IXYS

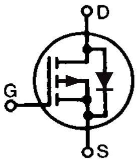
Preliminary Technical Information

TrenchP™ Power MOSFET

IXTA140P05T
IXTP140P05T
IXTH140P05T

V_{DSS} = - 50V
I_{D25} = - 140A
$R_{DS(on)}$ ≤ 8mΩ

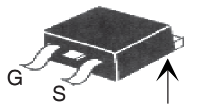
P-Channel Enhancement Mode
Avalanche Rated



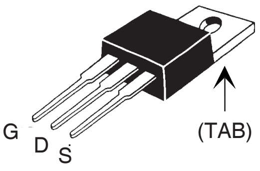
Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	- 50	V
V_{DGR}	T_J = 25°C to 150°C, R_{GS} = 1MΩ	- 50	V
V_{GSS}	Continuous	±20	V
V_{GSM}	Transient	±30	V
I_{D25}	T_C = 25°C	-140	A
I_{LRMS}	Lead Current Limit, RMS	- 75	A
I_{DM}	T_C = 25°C, pulse width limited by T_{JM}	- 420	A
I_A	T_C = 25°C	- 70	A
E_{AS}	T_C = 25°C	1	J
P_D	T_C = 25°C	298	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 10s	260	°C
M_d	Mounting torque (TO-220)(TO-247)	1.13/10	Nm/lb.in.
Weight	TO-263 TO-220 TO-247	2.5 3.0 6.0	g g g

Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)	Characteristic Values Min.	 Typ.	 Max.	
BV_{DSS}	V_{GS} = 0V, I_D = - 250μA	- 50			V
$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = - 250μA	- 2.0		- 4.0	V
I_{GSS}	V_{GS} = ± 20V, V_{DS} = 0V			±100	nA
I_{DSS}	V_{DS} = V_{DSS} V_{GS} = 0V T_J = 125°C			-10 - 750	μA μA
$R_{DS(on)}$	V_{GS} = -10V, I_D = 0.5 • I_{D25}, Note 1			8	mΩ

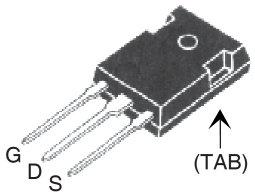
TO-263 (IXTA)



TO-220 (IXTP)



TO-247 (IXTH)



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

Features

- International standard packages
- Fast intrinsic diode
- Avalanche Rated
- Low Q_G and $R_{ds(on)}$
- Extended FBSOA

Advantages

- Low gate drive requirement
- High power density
- Fast switching

Applications

- Load switches
- High side switches
- Low voltage applications such as automotive, DC & DC converters
- SMPS
- Inverters and battery chargers
- Audio and Medical applications

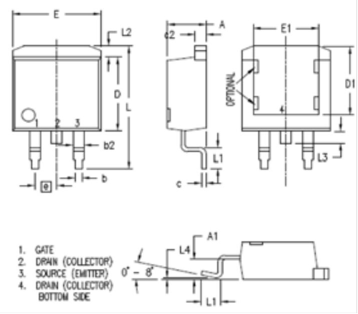
Symbol	Test Conditions	Characteristic Values			
(T_J = 25°C, unless otherwise specified)		Min.	Typ.	Max.	
g_{fs}	V_{DS} = -10V, I_D = 0.5 • I_{D25}, Note 1	44	72		S
C_{iss}	V_{GS} = 0V, V_{DS} = - 25V, f = 1MHz		13.5		nF
C_{oss}			1640		pF
C_{rss}			640		pF
$t_{d(on)}$	**Resistive Switching Times** V_{GS} = -10V, V_{DS} = - 30V, I_D = - 50A R_G = 1Ω (External)		28		ns
t_r			34		ns
$t_{d(off)}$			38		ns
t_f			25		ns
$Q_{g(on)}$	V_{GS} = -10V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25}		200		nC
Q_{gs}			50		nC
Q_{gd}			65		nC
R_{thJC}				0.42	°C/W
R_{thCS}	(TO-220)		0.50		°C/W
	(TO-247)		0.25		°C/W

