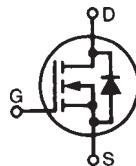


## PolarHV™ HiPerFET IXFC 20N80P Power MOSFET IXFR 20N80P

### Electrically Isolated Back Surface

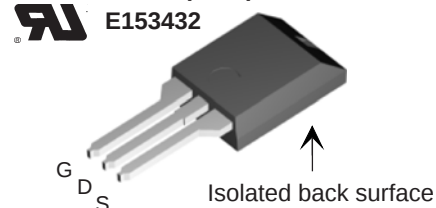
N-Channel Enhancement Mode  
Fast Recovery Diode  
Avalanche Rated



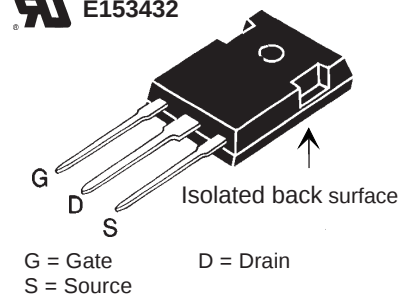
$$\begin{aligned} V_{DSS} &= 800 \text{ V} \\ I_{D25} &= 10 \text{ A} \\ R_{DS(on)} &\leq 500 \text{ m}\Omega \\ t_{rr} &\leq 250 \text{ ns} \end{aligned}$$

| 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                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                                                                                | 11                                                  | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                              | 60                                                  | A                |
| $I_{AR}$   | $T_C = 25^\circ\text{C}$                                                                                                                | 10                                                  | 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>$T_J \leq 150^\circ\text{C}$ , $R_G = 3 \Omega$ | 10                                                  | V/ns             |
| $P_D$      | $T_C = 25^\circ\text{C}$                                                                                                                | 166                                                 | 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                                                 | $^\circ\text{C}$ |
| $V_{ISOL}$ | 50/60 Hz, RMS, $t = 1$ minute, leads-to-tab                                                                                             | 2500                                                | V~               |
| $F_C$      | Mounting Force                                                                                                                          | (IXFC) 11..65 / 2.5..15<br>(IXFR) 20..120 / 4.5..25 | N/lb<br>N/lb     |
| Weight     | ISOPLUS220                                                                                                                              | 2                                                   | g                |
|            | ISOPLUS247                                                                                                                              | 5                                                   | g                |

ISOPLUS220™ (IXFC)  
E153432



ISOPLUS247™ (IXFR)  
E153432



#### Features

- Silicon chip on Direct-Copper-Bond substrate
- High power dissipation
- Isolated mounting surface
- 2500V electrical isolation
- Low drain to tab capacitance(<30pF)

#### Applications

- DC-DC converters
- Battery chargers
- Switched-mode and resonant-mode power supplies
- DC choppers
- AC motor control

#### Advantages

- Easy assembly
- Space savings
- High power density

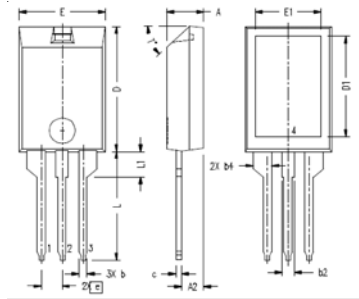
| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                                       | Characteristic Values |      |                      |
|--------------|-------------------------------------------------------------------------------------------------------------------|-----------------------|------|----------------------|
|              |                                                                                                                   | Min.                  | Typ. | Max.                 |
| $BV_{DSS}$   | $V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$                                                                  | 800                   |      | V                    |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 4 \text{ mA}$                                                                          | 3.0                   |      | 5.0 V                |
| $I_{GSS}$    | $V_{GS} = \pm 30 \text{ V}$ , $V_{DS} = 0 \text{ V}$                                                              |                       |      | $\pm 100 \text{ nA}$ |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$                                                                                                |                       |      | 25 $\mu\text{A}$     |
|              | $V_{GS} = 0 \text{ V}$ , $T_J = 125^\circ\text{C}$                                                                |                       |      | 1 mA                 |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 10 \text{ A}$<br>Pulse test, $t \leq 300 \mu\text{s}$ , duty cycle $d \leq 2 \%$ |                       |      | 500 m $\Omega$       |

