

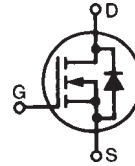
PolarHV™ HiPerFET IXFR 44N50P

Power MOSFET

ISOPLUS247™

(Electrically Isolated Back Surface)

N-Channel Enhancement
 Avalanche Rated
 Fast Intrinsic Diode



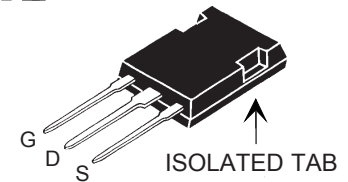
$$V_{DSS} = 500 \text{ V}$$

$$I_{D25} = 24 \text{ A}$$

$$R_{DS(on)} \leq 150 \text{ m}\Omega$$

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

ISOPLUS247 (IXFR)
 E153432



G = Gate
 S = Source
 D = Drain

| Symbol | Test Conditions | Maximum Ratings | |
|---------------|--|-------------------|------------------|
| V_{DSS} | $T_J = 25^\circ\text{C to } 175^\circ\text{C}$ | 500 | V |
| V_{DGR} | $T_J = 25^\circ\text{C to } 175^\circ\text{C}; R_{GS} = 1 \text{ M}\Omega$ | 500 | V |
| V_{GSM} | Transient | ± 40 | V |
| V_{GSM} | Continuous | ± 30 | V |
| I_{D25} | $T_C = 25^\circ\text{C}$ | 24 | A |
| I_{DM} | $T_C = 25^\circ\text{C}$, pulse width limited by T_{JM} | 132 | A |
| I_{AR} | $T_C = 25^\circ\text{C}$ | 44 | A |
| E_{AR} | $T_C = 25^\circ\text{C}$ | 55 | mJ |
| E_{AS} | $T_C = 25^\circ\text{C}$ | 1.7 | J |
| dv/dt | $I_S \leq I_{DM}$, $di/dt \leq 100 \text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ\text{C}$, $R_G = 10 \Omega$ | 10 | V/ns |
| P_D | $T_C = 25^\circ\text{C}$ | 208 | 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 (0.062 in.) from case for 10 s | 300 | $^\circ\text{C}$ |
| V_{ISOL} | 50/60 Hz, RMS, 1 minute | 2500 | V~ |
| F_c | Mounting Force | 20..120 / 4.5..25 | N/lb |
| Weight | | 5 | g |

Features

- † International standard isolated package
- † UL recognized package
- † Silicon chip on Direct-Copper-Bond substrate
 - High power dissipation
 - Isolated mounting surface
 - 2500V electrical isolation
- † Unclamped Inductive Switching (UIS) rated
- † Low package inductance
 - easy to drive and to protect
- † Fast intrinsic diode

Advantages

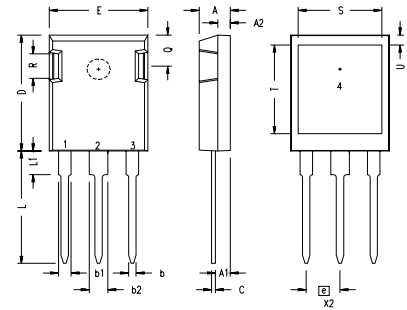
- † Easy to mount
- † Space savings
- † High power density

| Symbol | Test Conditions | Characteristic Values | | |
|--------------|--|-----------------------|------|---------------------------------------|
| | | Min. | Typ. | Max. |
| BV_{DSS} | $V_{GS} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$ | 500 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 4 \text{ mA}$ | 2.5 | | 5.0 V |
| I_{GSS} | $V_{GS} = \pm 30 \text{ V}_{DC}$, $V_{DS} = 0$ | | | $\pm 100 \text{ nA}$ |
| I_{DSS} | $V_{DS} = V_{DSS}$, $V_{GS} = 0 \text{ V}$ | | | 25 μA 500 μA |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$, $I_D = 22 \text{ A}$ | | | 150 $\text{m}\Omega$ |

| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | |
|--------------|---|---|------|-------------------------|
| | | Min. | Typ. | Max. |
| g_{fs} | $V_{DS} = 20\text{ V}$; $I_D = 22\text{ A}$, Note 1 | | 32 | S |
| C_{iss} | $V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$ | | 5440 | pF |
| C_{oss} | | | 639 | pF |
| C_{rss} | | | 40 | pF |
| $t_{d(on)}$ | $V_{GS} = 10\text{ V}$, $V_{DS} = 0.5 V_{DSS}$, $I_D = 22\text{ A}$ $R_G = 3\ \Omega$ (External) | | 25 | ns |
| t_r | | | 27 | ns |
| $t_{d(off)}$ | | | 70 | ns |
| t_f | | | 18 | ns |
| $Q_{g(on)}$ | $V_{GS} = 10\text{ V}$, $V_{DS} = 0.5 V_{DSS}$, $I_D = 22\text{ A}$ | | 98 | nC |
| Q_{gs} | | | 35 | nC |
| Q_{gd} | | | 30 | nC |
| R_{thJC} | | | | $0.6\ ^\circ\text{C/W}$ |
| R_{thCS} | | 0.15 | | $^\circ\text{C/W}$ |

| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | |
|----------|--|---|------|---------------|
| | | Min. | Typ. | Max. |
| I_s | $V_{GS} = 0\text{ V}$ | | | 30 A |
| I_{SM} | Repetitive | | | 132 A |
| V_{SD} | $I_F = I_s$, $V_{GS} = 0\text{ V}$, Note 1 | | | 1.5 V |
| t_{rr} | $I_F = 22\text{ A}$, | | | 200 ns |
| Q_{RM} | $-di/dt = 100\text{ A}/\mu\text{s}$ | | 0.6 | μC |
| I_{RM} | $V_R = 100\text{ V}$ | | 6.0 | A |

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

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.

