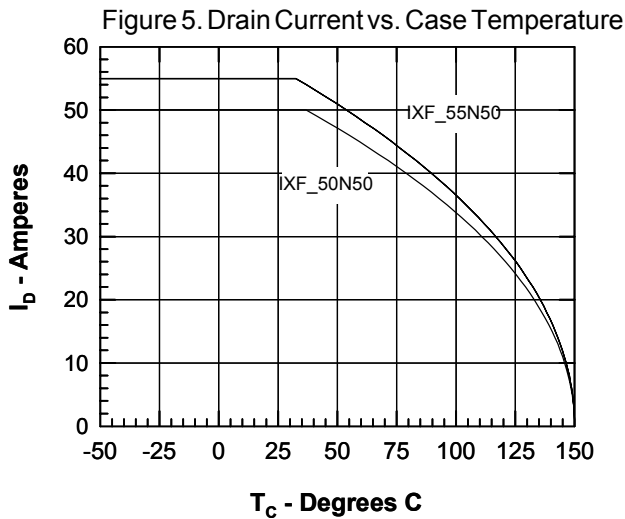
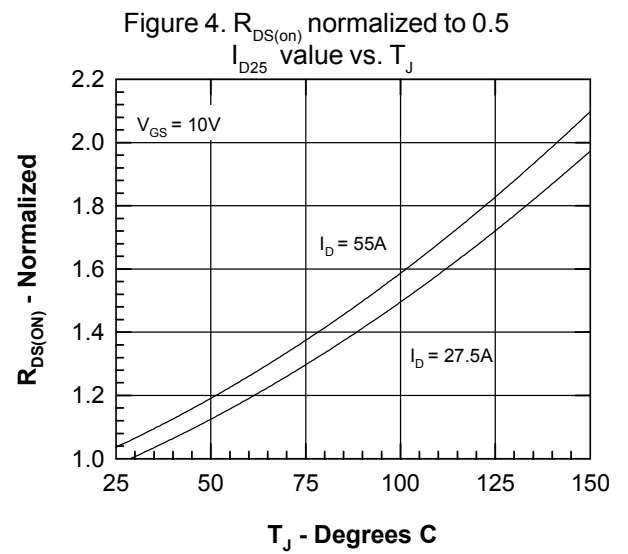
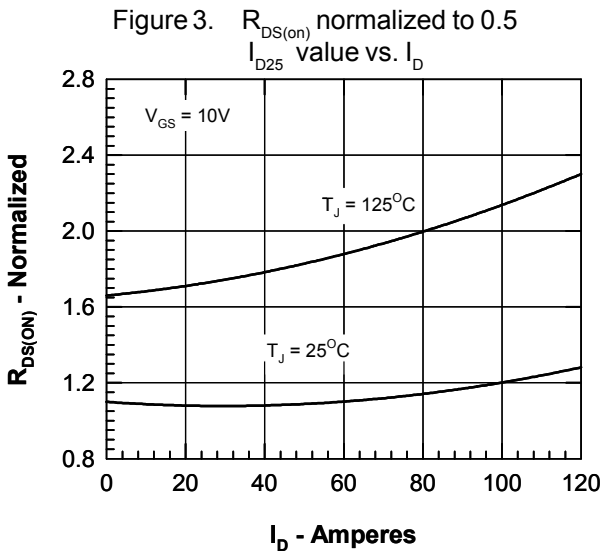
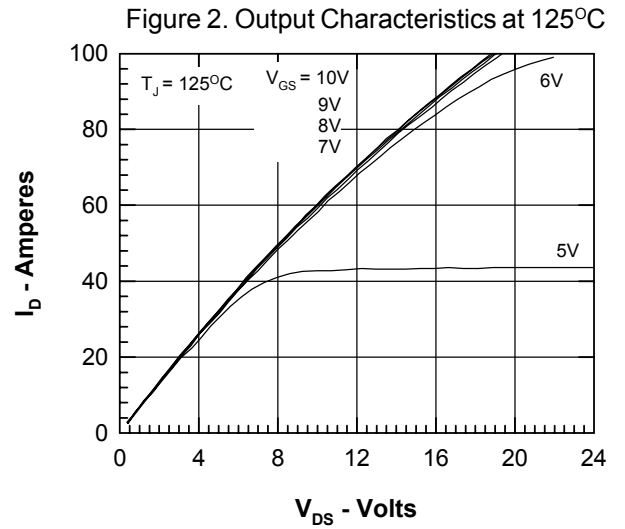
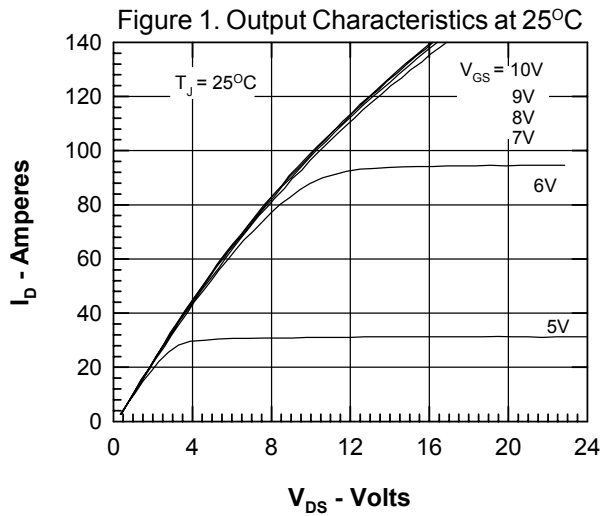


