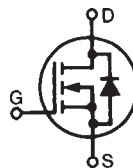


## PolarHV™ HiPerFET Power MOSFET

IXFK 44N80P  
IXFX 44N80P

$$\begin{aligned} V_{DSS} &= 800 \text{ V} \\ I_{D25} &= 44 \text{ A} \\ R_{DS(on)} &\leq 190 \text{ m}\Omega \\ t_{rr} &\leq 250 \text{ ns} \end{aligned}$$

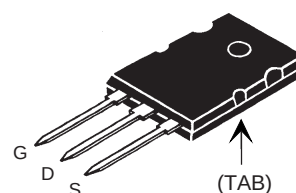
N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode



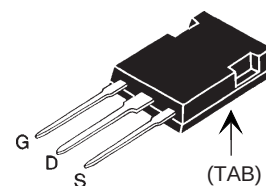
| Symbol     | Test Conditions                                                                                                                          | Maximum Ratings   |                  |
|------------|------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                                                                                          | 800               | V                |
| $V_{DGR}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1 \text{ M}\Omega$                                                           | 800               | V                |
| $V_{GS}$   | Continuous                                                                                                                               | $\pm 30$          | V                |
| $V_{GSM}$  | Transient                                                                                                                                | $\pm 40$          | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                                                                                 | 44                | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                               | 100               | A                |
| $I_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                                 | 22                | A                |
| $E_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                                 | 80                | mJ               |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                                                                                                 | 3.4               | 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             |
| $P_D$      | $T_C = 25^\circ\text{C}$                                                                                                                 | 1040              | W                |
| $T_J$      |                                                                                                                                          | -55 ... +150      | $^\circ\text{C}$ |
| $T_{JM}$   |                                                                                                                                          | 150               | $^\circ\text{C}$ |
| $T_{stg}$  |                                                                                                                                          | -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 (IXFK)                                                                                                                   | 1.13.10           | Nm/lb.in.        |
| $F_C$      | Mounting force (IXFX)                                                                                                                    | 20..120 / 4.5..25 | N/lb             |
| Weight     | (IXFK)                                                                                                                                   | 10                | g                |
|            | (IXFX)                                                                                                                                   | 5                 | g                |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified)                      | Characteristic Values |      |                      |
|--------------|------------------------------------------------------------------------------------------------|-----------------------|------|----------------------|
|              |                                                                                                | Min.                  | Typ. | Max.                 |
| $BV_{DSS}$   | $V_{GS} = 0 \text{ V}$ , $I_D = 800 \mu\text{A}$                                               | 800                   |      | V                    |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 8 \text{ mA}$                                                       | 3.0                   |      | 5.0 V                |
| $I_{GSS}$    | $V_{GS} = \pm 30 \text{ V}_{DC}$ , $V_{DS} = 0$                                                |                       |      | $\pm 200 \text{ nA}$ |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$                                                                             |                       |      | 50 $\mu\text{A}$     |
|              | $V_{GS} = 0 \text{ V}$ <span style="float: right;"><math>T_J = 125^\circ\text{C}</math></span> |                       |      | 1.5 mA               |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 0.5 I_{D25}$ , Note 1                                         |                       |      | 190 m $\Omega$       |

### TO-264 (IXFK)



### PLUS247 (IXFX)



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

### Features

- Fast intrinsic diode
- 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

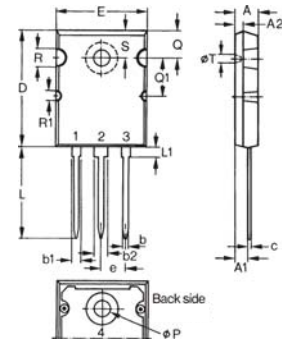
| Symbol       | Test Conditions                                                                             | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified) |      |                        |
|--------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------|------------------------|
|              |                                                                                             | Min.                                                                            | Typ. | Max.                   |
| $g_{fs}$     | $V_{DS} = 20\text{ V}; I_D = 0.5 I_{D25}$ , Note 1                                          | 27                                                                              | 43   | S                      |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                               |                                                                                 | 12   | nF                     |
| $C_{oss}$    |                                                                                             |                                                                                 | 910  | pF                     |
| $C_{rss}$    |                                                                                             |                                                                                 | 30   | pF                     |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = I_{D25}$<br>$R_G = 1\ \Omega$ (External) |                                                                                 | 28   | ns                     |
| $t_r$        |                                                                                             |                                                                                 | 22   | ns                     |
| $t_{d(off)}$ |                                                                                             |                                                                                 | 75   | ns                     |
| $t_f$        |                                                                                             |                                                                                 | 27   | ns                     |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}$                             |                                                                                 | 198  | nC                     |
| $Q_{gs}$     |                                                                                             |                                                                                 | 67   | nC                     |
| $Q_{gd}$     |                                                                                             |                                                                                 | 65   | nC                     |
| $R_{thJC}$   |                                                                                             |                                                                                 |      | $0.12^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                             | 0.15                                                                            |      | $^\circ\text{C/W}$     |

