

PolarP™ Power MOSFET

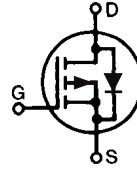
IXTR20P50P

$$V_{DSS} = -500V$$

$$I_{D25} = -13A$$

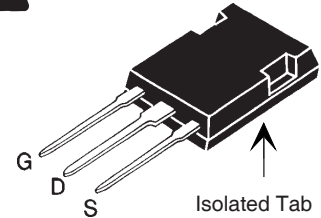
$$R_{DS(on)} \leq 490m\Omega$$

P-Channel Enhancement Mode
Avalanche Rated



ISOPLUS247 (IXTR)

E153432



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 $150^\circ C$, $R_{GS} = 1M\Omega$ | - 500 | V |
| V_{GSS} | Continuous | ± 20 | V |
| V_{GSM} | Transient | ± 30 | V |
| I_{D25} | $T_C = 25^\circ C$ | - 13 | A |
| I_{DM} | $T_C = 25^\circ C$, pulse width limited by T_{JM} | - 60 | A |
| I_{AR} | $T_C = 25^\circ C$ | - 20 | A |
| E_{AS} | $T_C = 25^\circ C$ | 2.5 | J |
| dV/dt | $I_S \leq I_{DM}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ C$ | 10 | V/ns |
| P_D | $T_C = 25^\circ C$ | 190 | W |
| T_J | | -55 ... +150 | $^\circ C$ |
| T_{JM} | | 150 | $^\circ C$ |
| T_{stg} | | -55 ... +150 | $^\circ C$ |
| T_L | 1.6mm (0.062 in.) from case for 10s | 300 | $^\circ C$ |
| T_{SOLD} | Plastic body for 10s | 260 | $^\circ C$ |
| V_{ISOL} | 50/60 Hz, RMS | t = 1min 2500 | V~ |
| | $I_{ISOL} \leq 1mA$ | t = 1s 3000 | V~ |
| M_d | Mounting force | 20..120 / 4.5..27 | N/lb. |
| Weight | | 5 | g |

Features

- Silicon chip on Direct-Copper Bond (DCB) substrate
 - UL recognized package
 - Isolated mounting surface
 - 2500V electrical isolation
- Avalanche rated
- The rugged PolarP™ process
- Low Q_g
- Low Drain-to-Tab capacitance
- Low package inductance
 - easy to drive and to protect

Applications

- High side switching
- Push-pull amplifiers
- DC Choppers
- Automatic test equipment
- Load-Switch Application
- Fuel Injection Systems

| 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 |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = -250\mu A$ | - 2.5 | | - 4.5 V |
| I_{GSS} | $V_{GS} = \pm 20V$, $V_{DS} = 0V$ | | | ± 100 nA |
| I_{DSS} | $V_{DS} = V_{DSS}$ $V_{GS} = 0V$ $T_J = 125^\circ C$ | | | - 25 μA - 200 μA |
| $R_{DS(on)}$ | $V_{GS} = -10V$, $I_D = -10A$, Note 1 | | | 490 m Ω |

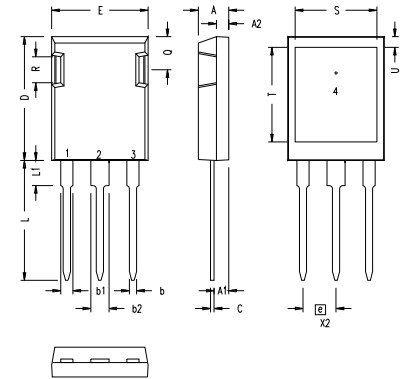
| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, unless otherwise specified) | Characteristic Values | | |
|--------------|---|-----------------------|------|--------------------|
| | | Min. | Typ. | Max. |
| g_{fs} | $V_{DS} = -10\text{V}$, $I_D = -10\text{A}$, Note 1 | 11 | 18 | S |
| C_{iss} | $V_{GS} = 0\text{V}$, $V_{DS} = -25\text{V}$, $f = 1\text{MHz}$ | | 5120 | pF |
| C_{oss} | | | 525 | pF |
| C_{rss} | | | 75 | pF |
| $t_{d(on)}$ | Resistive Switching Times $V_{GS} = -10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = -10\text{A}$ $R_G = 3\Omega$ (External) | | 26 | ns |
| t_r | | | 32 | ns |
| $t_{d(off)}$ | | | 80 | ns |
| t_f | | | 34 | ns |
| $Q_{g(on)}$ | $V_{GS} = -10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = -10\text{A}$ | | 103 | nC |
| Q_{gs} | | | 28 | nC |
| Q_{gd} | | | 38 | nC |
| R_{thJC} | | | 0.66 | $^\circ\text{C/W}$ |
| R_{thCS} | | 0.15 | | $^\circ\text{C/W}$ |