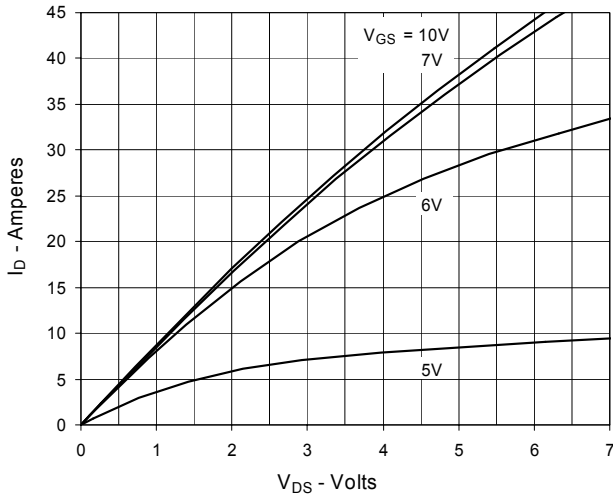
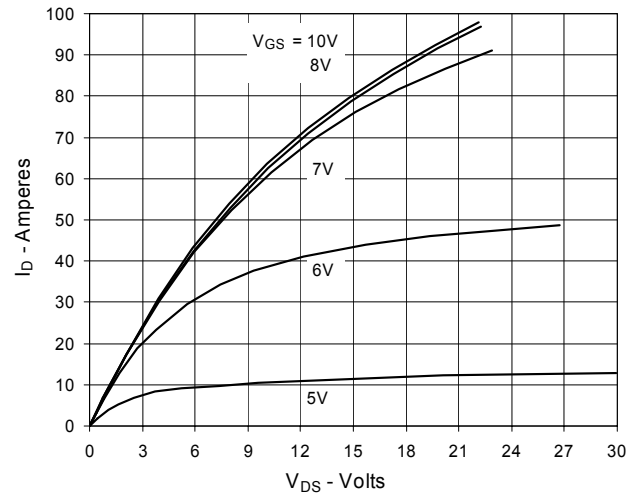
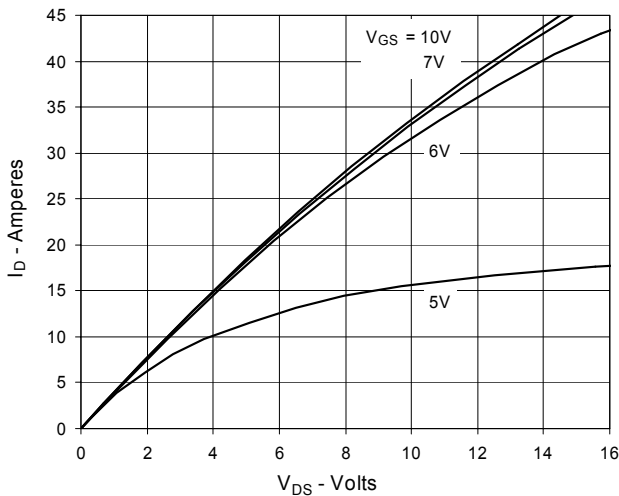
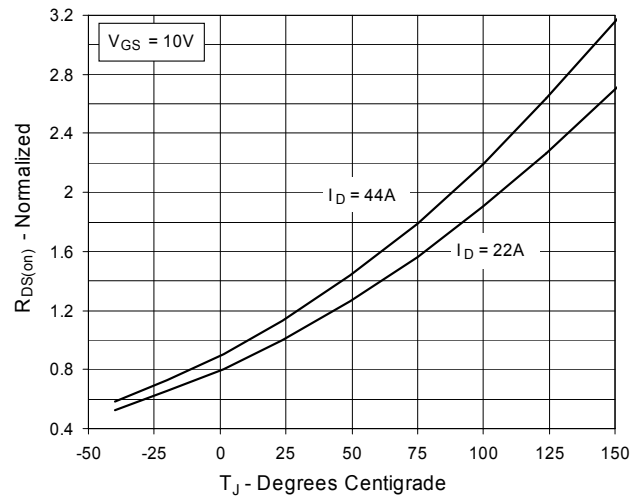
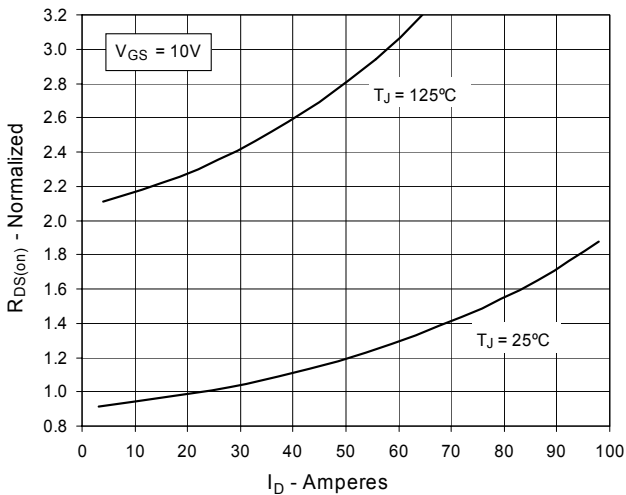
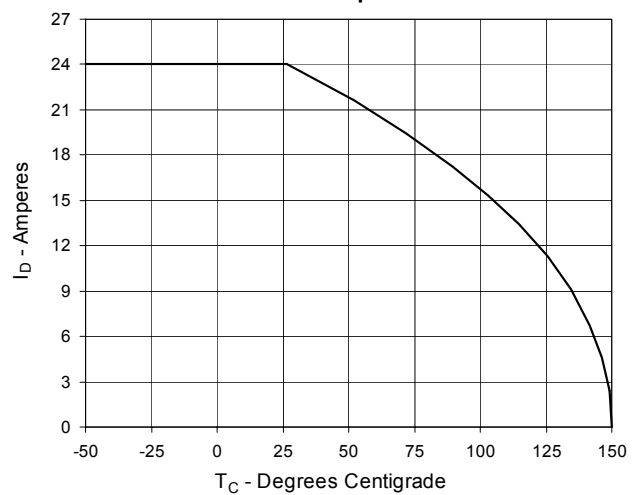
**Fig. 1. Output Characteristics
@ 25°C**

