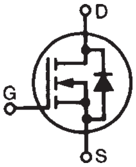
IXYS Preliminary Technical Information

Trench Gate Power MOSFET

IXTH86N25T
IXTQ86N25T
IXTV86N25T

V_{DSS} = 250V
I_{D25} = 86A
$R_{DS(on)} \leq$ 37mΩ

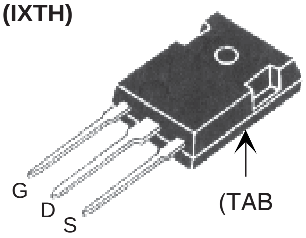
N-Channel Enhancement Mode
Avalanche Rated



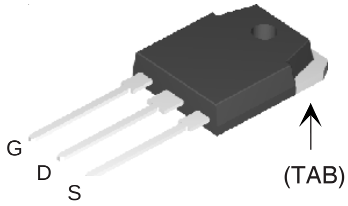
Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	250	V
V_{DGR}	T_J = 25°C to 150°C, R_{GS} = 1MΩ	250	V
V_{GSM}	Transient	± 30	V
I_{D25}	T_C = 25°C	86	A
I_{LRMS}	Lead Current Limit, RMS	75	A
I_{DM}	T_C = 25°C, pulse width limited by T_{JM}	190	A
I_{AS}	T_C = 25°C	10	A
E_{AS}	T_C = 25°C	1.5	J
P_D	T_C = 25°C	540	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	1.6mm (0.062 in.) from case for 10s	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	6.0	g
	TO-3P	5.5	g
	PLUS220	4.0	g

Symbol	Test Conditions	Characteristic Values			
(T_J = 25°C unless otherwise specified)		Min.	Typ.	Max.	
BV_{DSS}	V_{GS} = 0V, I_D = 250µA	250			V
$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 1mA	3		5	V
I_{GSS}	V_{GS} = ± 20V, V_{DS} = 0V			± 200	nA
I_{DSS}	V_{DS} = V_{DSS} V_{GS} = 0V			3	µA
	T_J = 125°C			250	µA
$R_{DS(on)}$	V_{GS} = 10V, I_D = 0.5 • I_{D25}, Notes 1, 2			37	mΩ

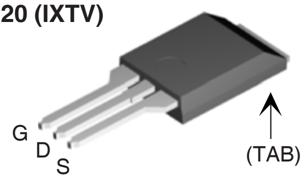
TO-247 (IXTH)



TO-3P (IXTQ)



PLUS220 (IXTV)



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

Features

- International standard packages
- Avalanche rated
- Low package inductance
  - easy to drive and to protect

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 control
- Uninterruptible power supplies

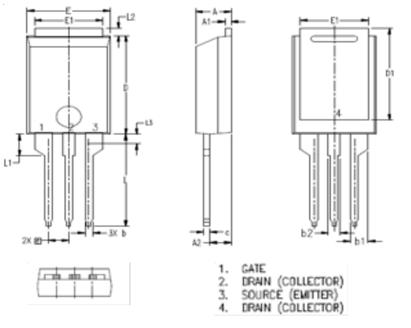
Symbol	Test Conditions (T_J = 25°C unless otherwise specified)	Characteristic Values Min.	 Typ.	 Max.	
g_{fs}	V_{DS} = 10V, I_D = 0.5 • I_{D25}, Note 1	45	76		S
C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz		5330		pF
C_{oss}			515		pF
C_{rss}			92		pF
$t_{d(on)}$	**Resistive Switching Times** V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25} R_G = 3.3Ω (External)		22		ns
t_r			28		ns
$t_{d(off)}$			55		ns
t_f			25		ns
$Q_{g(on)}$	V_{GS}= 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 25A		105		nC
Q_{gs}			32		nC
Q_{gd}			28		nC
R_{thJC}				0.23	°C/W
R_{thCS}			0.25		°C/W

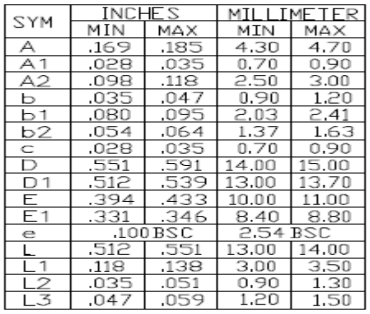
Source-Drain Diode

Symbol	Test Conditions T_J = 25°C unless otherwise specified)	Characteristic Values Min.	 Typ.	 Max.	
I_S	V_{GS} = 0V			86	A
I_{SM}	Repetitive, pulse width limited by T_{JM}			172	A
V_{SD}	I_F = I_S, V_{GS} = 0V, Note 1			1.5	V
t_{rr}	I_F = 43A, -di/dt = 250A/µs V_R = 100V, V_{GS} = 0V		156		ns
I_{RM}			21		A
Q_{RM}			1.7		µC

