

# Trench™ Power MOSFETs

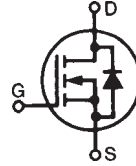
## IXTQ102N20T IXTH102N20T

$$V_{DSS} = 200V$$

$$I_{D25} = 102A$$

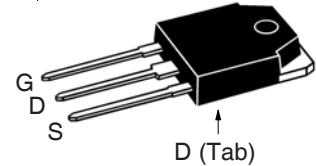
$$R_{DS(on)} \leq 23m\Omega$$

N-Channel Enhancement Mode  
Avalanche Rated

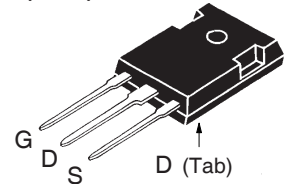


Symbol	Test Conditions	Maximum Ratings	
$V_{DSS}$	$T_J = 25^\circ C$ to $175^\circ C$	200	V
$V_{DGR}$	$T_J = 25^\circ C$ to $175^\circ C$ , $R_{GS} = 1M\Omega$	200	V
$V_{GSM}$	Transient	$\pm 30$	V
$I_{D25}$	$T_C = 25^\circ C$	102	A
$I_{LRMS}$	Lead Current Limit, RMS	75	A
$I_{DM}$	$T_C = 25^\circ C$ , pulse width limited by $T_{JM}$	250	A
$I_A$	$T_C = 25^\circ C$	5	A
$E_{AS}$	$T_C = 25^\circ C$	1.2	J
$dv/dt$	$I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 175^\circ C$	7	V/ns
$P_D$	$T_C = 25^\circ C$	750	W
$T_J$		-55 ... +175	$^\circ C$
$T_{JM}$		175	$^\circ C$
$T_{stg}$		-55 ... +175	$^\circ C$
$T_L$	Maximum Lead Temperature for Soldering	300	$^\circ C$
$T_{SOLD}$	Plastic Body for 10s	260	$^\circ C$
$M_d$	Mounting torque	1.13 / 10	Nm/lb.in
Weight	TO-3P	5.5	g
	TO-247	6.0	g

TO-3P (IXTQ)



TO-247 (IXTH)



G = Gate      D = Drain  
S = Source      Tab = Drain

### Features

- Ultra-low On Resistance
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
  - easy to drive and to protect
- 175 $^\circ C$  Operating Temperature

### Advantages

- Easy to mount
- Space savings
- High power density

### Applications

- Automotive
  - Motor Drives
  - High Side Switch
  - 12V Battery
  - ABS Systems
- DC/DC Converters and Off-line UPS
- Primary- Side Switch
- High Current Switching Applications

Symbol	Test Conditions ( $T_J = 25^\circ C$ unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{DSS}$	$V_{GS} = 0V$ , $I_D = 250\mu A$	200		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 1mA$	2.5		4.5 V
$I_{GSS}$	$V_{GS} = \pm 20V$ , $V_{DS} = 0V$			$\pm 200$ nA
$I_{DSS}$	$V_{DS} = V_{DSS}$ , $V_{GS} = 0V$ $T_J = 150^\circ C$			5 $\mu A$
				250 $\mu A$
$R_{DS(on)}$	$V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1	18	23	$m\Omega$

