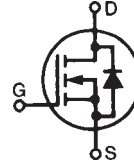


# PolarHT™ Power MOSFET

**IXTQ 120N15P**  
**IXTT 120N15P**

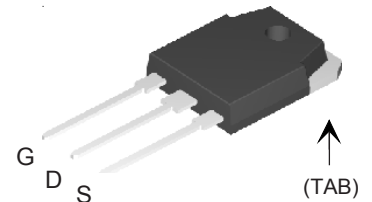
$$\begin{aligned} V_{DSS} &= 150 \text{ V} \\ I_{D25} &= 120 \text{ A} \\ R_{DS(on)} &\leq 16 \text{ m}\Omega \end{aligned}$$

N-Channel Enhancement Mode  
Avalanche Rated

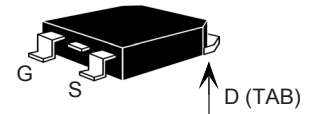


| Symbol       | Test Conditions                                                                                                                         | Maximum Ratings |                  |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$    | $T_J = 25^\circ\text{C to } 175^\circ\text{C}$                                                                                          | 150             | V                |
| $V_{DGR}$    | $T_J = 25^\circ\text{C to } 175^\circ\text{C}; R_{GS} = 1 \text{ M}\Omega$                                                              | 150             | V                |
| $V_{DSS}$    | Continuous                                                                                                                              | $\pm 20$        | V                |
| $V_{GSM}$    | Transient                                                                                                                               | $\pm 30$        | V                |
| $I_{D25}$    | $T_C = 25^\circ\text{C}$                                                                                                                | 120             | A                |
| $I_{D(RMS)}$ | External lead current limit                                                                                                             | 75              | A                |
| $I_{DM}$     | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                              | 260             | A                |
| $I_{AR}$     | $T_C = 25^\circ\text{C}$                                                                                                                | 60              | A                |
| $E_{AR}$     | $T_C = 25^\circ\text{C}$                                                                                                                | 60              | mJ               |
| $E_{AS}$     | $T_C = 25^\circ\text{C}$                                                                                                                | 2.0             | J                |
| $dv/dt$      | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 4 \Omega$ | 10              | V/ns             |
| $P_D$        | $T_C = 25^\circ\text{C}$                                                                                                                | 600             | 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)                                                                                                                 | 1.13/10         | Nm/lb.in.        |
| Weight       | TO-3P                                                                                                                                   | 5.5             | g                |
|              | TO-268                                                                                                                                  | 5.0             | g                |

TO-3P (IXTQ)



TO-268 (IXTT)



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

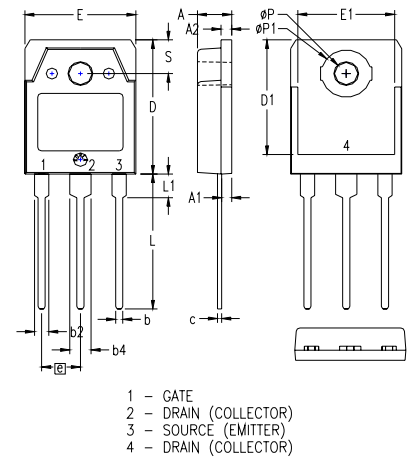
- Easy to mount
- Space savings
- High power density

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                                      | Characteristic Values |      |                                       |
|--------------|------------------------------------------------------------------------------------------------------------------|-----------------------|------|---------------------------------------|
|              |                                                                                                                  | Min.                  | Typ. | Max.                                  |
| $BV_{DSS}$   | $V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$                                                                 | 150                   |      | V                                     |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250 \mu\text{A}$                                                                      | 3.0                   |      | 5.0 V                                 |
| $I_{GSS}$    | $V_{GS} = \pm 20 \text{ V}$ , $V_{DS} = 0$                                                                       |                       |      | $\pm 100 \text{ nA}$                  |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0 \text{ V}$<br>$T_J = 175^\circ\text{C}$                                        |                       |      | 25 $\mu\text{A}$<br>500 $\mu\text{A}$ |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 0.5 I_{D25}$<br>Pulse test, $t \leq 300 \mu\text{s}$ , duty cycle $d \leq 2 \%$ |                       |      | 16 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                                          | 40                                                                                | 60                     | S    |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                   |                                                                                   | 4900                   | pF   |
| $C_{oss}$    |                                                                                                 |                                                                                   | 1300                   | pF   |
| $C_{rss}$    |                                                                                                 |                                                                                   | 330                    | pF   |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 60\text{ A}$<br>$R_G = 4\ \Omega$ (External) |                                                                                   | 33                     | ns   |
| $t_r$        |                                                                                                 |                                                                                   | 42                     | ns   |
| $t_{d(off)}$ |                                                                                                 |                                                                                   | 85                     | ns   |
| $t_f$        |                                                                                                 |                                                                                   | 26                     | ns   |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}$                                 |                                                                                   | 150                    | nC   |
| $Q_{gs}$     |                                                                                                 |                                                                                   | 40                     | nC   |
| $Q_{gd}$     |                                                                                                 |                                                                                   | 80                     | nC   |
| $R_{thJC}$   | (TO-3P)                                                                                         | 0.21                                                                              | $0.25^\circ\text{C/W}$ |      |
| $R_{thCS}$   |                                                                                                 |                                                                                   | $^\circ\text{C/W}$     |      |

