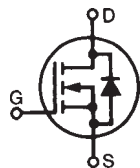


# PolarHT™ Power MOSFET

IXTA 110N055P  
IXTP 110N055P  
IXTQ 110N055P

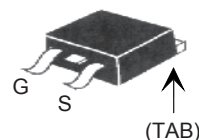
$V_{DSS} = 55 \text{ V}$   
 $I_{D25} = 110 \text{ A}$   
 $R_{DS(on)} \leq 13.5 \text{ m}\Omega$

N-Channel Enhancement Mode  
Avalanche Rated

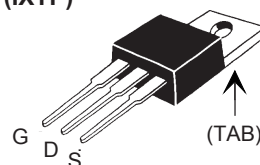


| Symbol     | Test Conditions                                                                                                                          | Maximum Ratings |                  |
|------------|------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C to } 175^\circ\text{C}$                                                                                           | 55              | V                |
| $V_{DGR}$  | $T_J = 25^\circ\text{C to } 175^\circ\text{C}; R_{GS} = 1 \text{ M}\Omega$                                                               | 55              | V                |
| $V_{GS}$   | Continuous                                                                                                                               | $\pm 20$        | V                |
| $V_{GSM}$  | Transient                                                                                                                                | $\pm 30$        | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                                                                                 | 110             | A                |
| $I_{DRMS}$ | External lead current limit                                                                                                              | 75              | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                               | 250             | A                |
| $I_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                                 | 110             | A                |
| $E_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                                 | 30              | mJ               |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                                                                                                 | 1.0             | J                |
| $dv/dt$    | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 10 \Omega$ | 10              | V/ns             |
| $P_D$      | $T_C = 25^\circ\text{C}$                                                                                                                 | 390             | 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             | $^\circ\text{C}$ |
| $T_{SOLD}$ | Plastic body for 10 s                                                                                                                    | 260             | $^\circ\text{C}$ |
| $M_d$      | Mounting torque (TO-3P / TO-220)                                                                                                         | 1.13/10         | Nm/lb.in.        |
| Weight     | TO-3P                                                                                                                                    | 5.5             | g                |
|            | TO-220                                                                                                                                   | 4               | g                |
|            | TO-263                                                                                                                                   | 3               | g                |

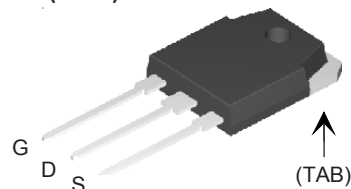
TO-263 (IXTA)



TO-220 (IXTP)



TO-3P (IXTQ)



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

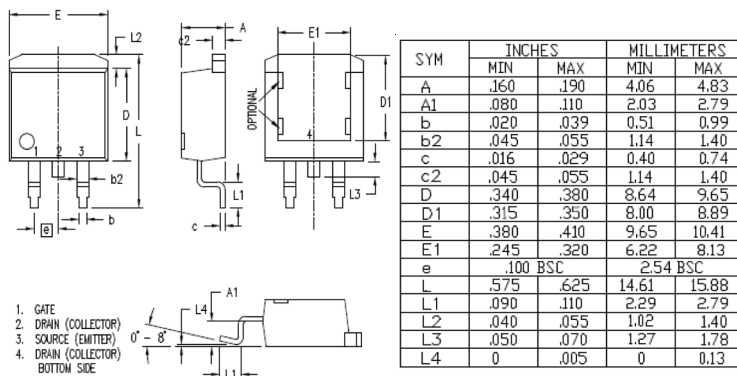
- Easy to mount
- Space savings
- High power density

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                                     | Characteristic Values |      |                      |
|--------------|-----------------------------------------------------------------------------------------------------------------|-----------------------|------|----------------------|
|              |                                                                                                                 | Min.                  | Typ. | Max.                 |
| $BV_{DSS}$   | $V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$                                                                | 55                    |      | V                    |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250 \mu\text{A}$                                                                     | 3.0                   |      | 5.5 V                |
| $I_{GSS}$    | $V_{GS} = \pm 20 \text{ V}_{DC}$ , $V_{DS} = 0$                                                                 |                       |      | $\pm 100 \text{ nA}$ |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$                                                                                              |                       |      | 25 $\mu\text{A}$     |
|              | $V_{GS} = 0 \text{ V}$ $T_J = 125^\circ\text{C}$                                                                |                       |      | 250 $\mu\text{A}$    |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 0.5 I_{D25}$<br>Pulse test, $t \leq 300 \mu\text{s}$ , duty cycle $d \leq 2\%$ | 11                    | 13.5 | $\text{m}\Omega$     |

