

Polar VHV™ Power MOSFET

IXTA1N120P
IXTP1N120P

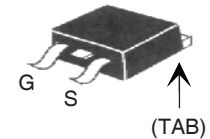
$V_{DSS} = 1200V$
 $I_{D25} = 1.0A$
 $R_{DS(on)} \leq 20\Omega$

N-Channel Enhancement Mode
Avalanche Rated

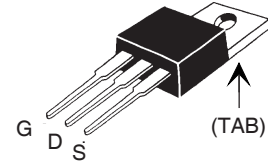


| Symbol | Test Conditions | Maximum Ratings | |
|---------------|--|-----------------|------------|
| V_{DSS} | $T_J = 25^\circ C$ to $150^\circ C$ | 1200 | V |
| V_{DGR} | $T_J = 25^\circ C$ to $150^\circ C$, $R_{GS} = 1M\Omega$ | 1200 | V |
| V_{GSS} | Continuous | ± 20 | V |
| V_{GSM} | Transient | ± 30 | V |
| I_{D25} | $T_C = 25^\circ C$ | 1.0 | A |
| I_{DM} | $T_C = 25^\circ C$, pulse width limited by T_{JM} | 1.8 | A |
| I_A | $T_C = 25^\circ C$ | 1.0 | A |
| E_{AR} | $T_C = 25^\circ C$ | 10 | mJ |
| E_{AS} | $T_C = 25^\circ C$ | 100 | mJ |
| dV/dt | $I_S \leq I_{DM}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ C$ | 10 | V/ns |
| P_D | $T_C = 25^\circ C$ | 63 | W |
| T_J | | -55 ... +150 | $^\circ C$ |
| T_{JM} | | 150 | $^\circ C$ |
| T_{stg} | | -55 ... +150 | $^\circ C$ |
| T_L | 1.6mm (0.062) from case for 10s | 300 | $^\circ C$ |
| T_{SOLD} | Plastic body for 10s | 260 | $^\circ C$ |
| M_d | Mounting torque (TO-220) | 1.13 / 10 | Nm/lb.in. |
| Weight | TO-263 | 2.50 | g |
| | TO-220 | 3.00 | g |

TO-263 (IXTA)



TO-220 (IXTP)



G = Gate D = Drain
S = Source TAB = Drain

Features

- International standard packages
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
- easy to drive and to protect

Advantages

- Easy to mount
- Space savings
- High power density

Applications:

- Switched-mode and resonant-mode power supplies
- DC-DC Converters
- Laser Drivers
- AC and DC motor controls
- Robotics and servo controls

| Symbol | Test Conditions ($T_J = 25^\circ C$, unless otherwise specified) | Characteristic Values | | |
|--------------|---|-----------------------|------|-------------|
| | | Min. | Typ. | Max. |
| BV_{DSS} | $V_{GS} = 0V$, $I_D = 250\mu A$ | 1200 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 50\mu A$ | 2.5 | | 4.5 V |
| I_{GSS} | $V_{GS} = \pm 20V$, $V_{DS} = 0V$ | | | ± 50 nA |
| I_{DSS} | $V_{DS} = V_{DSS}$ $V_{GS} = 0V$ $T_J = 125^\circ C$ | | | 5 μA |
| | | | | 200 μA |
| $R_{DS(on)}$ | $V_{GS} = 10V$, $I_D = 0.5 \cdot I_{D25}$, Note 1 | 15.5 | 20 | Ω |

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, unless otherwise specified) | Characteristic Values | | |
|---|---|-----------------------|------|--|
| | | Min. | Typ. | Max. |
| g_{fs} | $V_{DS} = 30\text{V}$, $I_D = 0.5 \cdot I_{D25}$, Note 1 | 0.55 | 0.92 | S |
| C_{iss} C_{oss} C_{rss} | $V_{GS} = 0\text{V}$, $V_{DS} = 25\text{V}$, $f = 1\text{MHz}$ | | 550 | pF |
| | | | 25 | pF |
| | | | 5.4 | pF |
| $t_{d(on)}$ t_r $t_{d(off)}$ t_f | Resistive Switching Times $V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 0.5 \cdot I_{D25}$ $R_G = 30\Omega$ (External) | | 20 | ns |
| | | | 28 | ns |
| | | | 54 | ns |
| | | | 27 | ns |
| $Q_{g(on)}$ Q_{gs} Q_{gd} | $V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 0.5 \cdot I_{D25}$ | | 17.6 | nC |
| | | | 3.5 | nC |
| | | | 10.6 | nC |
| R_{thJC} R_{thCS} | (TO-220) | 0.5 | 2.0 | $^\circ\text{C/W}$ $^\circ\text{C/W}$ |

