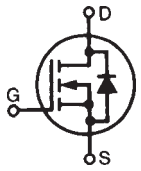
IXYS

# Polar™ Power MOSFET HiPerFET™

## IXFR20N120P

N-Channel Enhancement Mode
Avalanche Rated
Fast Intrinsic Diode

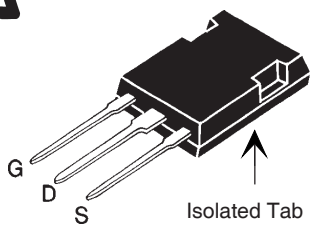



$V_{DSS}$ = 1200V
$I_{D25}$ = 13A
$R_{DS(on)}$ ≤ 630mΩ
$t_{rr}$ ≤ 300ns

| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{DSS}$ | $T_J$ = 25°C to 150°C | 1200 | V |
| $V_{DGR}$ | $T_J$ = 25°C to 150°C, $R_{GS}$ = 1MΩ | 1200 | V |
| $V_{GSS}$ | Continuous | ± 30 | V |
| $V_{GSM}$ | Transient | ± 40 | V |
| $I_{D25}$ | $T_C$ = 25°C | 13 | A |
| $I_{DM}$ | $T_C$ = 25°C, pulse width limited by $T_{JM}$ | 50 | A |
| $I_A$ | $T_C$ = 25°C | 10 | A |
| $E_{AS}$ | $T_C$ = 25°C | 1 | J |
| dV/dt | $I_S \le I_{DM}$, $V_{DD} \le V_{DSS}$, $T_J \le 150°C$ | 15 | V/ns |
| $P_D$ | $T_C$ = 25°C | 290 | W |
| $T_J$ | | -55 ... +150 | °C |
| $T_{JM}$ | | 150 | °C |
| $T_{stg}$ | | -55 ... +150 | °C |
| $T_L$ | Maximum lead temperature for soldering | 300 | °C |
| $T_{SOLD}$ | Plastic body for 10s | 260 | °C |
| $V_{ISOL}$ | 50/60 Hz, RMS, 1 minute | 2500 | V~ |
| $F_C$ | Mounting force | 20..120/4.5..27 | N/lb. |
| Weight | | 5 | g |

| Symbol | Test Conditions ($T_J$ = 25°C, unless otherwise specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $BV_{DSS}$ | $V_{GS}$ = 0V, $I_D$ = 1mA | 1200 | | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D$ = 1mA | 3.5 | | 6.5 | V |
| $I_{GSS}$ | $V_{GS}$ = ± 30V, $V_{DS}$ = 0V | | | ± 200 | nA |
| $I_{DSS}$ | $V_{DS} = V_{DSS}$ | | | 25 | μA |
| | $V_{GS}$ = 0V, $T_J$ = 125°C | | | 5 | mA |
| $R_{DS(on)}$ | $V_{GS}$ = 10V, $I_D$ = 10A, Note 1 | | | 630 | mΩ |

**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
- Unclamped Inductive Switching (UIS) rated
- Fast intrinsic Rectifier

### Advantages

- Easy assembly
- Space savings
- High power density

### Applications:

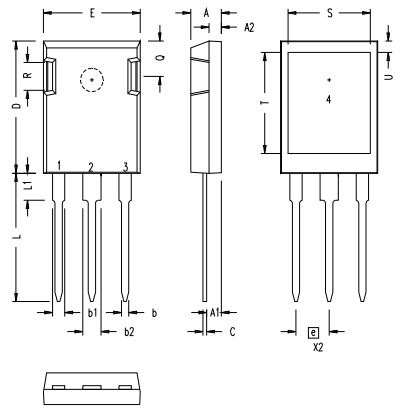
- High Voltage Switched-mode and resonant-mode power supplies
- High Voltage Pulse Power Applications
- High Voltage Discharge circuits in Lasers Pulsers, Spark Igniters, RF Generators
- High Voltage DC-DC converters
- High Voltage DC-AC inverters