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

PLUS220 (IXTV) Outline



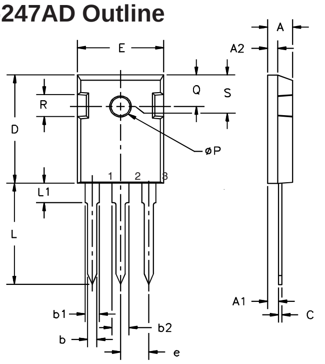


SYM	INCHES		MILLIMETER	
	MIN	MAX	MIN	MAX
A	.169	.185	4.30	4.70
A1	.028	.035	0.70	0.90
A2	.098	.118	2.50	3.00
b	.035	.047	0.90	1.20
b1	.080	.095	2.03	2.41
b2	.054	.064	1.37	1.63
c	.028	.035	0.70	0.90
D	.551	.591	14.00	15.00
D1	.512	.539	13.00	13.70
E	.394	.433	10.00	11.00
E1	.331	.346	8.40	8.80
e	.100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

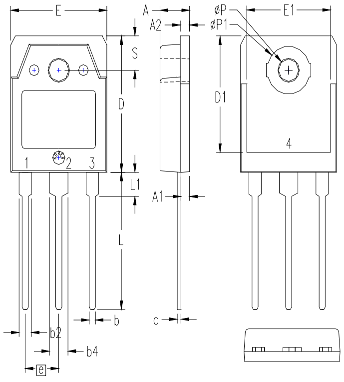
TO-247AD Outline



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

Dim.	Millimeter Min.	 Max.	Inches 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
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		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 @ 25ºC