Source-Drain Diode

Symbol	Test Conditions	Characteristic Values			
(T_J = 25°C, unless otherwise specified)		Min.	Typ.	Max.	
I_S	V_{GS} = 0V			-140	A
I_{SM}	Repetitive, pulse width limited by T_{JM}			- 560	A
V_{SD}	I_F = - 70A, V_{GS} = 0V, Note 1			-1.3	V
t_{rr}	I_F = - 70A, -di/dt = -100A/µs V_R = - 25V, V_{GS} = 0V		53		ns
Q_{RM}			58		nC
I_{RM}			- 2.2		A

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

TO-263 (IXTA) Outline

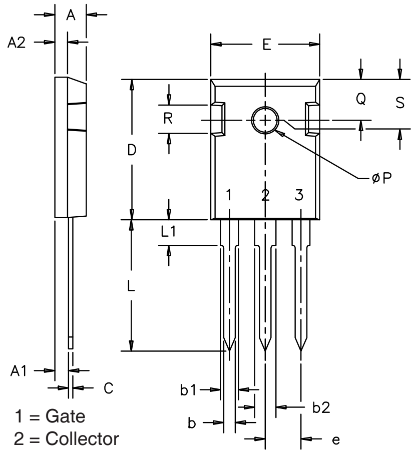


SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.160	.190	4.06	4.83
A1	.080	.110	2.03	2.79
b	.020	.039	0.51	0.99
b2	.045	.055	1.14	1.40
c	.016	.029	0.40	0.74
c2	.045	.055	1.14	1.40
D	.340	.380	8.64	9.65
D1	.315	.350	8.00	8.89
E	.380	.410	9.65	10.41
E1	.245	.320	6.22	8.13
e	.100 BSC		2.54 BSC	
L	.575	.625	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

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.

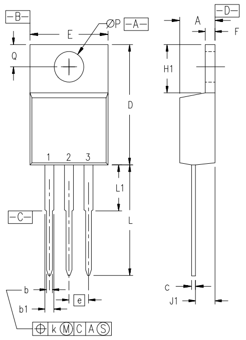
TO-247 (IXTH) AD Outline



1 = Gate
2 = Collector
3 = Emitter
Tab = Collector

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.185	.209	4.7	5.3
A_1	.087	.102	2.2	2.54
A_2	.059	.098	2.2	2.6
b	.040	.055	1.0	1.4
b_1	.065	.084	1.65	2.13
b_2	.113	.123	2.87	3.12
C	.016	.031	.4	.8
D	.819	.845	20.80	21.46
E	.610	.640	15.75	16.26
e	.215 BSC		5.45 BSC	
L	.780	.800	19.81	20.32
L1		.177		4.50
ØP	.140	.144	3.55	3.65
Q	.212	.244	5.4	6.2
R	.170	.216	4.32	5.49
S	.242 BSC		6.15 BSC	

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

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Fig. 1. Output Characteristics @ 25ºC