**Fig. 2. Extended Output Characteristics
@ 25°C**

**Fig. 3. Output Characteristics
@ 125°C**

**Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 22A$ Value
vs. Junction Temperature**

**Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 22A$ Value
vs. Drain Current**

**Fig. 6. Maximum Drain Current vs.
Case Temperature**


Fig. 7. Input Admittance

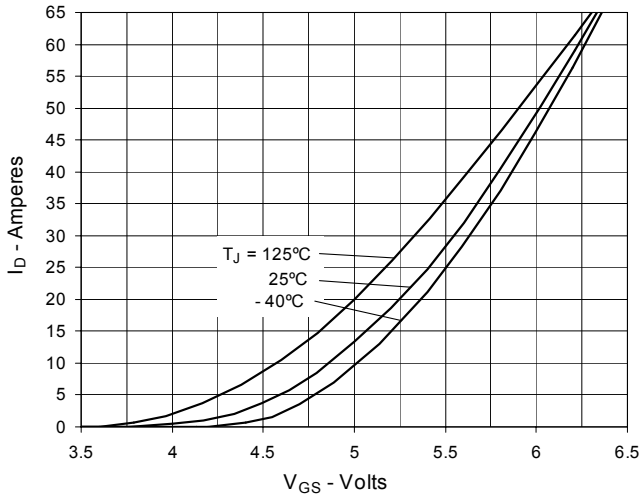


Fig. 8. Transconductance

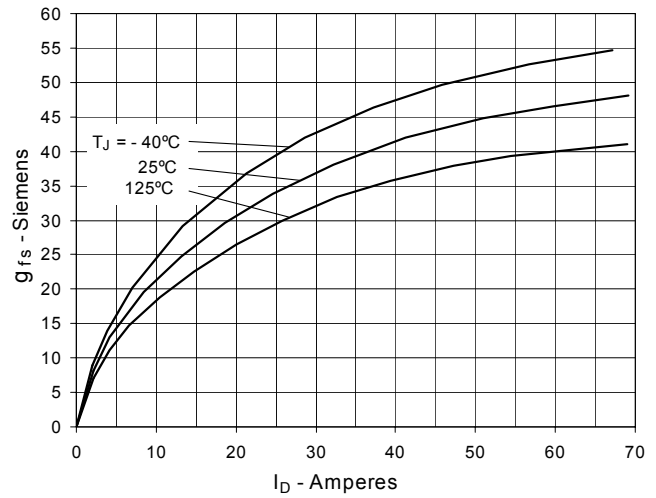