Figure 7. Gate Charge

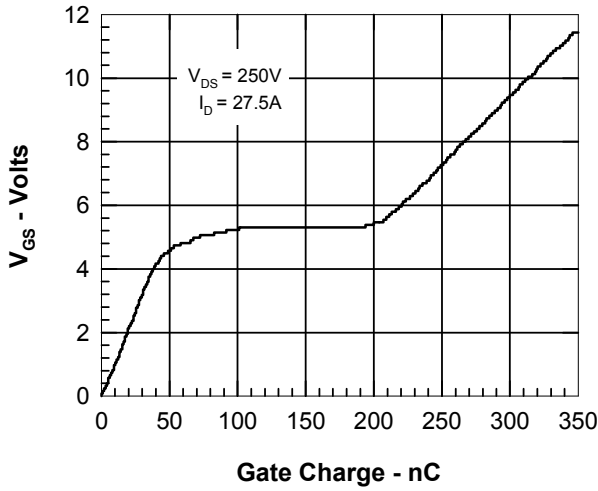


Figure 8. Capacitance Curves

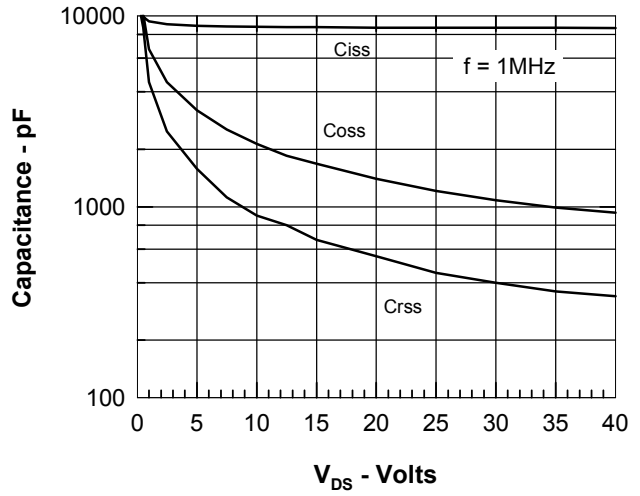


Figure 9. Forward Voltage Drop of the Intrinsic Diode

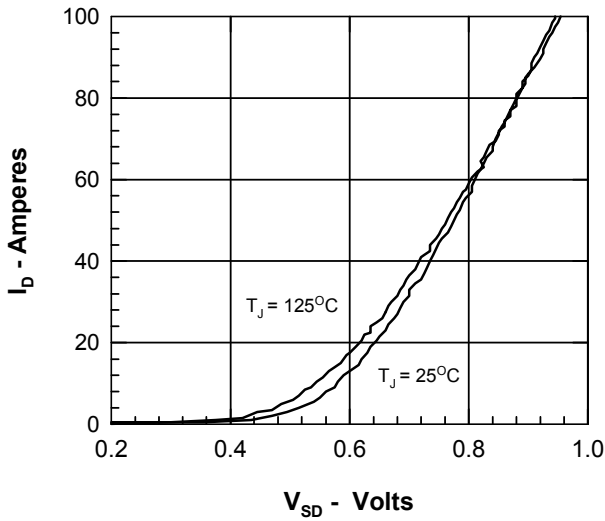
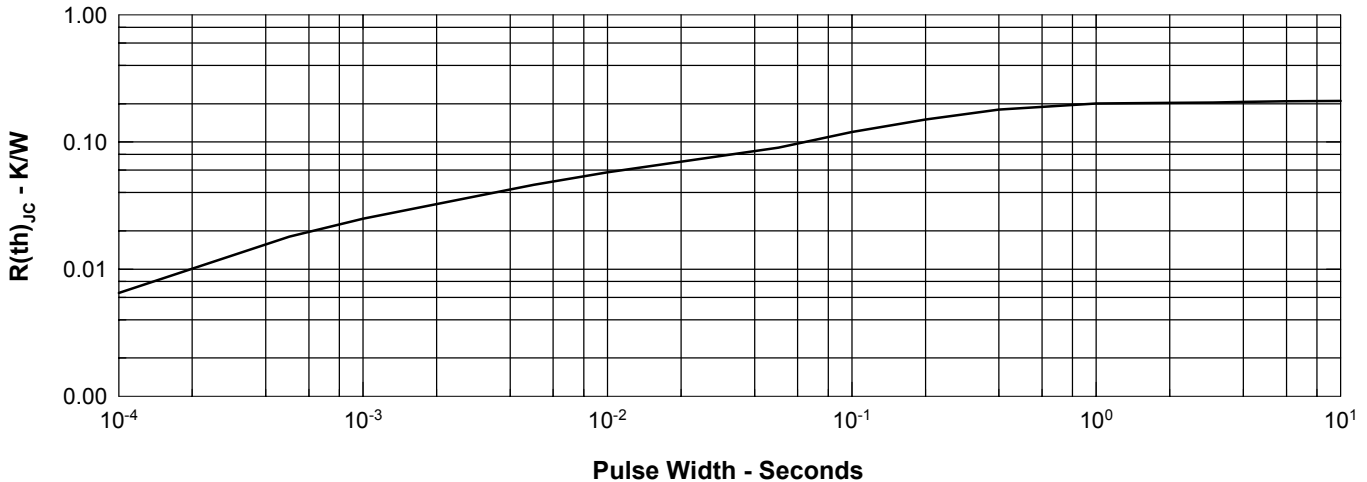


Figure 10. Transient Thermal Resistance



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 |
| | 4,850,072 | 4,931,844 | 5,034,796 | 5,063,307 | 5,237,481 | 5,381,025 | |