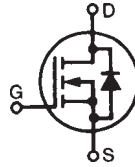


Polar™ Power MOSFET IXTP12N50PM

(Electrically Isolated Tab)

N-Channel Enhancement Mode
Avalanche Rated
Fast Intrinsic Diode



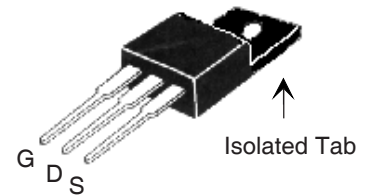
$$V_{DSS} = 500V$$

$$I_{D25} = 6A$$

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

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

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

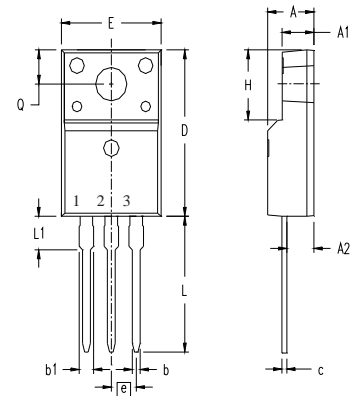
| Symbol | Test Conditions ($T_J = 25^\circ C$, unless otherwise specified) | Characteristic Values | | |
|--------------|---|-----------------------|------|--------------------------|
| | | Min. | Typ. | Max. |
| BV_{DSS} | $V_{GS} = 0V$, $I_D = 250\mu A$ | 500 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 250\mu A$ | 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

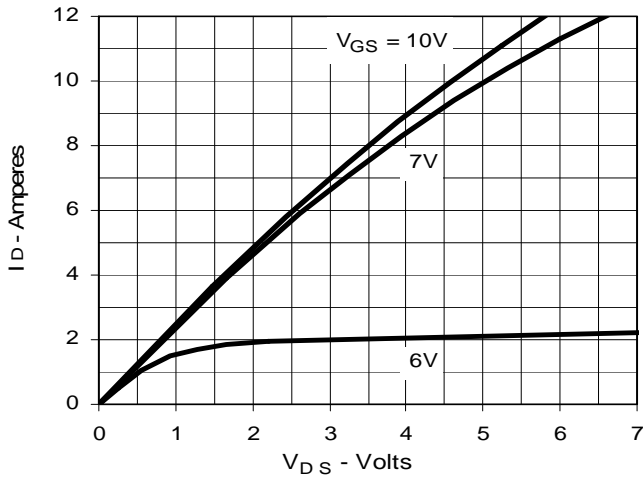


Fig. 2. Extended Output Characteristics
@ 25°C

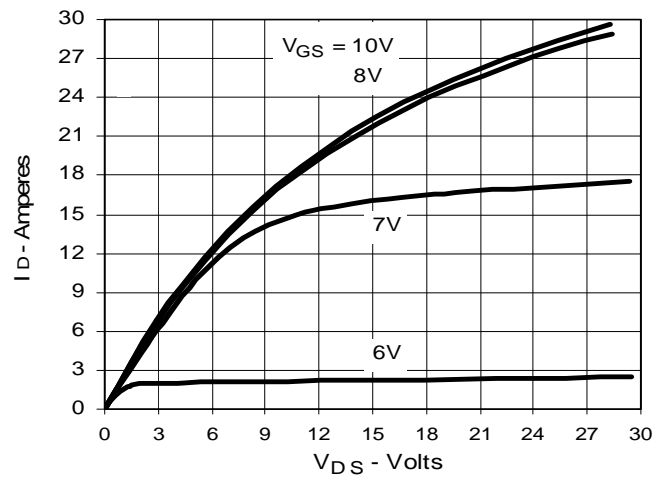


Fig. 3. Output Characteristics
@ 125°C

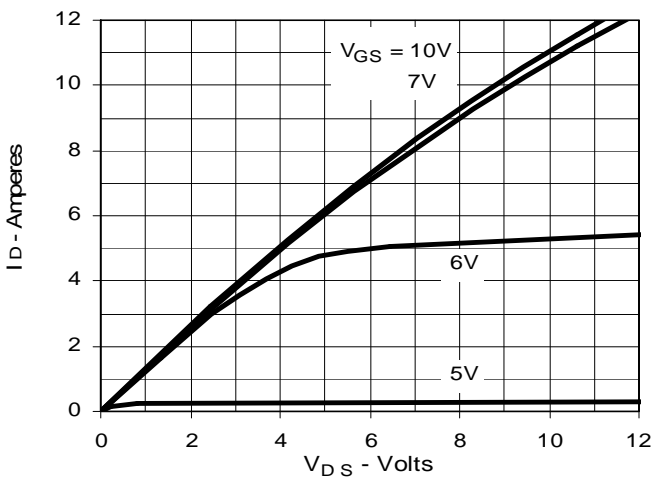


Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 6A$ Value vs. Junction Temperature

