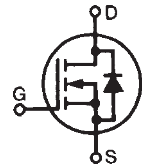
IXYS Preliminary Technical Information

Trench™ HiperFET™ Power MOSFET

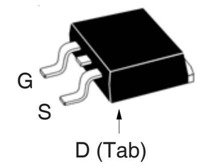
IXFA130N10T
IXFP130N10T

V_{DSS} = 100V
I_{D25} = 130A
$R_{DS(on)}$ ≤ 9.1mΩ

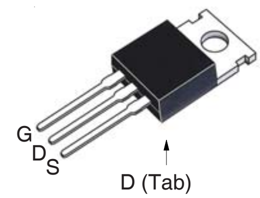
N-Channel Enhancement Mode
Avalanche Rated
Fast Intrisic Diode



TO-263 (IXFA)



TO-220 (IXFP)



G = Gate D = Drain
S = Source Tab = Drain

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 175°C	100	V
V_{DGR}	T_J = 25°C to 175°C, R_{GS} = 1MΩ	100	V
V_{GSS}	Continuous	± 20	V
V_{GSM}	Transient	± 30	V
I_{D25}	T_C = 25°C	130	A
I_{LRMS}	Lead Current Limit, RMS	120	A
I_{DM}	T_C = 25°C, Pulse Width Limited by T_{JM}	350	A
I_A	T_C = 25°C	65	A
E_{AS}	T_C = 25°C	750	mJ
P_D	T_C = 25°C	360	W
T_J		-55 ... +175	°C
T_{JM}		175	°C
T_{stg}		-55 ... +175	°C
T_L	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	°C
F_C	Mounting Force (TO-263)	10..65 / 2.2..14.6	N/lb
M_d	Mounting Torque (TO-220)	1.13 / 10	Nm/lb.in
Weight	TO-263	2.5	g
	TO-220	3.0	g

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{DSS}	V_{GS} = 0V, I_D = 250μA	100			V
$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 1mA	2.5		4.5	V
I_{GSS}	V_{GS} = ± 20V, V_{DS} = 0V			± 200	nA
I_{DSS}	V_{DS} = V_{DSS}, V_{GS} = 0V			10	μA
	T_J = 150°C			500	μA
$R_{DS(on)}$	V_{GS} = 10V, I_D = 25A, Notes 1, 2			9.1	mΩ

Features

- Ultra-Low On Resistance
- Avalanche Rated
- Low Package Inductance
  - Easy to Drive and to Protect
- 175°C Operating Temperature
- Fast Intrinsic Diode

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
- Distributed Power Architechtures and VRMs
- Electronic Valve Train Systems
- High Current Switching Applications
- High Voltage Synchronous Recifier

Symbol	Test Conditions ($T_J = 25°C$ Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	V_{DS}= 10V, I_D = 60A, Note 1	55	93		S
C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz		5080		pF
C_{oss}			630		pF
C_{rss}			95		pF
$t_{d(on)}$	**Resistive Switching Times** V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 25A R_G = 5Ω (External)		30		ns
t_r			47		ns
$t_{d(off)}$			44		ns
t_f			28		ns
$Q_{g(on)}$	V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 25A		104		nC
Q_{gs}			30		nC
Q_{gd}			29		nC
R_{thJC}				0.42	°C/W
R_{thCH}	TO-220		0.50		°C/W

Source-Drain Diode

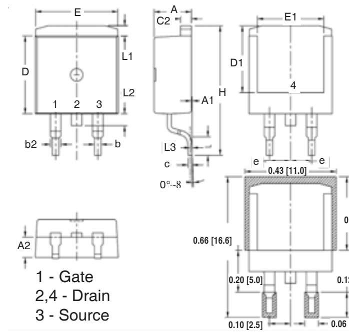
Symbol	Test Conditions ($T_J = 25°C$ Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
I_S	V_{GS} = 0V			130	A
I_{SM}	Repetitive, Pulse Width Limited by T_{JM}			350	A
V_{SD}	I_F = 25A, V_{GS} = 0V, Note 1			1.0	V
t_{rr}	I_F = 65A, -di/dt = 100A/μs V_R = 0.5 • V_{DSS}, V_{GS} = 0V		67		ns
I_{RM}			4.7		A
Q_{rr}			160		nC

Notes: 1. Pulse test, t ≤ 300 μs; 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.