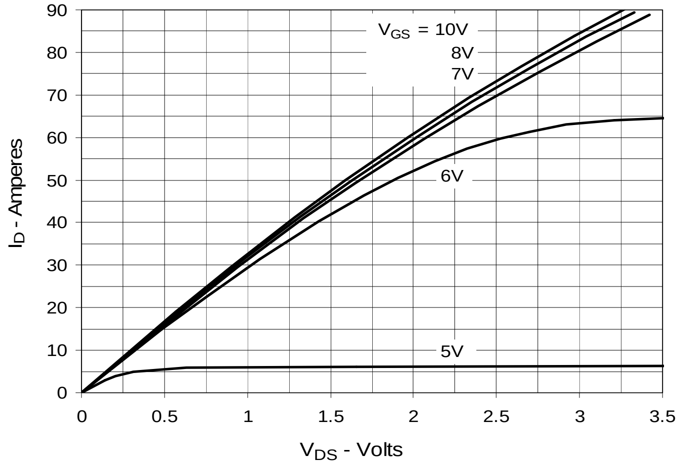


Fig. 2. Extended Output Characteristics @ 25ºC

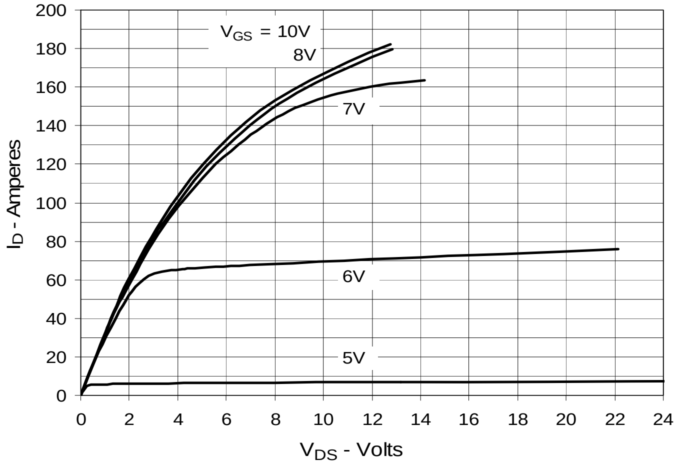


Fig. 3. Output Characteristics @ 125ºC

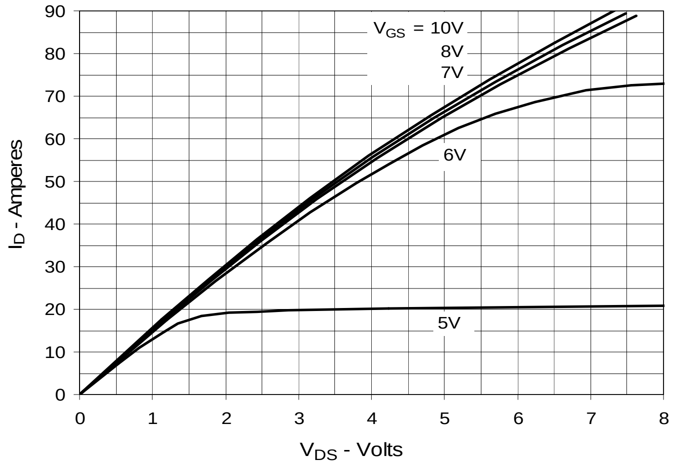


Fig. 4. $R_{DS(on)}$ Normalized to I_D = 43A Value vs. Junction Temperature

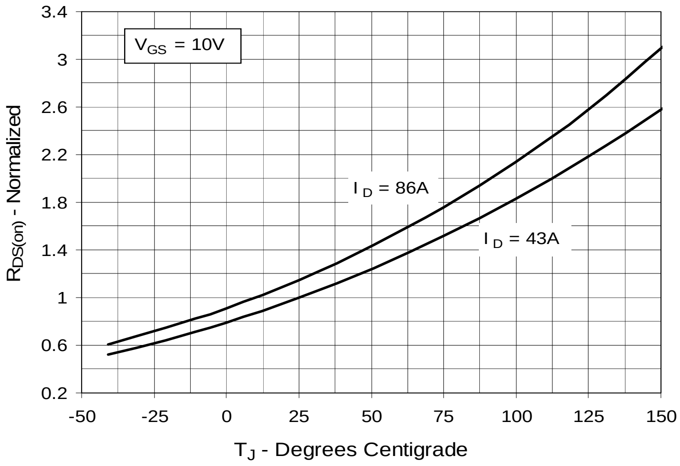


Fig. 5. $R_{DS(on)}$ Normalized to I_D = 43A Value vs. Drain Current

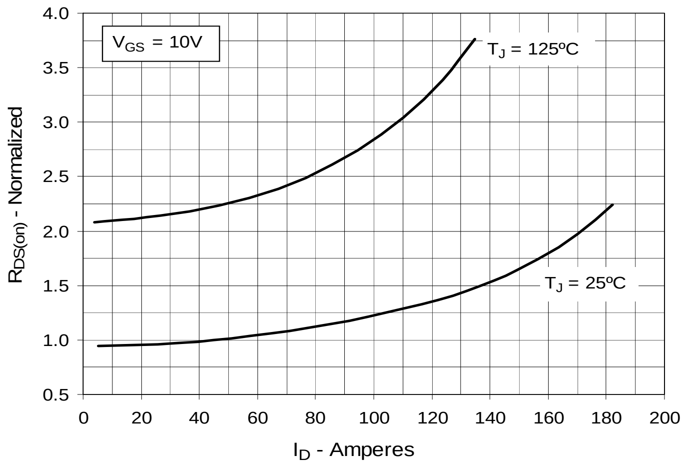
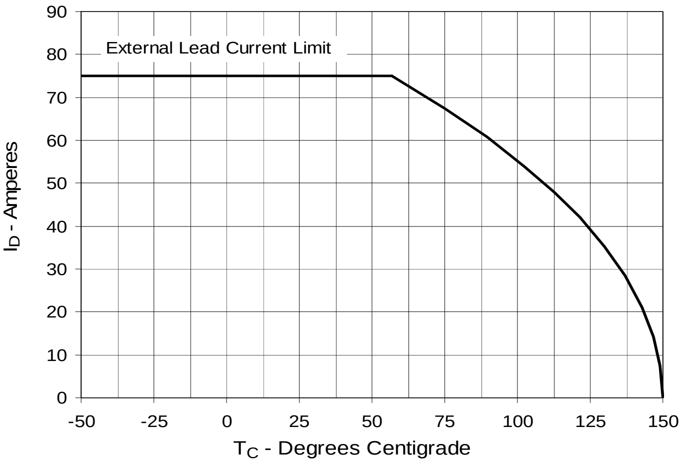


