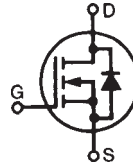


PolarHT™ Power MOSFET

IXTK 140N20P

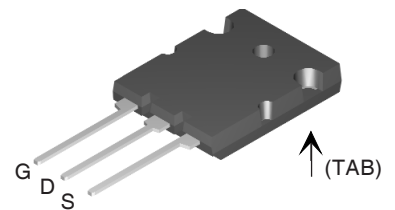
$$\begin{aligned} V_{DSS} &= 200 \text{ V} \\ I_{D25} &= 140 \text{ A} \\ R_{DS(on)} &= 18 \text{ m}\Omega \end{aligned}$$

N-Channel Enhancement Mode



| Symbol | Test Conditions | Maximum Ratings | |
|---------------|---|-----------------|------------------|
| V_{DSS} | $T_J = 25^\circ\text{C}$ to 175°C | 200 | V |
| V_{DGR} | $T_J = 25^\circ\text{C}$ to 175°C ; $R_{GS} = 1 \text{ M}\Omega$ | 200 | V |
| V_{GSM} | | ± 20 | V |
| I_{D25} | $T_C = 25^\circ\text{C}$ | 140 | A |
| $I_{D(RMS)}$ | External lead current limit | 75 | A |
| I_{DM} | $T_C = 25^\circ\text{C}$, pulse width limited by T_{JM} | 280 | A |
| I_{AR} | $T_C = 25^\circ\text{C}$ | 60 | A |
| E_{AR} | $T_C = 25^\circ\text{C}$ | 100 | mJ |
| E_{AS} | $T_C = 25^\circ\text{C}$ | 4 | J |
| dv/dt | $I_S \leq I_{DM}$, $di/dt \leq 100 \text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ\text{C}$, $R_G = 4 \Omega$ | 10 | V/ns |
| P_D | $T_C = 25^\circ\text{C}$ | 800 | W |
| T_J | | -55 ... +175 | $^\circ\text{C}$ |
| T_{JM} | | 175 | $^\circ\text{C}$ |
| T_{stg} | | -55 ... +150 | $^\circ\text{C}$ |
| T_L | 1.6 mm (0.062 in.) from case for 10 s | 300 | $^\circ\text{C}$ |
| M_d | Mounting torque | 1.13/10 | Nm/lb.in. |
| Weight | | 10 | g |

TO-264(SP) (IXTK)



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

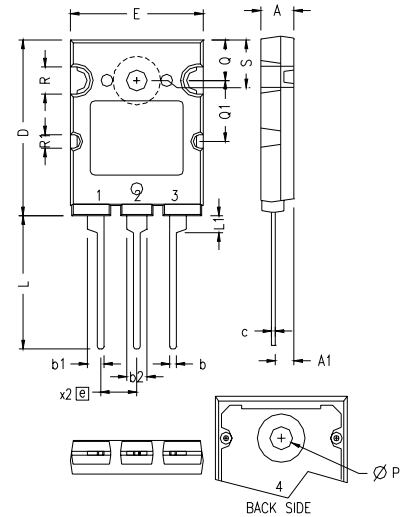
- Easy to mount
- Space savings
- High power density

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, unless otherwise specified) | Characteristic Values | | |
|--------------|--|-----------------------|------|---|
| | | Min. | Typ. | Max. |
| V_{DSS} | $V_{GS} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$ | 200 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 500 \mu\text{A}$ | 2.5 | | 5.0 V |
| I_{GSS} | $V_{GS} = \pm 20 \text{ V}_{DC}$, $V_{DS} = 0$ | | | $\pm 200 \text{ nA}$ |
| I_{DSS} | $V_{DS} = V_{DSS}$, $V_{GS} = 0 \text{ V}$, $T_J = 150^\circ\text{C}$ | | | 25 μA 250 μA |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$, $I_D = 0.5 I_{D25}$ $V_{GS} = 15 \text{ V}$, $I_D = 140 \text{ A}$ Pulse test, $t \leq 300 \mu\text{s}$, duty cycle $d \leq 2\%$ | 14 | | 18 $\text{m}\Omega$ $\text{m}\Omega$ |