| Symbol | Test Conditions ($T_J$ = 25°C unless otherwise specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $V_{DS}$ = 20V, $I_D$ = 10A, Note 1 | 10 | 16 | | S |
| $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = 25V, f = 1MHz | | 11.1 | | nF |
| $C_{oss}$ | | | 600 | | pF |
| $C_{rss}$ | | | 60 | | pF |
| $R_{Gi}$ | Gate input resistance | | 1.60 | | Ω |
| $t_{d(on)}$ | **Resistive Switching Times** | | 49 | | ns |
| $t_r$ | $V_{GS}$ = 10V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 10A | | 45 | | ns |
| $t_{d(off)}$ | $R_G$ = 1Ω (External) | | 72 | | ns |
| $t_f$ | | | 70 | | ns |
| $Q_{g(on)}$ | $V_{GS}$ = 10V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 10A | | 193 | | nC |
| $Q_{gs}$ | | | 74 | | nC |
| $Q_{gd}$ | | | 85 | | nC |
| $R_{thJC}$ | | | | 0.43 | °C/W |
| $R_{thCS}$ | | | 0.15 | | °C/W |

| Source-Drain Diode ($T_J$ = 25°C unless otherwise specified) | | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $I_S$ | $V_{GS}$ = 0V | | | 20 | A |
| $I_{SM}$ | Repetitive, pulse width limited by $T_{JM}$ | | | 80 | A |
| $V_{SD}$ | $I_F$ = $I_S$, $V_{GS}$ = 0V, Note 1 | | | 1.5 | V |
| $t_{rr}$ | $I_F$ = 10A, -di/dt = 100A/μs | | | 300 | ns |
| $Q_{RM}$ | $V_R$ = 100V, $V_{GS}$ = 0V | | 0.84 | | μC |
| $I_{RM}$ | | | 9 | | A |

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

**ISOPLUS247 (IXFR) Outline**




| SYM | INCHES MIN | INCHES MAX | MILLIMETERS MIN | MILLIMETERS 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 @ 25ºC**

