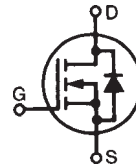


PolarHV™ HiPerFET Power MOSFET

N-Channel Enhancement Mode
Avalanche Rated
Fast Intrinsic Diode

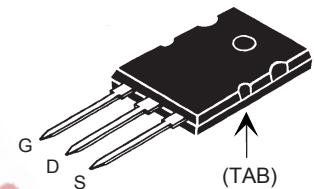
IXFK 48N60P
IXFX 48N60P

$V_{DSS} = 600\text{ V}$
 $I_{D2} = 48\text{ A}$
 $R_{DS(on)} \leq 135\text{ m}\Omega$
 $t_{rr} \leq 200\text{ ns}$

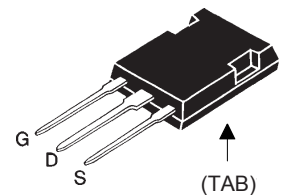


| Symbol | Test Conditions | Maximum Ratings | |
|------------|---|-------------------|------------------|
| V_{DSS} | $T_J = 25^\circ\text{C}$ to 150°C | 600 | V |
| V_{DGR} | $T_J = 25^\circ\text{C}$ to 150°C ; $R_{GS} = 1\text{ M}\Omega$ | 600 | V |
| V_{GSS} | Continuous | ± 30 | V |
| V_{GSM} | Transient | ± 40 | V |
| I_{D25} | $T_C = 25^\circ\text{C}$ | 48 | A |
| I_{DM} | $T_C = 25^\circ\text{C}$, pulse width limited by T_{JM} | 110 | A |
| I_{AR} | $T_C = 25^\circ\text{C}$ | 48 | A |
| E_{AR} | $T_C = 25^\circ\text{C}$ | 70 | mJ |
| E_{AS} | $T_C = 25^\circ\text{C}$ | 2.0 | J |
| dv/dt | $I_S \leq I_{DM}$, $di/dt \leq 100\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ\text{C}$, $R_G = 4\ \Omega$ | 20 | V/ns |
| P_D | $T_C = 25^\circ\text{C}$ | 830 | W |
| T_J | | -55 ... +150 | $^\circ\text{C}$ |
| T_{JM} | | 150 | $^\circ\text{C}$ |
| T_{stg} | | -55 ... +150 | $^\circ\text{C}$ |
| M_d | Mounting torque (TO-264) | 1.13/10 Nm/lb.in. | |
| Weight | TO-264 | 10 | g |
| | PLUS247 | 6 | g |
| T_L | 1.6 mm (0.062 in.) from case for 10 s | 300 | $^\circ\text{C}$ |
| T_{SOLD} | Plastic body for 10 s | 260 | $^\circ\text{C}$ |

TO-264 (IXFK)



PLUS247 (IXFX)



G = Gate D = Drain
S = Source Tab = Drain

Features

- † International standard packages
- † Fast recovery diode
- † Unclamped Inductive Switching (UIS) rated
- † Low package inductance
- easy to drive and to protect

Advantages

- † Easy to mount
- † Space savings
- † High power density

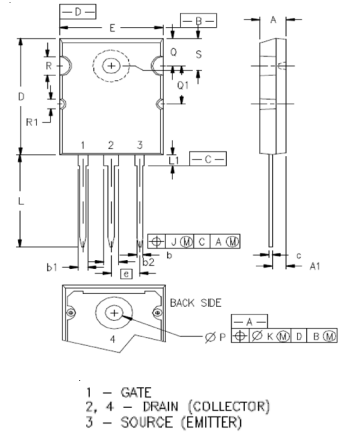
| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, unless otherwise specified) | Characteristic Values | | |
|--------------|--|-----------------------|------|--|
| | | Min. | Typ. | Max. |
| BV_{DSS} | $V_{GS} = 0\text{ V}$, $I_D = 250\ \mu\text{A}$ | 600 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 8\text{ mA}$ | 3.0 | | 5.0 V |
| I_{GSS} | $V_{GS} = \pm 30\text{ V}_{DC}$, $V_{DS} = 0$ | | | $\pm 200\text{ nA}$ |
| I_{DSS} | $V_{DS} = V_{DSS}$, $V_{GS} = 0\text{ V}$, $T_J = 125^\circ\text{C}$ | | | 25 μA 1000 μA |
| $R_{DS(on)}$ | $V_{GS} = 10\text{ V}$, $I_D = 0.5\ I_{D25}$ Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $d \leq 2\%$ | | | 135 $\text{m}\Omega$ |

