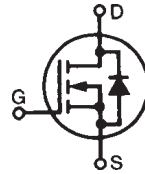


## Trench Gate Power MOSFET HiperFET™

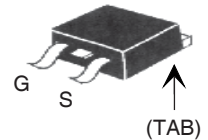
**IXFA102N15T**  
**IXFH102N15T**  
**IXFP102N15T**

N-Channel Enhancement Mode  
Avalanche Rated

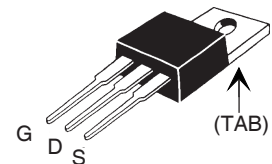


$$\begin{aligned} V_{DSS} &= 150V \\ I_{D25} &= 102A \\ R_{DS(on)} &\leq 18m\Omega \\ t_{rr} &\leq 120ns \end{aligned}$$

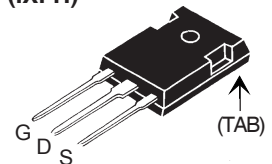
TO-263 (IXFA)



TO-220 (IXFP)



TO-247 (IXFH)



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

| 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 $175^\circ\text{C}$ $R_{GS} = 1M\Omega$      | 150                | V                |
| $V_{GSS}$  | Continuous                                                               | $\pm 20$           | V                |
| $V_{GSM}$  | Transient                                                                | $\pm 30$           | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                 | 102                | A                |
| $I_{LRMS}$ | Lead Current Limit, RMS                                                  | 75                 | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , Pulse Width Limited by $T_{JM}$               | 300                | A                |
| $I_A$      | $T_C = 25^\circ\text{C}$                                                 | 51                 | A                |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                                 | 750                | mJ               |
| $dV/dt$    | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 175^\circ\text{C}$ | 20                 | V/ns             |
| $P_D$      | $T_C = 25^\circ\text{C}$                                                 | 455                | W                |
| $T_J$      |                                                                          | -55 ... +175       | $^\circ\text{C}$ |
| $T_{JM}$   |                                                                          | 175                | $^\circ\text{C}$ |
| $T_{stg}$  |                                                                          | -55 ... +175       | $^\circ\text{C}$ |
| $T_L$      | 1.6mm (0.062 in.) from Case for 10s                                      | 300                | $^\circ\text{C}$ |
| $T_{SOLD}$ | Plastic Body for 10 seconds                                              | 260                | $^\circ\text{C}$ |
| $M_d$      | Mounting Torque (TO-220 & TO-247)                                        | 1.13 / 10          | Nmlb.in.         |
| $F_C$      | Mounting Force (TO-263)                                                  | 10..65 / 2.2..14.6 | N/lb.            |
| Weight     | TO-263                                                                   | 2.5                | g                |
|            | TO-220                                                                   | 3.0                | g                |
|            | TO-247                                                                   | 6.0                | g                |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified) | Characteristic Values |      |                          |
|--------------|---------------------------------------------------------------------------|-----------------------|------|--------------------------|
|              |                                                                           | Min.                  | Typ. | Max.                     |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu A$                                          | 150                   |      | V                        |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 1mA$                                           | 2.5                   |      | 5.0 V                    |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$                                        |                       |      | $\pm 200$ nA             |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 150^\circ\text{C}$           |                       |      | 5 $\mu A$<br>750 $\mu A$ |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                       |                       |      | 18 m $\Omega$            |

### Features

- International Standard Packages
- Avalanche Rated

### Advantages

- Easy to Mount
- Space Savings
- High Power Density

### Applications

- DC-DC Converters
- Battery Chargers
- Switched-Mode and Resonant-Mode Power Supplies
- DC Choppers
- AC Motor Drives
- Uninterruptible Power Supplies
- High Speed Power Switching Applications