Source-Drain Diode

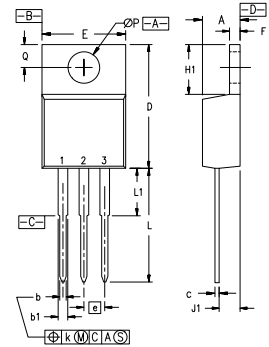
Characteristic Values

($T_J = 25^\circ\text{C}$, unless otherwise specified)

| Symbol | Test Conditions | Min. | Typ. | Max. |
|----------|--|------|------|-------|
| I_S | $V_{GS} = 0\text{V}$ | | | 1.0 A |
| I_{SM} | Repetitive | | | 3.0 A |
| V_{SD} | $I_F = I_S$, $V_{GS} = 0\text{V}$, Note 1 | | | 1.5 V |
| t_{rr} | $I_F = 1.0\text{A}$, $-di/dt = 100\text{A}/\mu\text{s}$, $V_R = 100\text{V}$, $V_{GS} = 0\text{V}$ | | 900 | ns |

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

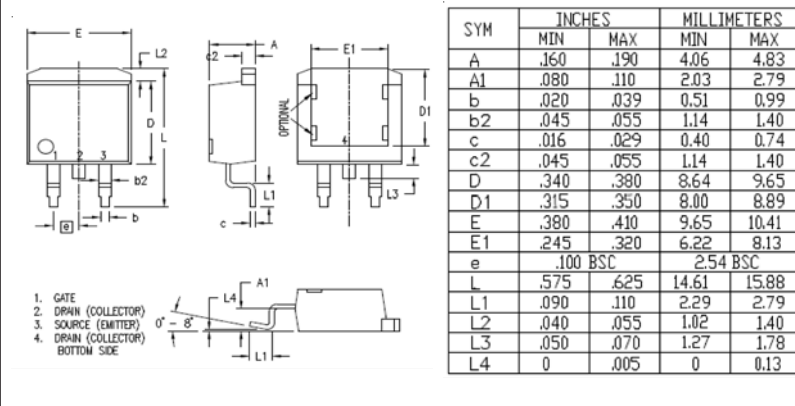
TO-220 (IXTP) Outline



Pins: 1 - Gate 2 - Drain

| SYM | INCHES | | MILLIMETERS | |
|-----------------|----------|------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .170 | .190 | 4.32 | 4.83 |
| b | .025 | .040 | 0.64 | 1.02 |
| b1 | .045 | .065 | 1.15 | 1.65 |
| c | .014 | .022 | 0.35 | 0.56 |
| D | .580 | .630 | 14.73 | 16.00 |
| E | .390 | .420 | 9.91 | 10.66 |
| e | .100 BSC | | 2.54 BSC | |
| F | .045 | .055 | 1.14 | 1.40 |
| H1 | .230 | .270 | 5.85 | 6.85 |
| J1 | .090 | .110 | 2.29 | 2.79 |
| k | 0 | .015 | 0 | 0.38 |
| L | .500 | .550 | 12.70 | 13.97 |
| L1 | .110 | .230 | 2.79 | 5.84 |
| $\varnothing P$ | .139 | .161 | 3.53 | 4.08 |
| Q | .100 | .125 | 2.54 | 3.18 |

TO-263 (IXTA) Outline



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 | 7,157,338B2 |
| | 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

