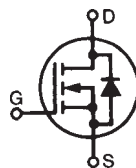


# PolarHV™ HiPerFET Power MOSFET

N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode

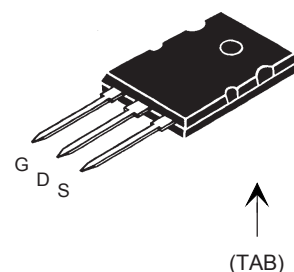
**IXFK 32N80P**  
**IXFX 32N80P**

$V_{DSS} = 800 \text{ V}$   
 $I_{D25} = 32 \text{ A}$   
 $R_{DS(on)} \leq 270 \text{ m}\Omega$   
 $t_{rr} \leq 250 \text{ ns}$

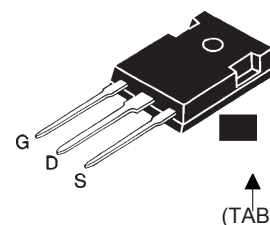


| Symbol     | Test Conditions                                                                                                                         | Maximum Ratings   |                  |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C to } 150^\circ\text{C}$                                                                                          | 800               | V                |
| $V_{DGR}$  | $T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GS} = 1 \text{ M}\Omega$                                                              | 800               | V                |
| $V_{GSS}$  | Continuous                                                                                                                              | $\pm 30$          | V                |
| $V_{GSM}$  | Transient                                                                                                                               | $\pm 40$          | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                                                                                | 32                | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                              | 70                | A                |
| $I_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                                | 16                | A                |
| $E_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                                | 50                | 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             |
| $P_D$      | $T_C = 25^\circ\text{C}$                                                                                                                | 830               | 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 (TO-264)                                                                                                                | 1.13/10 Nm/lb.in. |                  |
| Weight     | TO-264                                                                                                                                  | 10                | g                |
|            | PLUS247                                                                                                                                 | 6                 | g                |

TO-264 (IXFK)



PLUS247 (IXFX)



G = Gate      L : Drain  
S = Source    Tab = Drain

## Features

- International standard packages
- Fast recovery diode
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
  - easy to drive and to protect

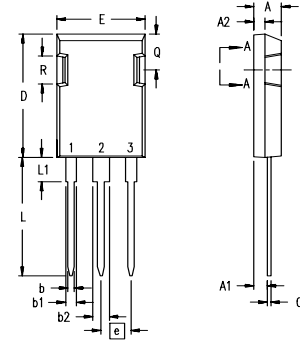
## Advantages

- 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.                 |
| $BV_{DSS}$   | $V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$                                                                 | 800                   |      | V                    |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 8 \text{ mA}$                                                                         | 3.0                   |      | 5.0 V                |
| $I_{GSS}$    | $V_{GS} = \pm 30 \text{ V}_{DC}$ , $V_{DS} = 0$                                                                  |                       |      | $\pm 200 \text{ nA}$ |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0 \text{ V}$<br>$T_J = 125^\circ\text{C}$                                        |                       |      | 25 $\mu\text{A}$     |
|              |                                                                                                                  |                       |      | 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 $d \leq 2 \%$ |                       |      | 270 $\text{m}\Omega$ |

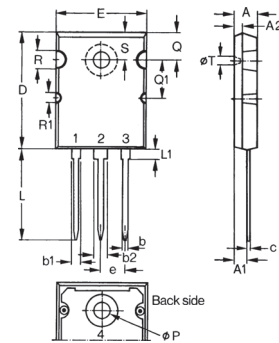
| Symbol       | Test Conditions                                                                                 | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified) |      |                    |
|--------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------|--------------------|
|              |                                                                                                 | Min.                                                                            | Typ. | Max.               |
| $g_{fs}$     | $V_{DS} = 20\text{ V}; I_D = 0.5 I_{D25}$ , pulse test                                          | 23                                                                              | 38   | S                  |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                   |                                                                                 | 8800 | pF                 |
| $C_{oss}$    |                                                                                                 |                                                                                 | 700  | pF                 |
| $C_{rss}$    |                                                                                                 |                                                                                 | 26   | pF                 |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}$<br>$R_G = 2\ \Omega$ (External) |                                                                                 | 30   | ns                 |
| $t_r$        |                                                                                                 |                                                                                 | 24   | ns                 |
| $t_{d(off)}$ |                                                                                                 |                                                                                 | 85   | ns                 |
| $t_f$        |                                                                                                 |                                                                                 | 24   | 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                 |
| $Q_{gd}$     |                                                                                                 |                                                                                 | 44   | nC                 |
| $R_{thJC}$   |                                                                                                 |                                                                                 | 0.15 | $^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                 |                                                                                 |      | $^\circ\text{C/W}$ |

