

TrenchMV™ Power MOSFET

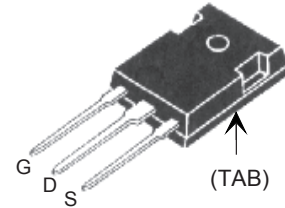
IXTH250N075T
IXTQ250N075T

$V_{DSS} = 75 \text{ V}$
 $I_{D25} = 250 \text{ A}$
 $R_{DS(on)} \leq 4.0 \text{ m}\Omega$

N-Channel Enhancement Mode
Avalanche Rated

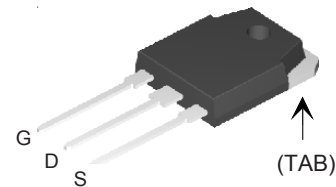


TO-247 (IXTH)



Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	$T_J = 25^\circ\text{C to } 175^\circ\text{C}$	75	V
V_{DGR}	$T_J = 25^\circ\text{C to } 175^\circ\text{C}; R_{GS} = 1 \text{ M}\Omega$	75	V
V_{GSM}	Transient	± 20	V
I_{D25}	$T_C = 25^\circ\text{C}$	250	A
I_{LRMS}	Lead Current Limit, RMS	75	A
I_{DM}	$T_C = 25^\circ\text{C}$, pulse width limited by T_{JM}	560	A
I_{AR}	$T_C = 25^\circ\text{C}$	40	A
E_{AS}	$T_C = 25^\circ\text{C}$	1.5	J
dv/dt	$I_S \leq I_{DM}$, $di/dt \leq 100 \text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DSS}$ $T_J \leq 175^\circ\text{C}$, $R_G = 3.3 \Omega$	3	V/ns
P_D	$T_C = 25^\circ\text{C}$	550	W
T_J		-55 ... +175	$^\circ\text{C}$
T_{JM}		175	$^\circ\text{C}$
T_{stg}		-55 ... +175	$^\circ\text{C}$
T_L	1.6 mm (0.062 in.) from case for 10 s	300	$^\circ\text{C}$
T_{SOLD}	Plastic body for 10 seconds	260	$^\circ\text{C}$
M_d	Mounting torque	1.13 / 10	Nm/lb.in.
Weight	TO-3P	5.5	g
	TO-247	6	g

TO-3P (IXTQ)



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 $^\circ\text{C}$ Operating Temperature

Advantages

- Easy to mount
- Space savings
- High power density

Applications

- Automotive
 - Motor Drives
 - 42V Power Bus
 - ABS Systems
- DC/DC Converters and Off-line UPS
- Primary Switch for 24V and 48V Systems
- High Current Switching Applications

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$ unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{DSS}	$V_{GS} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$	75		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250 \mu\text{A}$	2.0		V
I_{GSS}	$V_{GS} = \pm 20 \text{ V}$, $V_{DS} = 0 \text{ V}$			$\pm 200 \text{ nA}$
I_{DSS}	$V_{DS} = V_{DSS}$ $V_{GS} = 0 \text{ V}$ $T_J = 150^\circ\text{C}$			5 μA 250 μA
$R_{DS(on)}$	$V_{GS} = 10 \text{ V}$, $I_D = 50 \text{ A}$, Notes 1, 2	3.3	4.0	m Ω

Symbol	Test Conditions	Characteristic Values		
		Min.	Typ.	Max.
$(T_j = 25^\circ\text{C unless otherwise specified})$				
g_{fs}	$V_{DS} = 10\text{ V}; I_D = 60\text{ A, Note 1}$	75	122	S
C_{iss}			9900	pF
C_{oss}	$V_{GS} = 0\text{ V}; V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		1330	pF
C_{rss}			285	pF
$t_{d(on)}$	Resistive Switching Times		32	ns
t_r	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 50\text{ A}$		50	ns
$t_{d(off)}$	$R_G = 3.3\ \Omega$ (External)		58	ns
t_f			45	ns
$Q_{g(on)}$			200	nC
Q_{gs}	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 25\text{ A}$		50	nC
Q_{gd}			60	nC
R_{thJC}				0.27°C/W
R_{thCH}		0.25		$^\circ\text{C/W}$