PRELIMINARY TECHNICAL INFORMATION

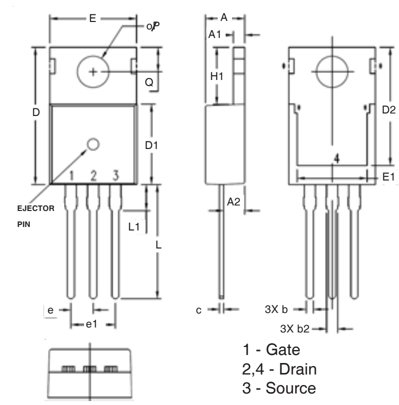
The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right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

TO-263 Outline



SYM	INCHES MIN	MAX	MILLIMETER MIN	MAX
A	.170	.185	4.30	4.70
A1	.000	.008	0.00	0.20
A2	.091	.098	2.30	2.50
b	.028	.035	0.70	0.90
b2	.046	.060	1.18	1.52
C	.018	.024	0.45	0.60
C2	.049	.060	1.25	1.52
D	.340	.370	8.63	9.40
D1	.300	.327	7.62	8.30
E	.380	.410	9.65	10.41
E1	.270	.330	6.86	8.38
e	.100 BSC		2.54 BSC	
H	.580	.620	14.73	15.75
L	.075	.105	1.91	2.67
L1	.039	.060	1.00	1.52
L2	—	.070	—	1.77
L3	.010 BSC		0.254 BSC	

TO-220 Outline



SYM	INCHES MIN	MAX	MILLIMETERS MIN	MAX
A	.169	.185	4.30	4.70
A1	.047	.055	1.20	1.40
A2	.079	.106	2.00	2.70
b	.024	.039	0.60	1.00
b2	.045	.057	1.15	1.45
c	.014	.026	0.35	0.65
D	.587	.626	14.90	15.90
D1	.335	.370	8.50	9.40
(D2)	.500	.531	12.70	13.50
E	.382	.406	9.70	10.30
(E1)	.283	.323	7.20	8.20
e	.100 BSC		2.54 BSC	
e1	.200 BSC		5.08 BSC	
H1	.244	.268	6.20	6.80
L	.492	.547	12.50	13.90
L1	.110	.154	2.80	3.90
ØP	.134	.150	3.40	3.80
Q	.106	.126	2.70	3.20