Source-Drain Diode

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, unless otherwise specified) | Characteristic Values | | |
|----------|--|-----------------------|------|---------------|
| | | Min. | Typ. | Max. |
| I_s | $V_{GS} = 0\text{V}$ | | | - 20 A |
| I_{SM} | Repetitive, pulse width limited by T_{JM} | | | - 80 A |
| V_{SD} | $I_F = -10\text{A}$, $V_{GS} = 0\text{V}$, Note 1 | | | - 2.8 V |
| t_{rr} | $I_F = -10\text{A}$, $-di/dt = -150\text{A}/\mu\text{s}$ $V_R = -100\text{V}$, $V_{GS} = 0\text{V}$ | | 406 | ns |
| Q_{RM} | | | 8.93 | μC |
| I_{RM} | | | - 44 | A |

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

ISOPLUS247 (IXTR) 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.

PRELIMINARY TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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| | | | | | | | | | | |
|--|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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 | 7,157,338B2 |
| | 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

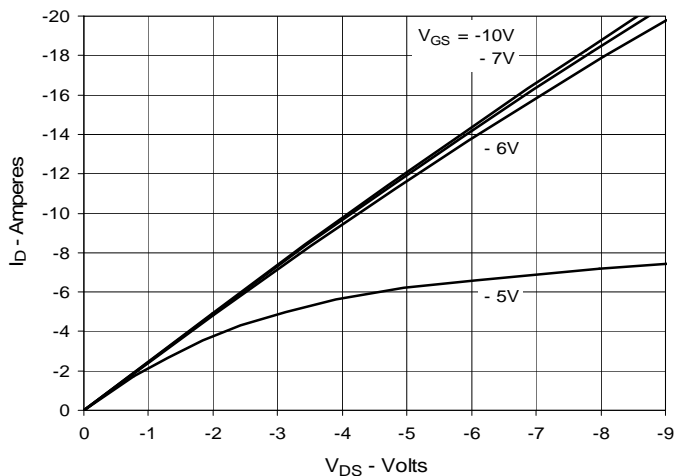


Fig. 2. Extended Output Characteristics @ 25°C

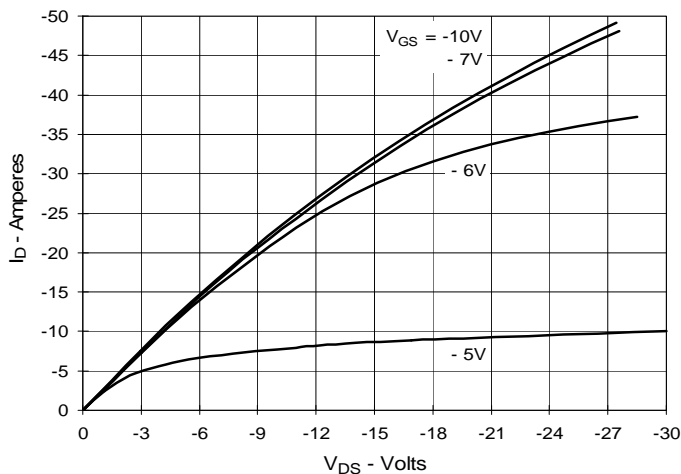


Fig. 3. Output Characteristics @ 125°C

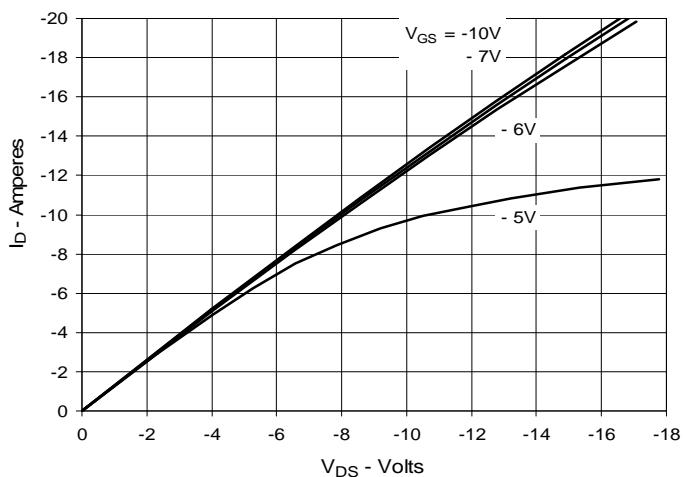


Fig. 4. $R_{DS(on)}$ Normalized to $I_D = -10A$ vs. Junction Temperature

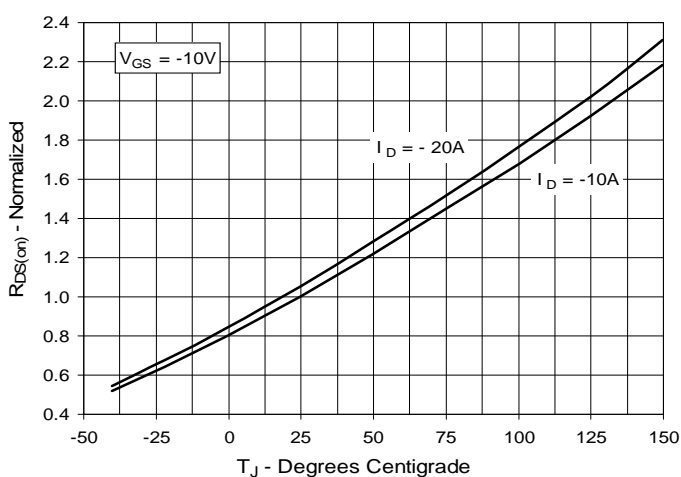


Fig. 5. $R_{DS(on)}$ Normalized to $I_D = -10A$ vs. Drain Current

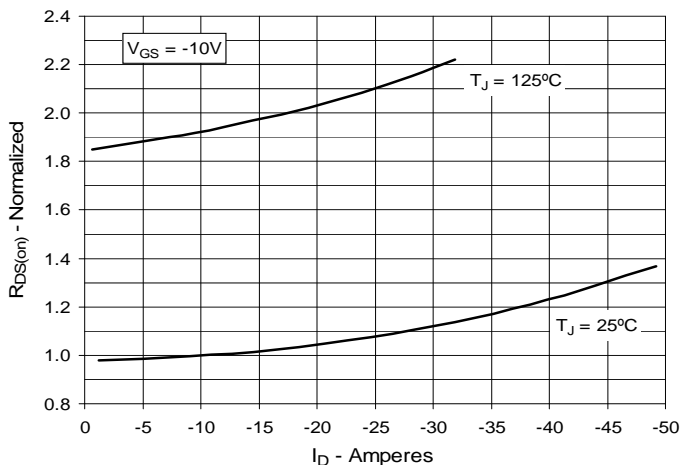


Fig. 6. Maximum Drain Current vs. Case Temperature