| Source-Drain Diode |                                                                                                       | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified) |      |               |
|--------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------|---------------|
| Symbol             | Test Conditions                                                                                       | Min.                                                                            | Typ. | Max.          |
| $I_S$              | $V_{GS} = 0\text{ V}$                                                                                 |                                                                                 |      | 32 A          |
| $I_{SM}$           | Repetitive                                                                                            |                                                                                 |      | 70 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>$V_R = 100\text{ V}, V_{GS} = 0\text{ V}$   |                                                                                 | 0.8  | 250 ns        |
| $Q_{RM}$           |                                                                                                       |                                                                                 |      | $\mu\text{C}$ |
| $I_{RM}$           |                                                                                                       |                                                                                 |      | A             |

**PLUS 247™ 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  |
| A <sub>1</sub> | 2.29       | 2.54  | .090     | .100  |
| A <sub>2</sub> | 1.91       | 2.16  | .075     | .085  |
| b              | 1.14       | 1.40  | .045     | .055  |
| b <sub>1</sub> | 1.91       | 2.13  | .075     | .084  |
| b <sub>2</sub> | 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  |

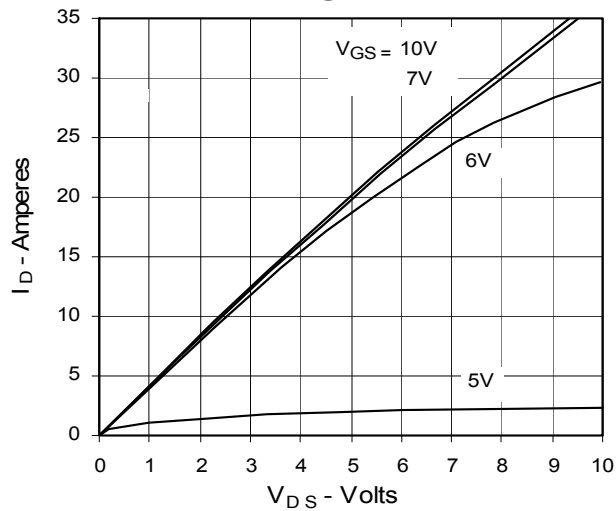
**TO-264 Outline**


| Dim.           | Millimeter |       | Inches   |       |
|----------------|------------|-------|----------|-------|
|                | Min.       | Max.  | Min.     | Max.  |
| A              | 4.82       | 5.13  | .190     | .202  |
| A <sub>1</sub> | 2.54       | 2.89  | .100     | .114  |
| A <sub>2</sub> | 2.00       | 2.10  | .079     | .083  |
| b              | 1.12       | 1.42  | .044     | .056  |
| b <sub>1</sub> | 2.39       | 2.69  | .094     | .106  |
| b <sub>2</sub> | 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  |