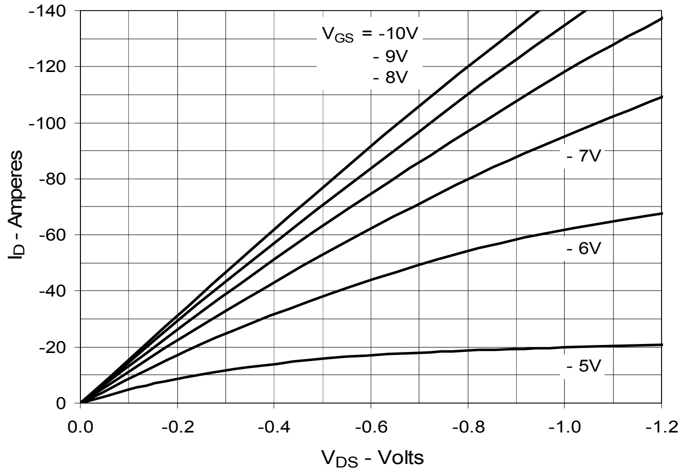


Fig. 2. Extended Output Characteristics @ 25ºC

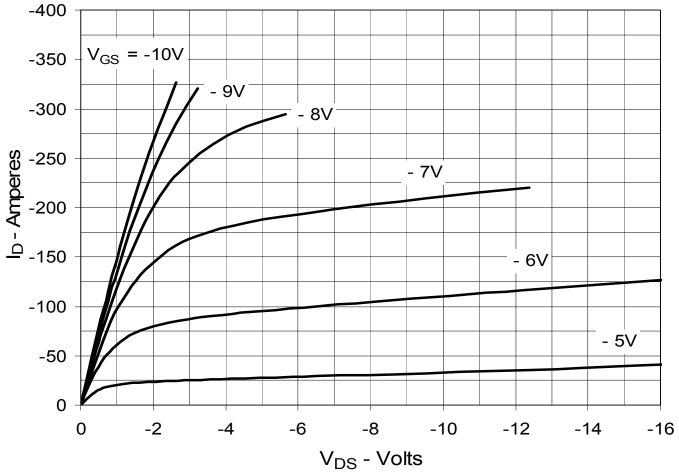


Fig. 3. Output Characteristics @ 125ºC

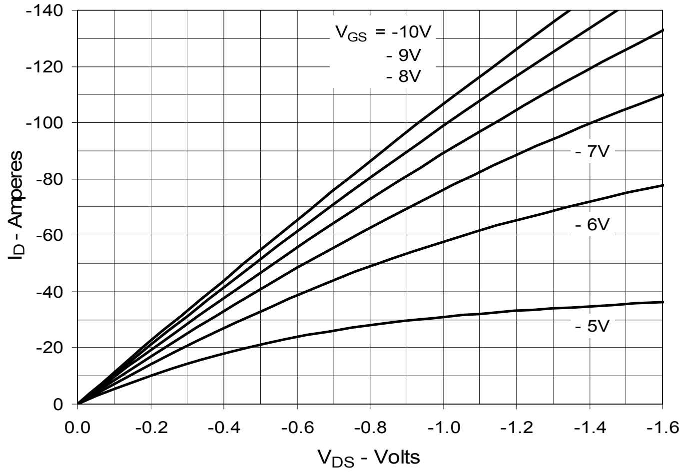


Fig. 4. $R_{DS(on)}$ Normalized to I_D = -70A vs. Junction Temperature

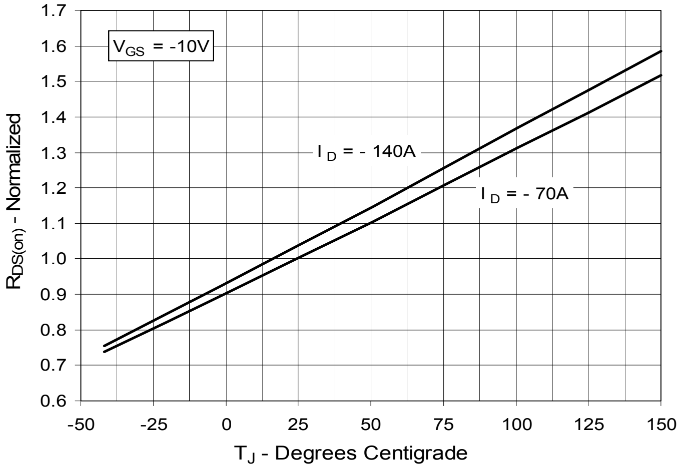