Fig. 9. Forward Voltage Drop of Intrinsic Diode

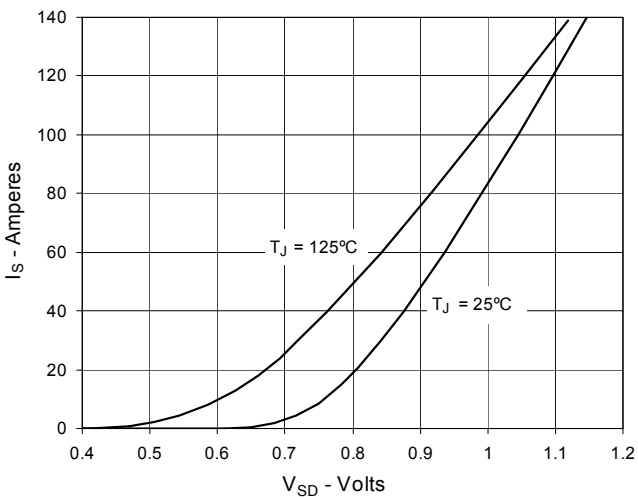


Fig. 10. Gate Charge

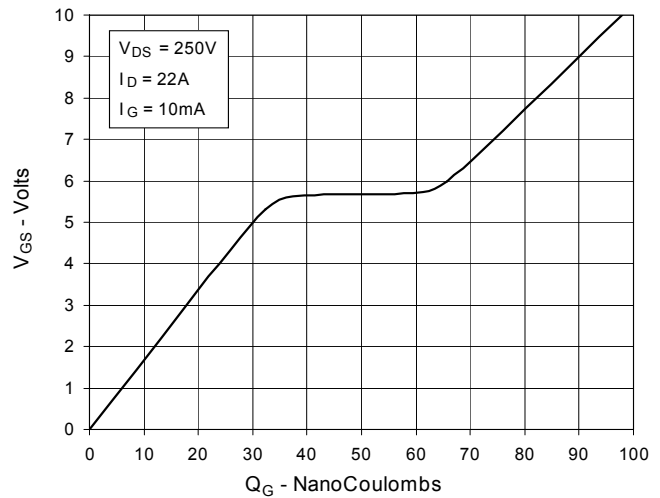


Fig. 11. Capacitance

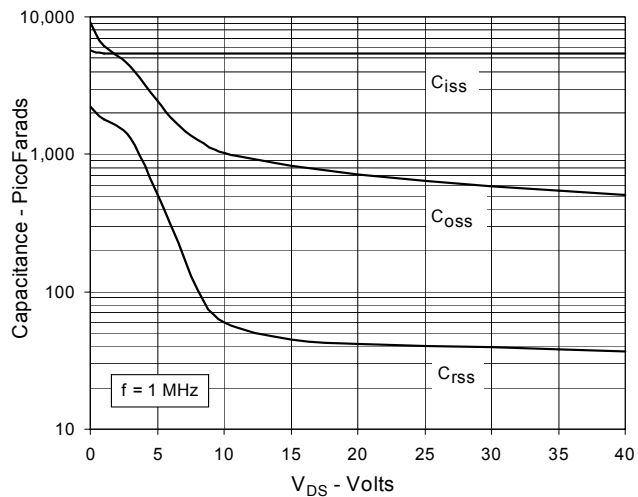


Fig. 12. Forward-Bias Safe Operating Area

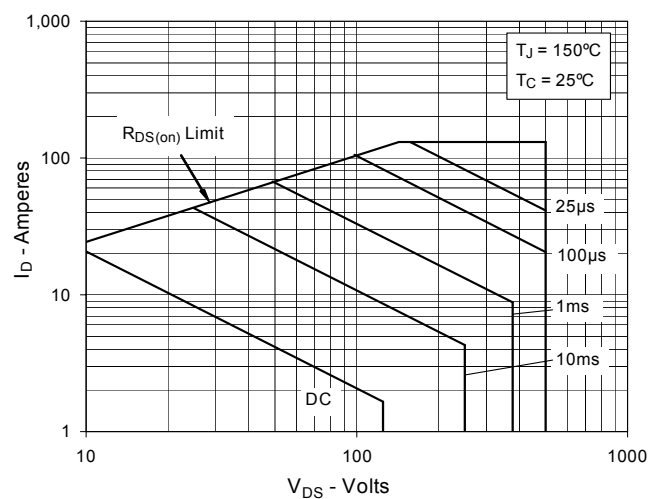
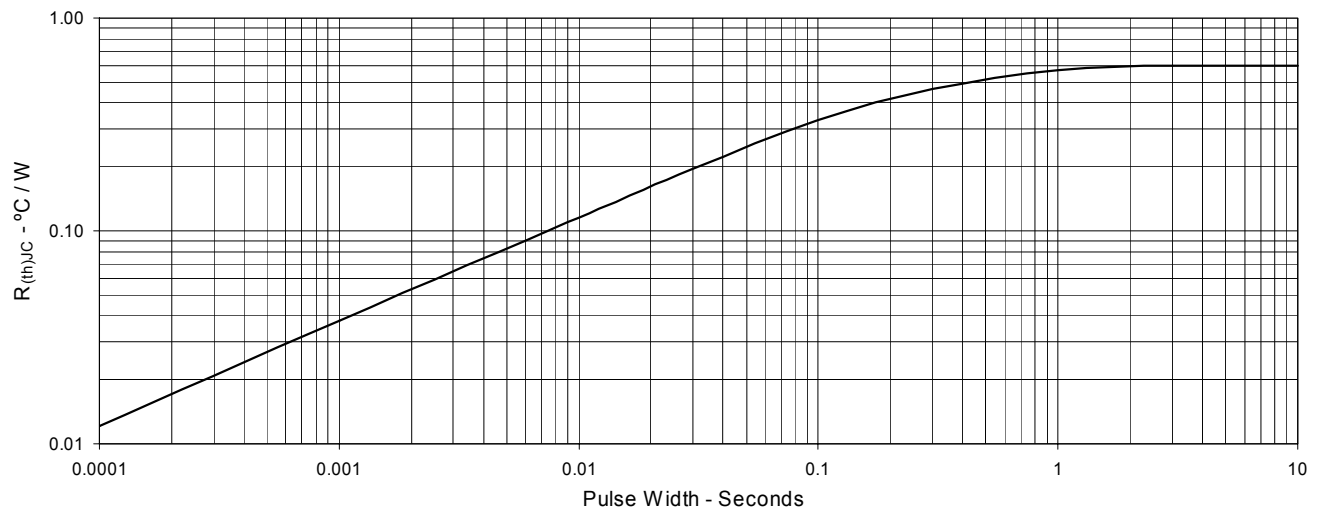


Fig. 13. Maximum Transient Thermal Resistance





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