### Source-Drain Diode

| Symbol   | Test Conditions                                                                                     | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified) |      |               |
|----------|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------|---------------|
|          |                                                                                                     | Min.                                                                            | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{ V}$                                                                               |                                                                                 |      | 44 A          |
| $I_{SM}$ | Repetitive                                                                                          |                                                                                 |      | 100 A         |
| $V_{SD}$ | $I_F = I_S, V_{GS} = 0\text{ V}$ , Note 1                                                           |                                                                                 |      | 1.5 V         |
| $t_{rr}$ | $I_F = 22\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}$<br>$V_R = 100\text{ V}, V_{GS} = 0\text{ V}$ |                                                                                 |      | 250 ns        |
| $Q_{RM}$ |                                                                                                     |                                                                                 | 0.8  | $\mu\text{C}$ |
| $I_{RM}$ |                                                                                                     |                                                                                 | 8.0  | A             |

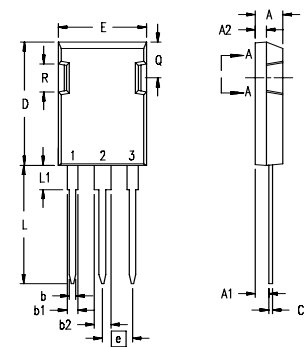
Note 1: Pulse test,  $t \leq 300\ \mu\text{s}$ , duty cycle  $d \leq 2\%$

### TO-264 (IXFK) Outline



| Dim. | Millimeter |       | Inches   |       |
|------|------------|-------|----------|-------|
|      | Min.       | Max.  | Min.     | Max.  |
| A    | 4.82       | 5.13  | .190     | .202  |
| A1   | 2.54       | 2.89  | .100     | .114  |
| A2   | 2.00       | 2.10  | .079     | .083  |
| b    | 1.12       | 1.42  | .044     | .056  |
| b1   | 2.39       | 2.69  | .094     | .106  |
| b2   | 2.90       | 3.09  | .114     | .122  |
| c    | 0.53       | 0.83  | .021     | .033  |
| D    | 25.91      | 26.16 | 1.020    | 1.030 |
| E    | 19.81      | 19.96 | .780     | .786  |
| e    | 5.46 BSC   |       | .215 BSC |       |
| J    | 0.00       | 0.25  | .000     | .010  |
| K    | 0.00       | 0.25  | .000     | .010  |
| L    | 20.32      | 20.83 | .800     | .820  |
| L1   | 2.29       | 2.59  | .090     | .102  |
| P    | 3.17       | 3.66  | .125     | .144  |
| Q    | 6.07       | 6.27  | .239     | .247  |
| Q1   | 8.38       | 8.69  | .330     | .342  |
| R    | 3.81       | 4.32  | .150     | .170  |
| R1   | 1.78       | 2.29  | .070     | .090  |
| S    | 6.04       | 6.30  | .238     | .248  |
| T    | 1.57       | 1.83  | .062     | .072  |

### PLUS 247™ (IXFX) Outline



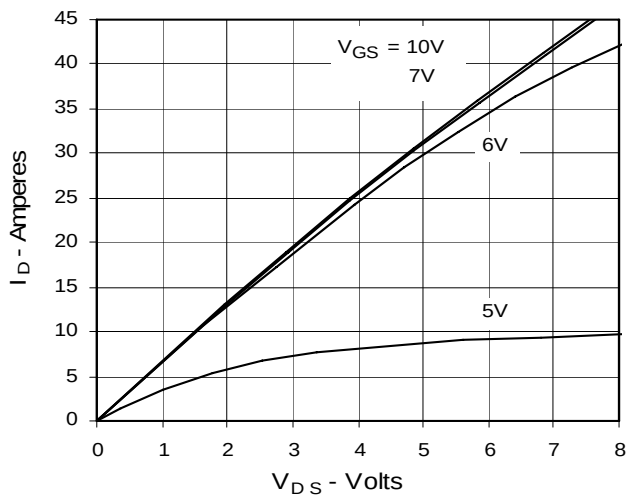
Terminals: 1 - Gate  
2 - Drain (Collector)  
3 - Source (Emitter)  
4 - Drain (Collector)

