IXYS

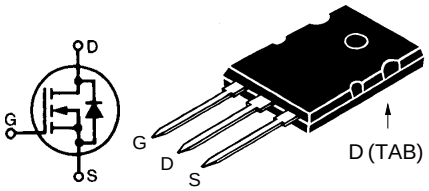
# HiPerFET™ Power MOSFET

## Single MOSFET Die

Preliminary data

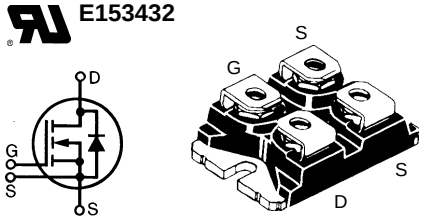
| $V_{DSS}$ | $I_{D25}$ | $R_{DS(on)}$ | $t_{rr}$ |
|---|---|---|---|
| **IXFN170N10** 100V | 170A | 10mΩ | 200ns |
| **IXFK170N10** 100V | 170A | 10mΩ | 200ns |

**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

| Symbol | Test Conditions | Maximum Ratings IXFK 170N10 | IXFN 170N10 | |
|---|---|---|---|---|
| $V_{DSS}$ | $T_J$ = 25°C to 150°C | 100 | 100 | V |
| $V_{DGR}$ ① | $T_J$ = 25°C to 150°C | 100 | 100 | V |
| $V_{GS}$ | Continuous | ±20 | ±20 | V |
| $V_{GSM}$ | Transient | ±30 | ±30 | V |
| $I_{D25}$ | $T_C$ = 25°C | 170③ | 170 | A |
| $I_{D125}$ ④ | $T_C$ = 125°C | 76 | NA | |
| $I_{DM}$ ② | $T_C$ = 25°C | 680 | 680 | A |
| $I_{AR}$ | $T_C$ = 25°C | 170 | 170 | A |
| $E_{AR}$ | $T_C$ = 25°C | 60 | 60 | mJ |
| dv/dt | $I_S \le I_{DM}$, di/dt ≤ 100 A/µs, $V_{DD} \le V_{DSS}$ $T_J \le 150°C$, $R_G$ = 2 Ω | 5 | 5 | V/ns |
| $P_D$ | $T_C$ = 25°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 min | N/A | 2500 | V~ |
| | $I_{ISOL} \le$ 1 mA t = 1 s | 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 |

| Symbol | Test Conditions ($T_J$ = 25°C, unless otherwise specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $V_{DSS}$ | $V_{GS}$ = 0 V, $I_D$ = 3mA | 100 | | | V |
| | $V_{DSS}$ temperature coefficient | | 0.077 | | %/K |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D$ = 8mA | 2 | | 4 | V |
| | $V_{GS(th)}$ temperature coefficient | | -0.183 | | %/K |
| $I_{GSS}$ | $V_{GS}$ = ±20V, $V_{GS}$ = 0V | | | ±200 | nA |
| $I_{DSS}$ | $V_{DS}$ = 0.8 • $V_{DSS}$ V, $T_J$ = 25°C | | | 400 | µA |
| | $V_{GS}$ = 0 V, $T_J$ = 125°C | | | 2 | mA |
| $R_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 0.5 • $I_{D25}$ Pulse test, t ≤ 300 ms, duty cycle d ≤ 2 % | | | 10 | mΩ |

### Features

- International standard packages
- Encapsulating epoxy meets UL94V-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
- Synchronous rectification
- Battery chargers
- Switched-mode and resonant-mode power supplies
- DC choppers
- Temperature and lighting controls
- Low voltage relays

