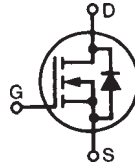


Polar™ Power MOSFET IXTP12N50PM

(Electrically Isolated Tab)

N-Channel Enhancement Mode
Avalanche Rated
Fast Intrinsic Diode



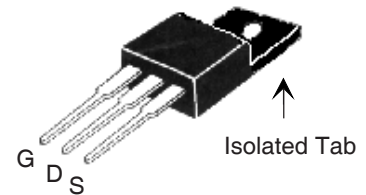
$$V_{DSS} = 500V$$

$$I_{D25} = 6A$$

$$R_{DS(on)} \leq 500m\Omega$$

$$t_{rr} \leq 300ns$$

OVERMOLDED TO-220
(IXTP...M) OUTLINE



G = Gate D = Drain
S = Source

| Symbol | Test Conditions | Maximum Ratings | |
|---------------|---|-----------------|------------|
| V_{DSS} | $T_J = 25^\circ C$ to $150^\circ C$ | 500 | V |
| V_{DGR} | $T_J = 25^\circ C$ to $150^\circ C$, $R_{GS} = 1 M\Omega$ | 500 | V |
| V_{GSS} | Continuous | ± 30 | V |
| V_{GSM} | Transient | ± 40 | V |
| I_{D25} | $T_C = 25^\circ C$ | 6 | A |
| I_{DM} | $T_C = 25^\circ C$, pulse width limited by T_{JM} | 30 | A |
| I_A | $T_C = 25^\circ C$ | 12 | A |
| E_{AS} | $T_C = 25^\circ C$ | 600 | mJ |
| dv/dt | $I_S \leq I_{DM}$, $V_{DD} \leq V_{DSS}$, $T_J = 150^\circ C$ | 10 | V/ns |
| P_D | $T_C = 25^\circ C$ | 50 | W |
| T_J | | - 55 ... +150 | $^\circ C$ |
| T_{JM} | | 150 | $^\circ C$ |
| T_{stg} | | - 55 ... +150 | $^\circ C$ |
| T_L | 1.6 mm (0.062 in.) from case for 10 s | 300 | $^\circ C$ |
| T_{SOLD} | Plastic body for 10 s | 260 | $^\circ C$ |
| M_d | Mounting torque | 1.13/10 | Nm/lb.in. |
| Weight | | 2.5 | g |

Features

- Plastic overmolded tab for electrical isolation
- International standard package
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
 - easy to drive and to protect

Advantages

- Easy to mount
- Space savings

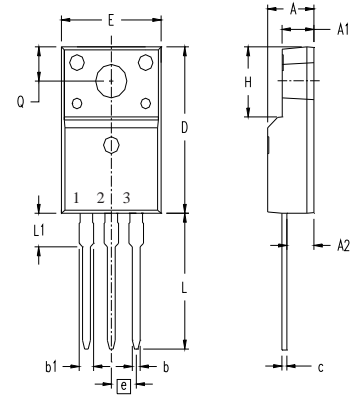
| Symbol | Test Conditions ($T_J = 25^\circ C$, unless otherwise specified) | Characteristic Values | | |
|--------------|---|-----------------------|------|--------------------------|
| | | Min. | Typ. | Max. |
| BV_{DSS} | $V_{GS} = 0V$, $I_D = 250\mu A$ | 500 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 250\mu A$ | 3.0 | | V |
| I_{GSS} | $V_{GS} = \pm 30V$, $V_{DS} = 0V$ | | | ± 100 nA |
| I_{DSS} | $V_{DS} = V_{DSS}$ $V_{GS} = 0V$ $T_J = 125^\circ C$ | | | 5 μA 250 μA |
| $R_{DS(on)}$ | $V_{GS} = 10V$, $I_D = 6A$, Note 1 | | | 500 m Ω |

| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | |
|--------------|---|---|------|------------------------|
| | | Min. | Typ. | Max. |
| g_{fs} | $V_{DS} = 10\text{V}, I_D = 6\text{A}$, Note 1 | 7.5 | 13 | S |
| C_{iss} | $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$ | | 1830 | pF |
| C_{oss} | | | 182 | pF |
| C_{rss} | | | 16 | pF |
| $t_{d(on)}$ | $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 6\text{A}$ $R_G = 10\Omega$ (External) | | 22 | ns |
| t_r | | | 27 | ns |
| $t_{d(off)}$ | | | 65 | ns |
| t_f | | | 20 | ns |
| $Q_{g(on)}$ | $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 6\text{A}$ | | 29 | nC |
| Q_{gs} | | | 11 | nC |
| Q_{gd} | | | 10 | nC |
| R_{thJC} | | | | 2.5 $^\circ\text{C/W}$ |

Source-Drain Diode

| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$ unless otherwise specified) | | |
|----------|--|---|------|---------------|
| | | Min. | Typ. | Max. |
| I_S | $V_{GS} = 0\text{V}$ | | | 12 A |
| I_{SM} | Repetitive, pulse width limited by T_{JM} | | | 48 A |
| V_{SD} | $I_F = I_S, V_{GS} = 0\text{V}$, Note 1 | | | 1.5 V |
| t_{rr} | $I_F = 6\text{A}, -di/dt = 150\text{A}/\mu\text{s}$ $V_R = 100\text{V}, V_{GS} = 0\text{V}$ | | | 300 ns |
| Q_{RM} | | | 2.8 | μC |
| I_{RM} | | | 18.2 | A |

ISOLATED TO-220 (IXTP...M)



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

| SYM | INCHES | | MILLIMETERS | |
|-----------------|----------|------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .177 | .193 | 4.50 | 4.90 |
| A1 | .092 | .108 | 2.34 | 2.74 |
| A2 | .101 | .117 | 2.56 | 2.96 |
| b | .028 | .035 | 0.70 | 0.90 |
| b1 | .050 | .058 | 1.27 | 1.47 |
| c | .018 | .024 | 0.45 | 0.60 |
| D | .617 | .633 | 15.67 | 16.07 |
| E | .392 | .408 | 9.96 | 10.36 |
| e | .100 BSC | | 2.54 BSC | |
| H | .255 | .271 | 6.48 | 6.88 |
| L | .499 | .523 | 12.68 | 13.28 |
| L1 | .119 | .135 | 3.03 | 3.43 |
| $\varnothing P$ | .121 | .129 | 3.08 | 3.28 |
| Q | .126 | .134 | 3.20 | 3.40 |

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

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 | 7,005,734 B2 | 7,157,338 B2 |
| 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 | 7,063,975 B2 | |
| 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 | 7,071,537 | |

