

# TrenchT2™ Power MOSFET

## IXTA140N055T2 IXTP140N055T2

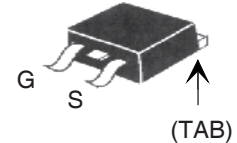
$V_{DSS} = 55V$   
 $I_{D25} = 140A$   
 $R_{DS(on)} \leq 5.4m\Omega$

N-Channel Enhancement Mode  
Avalanche Rated

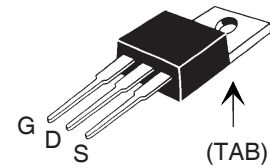


Symbol	Test Conditions	Maximum Ratings	
$V_{DSS}$	$T_J = 25^\circ C$ to $175^\circ C$	55	V
$V_{DGR}$	$T_J = 25^\circ C$ to $175^\circ C$ , $R_{GS} = 1M\Omega$	55	V
$V_{GSM}$	Transient	$\pm 20$	V
$I_{D25}$	$T_C = 25^\circ C$	140	A
$I_{LRMS}$	Lead Current Limit, RMS	75	A
$I_{DM}$	$T_C = 25^\circ C$ , pulse width limited by $T_{JM}$	350	A
$I_A$	$T_C = 25^\circ C$	70	A
$E_{AS}$	$T_C = 25^\circ C$	600	mJ
$P_D$	$T_C = 25^\circ C$	250	W
$T_J$		-55 ... +175	$^\circ C$
$T_{JM}$		175	$^\circ C$
$T_{stg}$		-55 ... +175	$^\circ C$
$T_L$	1.6mm (0.062in.) from case for 10s	300	$^\circ C$
$T_{sold}$	Plastic body for 10 seconds	260	$^\circ C$
$M_d$	Mounting torque (TO-220)	1.13 / 10	Nm/lb.in.
Weight	TO-263	2.5	g
	TO-220	3.0	g

TO-263 (IXTA)



TO-220 (IXTP)



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

### Features

- International standard packages
- 175°C Operating Temperature
- High current handling capability
- Avalanche rated
- Low  $R_{DS(on)}$

### Advantages

- Easy to mount
- Space savings
- High power density

### Applications

- Automotive
  - Motor Drives
  - 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.
$BV_{DSS}$	$V_{GS} = 0V$ , $I_D = 250\mu A$	55		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250\mu A$	2.0		4.0 V
$I_{GSS}$	$V_{GS} = \pm 20V$ , $V_{DS} = 0V$			$\pm 200$ nA
$I_{DSS}$	$V_{DS} = V_{DSS}$			5 $\mu A$
	$V_{GS} = 0V$ $T_J = 150^\circ C$			150 $\mu A$
$R_{DS(on)}$	$V_{GS} = 10V$ , $I_D = 50A$ , Notes 1, 2			5.4 m $\Omega$

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$g_{fs}$	$V_{DS} = 10\text{V}, I_D = 60\text{A}$ , Note 1	40	70	S
$C_{iss}$	$V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$		4760	pF
$C_{oss}$			715	pF
$C_{rss}$			92	pF
$t_{d(on)}$	<b>Resistive Switching Times</b> $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$ $R_G = 5\Omega$ (External)		13	ns
$t_r$			35	ns
$t_{d(off)}$			21	ns
$t_f$			17	ns
$Q_{g(on)}$	$V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$		82	nC
$Q_{gs}$			22	nC
$Q_{gd}$			22	nC
$R_{thJC}$				0.60 $^\circ\text{C/W}$
$R_{thCH}$	TO-220	0.50		$^\circ\text{C/W}$