| Symbol | Test Conditions | Characteristic Values | | |
|--------------|--|-----------------------|------|----------------------|
| | | Min. | Typ. | Max. |
| g_{fs} | $V_{DS} = 20\text{ V}; I_D = 0.5 I_{D25}$, pulse test | 35 | 53 | S |
| C_{iss} | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$ | | 8860 | pF |
| C_{oss} | | | 850 | pF |
| C_{rss} | | | 60 | pF |
| $t_{d(on)}$ | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 I_{D25}$ $R_G = 2\ \Omega$ (External) | | 30 | ns |
| t_r | | | 25 | ns |
| $t_{d(off)}$ | | | 85 | ns |
| t_f | | | 22 | ns |
| $Q_{g(on)}$ | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}$ | | 150 | nC |
| Q_{gs} | | | 50 | nC |
| Q_{gd} | | | 50 | nC |
| R_{thJC} | TO-264 and PLUS247 | | 0.15 | $^{\circ}\text{C/W}$ |
| R_{thCs} | | | 0.15 | $^{\circ}\text{C/W}$ |

Source-Drain Diode

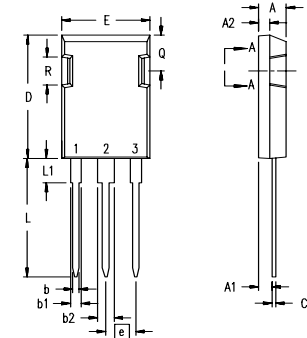
| Symbol | Test Conditions | Characteristic Values | | |
|----------|---|-----------------------|------|---------------|
| | | Min. | Typ. | Max. |
| I_S | $V_{GS} = 0\text{ V}$ | | | 48 A |
| I_{SM} | Repetitive | | | 110 A |
| V_{SD} | $I_F = I_S, V_{GS} = 0\text{ V}$, Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $d \leq 2\%$ | | | 1.5 V |
| t_{rr} | $I_F = 25\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}$ $V_R = 100\text{ V}$ | | 0.8 | 200 ns |
| Q_{RM} | | | 6.0 | μC |
| I_{RM} | | | | A |

TO-264 (IXFK) Outline



| SYM | INCHES | | MILLIMETERS | |
|------------------|----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .185 | .209 | 4.70 | 5.31 |
| A1 | .102 | .118 | 2.59 | 3.00 |
| b | .037 | .055 | 0.94 | 1.40 |
| b1 | .087 | .102 | 2.21 | 2.59 |
| b2 | .110 | .126 | 2.79 | 3.20 |
| c | .017 | .029 | 0.43 | 0.74 |
| D | 1.007 | 1.047 | 25.58 | 26.59 |
| E | .760 | .799 | 19.30 | 20.29 |
| e | .215 BSC | | 5.46 BSC | |
| J | .000 | .010 | 0.00 | 0.25 |
| K | .000 | .010 | 0.00 | 0.25 |
| L | .779 | .842 | 19.79 | 21.39 |
| L1 | .087 | .102 | 2.21 | 2.59 |
| $\varnothing P$ | .122 | .138 | 3.10 | 3.51 |
| Q | .240 | .256 | 6.10 | 6.50 |
| Q1 | .350 | .346 | 8.38 | 8.79 |
| $\varnothing R$ | .155 | .187 | 3.94 | 4.75 |
| $\varnothing R1$ | .085 | .093 | 2.16 | 2.36 |
| S | .243 | .253 | 6.17 | 6.43 |

PLUS 247™ (IXFX) Outline



Terminals: 1 - Gate
2 - Drain (Collector)
3 - Source (Emitter)
4 - Drain (Collector)

| Dim. | Millimeter | | Inches | |
|----------------|------------|-------|----------|-------|
| | Min. | Max. | Min. | Max. |
| A | 4.83 | 5.21 | .190 | .205 |
| A ₁ | 2.29 | 2.54 | .090 | .100 |
| A ₂ | 1.91 | 2.16 | .075 | .085 |
| b | 1.14 | 1.40 | .045 | .055 |
| b ₁ | 1.91 | 2.13 | .075 | .084 |
| b ₂ | 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 | 0.244 |
| R | 4.32 | 4.83 | .170 | .190 |

