

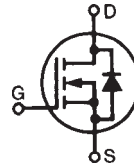
PolarHV™ HiPerFET IXFR 80N50P

Power MOSFET

ISOPLUS247™

(Electrically Isolated Back Surface)

N-Channel Enhancement Mode
Avalanche Rated
Fast Intrinsic Diode



$$V_{DSS} = 500 \text{ V}$$

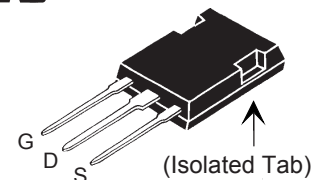
$$I_{D25} = 45 \text{ A}$$

$$R_{DS(on)} \leq 72 \text{ m}\Omega$$

$$t_{rr} \leq 200 \text{ ns}$$

| Symbol | Test Conditions | Maximum Ratings | |
|---------------|---|-----------------|------------------|
| V_{DSS} | $T_J = 25^\circ\text{C}$ to 150°C | 500 | V |
| V_{DGR} | $T_J = 25^\circ\text{C}$ to 150°C ; $R_{GS} = 1 \text{ M}\Omega$ | 500 | V |
| V_{GSM} | Transient | ± 40 | V |
| V_{GSM} | Continuous | ± 30 | V |
| I_{D25} | $T_C = 25^\circ\text{C}$ | 45 | A |
| I_{DM} | $T_C = 25^\circ\text{C}$, pulse width limited by T_{JM} | 200 | A |
| I_{AR} | $T_C = 25^\circ\text{C}$ | 80 | A |
| E_{AR} | $T_C = 25^\circ\text{C}$ | 80 | mJ |
| E_{AS} | $T_C = 25^\circ\text{C}$ | 3.5 | J |
| dv/dt | $I_S \leq I_{DM}$, $di/dt \leq 100 \text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ\text{C}$, $R_G = 2 \Omega$ | 20 | V/ns |
| P_D | $T_C = 25^\circ\text{C}$ | 360 | W |
| T_J | | -55 ... +150 | $^\circ\text{C}$ |
| T_{JM} | | 150 | $^\circ\text{C}$ |
| T_{stg} | | -55 ... +150 | $^\circ\text{C}$ |
| T_L | Maximum lead temperature for soldering | 300 | $^\circ\text{C}$ |
| F_C | Mounting force | 20..120/4.5..25 | N/lb |
| V_{ISOL} | 50/60 Hz, RMS, 1 minute | 2500 | V~ |
| Weight | | 5 | g |

ISOPLUS247 (IXFR)
E153432



G = Gate D = Drain
S = Source

Features

- † Silicon chip on Direct-Copper-Bond substrate
- High power dissipation
- Isolated mounting surface
- 2500V electrical isolation
- † 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

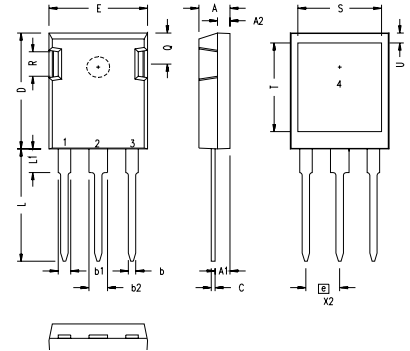
| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$ unless otherwise specified) | Characteristic Values | | |
|--------------|---|-----------------------|------|--------------------------|
| | | Min. | Typ. | Max. |
| BV_{DSS} | $V_{GS} = 0 \text{ V}$, $I_D = 500 \mu\text{A}$ | 500 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 8 \text{ mA}$ | 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 2 mA |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$, $I_D = 40 \text{ A}$ | | | 72 m Ω |

| Symbol | Test Conditions | Characteristic Values | | |
|---------------------------|--|---|------|-----------|
| | | (T _J = 25° C unless otherwise specified) | | |
| | | Min. | Typ. | Max. |
| g_{fs} | V _{DS} = 20 V; I _D = 40 A, I _{D25} , Note 1 | 45 | 70 | S |
| C_{iss} | | | 12.7 | nF |
| C_{oss} | V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz | | 1280 | pF |
| C_{rss} | | | 120 | pF |
| t_{d(on)} | | | 25 | ns |
| t_r | V _{GS} = 10 V, V _{DS} = 0.5 V _{DSS} , I _D = 40 A | | 27 | ns |
| t_{d(off)} | R _G = 1 Ω (External) | | 70 | ns |
| t_f | | | 16 | ns |
| Q_{g(on)} | | | 197 | nC |
| Q_{gs} | V _{GS} = 10 V, V _{DS} = 0.5 V _{DSS} , I _D = 40 A | | 70 | nC |
| Q_{gd} | | | 64 | nC |
| R_{thJC} | | | | 0.35° C/W |
| R_{thCS} | | 0.15 | | ° C/W |