Symbol	Test Conditions	Characteristic Values		
		Min.	Typ.	Max.
(T <sub>J</sub> = 25°C unless otherwise specified)				
<b>g<sub>fs</sub></b>	V <sub>DS</sub> = 10V, I <sub>D</sub> = 0.5 • I <sub>D25</sub> , Note 1	55	92	S
<b>C<sub>iss</sub></b>	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 25V, f = 1MHz		6800	pF
<b>C<sub>oss</sub></b>			722	pF
<b>C<sub>rss</sub></b>			126	pF
<b>t<sub>d(on)</sub></b>	<b>Resistive Switching Times</b> V <sub>GS</sub> = 10V, V <sub>DS</sub> = 0.5 • V <sub>DSS</sub> , I <sub>D</sub> = 0.5 • I <sub>D25</sub> R <sub>G</sub> = 2.5Ω (External)		19	ns
<b>t<sub>r</sub></b>			26	ns
<b>t<sub>d(off)</sub></b>			50	ns
<b>t<sub>f</sub></b>			25	ns
<b>Q<sub>g(on)</sub></b>	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 0.5 • V <sub>DSS</sub> , I <sub>D</sub> = 25A		114	nC
<b>Q<sub>gs</sub></b>			34	nC
<b>Q<sub>gd</sub></b>			31	nC
<b>R<sub>thJC</sub></b>		0.25		0.20 °C/W
<b>R<sub>thCH</sub></b>				°C/W

### Source-Drain Diode

Symbol	Test Conditions	Characteristic Values		
		Min.	Typ.	Max.
(T <sub>J</sub> = 25°C unless otherwise specified)				
<b>I<sub>S</sub></b>	V <sub>GS</sub> = 0V			102 A
<b>I<sub>SM</sub></b>	Repetitive, pulse width limited by T <sub>JM</sub>			330 A
<b>V<sub>SD</sub></b>	I <sub>F</sub> = 50A, V <sub>GS</sub> = 0V, Note 1			1.2 V
<b>t<sub>rr</sub></b>	I <sub>F</sub> = 50A, V <sub>GS</sub> = 0V, -di/dt = 100A/μs V <sub>R</sub> = 50V		130	ns

Note: 1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.

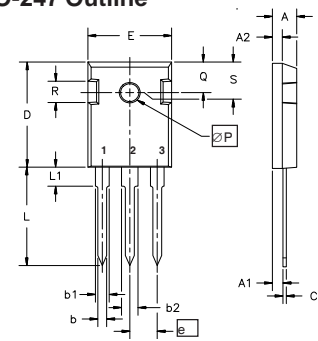
### PRELIMINARY TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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

IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:	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
	4,860,072	5,017,508	5,063,307	5,381,025	6,259,123B1	6,534,343	6,710,405B2	6,759,692	7,063,975B2	
	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	

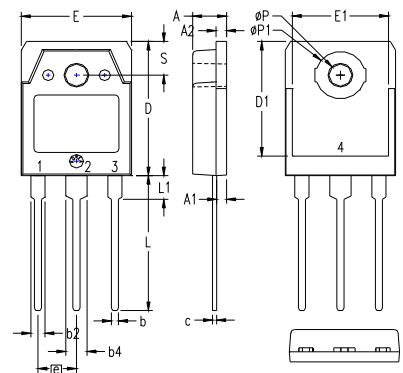
### TO-247 Outline



Terminals: 1 - Gate 2 - 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
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