| Source-Drain Diode |                                                                                                       | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |               |
|--------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------|
| Symbol             | Test Conditions                                                                                       | Min.                                                                              | Typ. | Max.          |
| $I_S$              | $V_{GS} = 0\text{ V}$                                                                                 |                                                                                   |      | 120 A         |
| $I_{SM}$           | Repetitive                                                                                            |                                                                                   |      | 260 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         |
| $t_{rr}$           | $I_F = 25\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}$<br>$V_R = 100\text{ V}, V_{GS} = 0\text{ V}$   |                                                                                   | 150  | ns            |
| $Q_{RM}$           |                                                                                                       |                                                                                   | 2.3  | $\mu\text{C}$ |

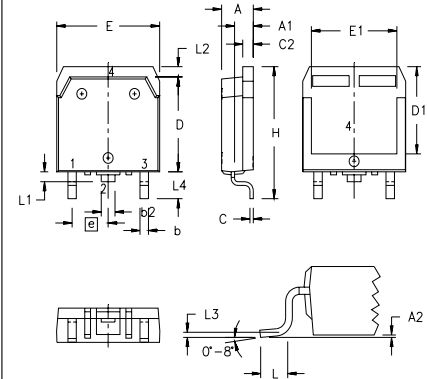
## TO-3P (IXTQ) Outline



| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .185     | .193 | 4.70        | 4.90  |
| A1  | .051     | .059 | 1.30        | 1.50  |
| A2  | .057     | .065 | 1.45        | 1.65  |
| b   | .035     | .045 | 0.90        | 1.15  |
| b2  | .075     | .087 | 1.90        | 2.20  |
| b4  | .114     | .126 | 2.90        | 3.20  |
| c   | .022     | .031 | 0.55        | 0.80  |
| D   | .780     | .791 | 19.80       | 20.10 |
| D1  | .665     | .677 | 16.90       | 17.20 |
| E   | .610     | .622 | 15.50       | 15.80 |
| E1  | .531     | .539 | 13.50       | 13.70 |
| e   | .215 BSC |      | 5.45 BSC    |       |
| L   | .779     | .795 | 19.80       | 20.20 |
| L1  | .134     | .142 | 3.40        | 3.60  |
| L2  | .126     | .134 | 3.20        | 3.40  |
| ØP  | .272     | .280 | 6.90        | 7.10  |
| S   | .193     | .201 | 4.90        | 5.10  |

All metal area are tin plated.