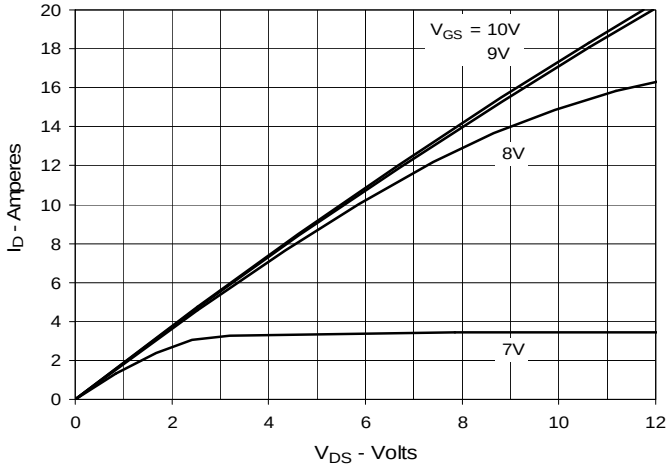



**Fig. 2. Extended Output Characteristics @ 25ºC**

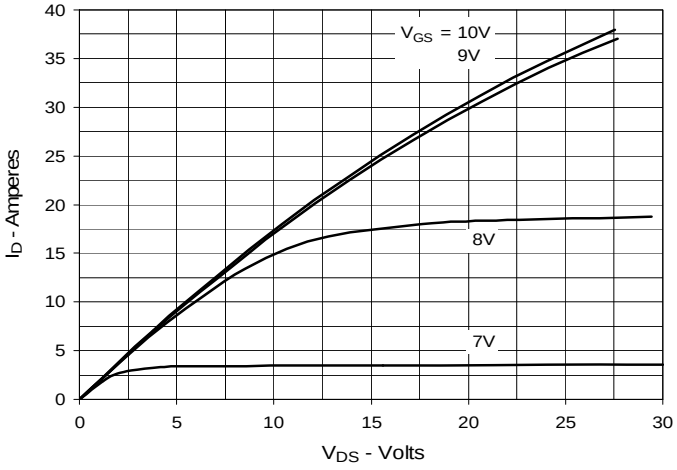



**Fig. 3. Output Characteristics @ 125ºC**

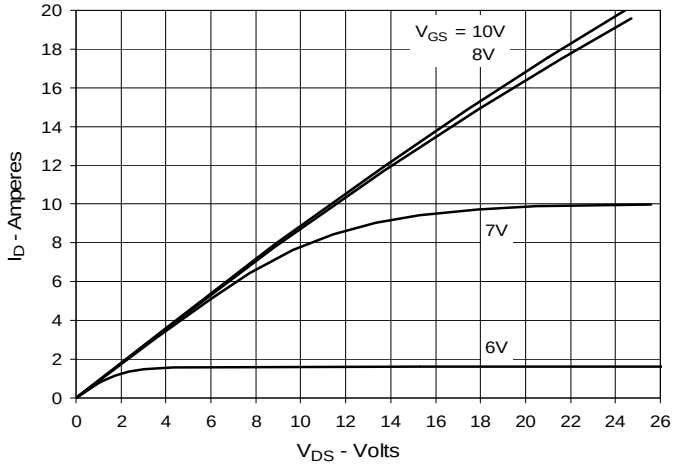



**Fig. 4. $R_{DS(on)}$ Normalized to $I_D$ = 10A Value vs. Junction Temperature**

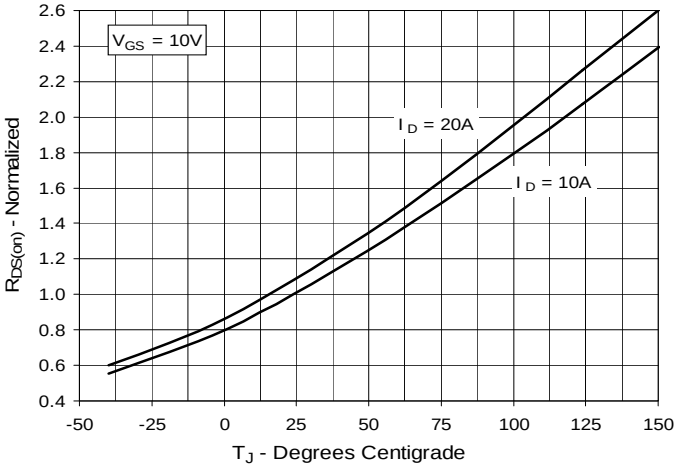



