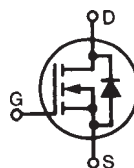


# PolarHT™ HiPerFET IXFH 150N15P Power MOSFET IXFK 150N15P

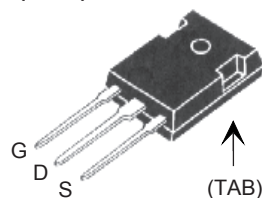
N-Channel Enhancement Mode  
Fast Intrinsic Diode  
Avalanche Rated



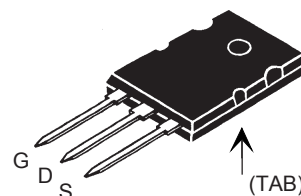
$$\begin{aligned} V_{DSS} &= 150 \text{ V} \\ I_{D25} &= 150 \text{ A} \\ R_{DS(on)} &\leq 13 \text{ m}\Omega \\ t_{rr} &\leq 200 \text{ ns} \end{aligned}$$

| 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                |
| $V_{GS}$     | Continuous                                                                                                                              | $\pm 20$        | V                |
| $V_{GSM}$    | Transient                                                                                                                               | $\pm 30$        | V                |
| $I_{D25}$    | $T_C = 25^\circ\text{C}$                                                                                                                | 150             | A                |
| $I_{D(RMS)}$ | External lead current limit                                                                                                             | 75              | A                |
| $I_{DM}$     | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                              | 340             | A                |
| $I_{AR}$     | $T_C = 25^\circ\text{C}$                                                                                                                | 60              | A                |
| $E_{AR}$     | $T_C = 25^\circ\text{C}$                                                                                                                | 80              | mJ               |
| $E_{AS}$     | $T_C = 25^\circ\text{C}$                                                                                                                | 2.5             | J                |
| $dv/dt$      | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 175^\circ\text{C}$ , $R_G = 4 \Omega$ | 10              | V/ns             |
| $P_D$        | $T_C = 25^\circ\text{C}$                                                                                                                | 714             | W                |
| $T_J$        |                                                                                                                                         | -55 ... +175    | $^\circ\text{C}$ |
| $T_{JM}$     |                                                                                                                                         | 175             | $^\circ\text{C}$ |
| $T_{stg}$    |                                                                                                                                         | -55 ... +175    | $^\circ\text{C}$ |
| $T_L$        | 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       | TO-3P                                                                                                                                   | 5.5             | g                |
|              | TO-264                                                                                                                                  | 10              | g                |

TO-247 (IXFH)



TO-264 (IXFK)



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

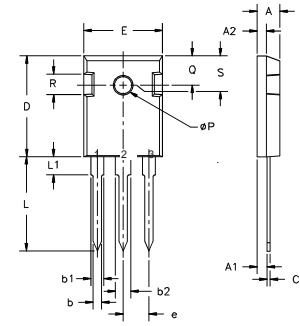
## Advantages

- † Easy to mount
- † Space savings
- † High power density

| Symbol       | Test Conditions<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                    |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 4 \text{ mA}$                                                                         | 3.0                   |      | 5.0 V                |
| $I_{GSS}$    | $V_{GS} = \pm 20 \text{ V}_{DC}$ , $V_{DS} = 0$                                                                  |                       |      | $\pm 100 \text{ nA}$ |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$                                                                                               |                       |      | 25 $\mu\text{A}$     |
|              | $V_{GS} = 0 \text{ V}$ $T_J = 175^\circ\text{C}$                                                                 |                       |      | 1000 $\mu\text{A}$   |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 0.5 I_{D25}$<br>Pulse test, $t \leq 300 \mu\text{s}$ , duty cycle $d \leq 2 \%$ |                       |      | 13 $\text{m}\Omega$  |