Fig. 5. $R_{DS(on)}$ Normalized to I_D = -70A vs. Drain Current

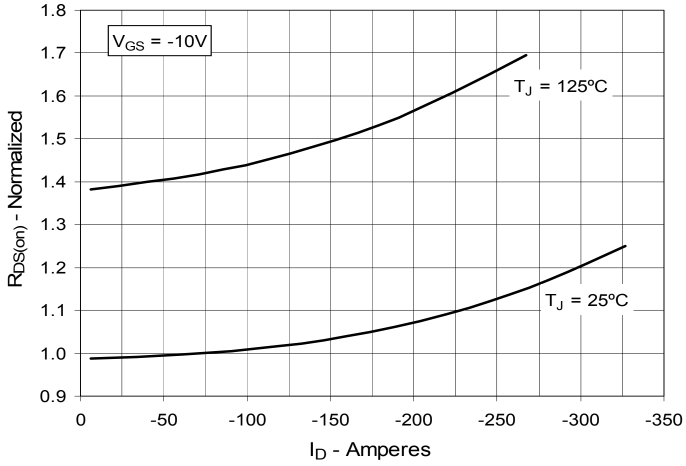


Fig. 6. Maximum Drain Current vs. Case Temperature

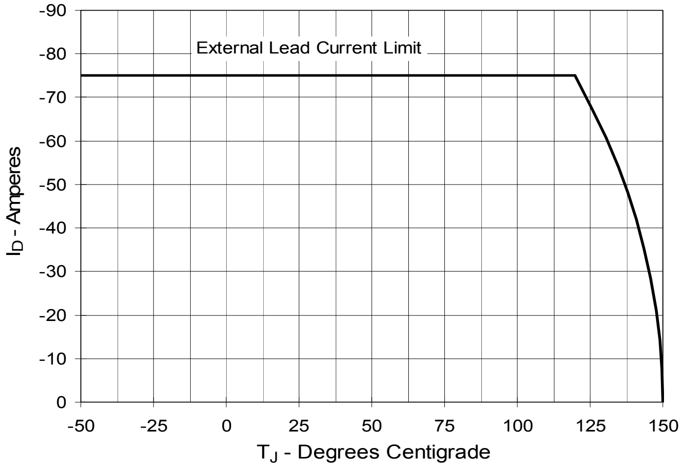


Fig. 7. Input Admittance

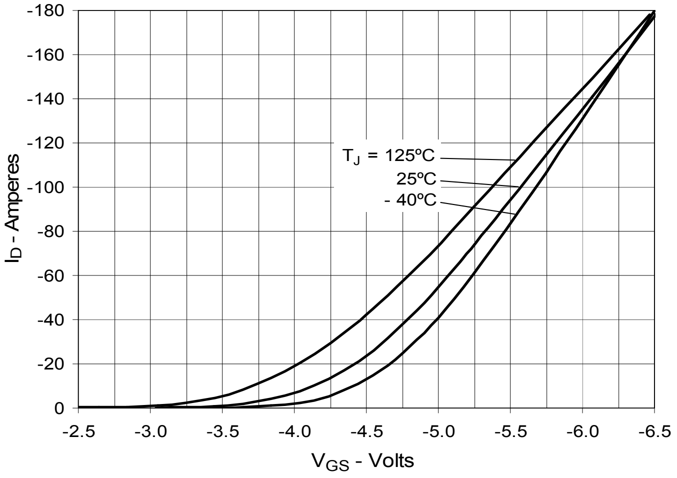


Fig. 8. Transconductance