**Fig. 5. $R_{DS(on)}$ Normalized to $I_D$ = 10A Value vs. Drain Current**

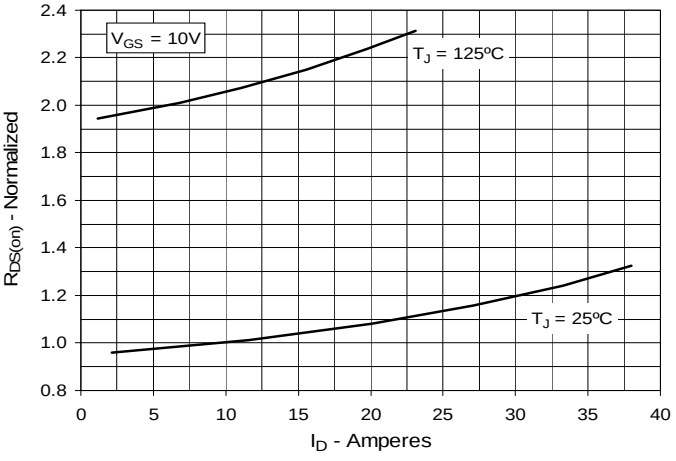



**Fig. 6. Maximum Drain Current vs. Case Temperature**

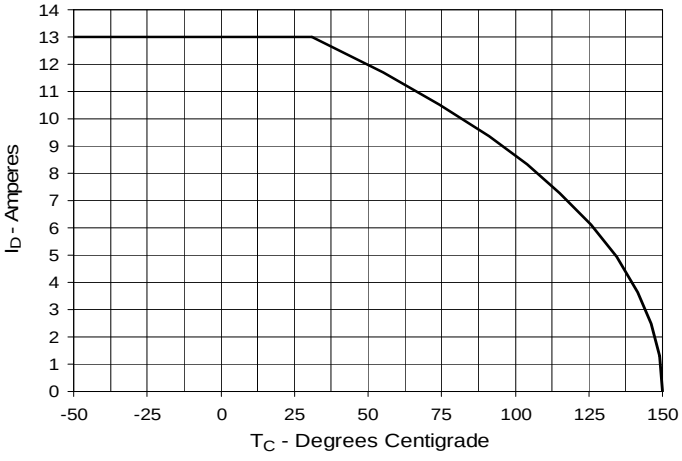


**Fig. 7. Input Admittance**

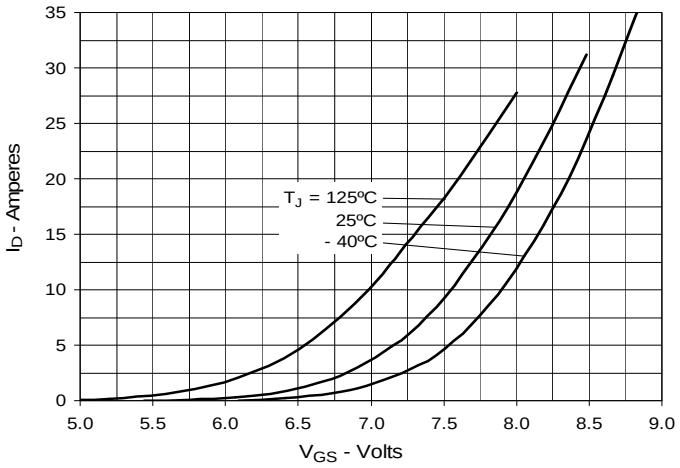



**Fig. 8. Transconductance**

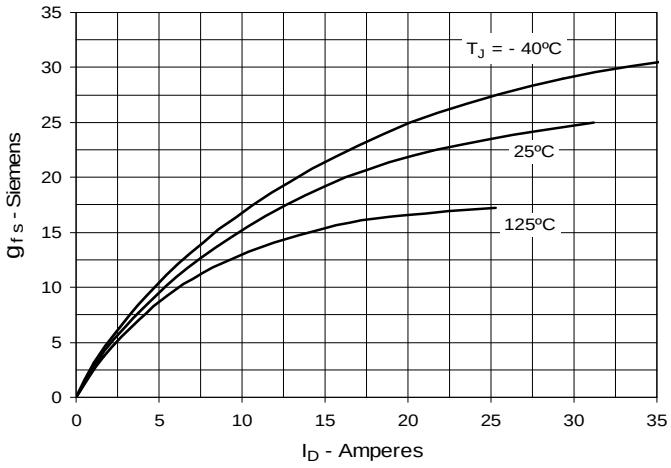