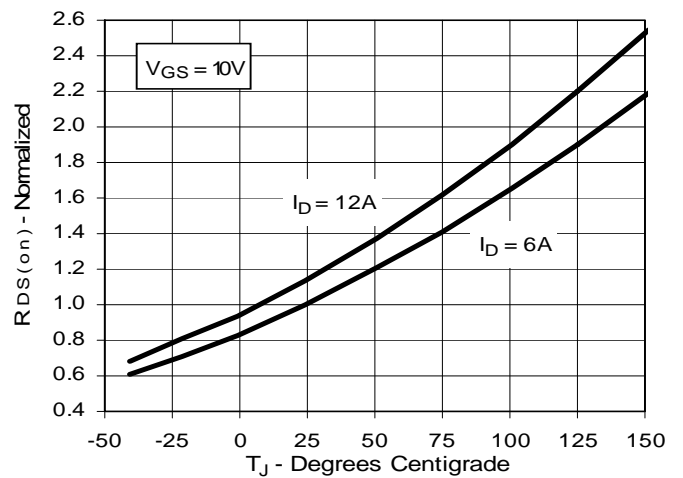


Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 6A$ Value vs. Drain Current

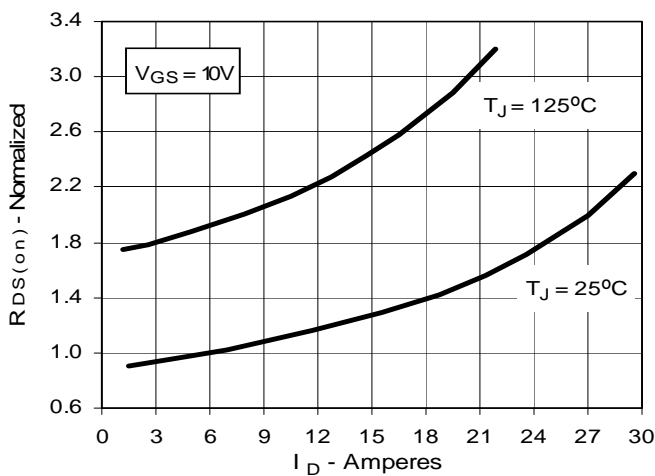


Fig. 6. Drain Current vs. Case Temperature

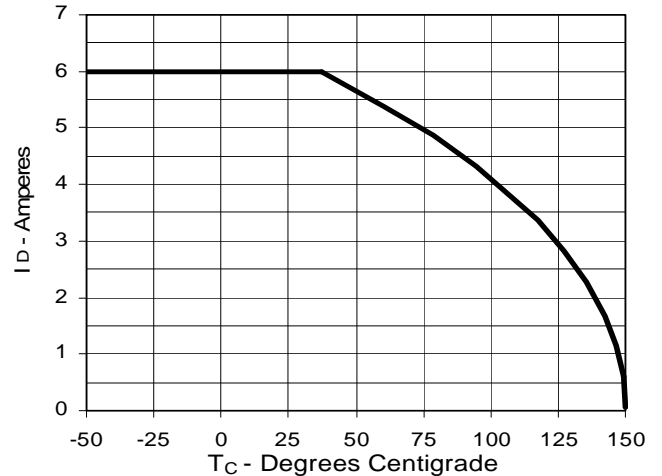


Fig. 7. Input Admittance