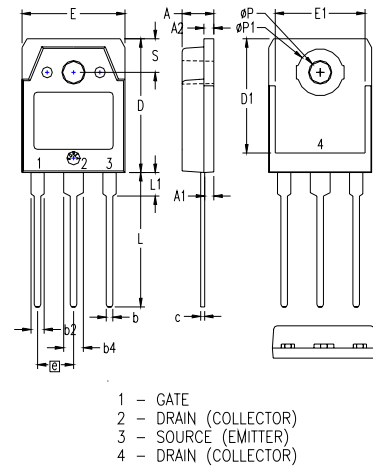
| Symbol       | Test Conditions                                                                                        | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                        |
|--------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|------------------------|
|              |                                                                                                        | Min.                                                                              | Typ. | Max.                   |
| $g_{fs}$     | $V_{DS} = 10\text{ V}$ ; $I_D = 0.5 I_{D25}$ , pulse test                                              | 23                                                                                | 36   | S                      |
| $C_{iss}$    | $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                                    |                                                                                   | 2210 | pF                     |
| $C_{oss}$    |                                                                                                        |                                                                                   | 1400 | pF                     |
| $C_{rss}$    |                                                                                                        |                                                                                   | 550  | pF                     |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.5 V_{DSS}$ , $I_D = 0.5 I_{D25}$<br>$R_G = 10\ \Omega$ (External) |                                                                                   | 27   | ns                     |
| $t_r$        |                                                                                                        |                                                                                   | 53   | ns                     |
| $t_{d(off)}$ |                                                                                                        |                                                                                   | 66   | ns                     |
| $t_f$        |                                                                                                        |                                                                                   | 45   | ns                     |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.5 V_{DSS}$ , $I_D = 0.5 I_{D25}$                                  |                                                                                   | 76   | nC                     |
| $Q_{gs}$     |                                                                                                        |                                                                                   | 17   | nC                     |
| $Q_{gd}$     |                                                                                                        |                                                                                   | 33   | nC                     |
| $R_{thJC}$   |                                                                                                        |                                                                                   |      | $0.38^\circ\text{C/W}$ |
| $R_{thCS}$   | (TO-3P)                                                                                                |                                                                                   | 0.21 | $^\circ\text{C/W}$     |
|              | (TO-220)                                                                                               |                                                                                   | 0.25 | $^\circ\text{C/W}$     |

| Source-Drain Diode |                                                                                                          | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |               |
|--------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------|
| Symbol             | Test Conditions                                                                                          | Min.                                                                              | Typ. | Max.          |
| $I_S$              | $V_{GS} = 0\text{ V}$                                                                                    |                                                                                   |      | 110 A         |
| $I_{SM}$           | Repetitive                                                                                               |                                                                                   |      | 250 A         |
| $V_{SD}$           | $I_F = I_S$ , $V_{GS} = 0\text{ V}$ ,<br>Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$ |                                                                                   |      | 1.5 V         |
| $t_{rr}$           | $I_F = 25\text{ A}$ , $-di/dt = 100\text{ A}/\mu\text{s}$                                                |                                                                                   | 80   | ns            |
| $Q_{RM}$           | $V_R = 25\text{ V}$ , $V_{GS} = 0\text{ V}$                                                              |                                                                                   | 1.4  | $\mu\text{C}$ |