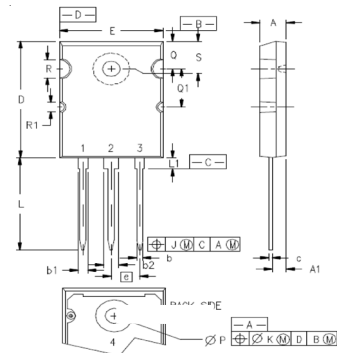
| Symbol       | Test Conditions                                                                                     | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                        |
|--------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|------------------------|
|              |                                                                                                     | Min.                                                                              | Typ. | Max.                   |
| $g_{fs}$     | $V_{DS} = 10\text{ V}$ ; $I_D = 0.5 I_{D25}$ , pulse test                                           | 55                                                                                | 80   | S                      |
| $C_{iss}$    | $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                                 |                                                                                   | 5800 | pF                     |
| $C_{oss}$    |                                                                                                     |                                                                                   | 1730 | pF                     |
| $C_{rss}$    |                                                                                                     |                                                                                   | 400  | pF                     |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.5 V_{DSS}$ , $I_D = I_{D25}$<br>$R_G = 3.3\ \Omega$ (External) |                                                                                   | 30   | ns                     |
| $t_r$        |                                                                                                     |                                                                                   | 33   | ns                     |
| $t_{d(off)}$ |                                                                                                     |                                                                                   | 100  | ns                     |
| $t_f$        |                                                                                                     |                                                                                   | 28   | ns                     |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.5 V_{DSS}$ , $I_D = 0.5 I_{D25}$                               |                                                                                   | 190  | nC                     |
| $Q_{gs}$     |                                                                                                     |                                                                                   | 40   | nC                     |
| $Q_{gd}$     |                                                                                                     |                                                                                   | 105  | nC                     |
| $R_{thJC}$   |                                                                                                     |                                                                                   |      | $0.21^\circ\text{C/W}$ |
| $R_{thCS}$   | TO-247                                                                                              |                                                                                   | 0.21 | $^\circ\text{C/W}$     |
| $R_{thCS}$   | TO-264                                                                                              |                                                                                   | 0.15 | $^\circ\text{C/W}$     |

| Source-Drain Diode |                                                                                                          | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |               |
|--------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------|
| Symbol             | Test Conditions                                                                                          | Min.                                                                              | Typ. | Max.          |
| $I_S$              | $V_{GS} = 0\text{ V}$                                                                                    |                                                                                   |      | 150 A         |
| $I_{SM}$           | Repetitive                                                                                               |                                                                                   |      | 340 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         |
| $t_{rr}$           | $I_F = 25\text{ A}$<br>$-di/dt = 100\text{ A}/\mu\text{s}$                                               |                                                                                   |      | 200 ns        |
| $Q_{RM}$           | $V_R = 100\text{ V}$                                                                                     |                                                                                   | 0.8  | $\mu\text{C}$ |

**TO-247 (IXFH) Outline**


Terminals: 1 - Gate  
2 - Drain  
3 - Source  
Tab - Drain

| Dim.           | Millimeter |       | Inches |       |
|----------------|------------|-------|--------|-------|
|                | Min.       | Max.  | Min.   | Max.  |
| A              | 4.7        | 5.3   | .185   | .209  |
| A <sub>1</sub> | 2.2        | 2.54  | .087   | .102  |
| A <sub>2</sub> | 2.2        | 2.6   | .059   | .098  |
| b              | 1.0        | 1.4   | .040   | .055  |
| b <sub>1</sub> | 1.65       | 2.13  | .065   | .084  |
| b <sub>2</sub> | 2.87       | 3.12  | .113   | .123  |
| C              | .4         | .8    | .016   | .031  |
| D              | 20.80      | 21.46 | .819   | .845  |
| E              | 15.75      | 16.26 | .610   | .640  |
| e              | 5.20       | 5.72  | 0.205  | 0.225 |
| L              | 19.81      | 20.32 | .780   | .800  |
| L <sub>1</sub> |            | 4.50  |        | .177  |
| ØP             | 3.55       | 3.65  | .140   | .144  |
| Q              | 5.89       | 6.40  | 0.232  | 0.252 |
| R              | 4.32       | 5.49  | .170   | .216  |
| S              | 6.15       | BSC   | 242    | BSC   |