Fig. 1. Output Characteristics
@ 25°C

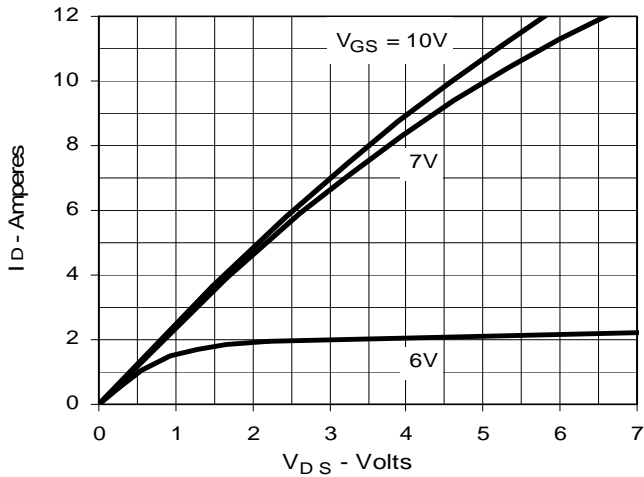


Fig. 2. Extended Output Characteristics
@ 25°C

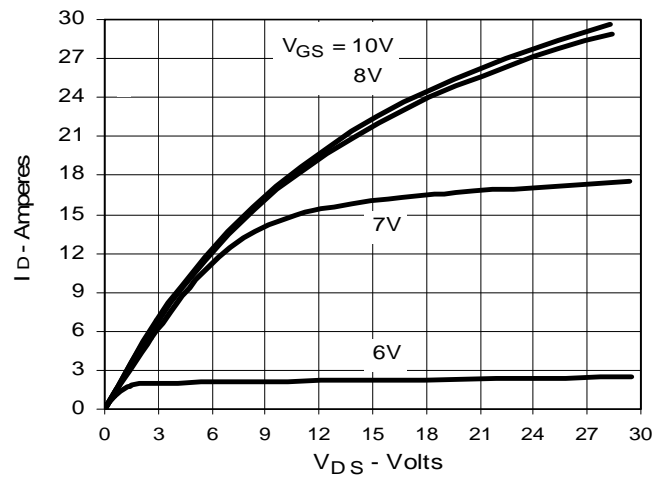


Fig. 3. Output Characteristics
@ 125°C

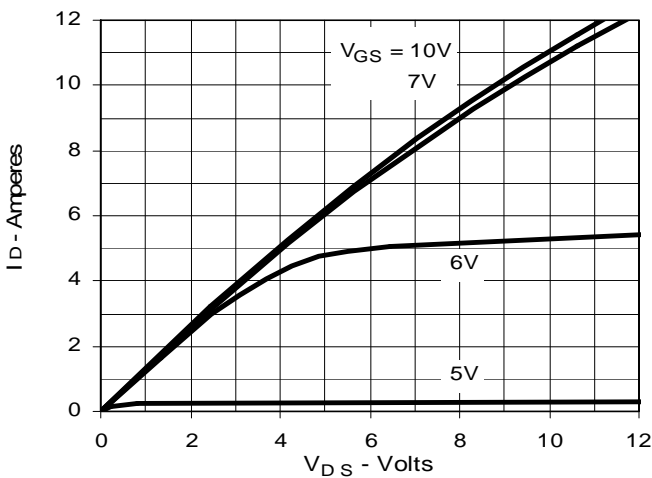


Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 6A$ Value vs. Junction Temperature

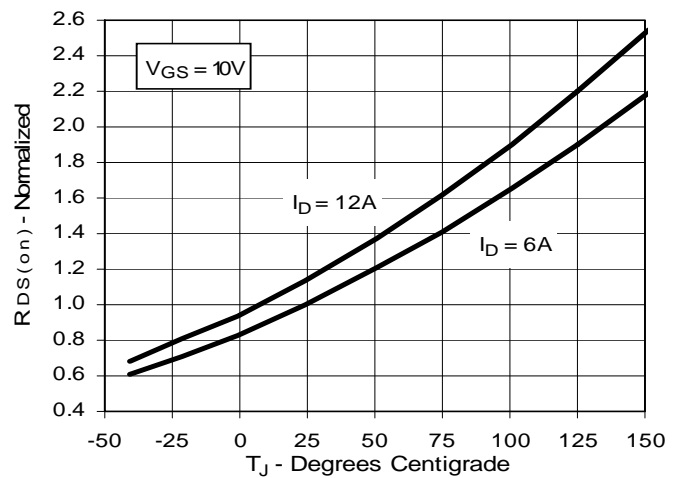


Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 6A$ Value vs. Drain Current