Fig. 1. Output Characteristics @ $T_J = 25^oC$

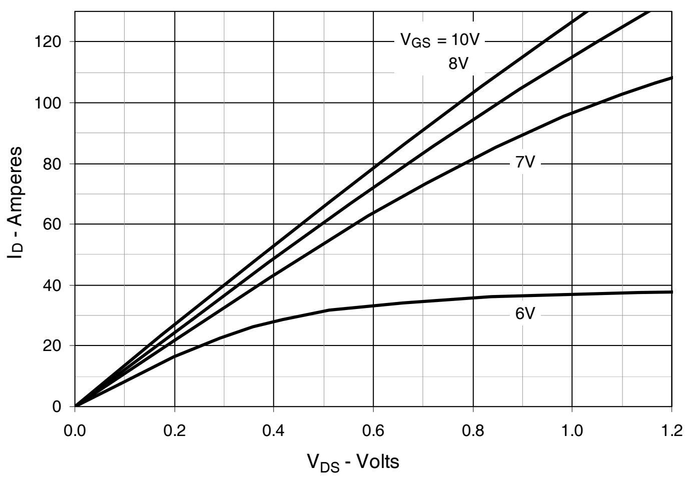


Fig. 2. Extended Output Characteristics @ $T_J = 25^oC$

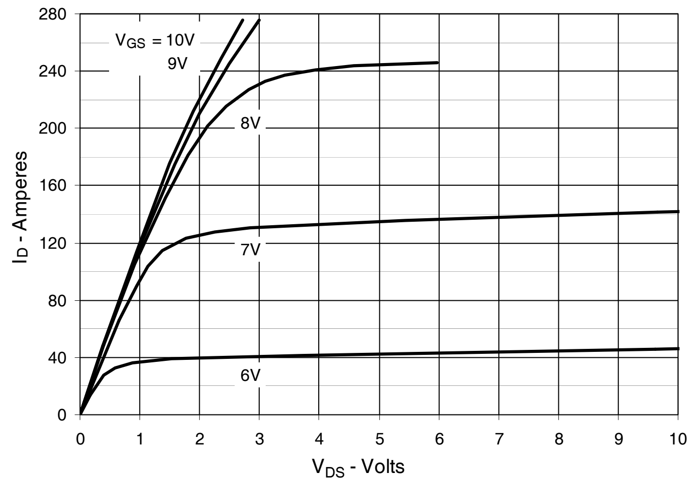


Fig. 3. Output Characteristics @ $T_J = 150^oC$

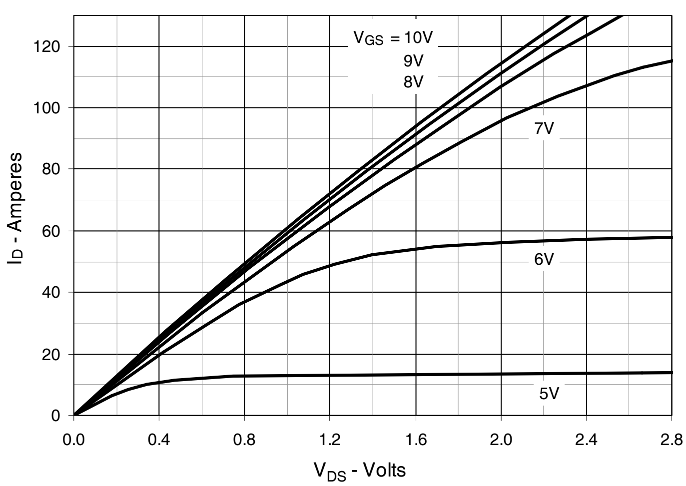


Fig. 4. $R_{DS(on)}$ Normalized to I_D = 65A Value vs. Junction Temperature