Fig. 6. Maximum Drain Current vs. Case Temperature



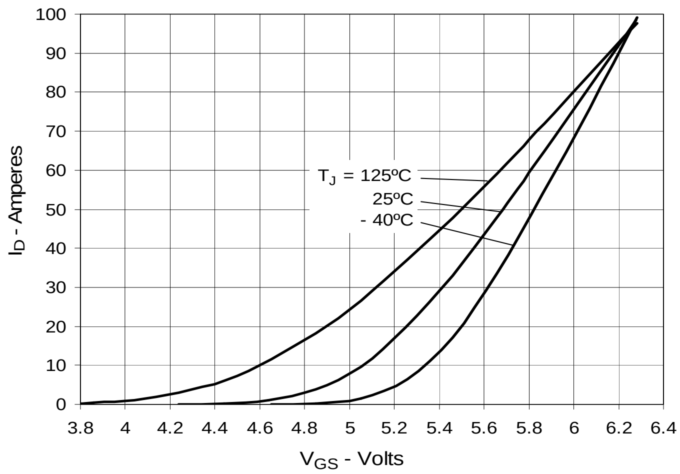


Fig. 7. Input Admittance

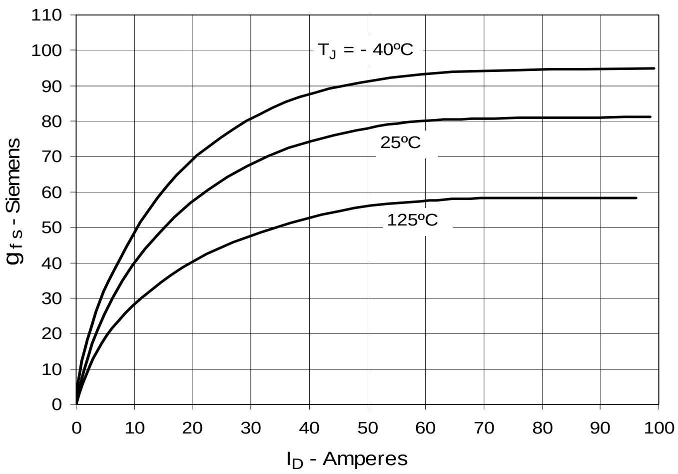


Fig. 8. Transconductance

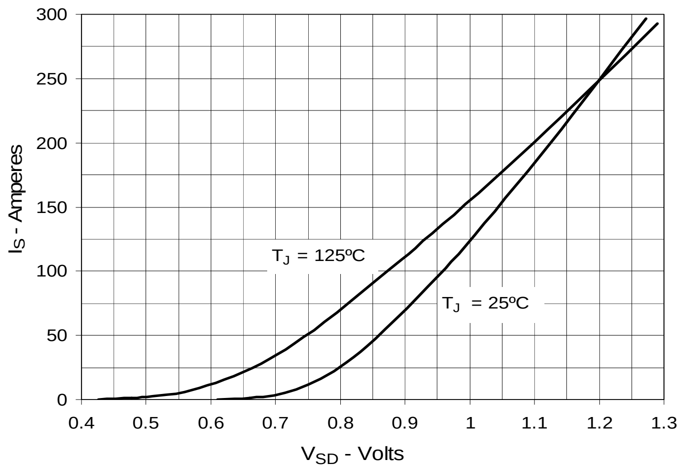


Fig. 9. Forward Voltage Drop of Intrinsic Diode

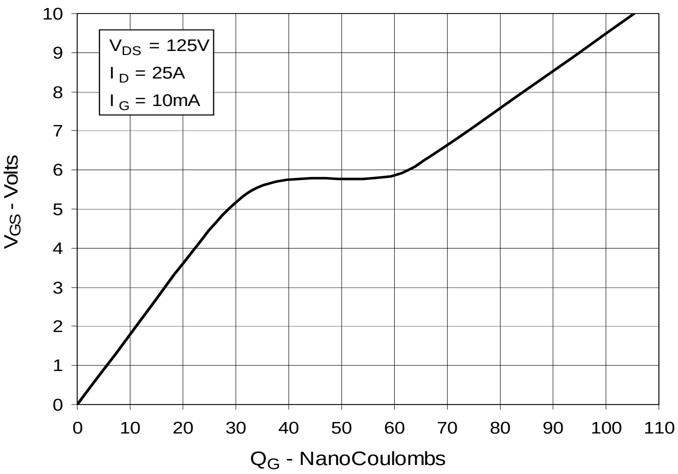


Fig. 10. Gate Charge

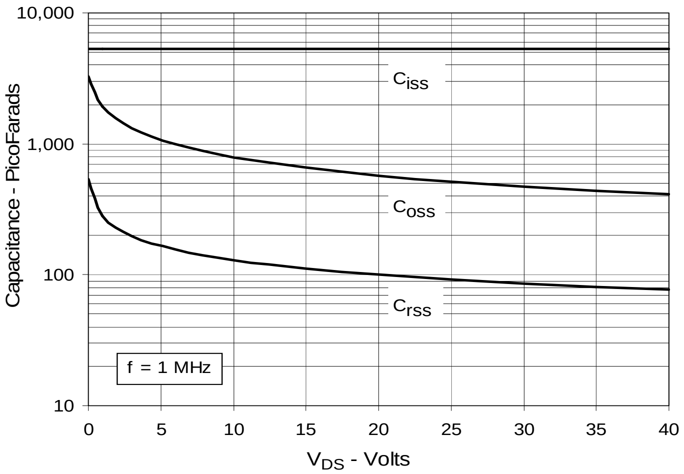