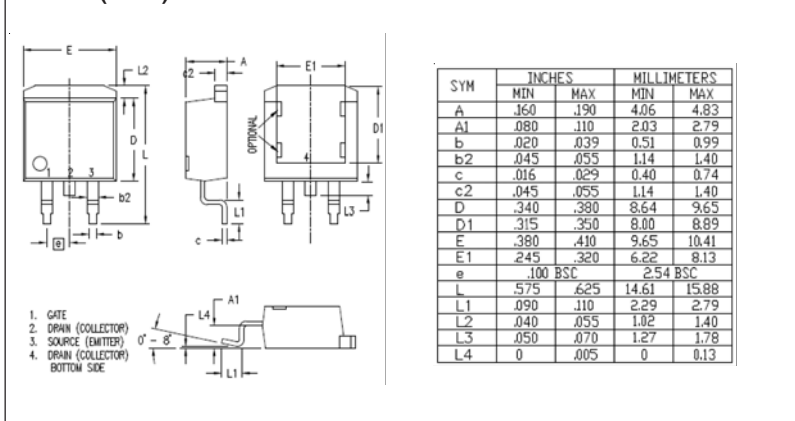
| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)                                                                            | Characteristic Values |      |                        |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|------------------------|
|              |                                                                                                                                                      | Min.                  | Typ. | Max.                   |
| $g_{fs}$     | $V_{DS} = 10\text{V}$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                                                                                           | 50                    | 80   | S                      |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                                     |                       | 5220 | pF                     |
| $C_{oss}$    |                                                                                                                                                      |                       | 685  | pF                     |
| $C_{rss}$    |                                                                                                                                                      |                       | 95   | pF                     |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$<br>$R_G = 3.3\Omega$ (External) |                       | 20   | ns                     |
| $t_r$        |                                                                                                                                                      |                       | 14   | ns                     |
| $t_{d(off)}$ |                                                                                                                                                      |                       | 25   | ns                     |
| $t_f$        |                                                                                                                                                      |                       | 22   | ns                     |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 25\text{A}$                                                                            |                       | 87   | nC                     |
| $Q_{gs}$     |                                                                                                                                                      |                       | 23   | nC                     |
| $Q_{gd}$     |                                                                                                                                                      |                       | 31   | nC                     |
| $R_{thJC}$   | (TO-220)                                                                                                                                             | 0.50                  |      | $0.33^\circ\text{C/W}$ |
| $R_{thCH}$   |                                                                                                                                                      |                       |      | $^\circ\text{C/W}$     |
|              | (TO-247)                                                                                                                                             | 0.21                  |      | $^\circ\text{C/W}$     |

## Source-Drain Diode

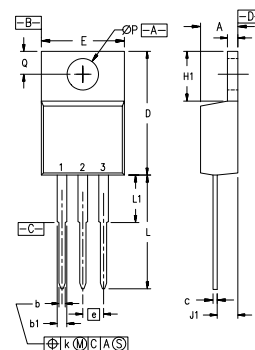
| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)                            | Characteristic Values |      |        |
|----------|------------------------------------------------------------------------------------------------------|-----------------------|------|--------|
|          |                                                                                                      | Min.                  | Typ. | Max.   |
| $I_S$    | $V_{GS} = 0\text{V}$                                                                                 |                       |      | 102 A  |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$                                                          |                       |      | 400 A  |
| $V_{SD}$ | $I_F = 100\text{A}$ , $V_{GS} = 0\text{V}$ , Note 1                                                  |                       |      | 1.3 V  |
| $t_{rr}$ | $I_F = 51\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 75\text{V}$ , $V_{GS} = 0\text{V}$ |                       | 6.2  | 120 ns |
| $I_{RM}$ |                                                                                                      |                       |      | A      |
| $Q_{RM}$ |                                                                                                      |                       |      | nC     |
|          |                                                                                                      |                       | 236  |        |