PolarHT™ DMOS transistors utilize proprietary designs and process. US patent is pending.

| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | |
|--------------|---|---|------|----------|
| | | Min. | Typ. | Max. |
| g_{fs} | $V_{DS} = 10\text{ V}; I_D = 0.5 I_{D25}$, pulse test | 50 | 84 | S |
| C_{iss} | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$ | | 7500 | pF |
| C_{oss} | | | 1800 | pF |
| C_{rss} | | | 280 | pF |
| $t_{d(on)}$ | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 60\text{ A}$ $R_G = 3.3\ \Omega$ (External) | | 30 | ns |
| t_r | | | 35 | ns |
| $t_{d(off)}$ | | | 150 | ns |
| t_f | | | 90 | ns |
| $Q_{g(on)}$ | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}$ | | 240 | nC |
| Q_{gs} | | | 50 | nC |
| Q_{gd} | | | 100 | nC |
| R_{thJC} | | | | 0.18 K/W |
| R_{thCK} | | 0.15 | | K/W |

| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | |
|----------|---|---|------|-------|
| | | Min. | typ. | Max. |
| I_s | $V_{GS} = 0\text{ V}$ | | | 140 A |
| I_{SM} | Repetitive | | | 280 A |
| V_{SD} | $I_F = I_s, V_{GS} = 0\text{ V}$, Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $d \leq 2\%$ | | | 1.5 V |
| t_{rr} | $I_F = 25\text{ A}$ $-di/dt = 100\text{ A}/\mu\text{s}$ | | 120 | ns |
| Q_{RM} | | $V_R = 100\text{ V}$ | | 3.5 |

TO-264(SP) Outline (IXTK)


| SYM | INCHES | | MILLIMETERS | |
|-----|----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .185 | .209 | 4.70 | 5.30 |
| A1 | .102 | .118 | 2.60 | 3.00 |
| b | .035 | .049 | 0.90 | 1.25 |
| b1 | .091 | .106 | 2.30 | 2.70 |
| b2 | .110 | .126 | 2.80 | 3.20 |
| c | .020 | .033 | 0.50 | 0.85 |
| D | 1.012 | 1.035 | 25.70 | 26.30 |
| E | .776 | .799 | 19.70 | 20.30 |
| e | .215 BSC | | 5.46 BSC | |
| L | .768 | .807 | 19.50 | 20.50 |
| L1 | .091 | .106 | 2.30 | 2.70 |
| ØP | .122 | .138 | 3.10 | 3.50 |
| Q | .228 | .244 | 5.80 | 6.20 |
| Q1 | .346 | .362 | 8.80 | 9.20 |
| ØR | .150 | .165 | 3.80 | 4.20 |
| ØR1 | .071 | .087 | 1.80 | 2.20 |
| S | .228 | .244 | 5.80 | 6.20 |

1 - GATE
2, 4 - DRAIN (COLLECTOR)
3 - SOURCE (EMITTER)

NOTE: Leads and back heatsink are solder plated.

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 |
| | 4,850,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123 B1 | 6,534,343 | 6,710,405 B2 | |
| | 4,881,106 | 5,034,796 | 5,187,117 | 5,486,715 | 6,306,728 B1 | 6,583,505 | 6,710,463 | |