### TO-3P Outline

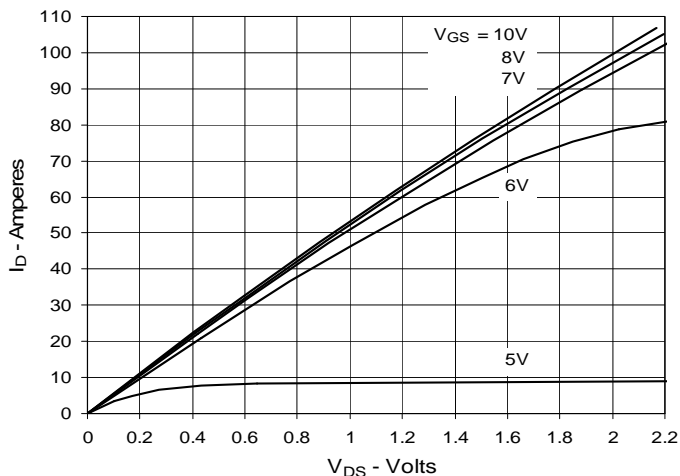


Pins: 1 - Gate 2 - Drain  
3 - Source 4 - Drain

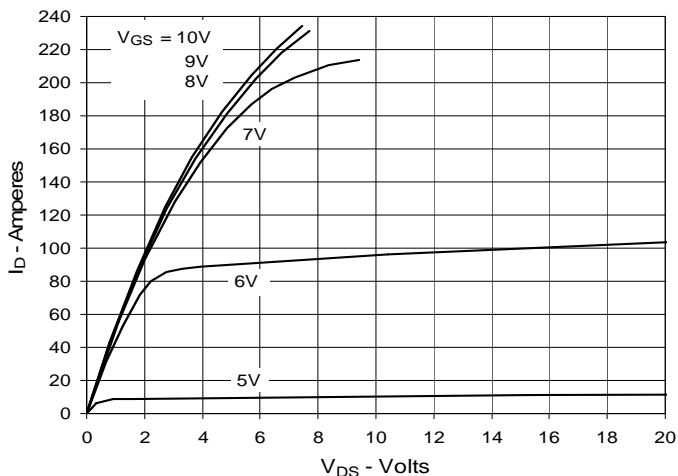
SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.185	.193	4.70	4.90
A1	.051	.059	1.30	1.50
A2	.057	.065	1.45	1.65
b	.035	.045	0.90	1.15
b2	.075	.087	1.90	2.20
b4	.114	.126	2.90	3.20
c	.022	.031	0.55	0.80
D	.780	.791	19.80	20.10
D1	.665	.677	16.90	17.20
E	.610	.622	15.50	15.80
E1	.531	.539	13.50	13.70
e	.215 BSC		5.45 BSC	
L	.779	.795	19.80	20.20
L1	.134	.142	3.40	3.60
ØP	.126	.134	3.20	3.40
ØP1	.272	.280	6.90	7.10
S	.193	.201	4.90	5.10

All metal area are tin plated.

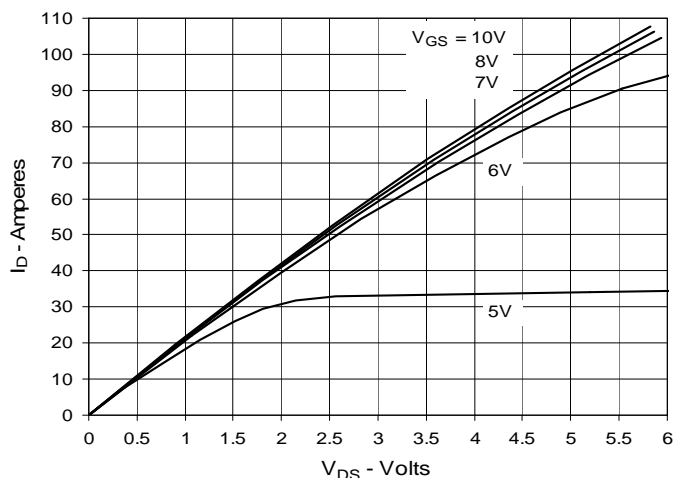
**Fig. 1. Output Characteristics @ 25°C**



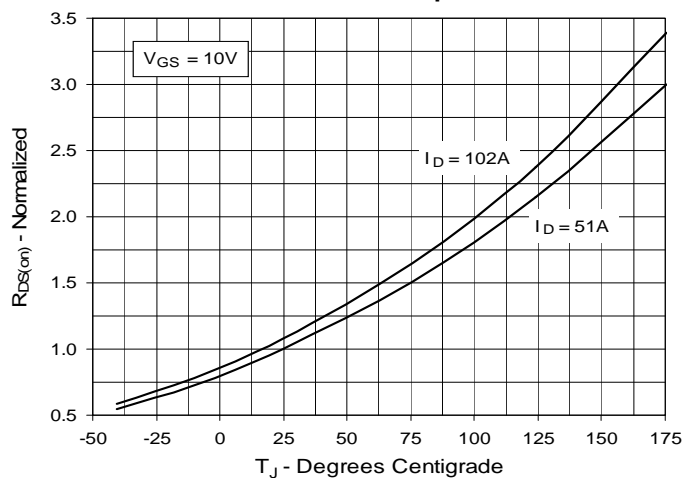
**Fig. 2. Extended Output Characteristics @ 25°C**