**TO-264 (IXFK) Outline**


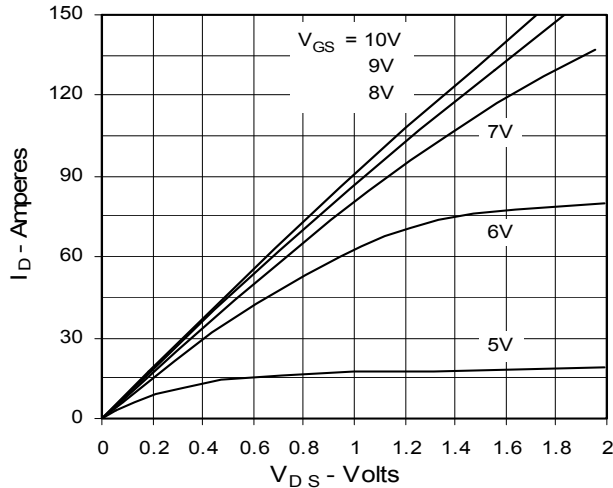
1 - GATE  
2, 4 - DRAIN (COLLECTOR)  
3 - SOURCE (EMITTER)

| SYM             | INCHES  |       | MILLIMETERS |       |
|-----------------|---------|-------|-------------|-------|
|                 | MIN     | MAX   | MIN         | MAX   |
| A               | .185    | .209  | 4.70        | 5.31  |
| A <sub>1</sub>  | .102    | .118  | 2.59        | 3.00  |
| b               | .037    | .055  | 0.94        | 1.40  |
| b <sub>1</sub>  | .087    | .102  | 2.21        | 2.59  |
| b <sub>2</sub>  | .110    | .126  | 2.79        | 3.20  |
| c               | .017    | .029  | 0.43        | 0.74  |
| D               | 1.007   | 1.047 | 25.58       | 26.59 |
| E               | .760    | .799  | 19.30       | 20.29 |
| e               | .215BSC |       | 5.46 BSC    |       |
| J               | .000    | .010  | 0.00        | 0.25  |
| K               | .000    | .010  | 0.00        | 0.25  |
| L               | .779    | .842  | 19.79       | 21.39 |
| L <sub>1</sub>  | .087    | .102  | 2.21        | 2.59  |
| ØP              | .122    | .138  | 3.10        | 3.51  |
| Q               | .240    | .256  | 6.10        | 6.50  |
| Q <sub>1</sub>  | .330    | .346  | 8.38        | 8.79  |
| ØR              | .155    | .187  | 3.94        | 4.75  |
| ØR <sub>1</sub> | .085    | .093  | 2.16        | 2.36  |
| S               | .243    | .253  | 6.17        | 6.43  |

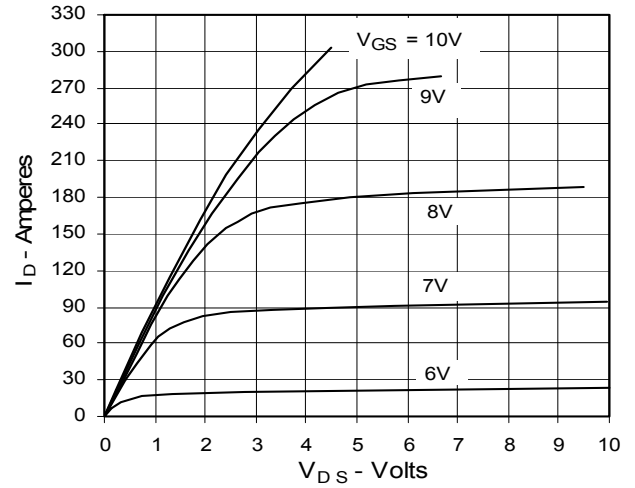
IXYS reserves the right to change limits, test conditions, and dimensions.