### Source-Drain Diode

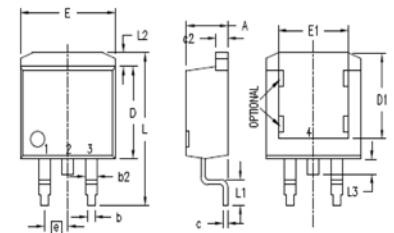
Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$I_S$	$V_{GS} = 0\text{V}$			140 A
$I_{SM}$	Repetitive, Pulse width limited by $T_{JM}$			560 A
$V_{SD}$	$I_F = 70\text{A}, V_{GS} = 0\text{V}$ , Note 1			1.3 V
$t_{rr}$	$I_F = 70\text{A}, V_{GS} = 0\text{V}$ $-di/dt = 100\text{A}/\mu\text{s}$ $V_R = 27\text{V}$		40	ns
$I_{RM}$			2.5	A
$Q_{RM}$			50	nC

- Notes: 1. Pulse test,  $t \leq 300\mu\text{s}$ ; duty cycle,  $d \leq 2\%$ .  
2. On through-hole packages,  $R_{DS(on)}$  Kelvin test contact location must be 5mm or less from the package body.

### PRELIMINARY TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

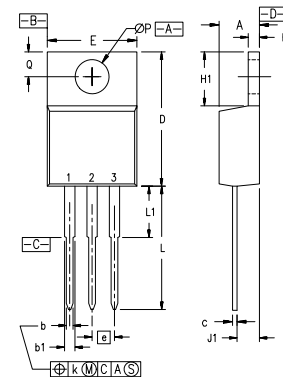
### TO-263 (IXTA) Outline



- GATE
- DRAIN (COLLECTOR)
- SOURCE (EMITTER)
- DRAIN (COLLECTOR) BOTTOM SIDE

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.160	.190	4.06	4.83
A1	.080	.110	2.03	2.79
b	.020	.039	0.51	0.99
b2	.045	.055	1.14	1.40
c	.016	.029	0.40	0.74
c2	.045	.055	1.14	1.40
D	.340	.380	8.64	9.65
D1	.315	.350	8.00	8.89
E	.380	.410	9.65	10.41
E1	.245	.320	6.22	8.13
e	.100 BSC		2.54 BSC	
L	.575	.625	14.61	15.88
L1	.090	.110	2.29	2.79
L2	.040	.055	1.02	1.40
L3	.050	.070	1.27	1.78
L4	0	.005	0	0.13