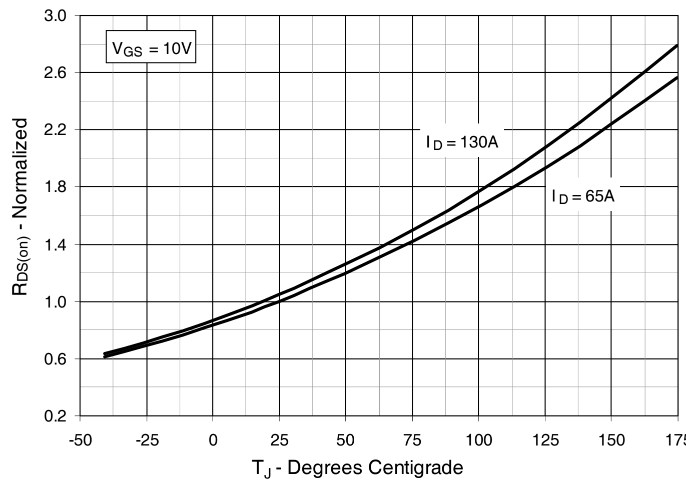


Fig. 5. $R_{DS(on)}$ Normalized to I_D = 65A Value vs. Drain Current

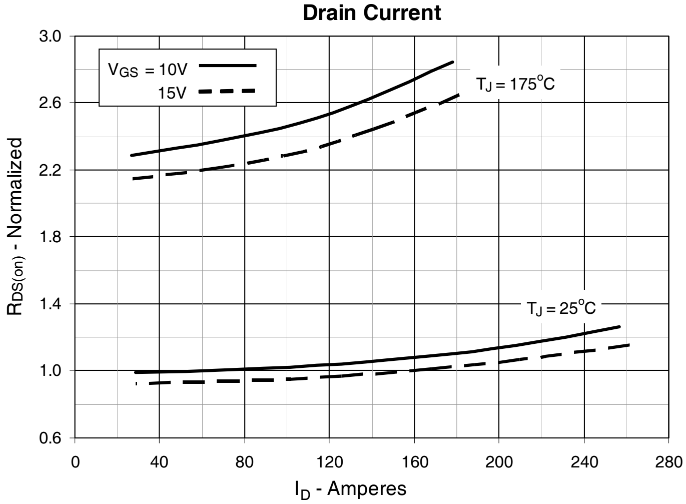


Fig. 6. Drain Current vs. Case Temperature

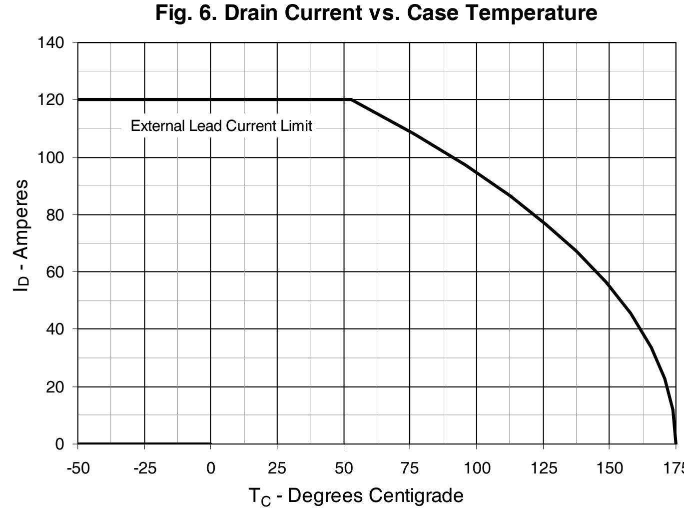


Fig. 7. Input Admittance

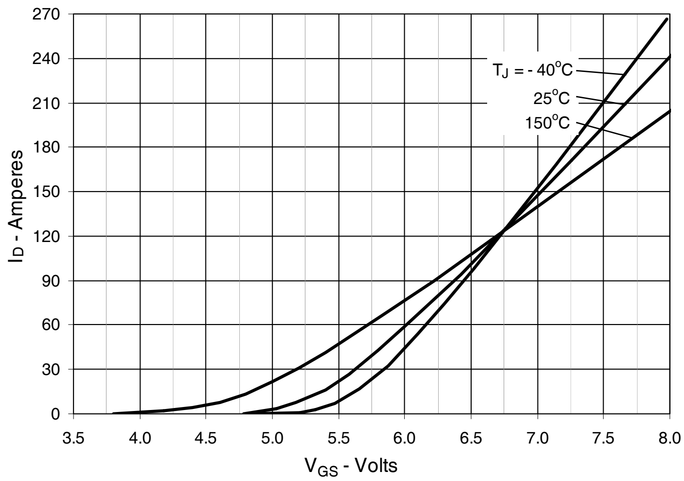