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

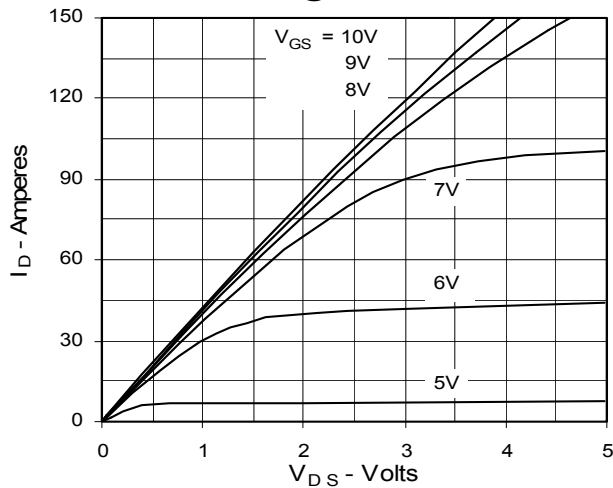
**Fig. 1. Output Characteristics**  
**@ 25°C**



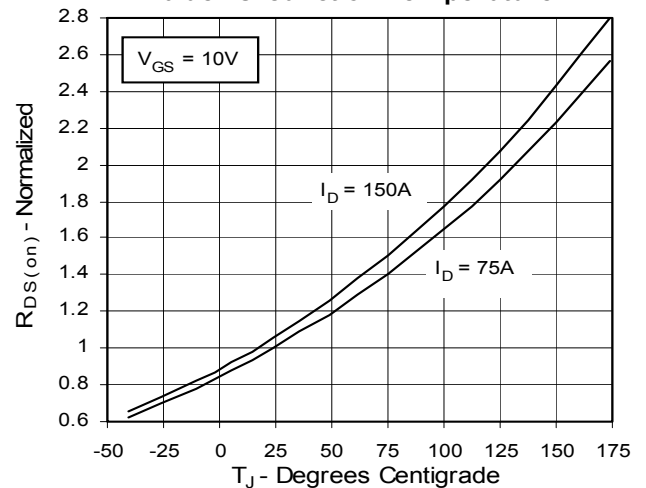
**Fig. 2. Extended Output Characteristics**  
**@ 25°C**



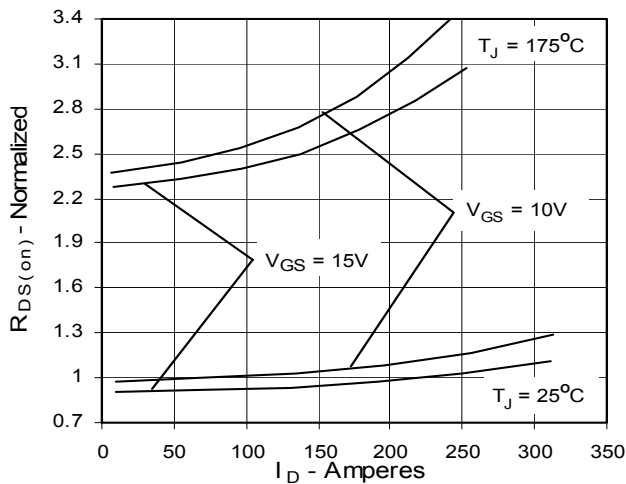
**Fig. 3. Output Characteristics**  
**@ 150°C**



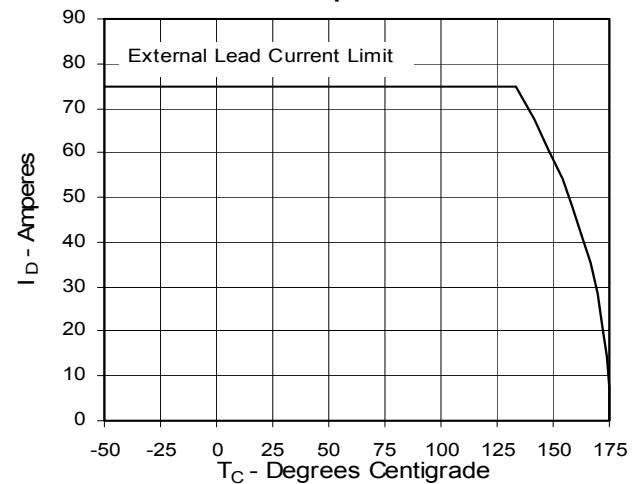
**Fig. 4.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$**   
**Value vs. Junction Temperature**



