IXYS

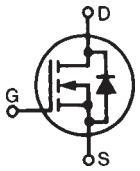
Preliminary Technical Information

TrenchHV™ Power MOSFET

IXTH102N20T
IXTQ102N20T
IXTV102N20T

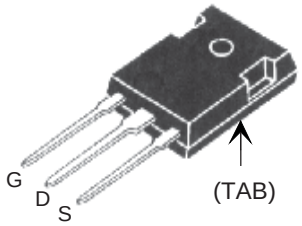
V_{DSS} = 200 V
I_{D25} = 102 A
$R_{DS(on)}$ ≤ 23 mΩ

N-Channel Enhancement Mode
Avalanche Rated

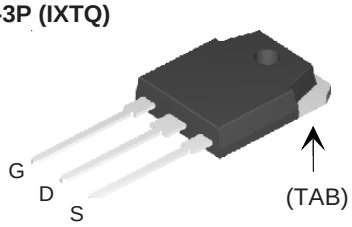


Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 175°C	200	V
V_{GSM}	Transient	± 30	V
I_{D25}	T_C = 25°C	102	A
I_{LRMS}	Lead Current Limit, RMS	75	A
I_{DM}	T_C = 25°C, pulse width limited by T_{JM}	250	A
I_{AS}	T_C = 25°C	5	A
E_{AS}	T_C = 25°C	1.2	J
dv/dt	$I_S \le I_{DM}$, di/dt ≤ 100 A/ms, $V_{DD} \le V_{DSS}$ $T_J \le 175°C$, R_G = 2.5 Ω	7	V/ns
P_D	T_C = 25°C	750	W
T_J		-55 ... +175	°C
T_{JM}		175	°C
T_{stg}		-55 ... +175	°C
T_L	1.6 mm (0.062 in.) from case for 10 s	300	°C
T_{SOLD}	Plastic body for 10 seconds	260	°C
M_d	Mounting torque (TO-247 & TO-3P)	1.13 / 10	Nm/lb.in.
F_C	Mounting force (PLUS220)	11..65 / 2.5..14.6	N/lb.
Weight	TO-247	6	g
	TO-3P	5.5	g
	PLUS220	4	g

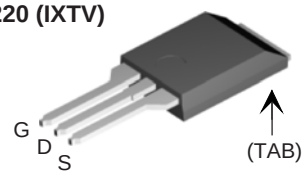
TO-247 (IXTH)



TO-3P (IXTQ)



PLUS220 (IXTV)



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

Symbol (T_J = 25°C unless otherwise specified)	Test Conditions	Characteristic Values Min.	Typ.	Max.	
BV_{DSS}	V_{GS} = 0 V, I_D = 250 μA	200			V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 1 mA	2.5		4.5	V
I_{GSS}	V_{GS} = ± 20 V, V_{DS} = 0 V			± 200	nA
I_{DSS}	$V_{DS} = V_{DSS}$			5	μA
	V_{GS} = 0 V, T_J = 150°C			250	μA
$R_{DS(on)}$	V_{GS} = 10 V, $I_D = 0.5\ I_{D25}$, Notes 1, 2		18	23	mΩ

Features
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
  - easy to drive and to protect
- 175 °C Operating Temperature

Advantages
- Easy to mount
- Space savings
- High power density

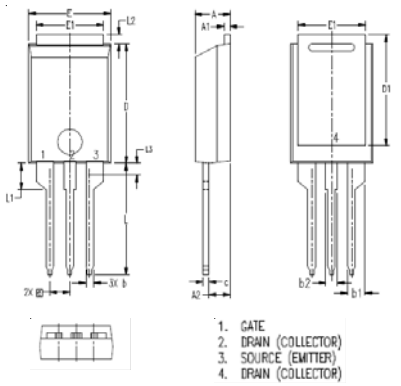
Symbol	Test Conditions (T_J = 25°C unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	V_{DS}= 10 V; I_D = 0.5 I_{D25}, Note 1	55	92		S
C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		6800		pF
C_{oss}			722		pF
C_{rss}			126		pF
$t_{d(on)}$	**Resistive Switching Times**		19		ns
t_r	V_{GS} = 10 V, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}		26		ns
$t_{d(off)}$	R_G = 2.5 Ω (External)		50		ns
t_f			25		ns
$Q_{g(on)}$	V_{GS}= 10 V, V_{DS} = 0.5 V_{DSS}, I_D = 25 A		114		nC
Q_{gs}			34		nC
Q_{gd}			31		nC
R_{thJC}				0.20	°C/W
R_{thCS}			0.25		°C/W