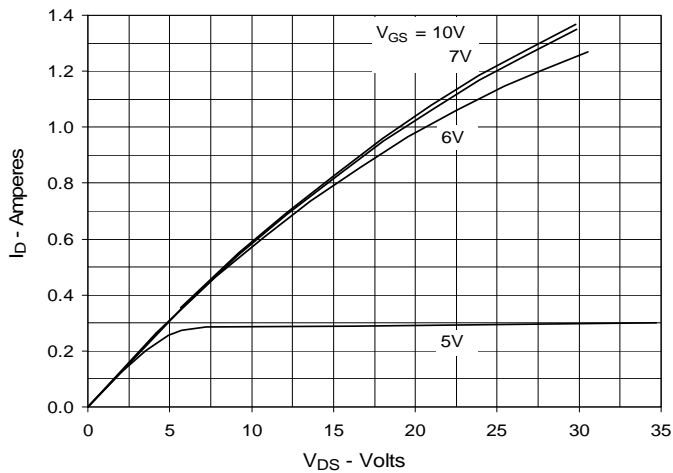


Fig. 2. Output Characteristics @ 125°C

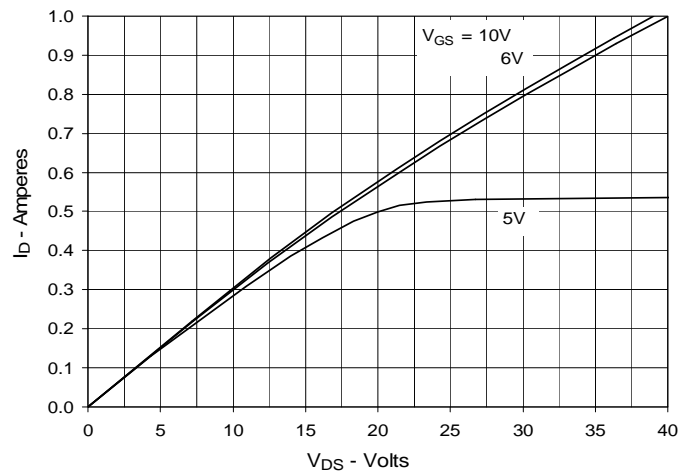


Fig. 3. $R_{DS(on)}$ Normalized to $I_D = 0.5A$ Value vs. Junction Temperature

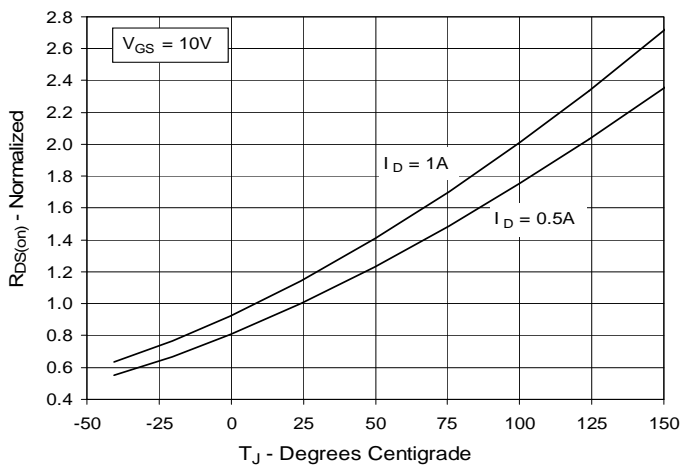


Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 0.5A$ Value vs. Drain Current