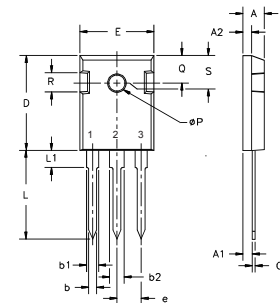
Source-Drain Diode

Symbol	Test Conditions	Characteristic Values		
		Min.	Typ.	Max.
$T_j = 25^\circ\text{C unless otherwise specified}$				
I_s	$V_{GS} = 0\text{ V}$			250 A
I_{SM}	Pulse width limited by T_{JM}			560 A
V_{SD}	$I_F = 50\text{ A}, V_{GS} = 0\text{ V, Note 1}$			1.0 V
t_{rr}	$I_F = 50\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}$ $V_R = 25\text{ V}, V_{GS} = 0\text{ V}$		80	ns

- 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 5 mm or less from the package body.

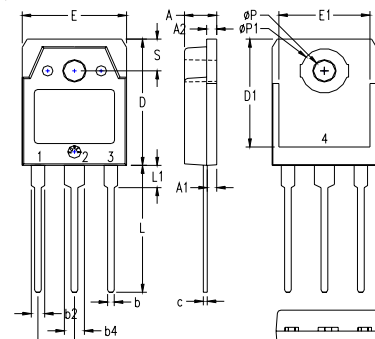
PRELIMINARY TECHNICAL INFORMATION

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-247AD Outline


Terminals: 1 - Gate
 2 - Drain
 3 - Source
 Tab - Drain

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.7	5.3	.185	.209
A ₁	2.2	2.54	.087	.102
A ₂	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b ₁	1.65	2.13	.065	.084
b ₂	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
∅P	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

TO-3P (IXTQ) Outline


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

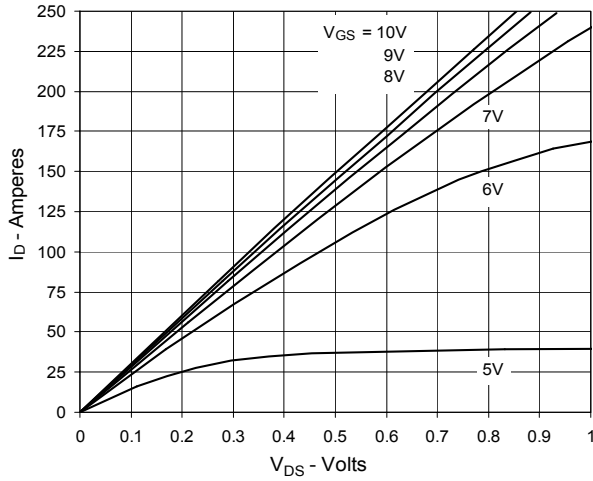
SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.185	.193	4.70	4.90
A ₁	.051	.059	1.30	1.50
A ₂	.057	.065	1.45	1.65
b	.035	.045	0.90	1.15
b ₂	.075	.087	1.90	2.20
b ₄	.114	.126	2.90	3.20
c	.022	.031	0.55	0.80
D	.780	.791	19.80	20.10
D ₁	.665	.677	16.90	17.20
E	.610	.622	15.50	15.80
E ₁	.531	.539	13.50	13.70
e		.215 BSC		5.45 BSC
L	.779	.795	19.80	20.20
L ₁	.134	.142	3.40	3.60
∅P	.126	.134	3.20	3.40
∅P ₁	.272	.280	6.90	7.10
S	.193	.201	4.90	5.10

All metal area are tin plated.