### Advantages

- Easy to mount
- Space savings
- High power density

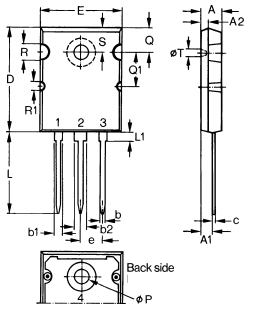
| Symbol | Test Conditions ($T_J$ = 25°C, unless otherwise specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $V_{DS}$ = 10 V; $I_D$ = 0.5 • $I_{D25}$, pulse test | | 65 | | S |
| $C_{iss}$ | | | 10,300 | | pF |
| $C_{oss}$ | $V_{GS}$ = 0 V, $V_{DS}$ = 25 V, f = 1 MHz | | 2,200 | | pF |
| $C_{rss}$ | | | 1,200 | | pF |
| $t_{d(on)}$ | | | 40 | | ns |
| $t_r$ | $V_{GS}$ = 10 V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 0.5 • $I_{D25}$ | | 90 | | ns |
| $t_{d(off)}$ | $R_G$ = 1 Ω (External), | | 158 | | ns |
| $t_f$ | | | 79 | | ns |
| $Q_{g(on)}$ | | | 515 | | nC |
| $Q_{gs}$ | $V_{GS}$ = 10 V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 0.5 • $I_{D25}$ | | 62 | | nC |
| $Q_{gd}$ | | | 276 | | 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 |

**Source-Drain Diode**

| Symbol | Test Conditions ($T_J$ = 25°C, unless otherwise specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $I_S$ | $V_{GS}$ = 0 | | | 170 | A |
| $I_{SM}$ | Repetitive; pulse width limited by $T_{JM}$ | | | 680 | A |
| $V_{SD}$ | $I_F$ = 100 A, $V_{GS}$ = 0 V, Pulse test, t ≤ 300 μs, duty cycle d ≤ 2 % | | | 1.5 | V |
| $t_{rr}$ | | | 175 | | ns |
| $Q_{RM}$ | $I_F$ = 50 A, -di/dt = 100 A/μs, $V_R$ = 100 V | | 1.1 | | μC |
| $I_{RM}$ | | | 12.6 | | A |

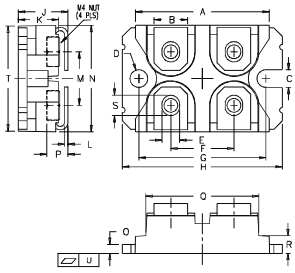
Notes:
1. $R_{GS}$ = 1 MΩ
2. Pulse width limited by $T_{JM}$.
3. Chip capability
4. Current limited by external leads