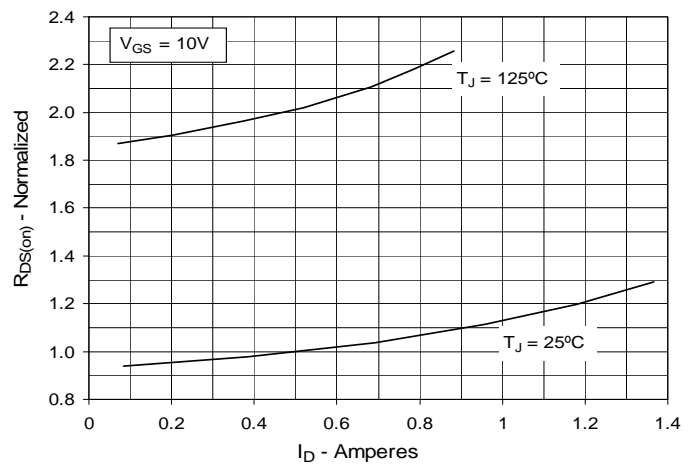


Fig. 5. Maximum Drain Current vs. Case Temperature

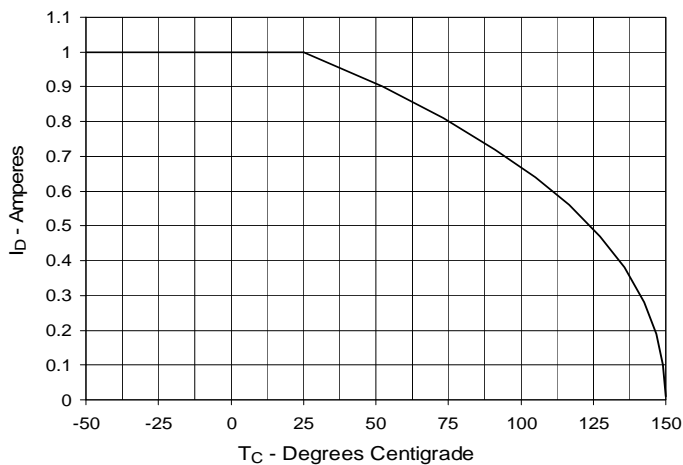


Fig. 6. Input Admittance

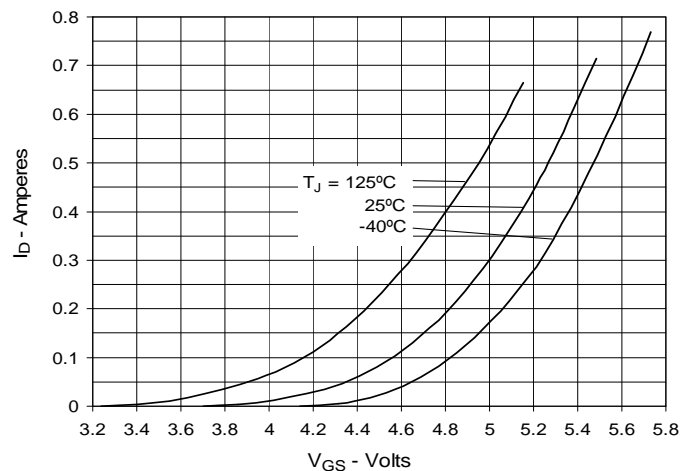


Fig. 7. Transconductance

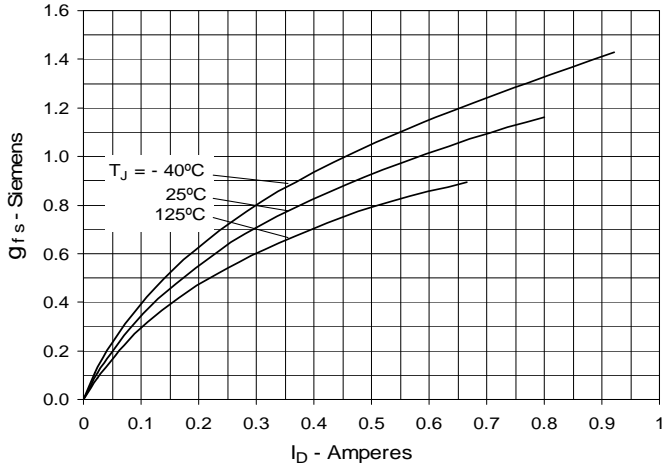


Fig. 8. Forward Voltage Drop of Intrinsic Diode