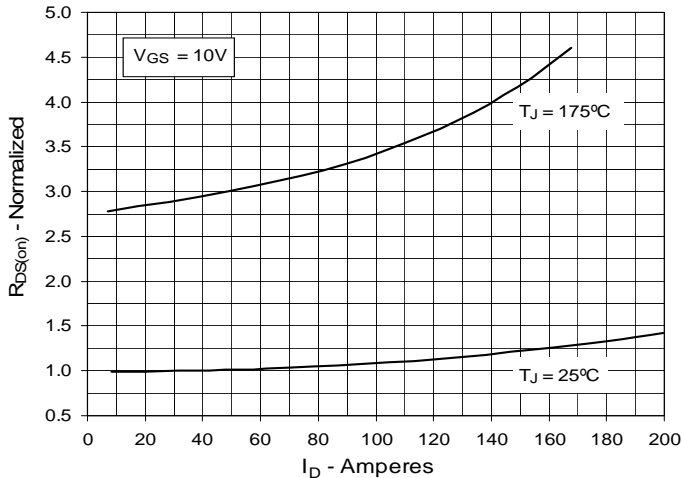
**Fig. 3. Output Characteristics @ 150°C**



**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**

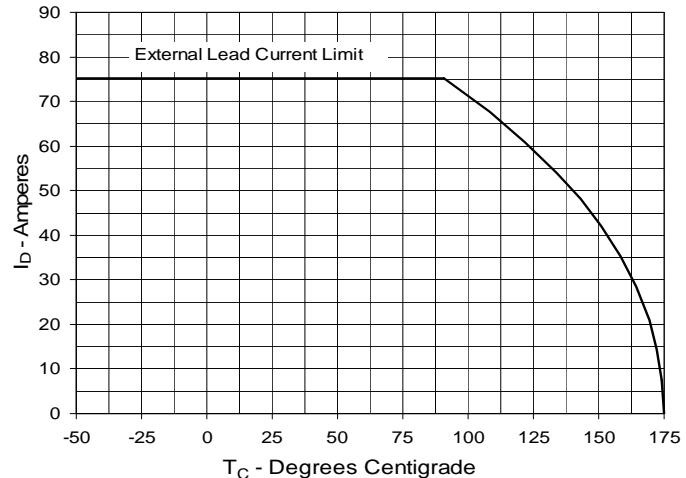


Fig. 7. Input Admittance

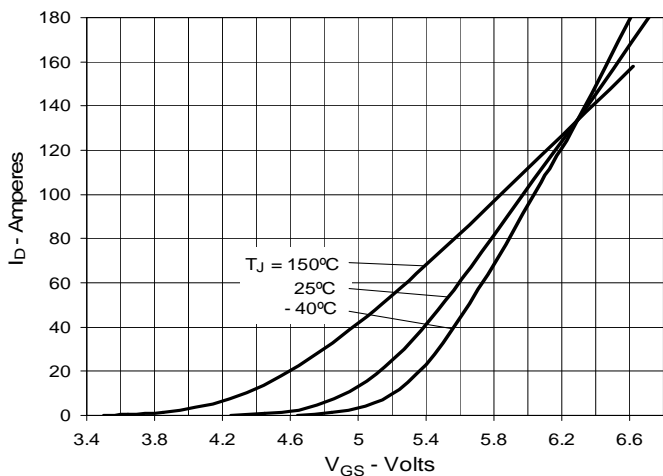