| Dim. | Millimeter |       | Inches   |       |
|------|------------|-------|----------|-------|
|      | Min.       | Max.  | Min.     | Max.  |
| A    | 4.83       | 5.21  | .190     | .205  |
| A1   | 2.29       | 2.54  | .090     | .100  |
| A2   | 1.91       | 2.16  | .075     | .085  |
| b    | 1.14       | 1.40  | .045     | .055  |
| b1   | 1.91       | 2.13  | .075     | .084  |
| b2   | 2.92       | 3.12  | .115     | .123  |
| C    | 0.61       | 0.80  | .024     | .031  |
| D    | 20.80      | 21.34 | .819     | .840  |
| E    | 15.75      | 16.13 | .620     | .635  |
| e    | 5.45 BSC   |       | .215 BSC |       |
| L    | 19.81      | 20.32 | .780     | .800  |
| L1   | 3.81       | 4.32  | .150     | .170  |
| Q    | 5.59       | 6.20  | .220     | 0.244 |
| R    | 4.32       | 4.83  | .170     | .190  |

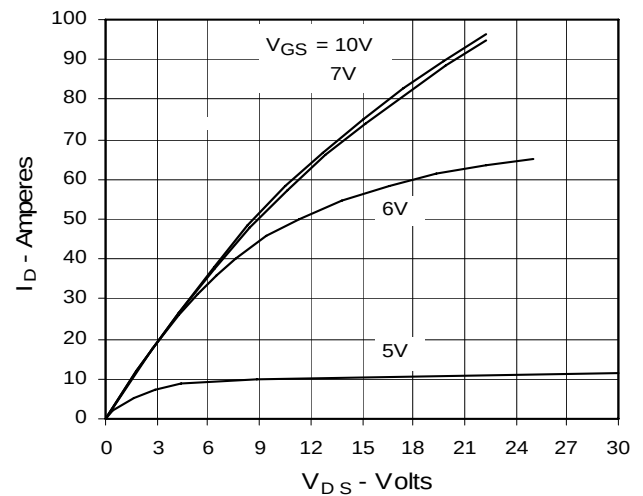
IXYS reserves the right to change limits, test conditions, and dimensions.

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4,881,106 5,034,796 5,187,117 5,486,715 6,306,728 B1 6,583,505 6,710,463 6771478 B2

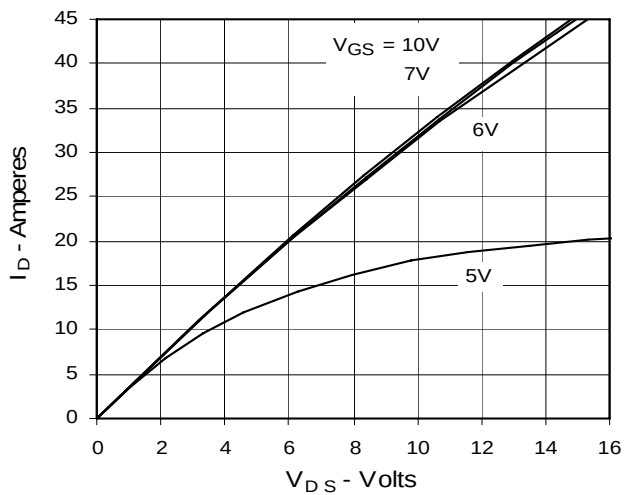
**Fig. 1. Output Characteristics**  
@ 25°C



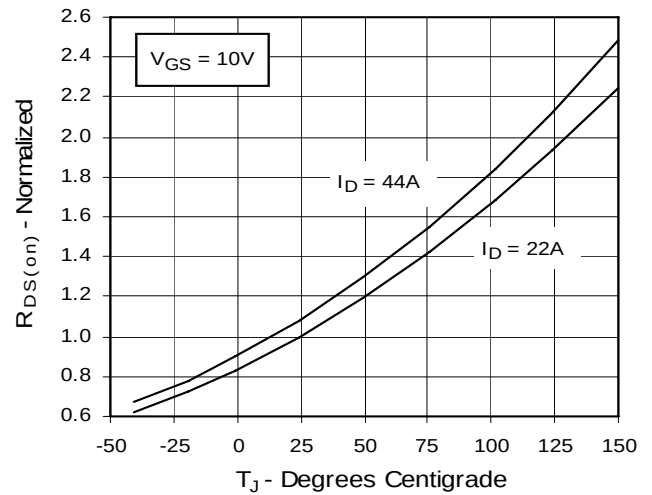
**Fig. 2. Extended Output Characteristics**  
@ 25°C