| Symbol | Test Conditions | Characteristic Values | | |
|-----------------------|--|---|------|--------|
| | | (T _J = 25° C unless otherwise specified) | | |
| | | Min. | Typ. | Max. |
| I_S | V _{GS} = 0 V | | | 80 A |
| I_{SM} | Repetitive | | | 200 A |
| V_{SD} | I _F = I _S , V _{GS} = 0 V, | | | 1.5 V |
| t_{rr} | I _F = 25 A, -di/dt = 100 A/μs | | | 200 ns |
| Q_{RM} | V _R = 100 V, V _{GS} = 0 V | | 0.6 | μC |
| I_{RM} | | | 6 | A |

Notes:

1. Pulse test, t ≤ 300 μs, duty cycle d ≤ 2 %

ISOPLUS247™ Outline


| SYM | INCHES | | MILLIMETERS | |
|-----|----------|------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .190 | .205 | 4.83 | 5.21 |
| A1 | .090 | .100 | 2.29 | 2.54 |
| A2 | .075 | .085 | 1.91 | 2.16 |
| b | .045 | .055 | 1.14 | 1.40 |
| b1 | .075 | .084 | 1.91 | 2.13 |
| b2 | .115 | .123 | 2.92 | 3.12 |
| C | .024 | .031 | 0.61 | 0.80 |
| D | .819 | .840 | 20.80 | 21.34 |
| E | .620 | .635 | 15.75 | 16.13 |
| e | .215 BSC | | 5.45 BSC | |
| L | .780 | .800 | 19.81 | 20.32 |
| L1 | .150 | .170 | 3.81 | 4.32 |
| Q | .220 | .244 | 5.59 | 6.20 |
| R | .170 | .190 | 4.32 | 4.83 |
| S | .520 | .540 | 13.21 | 13.72 |
| T | .620 | .640 | 15.75 | 16.26 |
| U | .065 | .080 | 1.65 | 2.03 |

- 1 - GATE
- 2 - DRAIN (COLLECTOR)
- 3 - SOURCE (EMITTER)
- 4 - NO CONNECTION

NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-247AD except screw hole.

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 | 4,931,844 | 5,049,961 | 5,237,481 | 6,162,665 | 6,404,065 B1 | 6,683,344 | 6,727,585 |
| | 4,850,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123 B1 | 6,534,343 | 6,710,405B2 | 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