## TO-268 Outline

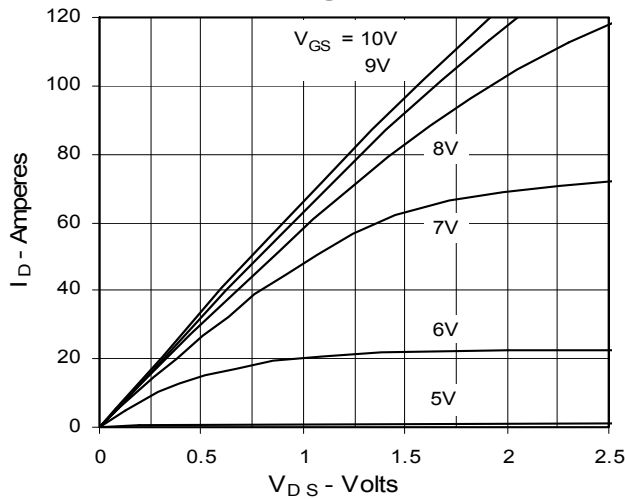


| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .193     | .201 | 4.90        | 5.10  |
| A1  | .106     | .114 | 2.70        | 2.90  |
| A2  | .001     | .010 | 0.02        | 0.25  |
| b   | .045     | .057 | 1.15        | 1.45  |
| b2  | .075     | .083 | 1.90        | 2.10  |
| C   | .016     | .026 | 0.40        | 0.65  |
| C2  | .057     | .063 | 1.45        | 1.60  |
| D   | .543     | .551 | 13.80       | 14.00 |
| D1  | .488     | .500 | 12.40       | 12.70 |
| E   | .624     | .632 | 15.85       | 16.05 |
| E1  | .524     | .535 | 13.30       | 13.60 |
| e   | .215 BSC |      | 5.45 BSC    |       |
| H   | .736     | .752 | 18.70       | 19.10 |
| L   | .094     | .106 | 2.40        | 2.70  |
| L1  | .047     | .055 | 1.20        | 1.40  |
| L2  | .039     | .045 | 1.00        | 1.15  |
| L3  | .010 BSC |      | 0.25 BSC    |       |
| L4  | .150     | .161 | 3.80        | 4.10  |

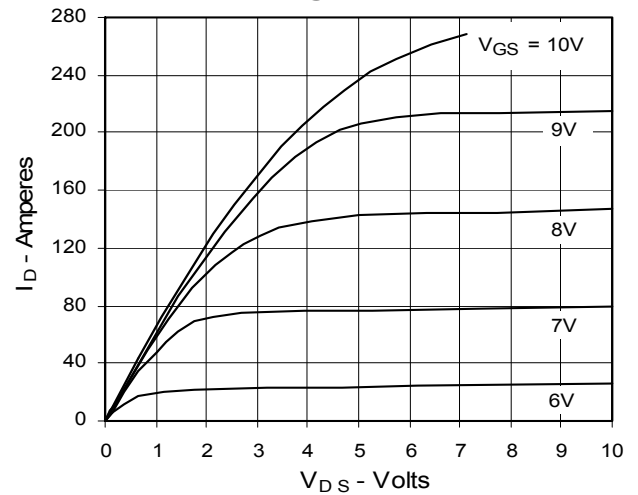
IXYS reserves the right to change limits, test conditions, and dimensions.

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

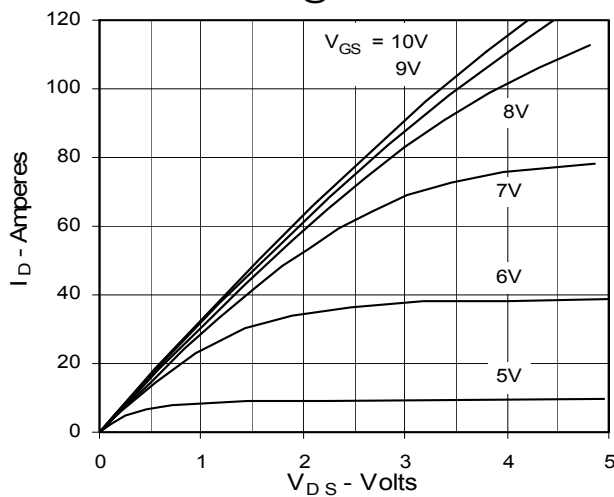
**Fig. 1. Output Characteristics**  
**@ 25°C**



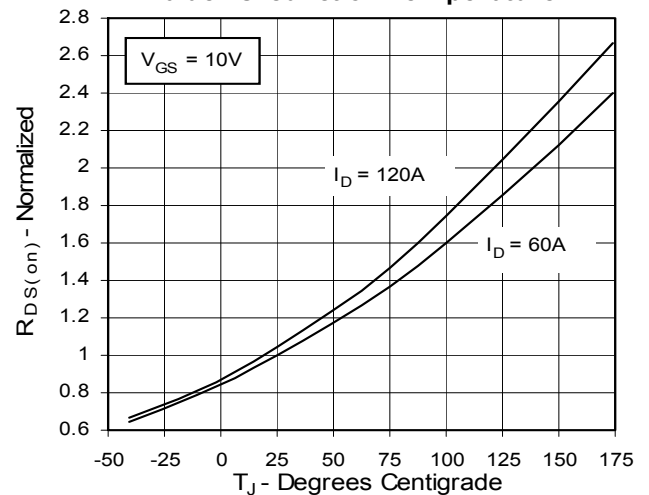
**Fig. 2. Extended Output Characteristics**  
**@ 25°C**