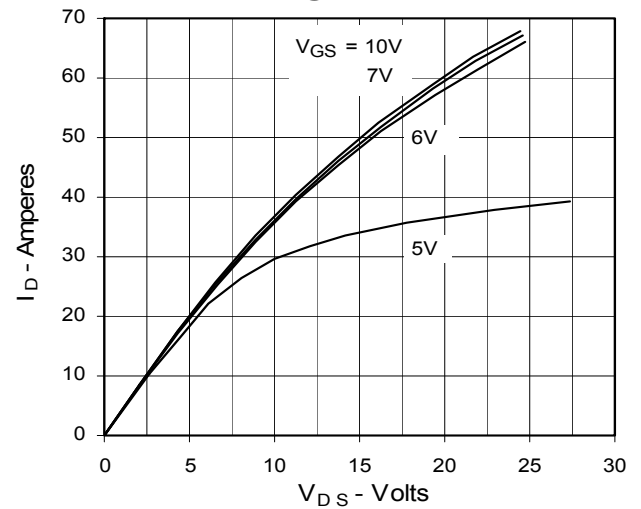
IXYS reserves the right to change limits, test conditions, and dimensions.

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

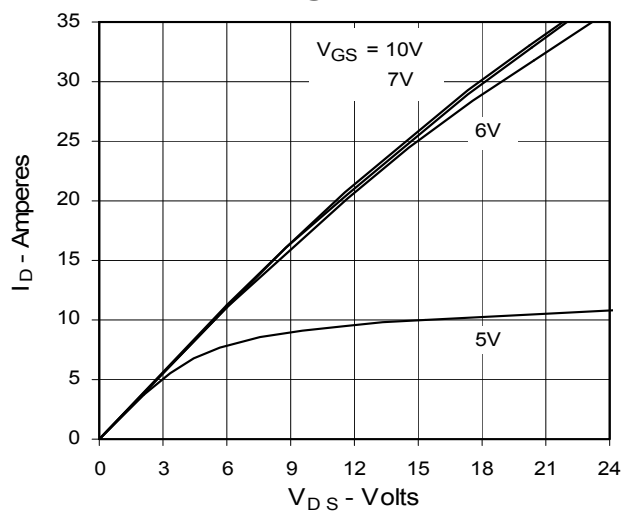
**Fig. 1. Output Characteristics**  
**@ 25°C**



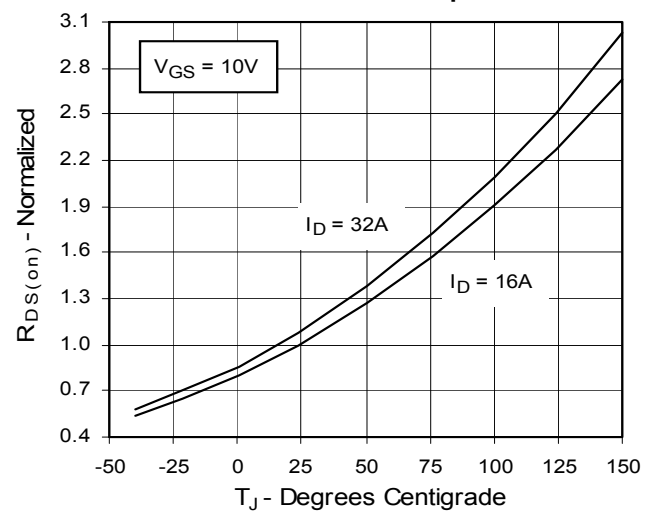
**Fig. 2. Extended Output Characteristics**  
**@ 25°C**



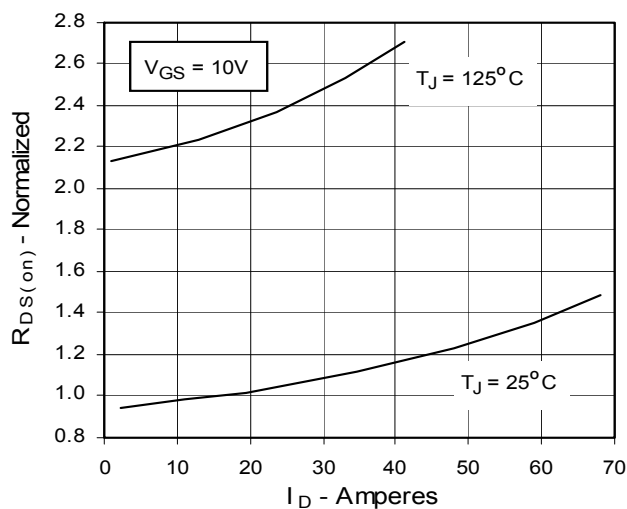
**Fig. 3. Output Characteristics**  
**@ 125°C**