### TO-220 (IXTP) Outline

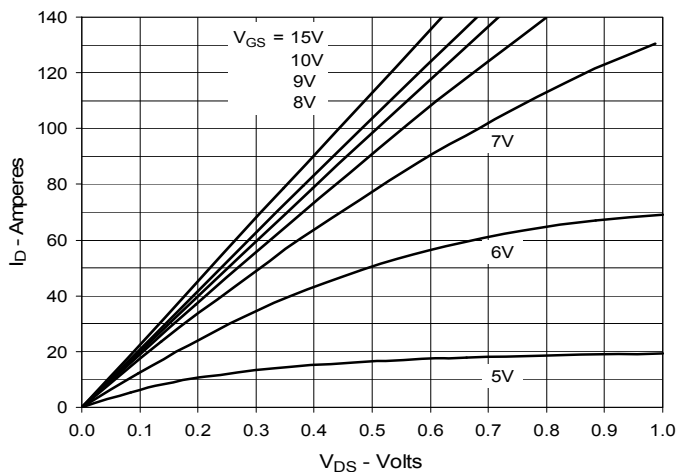


- Pins: 1 - Gate  
2 - Drain  
3 - Source  
4 - Drain

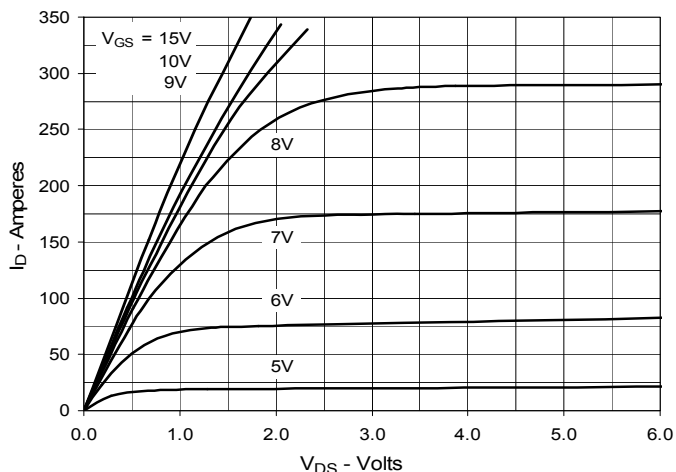
SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.170	.190	4.32	4.83
b	.025	.040	0.64	1.02
b1	.045	.065	1.15	1.65
c	.014	.022	0.35	0.56
D	.580	.630	14.73	16.00
E	.390	.420	9.91	10.66
e	.100 BSC		2.54 BSC	
F	.045	.055	1.14	1.40
H1	.230	.270	5.85	6.85
J1	.090	.110	2.29	2.79
k	0	.015	0	0.38
L	.500	.550	12.70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

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

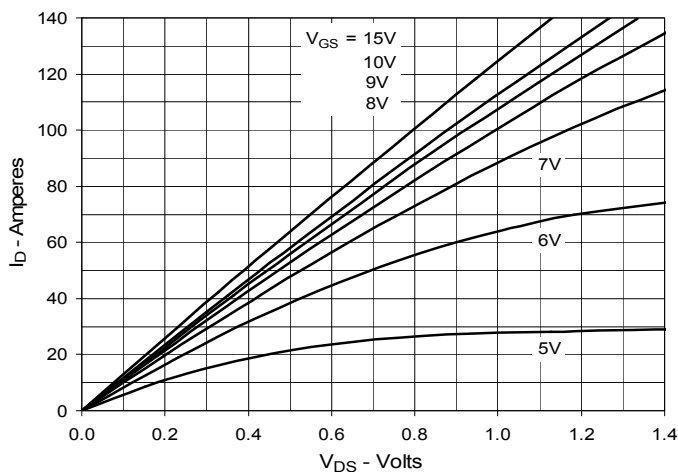
**Fig. 1. Output Characteristics @ 25°C**



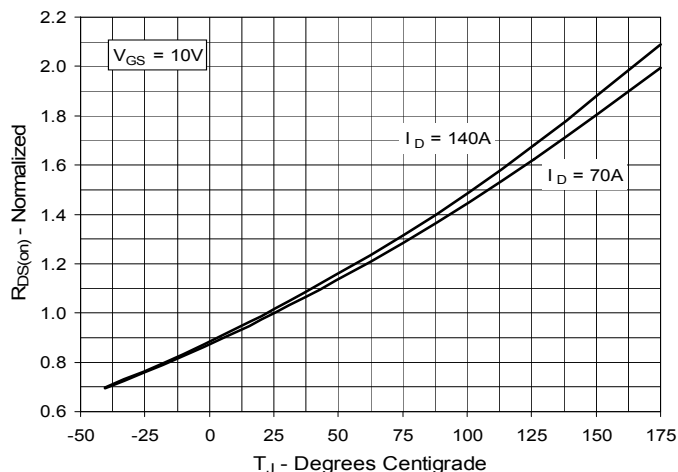
**Fig. 2. Extended Output Characteristics @ 25°C**