| Symbol       | Test Conditions                                                                             | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified) |      |                          |
|--------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------|--------------------------|
|              |                                                                                             | Min.                                                                            | Typ. | Max.                     |
| $g_{fs}$     | $V_{DS} = 20\text{ V}; I_D = 10\text{ A}$ , pulse test                                      | 12                                                                              | 23   | S                        |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                               |                                                                                 | 4680 | pF                       |
| $C_{oss}$    |                                                                                             |                                                                                 | 360  | pF                       |
| $C_{rss}$    |                                                                                             |                                                                                 | 28   | pF                       |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = V_{DSS}, I_D = 10\text{ A}$<br>$R_G = 3\ \Omega$ (External) |                                                                                 | 22   | ns                       |
| $t_r$        |                                                                                             |                                                                                 | 24   | ns                       |
| $t_{d(off)}$ |                                                                                             |                                                                                 | 70   | ns                       |
| $t_f$        |                                                                                             |                                                                                 | 25   | ns                       |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 10\text{ A}$                             |                                                                                 | 85   | nC                       |
| $Q_{gs}$     |                                                                                             |                                                                                 | 25   | nC                       |
| $Q_{gd}$     |                                                                                             |                                                                                 | 27   | nC                       |
| $R_{thJC}$   |                                                                                             | 0.21                                                                            |      | $0.75\ ^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                             |                                                                                 |      | $^\circ\text{C/W}$       |

## Source-Drain Diode

| Symbol   | Test Conditions                                                                                       | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified) |      |               |
|----------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------|---------------|
|          |                                                                                                       | Min.                                                                            | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{ V}$                                                                                 |                                                                                 |      | 20 A          |
| $I_{SM}$ | Repetitive                                                                                            |                                                                                 |      | 60 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         |
| $t_{rr}$ | $I_F = 20\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}$<br>$V_R = 100\text{ V}; V_{GS} = 0\text{ V}$   |                                                                                 | 8    | 250 ns        |
| $I_{RM}$ |                                                                                                       |                                                                                 |      | A             |
| $Q_{RM}$ |                                                                                                       |                                                                                 |      | $\mu\text{C}$ |

## ISOPLUS220 (IXFC) Outline

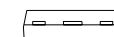
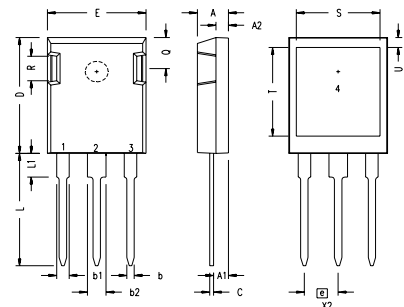


Note:  
Bottom heatsink (Pin 4) is electrically isolated from Pin 1, 2, or 3.

| SYM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | .157   | .197  | 4.00        | 5.00  |
| A2  | .098   | .118  | 2.50        | 3.00  |
| b   | .035   | .051  | 0.90        | 1.30  |
| b2  | .049   | .065  | 1.25        | 1.65  |
| b4  | .093   | .100  | 2.35        | 2.55  |
| c   | .028   | .039  | 0.70        | 1.00  |
| D   | .591   | .630  | 15.00       | 16.00 |
| D1  | .472   | .512  | 12.00       | 13.00 |
| E   | .394   | .433  | 10.00       | 11.00 |
| E1  | .295   | .335  | 7.50        | 8.50  |
| e   | .100   | BASIC | 2.55        | BASIC |
| L   | .512   | .571  | 13.00       | 14.50 |
| L1  | .118   | .138  | 3.00        | 3.50  |
| T*  |        |       | 42.5*       | 47.5* |

IXYS CO 0177 R0

## ISOPLUS247 (IXFR) Outline



| SYM | INCHES |      | MILLIMETERS |       |
|-----|--------|------|-------------|-------|
|     | MIN    | MAX  | MIN         | MAX   |
| A   | .190   | .205 | 4.83        | 5.21  |
| A1  | .090   | .100 | 2.29        | 2.54  |
| A2  | .075   | .085 | 1.91        | 2.16  |
| b   | .045   | .055 | 1.14        | 1.40  |
| b1  | .075   | .084 | 1.91        | 2.13  |
| b2  | .115   | .123 | 2.92        | 3.12  |
| C   | .024   | .031 | 0.61        | 0.80  |
| D   | .819   | .840 | 20.80       | 21.34 |
| E   | .620   | .635 | 15.75       | 16.13 |
| e   | .215   | BSC  | 5.45        | BSC   |
| L   | .780   | .800 | 19.81       | 20.32 |
| L1  | .150   | .170 | 3.81        | 4.32  |
| Q   | .220   | .244 | 5.59        | 6.20  |
| R   | .170   | .190 | 4.32        | 4.83  |
| S   | .520   | .540 | 13.21       | 13.72 |
| T   | .620   | .640 | 15.75       | 16.26 |
| U   | .065   | .080 | 1.65        | 2.03  |