Fig. 8. Transconductance

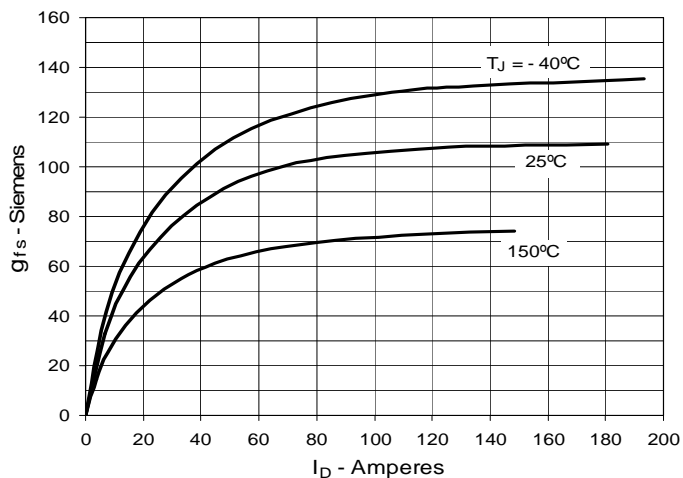


Fig. 9. Forward Voltage Drop of Intrinsic Diode

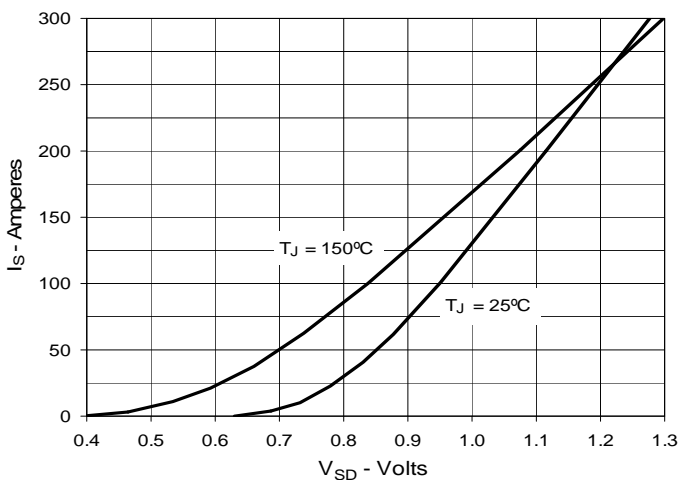


Fig. 10. Gate Charge

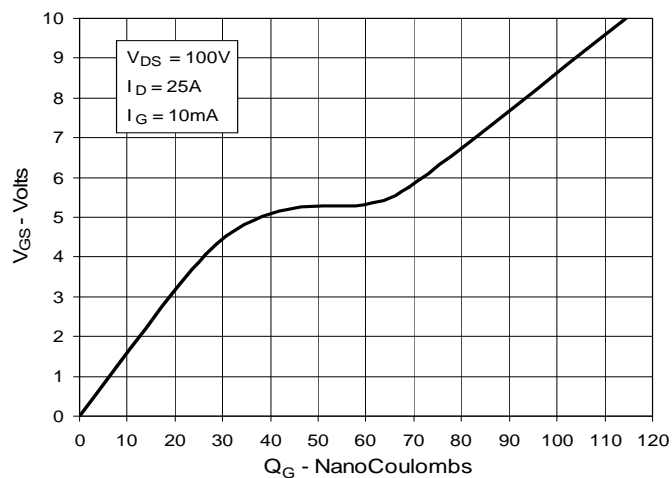