Source-Drain Diode

Symbol	Test Conditions (T_J = 25°C unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
I_S	V_{GS} = 0 V			102	A
I_{SM}	Pulse width limited by T_{JM}			330	A
V_{SD}	I_F = 50 A, V_{GS} = 0 V, Note 1			1.2	V
t_{rr}	I_F = 50 A, -di/dt = 100 A/µs		130		ns
	V_R = 50 V, V_{GS} = 0 V				

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

PLUS220 (IXTV) Outline

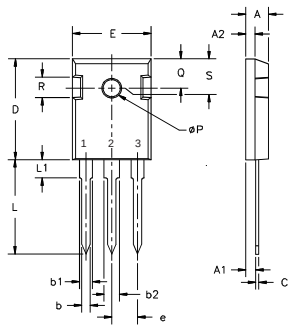


SYM	INCHES MIN	INCHES MAX	MILLIMETER MIN	MILLIMETER MAX
A	.169	.185	4.30	4.70
A1	.028	.035	0.70	0.90
A2	.098	.118	2.50	3.00
b	.035	.047	0.90	1.20
b1	.080	.095	2.03	2.41
b2	.054	.064	1.37	1.63
c	.028	.035	0.70	0.90
D	.551	.591	14.00	15.00
D1	.512	.539	13.00	13.70
E	.394	.433	10.00	11.00
E1	.331	.346	8.40	8.80
e	.100 BSC		2.54 BSC	
L	.512	.551	13.00	14.00
L1	.118	.138	3.00	3.50
L2	.035	.051	0.90	1.30
L3	.047	.059	1.20	1.50

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.

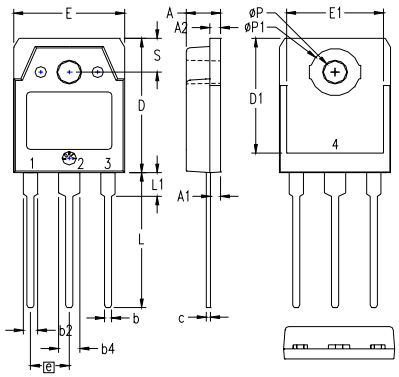
TO-247AD Outline



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

Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches 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
ÆP	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 MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS 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.

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Fig. 1. Output Characteristics @ 25ºC