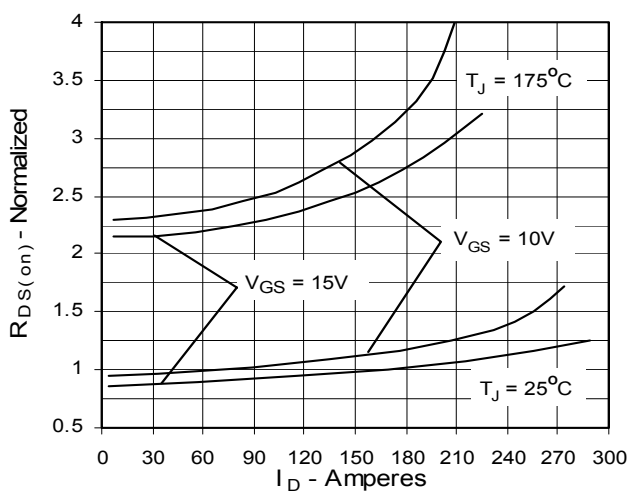
**Fig. 3. Output Characteristics**  
**@ 150°C**



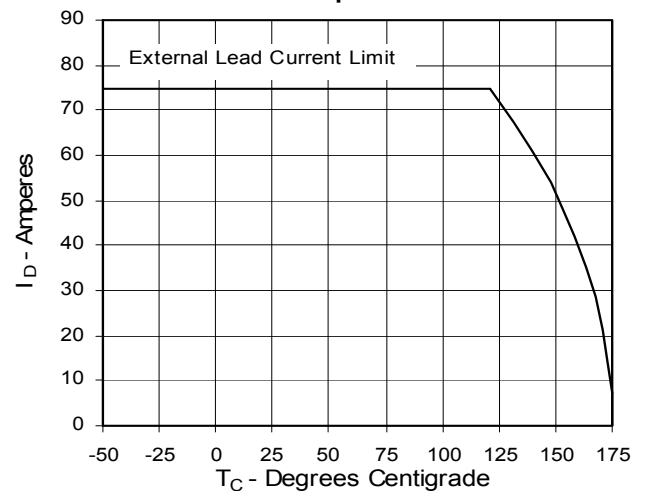
**Fig. 4.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$**   
**Value vs. Junction Temperature**