Fig. 11. Capacitance

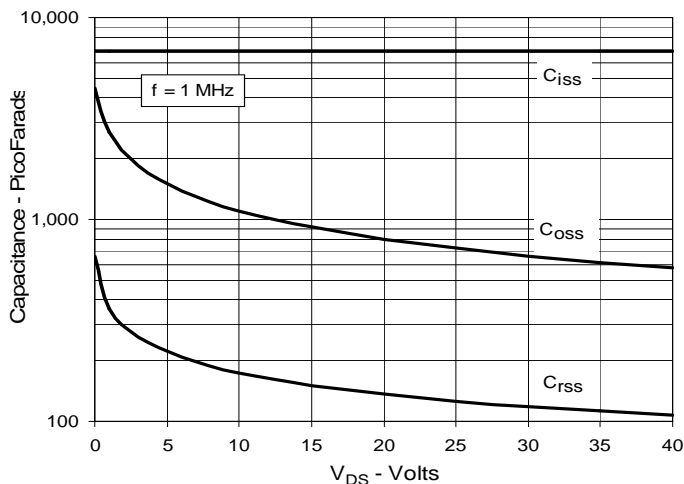
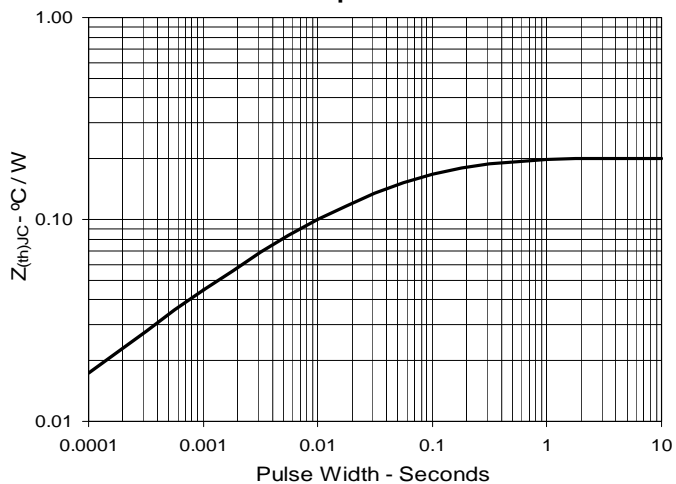
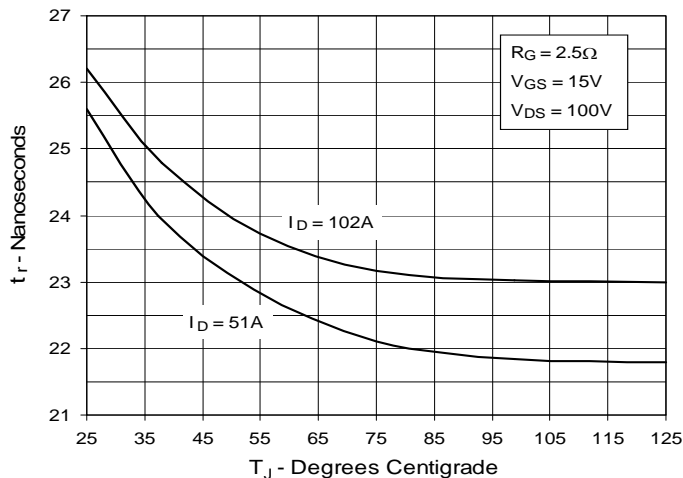


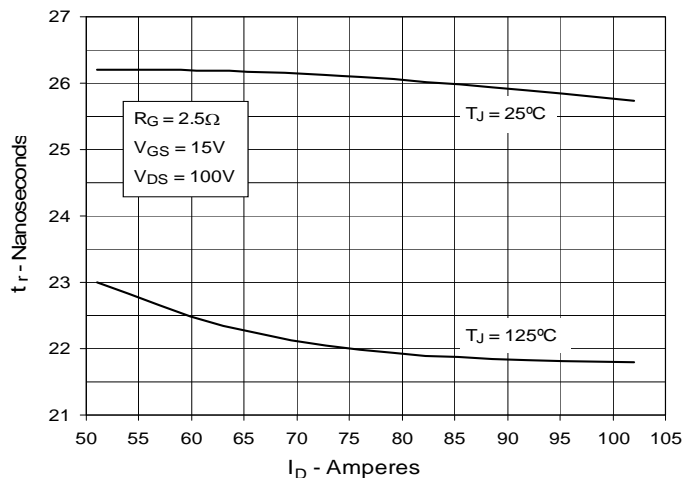
Fig. 12. Maximum Transient Thermal Impedance