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

IXYS MOSFETs and IGBTs are covered by 4,835,592 4,931,844 5,049,961 5,237,481 6,162,665 6,404,065 B1 6,683,344 6,727,585
one or more of the following U.S. patents: 4,850,072 5,017,508 5,063,307 5,381,025 6,259,123 B1 6,534,343 6,710,405 B2 6,759,692
4,881,106 5,034,796 5,187,117 5,486,715 6,306,728 B1 6,583,505 6,710,463 6,771,478 B2

Fig. 1. Output Characteristics @ 25°C

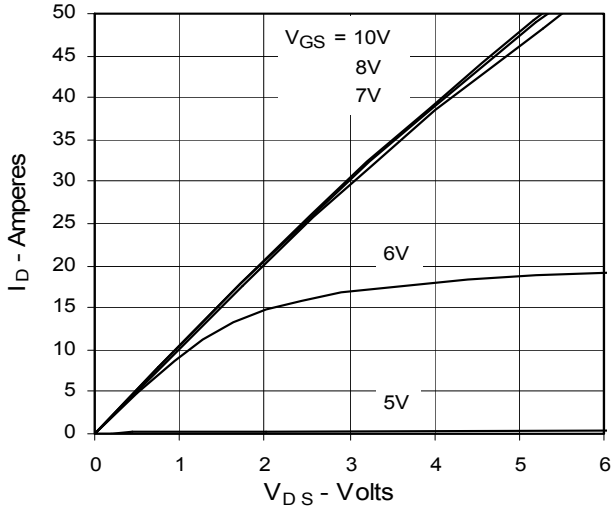


Fig. 2. Extended Output Characteristics @ 25°C

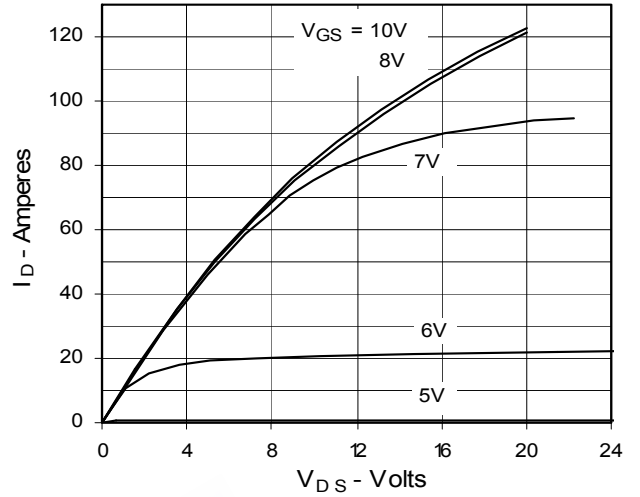


Fig. 3. Output Characteristics @ 125°C

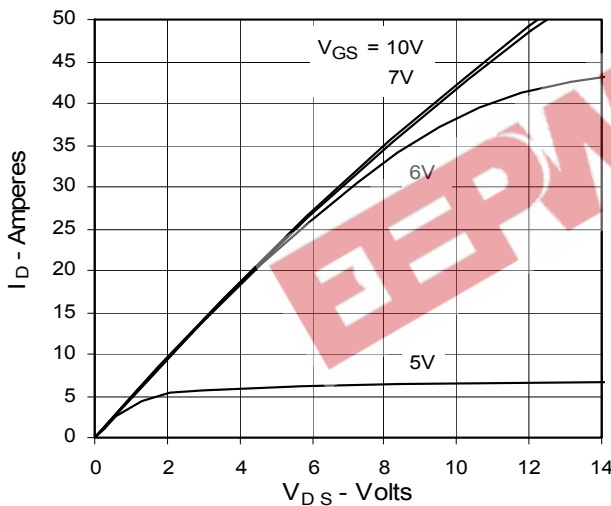


Fig. 4. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. Junction Temperature