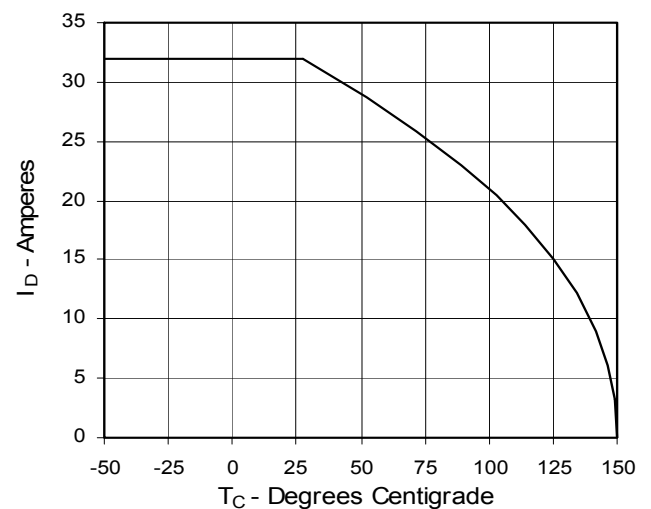
**Fig. 4.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$**   
**Value vs. Junction Temperature**

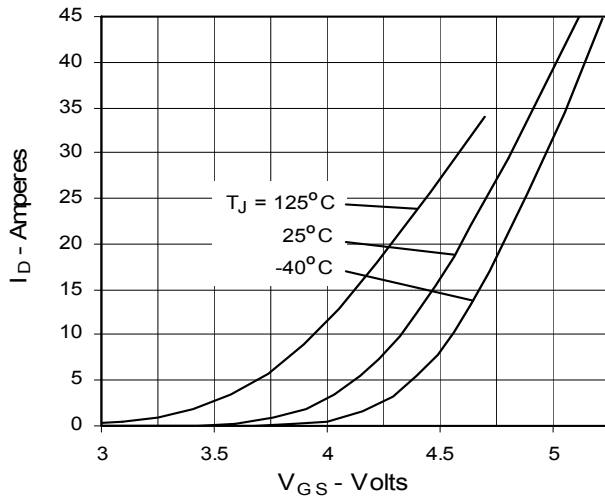
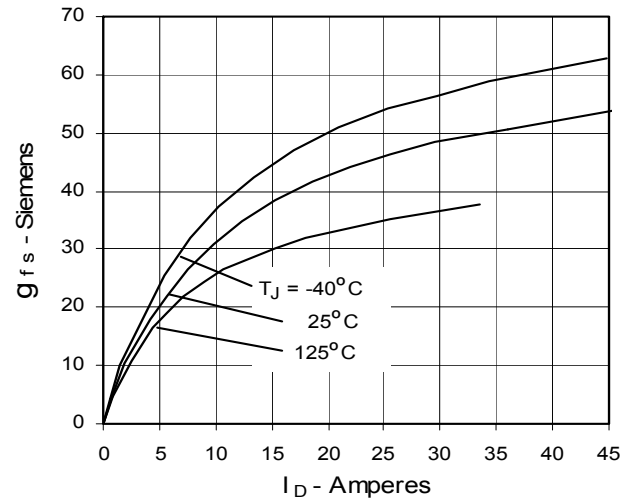
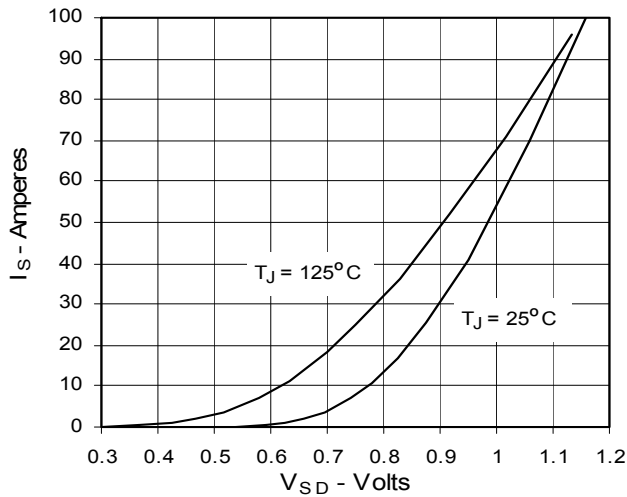
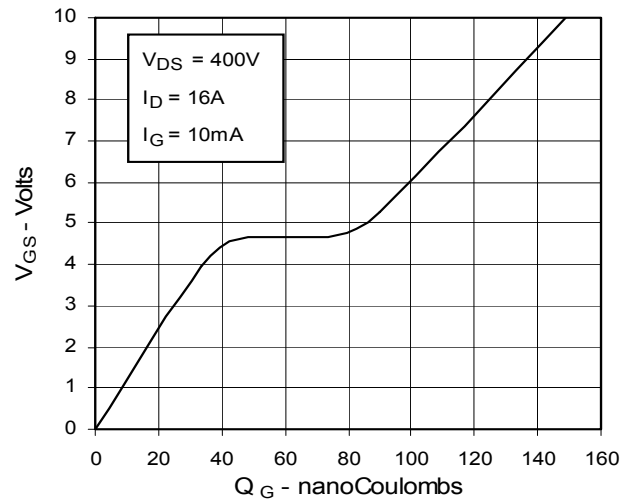