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

## TO-263 (IXFA) Outline



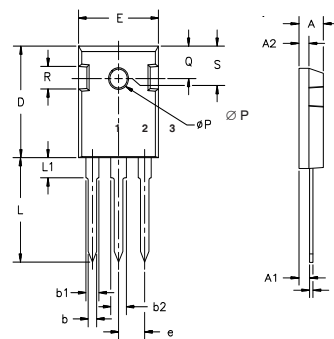
## TO-220 (IXFP) Outline



Pins: 1 - Gate 2 - Drain

| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .170     | .190 | 4.32        | 4.83  |
| b   | .025     | .040 | 0.64        | 1.02  |
| b1  | .045     | .065 | 1.15        | 1.65  |
| c   | .014     | .022 | 0.35        | 0.56  |
| D   | .580     | .630 | 14.73       | 16.00 |
| E   | .390     | .420 | 9.91        | 10.66 |
| e   | .100 BSC |      | 2.54 BSC    |       |
| F   | .045     | .055 | 1.14        | 1.40  |
| H1  | .230     | .270 | 5.85        | 6.85  |
| J1  | .090     | .110 | 2.29        | 2.79  |
| k   | 0        | .015 | 0           | 0.38  |
| L   | .500     | .550 | 12.70       | 13.97 |
| L1  | .110     | .230 | 2.79        | 5.84  |
| ØP  | .139     | .161 | 3.53        | 4.08  |
| Q   | .100     | .125 | 2.54        | 3.18  |

## TO-247 (IXFH) Outline

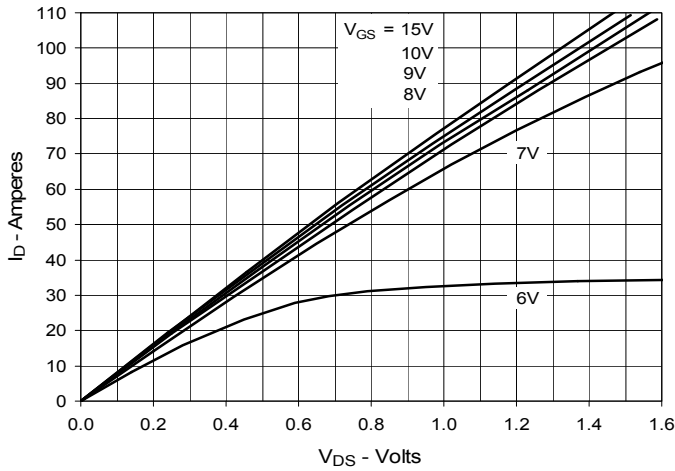
Terminals: 1 - Gate 2 - Drain  
3 - Source

| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | Min.       | Max.  | Min.   | Max.  |
| A    | 4.7        | 5.3   | .185   | .209  |
| A1   | 2.2        | 2.54  | .087   | .102  |
| A2   | 2.2        | 2.6   | .059   | .098  |
| b    | 1.0        | 1.4   | .040   | .055  |
| b1   | 1.65       | 2.13  | .065   | .084  |
| b2   | 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  |
| L1   |            | 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   |

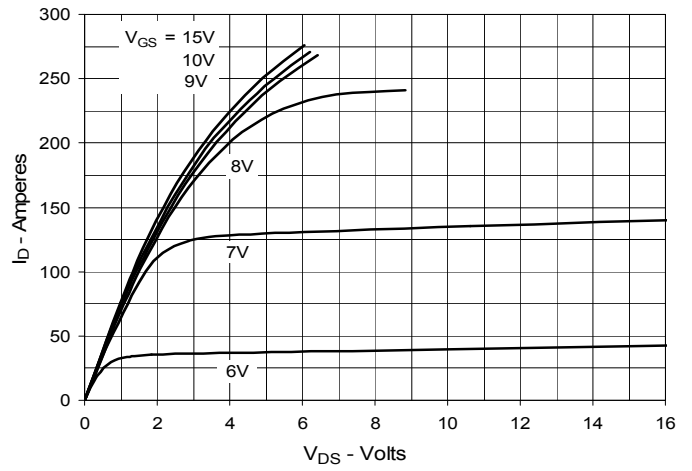
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

IXYS MOSFETs and IGBTs are covered 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 7,005,734 B2 7,157,338B2  
by 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 7,063,975 B2  
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 7,071,537

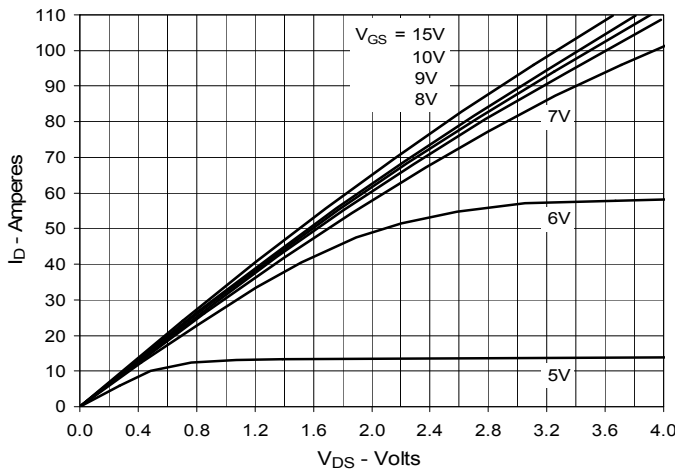
**Fig. 1. Output Characteristics**  
@ 25°C