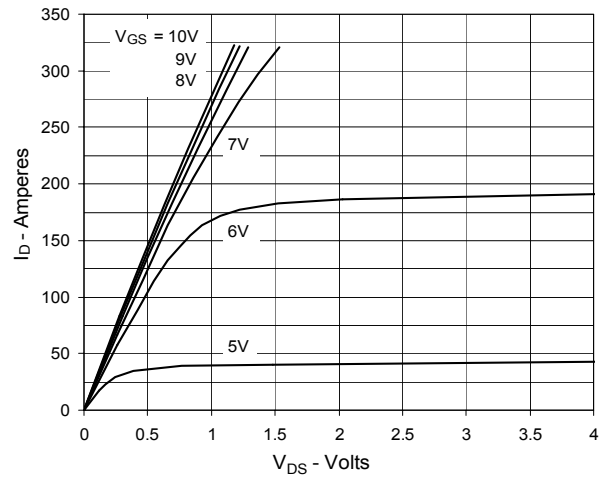
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IXYS MOSFETs and IGBTs are covered by	4,835,592	4,931,844	5,049,961	5,237,481	6,162,665	6,404,065 B1	6,683,344	6,727,585	7,005,734 B2
one or more of the following U.S. patents:	4,850,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405 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

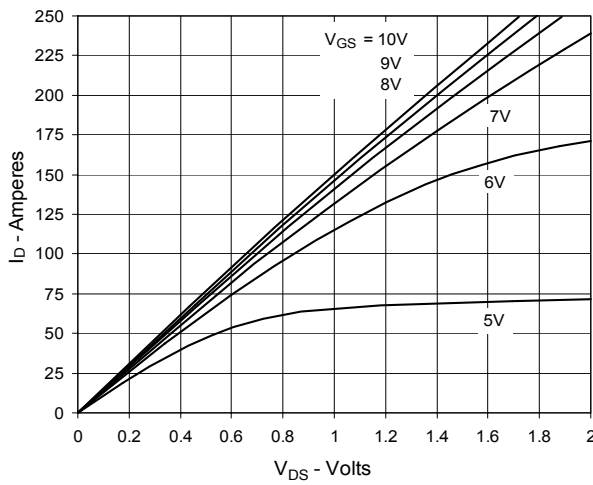
**Fig. 1. Output Characteristics
@ 25°C**



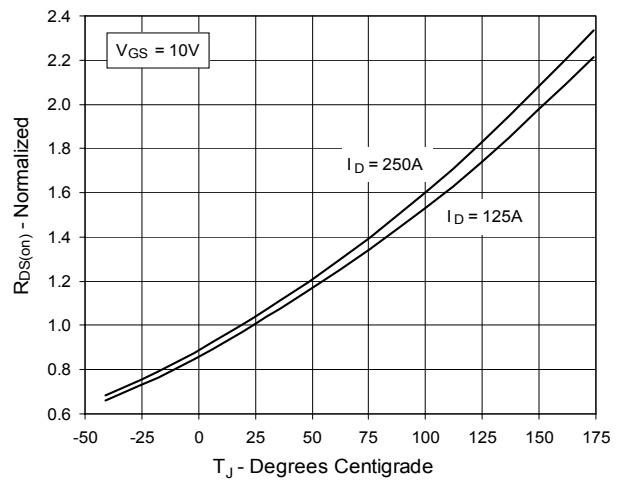
**Fig. 2. Extended Output Characteristics
@ 25°C**