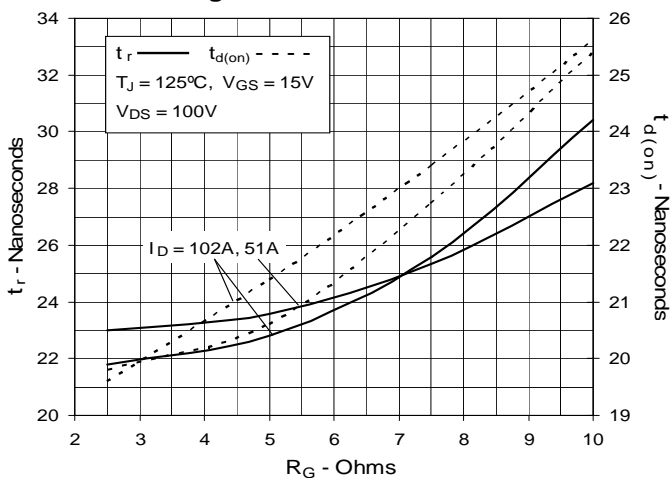
**Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature**



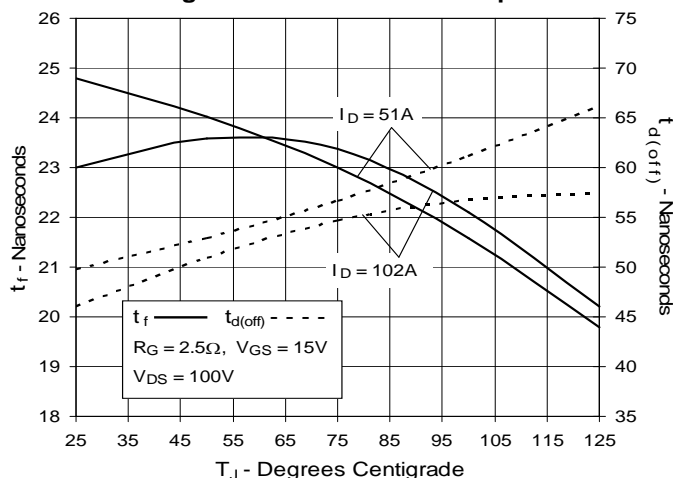
**Fig. 14. Resistive Turn-on Rise Time vs. Drain Current**



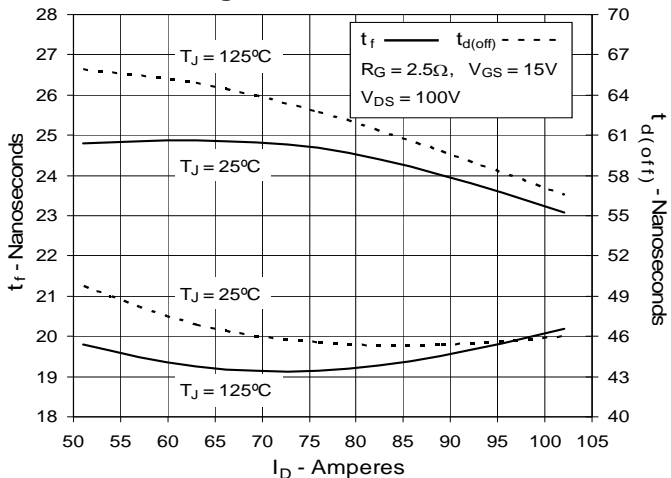
**Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance**



**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**