**Fig. 9. Forward Voltage Drop of Intrinsic Diode**

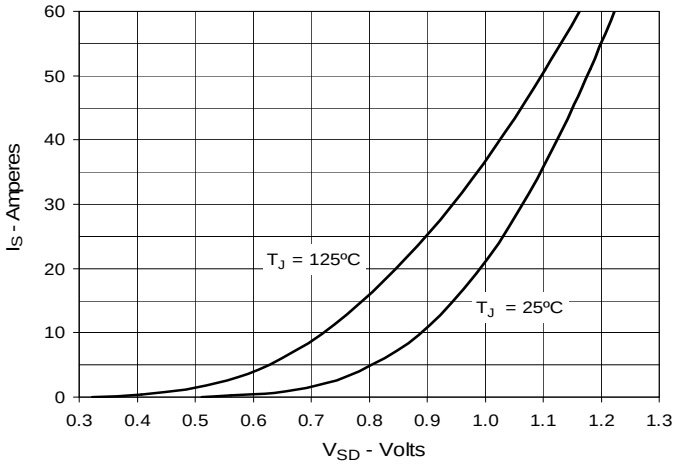



**Fig. 10. Gate Charge**

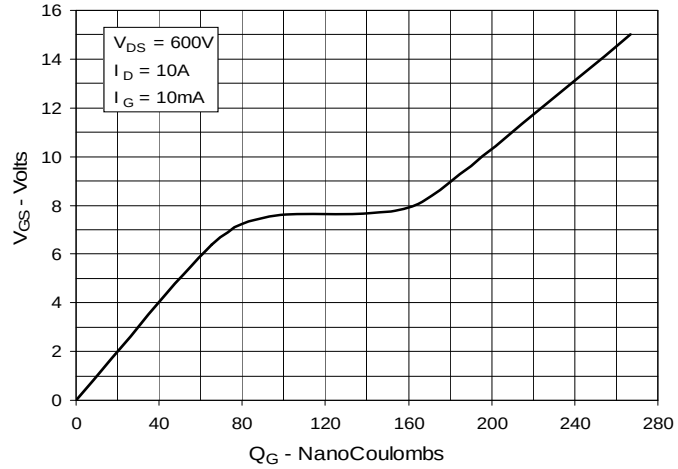



**Fig. 11. Capacitance**

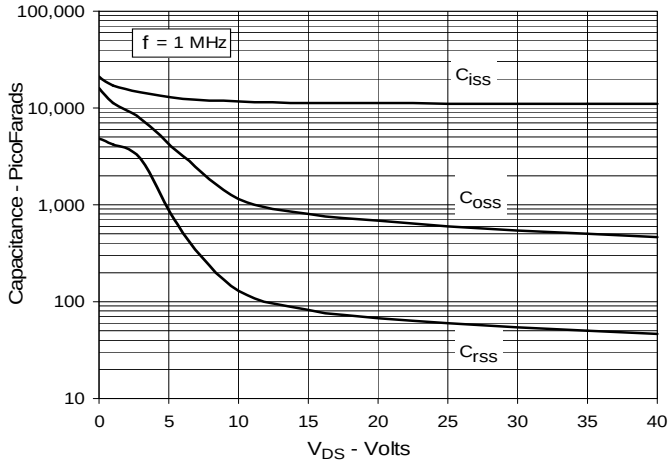
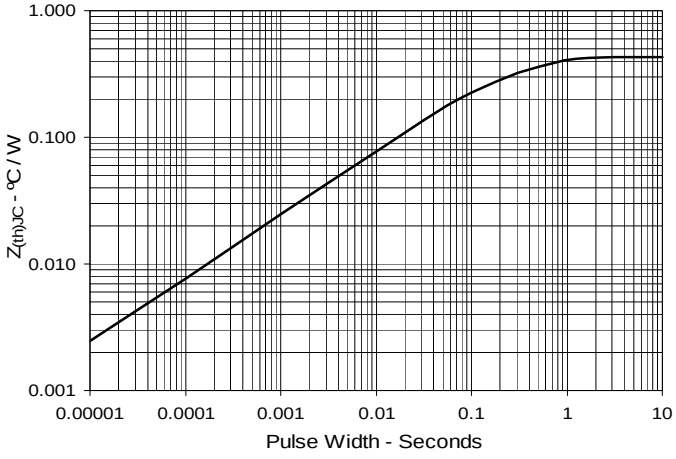



**Fig. 12. Maximum Transient Thermal Impedance**




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