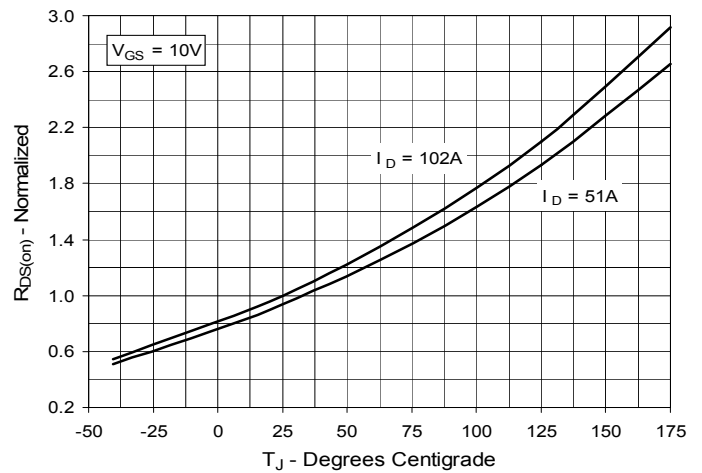
**Fig. 2. Extended Output Characteristics**  
@ 25°C



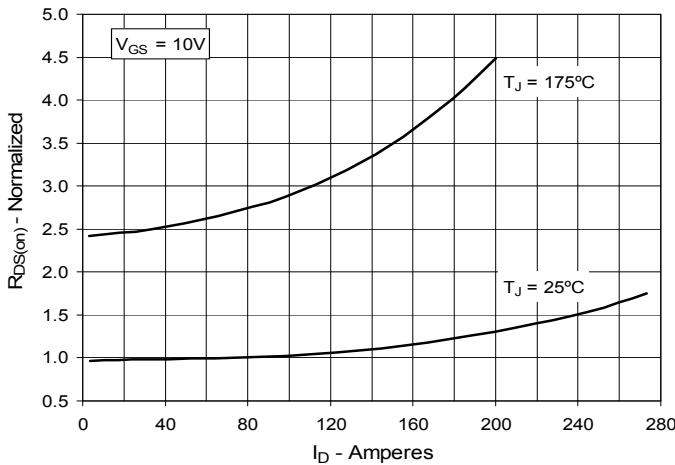
**Fig. 3. Output Characteristics**  
@ 150°C