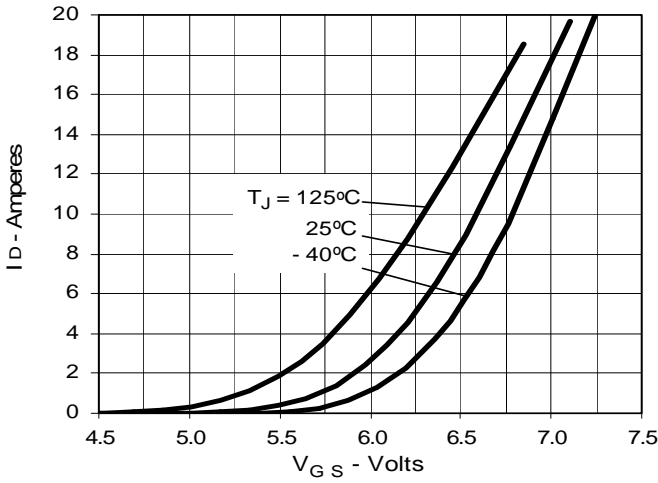


Fig. 8. Transconductance

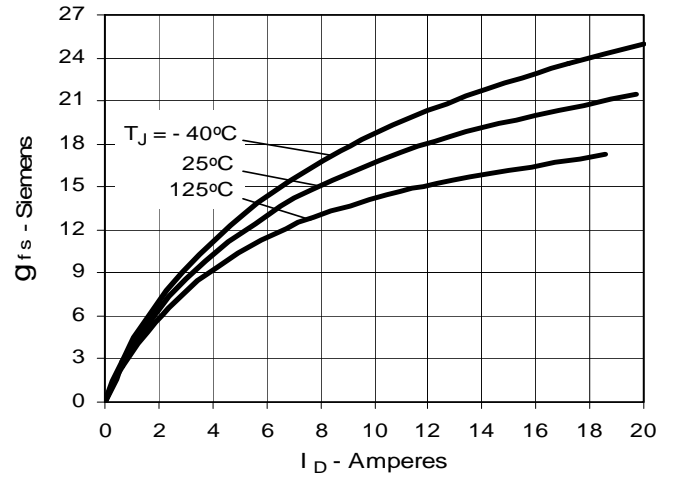


Fig. 9. Source Current vs. Source-To-Drain Voltage

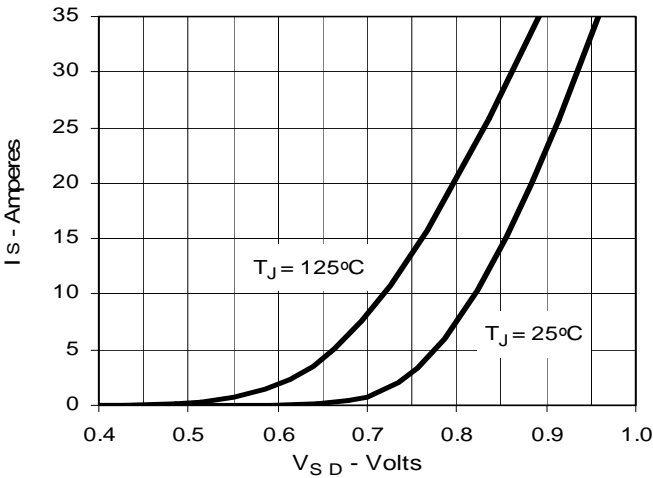


Fig. 10. Gate Charge

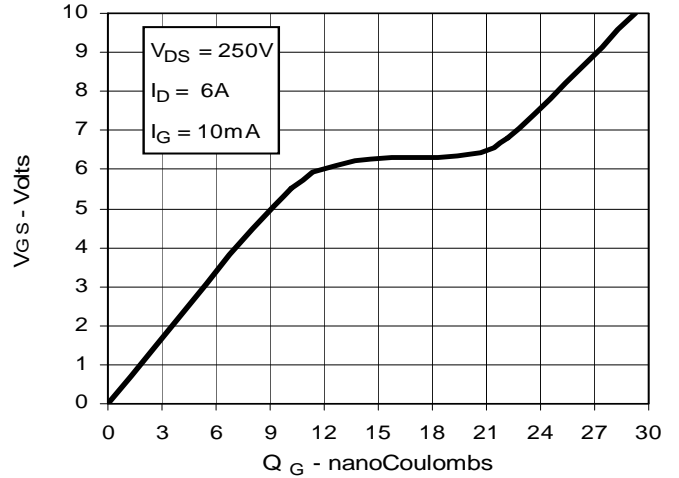


Fig. 11. Capacitance