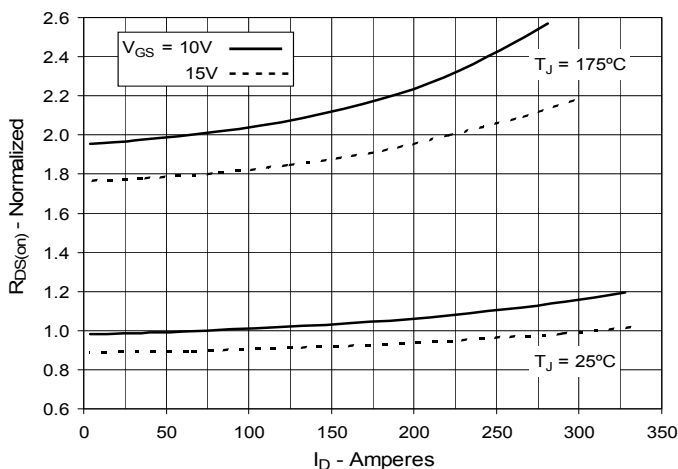
**Fig. 3. Output Characteristics @ 150°C**



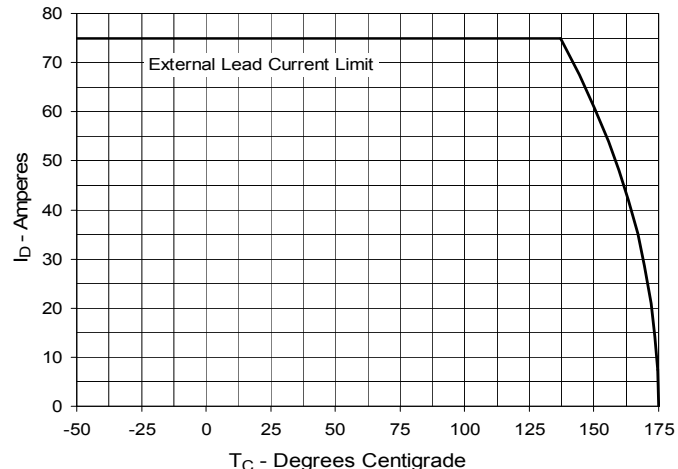
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 70A$  Value vs. Junction Temperature**



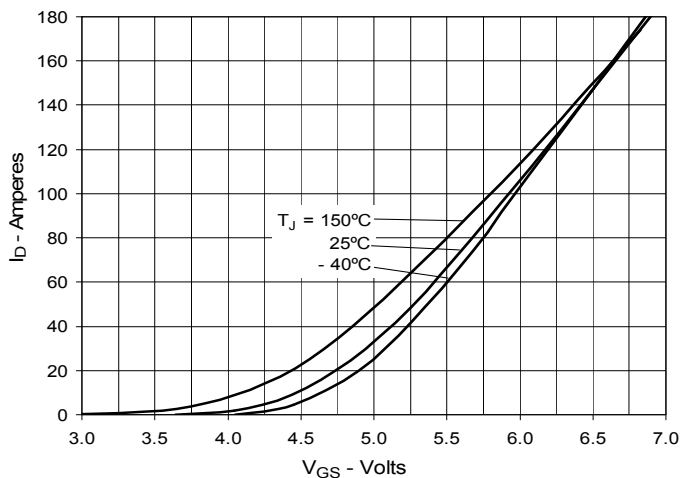
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 70A$  Value vs. Drain Current**



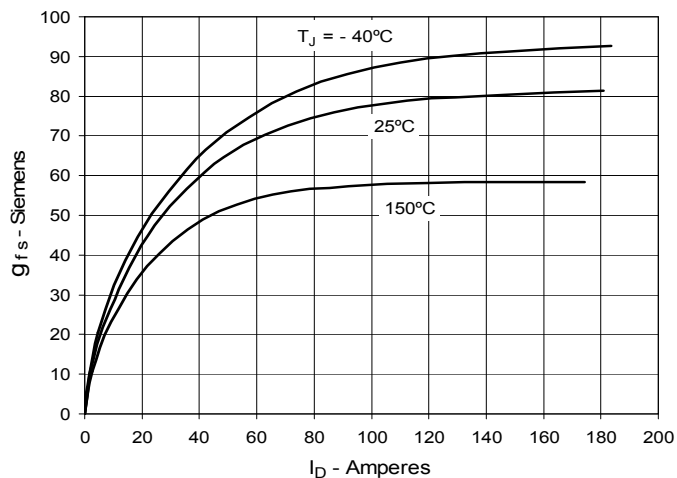
**Fig. 6. Drain Current vs. Case Temperature**