**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 51A$  Value**  
vs. Junction Temperature



**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 51A$  Value**  
vs. Drain Current



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

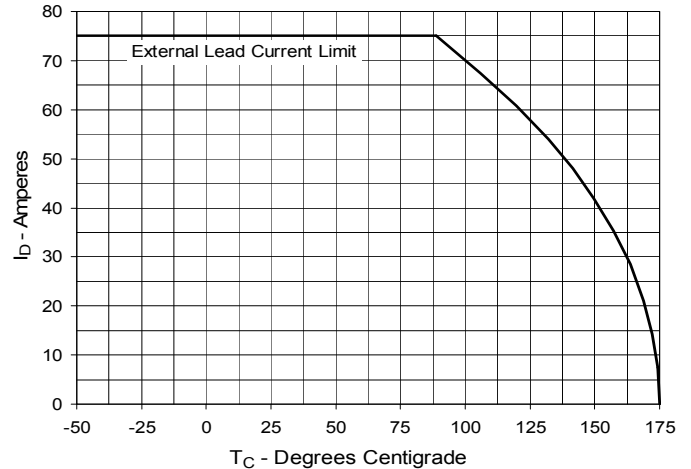


Fig. 7. Input Admittance

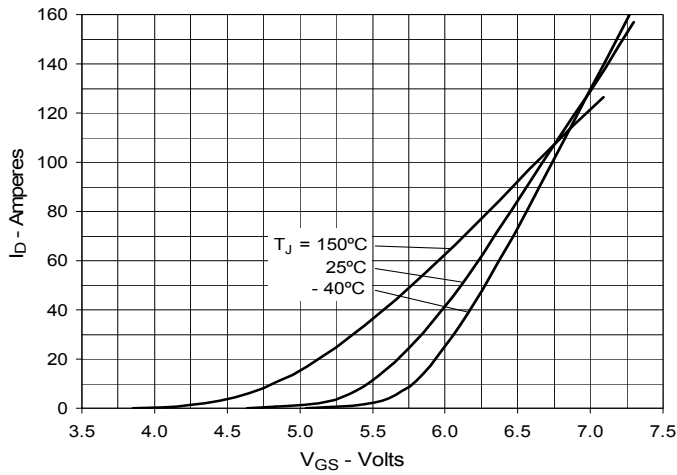


Fig. 8. Transconductance

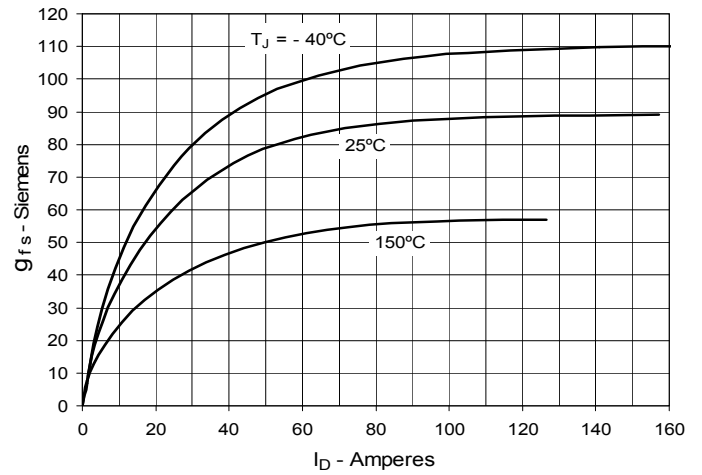