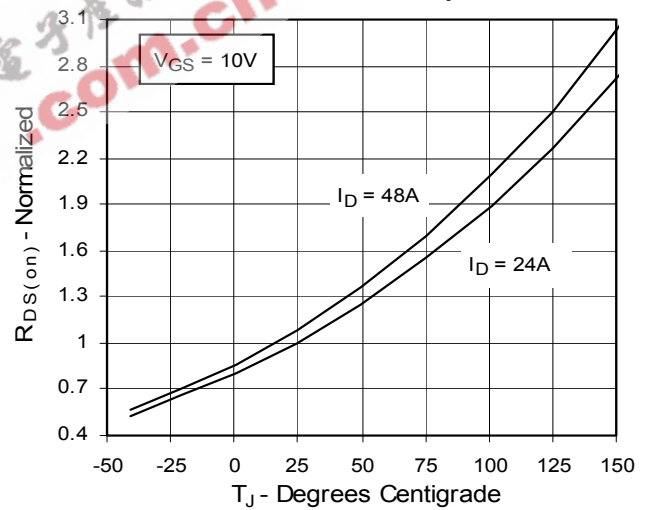


Fig. 5. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. I_D

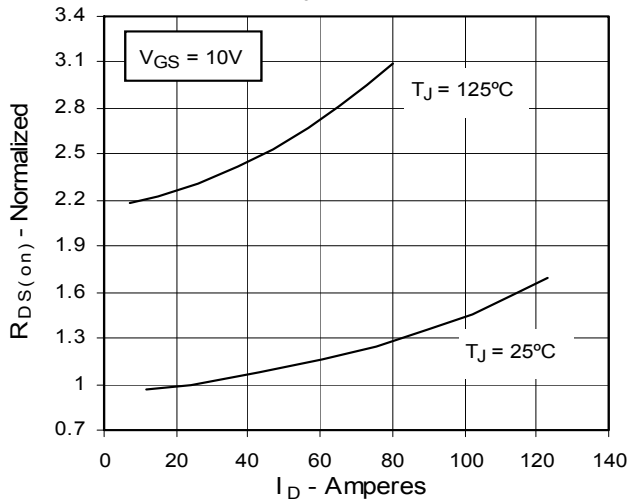


Fig. 6. Drain Current vs. Case Temperature

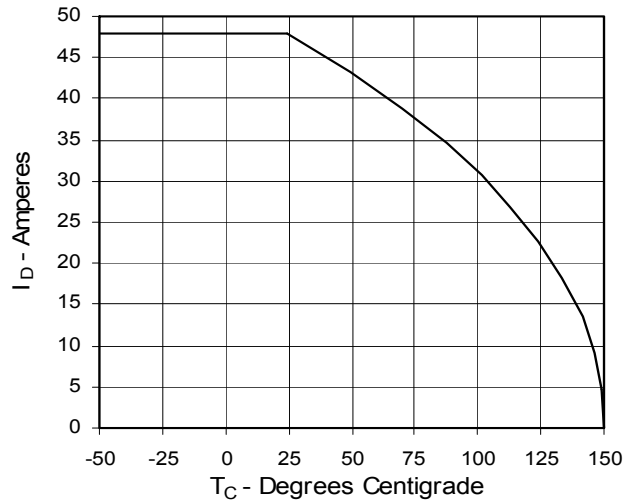


Fig. 7. Input Admittance

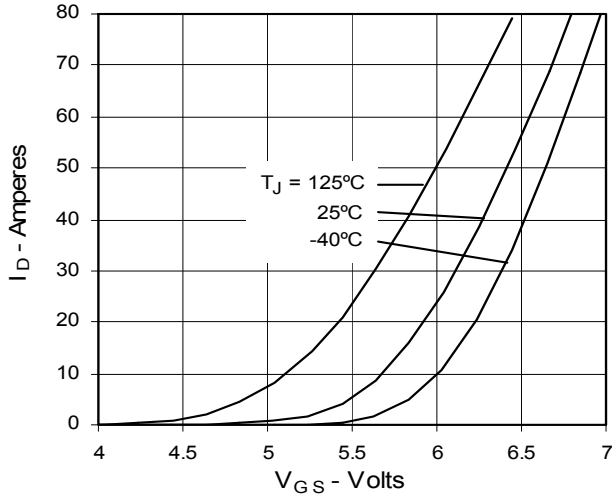


Fig. 8. Transconductance