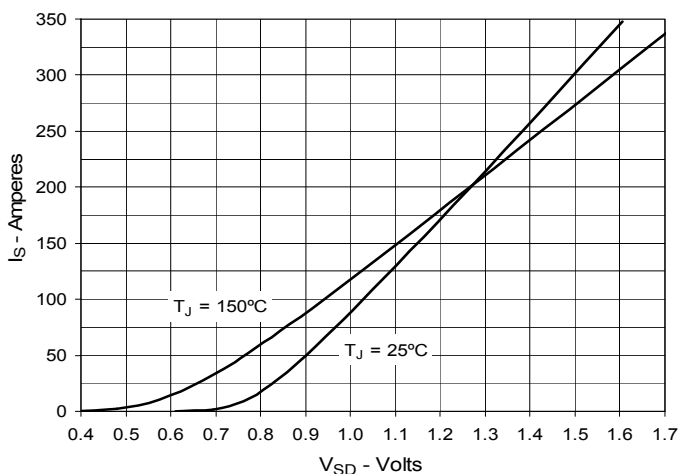
**Fig. 7. Input Admittance**



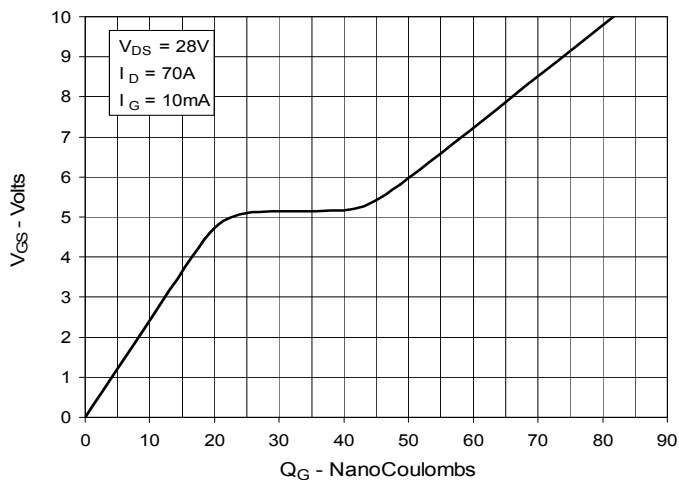
**Fig. 8. Transconductance**



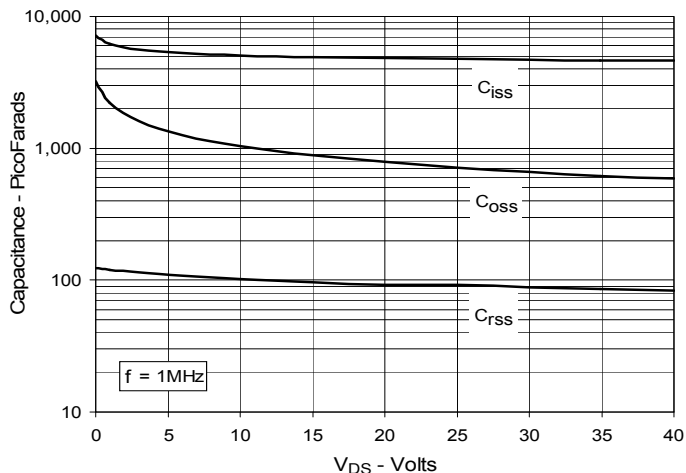
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