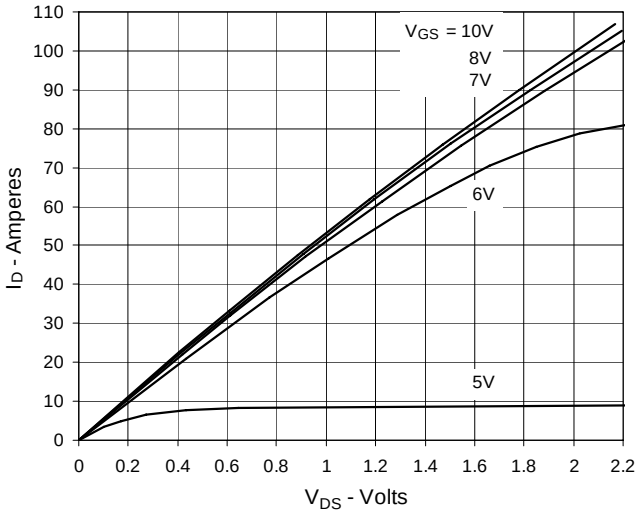

Fig. 2. Extended Output Characteristics @ 25ºC

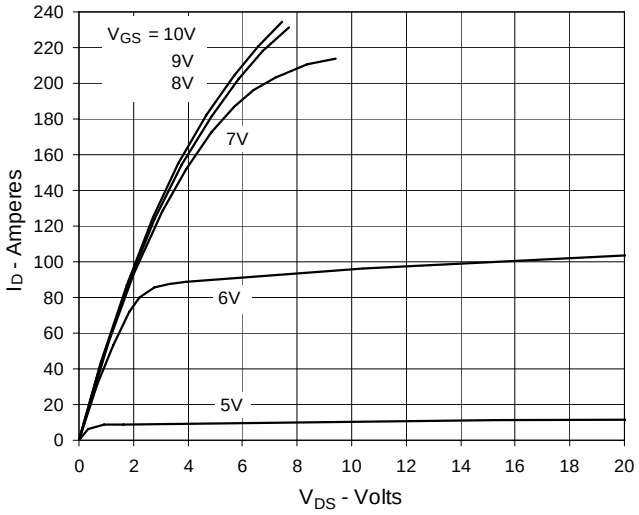

Fig. 3. Output Characteristics @ 150ºC

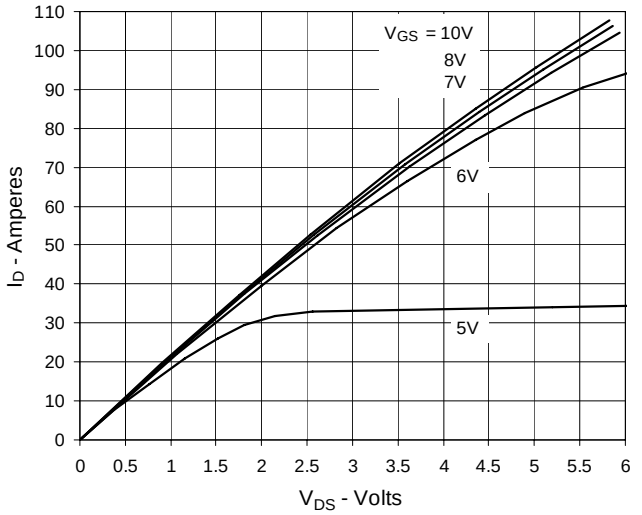

Fig. 4. $R_{DS(on)}$ Normalized to I_D = 51A Value vs. Junction Temperature

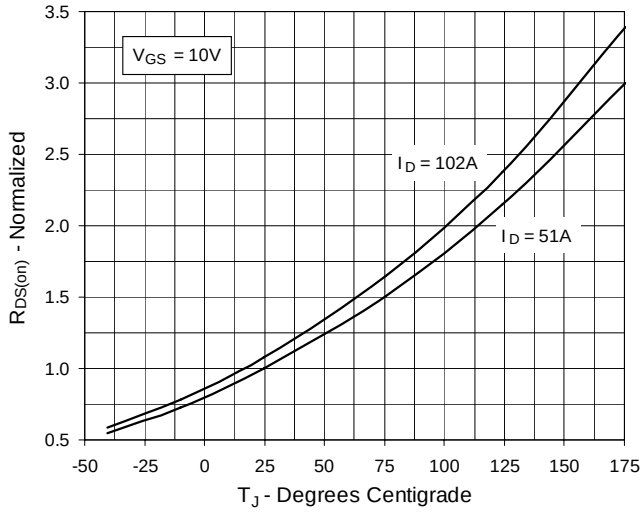

Fig. 5. $R_{DS(on)}$ Normalized to I_D = 51A Value vs. Drain Current