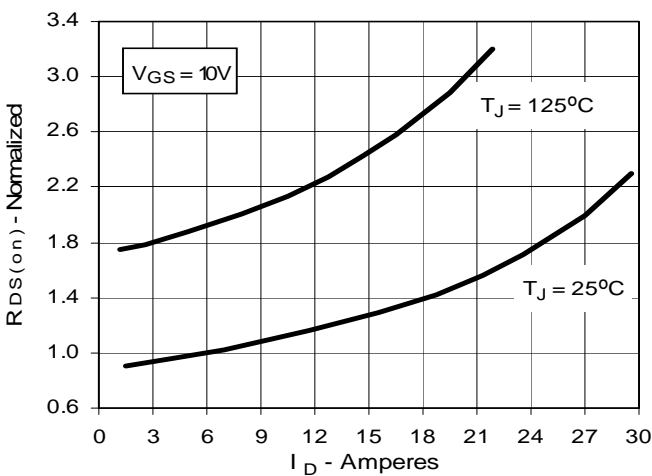


Fig. 6. Drain Current vs. Case Temperature

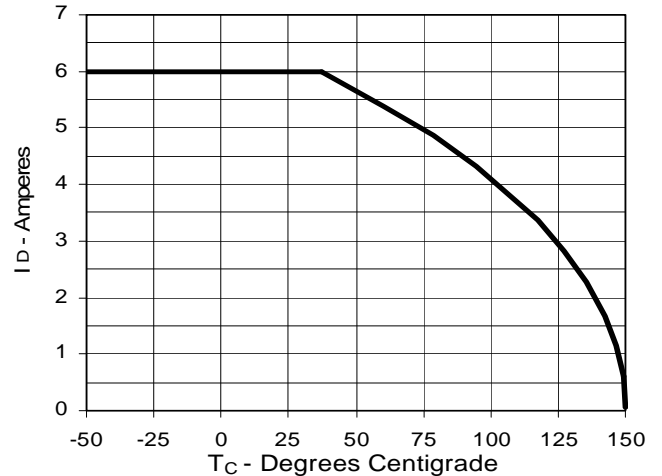


Fig. 7. Input Admittance

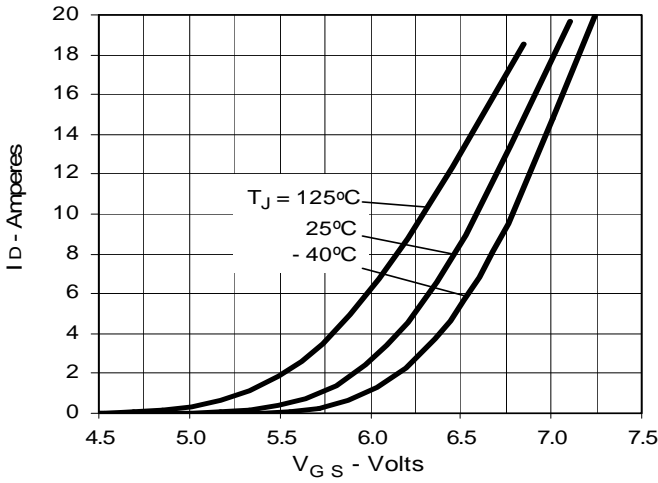


Fig. 8. Transconductance