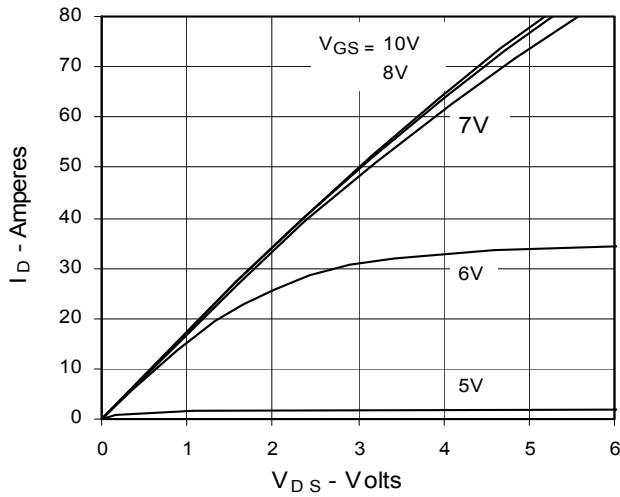


Fig. 2. Extended Output Characteristics @ 25°C

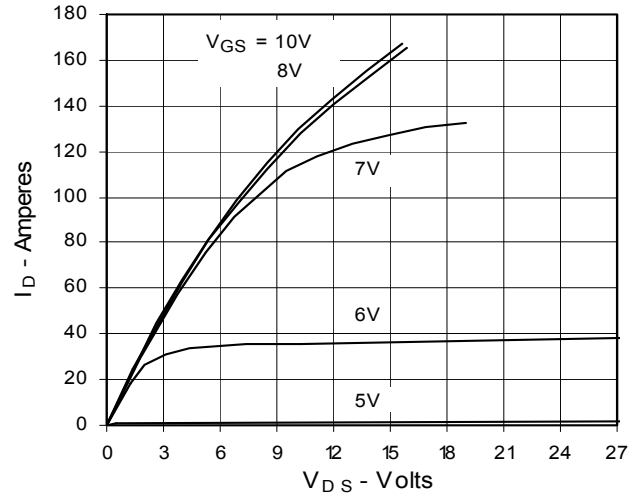


Fig. 3. Output Characteristics @ 125°C

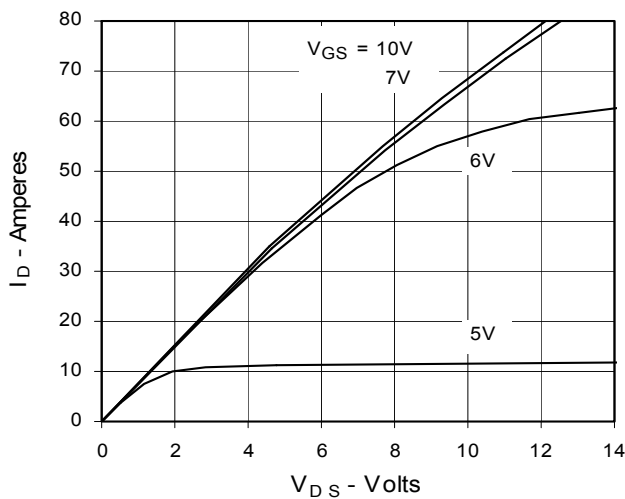


Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 40$ A Value vs. Junction Temperature