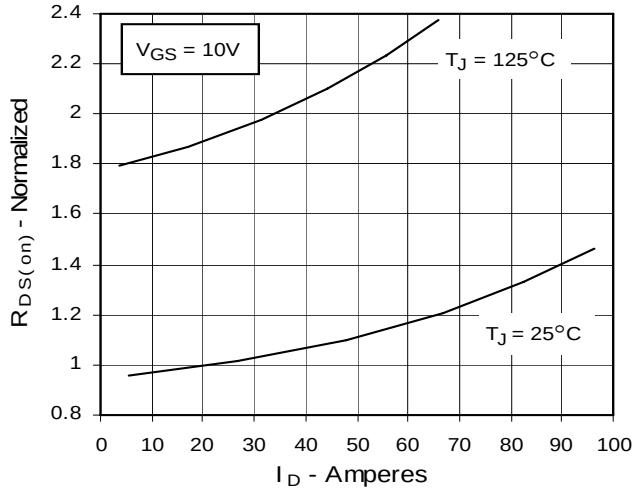
**Fig. 3. Output Characteristics**  
@ 125°C



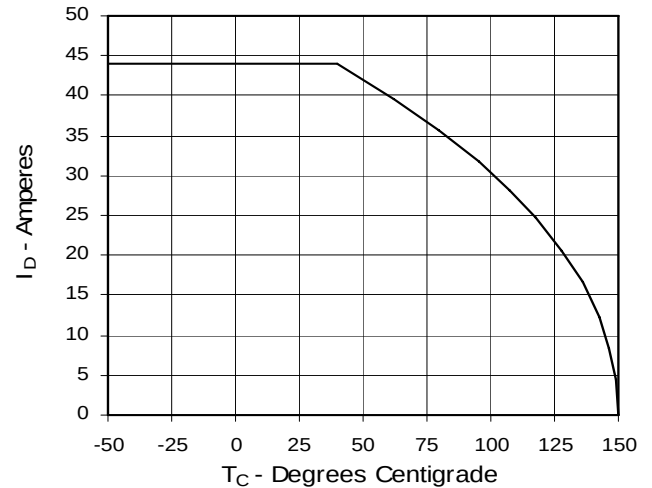
**Fig. 4.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value vs. Junction Temperature**