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



**Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 125A$ Value
vs. Junction Temperature**



**Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 125A$ Value
vs. Drain Current**

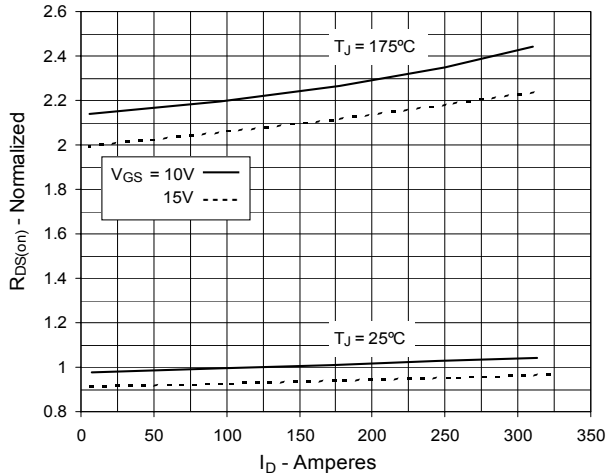


Fig. 6. Drain Current vs. Case Temperature

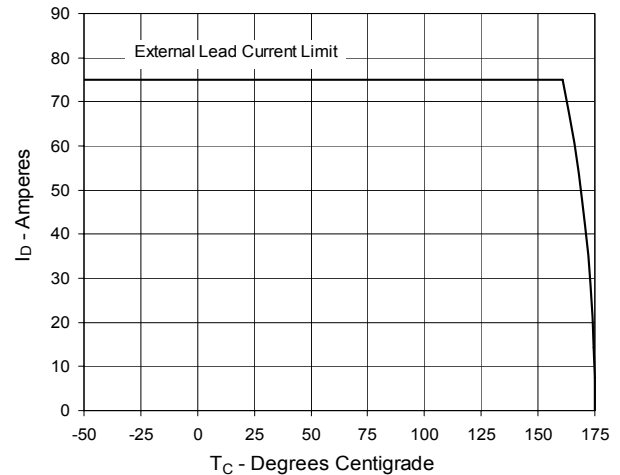


Fig. 7. Input Admittance