Fig. 11. Capacitance

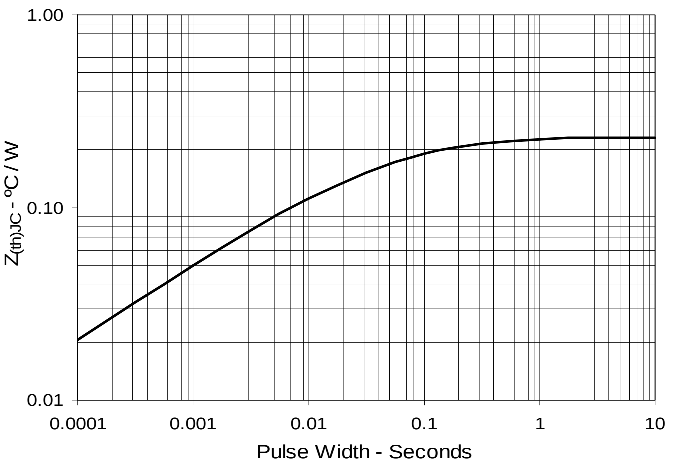


Fig. 12. Maximum Transient Thermal Impedance

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

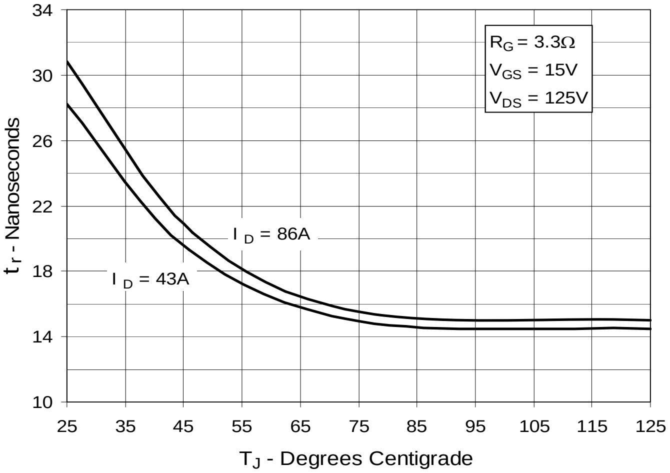


Fig. 14. Resistive Turn-on Rise Time vs. Drain Current

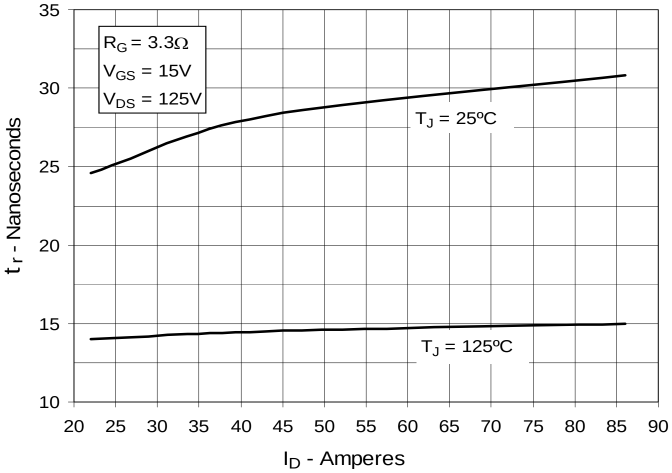


Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance

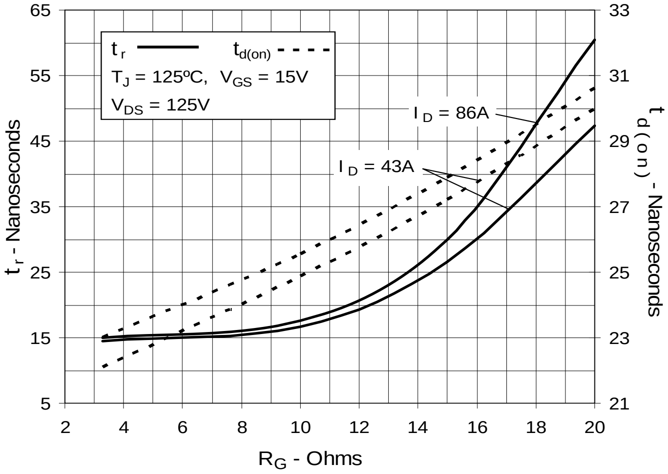