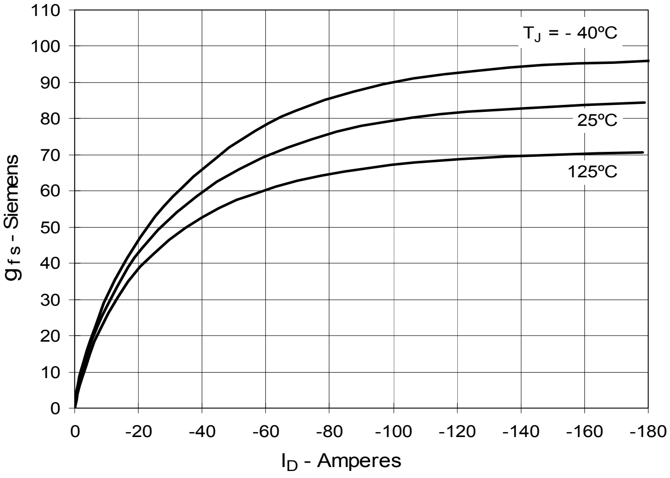


Fig. 9. Forward Voltage Drop of Intrinsic Diode

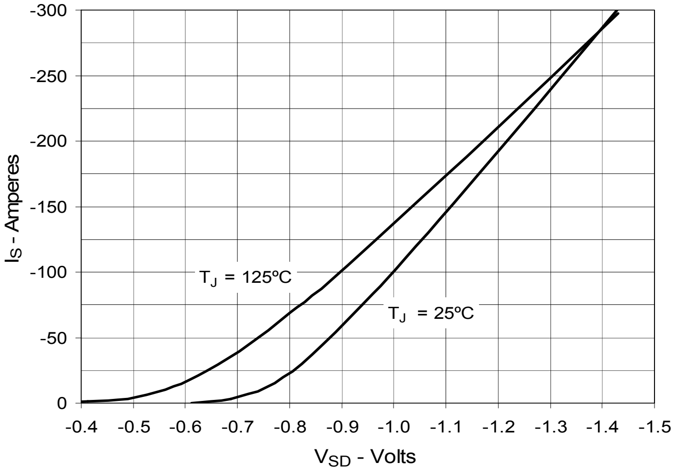


Fig. 10. Gate Charge

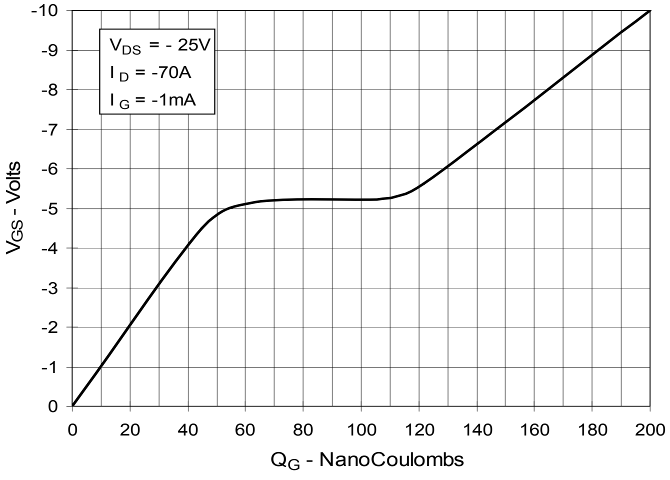


Fig. 11. Capacitance

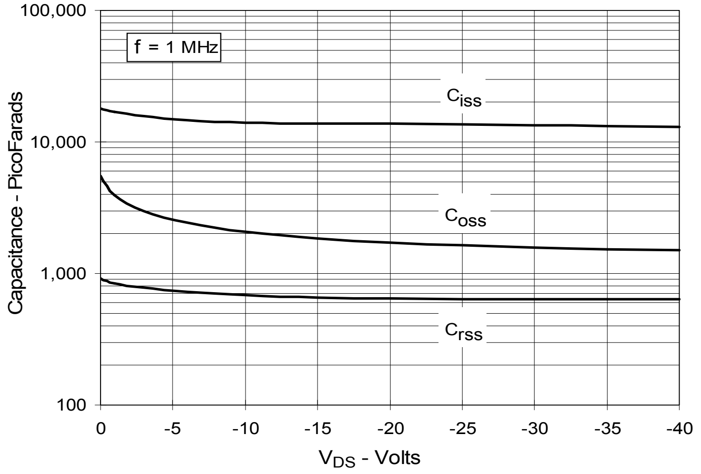
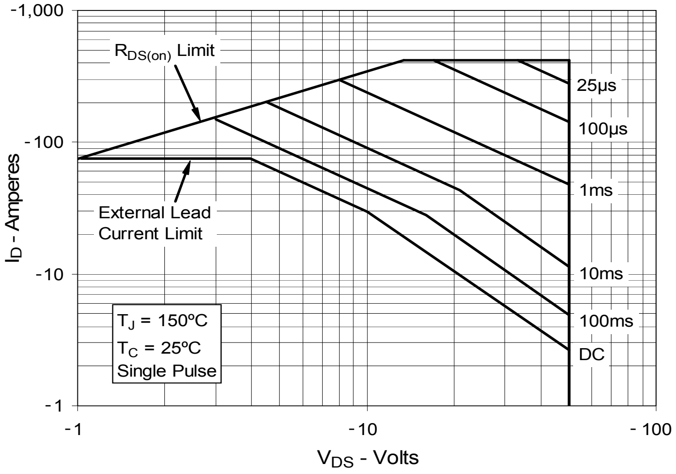