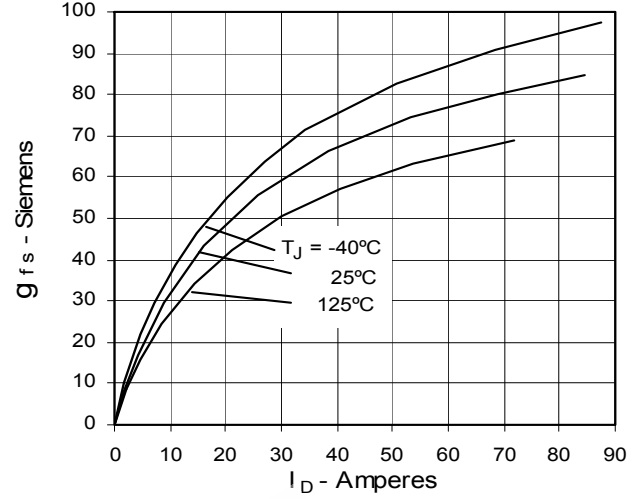


Fig. 9. Source Current vs. Source-To-Drain Voltage

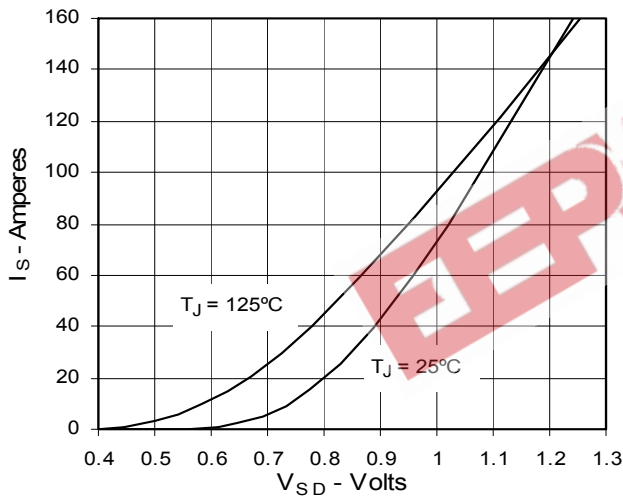


Fig. 10. Gate Charge

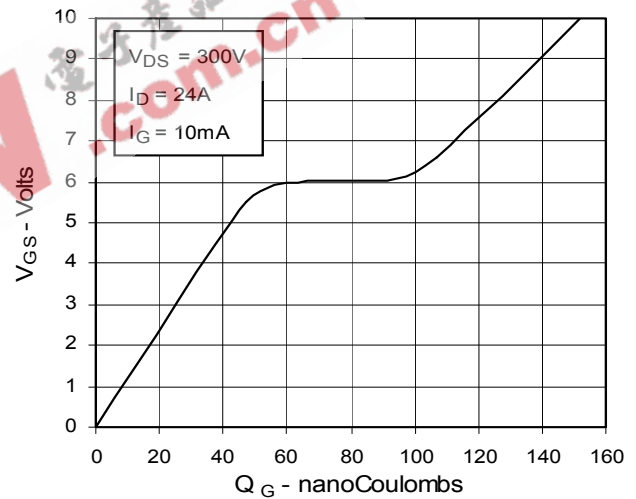


Fig. 11. Capacitance

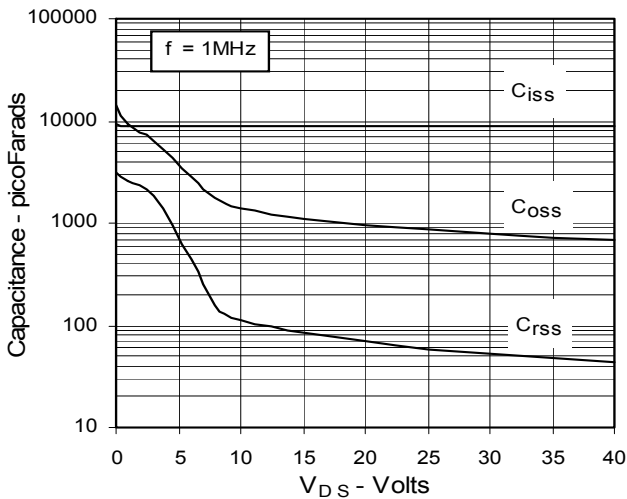


Fig. 13. Maximum Transient Thermal Resistance