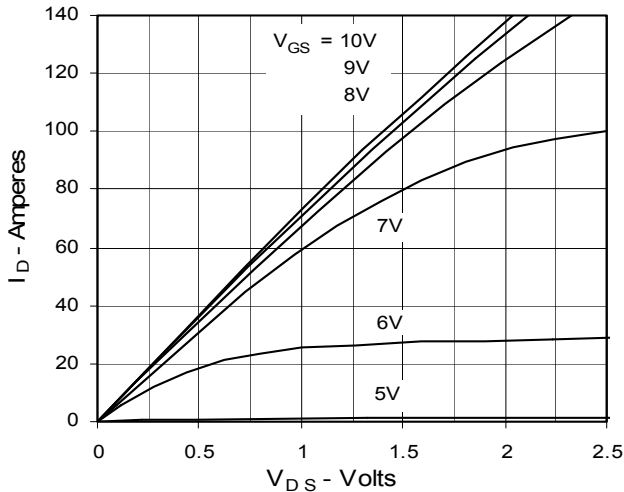
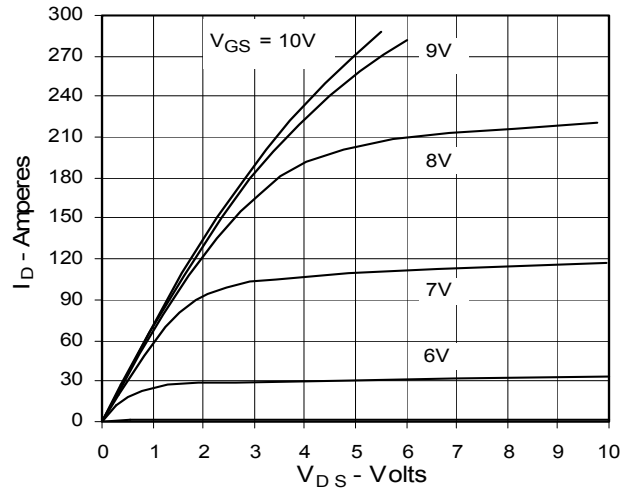
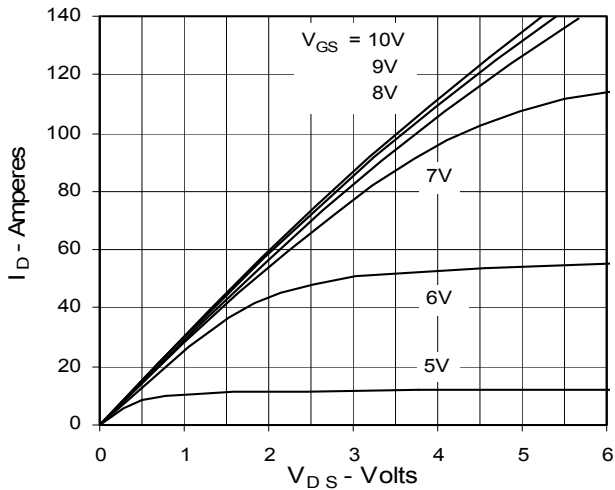
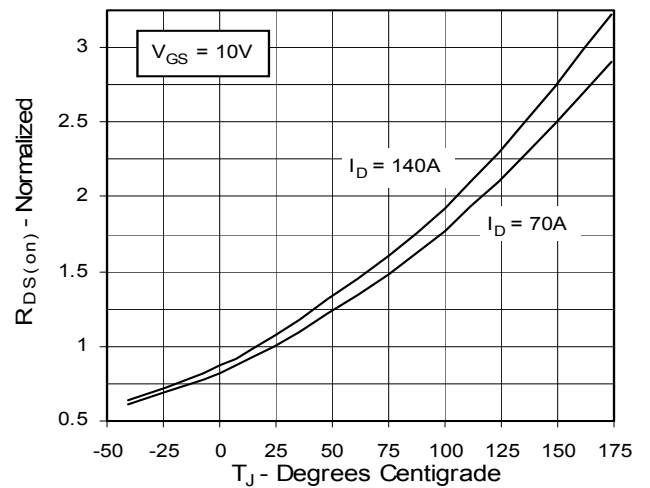
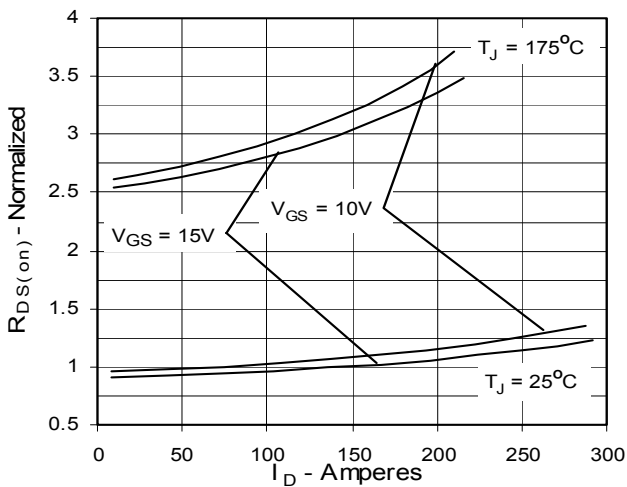
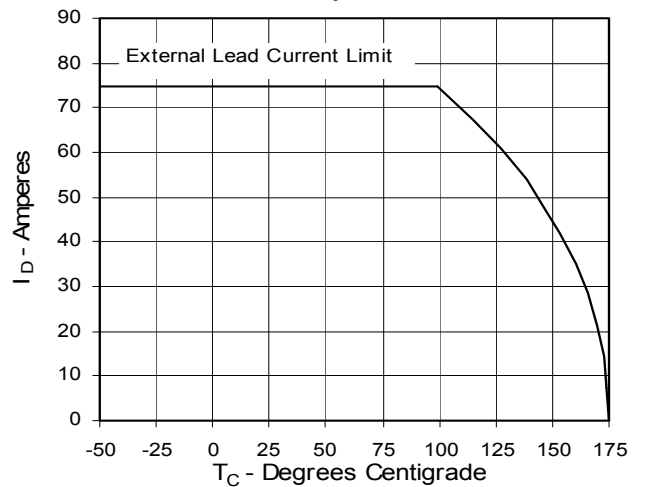
**Fig. 1. Output Characteristics
@ 25°C**