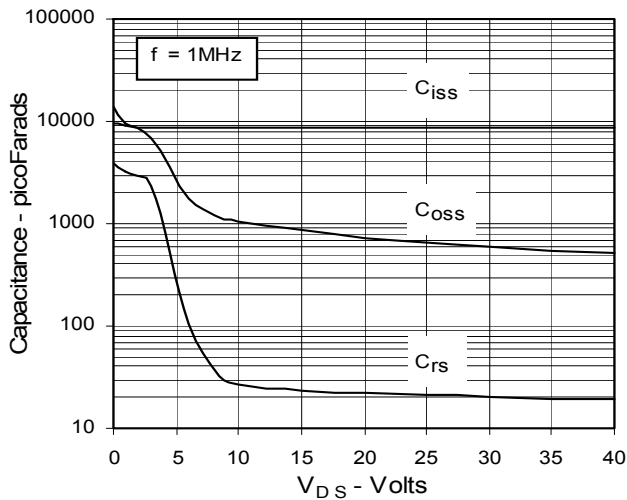
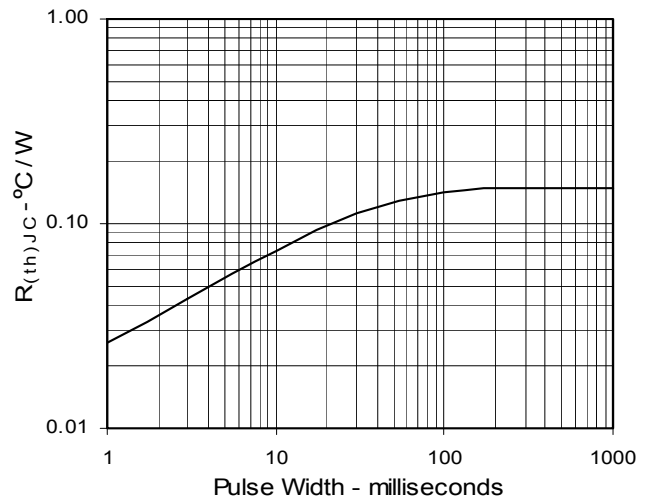


**Fig. 5.  $R_{DS(on)}$  Normalized to**  
**0.5  $I_{D25}$  Value vs.  $I_D$**



**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. Maximum Transient Thermal Resistance**




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