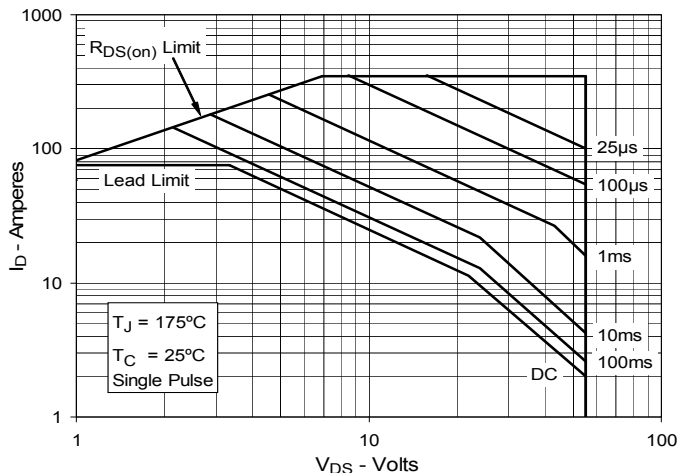
**Fig. 10. Gate Charge**



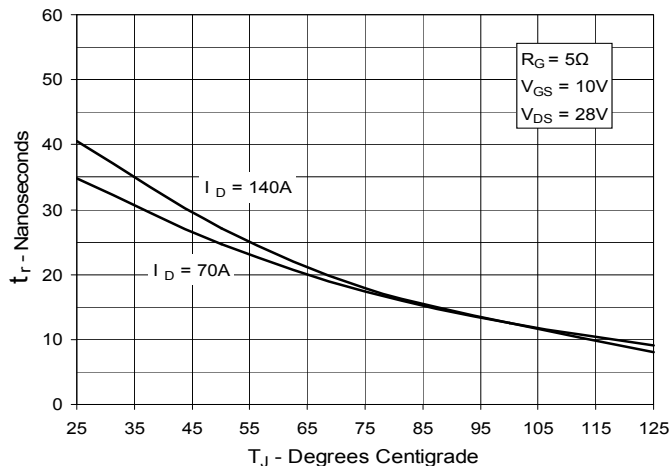
**Fig. 11. Capacitance**



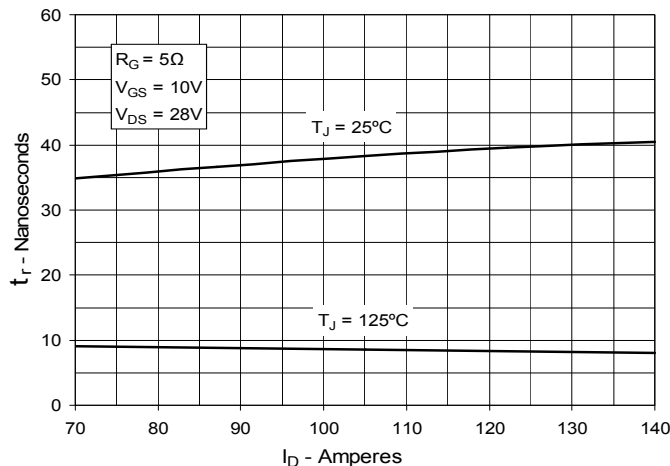
**Fig. 12. Forward-Bias Safe Operating Area**



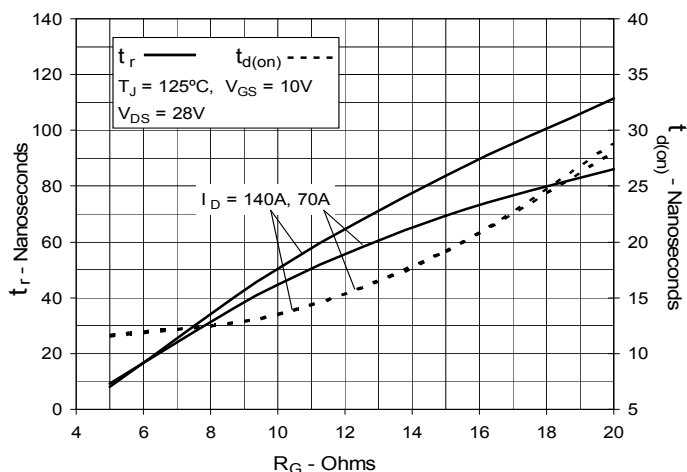
**Fig. 13. Resistive Turn-on  
Rise Time vs. Junction Temperature**