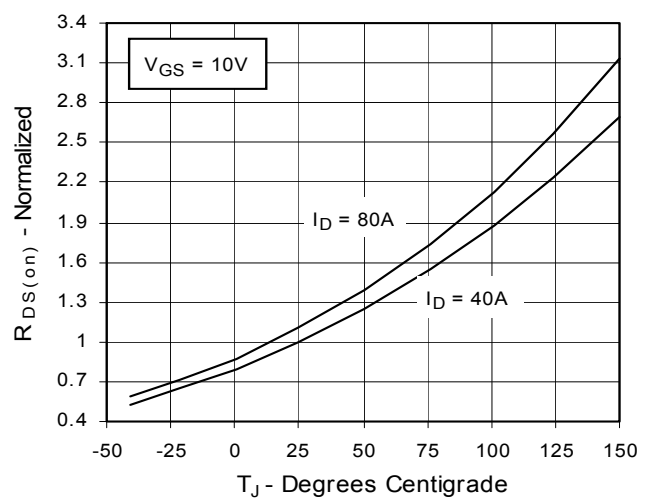


Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 40$ A Value vs. I_D

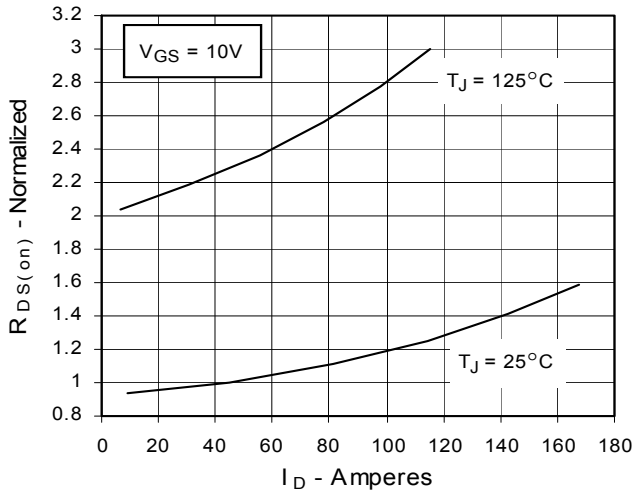


Fig. 6. Drain Current vs. Case Temperature

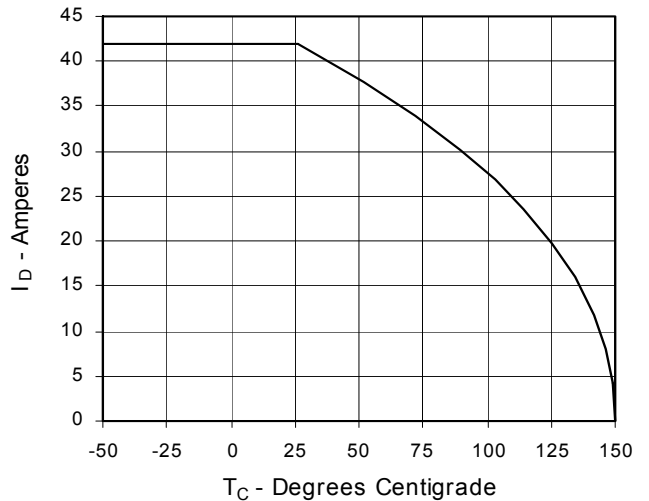


Fig. 7. Input Admittance

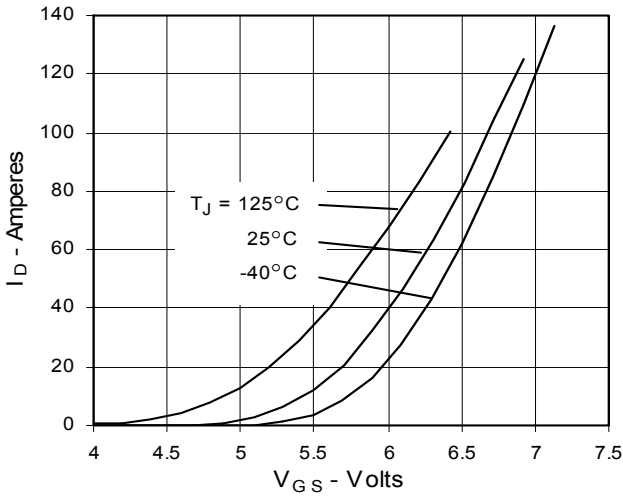


Fig. 8. Transconductance

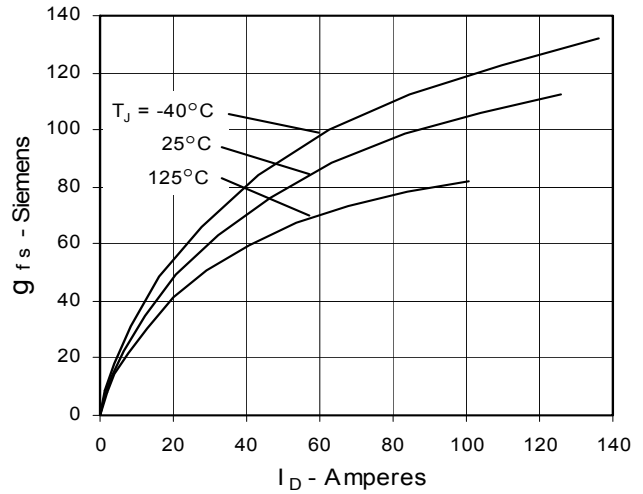


Fig. 9. Source Current vs. Source-To-Drain Voltage