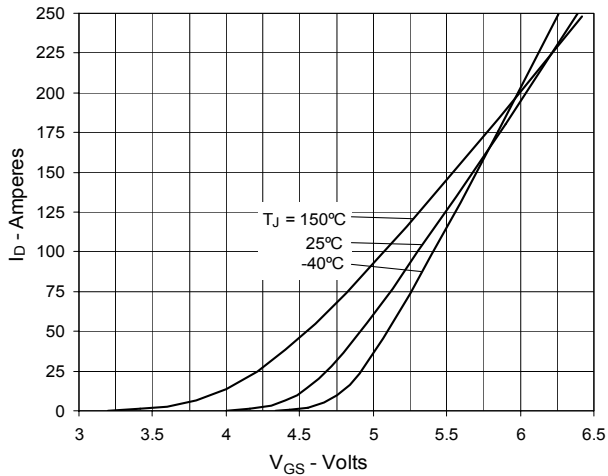


Fig. 8. Transconductance

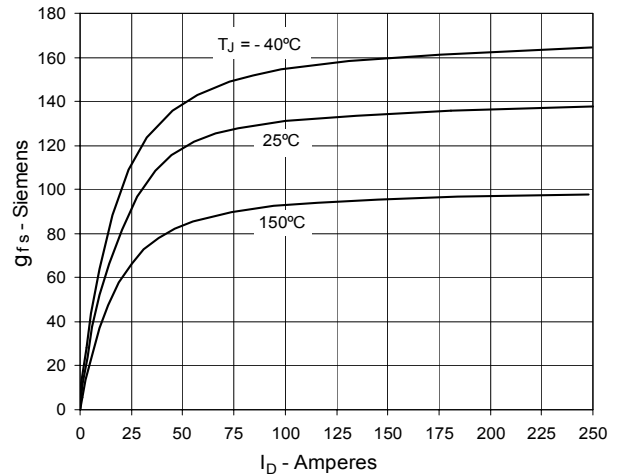


Fig. 9. Forward Voltage Drop of Intrinsic Diode

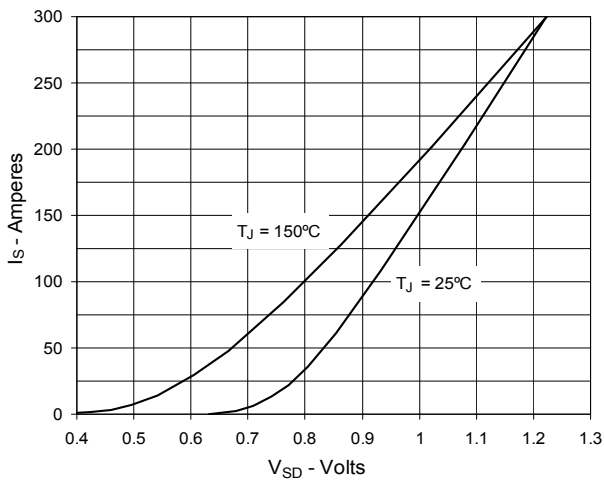


Fig. 10. Gate Charge

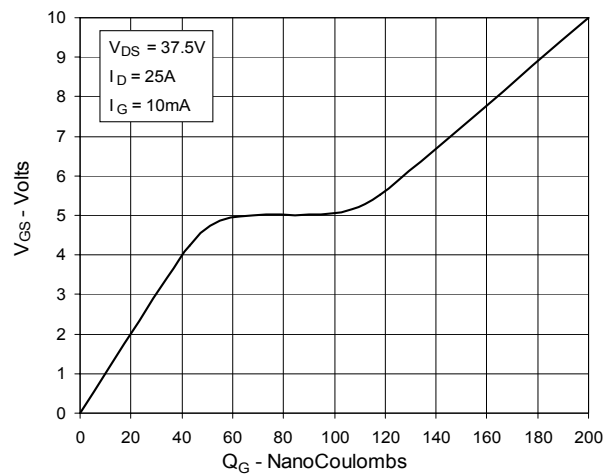


Fig. 11. Capacitance

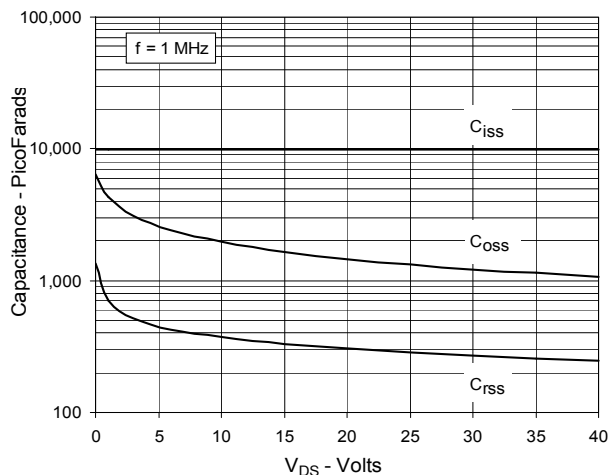
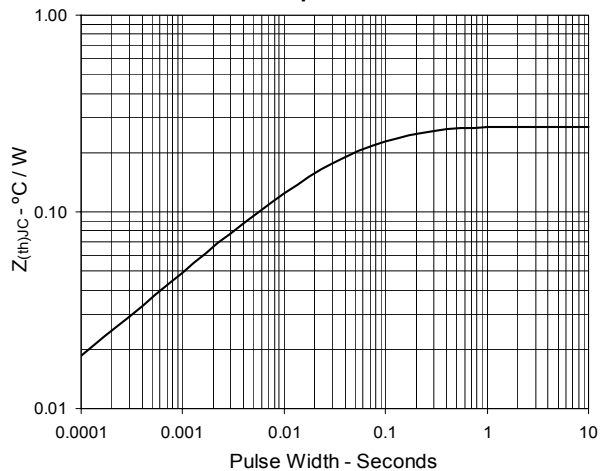
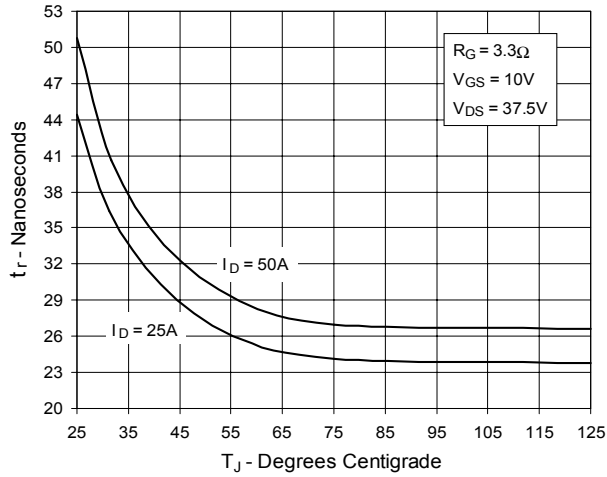