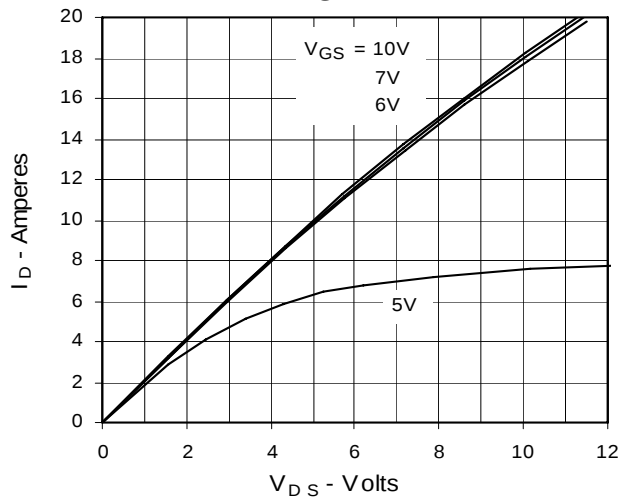
- 1 - GATE
- 2 - DRAIN (COLLECTOR)
- 3 - SOURCE (EMITTER)
- 4 - NO CONNECTION

NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-247AD except screw hole.

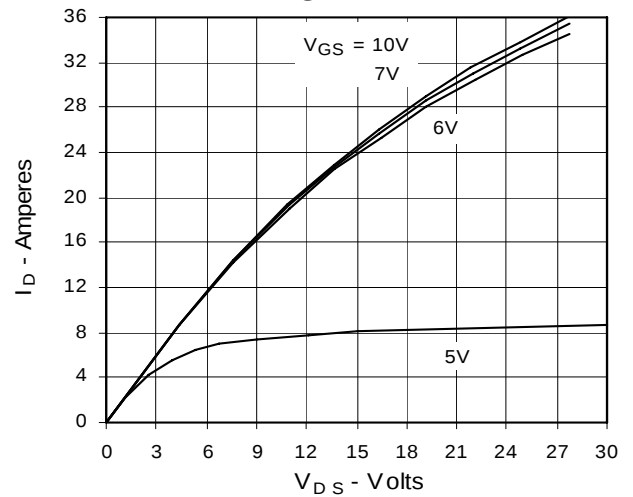
IXYS reserves the right to change limits, test conditions, and dimensions.

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

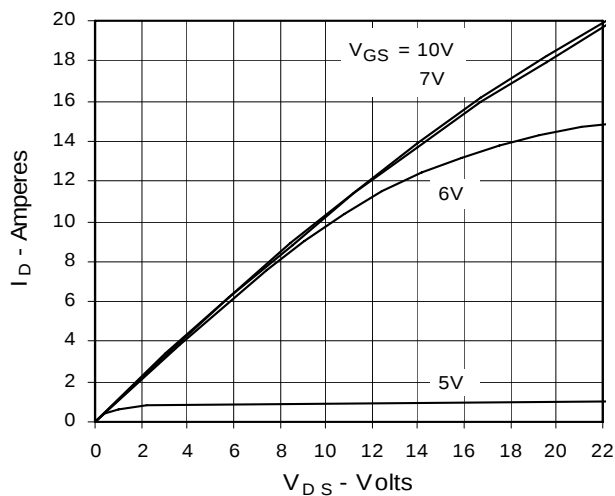
**Fig. 1. Output Characteristics**  
**@ 25°C**



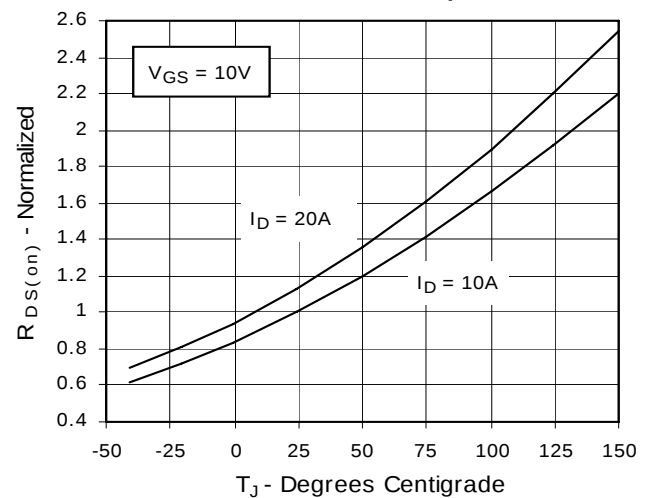
**Fig. 2. Extended Output Characteristics**  
**@ 25°C**