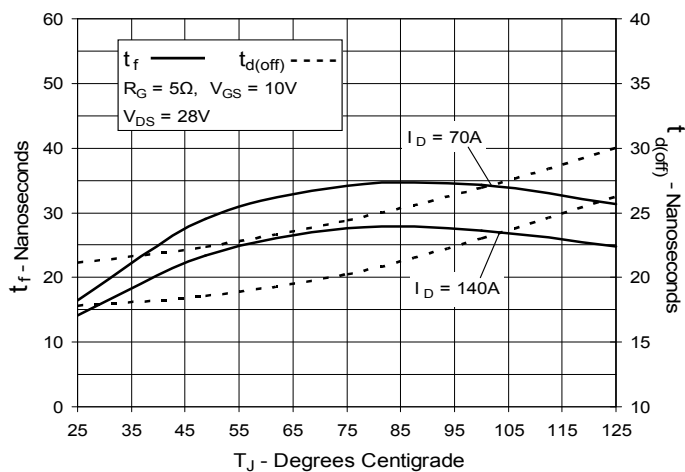
**Fig. 14. Resistive Turn-on  
Rise Time vs. Drain Current**



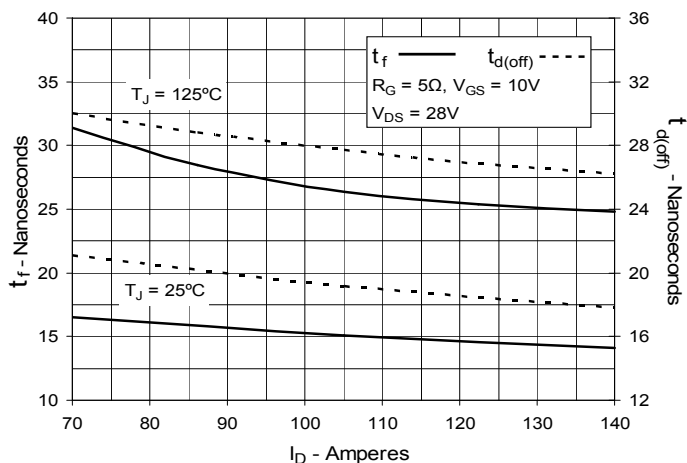
**Fig. 15. Resistive Turn-on  
Switching Times vs. Gate Resistance**



**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**

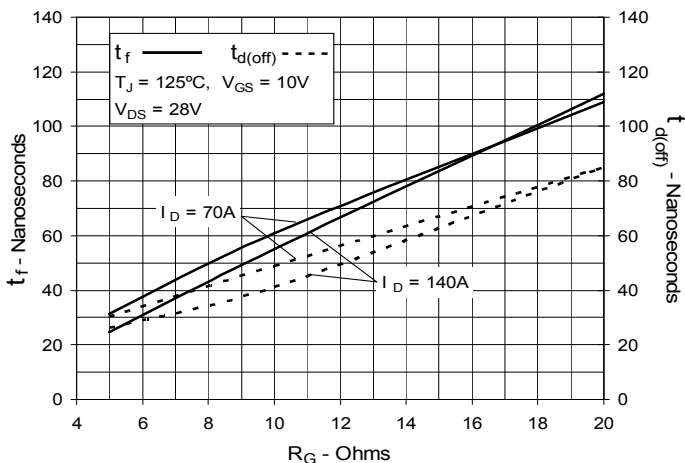


Fig. 19. Maximum Transient Thermal Impedance