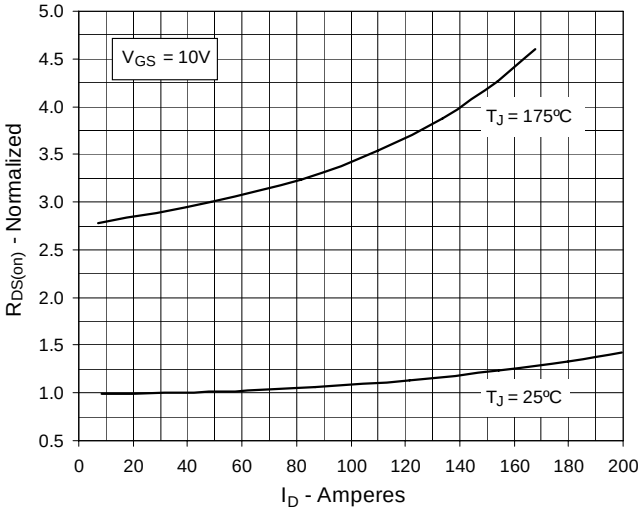

Fig. 6. Drain Current vs. Case Temperature

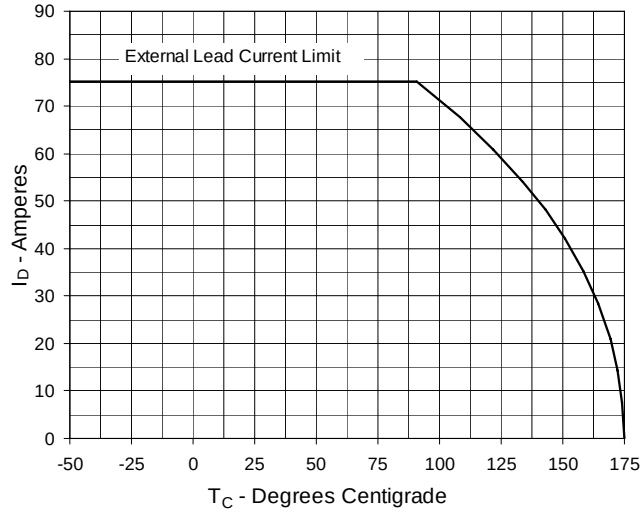

Fig. 7. Input Admittance

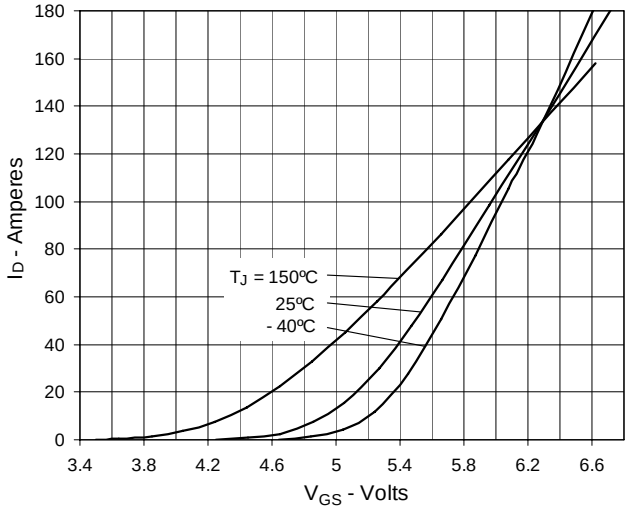

Fig. 8. Transconductance

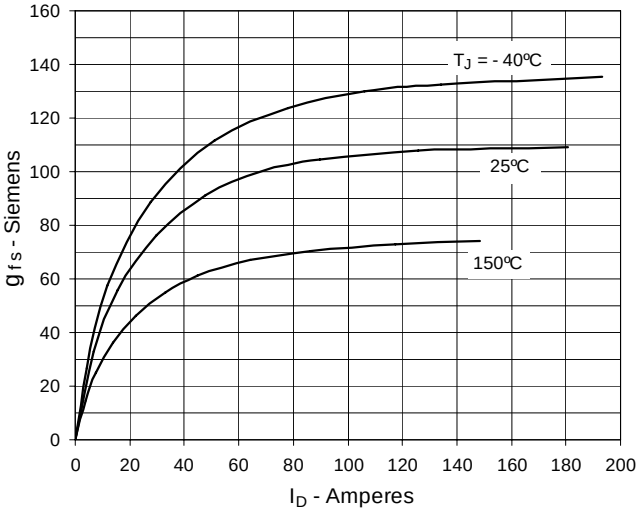

Fig. 9. Forward Voltage Drop of Intrinsic Diode

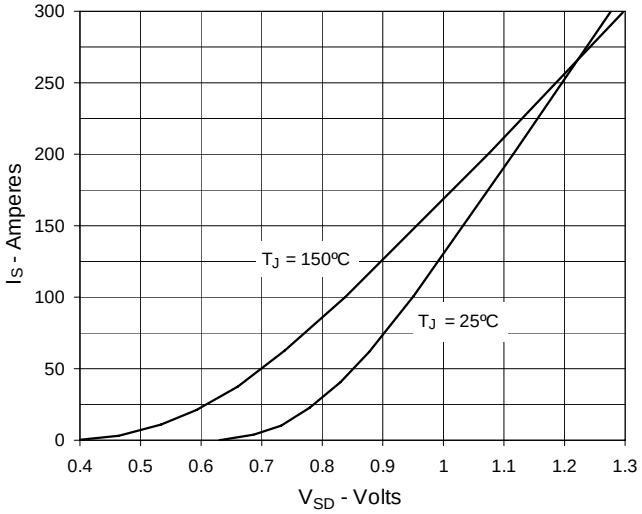

Fig. 10. Gate Charge