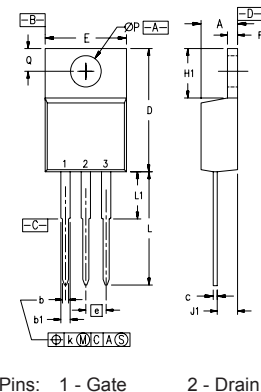
### TO-263 (IXTA) Outline



### TO-3P (IXTQ) Outline



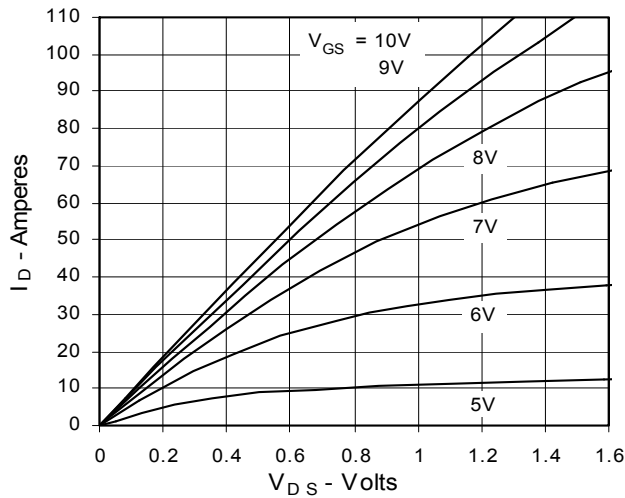
### TO-220 (IXTP) Outline



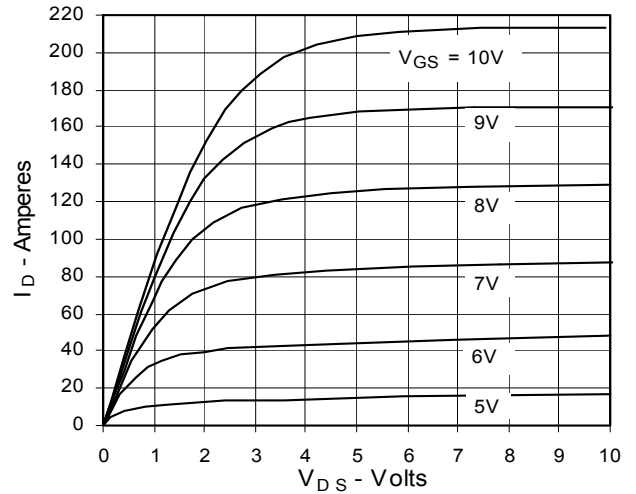
IXYS reserves the right to change limits, test conditions, and dimensions.

IXYS MOSFETs and IGBTs are covered by 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  
one or more of the following U.S. patents: 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  
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

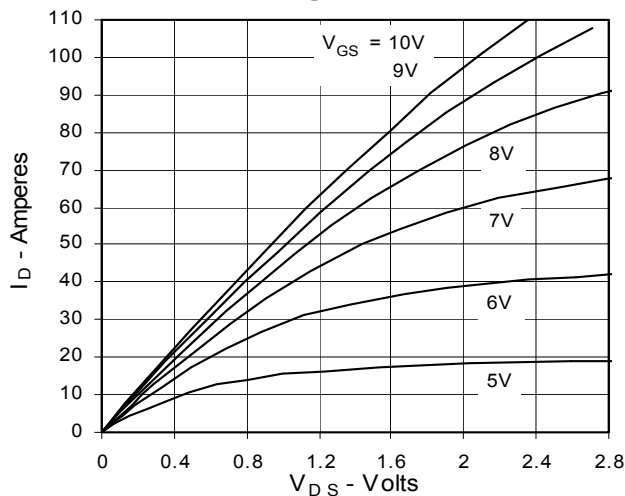
**Fig. 1. Output Characteristics  
@ 25°C**



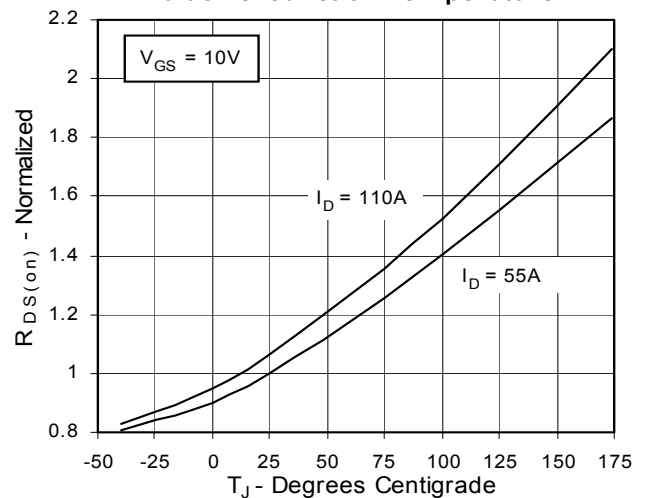
**Fig. 2. Extended Output Characteristics  
@ 25°C**