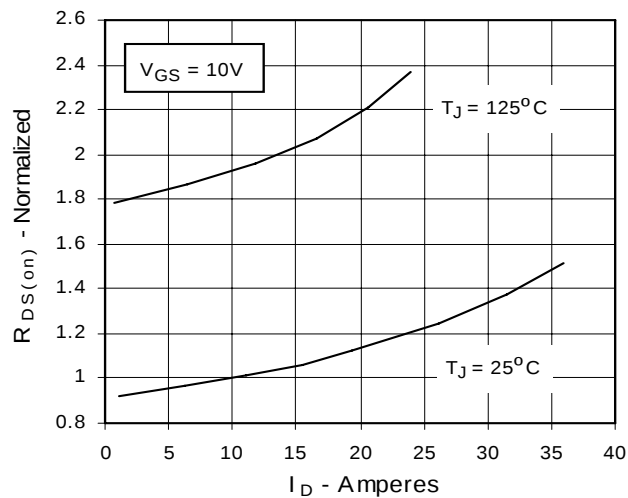
**Fig. 3. Output Characteristics**  
**@ 125°C**



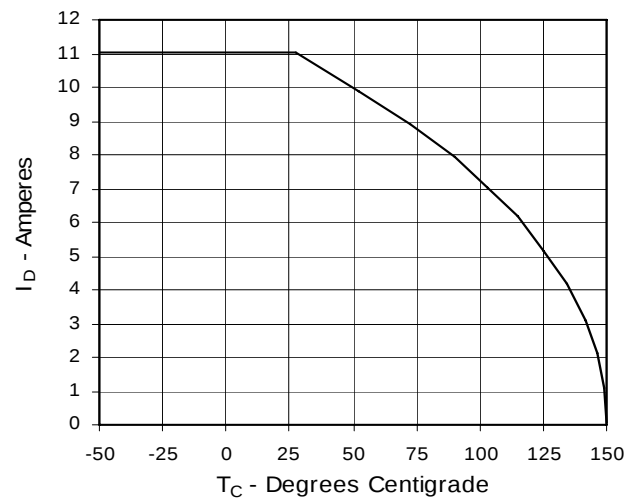
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 10A$**   
**Value vs. Junction Temperature**