Fig. 16. Resistive Turn-off Switching Times vs. Junction Temperature

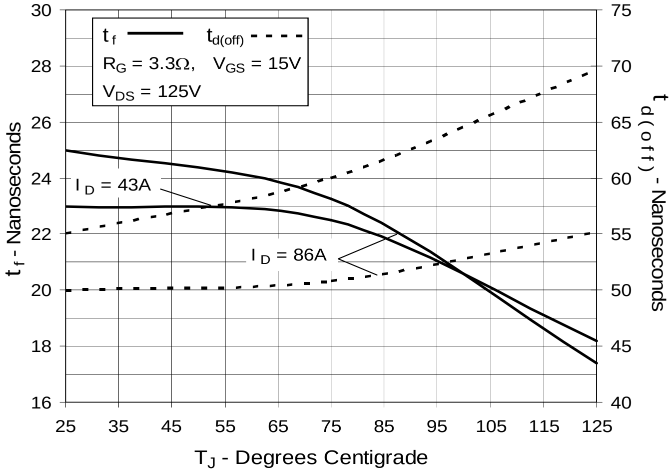


Fig. 17. Resistive Turn-off Switching Times vs. Drain Current

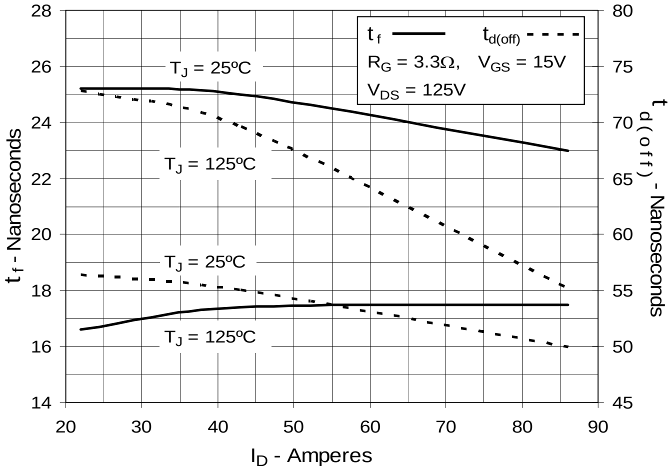
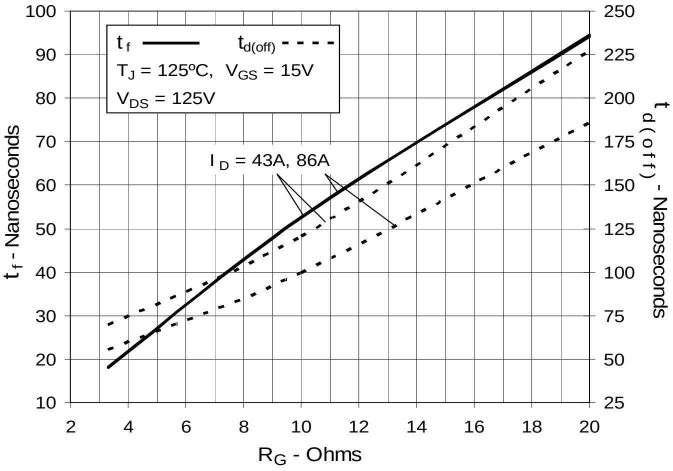


Fig. 18. Resistive Turn-off Switching Times vs. Gate Resistance



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