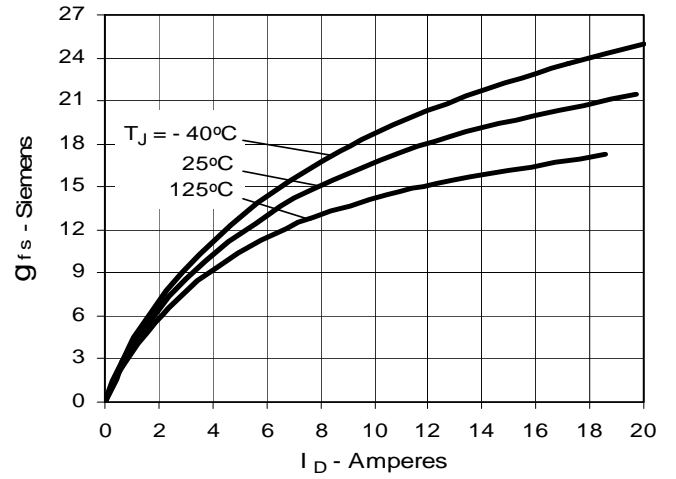


Fig. 9. Source Current vs. Source-To-Drain Voltage

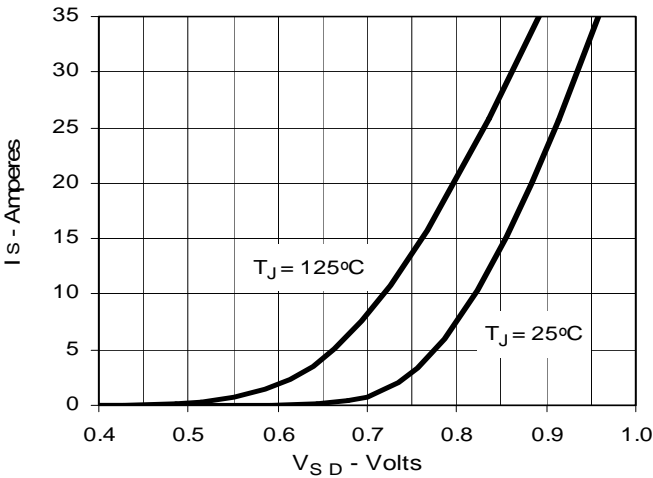


Fig. 10. Gate Charge

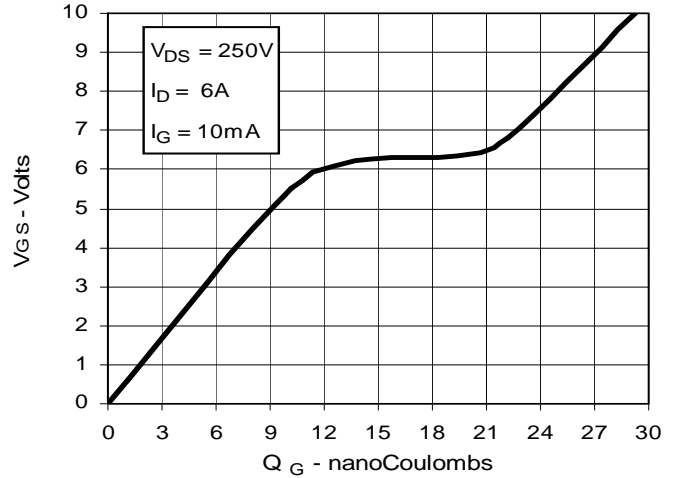


Fig. 11. Capacitance

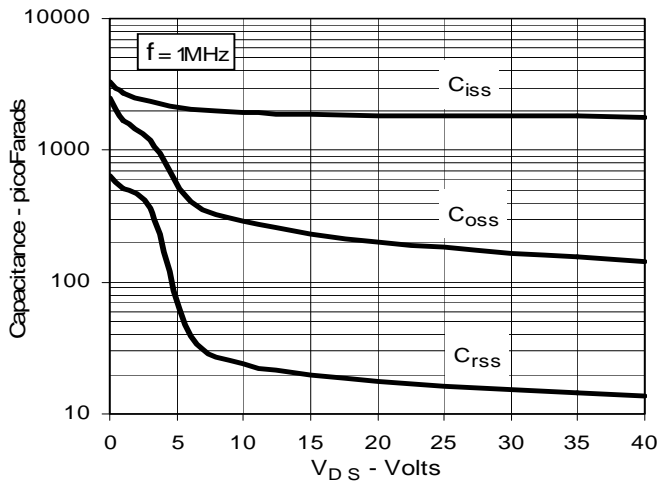