Fig. 8. Transconductance

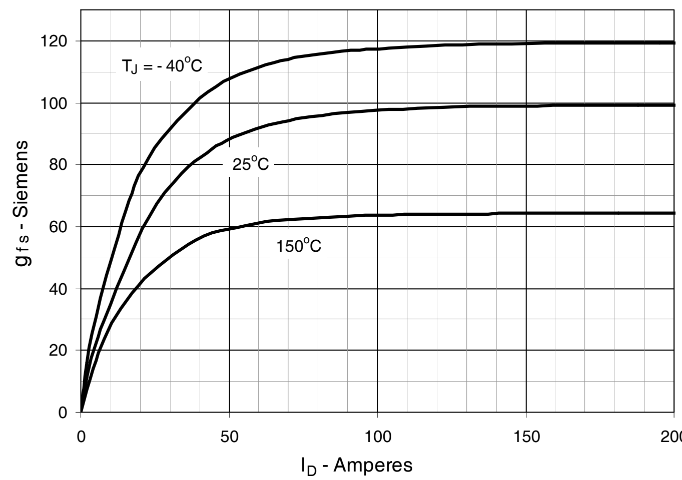


Fig. 9. Forward Voltage Drop of Intrinsic Diode

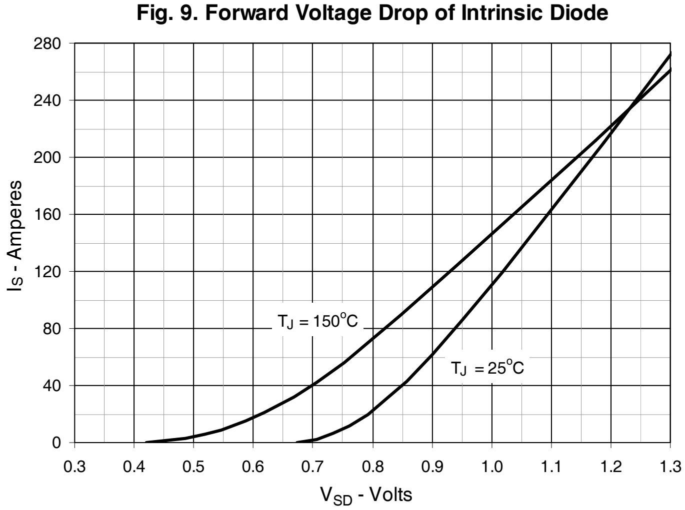


Fig. 10. Gate Charge

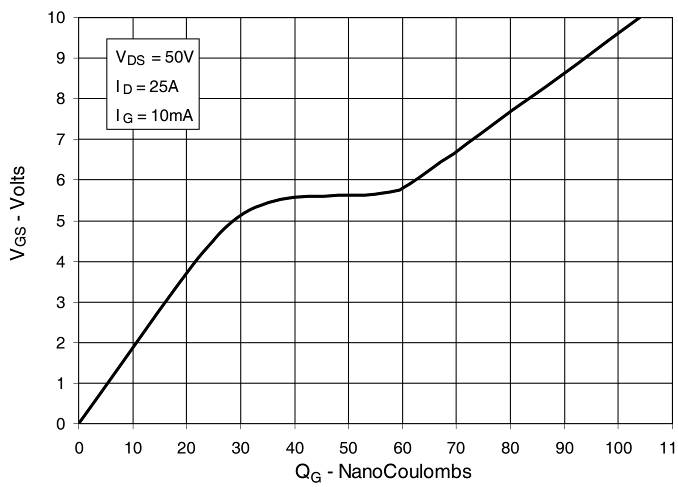


Fig. 11. Capacitance

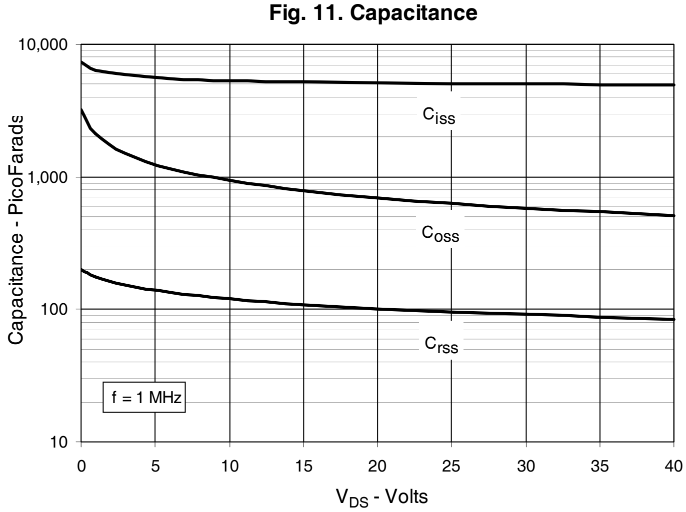