Fig. 12. Maximum Transient Thermal Impedance

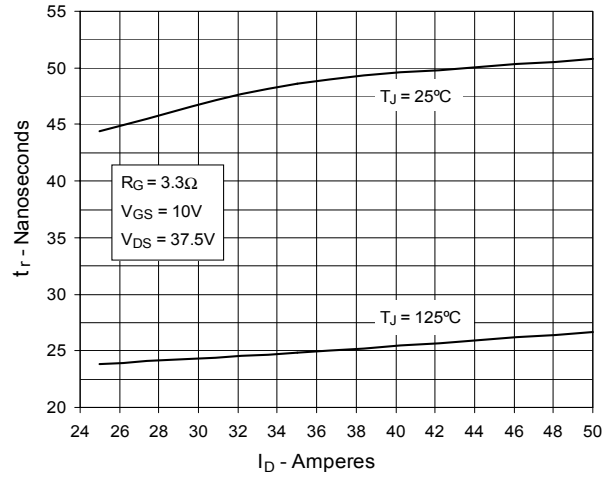


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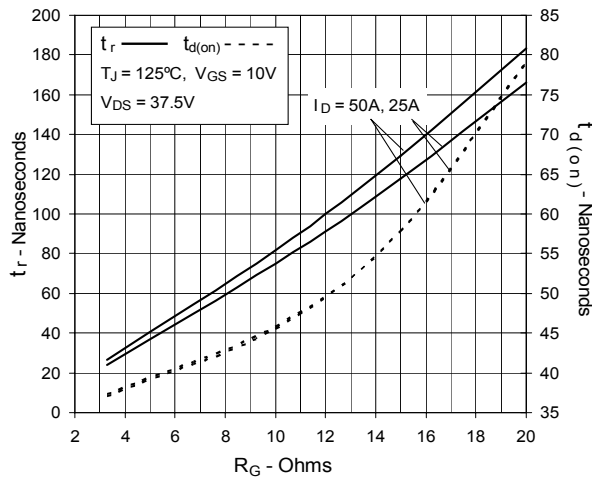
**Fig. 13. Resistive Turn-on
Rise Time vs. Junction Temperature**



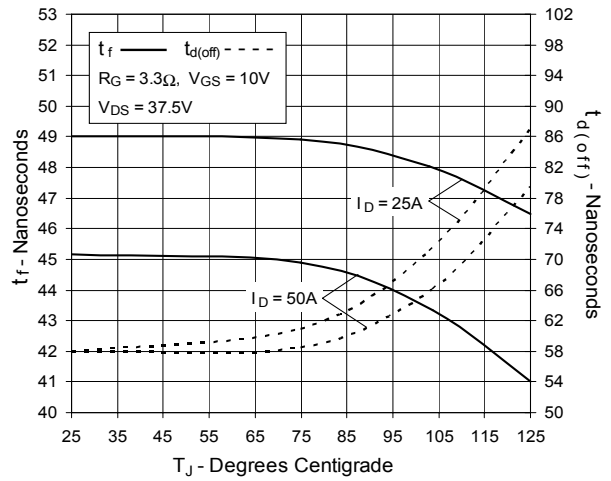
**Fig. 14. Resistive Turn-on
Rise Time vs. Drain Current**



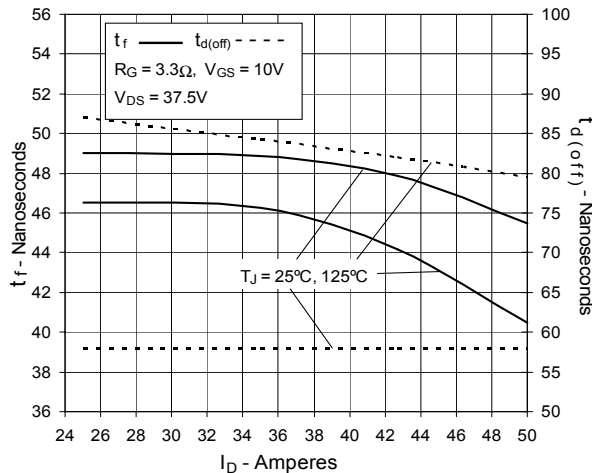
**Fig. 15. Resistive Turn-on
Switching Times vs. Gate Resistance**



**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**