Fig. 9. Forward Voltage Drop of Intrinsic Diode

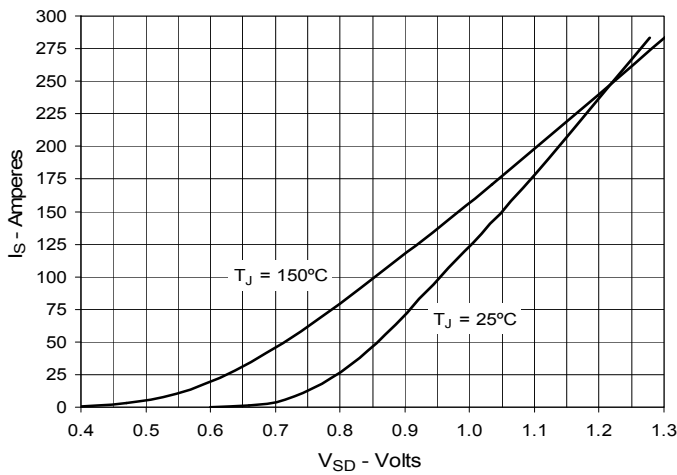


Fig. 10. Gate Charge

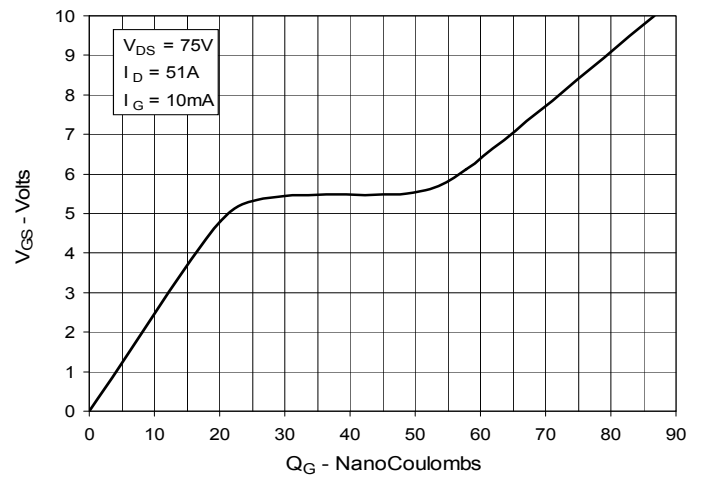


Fig. 11. Capacitance

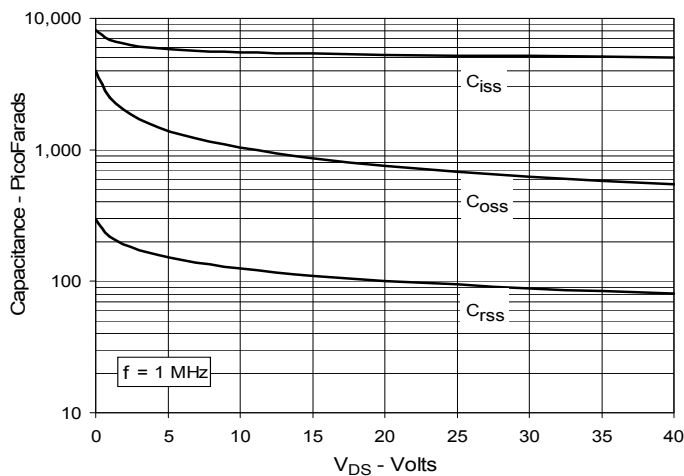
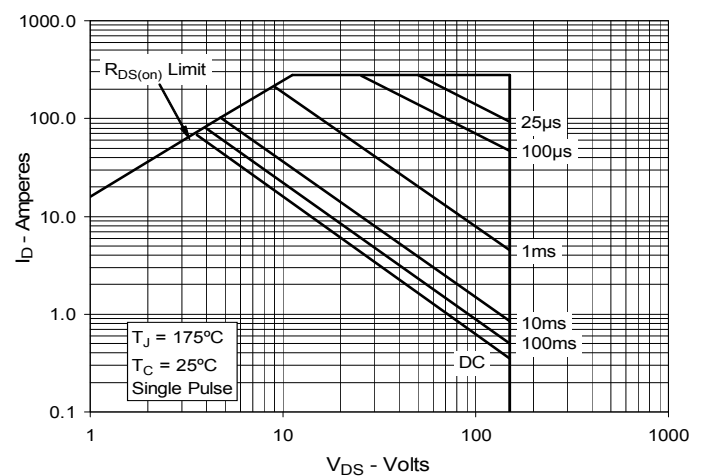
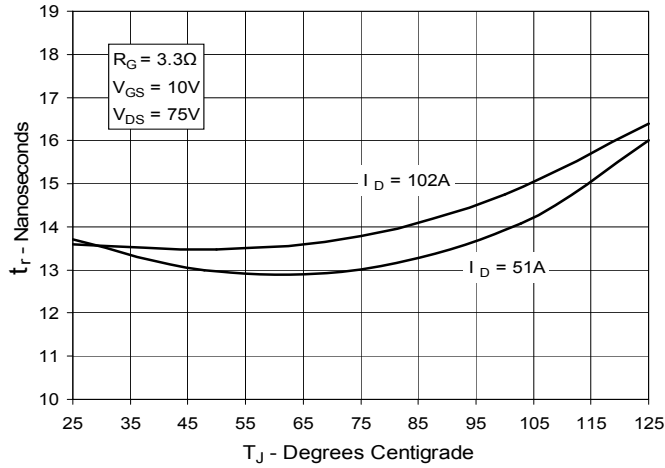


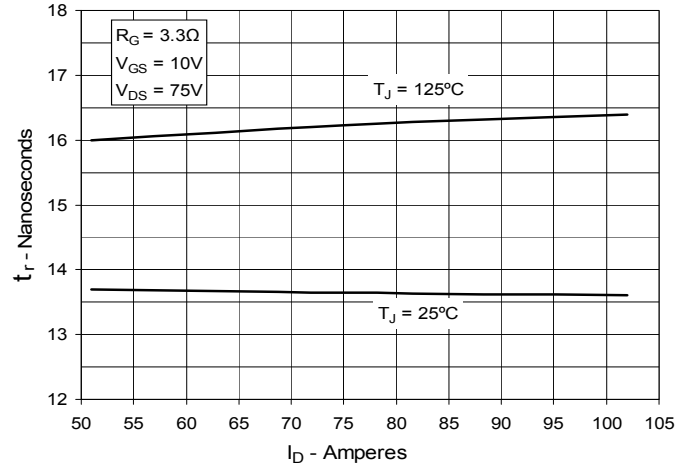
Fig. 12. Forward-Bias Safe Operating Area