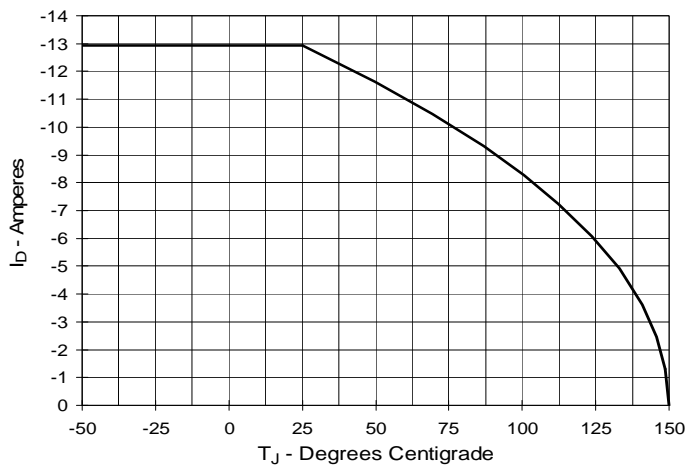


Fig. 7. Input Admittance

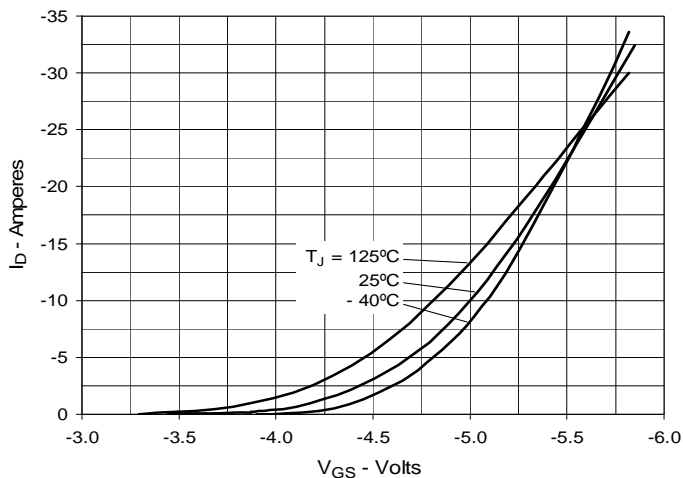


Fig. 8. Transconductance

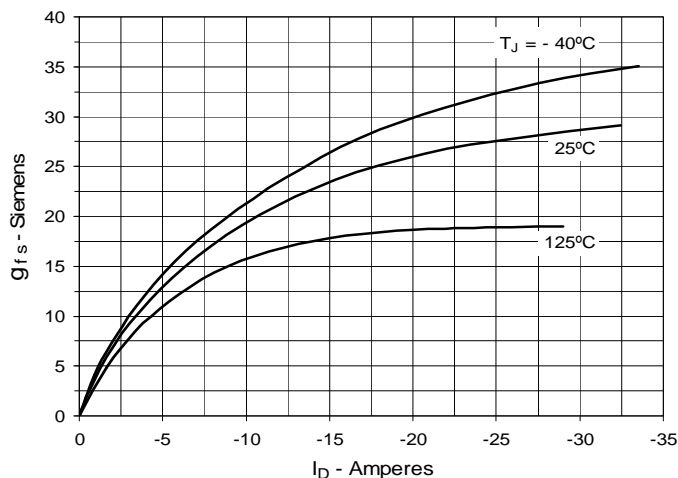


Fig. 9. Forward Voltage Drop of Intrinsic Diode

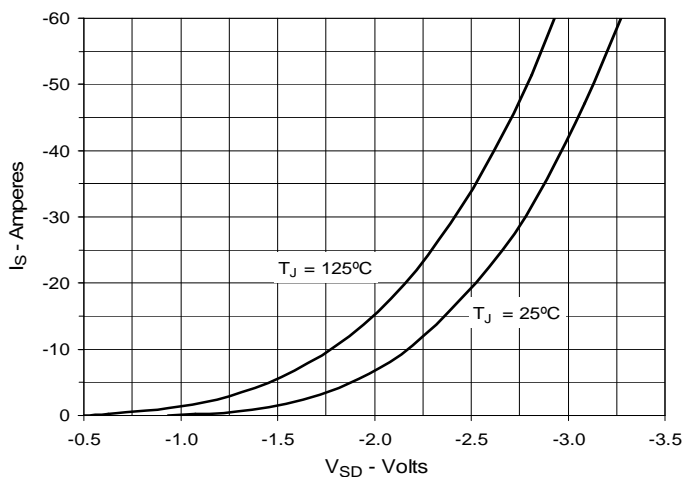


Fig. 10. Gate Charge

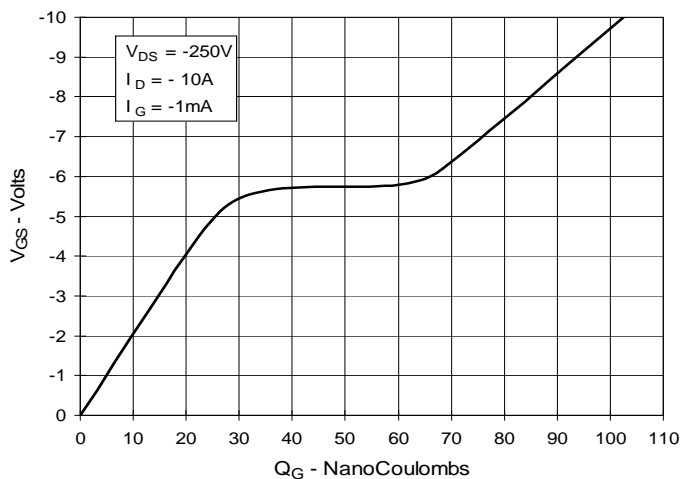


Fig. 11. Capacitance

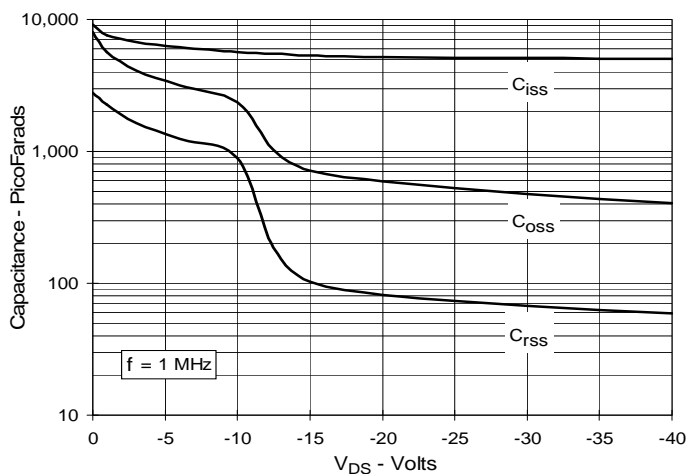


Fig. 12. Forward-Bias Safe Operating Area

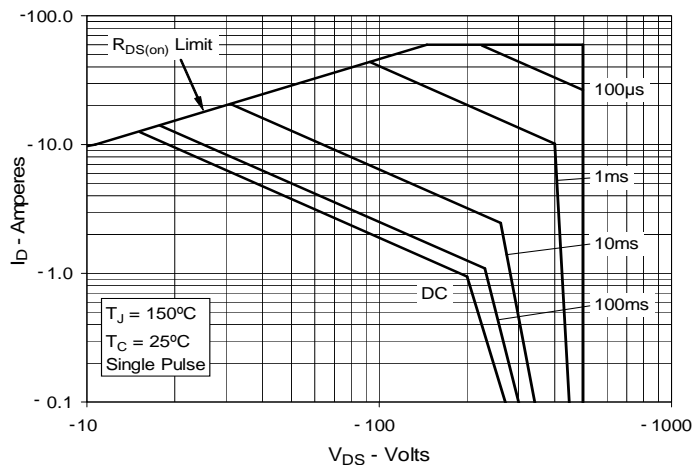


Fig. 13. Maximum Transient Thermal Impedance