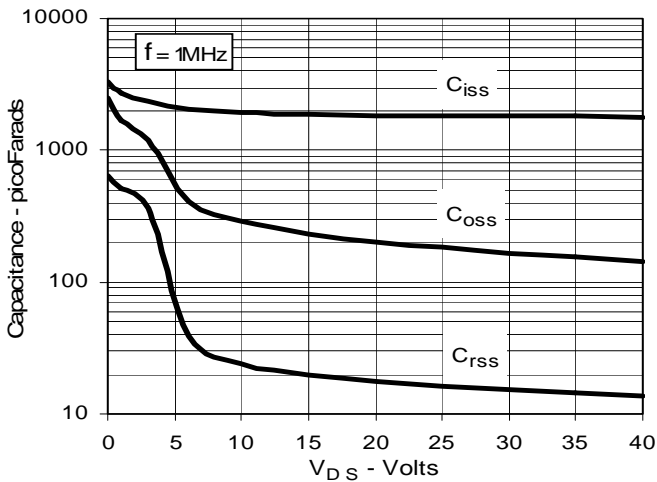


Fig. 12. Forward-Bias Safe Operating Area

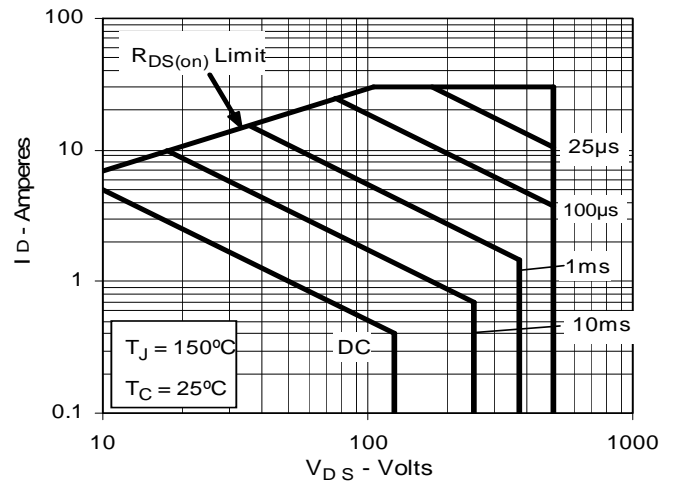
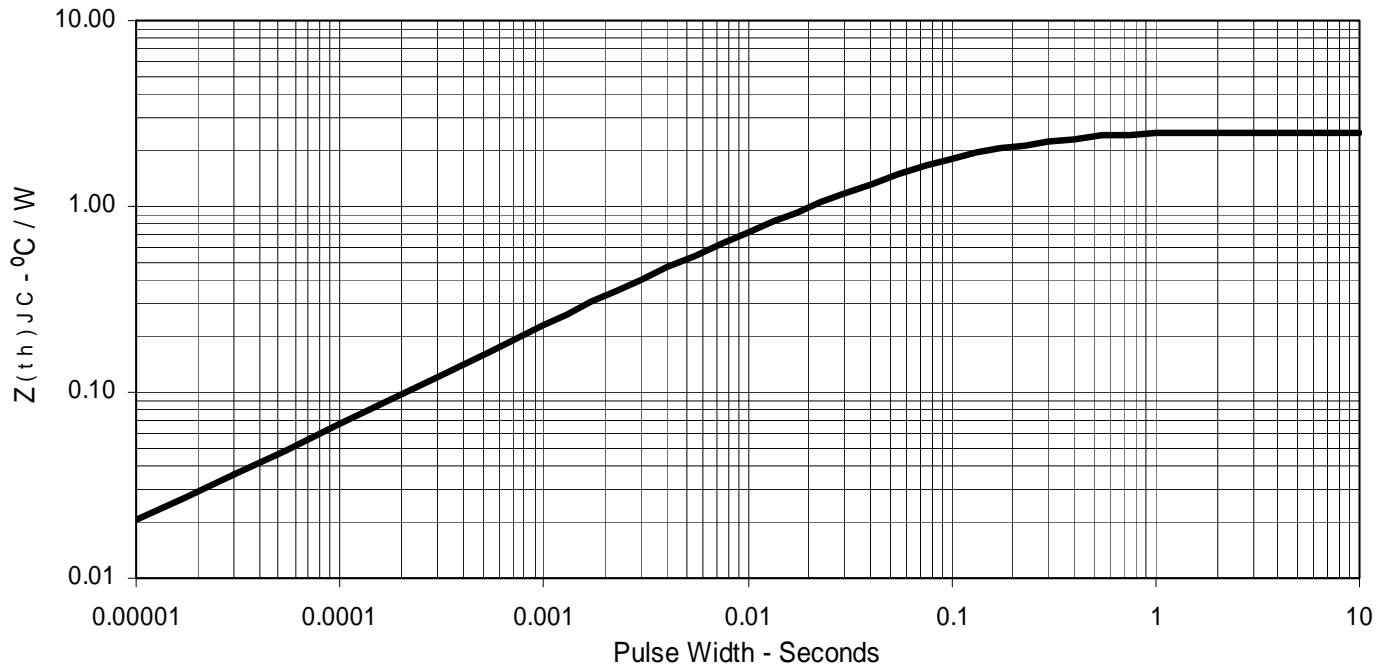


Fig. 13. Maximum Transient Thermal Impedance





Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.