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



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



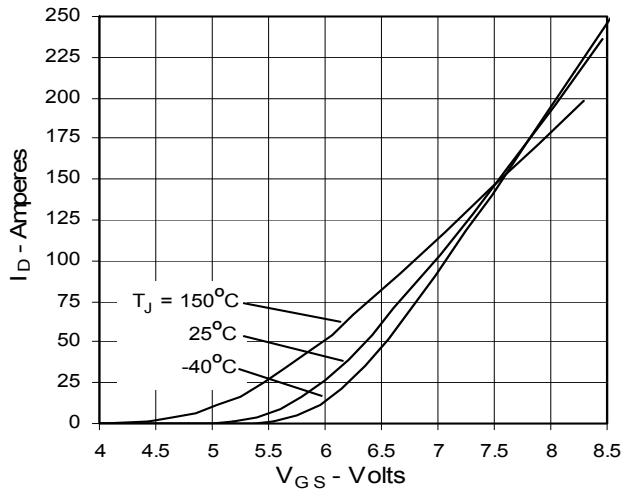
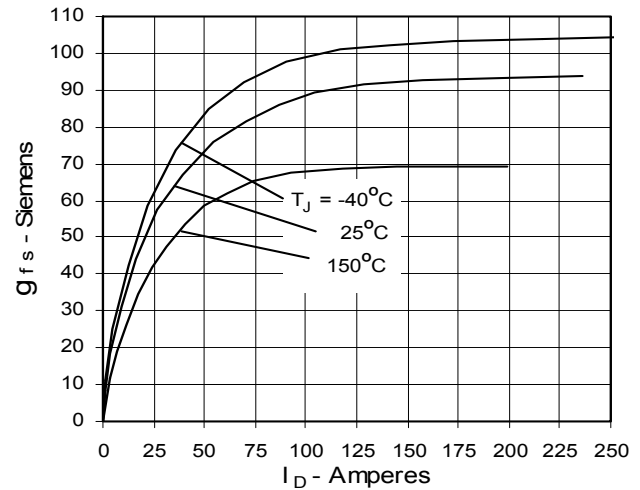
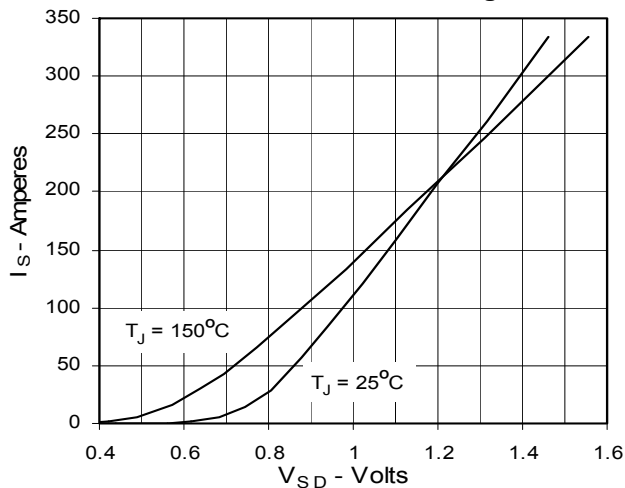
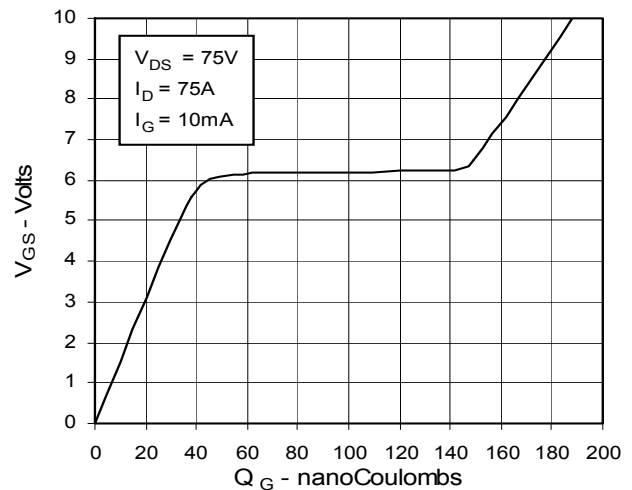