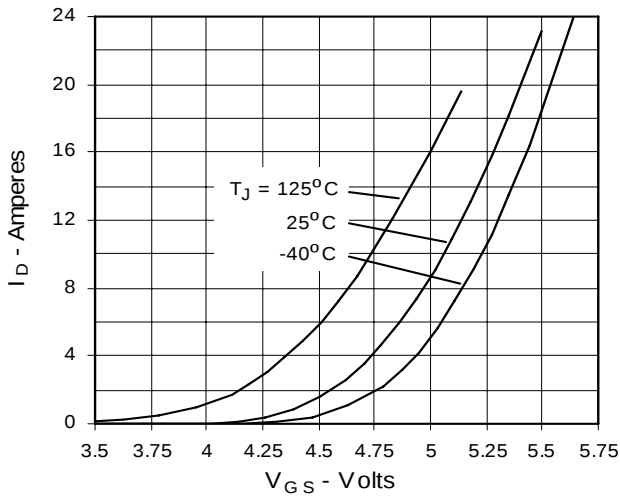
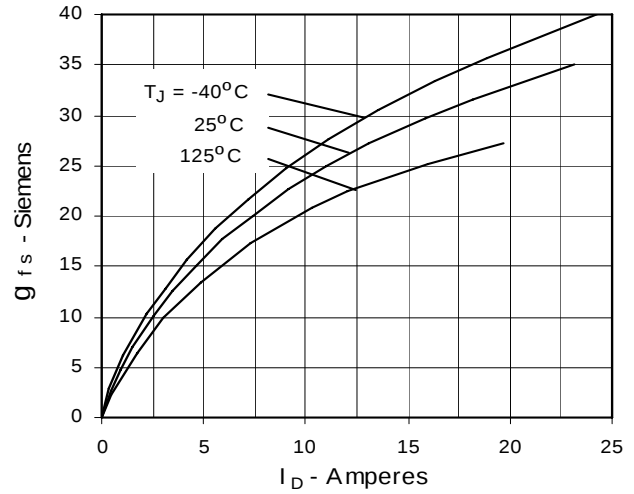
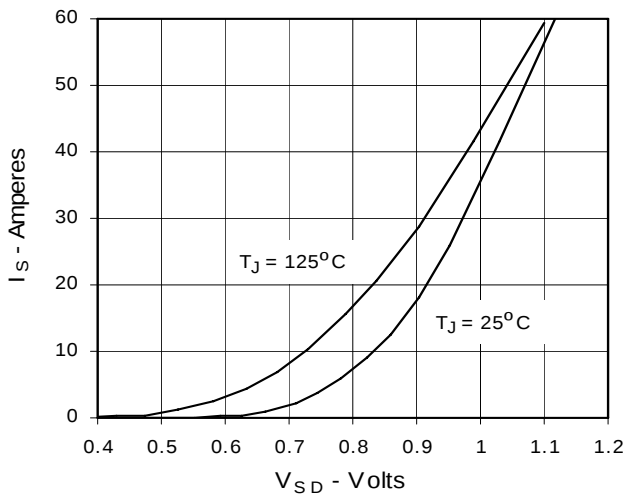
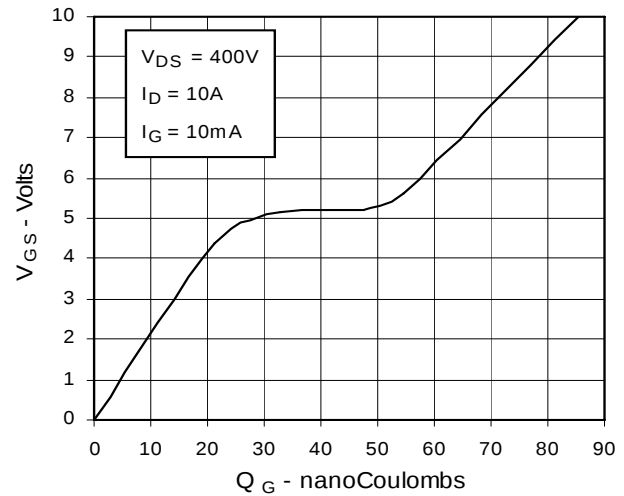
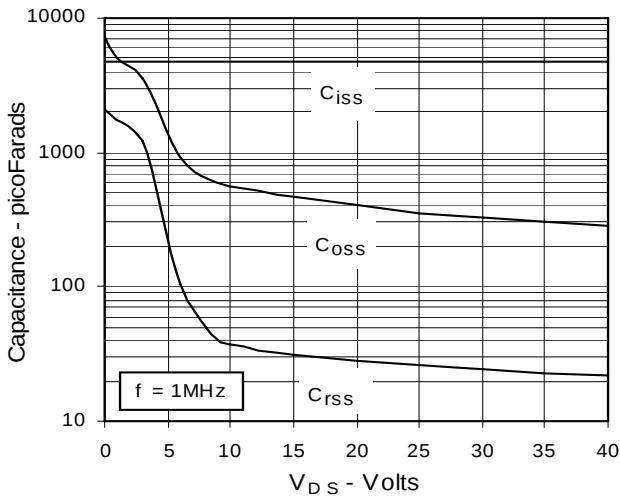
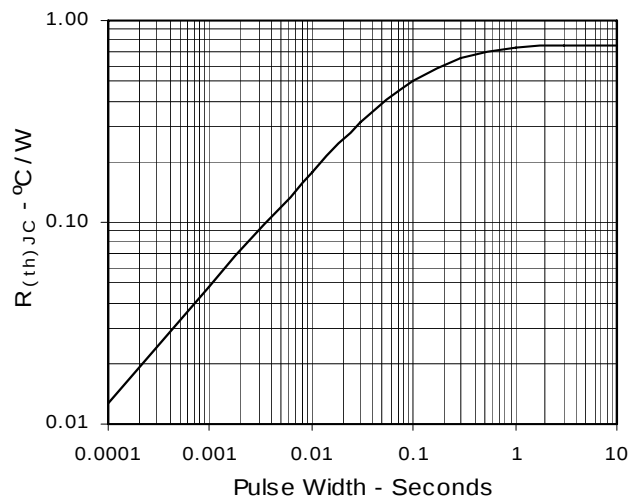


**Fig. 5.  $R_{DS(on)}$  Normalized to**  
 **$I_D = 10A$  Value vs. Drain Current**



**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. Maximum Transient Thermal Resistance**




---

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).