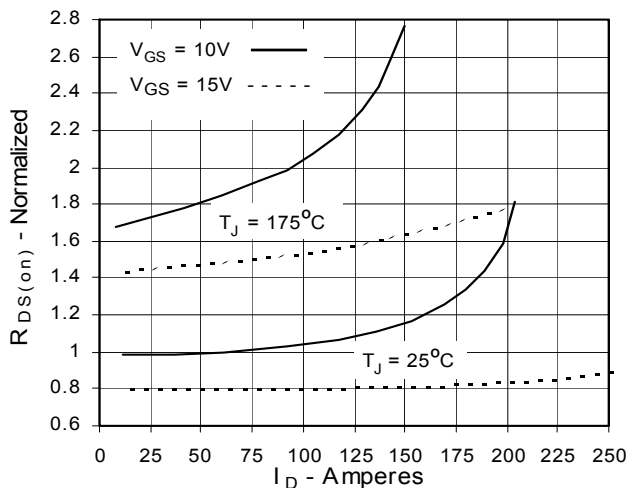
**Fig. 3. Output Characteristics  
@ 150°C**



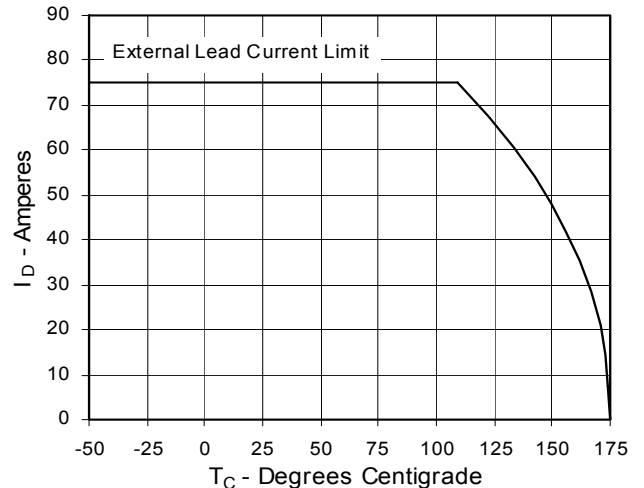
**Fig. 4.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$   
Value vs. Junction Temperature**



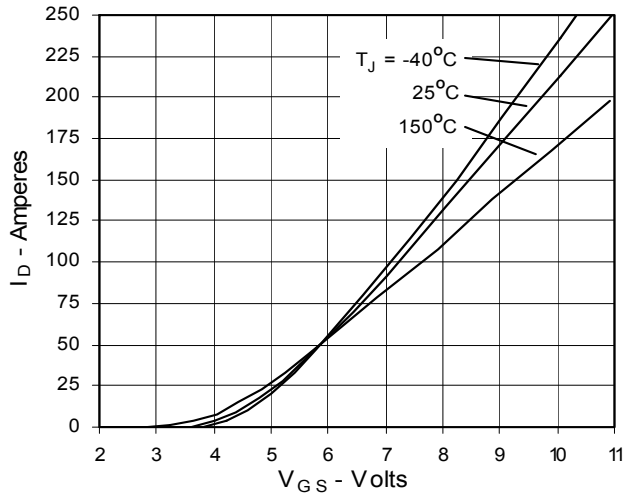
**Fig. 5.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$   
Value vs. Drain Current**



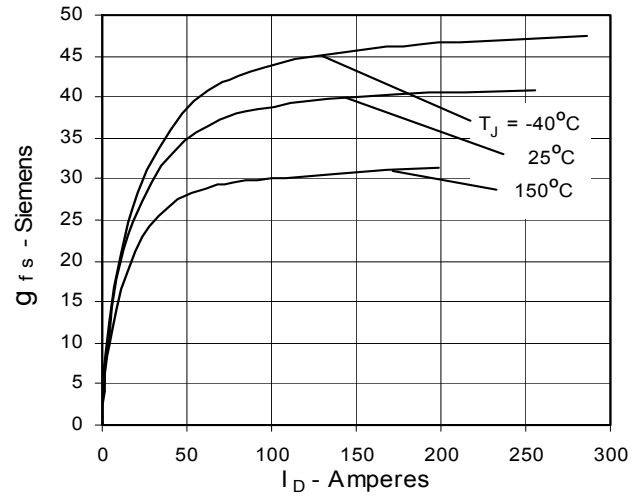
**Fig. 6. Drain Current vs. Case  
Temperature**