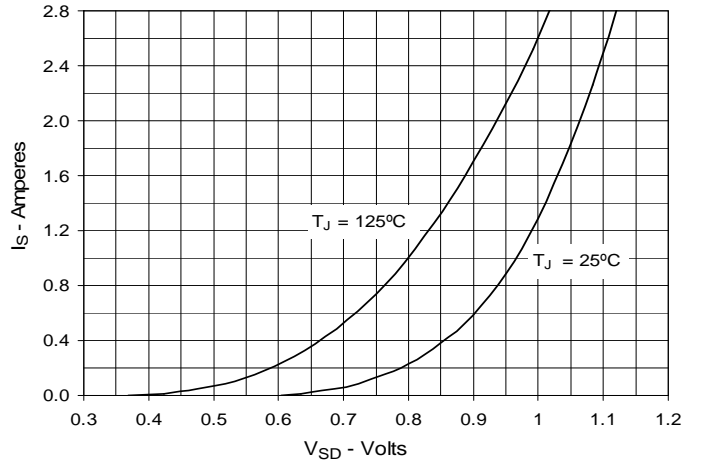


Fig. 9. Gate Charge

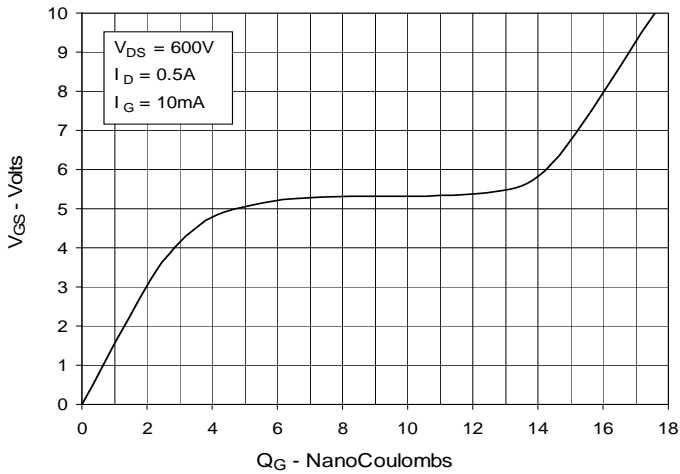


Fig. 10. Capacitance

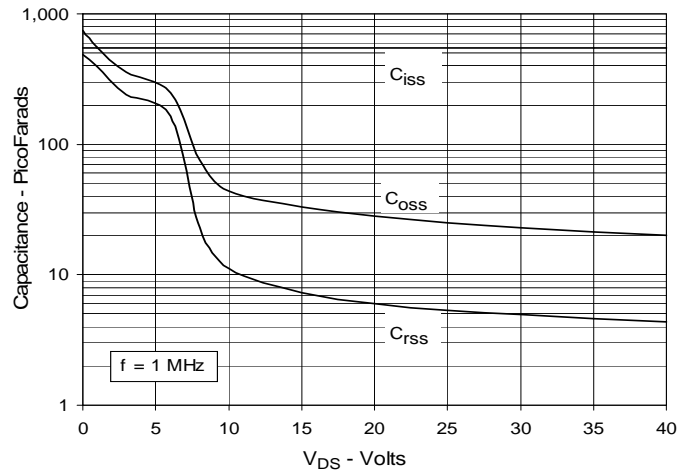
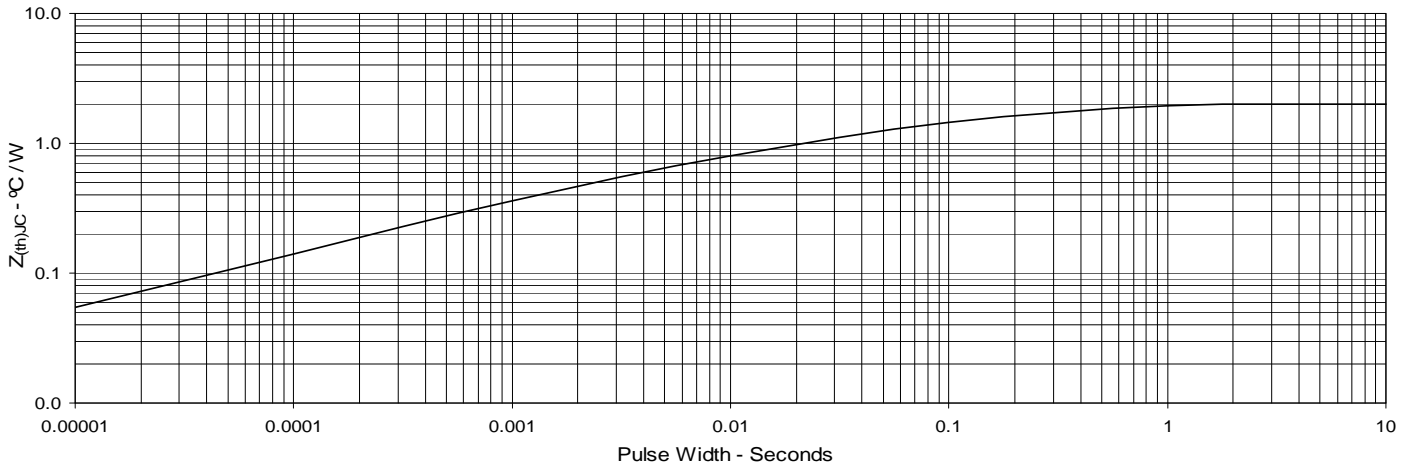


Fig. 11. Maximum Transient Thermal Impedance



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