**TO-264 AA Outline**




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

Figure 1. Output Characteristics at 25°C

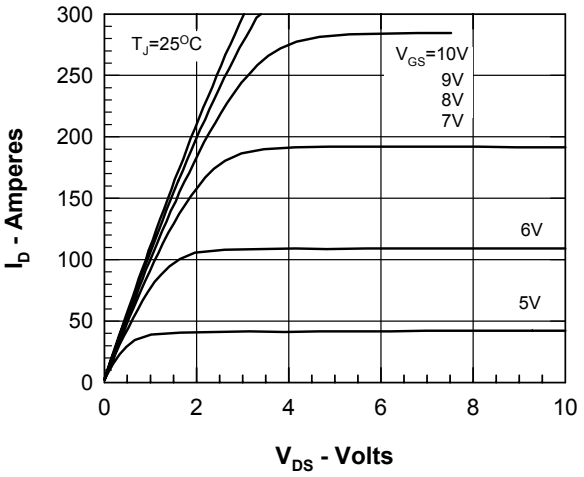



Figure 2. Output Characteristics at 125°C

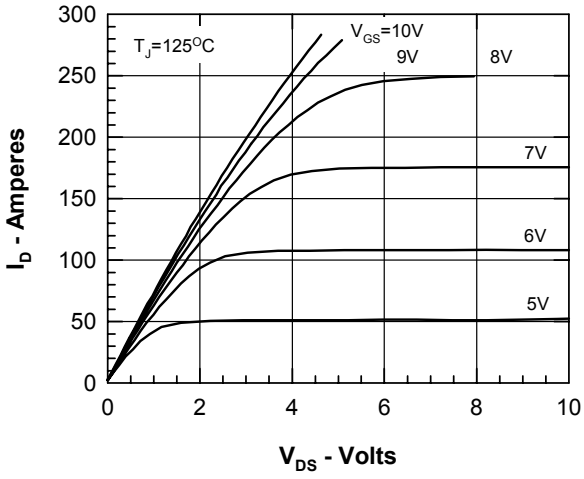



Figure 3. $R_{DS(on)}$ normalized to 0.5 $I_{D25}$ value vs. $I_D$

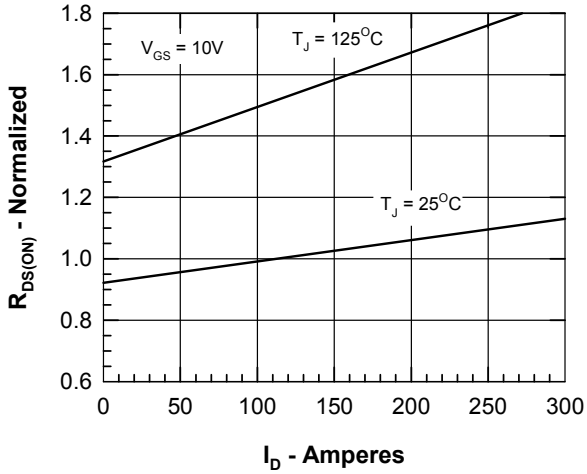



Figure 4. $R_{DS(on)}$ normalized to 0.5 $I_{D25}$ value vs. $T_J$

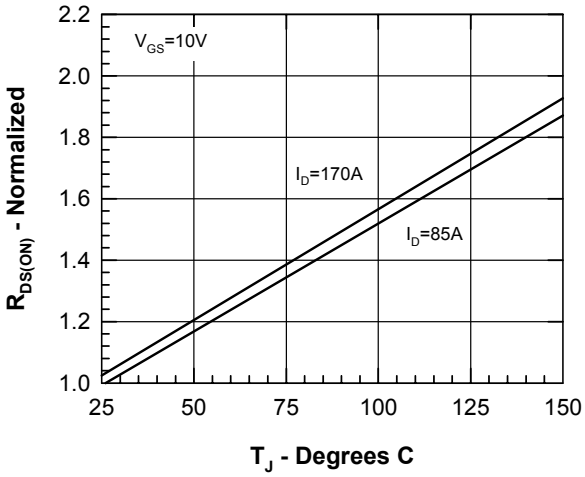



Figure 5. Drain Current vs. Case Temperature