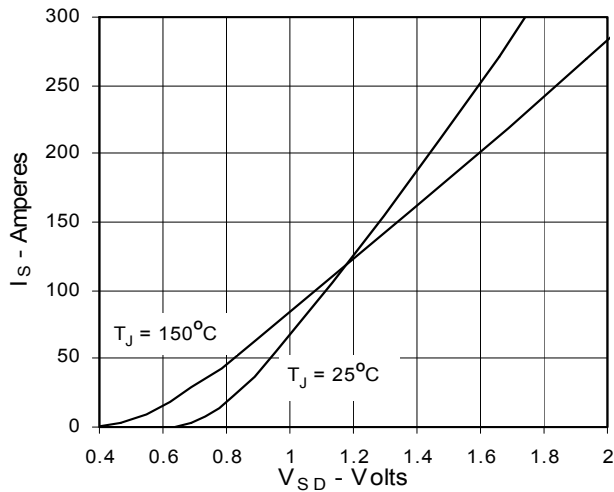
**Fig. 7. Input Admittance**



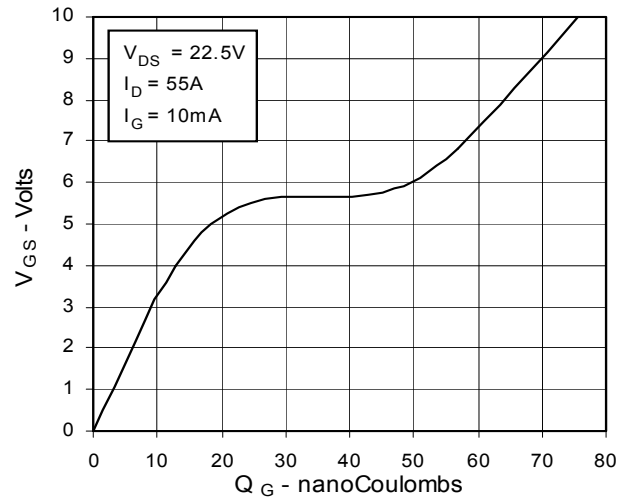
**Fig. 8. Transconductance**



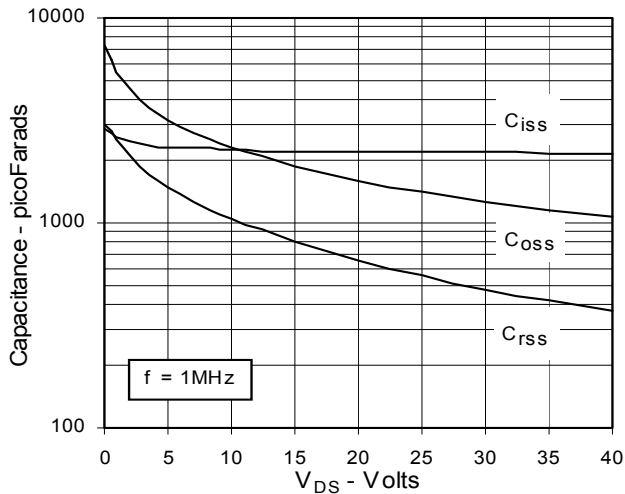
**Fig. 9. Source Current vs. Source-To-Drain Voltage**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



**Fig. 12. Forward-Bias Safe Operating Area**

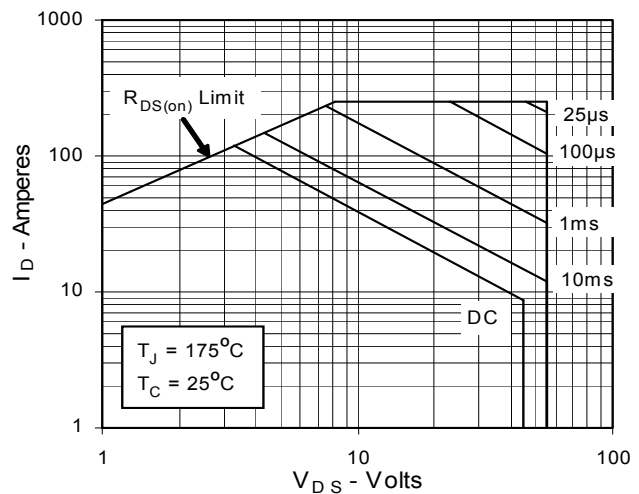


Fig. 13. Maximum Transient Thermal Resistance