Fig. 12. Forward-Bias Safe Operating Area



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

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

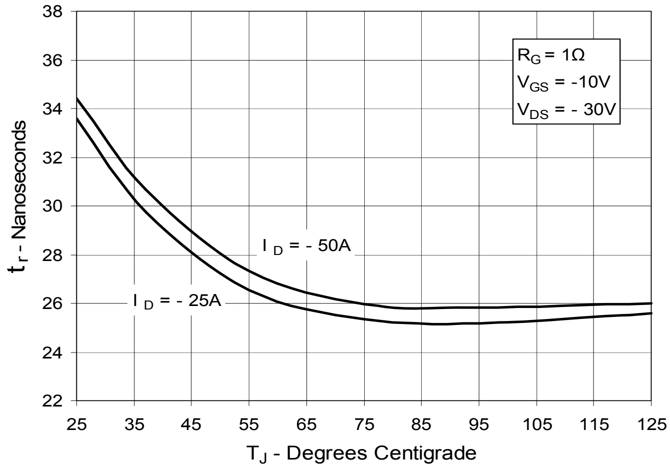


Fig. 14. Resistive Turn-on Rise Time vs. Drain Current

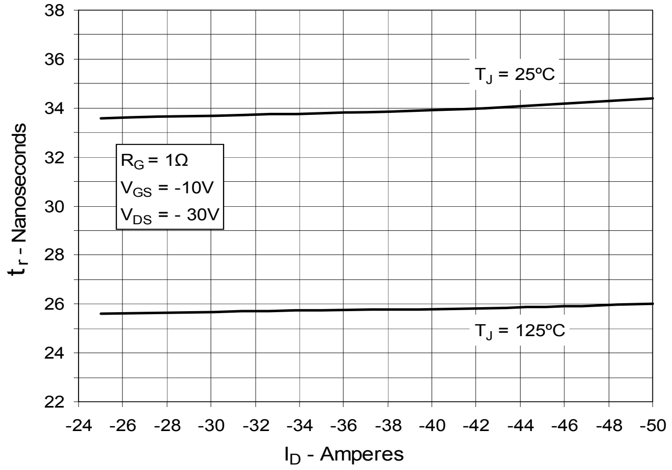


Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance

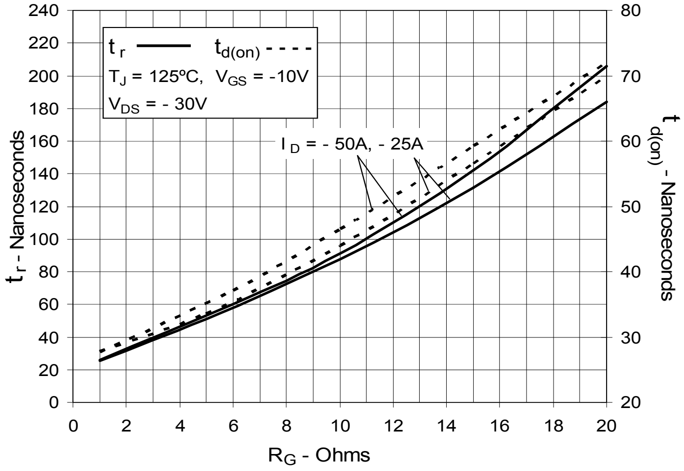