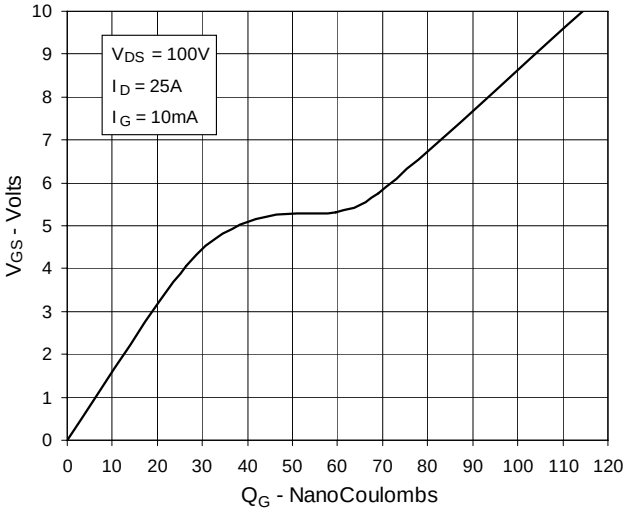

Fig. 11. Capacitance

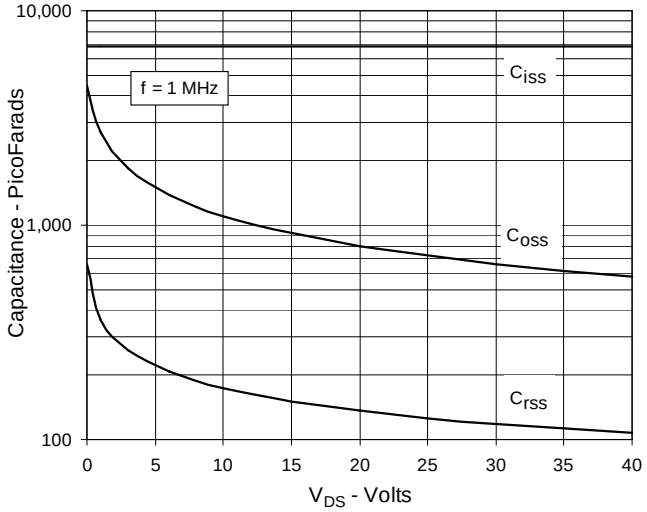

Fig. 12. Maximum Transient Thermal Impedance

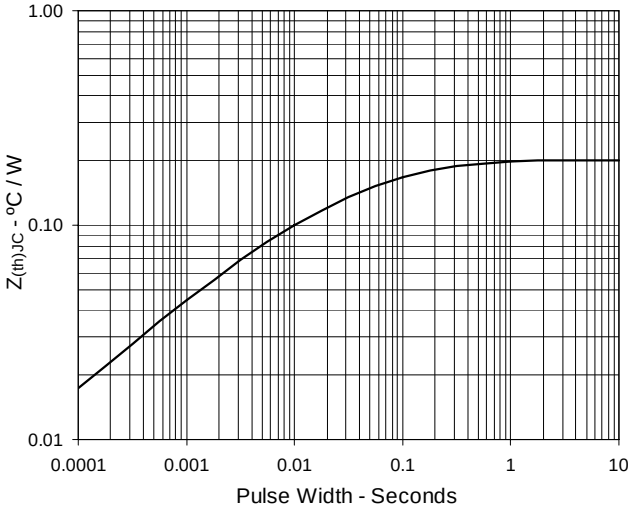

Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature

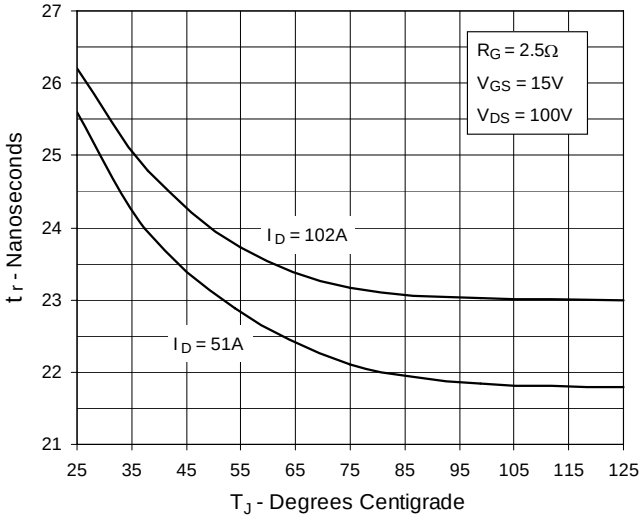

Fig. 14. Resistive Turn-on Rise Time vs. Drain Current

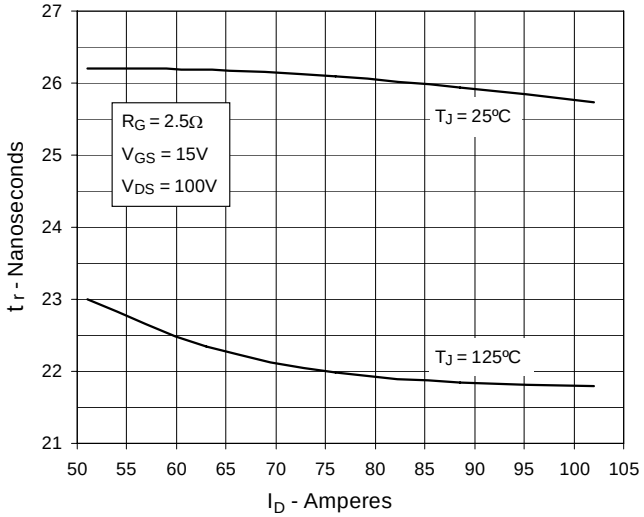

Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance

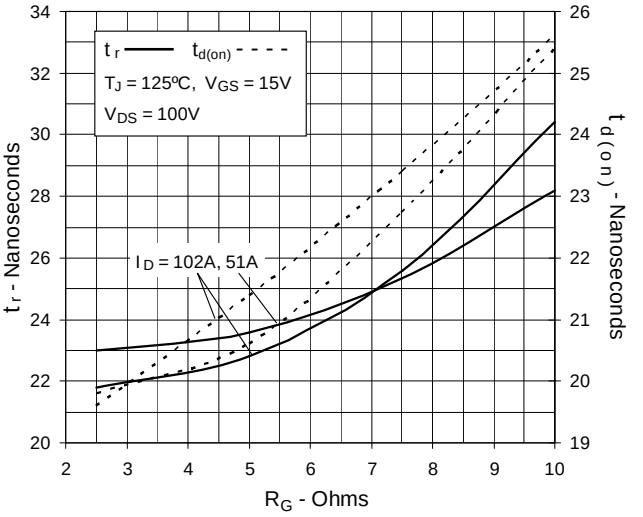

Fig. 16. Resistive Turn-off Switching Times vs. Junction Temperature

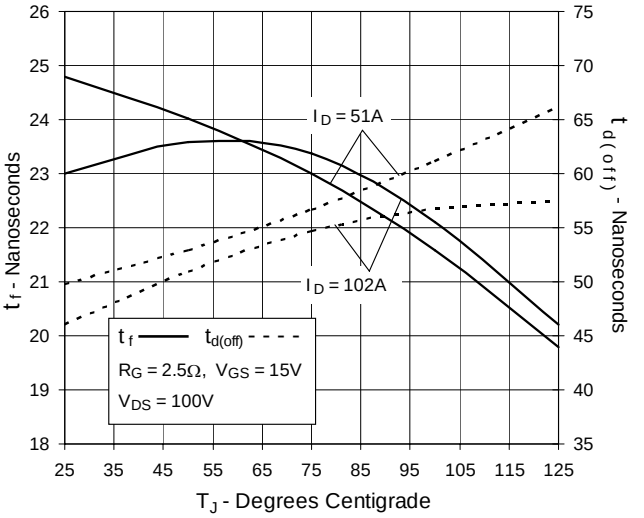

Fig. 17. Resistive Turn-off Switching Times vs. Drain Current

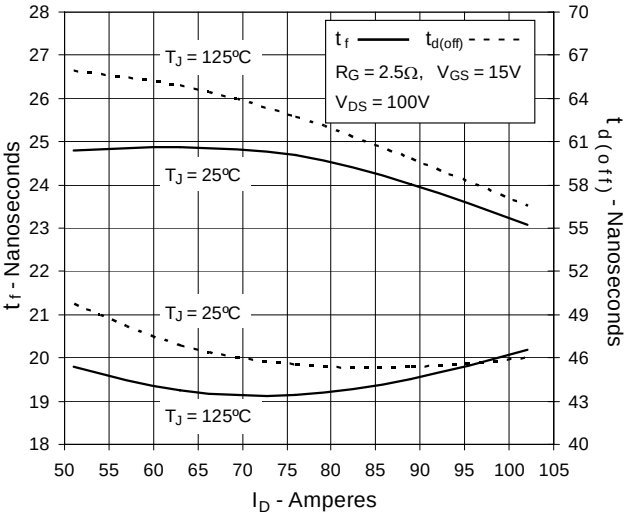

Fig. 18. Resistive Turn-off Switching Times vs. Gate Resistance