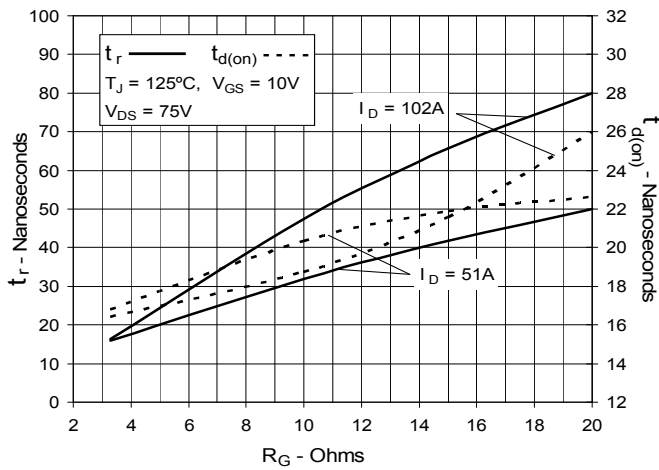
**Fig. 13. Resistive Turn-on  
Rise Time vs. Junction Temperature**



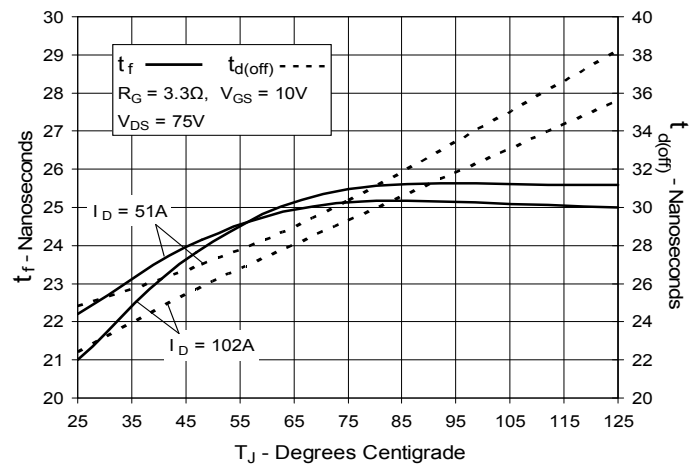
**Fig. 14. Resistive Turn-on  
Rise Time vs. Drain Current**



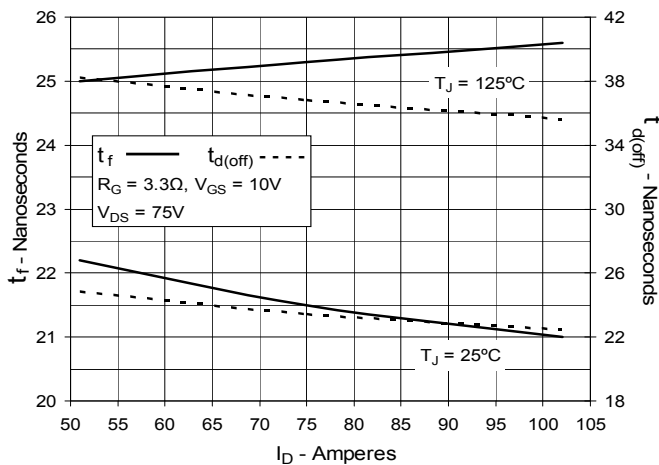
**Fig. 15. Resistive Turn-on  
Switching Times vs. Gate Resistance**