Fig. 12. Forward-Bias Safe Operating Area

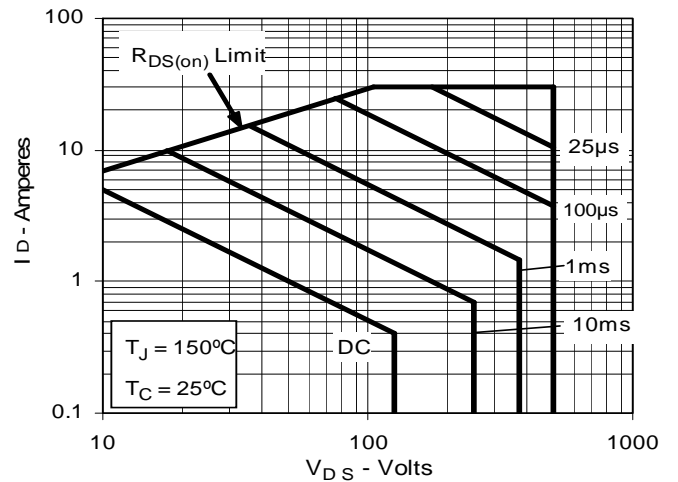
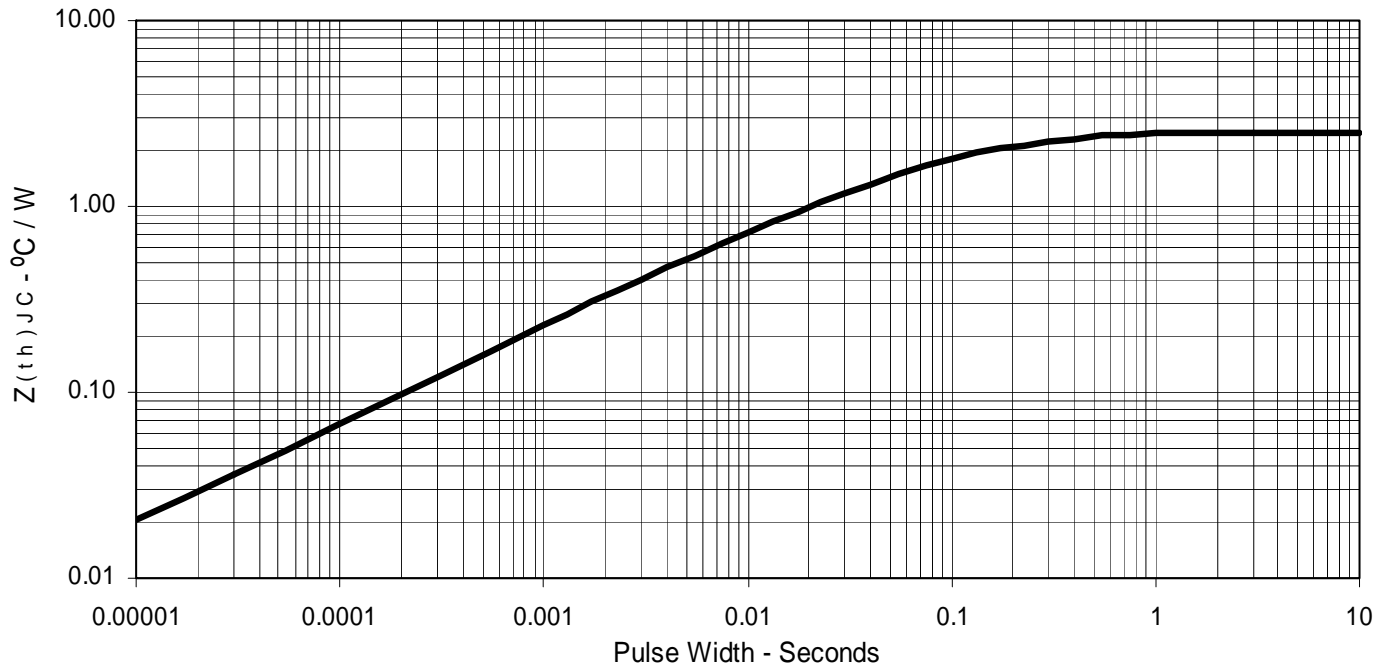


Fig. 13. Maximum Transient Thermal Impedance





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