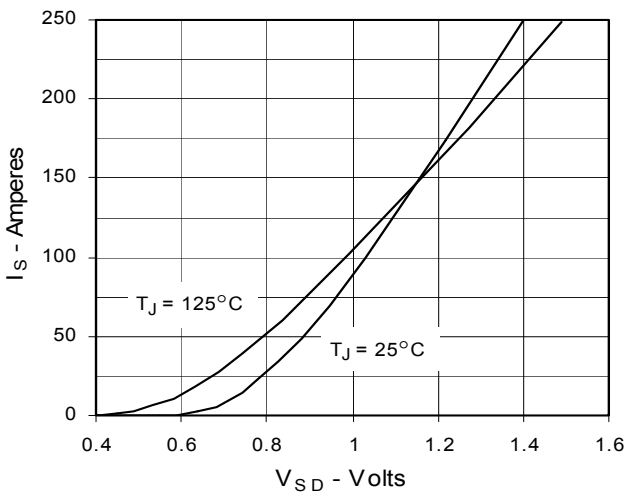


Fig. 10. Gate Charge

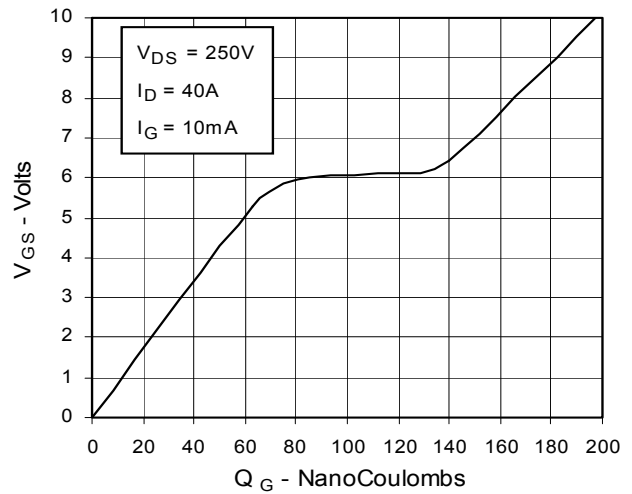


Fig. 11. Capacitance

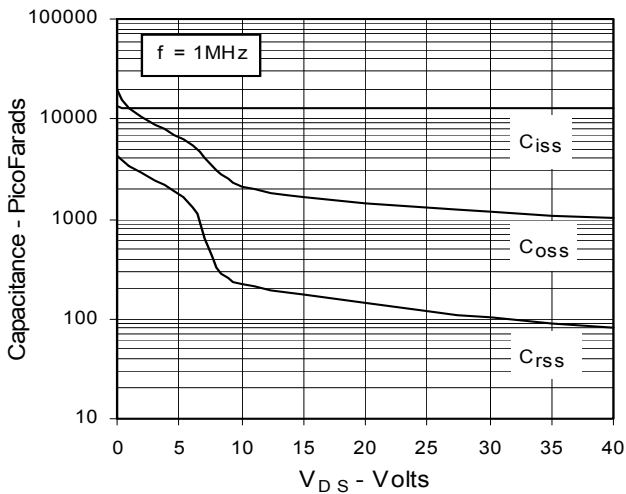


Fig. 12. Forward-Bias Safe Operating Area

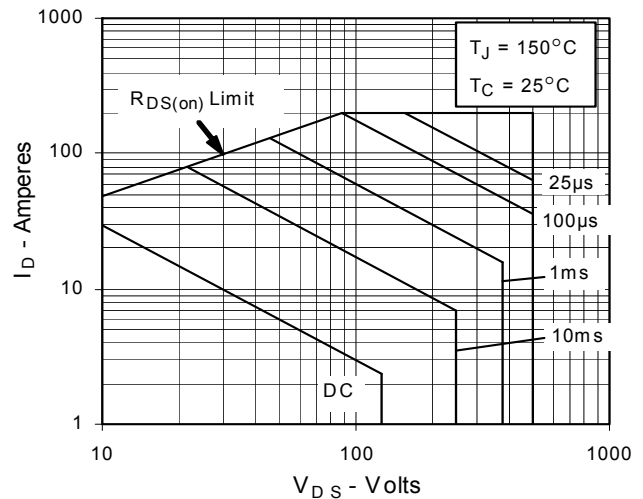
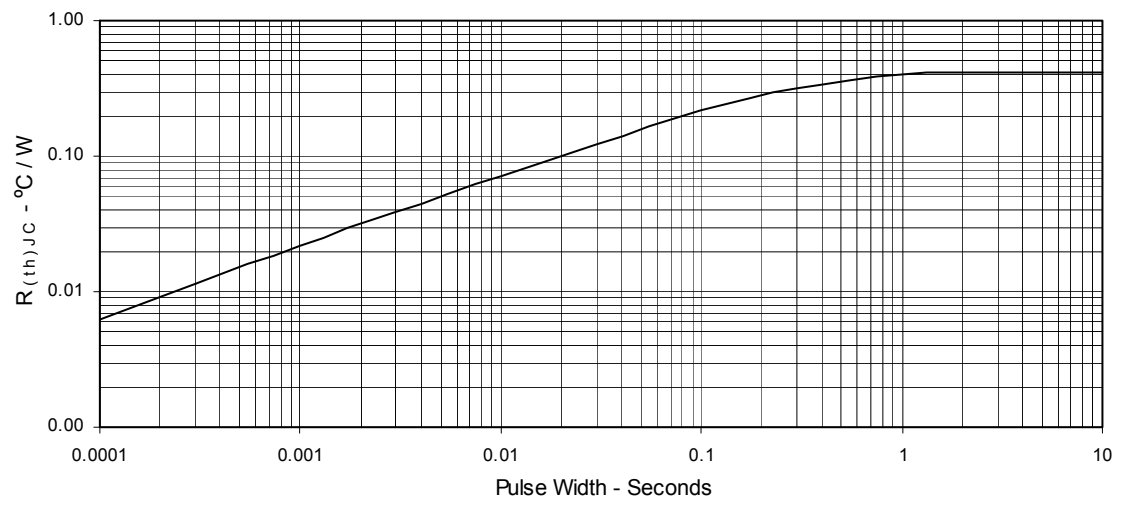


Fig. 13. Maximum Transient Thermal Resistance





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