Fig. 12. Maximum Transient Thermal Impedance

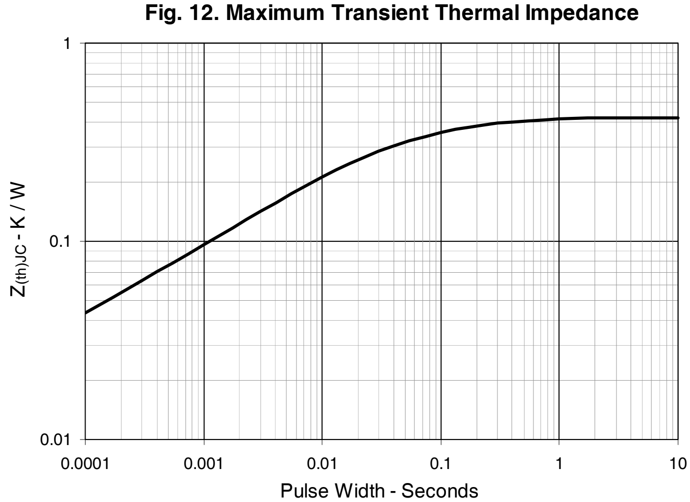


Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature

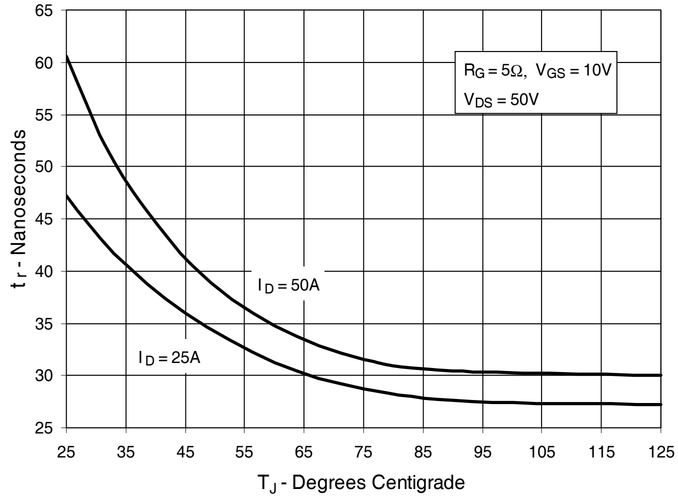


Fig. 14. Resistive Turn-on Rise Time vs. Drain Current

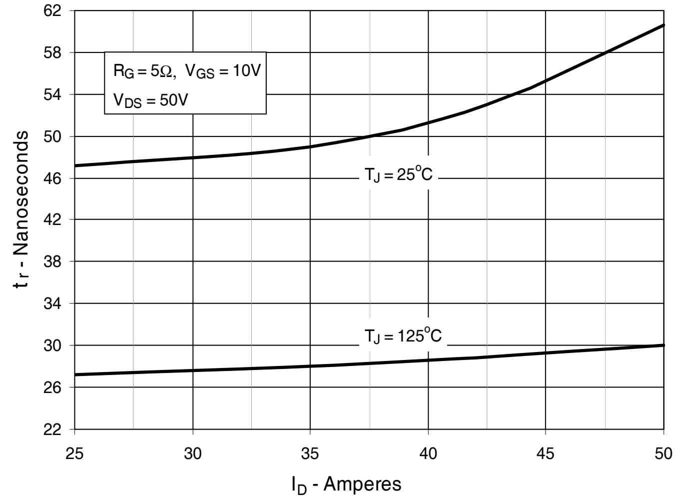


Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance

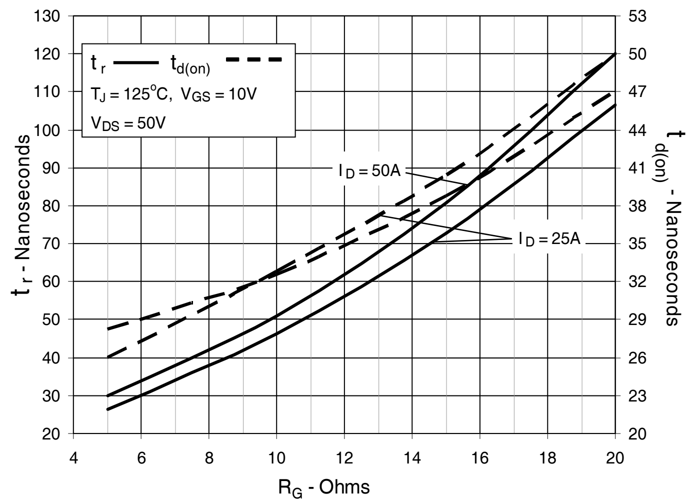


Fig. 16. Resistive Turn-off Switching Times vs. Junction Temperature

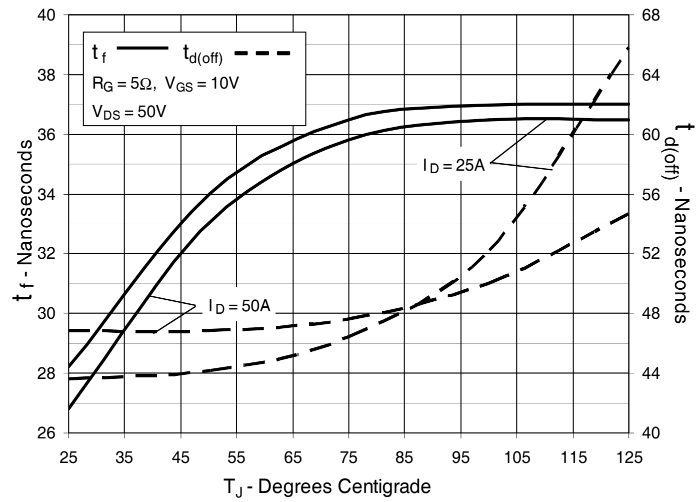


Fig. 17. Resistive Turn-off Switching Times vs. Drain Current

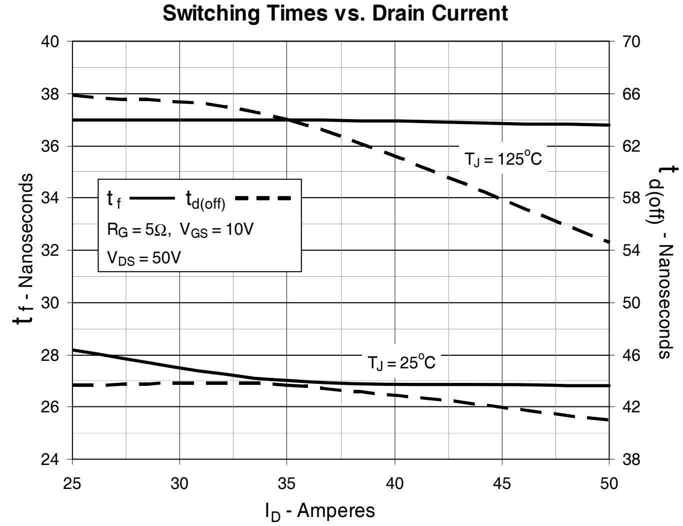


Fig. 18. Resistive Turn-off Switching Times vs. Gate Resistance