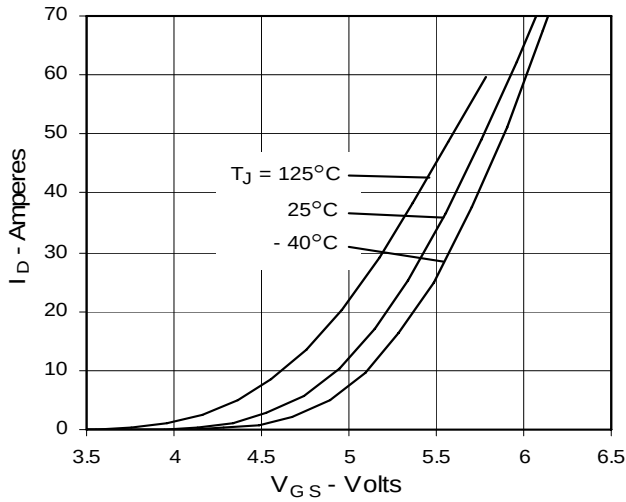
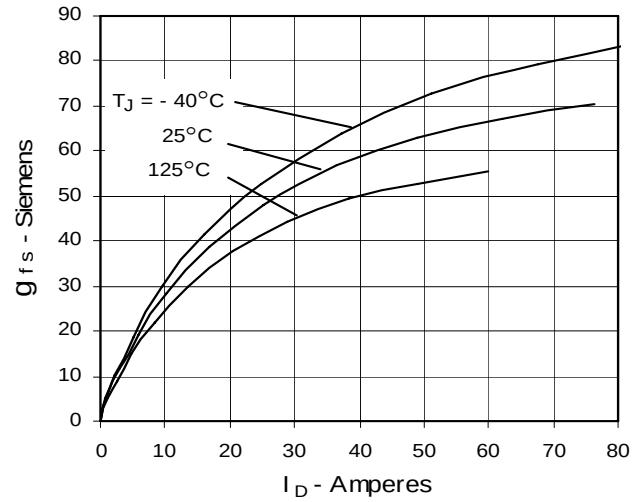
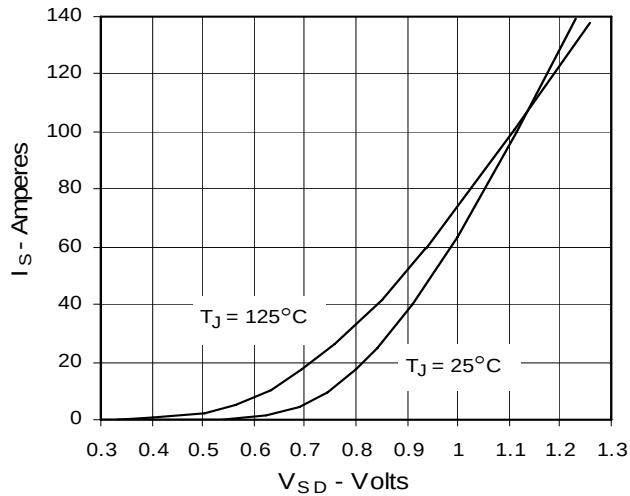
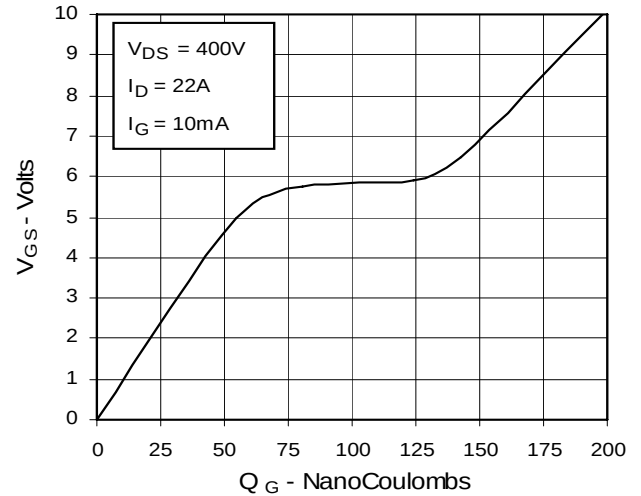
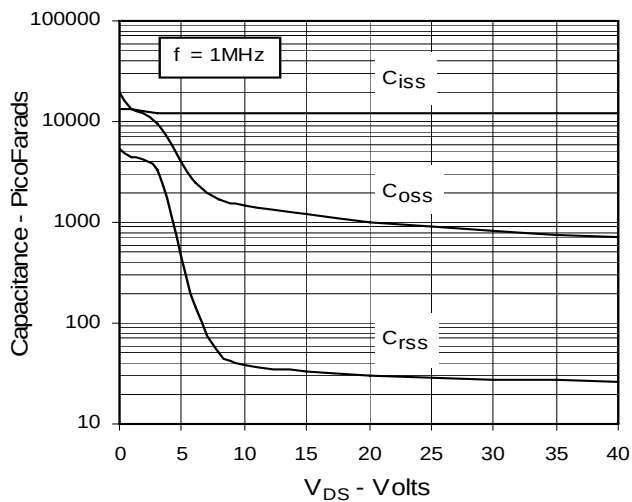
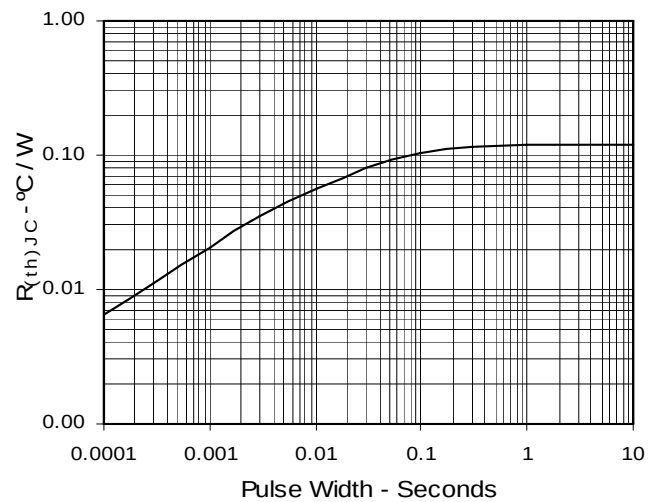


**Fig. 5.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value vs. Drain Current**



**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. 13. Maximum Transient Thermal Resistance**


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