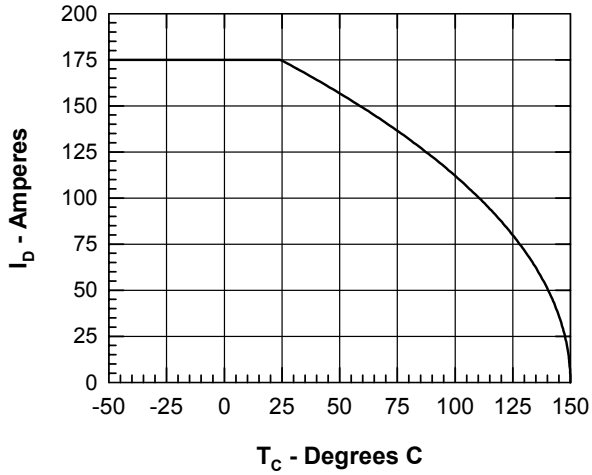



Figure 6. Admittance Curves

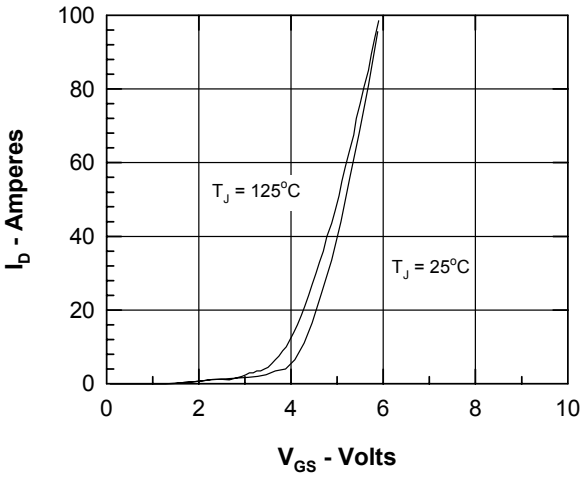


Figure 7. Gate Charge

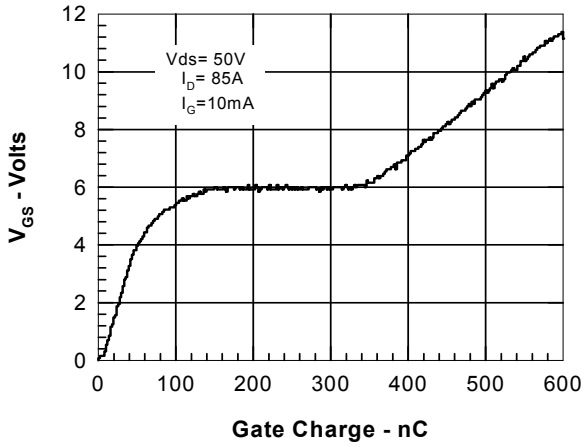



Figure 8. Capacitance Curves

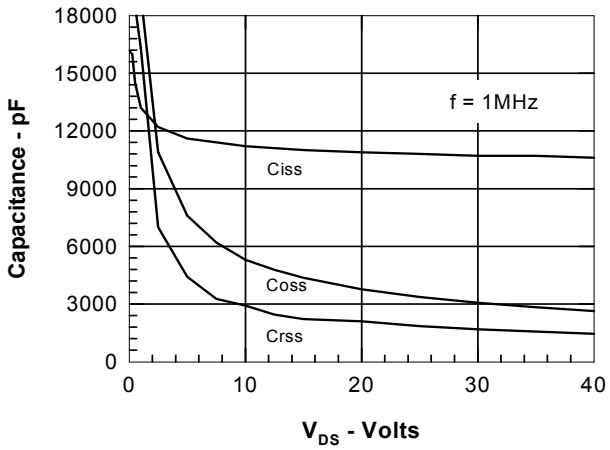



Figure 9. Forward Voltage Drop of the Intrinsic Diode

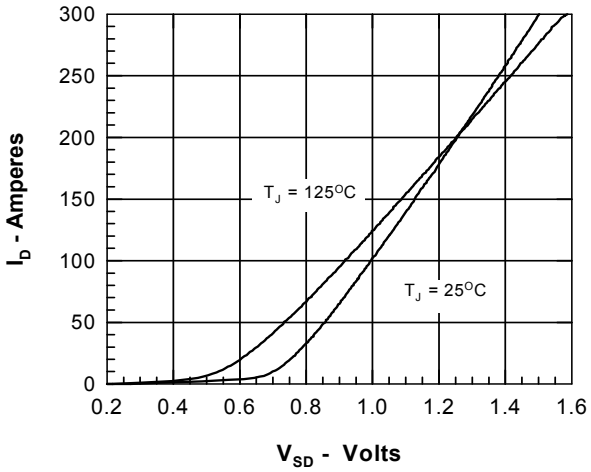



Figure10. Forward Bias Safe Operating Area

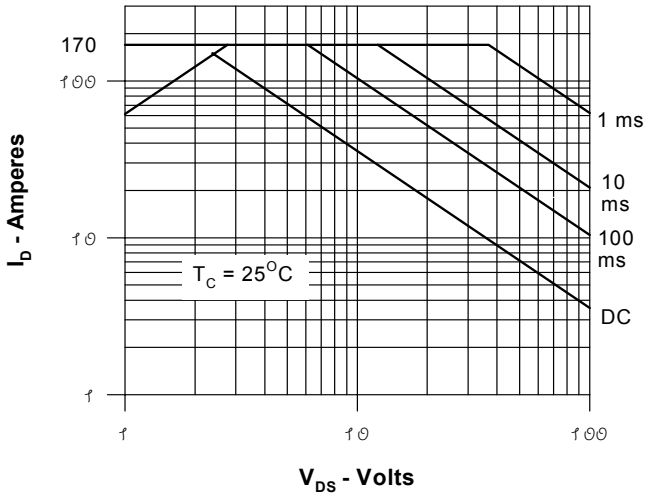



Figure 11. Transient Thermal Resistance