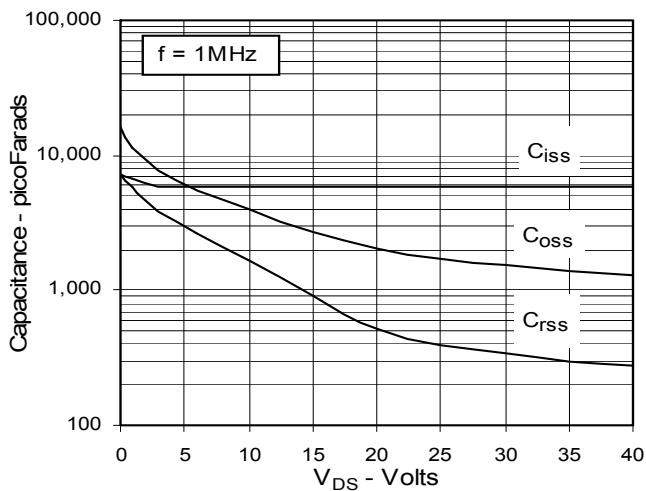
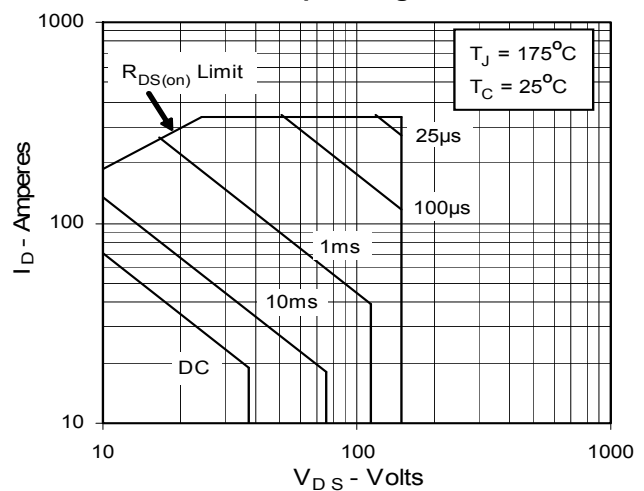
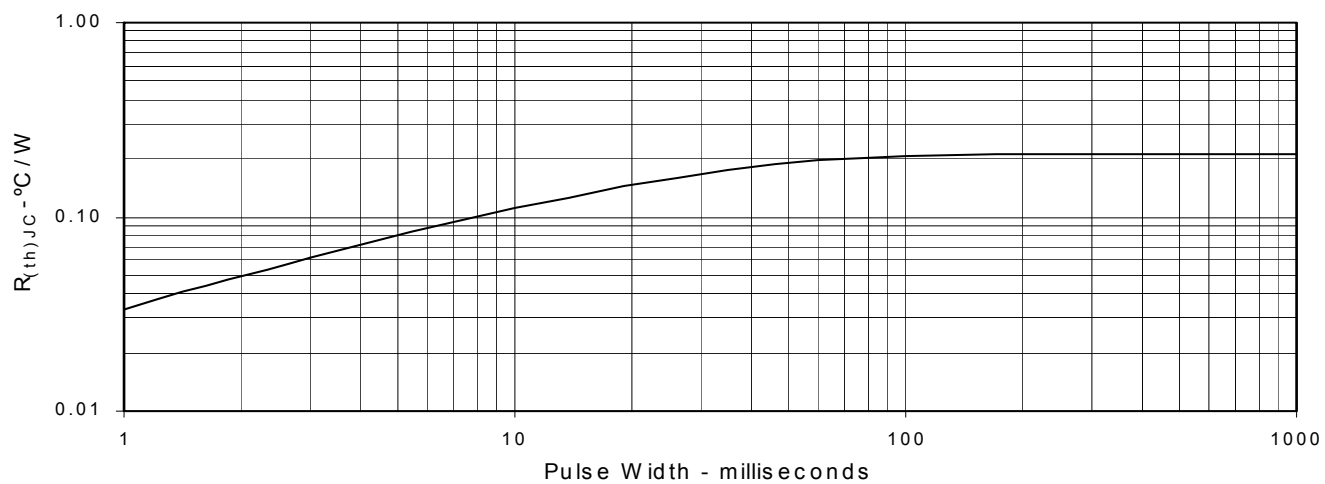
**Fig. 7. Input Admittance**

**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





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