Fig. 16. Resistive Turn-off Switching Times vs. Junction Temperature

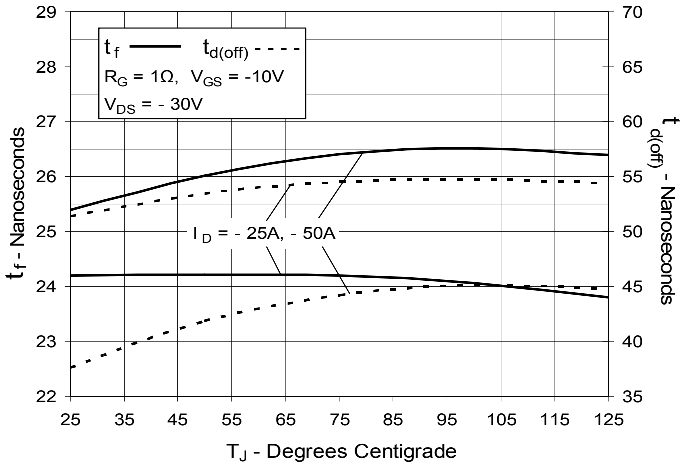


Fig. 17. Resistive Turn-off Switching Times vs. Drain Current

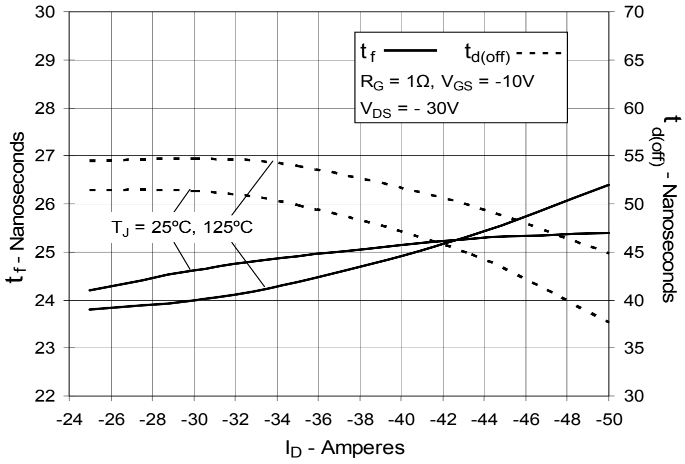


Fig. 18. Resistive Turn-off Switching Times vs. Gate Resistance

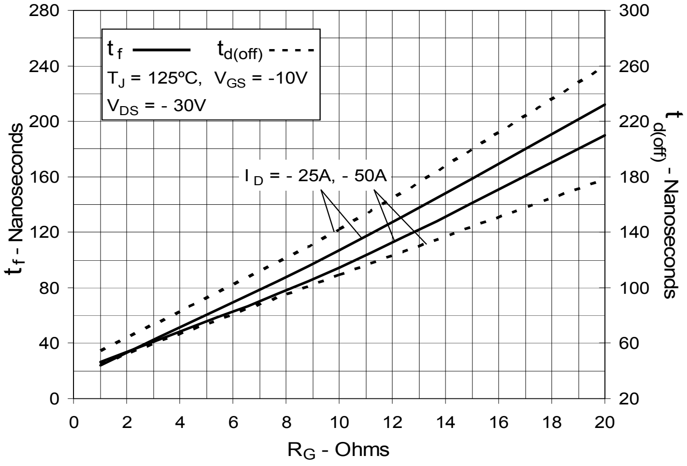


Fig. 19. Maximum Transient Thermal Impedance