**Fig. 2. Extended Output Characteristics
@ 25°C**

**Fig. 3. Output Characteristics
@ 150°C**

**Fig. 4. $R_{DS(on)}$ Normalized to 0.5 I_{D25}
Value vs. Junction Temperature**

**Fig. 5. $R_{DS(on)}$ Normalized to 0.5 I_{D25}
Value vs. Drain Current**

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


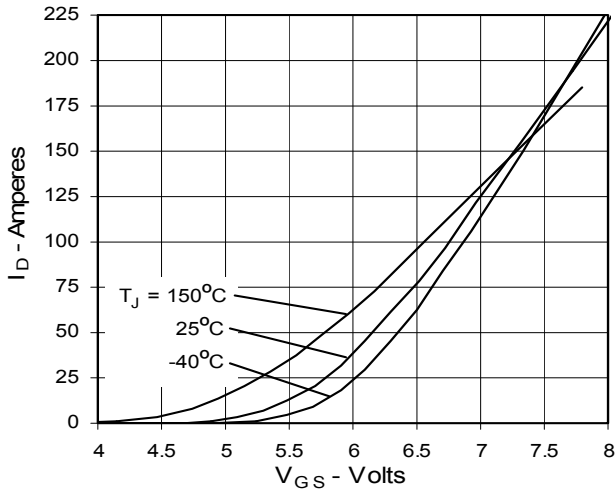
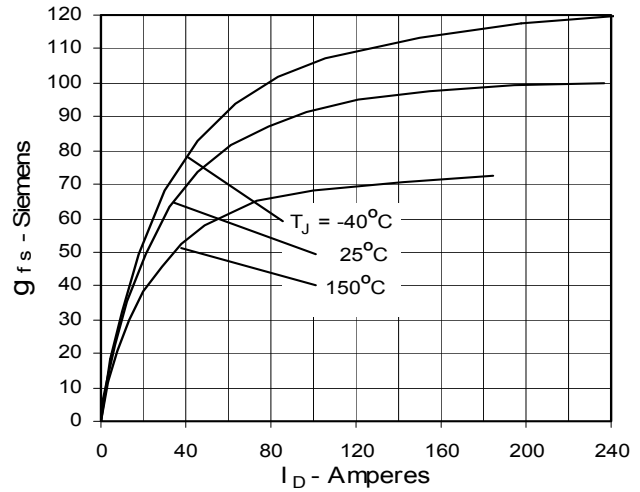
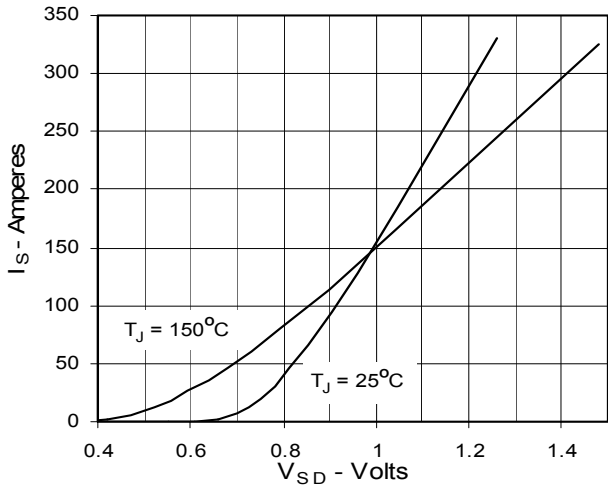
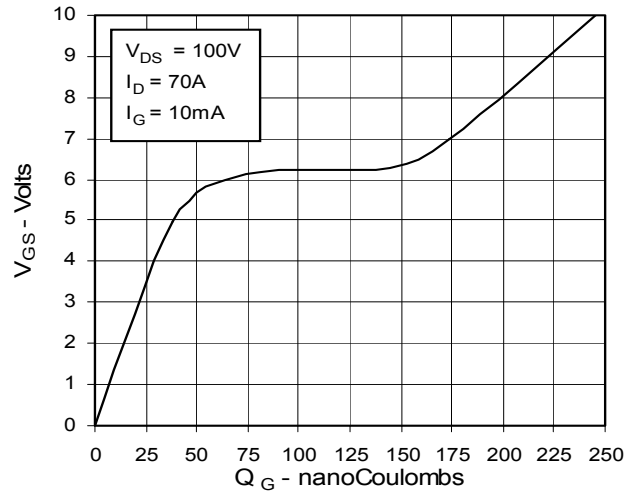
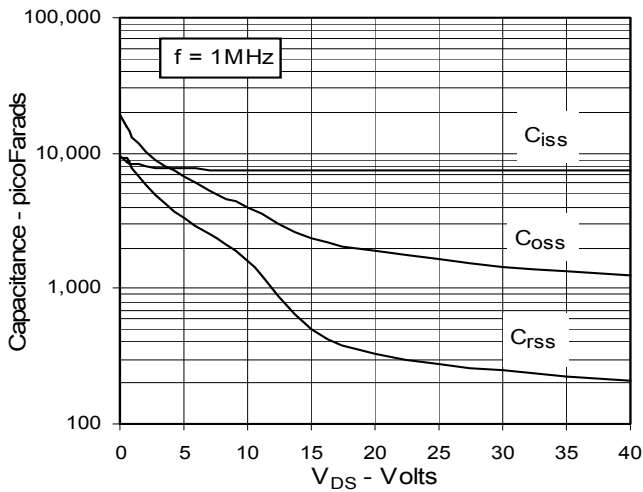
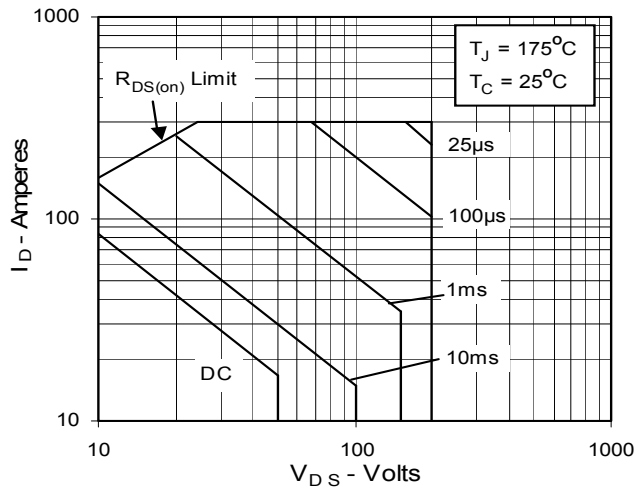
Fig. 7. Input Admittance

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 Resistance