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



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



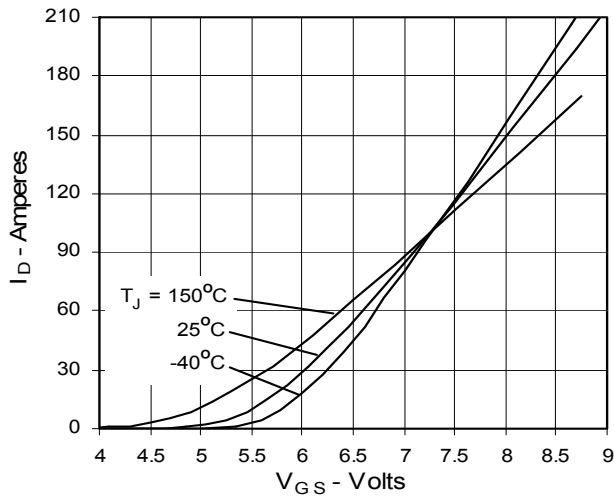
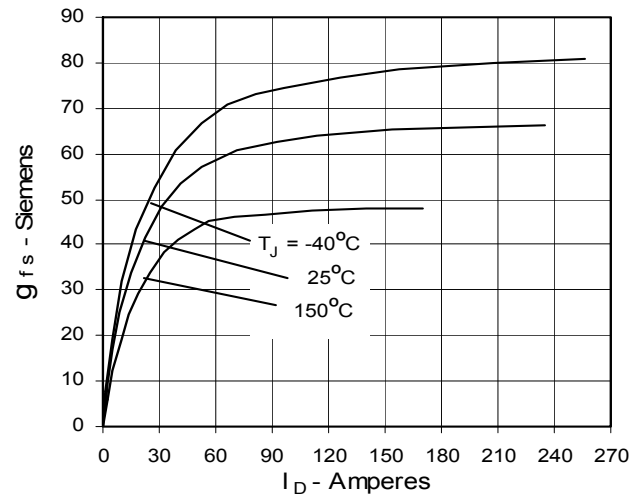
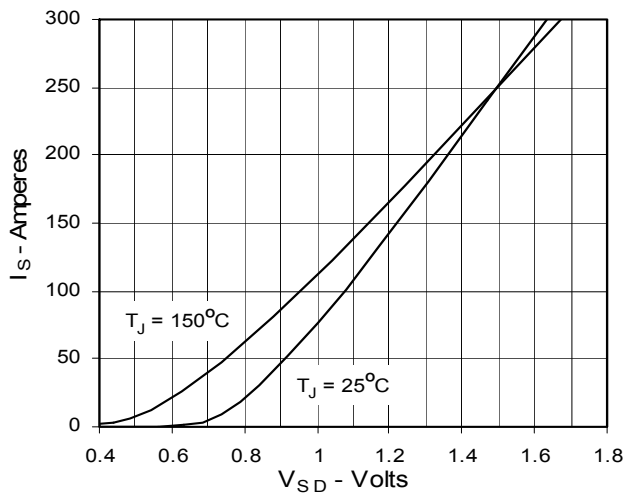
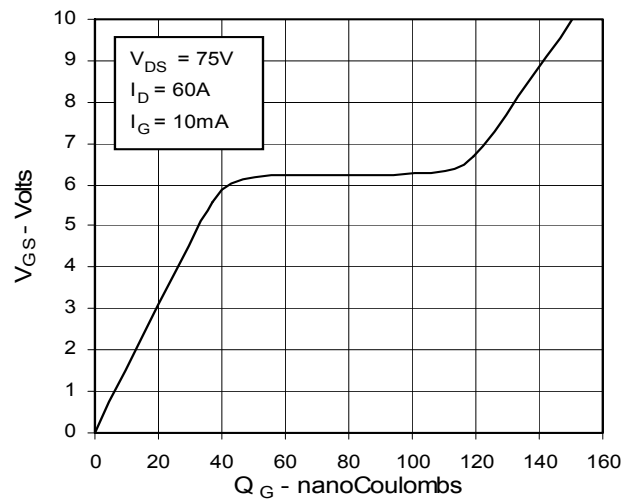
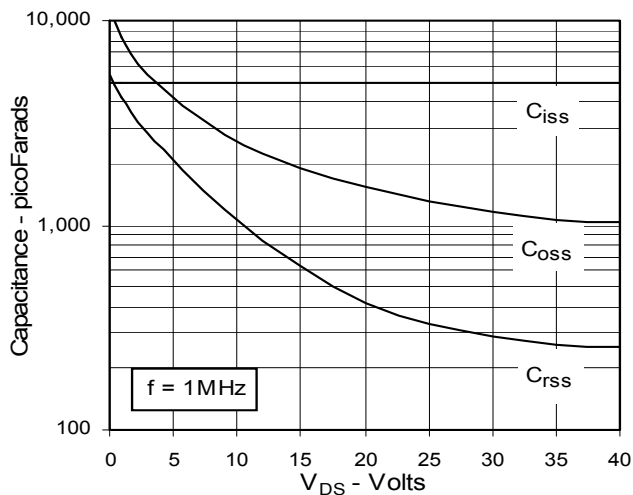
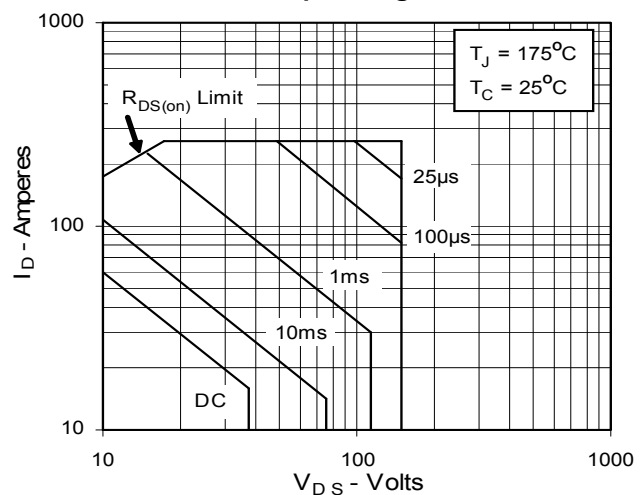
**Fig. 7. Input Admittance**

**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