**Fig. 16. Resistive Turn-off  
Switching Times vs. Junction Temperature**



**Fig. 17. Resistive Turn-off  
Switching Times vs. Drain Current**



**Fig. 18. Resistive Turn-off  
Switching Times vs. Gate Resistance**

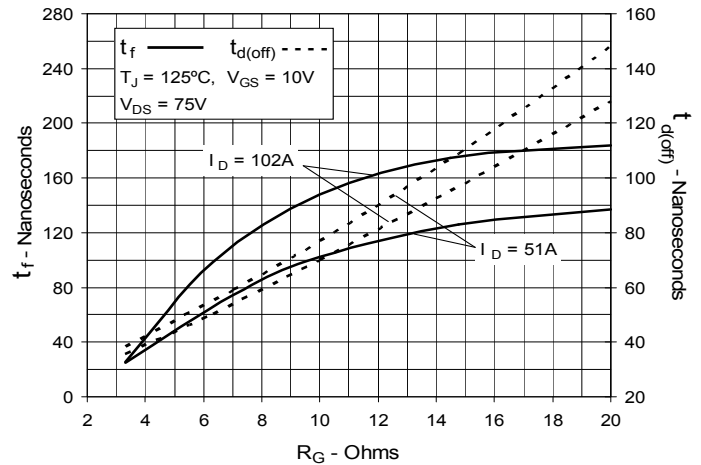
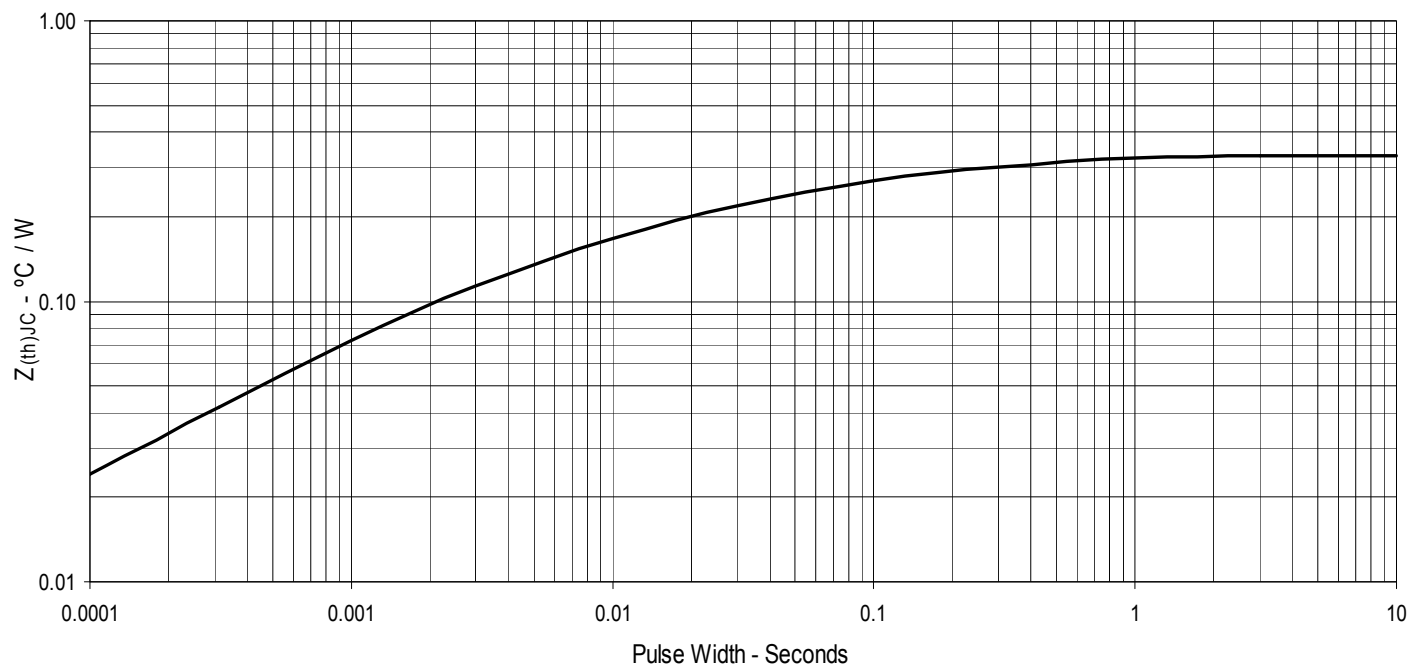


Fig. 19. Maximum Transient Thermal Impedance





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